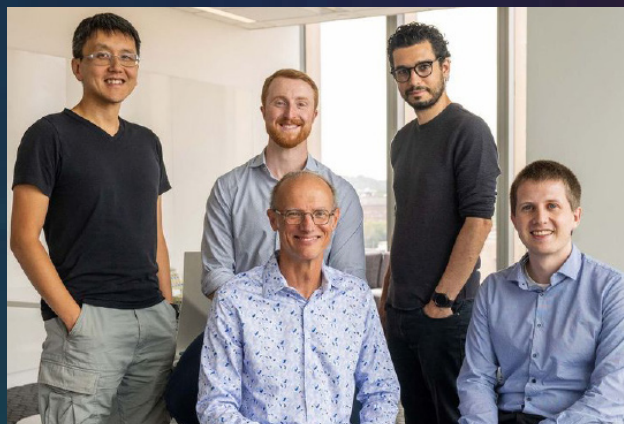
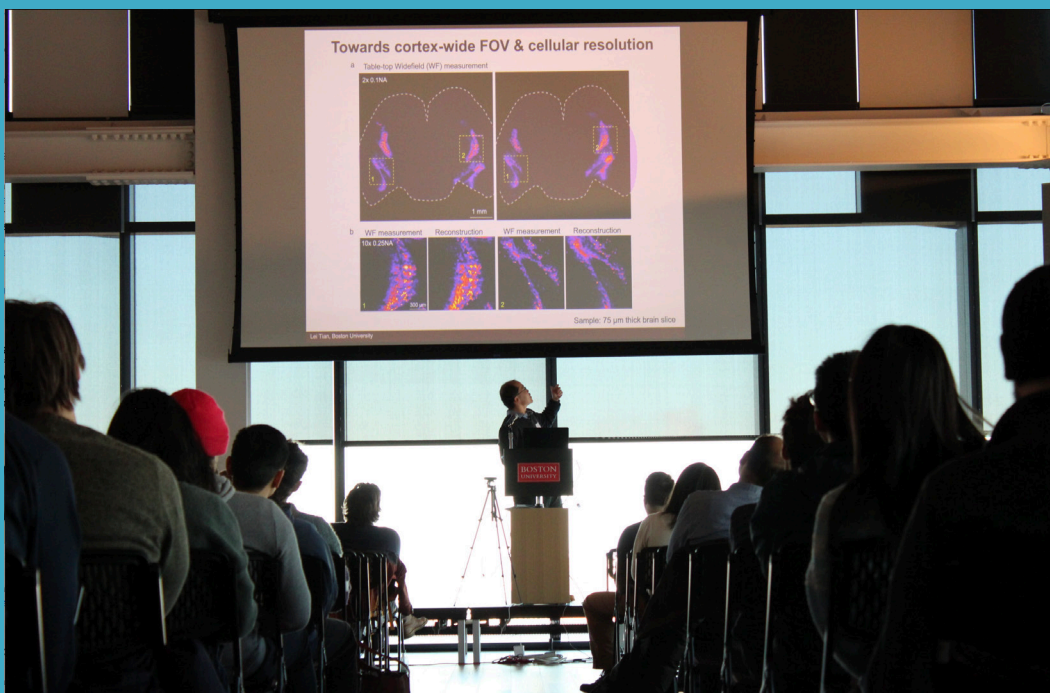


Revolutionizing RNA Medicine

A team of interdisciplinary BU researchers hit upon a new technology that could transform RNA-based vaccines and cancer treatments. - page 17

Research team members (l-r)
Wilson Wong, Jack Kirsch,
Mark Grinstaff, Florian Douam,
and Joshua McGee.





2023-2024 ANNUAL REPORT

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ON THE COVER:

An interdisciplinary team of BU researchers, working with self-amplifying RNA (saRNA) could revolutionize vaccines and cancer treatments.

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Revolutionizing RNA Medicine

By Jessica Colarossi

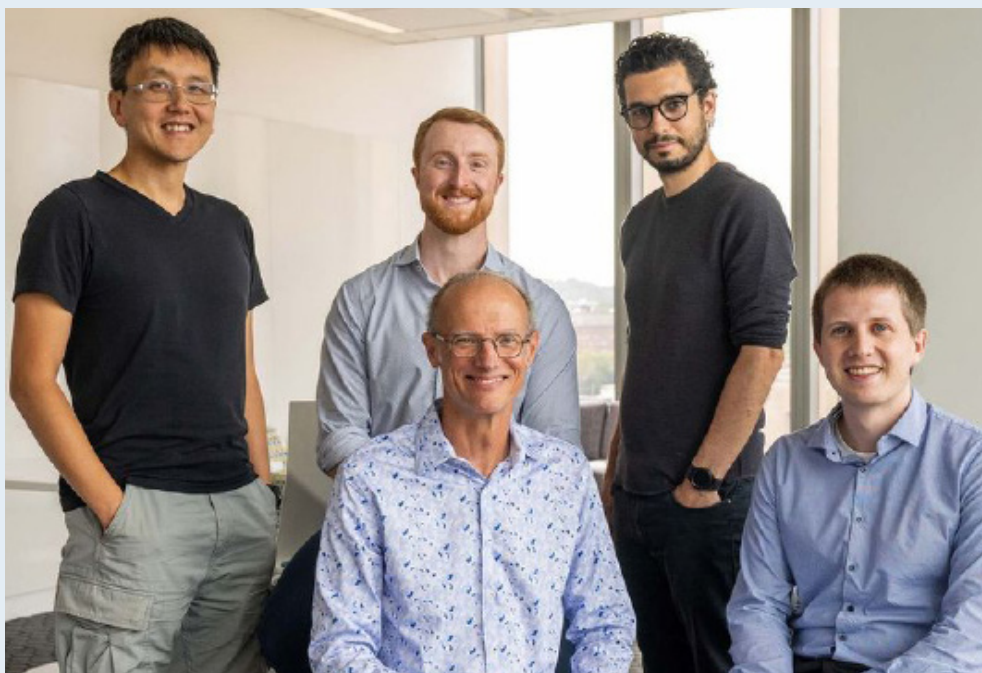
It all started in the lab. Two Boston University doctoral students, Joshua McGee (ENG'26) and Jack Kirsch (ENG'23), were creating and testing different types of RNA—strands of ribonucleic acid, built from chains of chemical compounds called nucleotides, that help carry out genetic instructions in cells. They were determined to see if RNA sequences crafted with small changes to their nucleotides can still work. After running dozens of experiments, they hit a dead end.

“At first, it was a failure,” McGee says.

Decades of research have uncovered the mysteries of RNA in living cells. Without it, our cells couldn't perform fundamental tasks, like constructing other cells, carrying amino acids from one part of the cell to the other, or mounting immune responses to viruses.

But, more recently, scientists have figured out how to harness RNA to make treatments aimed at fighting genetic diseases and cancer. They've also learned how to use messenger RNA (mRNA) to make COVID-19 vaccines. The experiments that McGee and Kirsch perform are aimed at using RNA to deliver lifesaving drugs and create more effective vaccines than we have today.

Working alongside **Mark Grinstaff**, BU's William Fairfield Warren Distinguished Professor of biomedical engineering and chemistry, and **Wilson Wong**, a College of Engineering associate professor of biomedical engineering, they started talking about what to do next—and what to do with the chemical components left over from the initial experiments. They decided to focus on



Clockwise, from back left: Wilson Wong, Jack Kirsch, Florian Douam, Joshua McGee, and Mark Grinstaff.

An accidental discovery turned into an unexpected success, when a team of interdisciplinary BU researchers created a new and improved COVID vaccine.

modifying the chemical structure of a lesser-known type of RNA, called self-amplifying RNA (saRNA), which is manufactured in the lab and replicates itself multiple times in a cell to produce a higher number of the proteins it's programmed to make.

The new method worked: their modified saRNA was replicating itself in a petri dish.

“Our reaction to that was a lot of excitement, but also the normal scientist thinking, ‘Did we do this right?’” McGee says. “We went back to do it again and again. And we got the same results.”

The results kicked off a yearlong research project that moved from Grinstaff's chemistry lab to Wong's genetics engineering lab

to BU's National Emerging Infectious Diseases Laboratories (NEIDL), where they tested their modified saRNA as a vaccine against the COVID-19 virus. They found that a lower dose of their new vaccine in mice protected them from the disease just as well as current mRNA vaccines. Their findings are published in **Nature Biotechnology**.

It'll be years of further testing before this vaccine can be approved for humans. Even though there is one type of saRNA vaccine—approved last year for use in Japan—the researchers hope their modified version will make the technology more appealing to drug manufacturers, as well as overcome the challenges of using saRNA as a vaccine.

"The challenge with regular self-amplifying RNA is that there are two competing processes—the RNA is trying to make more and more protein, and at the same time the immune system is degrading it," says Grinstaff. Standard mRNA COVID vaccines tell cells to produce a spike protein that mimics the real virus. That, in turn, causes the immune system to kick in and fight the virus. But an saRNA vaccine goes one step further by repeating those instructions to the cell over and over, making more of the machinery to create the spike proteins. More proteins means you don't need as high a dose and the immune system remembers how to fight the virus over a longer period of time.

"So the idea is that this could give you a long duration of protein expression, even when using a lower dose," Grinstaff says.

Another challenge is that saRNA could create a much-too-strong reaction that can lead to uncomfortable side effects—worse than those of current COVID vaccines, which typically cause some people to develop a mild fever or aches.

Grinstaff, Wong, and the team collaborated closely with **Florian Douam**, a BU Chobanian & Avedisian School of Medicine assistant professor of virology, immunology, and microbiology and a core faculty member at NEIDL. He and his team performed a study—called a "viral challenge"—to evaluate if a COVID-19 vaccine built with the modified saRNA technology could protect mice more effectively against severe COVID-19 disease than earlier saRNA and mRNA vaccines.

"The viral challenge aspect was particularly important," Douam says. "It exposed how a very low dose of this novel saRNA technology is able to protect mice against lethal disease much more effectively than traditional saRNA and mRNA COVID-19 vaccines at a similar dose." Douam says that the new vaccine, which incorporates modified nucleotides called m5C (5-methylcytidine), also triggered very low levels of inflammation upon vaccination comparable to mRNA vaccines.

"There is still plenty of work to be done to unveil all of the advantages of this technology over other existing RNA vaccine approaches," Douam says. But this was a promising start.

The next question is whether their modified saRNA can provide longer-lasting protection against virus infection compared to existing RNA-based vaccines at a similar dosage.



More Promising Treatments

Besides COVID vaccines, the team's well-tolerated saRNA could open the door for other types of treatments and gene therapy.

"At the end of the day, this is a protein-producing system," Wong says. "A gene-delivery system."

For a genetic disorder, saRNA could be programmed to produce a missing gene or replace a defective one, Wong says. For treating lung, breast, and other cancers, "we can have it produce an anticancer drug for disease that requires a high dose and a lot of protein being made."

"That's why we're really excited about our self-amplifying RNA

"Our reaction was a lot of excitement, but also the normal scientist thinking, 'Did we do this right?' We went back to do it again and again. And we got the same results."

Joshua McGee (ENG'26)

technology—because we think we can lower the dose that's needed to enable some of these therapeutic applications," Wong says.

"That's how we envision it."

Grinstaff recently received an inaugural Trailblazer Engineering Impact Award from the **National Science Foundation**, which comes with a \$3 million grant, to continue exploring saRNA technology—something that can "fundamentally alter the genetic engineering paradigm," according to the NSF.

"There's so much work that we're doing now to further understand what we have discovered," says McGee, who is coadvised by Wong and Grinstaff. "There are a lot of publications out there that suggested research on saRNA would also fail. This made me realize that it's okay to try things that other people think might fail, because, who knows, they could be wrong."

BME Department 2023-2024

Faculty

In January 2024 the BME Department added three new faculty - Assistant Professors Samagya Banskota, Miguel Jimenez and Matthias Stangl. At the end of FY 2024, the BME Faculty numbered 43, making the department one of the largest in the country in terms of primary faculty.

Graduate Program

The BME PhD Program awarded 23 degrees in AY23-24, bringing our total PhD degrees awarded to 445 since the program began in 1991. 59 MS degrees were awarded, as well as 21 MEng degrees. Our graduate programs enrolled 267 students (179 PhD students; 5 MD/PhD; 43 MS; 28 MEng).

Graduate student recruitment: In the fall 2022 we matriculated 102 new graduate students (36 PhD, 32 MS, 20 MEng and 14 LEAP). Our applicant pool continues to be competitive with other top tier Biomedical Engineering Programs. In the 2022 - 2023 recruiting season, we received 1,182 applications (PhD, MS and MEng).

Undergraduate Program

The BME Undergraduate Program awarded 163 Bachelor of Science degrees and enrolled 596 students in AY 23-24.

Research

In FY 2024 the BME faculty was awarded \$48,903,314 in extramural funds available for expenditure during the year. They expended \$40,460,416. This translates to about \$1.4M per research active faculty member in new funding and **\$1.3M per research active faculty member in expenditures**. **The faculty submitted 139 research proposals for \$178M.**

Our faculty is comprised of world renowned scientists and engineers who work across every scale of biology and in a wide spectrum of bioengineering subspecialties. Their research is driven by advancing fundamental understanding of biology and physiology in health and disease and then translating these principles to new technologies that impact the human condition and the practice of medicine. The research laboratories of the research active faculty members are listed on our web site (<http://www.bu.edu/bme/research/labs/>) and they also participate in 8 interdisciplinary research centers that are directed by BME faculty: Bioengineering Technology and Entrepreneurship Center (BTEC), Biological Design Center (BDC), Biomolecular Engineering Research Center (BMERC), Center on Forced Displacement (CDF), NSF Engineering Research Center in Cellular Metamaterials (CELL-MET), Nanotechnology Innovation Center (BUNano), Neurophotonics Center (NPC), and Precision Diagnostics Center (PDC).



“As biomedical engineers, it’s our calling in the world to improve human health. That’s what drives every single person here.”

- John A. White, BME Department Chair

BU BME 2023-2024

43 Primary Faculty

185 PhD Students

596 Undergraduates

65 Courses Taught

\$49 MILLION
Research Funding



ADMINISTRATION

CHAIR

Dr. John A. White

VICE CHAIR

Dr. Muhammad Zaman

ASSOCIATE CHAIR FOR GRADUATE PROGRAM

Dr. Mary Dunlop

ASSOCIATE CHAIR FOR UNDERGRADUATE PROGRAM

Dr. Irving Bigio

DIRECTOR OF BME MASTER'S PROGRAMS

Dr. Mario Cabodi

DIRECTOR OF PHD PROGRAM ADMISSIONS

Dr. Darren Roblyer

DIRECTOR FOR MASTER'S PROGRAM ADMISSIONS

Dr. Kamal Sen

DIRECTOR

Christen Bailey

ASSOCIATE DIRECTOR

Inna Gerzon

ASSISTANT DIRECTOR, FINANCE & ADMINISTRATION

Katie Eno

BME DEPARTMENT STAFF

ADMINISTRATIVE

Stefanie Salguero, *Administrative Assistant to the Chair*

Stephanie Johnson, *Senior Program Coordinator*

Alexa LaCroix, *Senior Program Coordinator*

Lyn Markey, *Design and Communications*

Dr. Joshua Finkelstein, *Executive Director, BDC*

ACADEMIC

Inna Gerzon, *Master's Programs Administrator*

John Benducci, *Undergraduate Program Administrator*

FINANCIAL

Kyle Best, *Financial Administrator*

Ian Butler, *Financial Manager*

Irene Orzechowski, *Financial Manager*

Debby Chiu, *Financial Manager*

Laura Prusaitis, *Financial Manager*

Tara Sorrentino, *Financial Manager*

Left: BME Assistant Professor Matthias Stangl working with graduate students Omar El Sayed and Anna Vena to test a new hardware setup that combines neurophysiological recordings with wearable motion-tracking technologies, enabling novel studies of human brain activity during natural movement and behavior.

BU BME HIGHLIGHTS Faculty Awards, Honors and Significant Events Academic Year 2023-2024



Professor Irving Bigio's DermaSensor has been cleared for marketing by the FDA. The first-of-its-kind hand-held device uses artificial intelligence and light to detect common skin cancers, distinguishing between malignant and benign skin lesions. The underlying sensing technology, elastic scattering spectroscopy (ESS), aims to simplify mole detection and has the potential to reduce missed cancers by half.



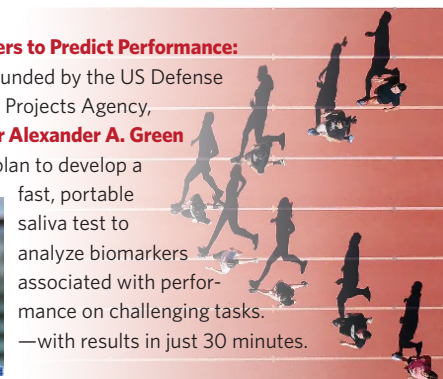
Analyzing Biomarkers to Predict Performance:

With up to \$17.7M funded by the US Defense Advanced Research Projects Agency,

Associate Professor Alexander A. Green

and his colleagues plan to develop a

fast, portable saliva test to analyze biomarkers associated with performance on challenging tasks. —with results in just 30 minutes.



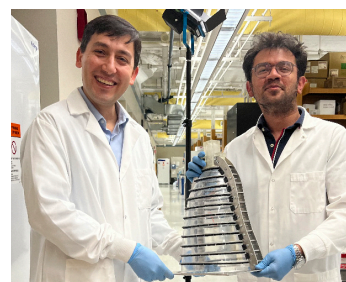
Professor Joyce Wong has been elected a Fellow of Biomaterials Science and Engineering, joining a group of less than 500 of the most respected biomaterials scientists around the globe. The field's highest honor, it is bestowed by the International Union of Societies for

Biomaterials Science and Engineering (IUSBSE). "It's a great honor," says Wong. "I think it's a recognition of the advances that my lab has made in such a broad area of biomaterials, ranging from the fundamentals to applications, in combination with my advocacy efforts".

Assistant Professor Hadi Nia

has been selected as a 2024 Sloan Foundation Research Fellow, recognizing the potential of his groundbreaking work to unlock secrets behind cancer and pulmonary diseases. His work includes ex vivo studies of the lung and tumor mechanogenetics. The Alfred P. Sloan Foundation declared that the early career recipients show the

"potential to revolutionize their fields of study." The prestigious award is another recognition of the College of Engineering's strength in mechanobiology, which is one of our core convergent research areas.



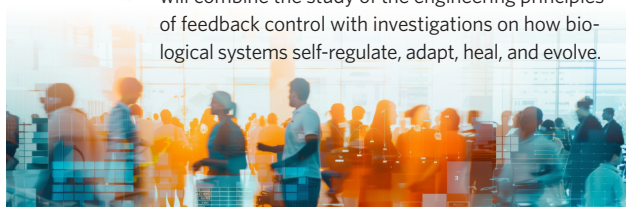
Professor Kamal Sen, Associate BME professor and Director of the Natural Sounds and Neural Coding Laboratory, was recently granted an NSF Award of \$2.96 million for the *Integrative Strategies for Understanding Neural and Cognitive Systems (NCS)* funding opportunity. Sen and his research team have advanced the study of complex scene analysis (CSA), and the underlying neural circuitry responsible for the brain's remarkable ability to selectively attend to specific objects in acoustically complex scenarios.



Assistant Professor Brianne Connizzo was awarded a Wu Tsai Human Performance Agility Project award. She will be exploring the influence of sex and hormone signaling on recovery from exercise. Her project was recognized by the National Leadership Council as having a strong potential to advance our understanding of the biological principles underlying human performance, and expand the Alliance's current scientific program.



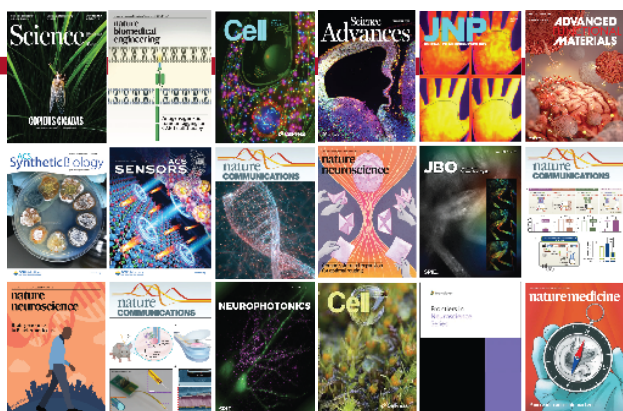
First of its kind: The National Science Foundation will fund BU's newest graduate training program, **Biological Feedback Control**, drawing from PhD students in engineering, natural sciences, physical sciences, health sciences, and data science. The interdisciplinary community of students and faculty will combine the study of the engineering principles of feedback control with investigations on how biological systems self-regulate, adapt, heal, and evolve.



Assistant Professor Michelle Teplensky

is one of only ten winners nationwide of a Hartwell Biomedical Research award. She has also earned a Beckman Young Investigator award, funding her pioneering research to lengthen the lifetimes of single vaccines for flu, #COVID19, HIV, and more. The research will allow the engineering of versatile vaccine responses through nanomaterial design, using porous nanosized scaffolds made of tunable chemical building blocks.





A sampling of impactful research in top journals.

Wilson Wong - **SCIENCE**

Engineered bacteria guide T cells to tumors

Hadi Nia, Mark Grinstaff, Darren Roblyer et al

NATURE BIOMEDICAL ENGINEERING

Intravital measurements of solid stresses in tumours reveal length-scale and microenvironmentally dependent force transmission

Xue Han, Michael Hasselmo - **CELL**

Theta and gamma rhythmic coding through two spike output modes in the hippocampus during spatial navigation

Mary Dunlop, Mo Khalil et al. - **ACS SYNTHETIC BIOLOGY**

Deep Neural Networks for Predicting Single-Cell Responses and Probability Landscapes

James Galagan - **ACS SENSORS**

Strategy, Design, and Fabrication of Electrochemical Biosensors: A Tutorial

Michael Economo, Jeroen Mertz, Kivılcım Kılıç - **NATURE NEUROSCIENCE**

High-speed multiplane confocal microscopy for voltage imaging in densely labeled neuronal populations

Ji-Xin Cheng - **SCIENCE ADVANCES**

Stimulated Raman photothermal microscopy toward ultrasensitive chemical imaging

Kamal Sen - **JOURNAL OF NEUROPHYSIOLOGY**

A robust and compact population code for competing sounds in auditory cortex.

Jeroen Mertz - **SPIE JOURNAL OF BIOMEDICAL OPTICS**

Multiplane HiLo microscopy with speckle illumination and non-local means denoising

Mo Khalil - **CELL**

Cooperative assembly confers regulatory specificity and long-term genetic circuit stability

Wilson Wong - **NATURE COMMUNICATIONS**

Orthogonal inducible control of Cas13 circuits enables programmable RNA regulation in mammalian cells

Irving Bigio - **NATURE MEDICINE**

How AI-powered handheld devices are boosting disease diagnostics - from cancer to dermatology

Mary Dunlop - **NATURE COMMUNICATIONS**

Deep model predictive control of gene expression in thousands of single cells

David Boas, Kamal Sen, et al. - **FRONTIERS NEUROSCIENCE**

fNIRS dataset during complex scene analysis

Anna Devor et al. - **NEUROPHOTONICS**

Understanding the nervous system: lessons from Frontiers in Neurophotonics

Chris Chen, Jeroen Eyckmans - **ADVANCED FUNCTIONAL MATERIALS**

A Protein-Adsorbent Hydrogel with Tunable Stiffness for Tissue Culture Demonstrates Matrix-Dependent Stiffness Responses

Steve Ramirez, John White - **NATURE COMMUNICATIONS**

An implantable piezoelectric ultrasound stimulator (ImPULS) for deep brain activation

Tim O'Shea - **NATURE NEUROSCIENCE**

Derivation and transcriptional reprogramming of border-forming wound repair astrocytes after spinal cord injury or stroke in mice

BME Distinguished Seminars

Shyni Varghese, PhD *Duke University*

Bioengineered Platforms for Mechanistic Understandings and Therapeutic Interventions

Danielle Benoit, PhD *University of Oregon*

Innate Immunity: Friend or Foe in the Development of Therapeutic Biomaterials?

Tejal Desai, PhD *Brown University*

Biomedical Innovations of the Future

Kwabena Boahen, PhD *Stanford University*

Dendrocentric Learning for Synthetic Intelligence

Tal Danino, PhD *Columbia University*

Engineering Bacteria for Cancer Therapy

Paula Therese Hammond, PhD *Massachusetts Institute of Technology*

Electrostatic Designer Nanocarriers for Targeted Therapies

Aaron Batista, PhD *University of Pittsburgh*

Brain-Computer Interfaces: Basic Science Guides Clinical Advances

Faculty Honors

BU Ignition Awards **Bela Suki, Mark Grinstaff, Wilson Wong**

Wu Tsai Human Performance Agility Project award **Brianne Connizzo**

Rita Allen Foundation Scholar **Erica Pratt**

Time Magazines Best Inventions of 2023 **Ed Damiano**

Elected to NIBIB Council **Joyce Wong**

35 Under 35 Award, American Institute of Chemical Engineers (AIChE) **Michelle Teplensky**

Hariri Institute Junior Faculty Fellows **Brian DePasquale, Adriana Tomic**

Moorman Simon Interdisciplinary Career Development Professor **Erica Pratt**

Journal of Orthopaedic Research Early Career Award **Brianne Connizzo**

Sloan Research Fellowship **Hadi Nia**

NSF CAREER Award **Michael Albro**

Scialog Molecular Basis of Cognition Funding **Michael Economo**

Hartwell Individual Biomedical Research Award **Michelle Teplensky**

Beckman Young Investigator award **Michelle Teplensky**

Hevolution Foundation Geroscience Grant **Jeroen Eyckmans**

Fellow, Biomaterials Science and Engineering **Joyce Wong**

SPIE Biophotonics Technology Innovator Award **Ji-Xin Cheng**

American Chemical Society Division of Analytical Chemistry Spectrochemical Analysis Award **Ji-Xin Cheng**

Junior Faculty Fellow and Graduate Student Fellow Award **Brian DePasquale**

2024 Delisi Award **Ji-Xin Cheng**

ENG Service Award **Mary Dunlop**

2025 Hariri Institute Focused Research Program (FRP) award **Xin Zhang**

Beckman Young Investigator award **Michelle Teplensky**

Raman Award for Innovative Technological Dev. **Ji-Xin Cheng**

BMES Shu Chien Achievement Award **Chris Chen**

Outstanding Postdoctoral Mentor Award **Mary Dunlop**

Primary Faculty



SAMAGYA BANSKOTA

Assistant Professor, Biomedical Engineering

PhD, Biomedical Engineering, Duke University

Drug delivery, biomolecular engineering, biomaterials design, genome editing, synthetic biology, functional genomics and protein engineering.



IRVING BIGIO

Professor, Biomedical Engineering;

Electrical & Computer Engineering; Physics; Medicine;

Associate Chair for Undergraduate Program

PhD, Physics, University of Michigan

Medical applications of optics, lasers and spectroscopy; biomedical optics and biophotonics; biomolecular dynamics; applied spectroscopy, especially to biomedical problems; nonlinear optics; quantum electronics and laser physics.



DAVID BOAS

Professor, Biomedical Engineering;

Electrical & Computer Engineering;

Director, Neurophotonics Center

PhD, Physics, University of Pennsylvania

Neurophotonics; biomedical optics; functional near infrared spectroscopy; microscopy methods; oxygen delivery and consumption; neuro-vascular coupling; physiological modeling.



CHRISTOPHER S. CHEN

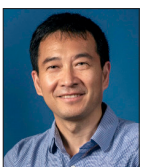
Professor, Biomedical Engineering;

Materials Science & Engineering;

Director, Biological Design Center

MD, Harvard Medical School; PhD, Medical Engineering and Medical Physics, Harvard-MIT Health Sciences and Technology Program

Vascular, cardiac, and stem cell biology and engineering; mechanobiology; micro- and nanotechnology; biomaterials cell adhesion and extracellular matrix.



JI-XIN CHENG

Professor, Biomedical Engineering; Electrical & Computer Engineering;

Chemistry; Physics; Materials Science & Engineering;

Moustakas Chair Professor in Photonics and Optoelectronics

PhD, Chemical Physics, University of Science and Technology of China

Molecular spectroscopic imaging technologies; label-free microscopy; medical photonics; neurophotonics; cancer metabolism; photonics for infectious diseases.



BRIANNE CONNIZZO

Assistant Professor, Biomedical Engineering

PhD, Bioengineering, University of Pennsylvania

Aging; orthopaedic and soft tissues; mechanobiology; multiscale biomechanics; extracellular matrix assembly and remodeling.



CHARLES DELISI

Dean Emeritus, College of Engineering

Professor, Biomedical Engineering; Physics;

Metcalf Professor of Science and Engineering

PhD, Physics, New York University

Developing and applying computational/mathematical methods, and high throughput experimental methods for inferring the structure and function of protein networks.



BRIAN DEPASQUALE

Assistant Professor, Biomedical Engineering

PhD, Neurobiology and Behavior, Columbia University

Machine learning; computational neuroscience; theoretical neuroscience.

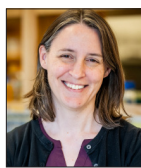


ANNA DEVOR

Professor, Biomedical Engineering

PhD, Hebrew University of Jerusalem, Israel

Cellular and systems-level neuroscience; microscopy; physiological underpinning of noninvasive imaging.



MARY DUNLOP

Associate Professor, Biomedical Engineering,

Associate Chair for Graduate Programs

PhD, Mechanical Engineering, California Institute of Technology

Understanding how microorganisms use feedback to respond to changes in their environment, studying naturally occurring examples of feedback to understand their implications for survival in changing conditions, and engineering novel, synthetic feedback control systems.



MICHAEL ECONOMO

Assistant Professor, Biomedical Engineering

PhD, Biomedical Engineering, Boston University

Systems neuroscience; motor control; long-range neural circuits; computational neuroscience, neurotechnology.



SOLOMON EISENBERG

Professor, Biomedical Engineering;

Electrical & Computer Engineering;

Senior Associate Dean for Academic Programs, College of Engineering

ScD, Electrical Engineering, Massachusetts Institute of Technology

Electrically mediated phenomena in tissues and biopolymers; cartilage biomechanics; computational modeling of electric field distributions in the human thorax and heart during defibrillation; transcranial magnetic stimulation.



JAMES GALAGAN

Professor, Biomedical Engineering;

Microbiology, Chobanian & Avedisian School of Medicine;

Associate Director, Precision Diagnostics Center

PhD, Computational Neuroscience, MIT

Biosensor development; computational biology; systems biology; genomics.



ALEXANDER GREEN

Associate Professor, Biomedical Engineering

PhD, Materials Science and Engineering, Northwestern University

Synthetic biology; nucleic acid nanotechnology; low-cost diagnostics; nanomaterials.



MARK GRINSTAFF

Professor, Biomedical Engineering; Chemistry;

Materials Science & Engineering;

Director, Nanotechnology Innovation Center

PhD, Chemistry, University of Illinois Urbana-Champaign

Biomaterials; tissue engineering; drug delivery; macromolecular chemistry and engineering, self-assembly; nanodevices.

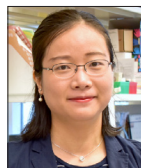


XUE HAN

Professor, Biomedical Engineering

PhD, Physiology, University of Wisconsin-Madison

Neurotechnology; optical neural modulation; optogenetics; neural prosthetics; neural network dynamics; brain rhythms; neurological and psychiatric diseases; cognition.



LIANGLIANG HAO

Assistant Professor, Biomedical Engineering

PhD, Chemical Biology, Northwestern University

Noninvasive disease detection and treatment monitoring at the Point-of-Care; tissue-specific transcriptome engineering; multimodal systemic imaging.



MIGUEL JIMENEZ

Assistant Professor, Biomedical Engineering

PhD, Chemistry, Columbia University

Microbial devices, bioelectronic devices, synthetic biology, biosensors, bioactuators, diagnostics & therapeutics, in situ directed evolution, human health, food & water security, countermeasures for exploration space travel.

Primary Faculty Cont.



DIANE JOSEPH-MCCARTHY

**Professor of the Practice, Biomedical Engineering,
Department of Chemistry
Executive Director, Bioengineering Technology & Entrepreneurship Center**
PhD, Physical Chemistry, Massachusetts Institute of Technology
Chemical biology, biophysics; computational science; drug discovery & development.



SIMON KASIF

**Professor, Biomedical Engineering;
Bioinformatics; Computer Science**
PhD, Computer Science, University of Maryland
Genomic systems biology; P4 medicine, wellness and disease prevention; medical bioinformatics; artificial intelligence; machine learning; high performance systems; reproducibility and science informatics.



AHMAD (MO) KHALIL

**Professor, Biomedical Engineering;
Associate Director, Biological Design Center**
PhD, Mechanical Engineering, Massachusetts Institute of Technology
Synthetic and systems biology; gene regulation; protein aggregation; microbial communities; laboratory evolution.



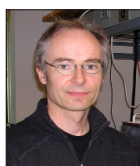
CATHERINE KLAPPERICH

**Professor, Biomedical Engineering; Mechanical Engineering; Materials Science & Engineering;
Director, Precision Diagnostics Center;
Associate Director, DAMP-CTL**
PhD, Mechanical Engineering, University of California, Berkeley
Design of new molecular diagnostics and appropriate technologies for healthcare.



KENNETH R. LUTCHEN

**Boston University Provost ad interim and Former ENG Dean,
Professor, Biomedical Engineering**
PhD, Biomedical Engineering, Case Western Reserve University
Airway and lung tissue mechanics and ventilation; computational modeling of structure-function relations in the lung; mechanical ventilation; integrated biomechanics of the lung; linear and nonlinear systems identification; blood-glucose regulation.



JEROME MERTZ

**Professor, Biomedical Engineering; Physics;
Electrical & Computer Engineering**
PhD, Physics, Université Paris VI and University of California, Santa Barbara
Development and application of new optical microscopy techniques to biological imaging.



JOHN NGO

Associate Professor, Biomedical Engineering
PhD, Biochemistry and Molecular Biophysics, California Institute of Technology
Protein structure and engineering; molecular and cellular engineering; single-molecule biophysics; cell signaling; fluorescence and electron microscopy.



HADI T. NIA

**Assistant Professor, Biomedical Engineering;
Materials Science & Engineering**
PhD, Mechanical Engineering, Massachusetts Institute of Technology
Tumor microenvironment; physical sciences of cancer; intravital imaging and animal models of cancer; mechanobiology and biomechanics.



TIMOTHY O'SHEA

Assistant Professor, Biomedical Engineering
PhD, Medical Engineering and Medical Physics, Massachusetts Institute of Technology
Glia Engineering, biomaterials, neural engineering, spinal cord injury, stroke, glial neurobiology, regenerative medicine, cell transplantation.



ERICA D. PRATT

**Assistant Professor, Biomedical Engineering;
Materials Science & Engineering
Moorman-Simon Interdisciplinary Career Development Professor**
PhD, Biomedical Engineering, Cornell University
Engineering-focused cancer research; liquid biopsy and rare cell detection; multi-omics in oncology; microfluidics and microfabrication; pancreatic cancer.



DARREN ROBLYER

**Associate Professor, Biomedical Engineering;
Electrical & Computer Engineering;
Director of BME PhD Program Admissions**
PhD, Bioengineering, Rice University
Optical functional imaging; diffuse optics; near infrared spectroscopy; monitoring of emerging targeted and cytotoxic therapies in oncology; non-invasive monitoring of tumor metabolism.



KAMAL SEN

**Associate Professor, Biomedical Engineering;
Director of Admissions and Recruitment for Master's Programs**
PhD, Physics, Brandeis University
Electrophysiological recording of neural responses in auditory processing; theoretical methods to characterize neuronal encoding; computational models of natural sound processing.



MICHAEL L. SMITH

**Associate Professor, Biomedical Engineering;
Materials Science and Engineering**
PhD, Biomedical Engineering, University of Virginia
Cellular mechanotransduction through the extracellular matrix; fibronectin structural biology; microfabricated surfaces for engineering cell function.



DIMITRIJE STAMENOVIĆ

**Professor, Biomedical Engineering;
Materials Science and Engineering**
PhD, Mechanics, University of Minnesota
Respiratory mechanics; cell mechanics; rheology of soft tissues; mechanics of foam-like structures.



MATTHIAS STANGL

Assistant Professor, Biomedical Engineering
PhD, German Center for Neurodegenerative Diseases & Otto-von-Guericke University Magdeburg
Cognitive neuroscience, neurotechnology, human brain imaging methods, signal processing and data analysis methods.



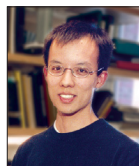
BÉLA SUKI

**Professor, Biomedical Engineering;
Materials Science and Engineering**
PhD, Biomechanics, Jozsef Attila University, Szeged (Hungary)
Mechanical properties of living tissues; modeling the dynamic and nonlinear behavior of complex biological systems; pulmonary physiology.



MICHELLE TEPLENSKY

**Assistant Professor, Biomedical Engineering;
Materials Science and Engineering**
PhD, Chemical Engineering, University of Cambridge
Engineering nanotechnology to program immune cell connectivity, processing, and communication by design and harnessing these insights to synthesize potent vaccines; immunotherapeutics.



JOE TIEN

**Associate Professor,
Biomedical Engineering;
Materials Science & Engineering**
PhD, Physics, Harvard University
Vascularization of biomaterials; quantitative physiology of engineered tissues; biomaterials for microsurgical applications; lymphatics; interstitial transport; inverse problems in vascular imaging.

Primary Faculty Cont.



ADRIANA TOMIC

**Assistant Professor,
Biomedical Engineering;
Microbiology**

PhD, Infection Biology, Hannover Medical School

At the interface between computational immunology, infection biology and clinical research, aiming to define the immunological signature of protective immunity in infectious diseases.



LUCIA M. VAINA

**Professor, Biomedical Engineering;
Neurology, Chobanian & Avedisian School of Medicine**

PhD, Mathematical Logic, Sorbonne, Paris; MD/PhD, Neurology, Doctorat d'Etat ès Sciences and in Médecine (MD PhD); Institut National Toulouse, France

Behavioral, functional imaging (fMRI and MEG) and theoretical & computational approaches to study the neural basis and the plasticity of high-level visual functions in the human brain.



SANDOR VAJDA

**Professor, Biomedical Engineering;
Systems Engineering; Chemistry;
Director, Biomolecular Engineering Research Center**

PhD, Chemistry, Hungarian Academy of Science

Scientific computing applied to problems in engineering, biochemistry, and biology, with focus on molecular mechanics, protein structure determination, protein-ligand interactions, docking, and drug design.



JOHN WHITE

**Chair, Biomedical Engineering
Professor, Biomedical Engineering;
Pharmacology and Experimental Therapeutics; Neuroscience**

PhD, Biomedical Engineering, Johns Hopkins University

Mechanisms of episodic memory; pathophysiology of epilepsy; computational neuroscience; design of real-time instrumentation; imaging of activity in neurons and astrocytes.



JOYCE WONG

**Professor, Biomedical Engineering;
Material Science and Engineering**

PhD, Materials Science and Engineering, Program in Polymer Science and Technology, Massachusetts Institute of Technology

Biomaterials, tailoring cell-material interfaces for drug delivery and tissue engineering applications; direct, quantitative measurement of biological interactions.



WILSON WONG

Associate Professor, Biomedical Engineering

PhD, Chemical Engineering, University of California, Los Angeles

Developing ways to control mammalian cell functions through engineering, biological network design, molecular biology, and chemical biology for medical applications at four different levels of regulation: receptor signaling, post-transcription, transcription, and DNA.



MUHAMMAD ZAMAN

**Vice Chair, Biomedical Engineering;
Professor, Biomedical Engineering;
Materials Science & Engineering**

PhD, Physical Chemistry University of Chicago

Comprehensive and quantitative approaches to develop a multiscale understanding of cell-matrix interactions for fundamental biological and applied clinical research.

Lecturers



OUSAMA M. A'AMAR

**Senior Lecturer,
Biomedical Engineering**

*PhD, with Distinction, Electrical Engineering,
The National Polytechnic Institute of Lorraine (INPL), France*



XIN BROWN

**Senior Lecturer,
Biomedical Engineering;
Biointerface Technologies Facility Manager**

PhD, Boston University School of Medicine



MARIO CABODI

**Master Lecturer,
Research Assistant Professor,
Biomedical Engineering,
Director of Masters Programs**

PhD, Cornell University



ANDY FAN

**Lecturer,
Biomedical Engineering**

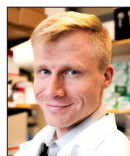
*PhD, Electrical Engineering,
Massachusetts Institute of Technology*



KAVON KARROBI

**Lecturer,
Biomedical Engineering;
Manager,
Bioengineering Technology & Entrepreneurship Center**

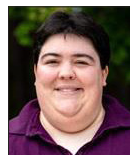
PhD, Biomedical Engineering, Boston University



JOSHUA KAYS

**Lecturer,
Biomedical Engineering**

PhD, Biomedical Engineering, Boston University



CHRISTINE MULVEY

**Senior Lecturer,
Biomedical Engineering**

PhD, Biomedical Engineering, Boston University

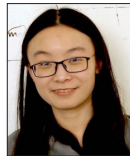
Research Faculty



ELIZABETH BARTOLAK-SUKI
Research Assistant Professor,
Biomedical Engineering
MD, General Medicine, Szent-Gyorgyi Medical
School, DSc, Molecular Cell biology, Semmelweis Medical
School
Inter/intracellular signaling and molecular/
medical pathology.



DIMITRI BEGLOV
Research Assistant Professor,
Biomedical Engineering
PhD, Molecular Biophysics, Moscow Physical and
Technical Institute
Computational chemistry and biology;
protein structure and function; computational
characterization and prediction of biomolecular
interactions.



XIAOJUN CHENG
Research Assistant Professor,
Biomedical Engineering
PhD, Physics, City University of New York
Exploiting light scattering and speckles to investigate
brain dynamics.



AARON COLBY
Research Assistant Professor,
Biomedical Engineering
PhD, Biomedical Engineering, Boston University
Developing novel delivery systems including
nanoparticles and drug concentrating devices
as tools for treating cancer.



EDWARD DAMIANO
Research Professor,
Biomedical Engineering
PhD, Applied Mechanics, Rensselaer Polytechnic
Institute
Integrated cellular and extracellular
biomechanics; biofluid dynamics;
microhemofluidics; microcirculation; vestibular
biomechanics; non-Newtonian rheology; closed-
loop blood-glucose regulation.



AURELIE EDWARDS
Research Professor,
Biomedical Engineering
PhD, Chemical Engineering, Massachusetts
Institute of Technology
Developing mathematical models of water and
solute transport in the kidney, at different scales, to
address physiological and pathological questions.



JEROEN EYCKMANS
Research Assistant Professor,
Biomedical Engineering
PhD, Medical Sciences, Katholieke
Universiteit Leuven
Tissue repair and regeneration; wound healing
biomechanics; biomimetic tissue-on-chip models;
skeletal organoid biology; reverse tissue engineering,
fibrosis.



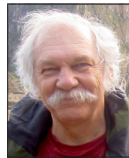
ODED GHITZA
Research Professor,
Biomedical Engineering
PhD, Electrical Engineering, Tel Aviv University
Formulation of cortical computation principles
that underlie the speech decoding process and that
are capable of predicting human performance in
speech perception tasks.



DIMA KOZAKOV
Research Associate Professor,
Biomedical Engineering
PhD, Biomedical Engineering, Boston University
Development of protein-protein and protein-
ligand docking algorithms, fast and efficient
scoring functions for screening large number of
potential docked complexes, protein homology
models suitable for docking.



BRIAN SNYDER
Research Professor,
Biomedical Engineering
MD/PhD, Biomechanics, University of Pennsylvania
Basic and applied research in musculoskeletal
biomechanics, cellular processes, and gene
expression.



THOMAS L. SZABO
Research Professor,
Biomedical Engineering;
Mechanical Engineering
PhD, Physics, University of Bath, UK Medical
imaging; diagnostic ultrasound; tissue
characterization; transduction; biomedical
signal processing; wave propagation; nonlinear
acoustics.



MARTIN THUNEMANN
Research Assistant Professor,
Biomedical Engineering
PhD, Biochemistry, Eberhard-Karls-Universität
Tübingen, Germany, Biochemistry, Dr. rer. nat.
Cellular and systems-level neuroscience,
microscopy, electrophysiology, preclinical
imaging.



ZAHID YAQOOB
Research Associate Professor,
Biomedical Engineering
PhD, Optics, University of Central Florida
Label-free interferometric microscopy;
fluorescence imaging; neurophotonics; cellular
biomechanics; organoid screening; artificial
intelligence.



MERYEM YUCEL
Research Associate Professor,
Biomedical Engineering
PhD, Biomedical Engineering, Boğaziçi University,
Istanbul, Turkey
Functional neuroimaging (fNIRS, fMRI, EEG);
fNIRS signal processing; cognitive neuroscience.

Adjunct Faculty



MERCEDES BALCELLS-CAMPS, PHD
Adjunct Research Professor,
Biomedical Engineering



ALLISON M. DENNIS, PHD
Adjunct Assistant Professor,
Biomedical Engineering



LAURA LEWIS, PHD
Adjunct Assistant Professor,
Biomedical Engineering



CHRISTINE MCBETH, PHD
Adjunct Research
Assistant Professor,
Biomedical Engineering



JULIO COLLADO VIDES, PHD
Adjunct Research Professor,
Biomedical Engineering

Emeritus



CHARLES CANTOR, PHD
Professor Emeritus,
Biomedical Engineering



H. STEVEN COLBURN, PHD
Professor Emeritus,
Biomedical Engineering



EVAN EVANS, PHD
Research Professor Emeritus,
Biomedical Engineering



MAXIM D. FRANK-KAMENETSKII
Professor Emeritus,
Biomedical Engineering



STEPHEN GROSSBERG, PHD
Professor Emeritus,
Biomedical Engineering



ARTHUR ROSENTHAL, PHD
Professor of Practice Emeritus,
Biomedical Engineering



TEMPLE F. SMITH, PHD
Professor Emeritus,
Biomedical Engineering



MALVIN TEICH, PHD
Professor Emeritus,
Biomedical Engineering
Physics

Affiliated Faculty



MICHAEL ALBROW, PHD
Assistant Professor,
Mechanical Engineering



FRANK GUENTHER, PHD
Professor,
Sargent College of Health and Rehabilitation
Sciences



TYLER PERRACHIONE, PHD
Associate Professor,
Sargent College of Health and Rehabilitation Sciences



MARGRIT BETKE, PHD
Professor,
College and Graduate School of Arts &
Sciences, Computer Science



MICHAEL HASSELMO, PHD
Professor,
Biology;
Director, Center for Systems Neuroscience



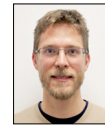
STEVE RAMIREZ, PHD
Assistant Professor,
Psychological & Brain Sciences



THOMAS BIFANO, PHD
Professor,
Mechanical Engineering;
Materials Science & Engineering;
Director, Photonics Center



LAERTIS IKONOMOU, PHD
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Medicine
Chobanian & Avedisian School of Medicine



TOMMASO RANZANI, PHD
Assistant Professor,
Mechanical Engineering;
Materials Science & Engineering



DAVID BISHOP, PHD
Professor, Electrical and Computer Engineering;
Physics; Materials Science & Engineering; Mechanical
Engineering; Head, Division of Materials Science &
Engineering;
Director, CELL-MET Engineering Research Center



W. CLEMENT KARL, PHD
Professor,
Electrical & Computer Engineering



ROBERT M. G. REINHART, PHD
Associate Professor,
Psychological & Brain Sciences



**CHANDRAMOULI
CHANDRASEKARAN, PHD**
Assistant Professor,
Anatomy & Neurobiology; Psychological and Brain Sci-
ences; Center for Systems Neuroscience



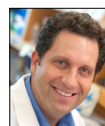
NANCY KOPELL, PHD
Professor,
Mathematics



MICHELLE SANDER, PHD
Associate Professor,
Electrical & Computer Engineering;
Materials Science & Engineering



JERRY CHEN, PHD
Assistant Professor,
Biology



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Medicine,
Chobanian & Avedisian School of Medicine;
Director, Center for Regenerative Medicine



BENJAMIN SCOTT, PHD
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Psychological & Brain Sciences



BRIAN CLEARY
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Computing and Data Science; Biology



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Chobanian & Avedisian School of Medicine



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Biology



QIANG CUI, PHD
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Chemistry



PANKAJ MEHTA, PHD
Professor,
Physics



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Gastroenterology
Chobanian & Avedisian School of Medicine



JACK DENNERLEIN, PHD
Professor,
Department of Physical Therapy



ELISE F. MORGAN, PHD
ad Interim Dean, College of Engineering,
Maysarah K. Sukkar Professor of Engineering
Design and Innovation
Professor,
Mechanical Engineering
Materials Science & Engineering



CARA STEPP, PHD
Professor,
Sargent College, Speech, Language & Hearing Science



DOUGLAS DENSMORE, PHD
Professor,
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S. HAMID NAWAB, PHD
Professor,
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ROBERT A. STERN, PHD
Professor,
Neurology, Neurosurgery, and Anatomy; Neurobiology
Chobanian & Avedisian School of Medicine



SHYAMSUNDER ERRAMILI, PHD
Professor,
Physics



ELAINE O. NSOESIE, PHD
Assistant Professor,
School of Public Health



NANCY SULLIVAN, PHD
Professor,
Chobanian & Avedisian School of Medicine; Biology



JEFFREY GAVORNIK, PHD
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Biology



IOANNIS PASCHALIDIS, PHD
Professor,
Electrical & Computer Engineering



LEI TIAN, PHD
Assistant Professor,
Electrical and Computer
Engineering

Affiliated Faculty Cont.



M. SELIM ÜNLÜ, PHD
Professor,
Electrical & Computer Engineering



ARTURO VEGAS, PHD
Assistant Professor,
Chemistry



ARCHANA VENKATARAMAN, PHD
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Electrical and Computer Engineering



ZEBÄ WUNDERLICH, PHD
Associate Professor,
Biology



RABIA YAZICIGIL, PHD
Professor,
Electrical & Computer Engineering



MEG YOUNGER, PHD
Assistant Professor,
Biology



KATHERINE YANHANG ZHANG, PHD
Professor,
Mechanical Engineering



XIN ZHANG, PHD
Professor,
Mechanical Engineering; Electrical & Computer
Engineering;
Materials Science & Engineering

Postdocs

POSTDOCTORAL ASSOCIATES

Razan Alnahhas
Virgile Andreani
James Angstman
Tsz Him Ching
Jakub Czuchnowski
Feiyang Deng
Natalie Fomin-Thunemann
Emily Hager
Yujin Han
Mustafa Cagatay Karakan
Suntae Kim
Ian Kinstlinger
Heidi Klumpe
Gulce Kureli
Micheal Mclellan
Hagar Moussa
Maria Moya
Mai Ngo
Jacob Norman
Nikit Patel
Pablo Perez
Thao Pham
Arjun Ravikumar
Michael Raymond
William Shaw
Subramanian Sundaram
Indorica Sutradhar
Mohammad Mahdi Tajdini
Li Chang Jessica Teo
Victor Tierrafria Pulido
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Marina Uroz Marimon
Abraham Christoffel Ignatius Van Steen
Claudia Varela
Brandon Wong
Zhehao Zhang
Yuxin Zhou

Research Staff

RESEARCH ENGINEER

John Jiang

RESEARCH FELLOWS

Laurie Kelleher
Shweta Khorana
Sreekanth Kura

RESEARCH SCIENTISTS

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Bernhard Zimmermann
Aleksandrs Zosuls

SENIOR RESEARCH ENGINEER

Eric Hazen

SENIOR RESEARCH SCIENTISTS

Darash Desai
Kivilcim Kilic
Jae Hun Kim
Hua-An Tseng

VISITING FELLOWS

Otgonjargal Altangerel
Jay Dubb
Rana Hussein
Sam Mlawer
Odysseas Morgan
Juan Luis Ugarte-Nunez

External Research Funding

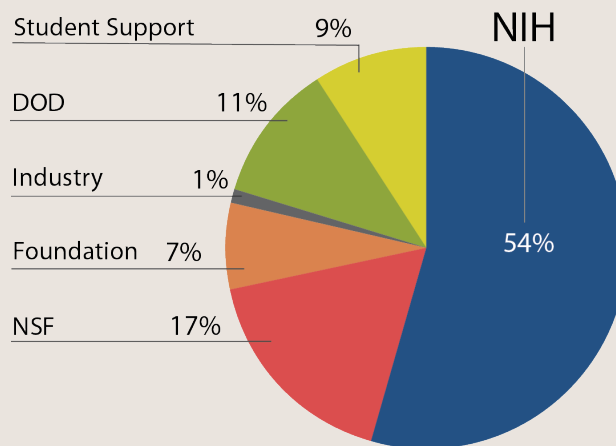
Boston University's Department of Biomedical Engineering

maintains a vibrant research program in its approximately 96,000 square feet of space on Boston University's Charles River Campus. We are comprised of **43 separate research laboratories**, and our faculty lead **8 research centers**.

The research can be characterized by a combination of:

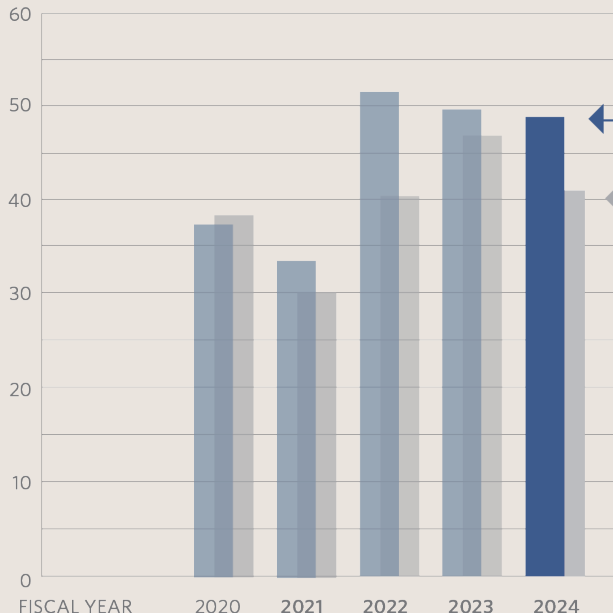
- Empirical and theoretical work with an attention to explicit mathematical models for the phenomena under study
- Intensive computer use for experimental and theoretical work
- A basic scientific flavor to the fundamental questions being asked
- An attention to the applications of improving health care, and a thorough understanding of the underlying physiological processes
- 4 Training Grants funding PhD students

BME Grant Funding by Agency



BME Faculty Annual Total Grant Funding

GRANT INCOME IN \$MILLIONS



BME Faculty Research Funding

\$48,903,314 7/1/22- 6/30/23

\$40,460,416 EXPENDITURES

139 new and continuing awards were funded.

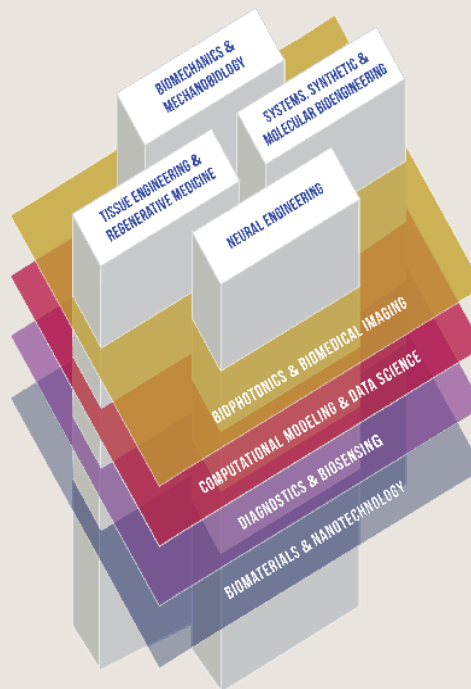
BU BME Research Areas

We have world leaders in these areas of research:

- Biomechanics and Mechanobiology
- Systems, Synthetic & Molecular Bioengineering
- Tissue Engineering & Regenerative Medicine
- Neural Engineering

Using the enabling technologies:

- Biophotonics & Biomedical Imaging
- Computation Modeling and Data Sciences
- Diagnostics & Biosensing
- Biomaterials & Nanotechnology



BU Research Centers

BU has eight interdisciplinary research centers that are directed by BME faculty:

BTEC

Bioengineering Technology and Entrepreneurship Center

Transforming education and innovation for bioengineering students through hands-on learning in partnership with industry, from gene editing to biosensors to digital medicine

BDC

Biological Design Center

To rigorously understand life's design principles and re-engineer them to revolutionize our approach to addressing critical challenges in human health and the environment

BMERC

Biomolecular Engineering Research Center

Developing and applying computational methods for the analysis and design of structures, functions, interactions, regulation and evolution of biological macromolecules

CFD

Center on Forced Displacement

Fostering research and engagement with the global challenge of forced displacement, through multidisciplinary teams from across BU, around the country, and around the world

CELL-MET

NSF Engineering Research Center in Cellular Metamaterials

Developing tissue-engineering principles to create scalable, low-cost technologies for growing clinically significant cardiac tissues from cell-level building blocks

BU nano

Nanotechnology Innovation Center

Where nanomaterials intersect medicine and energy through collaborative interdisciplinary research

NPC

Neurophotonics Center

Advancing our understanding and treatment of brain disorders through advanced optical science and photonic systems

PDC

Precision Diagnostics Center

Discovery, design and development and clinical translation of technology for disease screening and monitoring, treatment management and health maintenance

NIH Awards			
PI	Award Title	Prime Sponsor	\$ Amount
BIGIO	OPTIMIZATION AND VALIDATION OF QUANTITATIVE BIREFRINGENCE MICROSCOPY FOR ASSESSMENT OF MYELIN PATHOLOGIES ASSOCIATED WITH COGNITIVE IMPAIRMENTS AND MOTOR DEFICITS IN YOUNG AND OLD AGING MONKEY BRAIN	NIA	559,055
BIGIO	VALIDATION OF LIGHT SCATTERING SPECTROSCOPY FOR INTRA-OPERATIVE MARGIN GUIDANCE DURING ORAL CANCER RESECTION	NIDCR (sub BMC)	180,322
BOAS	THE NEUROSCIENCE OF EVERYDAY WORLD- A NOVEL WEARABLE SYSTEM FOR CONTINUOUS MEASUREMENT OF BRAIN FUNCTION	NIBIB	1,597,493
BOAS	TIME-GATED DIFFUSE CORRELATION SPECTROSCOPY FOR FUNCTIONAL IMAGING OF THE HUMAN BRAIN	NIBIB (Sub MGH)	102,424
BOAS	THE NEUROSCIENCE OF EVERYDAY WORLD- A NOVEL WEARABLE SYSTEM FOR CONTINUOUS MEASUREMENT OF BRAIN FUNCTION	NIBIB	980,087
BOAS	NEUROPHOTONIC ADVANCES FOR MECHANISTIC INVESTIGATION OF THE ROLE OF CAPILLARY DYSFUNCTION IN STROKE RECOVERY	NINDS	662,228
BOAS	BRAIN CONNECTS: MAPPING CONNECTIVITY OF THE HUMAN BRAINSTEM IN A NUCLEAR COORDINATE SYSTEM	NINDS (sub MGH)	105,255
BOAS	LOW-COST HIGH-PERFORMANCE NIRS-SCOS DEVICE FOR NON-INVASIVE MONITORING OF CEREBRAL BLOOD FLOW AND INTRACRANIAL PRESSURE IN TRAUMATIC BRAIN INJURY	NINDS (sub MGH)	114,927
CHEN	NOVEL STRATEGIES TO UNDERSTAND, PREDICT, AND PREVENT VASCULAR TOXICITY OF TARGETED CML THERAPIES	NHLBI (sub Tufts)	180,781
CHEN	DEFINING GENETIC ARCHITECTURE AND PATHWAYS OF DCM	NHLBI (sub Wyss Inst)	81,177
CHEN	SYNTHETIC VASCULARIZATION AND REGENERATION IN ENGINEERED TISSUES	NIBIB	565,247
CHENG	MAPPING CANCER METABOLISM BY MID-INFRARED PHOTOTHERMAL MICROSCOPY	NCI	390,792
CHENG	SUB-MILLIMETER PRECISION WIRELESS NEUROMODULATION USING A MICROWAVE SPLIT RING RESONATOR	NEI	206,250
CHENG	SENSING VULNERABLE PLAQUE IN VIVO BY AN ALL-OPTICAL INTRAVASCULAR ULTRASOUND AND PHOTOACOUSTIC CATHETER	NHLBI	589,577
CHENG	RAPID AST THROUGH METABOLIC IMAGING AT SINGLE CELL LEVEL	NIAID	1,339,910
CHENG	HIGH-CONTENT HIGH-SPEED CHEMICAL IMAGING OF METABOLIC REPROGRAMMING BY INTEGRATION OF ADVANCED INSTRUMENTATION AND DATA SCIENCE	NIBIB	494,768
CHENG	SUPER-SENSITIVE VIBRATIONAL IMAGING BY SYNERGIC DEVELOPMENT OF INSTRUMENTS AND PROBES	NIBIB	556,300
CHENG	FLUORESCENCE ENHANCED PHOTOTHERMAL INFRARED SPECTROSCOPY (FE-PTIR) BREAKTHROUGH FOR SIMULTANEOUS FLUORESCENCE MICROSCOPY AND SUB-MICRON IR SPECTROSCOPY	NIGMS (sub Photothermal Spectroscopy Corp.)	146,591
CHENG	A TRANSFORMATIVE METHOD FOR FUNCTIONAL BRAIN IMAGING WITH SPECKLE CONTRAST OPTICAL SPECTROSCOPY	NIBIB	417,289
CONNIZZO	NON UNIFORMITY IN THE PDL: STRUCTURE AND FUNCTION OF THE DENSE COLLAR	NIDCR (sub Tufts)	38,188
CONNIZZO	INNATE AND HORMONE-MEDIATED SEX DIFFERENCES IN EXTRACELLULAR MATRIX REMODELING	NIGMS	412,500
DEVOR	METABOLIC AND NEURAL ACTIVITY NORMALIZATION BY CEREBRAL BLOOD FLOW INCREASE IN AD/ABD MODELS	NIA (sub Cornell)	475,500
DEVOR	EFFECTS OF INTRINSIC AND DRUG-INDUCED NEUROMODULATION ON FUNCTIONAL BRAIN IMAGING	NIDA	370,026
DEVOR	LOCAL NEURONAL DRIVE AND NEUROMODULATORY CONTROL OF ACTIVITY IN THE PIAL NEUROVASCULAR CIRCUIT	NINDS	2,520,076
ECONOMO	LINKING MOTOR CORTEX ACTIVITY AND MOVEMENT IN THE MOUSE OROFACIAL SYSTEM.	NINDS	400,126
ECONOMO	REVERSE ENGINEERING THE BRAIN STEM CIRCUITS THAT GOVERN EXPLORATORY BEHAVIOR	NINDS (sub UCSD)	86,613
EDWARDS	RENAL ELECTROLYTE HANDLING IN FEMALES VS. MALES OVER LIFE CYCLE	NIDDK (sub USC)	163,705
GALAGAN	NOVEL BIOSENSORS BASED ON MINING BACTERIAL TRANSCRIPTION FACTORS	NIBIB	642,683
GREEN	RAPID LOW-COST PAPER-BASED BIODOSIMETRY THAT REVEALS INDIVIDUAL ORGAN INJURIES	NIAID (sub ASU)	83,127
GRINSTAFF	R21: A NOVEL ANTIBODY-DRUG CONJUGATE FOR TREATMENT OF SQUAMOUS CELL LUNG CARCINOMA	NCI	226,784
GRINSTAFF	SUPRATHERAPEUTIC PTX BUTTRESSES REDUCE LOCOREGIONAL RECURRENCE RATES FOLLOWING SURGERY FOR SOFT TISSUE SARCOMAS	NCI (sub BWH)	171,187
GRINSTAFF	BIODEGRADABLE, BIOCOMPATIBLE PRESSURE SENSITIVE ADHESIVES	NHLBI	545,646
GRINSTAFF	THE CONUNDRUM OF ABSENTEE RECEPTORS: EFFICACY POTENTIATION THROUGH DRUG-RECEPTOR MODULATION	NIAMS	652,797
GRINSTAFF	SUSTAINED RELEASE RELAXIN-2 FOR THE TREATMENT OF FROZEN SHOULDER	NIAMS	603,668
GRINSTAFF	THE CONUNDRUM OF ABSENTEE RECEPTORS: EFFICACY POTENTIATION THROUGH DRUG-RECEPTOR MODULATION	NIAMS	628,970

NIH Awards Cont.

PI	Award Title	Prime Sponsor	\$ Amount
GRINSTAFF	A RELAXIN-LOADED HYDROGEL FOR THE TREATMENT OF HYPERTROPHIC SCARS	NIAMS	526,041
HAN	MULTIDIMENSIONAL OPTIMIZATION OF VOLTAGE INDICATORS FOR IN VIVO NEURAL ACTIVITY IMAGING	NIMH	598,022
HAN	DESIGNING LOW-COST, CUSTOMIZABLE HIGH-DENSITY PROBES FOR ACUTE AND CHRONIC NEURAL RECORDINGS IN RODENTS	NIMH (sub Neural Dynamics Technologies)	113,606
HAN	VOLTAGE IMAGING ANALYSIS OF STRIATAL NETWORK DYNAMICS RELATED TO VOLUNTARY MOVEMENT AND PARKINSONS DISEASE	NINDS	478,131
HAN	VOLTAGE IMAGING ANALYSIS OF STRIATAL NETWORK DYNAMICS RELATED TO VOLUNTARY MOVEMENT AND PARKINSONS DISEASE (DIVERSITY SUPP)	NINDS	89,789
HAN (Co-PI)	TARGETING PATHOLOGIC SPIKE-RIPPLES TO ISOLATE AND DISRUPT EPILEPTIC DYNAMICS	NIMDS (sub MGH)	316,534
HAO	DEVELOPING MULTIPLEXED MICROENVIRONMENTAL SENSORS FOR PRECISION DIAGNOSTICS OF CANCER METASTASIS	NCI	249,000
KHALIL	PERIVASCULAR TISSUE MODELS TO OVERCOME MGMT-MEDIATED TEMOZOLOMIDE RESISTANCE IN GLIOBLASTOMA	NCI (sub U Illinois)	49,500
KHALIL	PROGRAMMABLE BENCHTOP BIOREACTORS FOR SCALABLE ECO-EVOLUTIONARY DYNAMICS OF THE HUMAN MICROBIOME	NIAID	823,196
KHALIL	EPACE: AUTOMATION PLATFORMS FOR ADAPTABLE AND SCALABLE CONTINUOUS EVOLUTION OF BIOMOLECULES WITH THERAPEUTIC POTENTIAL	NIBIB	804,366
MERTZ	MULTI-LAYER NEURONAL IMAGING WITH REVERBERATION MULTIPHOTON MICROSCOPY	NINDS	388,501
MOYA	A SCALABLE METHOD FOR MAPPING MICROCONNECTIVITY IN TRANSCRIPTOMICALLY DISTINCT NEURON TYPES	NIMH	73,772
NGO	DEVELOPING A TEMPORALLY-REGULATED GENE THERAPY FOR THERAPEUTIC ANGIOGENESIS	NHLBI	69,500
O'SHEA	REGULATING PARENCHYMAL REPAIR IN WOUND HEALING	NIGMS	412,500
O'SHEA	NANOTHERAPEUTICS FOR TARGETED GLIAL CELL DRUG DELIVERY	NINDS	247,500
O'SHEA	INTRAVITAL IMAGING OF TRANSPLANT EVOKED GLIA REPAIR IN STROKE	NINDS	206,250
ROBLER	MULTIPLEXED IMAGING IN THE NEAR INFRARED WITH INDIUM PHOSPHIDE QUANTUM SHELLS	NIGMS (sub Northeastern)	160,116
STANGL	NEURAL MECHANISMS OF SPATIAL REPRESENTATIONS BEYOND THE SELF	NINDS	241,421
VAJDA	ANALYSIS AND PREDICTION OF MOLECULAR INTERACTIONS	NIGMS	576,150
WONG W	PRECISE TUMOR TARGETING WITH LOGIC CAR CIRCUITS	NCI	553,669
WONG W	TARGETING FIBROBLAST DISCOIDIN DOMAIN RECEPTOR 2 FOR IMMUNOTHERAPY TO PULMONARY FIBROSIS	NHLBI (sub U Michigan)	20,976
WONG W	MULTIPLEXED AND LOGICAL CONTROL OF THE MAMMALIAN TRANSCRIPTOME USING CAS13	NIBIB	785,840
WONG W	PRECISE TARGETING OF T1D SPECIFIC T CELLS USING CAR AND PEPTIDE-MHC CHIMERIC ANTIGEN LIGANDS	NIDDK	1,444,308
WONG J	THE BOSTON UNIVERSITY KIDNEY AND MEDICAL ENGINEERING PROGRAM (BU-KIDMEP)	NIDDK (sub BMC)	13,157

NSF Awards

PI	Award Title	Prime Sponsor	\$ Amount
CHEN (Co-PI)	NANOSYSTEMS ENGINEERING RESEARCH CENTER FOR DIRECTED MULTISCALE ASSEMBLY OF CELLULAR METAMATERIALS WITH NANOSCALE PRECISION: CELL-MET	NSF	3,219,519
DUNLOP	OPTOGENETIC SELECTION FOR DYNAMIC PHENOTYPES IN BACTERIA	NSF	796,158
EYCKMANS (Co-PI)	UNDERSTANDING THE ROLE OF MECHANICAL BOUNDARY CONDITIONS ON TISSUE ASSEMBLY AND REPAIR IN 3D FIBROUS MICROTISSUES	NSF	635,000
HAN	COLLABORATIVE RESEARCH: DYNAMIC INTERACTIONS OF INDIVIDUAL NEURONS IN SUPPORTING HIPPOCAMPAL NETWORK OSCILLATIONS DURING BEHAVIOR	NSF	75,849
KLAPPERICH	EQUIPMENT: MRI: TRACK 1 ACQUISITION OF AN ILLUMINA NEXTSEQ 2000 SEQUENCING INSTRUMENT	NSF	639,794
SEN	NCS-FR: ENGINEERING BRAIN CIRCUITS FOR COMPLEX SCENE ANALYSIS	NSF	2,961,895
WONG J	THE BOSTON UNIVERSITY KIDNEY AND MEDICAL ENGINEERING PROGRAM (BU-KIDMEP)	NSF (sub Upenn)	125,000

Awards from Industry

PI	Award Title	Prime Sponsor	\$ Amount
CHEN	PREVENTING STRESS-INDUCED VASCULAR LEAK	Ventus Therapeutics	189,982.00
ECONOMO	FLEX: FLUORESCENT LIGHT EXAMINATION OF EXTENSORS (AND OTHER MUSCLES)	Research Corporation for Science Advancement	55,000.00
ECONOMO	FLEX: FLUORESCENT LIGHT EXAMINATION OF EXTENSORS (AND OTHER MUSCLES)	Research Corporation for Science Advancement	55,000.00
ECONOMO	FLEX: FLUORESCENT LIGHT EXAMINATION OF EXTENSORS (AND OTHER MUSCLES)	Research Corporation for Science Advancement	55,000.00
ECONOMO	FLEX: FLUORESCENT LIGHT EXAMINATION OF EXTENSORS (AND OTHER MUSCLES)	Research Corporation for Science Advancement	55,000.00

DOD

PI	Award Title	Prime Sponsor	\$ Amount
CHENG	IPA FOR CHENG JI-XIN	VA Medical Center	23,887
CHENG	PERSONNEL AGREEMENT FOR RESEARCH SERVICES OF HONGJIAN HE	VA Medical Center	90,580
GALAGAN	CONTINUOUS MULTIPLEXED SENSING FROM SWEAT AND ISF WITH A NEXT GENERATION WEARABLE	Defense and Security Accelerator	209,330
GREEN	EXCET: DIAL-A-THREAT YEAR 3	CDC Chemical Biological Center (sub Excet, Inc.)	71,901
GREEN	DEVELOPMENT OF LOW-COST, PAPER-BASED SYSTEM FOR THE DETECTION OF ADVENTITIOUS AGENTS IN BIOMANUFACTURING PROCESSES	DOD (sub Advanced Regenerative Manufacturing Inst. Inc.)	412,500
GREEN	SMART PAPER-INTEGRATED TECHNOLOGIES FOR INTERROGATING READINESS (SPITFIRE)	DOD/DARPA	2,982,362
GRINSTAFF	PRE-CLINICAL TECHNOLOGY VALIDATION INTRANASAL KETAMINE	Uniformed Services University (sub Jackson Foundation)	146,000
KHALIL	EPIGENETICALLY PROGRAMMED BIOLOGICAL MATERIALS	DOD	611,489
NIA	UNCOVERING CELL INTRINSIC AND EXTRINSIC FACTORS GOVERNING MELANOMA DORMANCY AT SINGLE-CELL RESOLUTION	DOD	646,252
SEN	FLEXIBLE PROCESSING OF COMPLEX AUDITORY SCENES USING ATTENTION	DOD	25,000

Awards from Foundations

PI	Award Title	Prime Sponsor	\$ Amount
CHEN	HAGER - BILLING AGREEMENT: UNCOVERING RULES OF ROBUST COLLECTIVE CELL SIGNALING IN COMPLEX ENVIRONMENTS	HHMI	15,745
CHEN	ENGINEERING HIGH DENSITY FUNCTIONAL VASCULAR, LYMPHATIC, AND DUCTAL TREES	WELLCOME (SUB WYSS INST)	34,926
CHENG	HIGH-CONTENT SRS IMAGING OF METABOLISM IN MULTICELLULAR BIOLOGICAL SYSTEMS	HHMI	7,107
ECONOMO	THE DESCENDING CONTROL OF MOVEMENT INITIATION BY THE MOTOR CORTEX	KLINGENSTEIN FUND	75,000
ECONOMO	ILLUMINATING THE MOLECULAR MECHANISMS OF MEMORY FORMATION DURING BEHAVIOR	THE KAVLI FOUNDATION	55,000
EYCKMANS	TARGETING EXTRACELLULAR MATRIX-SENESCENCE CROSSTALK AS A NOVEL APPROACH TO IMPROVE TISSUE REPAIR IN AGING	HEVOLUTION FOUNDATION	500,000
HAO	CRISPR-CAS-AMPLIFIED BIOMARKERS FOR DISEASE DETECTION AND MONITORING AT THE POINT OF CARE	PhRMA FOUNDATION	100,000
KHALIL	SYNTHETIC APOMIXIS FOR PERPETUATING HETEROSIS IN HYBRID CROPS	OPEN COLLECTIVE FOUNDATION	110,000
KHALIL	SCHMIDT SCIENCE POLYMATH AWARD	SCHMIDT FUND	500,000
KLAPPERICH	CLINICAL EVALUATION OF A NOVEL DIGITAL HEALTH INTERVENTION FOR NUTRITIONAL ANEMIAS	MASSACHUSETTS LIFE SCIENCES CENTER	805,660
NIA	DEVELOPMENT OF CRYSTAL RIBCAGE FOR IMAGING OF FUNCTIONING LUNG AT HIGH SPATIOTEMPORAL RESOLUTION	BECKMAN FOUNDATION	150,000
NIA	SLOAN RESEARCH FELLOWSHIP	SLOAN FOUNDATION	75,000
O'SHEA	GLIA REPAIR OF CHRONIC SCI LESION CORES BY A SEQUENTIAL ENZYMATIC DEBRIDEMENT AND CELL GRAFTING STRATEGY	WINGS FOR LIFE	108,400
PRATT	TUMOR-HOMING KINASE ACTIVITY PROBES FOR RARE CELL PROFILING	ALLEN FOUNDATION	500,000
SUNDARAM	CHARTING THE IMPACT OF MYOCARDIAL BRIDGING(MB)- IN VITRO MODELS FOR THE GEOMETRY SPECIFIC ROLE OF MB IN ATHEROSCLEROSIS	AHA	64,610
TEO	INVESTIGATING MECHANISMS REGULATING FLOW-INDUCED NOTCH-ACTIVATED VASCULAR BARRIER FUNCTION	AHA	74,792
TEPLENSKY	ENGINEERING VERSATILE VACCINE RESPONSES THROUGH NANOMATERIAL DESIGN	BECKMAN FOUNDATION	150,000
ZAMAN	HEALTH OF REFUGEES AND FORCIBLY DISPLACED COMMUNITIES	WELLCOME TRUST	75,452

Awards for Student Support

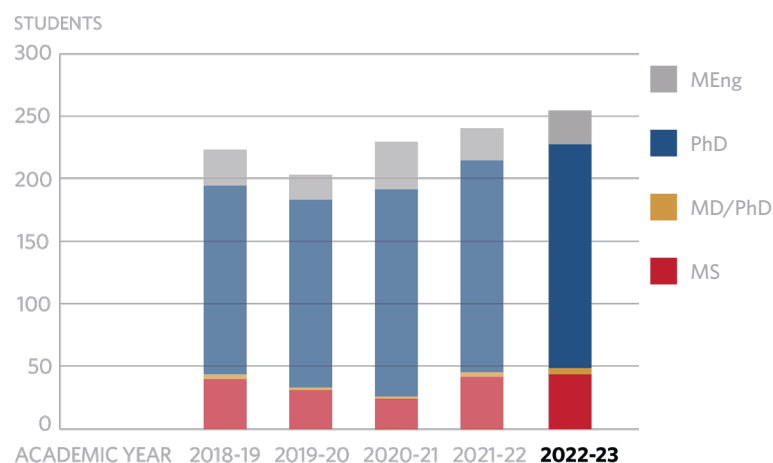
PI	Award Title	Prime Sponsor	\$ Amount
BOAS	A FIELD-DEPLOYABLE MAGNETIC RESONANCE IMAGING RHIZOTRON FOR MODELING AND ENHANCING ROOT GROWTH AND BIOGEOCHEMICAL FUNCTION	DOE (sub MGH)	52,813
BOAS	BILLING AGREEMENT FOR AYMAN ABDELHAKEEM	NINDS (sub MGH)	23,055
BOAS	BILLING AGREEMENT FOR MACKENZIE HYMAN	NINDS (sub MGH)	10,252
BOAS	BRAIN CONNECTS: THE CENTER FOR LARGE-SCALE IMAGING OF NEURAL CIRCUITS (LINC)	NINDS (sub MGH)	17,929
BRESSLER	DEVELOPMENT OF A SURGICAL DRUG DELIVERY SYSTEM FOR ENHANCEMENT OF CAR T CELL ACTIVITY	NCI	52,694
CARBONERO	MACHINE LEARNING FOR ANALYZING STATE DEPENDENT NEURONAL NETWORK DYNAMICS	NIMH	39,785
CHEN	SYNTHETIC BIOLOGY AND BIOTECHNOLOGY (SB2) PREDOCTORAL TRAINING PROGRAM	NIGMS	229,759
DORAN	SIMULTANEOUS OPTICAL VOLTAGE IMAGING AND FMRI IN BEHAVING MICE	NINDS	21,754
DUNLOP, KHALIL CHEN (Co-PIs)	NRT-UROL: A CONVERGENT TRAINING PROGRAM ON BIOLOGICAL CONTROL	NSF	2,999,999
GRINSTAFF	TRANSLATIONAL RESEARCH IN BIOMATERIALS	NIBIB	223,673
GRINSTAFF W	TRANSLATIONAL RESEARCH IN BIOMATERIALS (ADMIN SUPP)	NIBIB	53,810
KLAPPERICH	CLARE BOOTHE LUCE FELLOWSHIP FOR MADISON FLETCHER	Luce Foundation	65,244
KLUMPE	DAMON RUNYON POSTDOCTORAL FELLOWSHIP AWARD	Damon Runyon Foundation	74,000
SHI	PROBING IMMUNOVASCULAR MECHANOBIOLOGY IN PNEUMONIA-ASSOCIATED ACUTE LUNG INJURY AT THE SINGLE CAPILLARY LEVEL	NHLBI	52,694
TOUS	MULTIPLEXED OPTOGENETIC CONTROL OF MAMMALIAN GENOME AND TRANSCRIPTOME USING RECOMBINASES AND CAS13	NIGMS	79,582
WHITE	TRAINING PROGRAM IN QUANTITATIVE BIOLOGY & PHYSIOLOGY (QBP)	NIGMS	549,359
WILLIAMS	MECHANISMS OF NEURAL SYNCHRONY IN THE MEDIAL ENTORHINAL CORTEX	NINDS	39,779

Graduate Enrollment

ENROLLMENT FOR AY 2021-2022

		LEAP	MS	MD/PhD	PhD	MEng	TOTAL
US	M	7	19	4	78	7	115
	F	5	16	1	52	18	92
INT'L	M	1	4	0	17	1	23
	F	2	4	0	32	2	40
TOTAL		15	43	5	179	28	270

GRADUATE PROGRAM POPULATION

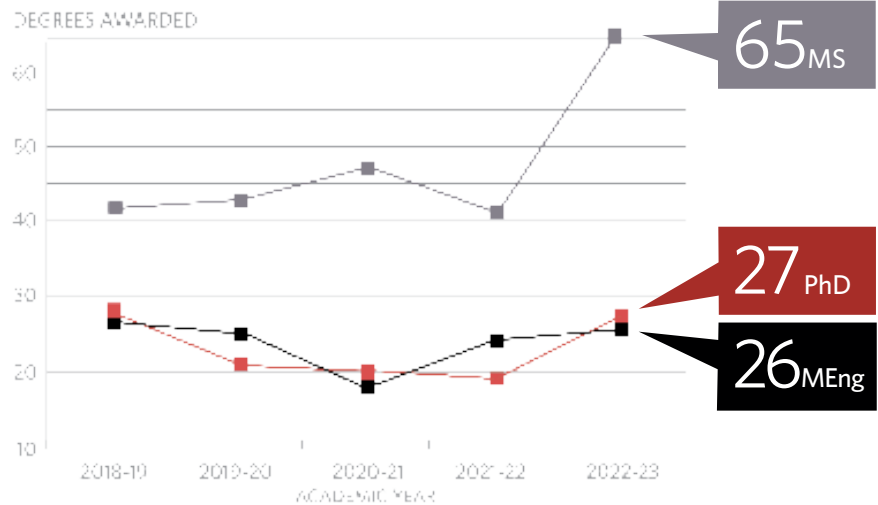


GRADUATE FUNDING AY 2021-2022

FELLOWSHIPS AND GRANTS	PhDs
Doctoral Research Fellowship	115
BME Distinguished Fellowship	19
Dean's Fellowship	2
NIH Quantitative Biology and Physiology T32 Training Grant	11
NIH Translational Research in Biomaterials T32 Training Grant	6
NIH Synthetic Biology and Biotechnology T32 Training Grant	2
BUSM T32 Training Grant	2
NSF Graduate Research Fellowship	11
NIH F31 Fellowship	7
Martin Luther King Fellowship	1
Taiwan Government Fellowship	1
Schlumber Foundation Fellowship	1
Dean's Fellowship	1
Clare Booth Luce Fellowship	1
Nanotechnology Innovation Center (BUnano) Fellowship	1
Kilachand Fellowship	1
Fellowship funded by Abhijit Kulkarni Gift	1
Lincoln Lab Scholarship	1
TOTAL	184

Graduate Degrees Awarded

DEGREES AWARDED



ADMISSION RESULTS FOR AY 2021-2022

		APPLICANTS					MATRICULANTS				
		LEAP	MEng	MS	PhD	TOTAL	LEAP	MEng	MS	PhD	TOTAL
US	M	15	26	51	148	240	7	5	9	13	34
	F	14	46	58	206	324	5	11	13	16	45
INT'L	M	4	33	87	166	290	1	2	1	3	7
	F	11	34	81	151	277	2	2	1	8	13
TOTAL		44	139	277	671	1131	15	20	24	40	99

ADMISSION RESULTS FOR AY 2022-2023

		APPLICANTS					MATRICULANTS				
		LEAP	MEng	MS	PhD	TOTAL	LEAP	MEng	MS	PhD	TOTAL
US	M	10	24	53	163	250	7	6	14	15	42
	F	14	47	53	194	308	5	14	11	9	39
INT'L	M	11	28	71	229	339	0	0	3	4	7
	F	8	24	86	210	328	2	0	4	8	14
TOTAL		43	123	263	796	1225	14	20	32	36	102

PHD Graduates

AUGUST 25, 2022

Usman Ghani
(Sandor Vajda, PhD Advisor)
"Investigating Determinants of Tumor Escape and Developing Computational Tools for Protein-Protein Interface Analysis"

Xuedong Zhu
(Michelle Sander, PhD Advisor)
"Pulsed Infrared Light for Modulating Neuromuscular Transmission"

JANUARY 13, 2023

Yoseph Warren Dance
(Joe Tien, PhD Advisor)
"Engineering Three-Dimensional Breast Tumor-on-a-Chip Devices to Investigate the Roles of Adipose Tissue and Obesity in the Early Stages of Breast Cancer Metastasis"

Megan Elizabeth Griebel
(Sandor Vajda, PhD Advisor)
"Deconstructing Wound Healing: in vitro Models and Factors Affecting Stromal Tissue Repair"

Zachary Joseph Heins
(Mo Khalil, PhD Advisor)
"Development of the eVOLVER Continuous Culture Platform for High-Throughput Phage-Assisted Continuous Evolution"

Uros Kuzmanovic
(James Galagan, PhD Advisor)
"Mining Microbes to Engineer Novel Biosensors"

Antonio Ortega Martinez
(David Boas, PhD Advisor)
"Wearable Brain Computer Interfaces with Near Infrared Spectroscopy"

David Patrick McIntyre
(Doug Densmore, PhD Advisor)
"Design Automation and Rapid Prototyping of Multi-Component Droplet Microfluidic Platforms"

Matthew Herbert Ning
(Kamal Sen, PhD Advisor)
"Decoding Spatial Location of Attended Audio-Visual Stimulus with EEG and fNIRS"

Jian Carlo Paz Nocon
(Kamal Sen, PhD Advisor)
"Neural Circuits for Solving the Cocktail Party Problem in Mouse Auditory Cortex"

Breanna M. O'Reilly
(Allyson Sgro, PhD Advisor)
"Multiscale Interrogation of Mechanically Driven Stromal Cell Behaviors"

Anup Tank
(Darren Roblyer, PhD Advisor)
"Optical Imaging Markers of Breast Cancer Treatment Response and Resistance"

Jiarui Yang
(David Boas, PhD Advisor)
"Serial Sectioning Block-Face Imaging of Post-Mortem Human Brain"

MAY 21, 2023

Mark Samuel Aronson
(Allyson Sgro, PhD Advisor)
"Biophysical Methods Bridging Signal Pathway Architecture and Dynamics in Multigenerational Bacterial Processes"

Yage Ding
(Wilson Wong, PhD Advisor)
"Orthogonal Inducible Control of Cas13 Circuits Enables Programmable RNA Regulation in Mammalian Cells"

John Thomas Giblin
(David Boas, PhD Advisor)
"Quantifying the Effects of Cerebral Capillary Flow Disruptions with Two Photon Microscopy"

Chuoqiao Huyan
(Allyson Sgro, PhD Advisor)
"Advance Cell Signaling Interrogation Using Theoretical and Experimental Approaches in Eukaryotic Model Systems"

Sebastian Eureko Jusuf
(Ji-Xin Cheng, PhD Advisor)
"Antimicrobial Phototherapy: Mechanisms and Translation"

Jack Rainier Kirsch
(Mark Grinstaff, PhD Advisor)
"Biotherapeutic Potentiation for the Treatment of Musculoskeletal Disease"

Andrew Martin
(Mark Grinstaff and Xue Han, PhD Co-Advisors)
"Tools for Modulating and Measuring Autophagy"

Rebecca Anna Mount
(Xue Han, PhD Advisor)
"Characterization of Hippocampal CA1 Network Dynamics in Health and Autism Spectrum Disorder"

Robert Sabatelle
(Mark Grinstaff, PhD Advisor)
"Design, Formulation Characterization and Evaluation of Polymeric Nanoparticles for Local Chemotherapy"

Nathan Tague
(Mary Dunlop, PhD Advisor)
"Utilizing Light as an Input and Output for Synthetic Biology and Metabolic Engineering"

Yuying Tan
(Ji-Xin Cheng, PhD Advisor)
"Uncovering Cancer Metabolic Signatures by High-Content Stimulated Raman Scattering (SRS) Imaging"

Kuan Cheng Wu
(David Boas, PhD Advisor)
"Critical Closing Pressure with Pulsatile Diffuse Optical Signals"

Xin Ye
(Jerry Chen, PhD Advisor)
"Ultra-Fast Two-Photon Microscope for Population Neuronal Voltage Imaging"

MENG Graduates

AUGUST 25, 2022

Catherine E. Barker
Nushera Khan

JANUARY 13, 2023

MEng with Practice Degree**Jessica Koch**

MAY 21, 2023

Kylee Ann Adams Anders
Christopher Baeky
Julie Anne Constantinescu
Stella Arianna Erickson
Omar Labban
Ryan Jason Lee
Aubrey Anmei Little
Erin Lockhart
Destiny Uchechi Matthew
Anushka Murti
Alexandra Catherine Elizabeth Nadeau
Matthew Thomas Nestler
Camille Nimmer-Guentner
Thomas Edward Joseph Noonan
Chisom Joan Orakwue
Corey Jacob Orlando
Ana Margarita Rosa Garcia
Alice Margaret Rose
Sara Elizabeth Rumpfer
Kaylee P. Tran
Sarah Michelle Young

MEng with Practice Degrees

Jordan Michelle Camarillo
Tzu-Yu Chiang

Brennan Lilliana Lavoie

MS Graduates

AUGUST 25, 2022

Isabella Camille Darke

Marissa McPhillips
(Joyce Wong, MS Thesis Advisor)
"A Biomaterials Science and Engineering Approach to Developing Spion-Based Lipid Nanoparticle Systems for Rare Immune Cell Isolation"

Inbo Shim
(Wilson Wong, MS Thesis Advisor)
"Tuning the SUPRA CAR to Different High/Low HER2 Levels"

Eileen Carol Walsh-Rock
(Joyce Wong, MS Mentored Project Advisor)
"Targeted Microbubbles as a Theranostic for Nascent Abdominal Adhesions"

Sydney Bailes
(Laura Lewis, PhD Advisor)
"Investigating Alterations in Resting-State and Sleep-Related Network Dynamics in Aging Populations"

Katie A. Bunde
(Michael Smith and Dimitrije Stamenović, PhD Co-Advisors)
"Application of Biomechanical Imaging to Observe the Effect of Force Transmission on Tensional Homeostasis of Living Cells"

Daniel David Carbonero
(John White and Mark Kramer, PhD Co-Advisors)
"Machine Learning Framework for Analyzing Shifting Neuronal Network Dynamics in Calcium Recordings"

Jingyao Chen
(Wilson Wong, PhD Advisor)
"Cell-Free Recombinase Genetic Circuit for Biological Memory Storage"

Neilesh Raymond Frings
(Elise Morgan, PhD Advisor)
"Characterizing the Vertebral Endplate Region and its Risk of Failure with Respect to Aging and Disc Degeneration"

Nin Rebecca Kang
(Alex Green, PhD Co-Advisor)
"Integrating Antibodies and Nucleic Acid Amplification for Rapid, Sensitive and Portable Protein Detection"

De'Ja Simone Rogers
(David Boas, PhD Advisor)
"Investigating Spontaneous Dynamics during All Sleep Stages using Modified fNIRS-EEG Hybridization"

Cristina Tous
(Wilson Wong, PhD Advisor)
"Optogenetic Control of Mammalian Gene Expression using Recombinases and Cas13"

Jeremy Christian Tran
(John Ngo, PhD Advisor)
"Proteolytic Regulation of Natural and Synthetic Notch Signaling Proteins"

MS with Practice Degree**Yibin Chen**

JANUARY 13, 2023

Priyam Shrikant Ambastha
(Mo Khalil and Christine McBeth, MS Thesis Co-Advisors)
"Developing a Microfluidic Device for Detecting Antibiotic Tolerance in Bacteria"

Sina Analoui
(Ben Scott, MS Mentored Project Advisor)
"Dispersion and Differentiation of Transplanted HVC-Derived Neural Progenitors in Juvenile Finches"

Anna Dailey Barbo
(Irving Bigio, MS Mentored Project Advisor)
"Multispectral Imaging of Colonoscopies"

Nina Zhou Chen
(Cathie Klapperich, MS Mentored Project Advisor)
"Designing In-House Lateral Flow Strips"

Yuqi Chen
(Ji-Xin Cheng, MS Mentored Project Advisor)
"Video-rate Mid-infrared Photoacoustic Microscopy"

Christian Daniel DeMoya
(Mark Grinstaff, PhD Advisor)
"Development of a Sulfated Poly(amido-saccharide) Interpenetrating Polymer Network as a GAG-Mimetic Treatment for Osteoarthritis"

Pierre Fabris
(Xue Han, PhD Advisor)
"Genetically Encoded Post-Synaptic Activity Indicators"

Zhongyue Guo
(Ji-Xin Cheng, PhD Advisor)
"Protein Aggregation in Living Cells by Mid-infrared Photothermal Microscopy"

Munib Hasnain
(Mike Economo, PhD Advisor)
"Investigating Population-Level Control Mechanisms of Movement Planning and Execution in the Mouse Motor Cortex"

Sebastian Jusuf
(Ji-Xin Cheng, PhD Advisor)
"Potentiation of Antimicrobials through Catalase Inactivation for Skin and Soft Tissue Infections"

Christopher Joseph Kuffner
(John Ngo, PhD Advisor)
"Conditionally Stable Proteins for Single-Molecule RNA Imaging and Protein Interaction Control in Live Cells"

Rang Li
(Diane Joseph-McCarthy, MS Thesis Advisor)
"Computational Identification of Antibody-Binding Epitopes from Mimotope Datasets"

Colleen Mary McCarthy
(Joyce Wong, MS Thesis Advisor)
"Fibrin Targeting Microbubbles for the Detection of Nascent Surgical Adhesions"

Adam Case McCormack

Mohamed Athif Mohammadu Rizan (Xue Han, PhD Advisor)
"Single-Cell and Population Dynamics of Neuronal Networks"

Shriya Gajanan Nimbalkar
(Brianna Connizzo, MS Mentored Project Advisor)
"In vivo Model to Investigate the Effect of Sustained Inflammation on Shoulder Joint Health"

Owen O'Connor
(Mary Dunlop, PhD Advisor)
"High Throughput Analysis of Single-Cell Dynamics in Bacterial Microcolonies Using Deep Learning"

Nikola Otic
(David Boas, PhD Advisor)
"Multi-Wavelength Multi-Distance Approach for Evaluating the Metabolic Activity of the Brain in Diffuse Correlation Spectroscopy and Wearable Near Infrared Spectroscopy"

Kathryn Eleanor Regan
(Hadi Nia, PhD Advisor)
"Probing the Multiscale Mechanical Properties of Biological Tissues in 3-D at Optical Resolution"

Abhishek Samal
(Lucia M. Vaina, MS Mentored Project Advisor)
"Cortical Regions Underlying the Detection of a Moving Object during Observer's Self-Motion"

Brett Michael Tingley
(Mark Grinstaff, PhD Advisor)
"Disabling Respiratory Virus Proliferation via Localized Drug Delivery and Virus Deactivating Nanoparticles"

Brandon Williams
(John White, PhD Advisor)
"Mechanisms of Neural Synchrony in the Medial Entorhinal Cortex"

Siyi Zheng
(Hadi Nia, MS Thesis Advisor)
"Evolution of Residual Solid Stresses and Viscoelastic Properties in Murine Brains by Age"

Xingjian Zhong
(Allison Dennis, PhD Advisor)
"Evaluating NIR-II Active Semiconductor Nanocrystals towards Biomedical Applications"

MS with Practice Degree

Prem Nelesh Kothandaraman Gowri
(Michael Albro, MS Mentored Project Advisor)
"Optimizing TGF- β in Engineered Cartilage and Studying the Effects of Clustered Cell Morphology"

MAY 21, 2023

Honour Oluwatemiloron Adewumi
(Tim O'Shea, PhD Advisor)
"Engineering Immature Astrocyte Grafts for Neural Regeneration"

Andrew S. Chan
(David Boas, MS Mentored Project Advisor)
"Fluoro-Sequencing of Proteins using Hyperdimensional Imaging"

Jiyang Chen
(Ji-Xin Cheng, MS Mentored Project Advisor)
"Near Infrared Phototherapy of MRSA: Sensitizes MRSA to Anti-Microbials in Both in vitro and in vivo Environment"

Dhimiter Cobani
(Sandor Vajda, MS Mentored Project Advisor)
"Improving Antibody-Antigen Structure Prediction Using AlphaFold-2"

Cristian Enrique Coriano-Ortiz
(Mary Dunlop, PhD Advisor)
"Characterization of Optogenetic Systems for Multiplexed Control of Synthetic Biological Networks"

Aditya Datye
(Shelley Fried and Lucia M. Vaina, MS Mentored Project Co-Advisors)
"Morphological Analysis of Fluorescently Labeled Ion Channels in CNS Neurons"

David DeMeritt
(David Boas, MS Mentored Project Advisor)
"Semi-Auto OCT Stalling Validation"

Simrita Dhulekar
(Joyce Wong, MS Mentored Project Advisor)
"Characterization of Fibrin-Targeted Polymerized Shell Microbubble Theranostic Agents for the Detection and Treatment of Abdominal Surgical Adhesions"

Eric Michael DuBois
(Tim O'Shea, PhD Advisor)
"Regulation of Glial Interfaces in the Mouse Central Nervous System Leveraging Bioactive, Glycosylated Materials"

Amit Eshed
(Alex Green, MS Thesis Advisor)
"Aptamer-Based Sequence Verification Platform for Rapid Multiplexed Detection of Viral RNA Targets"

Ariane Garrett
(Darren Roblyer, PhD Advisor)
"Monitoring Cardiovascular Health with Speckle Contrast Optical Spectroscopy"

Yuyang Gu
(Mark Grinstaff, MS Thesis Advisor)
"Poly(1,2-glycerol carbonate) Nanoparticles for Delivery of Hydrophilic Therapeutics"

Rose Anna Keating
(John Ngo, MS Thesis Advisor)
"Translational Control via Viral Protease Activated Stop Codon Base Editing"

James Kweonkyeong Kim
(Xue Han, MS Mentored Project Advisor)
"Investigate L-dopa Induced Dyskinesia and Potential Music Therapy for Parkinson's Disease"

Noshin Nawar
(Zeba Wunderlich, PhD Advisor)
"Quantifying Heterogeneity in the Drosophila melanogaster NF-KB Imd Pathway of Innate Immunity with Live Imaging of Fluorescent Reporters"

Jinan Qin
(Alex Green, MS Mentored Project Advisor)
"Investigating Methods to Protect Linear DNA in Lysate-Based Cell-Free Protein Expression Systems"

Cara Rose Ravasio
(Xue Han, PhD Advisor)
"Understanding Deep Brain Stimulation in the Hippocampus"

Shruthi Sankaranarayanan
(Alex Reinhart, MS Thesis Advisor)
"Causal Role of Different Frequencies of Brain Rhythms for the Processing of Conscious and Unconscious Perceptual Contents"

Dylan A. Smolen
(Hadi Nia, MS Thesis Advisor)
"Design and Fabrication of Porcine Crystal Ribcage for High Resolution ex vivo Imaging"

Azeo Torre
(Hadi Nia, MS Mentored Project Advisor)
"Lung Cancer Classification using Deformable Image Registration of Sequential CT volumes and Machine Learning"

Anish Srinivas Vasan
(Chris Chen and Jeroen Eyckmans, PhD Co-Advisors)
"Effects of Senescence on 3D Matrix Generation in a Wound-on-Chip Model"

Austin Wetzel
(Alberto Cruz-Martin, MS Mentored Project Advisor)
"Implementing a Multi Camera Acquisition Pipeline to Study Rodent Behavior"

Aleksandrs Zosuls
(Kamal Sen, MS Thesis Advisor)
"Focal Stimulation of the Basilar Membrane"

MS with Practice Degrees

Soham Prasad Kulkarni
(Jeroen Eyckmans, MS Mentored Project Advisor)
"Validation of WoundCompute: A Program to Assess Wound Closure in Engineered Microtissues"

Sydney Helen Marchando
(Joyce Wong, MS Thesis Advisor)
"Establishing a Method for Modulating Progesterone Using a Nanoparticle-Based System"

Jashan Sandhu
(Arjit Chakravarty and Diane Joseph-McCarthy, MS Mentored Project Co-Advisors)
"Engineering Molecular Binders to Prevent SARS-CoV-2 Spike Protein from Adopting a Conformation Competent to Bind its Human Receptor"

GRAD STUDENT AWARDS, TALKS AND FELLOWSHIPS

SB2/QBP/TRB Annual Symposium - Best Talk: **Adam Sanford**

NIH F31: **Patrick Doran**

Kilachand Fellowship: **Erin Neu**

NIH/NHLBI F31: **Menna Siddiqui**

NSF-GRFP: **Juan Jaramillo Montezco**

NSF GRFP: **Vivian Shi**

International Society for Magnetic Resonance in Medicine - ISMRM Summa Cum Laude Merit Award (talk): **Baarbod Ashenagar**

World Congress on Endometriosis in Edinburgh Scotland (poster): **Emily Davis**

Gordon Research Conference - Synthetic Biology (talk): **Jingyao Chen**

Gordon Research Conference : Physical Science of Cancer: **Rohin Banerji**

NSF GRFP Honorable Mention: **Zoe Garman**

BMES (talk): **Eric DuBois**

SB3C: Neil Frings, **Timothy Josephson**

BMES Faculty for the Future Schlumberger Foundation (poster): **Honour Adewumi**

BUnano: **Brett Tingley**

BMES 2023 : **Laboni Hassan**

University of Wisconsin Division of Otolaryngology, Voice & Swallow Clinics Lecture Series: **Hasini Weerathunge**

ASHA Convention: **Hasini Weerathunge**

Harvard-MIT Speech and Language Biomarkers Interest Group: **Hasini Weerathunge**

Neural Bases of Speech Production Symposium: **Hasini Weerathunge**

ASHFoundation New Century Scholars Doctoral Scholarship: **Hasini Weerathunge**

Academy of Neurologic Communication Disorders and Sciences (ANCDS) Student Fellowship: **Hasini Weerathunge**

American Speech-Language-Hearing Association Pathways program: **Hasini Weerathunge**

American Speech-Language-Hearing Association Research Mentoring-Pair Travel Award: **Hasini Weerathunge**

Barrels Meeting XXXV: **Hasini Weerathunge**

McNair Scholars program at UConn - PhD panel: **Hasini Weerathunge**

NSF Graduate Research Fellowship(posters): **Hasini Weerathunge**

Undergraduate Enrollment

ENROLLMENT FOR AY 2022-2023

602 STUDENTS
in the BME program

34%
of the College of
Engineering

	BME Department			All College of Engineering		
	F	M	TOTAL	F	M	TOTAL
FRESHMAN	106	72	178	201	308	509
SOPHOMORE	86	83	169	157	345	502
JUNIOR	62	56	118	112	223	335
SENIOR	66	71	137	134	272	406
TOTAL	320	282	602	604	1148	1752

COLLEGE OF ENGINEERING SELECTIVITY FOR AY 2022-2023

51% INCREASE
in selectivity over 10 years

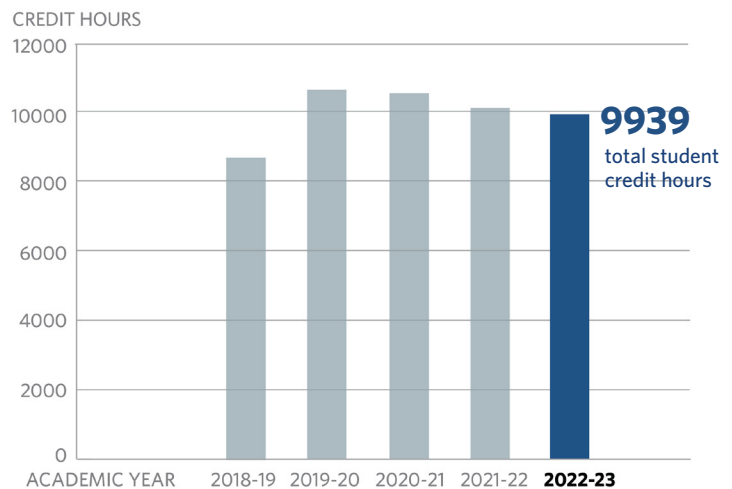


BME TEACHING HISTORY - AY 2022-2023

70 COURSES TAUGHT

42 PRIMARY FACULTY

\$50 MILLION
in research funding



Undergraduate Degrees Awarded

BS DEGREES BREAKDOWN - AY 2022-2023

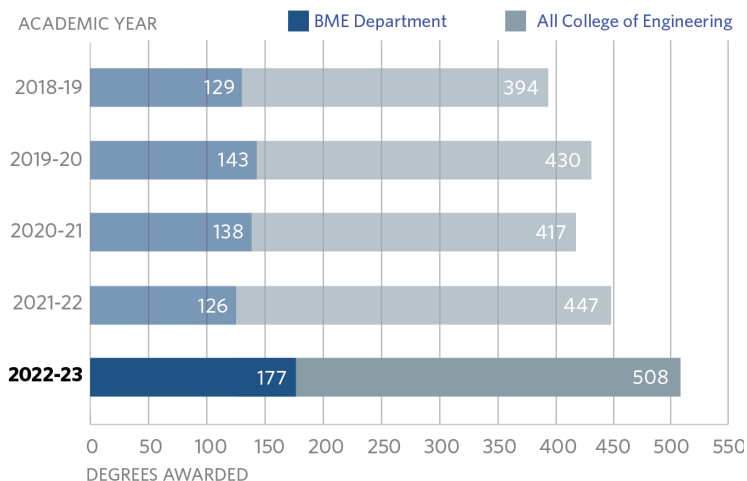
The Department awarded

177

BACHELOR OF SCIENCE
DEGREES

22%

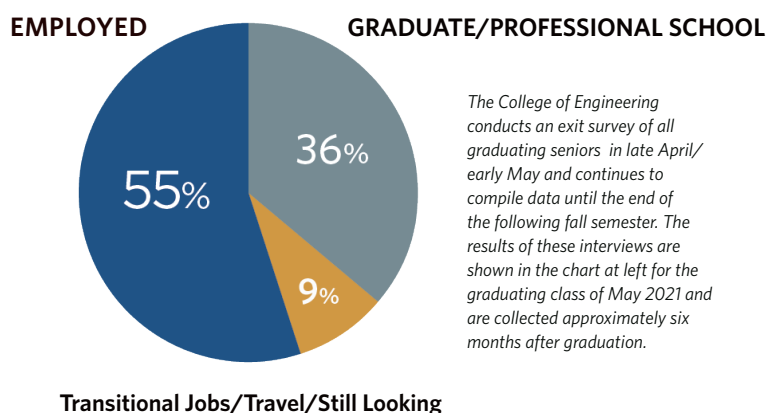
of all the BS degrees awarded by
the College of Engineering.



TRACKING ALUMNI

POST GRADUATION PLANS - 2020-2021 BME GRADUATES

91% EMPLOYED
or ENROLLED IN
GRADUATE SCHOOL
of 2020-2021 graduates



MMEDIC

MMEDIC

The **Modular Medical/Dental Integrated Curriculum (MMEDIC)** is a competitive early selection program that leads to a BS in Engineering and an MD from the Medical School.

This program is offered and administrated in collaboration with our School of Medicine and is designed to train biomedical engineers who have the MD as their ultimate degree objective. MMEDIC admits to the School of Medicine a small number of highly qualified students who have completed two years of the premedical option of the biomedical engineering curriculum. The program is not designed to accelerate the engineering or the medical training but rather to effect a better transition from undergraduate engineering study to graduate medical training. The BS in Biomedical Engineering is normally earned after 4 years of undergraduate study and the MD after an additional 4 years of study at the Boston University Medical School.

Undergraduate Student Awards

In 2023, several of the BME seniors were recognized for achievements and contributions to the Boston University community and BME profession.

Adam M. Miller Memorial Award:	Awarded by the Biomedical Engineering Department to the graduating senior who has best advanced the reputation and prestige of the department through his/her involvement in department, college, university, professional activities, or organizations, as well as through the academic and senior project programs. This year the award was presented to Riya Sen .
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Engineering Alumni Association Student Leader Award:	Presented to seniors who have made outstanding contributions to the College and University through their involvement in activities and organizations. The 3 award winners this year are Anushka Rathi , Owen Kelly and Brian Zhou .
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Student Advisor Service Awards:	Among the ENG winners for outstanding assistance in advising this year, the following BME seniors were recognized: Owen Kelly , Kate Lee , Yuke Li , Laura Raiff , Riya Sen and Ahmed Al Saif .
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Undergraduate Student Service Award:	This year's award winner is BME senior Soumaya Fayie .
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Outstanding Senior Project Award:	First Place in the Department's 2023 Outstanding Senior Design Project Award went to Ksenija Tasich , Krish Kapadia , Naimah Gill and Sarah Sheng for their project "Panoramic Camera Design for the Detection of Colorectal Cancer", under the supervision of Ousama A'amar and Irving Bigio (Boston Veterans Administration Hospital)
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Societal Impact Capstone Project Award (joint award):	Second Place in the Department's 2023 Societal Impact Capstone Project Award went to Alexandra Dolynuk , Soumaya Fayie , Kfir Flank , Aurelia Leona and Farida Korna for their project "White Matter Lesion Quantification from Structural Brain Images".
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Entrepreneurial Award:	Second Place in the Department's 2023 Entrepreneurial Award went to Mikayla Crowley and Dea Turashvili for their project "Autonomic Nervous System Data: Automatic Analysis".
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Undergraduate Student Organizations

Boston University Student Chapter of the Biomedical Engineering Society

The purpose of the Biomedical Engineering Society is: "To promote the increase of biomedical engineering knowledge and its utilization." The student chapter at Boston University works towards this goal in all of its activities. The Biomedical Engineering Society provides a focus for community building among BME students with activities which strengthen their understanding of and interest in Biomedical Engineering. The Society provides students with literature, field trips, films and guest lectures, which provide them with a "resource center" concerning such vital areas as career opportunities and graduate study in Biomedical Engineering.

BMES Officers AY 2021-2022

President - Prinjali Kalyan '23

Vice President - Brian Zhou '23

Treasurer - Abbigale Shi '24

Communications Chair:- Yiwen Zhang '24

Events Chair - Maiko Lum '25

Public Relations Chair - Arya Padalkar '24



Undergraduate Research Activities

Fellows from the **Distinguished Summer Research Fellowship program (DSRF)** spend the summer engaged in a transformative research experience under the guidance of a faculty member. The program provides students with \$10,000 per summer to cover housing, living expenses, and research expenses such as supplies, books, and related travel. Fellows must work full time in the lab of an engineering faculty member for at least 10 weeks.

The College of Engineering **Supplemental Undergraduate Research Funds (SURF)** program encourages faculty to involve undergraduates in their research programs during the academic year by providing matching funds for undergraduate students who are working on faculty-sponsored research. Requests for SURF funds are made by individual students when they have found positions in faculty labs.

The **Undergraduate Research Opportunities Program (UROP)** is a University-wide academic program which promotes participation by Boston University undergraduates in faculty-mentored research across all disciplines and throughout the calendar year.

DSRF Summer 2022

Gabriela Berniac
Hadassah Flagg
Rashid Kolaghassi
Farida Korna
William Krska
Taylor Ly
Johnathan Muhvich
Danielle Nadira
Do Hyun Park
Sarah Sheng
Armaan Vasowalla
Yiwen Zhang

DSRF Summer 2023

Jacob Labovitz
Julia Nowak
Logan Packard
Alexander Wagner
Chunlin Zhu
Anvita Reddy

SURF Summer 2022

Grace Chabbott
Hailey Fox
Ronald Huang
George Katsarakis
Kate Lee
Aurelia Leona
Yifei Liu
Shea Mowry
Nisrine Rahmaoui
Ayrton Reulet
Emilia Schimmelpfennig

SURF Fall 2022

May Aon
Gabriela Berniac
Massinissa Bosli
Grace Chabbott
Jacob Chin
Kayla Dunson
Sanford Edelist
Ricardo Fernandez
Hailey Fox
Anne-Sophie Gall
Emma Hartman
Maxine Hsiung
Ronald Huang
Innah Jeon
George Katsarakis
Anna Kawai
Madelyn Keller
Kate Lee
Aurelia Leona
Nicole Leonard
Yifei Liu
Taylor Ly
Artemis Margaronis

SURF Spring 2023

May Aon
Massinissa Bosli
Grace Chabbott
Jacob Chin
Kayla Dunson
Sanford Edelist
Ricardo Fernandez
Anne-Sophie Gall
Emma Hartman
Maxine Hsiung
Jivesh Jain
Allen Jang
Innah Jeon
Anna Kawai
Madelyn Keller
Kate Lee
Aurelia Leona
Nicole Leonard
Joseph Licata
Audrey Lindsay
Taylor Ly
Hanhminh Nguyen
Dylann Palmer
Savannah Parke
Felicia Pinto
Emily Pira
Marissa Ruiz
Adora Saro
Rashmina Sayeeda
Emilia Schimmelpfennig
Erin Shivers
Iris Vinal
Anne Zambon
Yiwen Zhang

SURF Summer 2023

Sulaiman Alsalamah
May Aon
Samer Berghol
Massinissa Bosli
Jacob Chin
Henry Chow
Ricardo Fernandez
Zain Jafri
Allen Jang
Madelyn Keller
Samuel Krick
Meron Nephtalem
Hanhminh Nguyen
Takaya Niibori
Dylann Palmer

UROP Fall 2022

Sukhneet Bhogal
Yazmin Camacho
Andy Liu
Emilia Schimmelpfennig
Olivia Border
Jacob Chin
Alexandra Dolynuk
Nourhan El Sherif
Veronica Hui
Madelyn Keller
Owen Kelly
Nikhil Lahiri
Jeffrey Li
Siyuan Li
Joseph Licata
Payton O'Connor
Ananya Pamaraj
Sabrina Wilderotter

UROP Spring 2023

Bernadelle Boateng
Massinissa Bosli
Sukhneet Bhogal
Madelyn Keller
Jeffrey Li
Emily McCarthy
Takaya Niibori
Payton O'Connor
Laura Raiff
Sabrina Wilderotter

UROP Summer 2023

Henry Chow
Ricardo Fernandez
Aidan Holmes
Jivesh Jain
Allen Jang
Nikhil Lahiri
Joseph Licata
Audrey Lindsay
Emily Long
Emily McCarthy
Hawa Ndiaye
Takaya Niibori
Abed Rhmari Tlemcani
Varun Shah
Anne Marie Zambon

The Senior Design Project



A major strong point of our undergraduate program continues to be the **Senior Design Project**.

The Senior Design Project Experience

Every BME senior is required to develop a project proposal with an individual faculty member, local area scientific mentor, or even a bioengineering corporate technical advisor (with a BME faculty co-supervisor). The project is then carried out with the guidance of the student's technical advisor. This brings together elements of engineering science and engineering design. In coordination with the technical work, this course includes experience in planning, establishing priorities and formal training in technical communication including proposal, abstract, progress reports and oral and written presentations of the final work. In conjunction with the BME Department's Visiting Committee, we have additional lectures from our industry partners to expose the students to elements of entrepreneurship, business plans, intellectual property, marketing, and clinical regulatory issues. The project continues over the full academic year and culminates in a Senior Design Project Conference that is attended by students, faculty, and representatives from BME industry, hospitals and other academic institutions. A record of the project presentations is followed by a listing of participating companies.

2024 Project Presentations

Devices

Ergonomic Earphone Design for High-Fidelity Audio Delivery During Functional Magnetic Resonance Imaging (fMRI) and Electroencephalography (EEG)

May Aon, Massinissa Bosli, Rahul Rangarajan

Treating Alzheimer's with 40Hz Light

Miriam Bounar, Roop Chakrabarti, Jasper Ezekiel, Gary Gega, Abdulrahman Kobayter

Canine Partial Limb Prosthetic

Benjamin Fang, Angelina Marrero, Owen O'Brien, Claudia Zaglewski

A Fiber Stretching and Imaging System

Weikang Ai, Wang Yu

Stretcher-Ventilator System for Mechanotransduction Studies of Mice Tracheas

Ethan Curtis, Natalia Feced Garcia, Christopher Wu

Exosome-Based Biomarker Discovery and Disease Diagnostics

Michelle Yung, Yilin Zhou

The Senior Design Project

Biomechanics

Investigating Sex-Dependent Differences in Tensional Homeostasis

Diya Desai, Josephine Dunphy, Nourhan El Sherif, Marin Perez, & Sabrina Wilderotter

Design and Fabrication of A Novel Negative Pressure Ventilator for Mice and Large Animals

Jung Won Park

Translation of a Novel Microstructured Tissue Fastener into a Coronary Stent

Isabelle Nguyen, Marianne Palmieri, Mark Ruta, Vrishin Sundaram and Nicole Zajac

Design of an Improved Optical Measurement Method for Spinal Deformation in Spinal Metastatic Disease

Massimo Siracusano, Teluck Sharma

Engineering Functional Recovery of Hyperproliferative Hepatocytes for Implantable Liver Grafts

Veronica Hui, Chi (Jeffrey) Li

Cell and Tissue Engineering

A Novel Method to Synthesize PET Nanoparticles and Measure Their Uptake in Edible Plants

Bharat Bandi, Ishika Mehta, Navya Shetty, Shantanu Vaid

Aptamer Nanostructures as Adenocarcinoma Immunotherapeutics

Yulianna Estrada, Siyuan Li

Nanoparticle-Chemotherapy Testing in Microfluidics Model of the Tumor Microenvironment

Ahona Dev, Dilek Aylin Manav, Sharani Nasankar, Athena Wang

Modeling a Nanomagnetic Culturing System for Uterine Fibroid Organoids with MCF-7 Spheroids

Ricardo Fernandez, Anika Joglekar, Fernando Ortiz, Abbigale Shi

Improving Throughput in the Geometric Viability Assay to Measure Bacterial Growth

Aidan Chan, Chris Chan, Andrew Chang, Youssef Haider, Sungmin Hwang

Development of Bioprinting Techniques for Manufacturing Skin/Tumor Models

John Carlson, James Coleman, Reina Dreyer

Digital and Predictive Medicine

Computational Investigation of PFAS Molecules Binding to Human Fatty Acid Binding Protein

Billy Zhai, Chunlin Zhu, Prakruti Dholiya

Building Computational Framework to Better Research on Cancerous Spinal Strength and Integrity

Ismail Sufi, Natalie Will

Scoring the Druggability of Proteins Based on Results of Advanced Protein Prediction Tools

Sulaiman Alsalamah, Madelyn Keller, Sydney Sorbello

Innovative Strategies in Venous Blood Collection: iCoagLab's Vision for Minimally Invasive and Enhanced Care

Victoria Gonzalez Canalle, Noelle Flanagan, Zoe McCarthy, Jessica Spada, Melina Teguis

Image signal processing for quantification of microvascular tissue damage in Alzheimer's disease

Olivia Border, Rose Coviello, Victoria Rodriguez

Investigation of Weakly Supervised Multi-label Image Classifier for Microscopy Image Representation

Jen Hsin Chiao, HyoJoo Kim, Sunni Lin, Susan Zhang (ECE)

Parent University for Language

Tanner Armstard, Evan Kwong, Christian Montoya, Jane Yoo

Neuroengineering

High-intensity and High-frequency Transcutaneous Electric Nerve Stimulation for Pain Management

Anna Kawai, Kelly Lam, Grace Lange, and Nik Swanson

Glyco-nucleoside Supramolecular Hydrogels for Glia Repair

Christian DiMatteo, Manal Alshamrani, and Mohammed Alwe-lyee

Classifying Human Gait Features with Machine Learning

Jiahe Niu, Xiang Yuan

Automated Analysis of Neural Activity in Down Syndrome Using Ca²⁺ Imaging in Human Cortical Organoids Derived from Induced Pluripotent Stem Cells (iPSCs)

Hang Yang, Wuyi Zhang

Speech Interactive Therapy App for Children with Autism

Emre Karabay, Raghavan Ramaswamy, Jeffrey Gao, Will Gardner, Nefeli Andreades

The Senior Design Project

Optics

Design and Implementation of a Portable Oximeter for Accurate Measurement of Oxygen Saturation Across a Wide Range of Skin Pigmentation

Bernadelle Boateng, Maya Frazier, Jenna Ludvigsen, and Arya Padalkar

Elastic Scattering Spectroscopy: A Promising Approach Towards Stratifying Melanin

Ethan Bosworth, Maks Levin, Tyler Sanabria, Arjavi Vyas, Sarah Wolf

Automated Imaging System for the Analysis of C.elegans Behavior

Alexa Lara, Joshua J. Mendoza, Celeste I. Vega

Development and Integration of a Lensometer Attachment into a Commercial Handheld Autorefractor

Hanna Alarcon, Mario Rodriguez Santana

Structural and Compositional Kinetics of α -Synuclein and its Pathological Mutants in Living Cells by Fluorescence Guided Mid-infrared Photothermal Spectroscopy

Ezekiel Cruz, Hanhminh Nguyen, Logan Packard

Laser Speckle Contrast Imaging for Superficial Tissue Blood Flow Visualization

Nadia Chitkushev, Ariel Lin

fNIRS-Based Hyperscanning To Investigate Inter-brain Neural Synchronization in Communication-Based Language Therapy for Aphasia

Xingxiao Li, Yiwen Zhang

Projects Previously Presented

Evaluating the Suitability of an In-vitro Human Endothelial Cell-based Assay to Assess CNS Penetration of Compounds

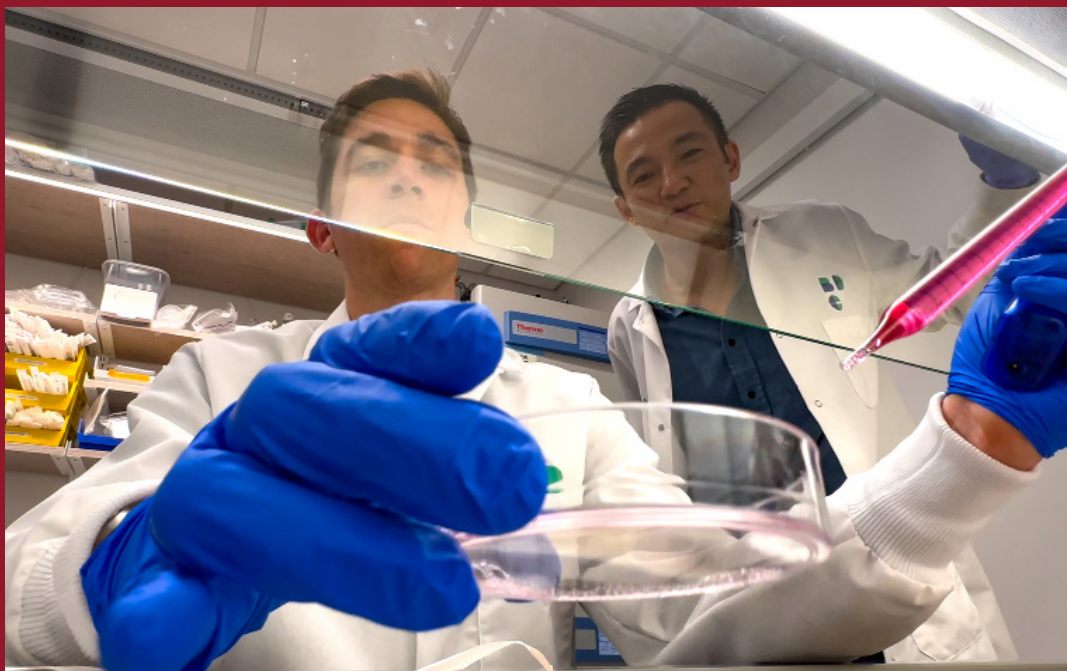
Teertha Ayanji, Vatsal Shrivastava



The Senior Design Project

Participating Companies

3M	Columbia University, College of Physicians and Surgeons	Massachusetts Institute of Technology
Accenture Life Sciences	Comprehensive Health Management Inc.	Medtronic, Inc.
Advanced Instruments, Inc.	ConforMIS, Inc.	METI
Advanced Silicon Group	Covidien	Minnesota State University
Ajax Biomedical	CSA Medical	MIT/Koch Institute
AltraBio	Cynosure	Motility Biomedical, Inc.
Altran	Davison	nanoView Diagnostics , Inc.
Applied Medical Resources	Davol - C.R. Bard, Inc.	Navinet
ArQule, Inc.	Decision Resources	Neuroptix Corporation
Aperture Bio	DEKA Research and Development Corporation	New Health Sciences
Atrium Medical	DePuy Synthes	NijiNeuro
Avedro, Inc.	DocBox, Inc.	Novartis Institutes for BioMedical Research
Banyan Life Sciences LLC	Draeger Medical Systems, Inc.	NuOrtho Surgical, Inc.
BD Advanced Diabetes Care	Draper	Olympus Surgical Technologies America
BD Medical	Eastman Kodak Company	Optasia Medical, Inc.
Beta Bionics	Eaton-Peabody Laboratory	Oregon Health & Science University
Beth Israel Deaconess Medical Center	Elm Electrical & Automation	Parexel
Biotronik	EndoCore	Perceptive Informatics PerkinElmer
BioTrove, Inc.	Enumeral Biomedical Holdings, Inc.	Pfizer Biotherapeutics
Bioventus LLC	Essex Orthopedics & Optima Sports Medicine	Philips Healthcare
Bitome	Fellers Snider et al.	Philips Ultrasound
Boston Engineering	Ferrotec Corporation	PlenOptika
Boston Medical Center, Dept. of Anesthesiology	Fluidform	Praxis Advisors LLC
Boston Medical Center, Dept. of Clinical Engineering	Foundation Medicine	Pulmatrix, Inc.
Boston Medical Center, Dept. of Orthopedic Surgery	Fractal Therapeutics	Raytheon
Boston Scientific	Fraunhofer USA-CMI	Regeneron Pharmaceuticals
Boston University School of Management	GE Healthcare	Respiratory Motion, Inc.
Boston University School of Medicine	Gems Sensors	Rtangent
Boston University School of Public Health	Genzyme Corporation	Sanofi
Boston University, Dept. of Athletic Training and Physical Therapy	GlobalData Healthcare	Sapient
Boston University, Dept. of Biochemistry	Goodyear-Veyance Technologies, Inc.	Schepens Eye Research Institute
Boston University, Dept. of Biology	Grant Street Group	Schneider Electric
Boston University, Dept. of Mechanical Engineering	Harvard Business School	Shire Pharmaceuticals
Boston University, Dept. of Physiological and Brain Sciences	Harvard Medical School	Solace Therapeutics, Inc.
Boston University, Dept. of Speech, Language and Hearing Sciences	Harvard University	SoundMedicine
Brandeis University	Harvard-MIT Division of Health Sciences and Technology	SQZ Biotechnologies
Brigham and Women's Hospital	HeartWare, Inc.	St. Jude Medical
Bright Cloud International Corp	Higher Order Technologies, LLC	Synthera Health
Broad Institute	Hologic	Takeda
Bruker Daltonics	Hypertherm	Teleflex Medical
C4 Therapeutics	IDEXX Laboratories	Ten15Ventures
CAE Healthcare	Image Stream Medical	Toxikon Corporation
CBS Local	ImagiRation	Tufts University
Center for Global Health and Development	Instrumentation Labs, Inc.	UMASS
Children's Hospital Boston	Integra LifeSciences	Universidad de Valencia
CIMIT	Ironwood Pharmaceuticals	University of Texas at Austin
CKD Associates	iWorx Systems, Inc.	University of Wisconsin-Madison
Clark & Elbing LLP	Jana Care Inc.	US Army Institute of Environmental Medicine
Cleveland Clinic	Janssen Pharmaceutical, Johnson & Johnson	USA Research Institute of Environmental Medicine
Coalesenz, Inc.	JH Technologies	VA Boston Healthcare System
Codman Neuro, Johnson & Johnson	Johnson & Johnson	Vantage Management Group Verbal Care
Colorado Nepal Alliance, Dept. of Veterans Affairs	Lahey Hospital and Medical Center	Vertex Pharmaceuticals
	Legionarius	Veterans Administration
	Lux Research	Visus Technologies
	Mankato National Instruments	Worcester Polytechnic Institute
	Massachusetts Eye and Ear Infirmary	Wyss Institute for Biologically Inspired Engineering
	Massachusetts General Hospital	Xcellerex
		Youpling Corp.



ABOVE: BME graduate student Jeremy Tran and Associate Professor John Ngo are working in the Ngo lab to understand how cells sense mechanical forces.

Department of Biomedical Engineering

Boston University
Department of Biomedical Engineering

Annual Report 2023-2024

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This report provides a description of the instructional and research activities of the Department of Biomedical Engineering at Boston University during the 2023-2024 academic year.

Boston University's policies provide for equal opportunity and affirmative action in employment and admission to all programs in the university.

For more information or to download this report as a PDF, please visit our website at:

bu.edu/bme



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Department of Biomedical Engineering

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