
DEPARTMENT OF MECHANICAL ENGINEERING

ANNUAL REPORT 2020-2021



STEVENS
INSTITUTE *of* TECHNOLOGY
THE INNOVATION UNIVERSITY®





TABLE OF CONTENTS

| | |
|---|-----------|
| FACULTY | 2 |
| FACULTY HONORS AND AWARDS | 3 |
| NEW ME FACULTY | 4 |
| COMMUNICATIONS | 4 |
| ME EXTERNAL ADVISORY BOARD | 5 |
| SPONSORED RESEARCH | 6 |
| FACULTY RESEARCH | 8 |
| UNDERGRADUATE STUDIES | 10 |
| ABET REVIEW | 11 |
| SENIOR DESIGN PROGRAM | 11 |
| ME SUMMER UNDERGRADUATE RESEARCH PROGRAM | 12 |
| ME UNDERGRADUATE STUDENT ADVISORY COUNCIL | 12 |
| UNDERGRADUATE FAMILY WEEKEND | 12 |
| GRADUATE STUDIES | 13 |
| MASTER'S PROGRAM | 13 |
| ME GRADUATE STUDENT RESEARCH SEMINARS | 14 |
| PHD PROGRAM | 15 |
| STUDENT ACCOMPLISHMENT HIGHLIGHTS | 16 |
| ASME: A CONNECTION TO MECHANICAL ENGINEERING AT STEVENS THAT BEGAN IN 1880 | 17 |

The accompanying 2020-2021 Annual Report summarizes the current state of the Mechanical Engineering Department at Stevens Institute of Technology and focuses on the Department's progress and achievements over the past year.

Research activity in FY 2021 has thrived with an 86% increase in awards and a 35% increase in expenditure from FY 2020. The Mechanical Engineering department has been at the forefront of innovation and growth while supporting interdisciplinary research and development with a focus on robotics and autonomous systems, wearable rehabilitation devices, micro/nanotechnology, product design and manufacturing, additive manufacturing, biomechanical engineering, hypersonic flows, computational fluid mechanics, and energy and sustainability.

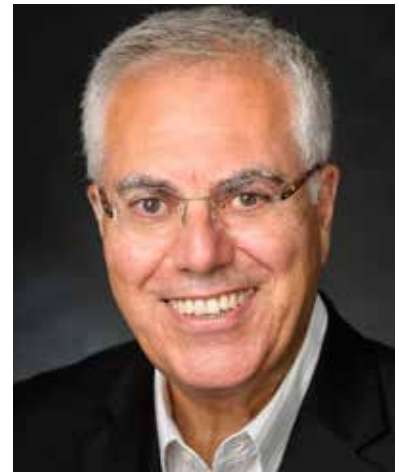
Highlights of our undergraduate program during 2020-2021 include a highly successful ABET review of our academic program, student involvement through the Mechanical Engineering Student Advisory Council to aid faculty-student interactions, the continuation of the Summer Undergraduate Research Program (SURP), and the establishment of a workshop series to aid in the continuation of student learning beyond the core curriculum. In the past year, the graduate program has shown a 118% increase in Master's enrollment from 2018. The department offered the newly created Master of Engineering in Robotics with thirteen enrolled students and granted a record eleven Mechanical Engineering PhD's in 2020-2021.

The department's strategic planning was initiated in January 2021. A fourteen-member faculty committee was put in charge to develop a draft for the full department review. The plan was developed based on our recent successes and identified areas for continued improvement while prioritizing new areas for opportunities and growth. The plan has six main goals including student centricity; program quality and delivery; external relations; promoting diversity, equity, and inclusion; building a growing high impact research enterprise; and enhancing mentoring and development of ME faculty.

The global coronavirus pandemic has greatly impacted all members of the Stevens community. During this time, the Mechanical Engineering Department worked to ensure continued growth and opportunities for students. Some examples of the department's effort for the continuation of student learning included the establishment of virtual study groups twice a week which allowed students to make connections and collaborate safely, and the ME IT department continuing to aid students and faculty remotely which was of utmost importance during a time where technology was a crucial component of student learning. Additionally, the department hosted various workshops including the "Career Planning in a time of Covid", where panelists guided students through how to network and job search during unprecedented times.

I am grateful for the commitment of our faculty and staff, whose tireless pursuit of excellence has made possible the achievements reported here. I am proud to be part of the Mechanical Engineering team at Stevens.

MESSAGE FROM THE CHAIR



Souran Manoochehri
Professor and Department Chair

**DURING THE GLOBAL
CORONAVIRUS PANDEMIC,
THE MECHANICAL
ENGINEERING DEPARTMENT
RELENTLESSLY WORKED
TO ENSURE CONTINUED
GROWTH AND OPPORTUNITIES
FOR STUDENTS.**

FACULTY

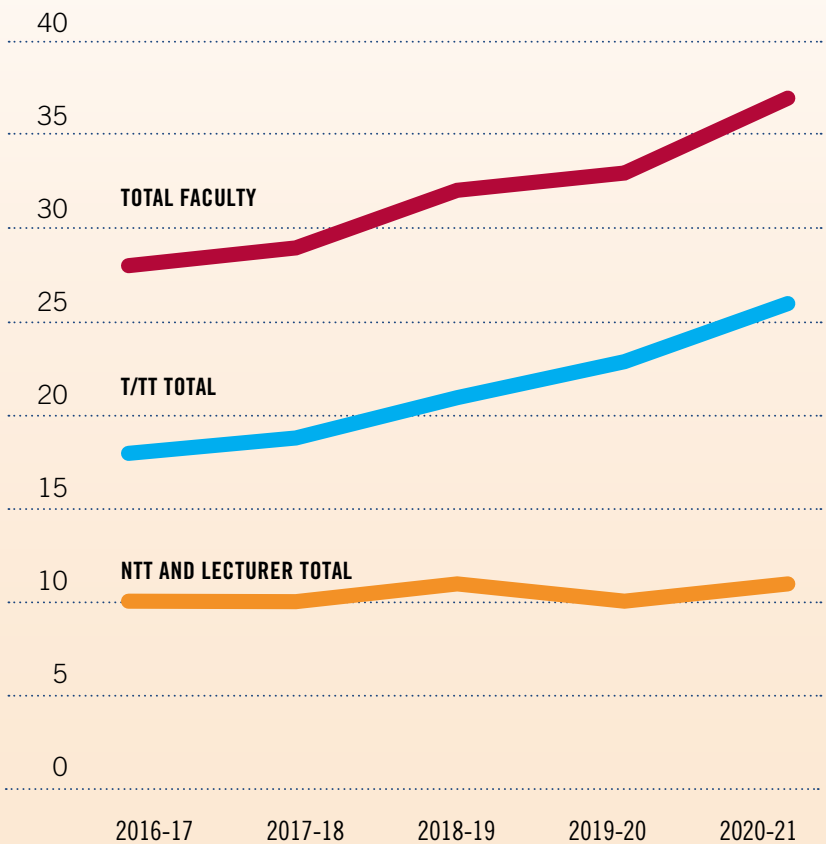


The Department's faculty constitutes a body of world-class researchers and educators who practice diverse activities across the engineering spectrum. Dedicated to supporting hands-on learning and research, the faculty provides each student with invaluable experiential knowledge and a myriad of opportunities and resources to further their educational and professional goals. The department's efforts have been globally recognized for world-class faculty, leading-edge research facilities, and a premier location proximate to New York City. The faculty pride themselves on their student-centric approach to guide students towards being the leaders of tomorrow.

The total number of Mechanical Engineering Faculty has increased by 21% over the past 5 years. The department is composed of 37 current faculty members, 26 are Tenure or Tenure Track (T/TT), 8 are Non-Tenure Track (NTT), and 3 are Lecturer. The faculty is 13% female.

THE TOTAL
NUMBER OF
MECHANICAL
ENGINEERING
FACULTY HAS
INCREASED
BY 21% OVER
THE PAST
FIVE YEARS

ME FACULTY GROWTH



FACULTY HONORS AND AWARDS



**ASSOCIATE PROFESSOR
BRENDAN ENGLOT**

Mechanical Engineering Associate Professor Brendan Englot received the Stevens 2020-2021 Award for Research Excellence. Professor Englot also received the 2020 Office of Naval Research Young Investigator Award.



**PROFESSOR
EUI-HYEOK YANG**

Mechanical Engineering Professor Eui-Hyeok Yang was the Editor-in-Chief in 2020 for the Elsevier's publication on Micro and Nano Technologies entitled "Synthesis, Modeling and Characterization of Two-Dimensional Materials and Their Heterostructures."



**ASSOCIATE PROFESSOR
NICHOLAUS PARZIALE**

Mechanical Engineering Associate Professor Nicholas Parziale received the 2020 Office of Naval Research Young Investigator Award.



**ASSOCIATE PROFESSOR
ROBERT CHANG**

Mechanical Engineering Associate Professor Robert Chang was appointed to the Leadership Advisory Committee (LAC) for the Advanced Regenerative Manufacturing Institute (ARMI).



**ASSISTANT PROFESSOR
DAMIANO ZANOTTO**

Mechanical Engineering Assistant Professor Damiano Zanotto received the 2020 National Science Foundation CAREER Award.



**PROFESSOR
CHANG-HWAN CHOI**

Mechanical Engineering Professor Chang-Hwan Choi was elected to the Advisory Board for the *Journal of Colloid and Interface Science*.



**PROFESSOR
KISHORE POCHIRAJU**

Mechanical Engineering Professor Kishore Pochiraju was elected President of the *American Composite Society*.



**PROFESSOR AND DEPARTMENT
CHAIR SOURAN MANOOCHEHRI**

Mechanical Engineering Professor and Department Chair Souran Manoochehri received the Stevens 2020-2021 Master of Engineering (Honoris Causa).

NEW ME FACULTY



**PROFESSOR
JIANMIN QU**

Professor of Mechanical Engineering and Provost and Vice President for Academic Affairs
PhD: Northwestern University
Specialization: *Theoretical and Applied Mechanics*



**ASSISTANT PROFESSOR
CHRISTOPHER SUGINO**

Assistant Professor of Mechanical Engineering
PhD: Georgia Institute of Technology
Specialization: *Acoustics and Linear Dynamics*

37% INCREASE IN TENURE TRACK FACULTY SINCE 2018

COMMUNICATIONS

Since its first newsletter in 2019, the Mechanical Engineering department has published and sent out 7 newsletters regarding the accomplishments and successes of both faculty and students. The department also started generating Annual Reports in 2020 to highlight the yearly successes of the ME department. Below are some samples of ME Faculty in media.



**ASSOCIATE PROFESSOR
BRENDAN ENGLOT**

Associate Professor Brendan Englot was mentioned in the Washington Examiner's piece titled "To cut costs owing to COVID-19, restaurateurs consider the use of robots for some work."



**ASSISTANT PROFESSOR
MEHMET KURT**

Assistant Professor Mehmet Kurt was mentioned in Live Science's piece titled "See how the brain wobbles with each heartbeat in incredible new videos," Verywell Health's piece titled "New 3D MRI shows the brain in detail we've never seen before."



**ASSISTANT PROFESSOR
DAMIANO ZANOTTO**

Assistant Professor Damiano Zanotto was mentioned in the Wall Street Journal's piece titled "A Robot That Finds Your Lost Stuff and More AI-Enabled Gadgets to Come"

Assistant Professor Kurt was also named to Fortune Magazine's "40 under 40" list in Turkey.

ME EXTERNAL ADVISORY BOARD

In 2020-2021, Claire Griffin and Regina Pynn joined the department's EAB as new members.



**CLAIRE GRIFFIN
PROGRAM MANAGER &
SENIOR ENGINEERING, NAVAL
SURFACE WARFARE CENTER,
SHIPBOARD INSTRUMENTATION
AND SYSTEMS CALIBRATION
AIRCRAFT CARRIER PROGRAM**

Claire Griffin is a Program Manager and Senior Mechanical Engineer at the Naval Surface Warfare Center, Philadelphia Division, within the Shipboard Instrumentation and Systems Calibration (SISCAL) department.

In her work, she has collaborated with technical experts, active-duty sailors, governmental representatives, and a variety of other entities to ensure that all systems installed onboard US Navy ships are properly calibrated and maintained by providing technical and programmatic support. Claire holds a B.E. from Stevens in Mechanical Engineering with a concentration in Robotics and a minor in Science Communication.



**REGINA PYNN
SR. PRODUCT MANAGER FOR
ADDITIVE MANUFACTURING,
HEXCEL**

Regina Pynn is Sr. Product Manager for Additive Manufacturing at Hexcel. In this role, she has responsibility for industry and customer relationships, including NCAMP qualification, entry into service on the F-35 platform, and commercial customer adoption. Before joining Hexcel in 2017 Regina worked for UTAS where she led development through Entry Into Service activities for hydromechanical and electromechanical control systems on commercial and defense platforms. Regina holds a B.E. from Stevens in Mechanical Engineering and an M.E. from Stevens in Systems Engineering.

**THE ME EXTERNAL ADVISORY BOARD IS MADE UP OF
EIGHT STEVENS ALUMNI AND INDUSTRY EXPERTS.
THE CURRENT MEMBERS OF THE EAB AND THEIR BIOGRAPHIES CAN BE FOUND ON
STEVENS.EDU/ME.**

SPONSORED RESEARCH

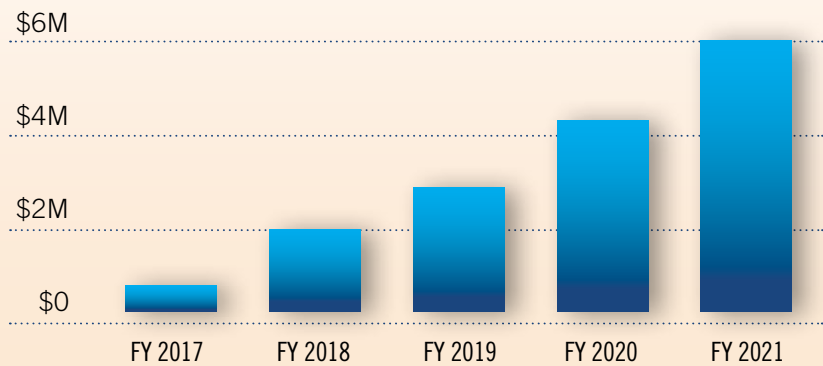


Research activity in FY 2021 has thrived with an 86% increase in awards and a 35% increase in expenditure from FY 2020. Mechanical Engineering faculty, in coordination with postdoctoral associates and graduate and undergraduate students, constantly seek to expand the field of mechanical engineering by conducting state of the art research.

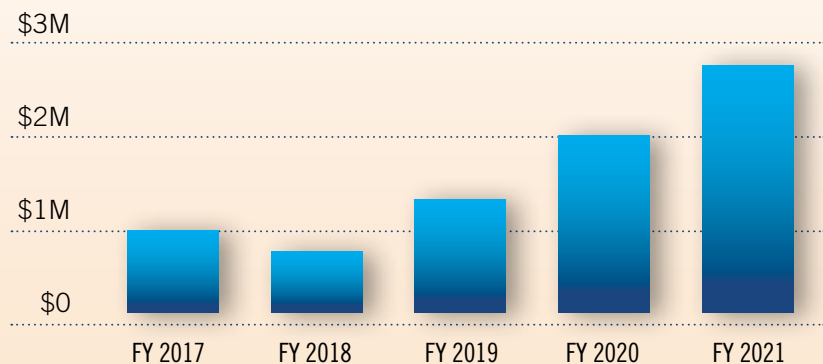
The Department has identified six research cluster areas: Micro/Nano Technology, Ubiquitous Robotics, Biomechanical Engineering and Human Health, Advanced Manufacturing, Energy Sustainability and Vibrations, and Thermal-Fluids Engineering. The department has achieved major growth in 2020-2021 with its annual research grants approaching \$6.0 million and expenditure above \$2.7 million.

**RESEARCH
ACTIVITY IN 2021
HAS THRIVED
WITH AN
86% INCREASE
IN AWARDS AND
35% INCREASE
IN EXPENDITURE**

ME TOTAL RESEARCH AWARD



ME TOTAL RESEARCH EXPENDITURE



During this reporting year, the number of multi-PI grants has grown resulting in a significant increase in funding and research laboratory expansions. This increased funding has also helped to create new research initiatives and increased faculty scholarly outputs. It is very important to recognize that the funding sources are very diverse as seen below in the active awards close to \$21 million as of December 2021. This shows a 44% increase in active awards since 2020.

| SPONSOR | TOTAL AMOUNT | PERCENT |
|---|------------------------|---------|
| US Department of Defence | \$9,740,606.00 | 46.50% |
| Air Force - Office of Scientific Research | \$1,648,325.00 | 7.87% |
| Army - Combat Capabilities Development Command (CCDC) | \$1,761,899.00 | 8.41% |
| Army - Medical Research Acquisition Activity | \$385,695.00 | 1.84% |
| Army - Corps of Engineers Mobile District | \$1,900,000.00 | 9.07% |
| Office of Naval Research | \$4,044,687.00 | 19.31% |
| National Science Foundation | \$7,458,843.00 | 35.61% |
| Defence Advanced Research Agency | \$1,439,276.00 | 6.87% |
| National Institutes of Health | \$862,262.00 | 4.12% |
| Korea Evaluation Institute of Industrial Technology | \$83,000.00 | 0.40% |
| Kaswin | \$379,904.00 | 1.81% |
| Schiumberger Limited | \$349,573.00 | 1.67% |
| Consolidated Edison, Inc. | \$250,000.00 | 1.19% |
| Muscular Dystrophy Association | \$10,000.00 | 0.05% |
| National Aeronautics and Space Administration | \$189,768.00 | 0.91% |
| New Jersey Health Foundation | \$120,000.00 | 0.57% |
| Ichan School of Medicine at Mount Sinai | \$54,941.00 | 0.26% |
| IEEE Robotics and Automation Society | \$10,000.00 | 0.05% |
| Grand Total | \$20,948,173.00 | |

\$20.9 MILLION ACTIVE FACULTY RESEARCH AWARDS
44% INCREASE SINCE 2020

FACULTY RESEARCH

Research in the Mechanical Engineering Department covers a variety of fields. The department has six key research clusters, which are: Micro/Nano Technology, Ubiquitous Robotics, Biomechanical Engineering and Human Health, Thermal-Fluids Engineering, Energy Sustainability and Vibrations, and Advanced Manufacturing.

Faculty in the Department of Mechanical Engineering continues to demonstrate excellence in research by conducting a high-level investigation in a variety of fields. The next two pages include all the active grants in the department of Mechanical Engineering as of December 2021 with a total amount close to \$21 million.

Automated Mobile Robot Inspection and Monitoring of Electric Substations

Brendan Englot

Consolidated Edison, Inc. - \$250,000

Time Resolved Nonintrusive Measurements in Unsteady Hypersonic Flows

Nicholaus Parziale

US Department of Defense - Office of Naval Research

Verification and Validation of High-Fidelity Plume Surface Interaction Simulations

Jason Rabinovitch

National Aeronautics and Space Administration - \$189,768

Development of multi-stage press casting process and dissimilar material deposition mold technology for ecofriendly car parts

Chang-Hwan Choi

Korea Evaluation Institute of Industrial Technology - \$83,000

AIMED: Artificial Intelligence Managed Exploration of Designs

Kishore Pochiraju, Brendan Englot

Defense Advanced Research Projects Agency \$1,439,276

Enhancing Quantum Efficiency of Thin Film Solar Cells via Joint Characterization of Radiation and Recombination

Shima Hajimirza

National Science Foundation - \$401,931

R21: Cross-correlation of biomechanical, connectomic and metabolic markers in AD patients at 7T MRI

Mehmet Kurt

Icahn School of Medicine at Mount Sinai - \$54,941

Spindle Failure Diagnosis and Life Prognostics using Artificial Intelligence and Machine Learning Techniques

Kishore Pochiraju

Kaswin - \$379,904

FE: Radiative and Dispersive Behavior of Instabilities in a Highly Cooled Hypersonic Boundary Layer

Nicholaus Parziale

US Department of Defense - Air Force Office of Scientific Research - \$98,406

LEAP-HI: Tackling brain diseases with mechanics: A data driven approach to merge advanced neuroimaging and multi-physics modeling

Mehmet Kurt, Johannes Weickenmeier

National Science Foundation - \$2,048,000

Material development and nanofabrication of graphene nanorings

Eui-Hyeok Yang

US Department of Defense - Army - Combat Capabilities Development Command (CCDC) - \$134,000

Graphene Rings for Atomically Thin Interferometers

Eui-Hyeok Yang

US Department of Defense - Army - Combat Capabilities Development Command (CCDC) - \$779,525

Scaling and Structure in Transitional and Turbulent Hypervelocity Flows

Nicholaus Parziale

US Department of Defense - Office of Naval Research - \$755,266

CAREER: Reinforcement-Learning Assist-As-Needed Control for Robot Assisted Gait Training

Damiano Zanotto

National Science Foundation - \$562,470

Distributional Reinforcement Learning for Safe Autonomous Navigation

Brendan Englot

US Department of Defense - Office of Naval Research - \$508,691

Learning-Enhanced Autonomous Navigation for GPS-Denied Vehicles

Brendan Englot

US Department of Defense - Army - DEVCOM \$477,905

Particulate and Precipitation Effects on High-speed Flight Vehicles

Nicholaus Parziale

US Department of Defense - Office of Naval Research - \$1,206,500

R21: Personalized predictions of biomarker progression in Alzheimer's disease

Johannes Weickenmeier

National Institutes of Health - \$424,050

Tunable resonant actuation for magnetic resonance elastography of active tissues

Mehmet Kurt

US Department of Defense - Army Medical Research Acquisition Activity - \$79,094

Real-time Concussion Monitoring in Contact Sports through Wearable Sensors
Mehmet Kurt

New Jersey Health Foundation - \$35,000

Advanced Design of Mechanisms and Actuators for Robotic Applications

Damiano Zanutto

IEEE Robotics and Automation Society - \$10,000

Quantum Technologies for Armament Systems – Task 6d: Additive Manufacturing

Souran Manoochchhri

US Department of Defense - Army - Combat Capabilities Development Command (CCDC) - \$227,971

I-Corps: Artificial Cornea of Microtextured Hydrogel

Chang-Hwan Choi

National Science Foundation - \$50,000

DURIP: Indraft Tunnel for High-Speed Aerodynamics Research

Nicholaus Parziale

US Department of Defense - Office of Naval Research - \$301,575

Wearable Technology to Assess Gait Function in SMA and DMD

Damiano Zanutto

Muscular Dystrophy Association - \$10,000

I-Corps: Flexible and Stretchable Electronic Skin Sensor

Eui-Hyeok Yang

National Science Foundation - \$50,000

Compressing Time and Space for an In Situ Dermal Graft Printing Paradigm

Robert Chang

US Department of Defense - Army Medical Research Acquisition Activity - \$306,601

R21: Amplified MRI (aMRI): A novel way to investigate the pathophysiology of Chiari Malformation I

Mehmet Kurt

National Institutes of Health - \$438,212

Non-intrusive measurement of density and velocity perturbations in supersonic and hypersonic wind tunnels

Nicholaus Parziale

US Department of Defense - Air Force - \$203,074

Collaborative Research: Mechanical Characterization of Bio-Interfaces by Shear Wave Scattering

Mehmet Kurt

National Science Foundation - \$329,989

Radiative and Dispersive Behavior of Instabilities in a Highly-Cooled Hypersonic Boundary Layer

Nicholaus Parziale

US Department of Defense - Air Force Office of Scientific Research - \$1,346,845

S&AS: FND: Learning-Enabled Autonomous 3D Exploration for Underwater Robots

Brendan Englot

National Science Foundation - \$353,334

DURIP - Laser Metal Deposition System for Additive Manufacturing and Corrosion Study of Metals

Chang-Hwan Choi

US Department of Defense - Office of Naval Research - \$372,600

FE: Gait Training After Stroke Using an Affordable Powered AFO with Somatosensory Stimulation

Damiano Zanutto

New Jersey Health Foundation - \$35,000

Strides Toward Identifying Objective Behavioral Signatures of ASD Severity: A Micro-Movement Gait Analysis Approach

Damiano Zanutto

New Jersey Health Foundation - \$50,000

Collaborative Research: A New Nonlinear Modal Updating Framework for Soft, Hydrating Materials

Mehmet Kurt

National Science Foundation - \$238,202

Dynamic 3D Printing With In Situ Depolarization: A New Biomanufacturing Paradigm for Guided Cell-Cell Communication

Robert Chang

National Science Foundation - \$300,001

Robust Autonomous Mapping, Navigation, and Inspection of Complex Marine Environments

Brendan Englot

Schlumberger Limited - \$349,573

CAREER: Belief Space Planning and Learning for Uncertainty-Immersed Underwater Robots

Brendan Englot

National Science Foundation - \$499,917

FE: CAREER: Additive Biomanufacturing an Engineered Stem Cell Microenvironment

Robert Chang

National Science Foundation - \$500,000

Industrial Base Resilience Initiative – Holston Army Ammunition Plant, TN

Christos Christodoulatos, Adeniyi Lawal, Xiaoguang Meng, Nick Parziale, Jason Rabinovitch, Tsan-Liang Su, and Valentina Prigiobbe

SIA Solutions LLC, US Army Corps of Engineers Mobile District - \$1,900,000

Fostering Adaptive Expertise to Increase Retention of Low-Income STEM Students

Frank Fisher, Alexander De Rosa, Ashley Lytle, Susan Metz, and Jean Zu

National Science Foundation - \$1,500,000

Risk-Adverse Learning and Control for Distributed Dynamical Systems with Partial Information

Darinka Dentcheva and Brendan Englot

US Department of Defense - Office of Naval Research - \$900,055

“Collaborative Research: NRI: Ocean-Powered Robots for Autonomous Offshore Aquaculture”

Brendan Englot and Long Wang

NSF-NIFA - \$375,000

LEAPS-MPS: Tailoring the Thermal Properties of Flexible Two-Dimensional (2D) Heterostructures

Annie Zhang

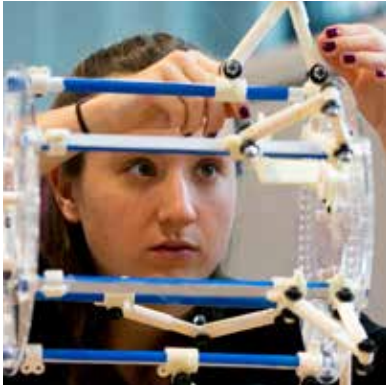
National Science Foundation - \$249,999

Ammunition Production Facility Modernization Review

Souran Manoochchhri, Frank Fisher, Chan Yu, and Christos Christodoulatos

US Department of Defense - Army - Combat Capabilities Development Command (CCDC) - \$142,498

UNDERGRADUATE STUDIES



96%

OF ME UNDERGRADUATES SECURED JOBS OR GRADUATE SCHOOL ADMISSION WITH A

\$73,000

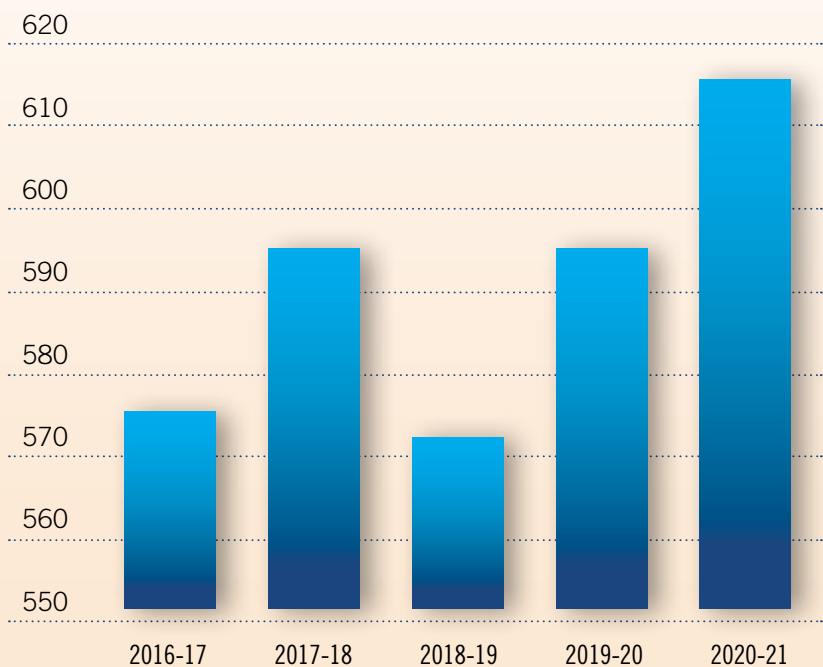
AVERAGE STARTING SALARY FOR ME UNDERGRADUATES IN 2020-2021

Reflecting on the diversity of subject matter found in the present-day practice of mechanical engineering, our program has consistently offered undergraduates a multitude of opportunities in educational studies and career advancement. The following outlines the department's major highlights, initiatives, and achievements in undergraduate studies in 2020-2021.

The 2020-2021 school year had 136 new enrollments for a total of 619 mechanical engineering undergraduates. At the completion of the school year, the Mechanical Engineering Department granted 124 undergraduate degrees to the class of 2021.

**THE 2020-2021
SCHOOL YEAR
HAD 136 NEW
ENROLLMENTS
FOR A TOTAL OF
619 MECHANICAL
ENGINEERING
UNDERGRADUATES**

TOTAL ME UNDERGRADUATE STUDENTS



A key highlight of our undergraduate program this last year was a successful ABET review. The senior design capstone course and student projects always stand out as a main part of our undergraduate studies. Some examples of the last year's projects are included in this report. Other examples of our undergraduate program initiatives during 2020-2021 include student involvement through the Mechanical Engineering Student Advisory Council to aid faculty-student interactions, the continuation of the Summer Undergraduate Research Program (SURP), and supporting several undergraduate events such as Family Weekend.

ABET REVIEW

During the Fall of 2021, the Mechanical Engineering Department was evaluated by the Accreditation Board for Engineering and Technology (ABET) and received a highly successful review of the program with no deficiencies or weaknesses. ABET accreditation assures that a college or university program meets the quality standards of the profession for which that program prepares graduates. The ME program was found to have no shortcomings with strengths in offering a series of eight design courses called the Design Spine that makes a Stevens student uniquely prepared for the global workforce. This verifies Stevens' Mechanical Engineering educational experience meets the global standard for technical education and enhances student employment opportunities.

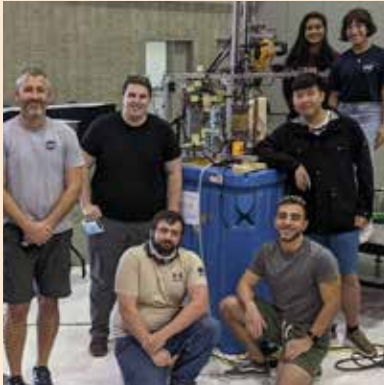
SENIOR DESIGN PROGRAM

Senior Design is a yearlong capstone course within the Mechanical Engineering curriculum and is an element of distinction within the department. This course is taken during senior year and extends over both semesters. During 2020-2021, the senior class was broken into thirty multi-disciplinary teams with projects spanning areas such as biomedical, defense, robotics, and energy. Some projects were competition based. Traditionally, the Mechanical Engineering teams have found success at winning the best senior design project as well as the elevator pitch competition at the Stevens Innovation Expo.

The 2021 **Senior Design Award for Mechanical Engineering** was presented to the interdisciplinary Articulating Robotic Gaze Operated System (ARGOS) team. Mechanical Engineering and Electrical Engineering students Carmine Feda, John Gazzara, Nicholas Gray, and Ryan Palmer strived to create a new generation of telepresence systems that dramatically amplified the sense of presence to the user. Under the support and guidance of their advisor Dr. Biruk Gebre, the team aimed to foster human-to-human communication from any distance in an age of technological separation. ARGOS sought to maintain the nonverbal cues by allowing the user to immerse themselves in the location through a 180-degree binocular camera and VR headset. A prototype system is shown to the right.



Articulating Robotic Gaze Operated System (ARGOS) team.



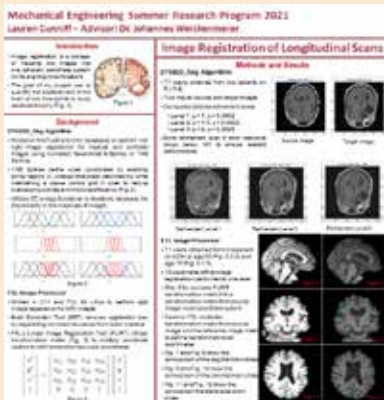
Team E.X.T.R.A.C.T.I.N.A.T.O.R at 2021 NASA Moon to Mars Ice Challenge

SENIOR DESIGN PROGRAM *Continued*

Another team of ME students was selected as finalists to the 2021 NASA Moon to Mars Ice Challenge and competed against top schools in Virginia in the early fall of 2021. The challenge required teams to design and build an autonomous drilling and ice extraction platform that could drill through materials as hard as cement and then melt and extract liquid water. The team also had to determine the materials they were drilling through using multiple sensors and controllers. Team E.X.T.R.A.C.T.I.N.A.T.O.R was comprised of Gina DeOliveira, Jawon Jang, Cyrus Polster, Steven Rigamonti, and Melissa Tirone and they were advised by Dr. Eric Williams. The team at the competition is pictured to the left.

ME SUMMER UNDERGRADUATE RESEARCH PROGRAM

The Department of Mechanical Engineering sponsored its second annual Summer Undergraduate Research Program (SURP) in 2021. The program provides mechanical engineering undergraduate students with the opportunity to engage with a faculty advisor while developing their research, communication, and writing skills. Of 79 applicants, 24 students were selected to work with 13 different faculty members. At the end of the eight-week program, students presented their work and posters at the SURP Virtual Summer Conference where three winners were chosen based on the scope of the project, work accomplished, and quality of their presentation.



1st Place Winner of 2021 Conference

ME UNDERGRADUATE STUDENT ADVISORY COUNCIL

The Mechanical Engineering Undergraduate Student Advisory Council (MESAC), established in 2019, was formed to facilitate a student-centric environment within the ME Department. The council provides feedback to the department to improve the experience of all Mechanical Engineering Undergraduate students. In the last year, the department has taken the MESAC feedback to offer more one-on-one meetings between students and faculty for professional advancement, standardize classes taught by multiple professors, and offer research opportunities to all ME students. Additionally, a professional development workshop series was offered in 2020-2021 to provide students with the necessary tools and skills to succeed as engineers. These workshops spanned areas such as MATLAB Programming, Scientific Research, and Career Opportunities.



2021 Family Weekend, the Mechanical Engineering Department opened its doors to families of Stevens students offering tours of their laboratories.

UNDERGRADUATE FAMILY WEEKEND

Family Weekend is an opportunity for Stevens undergraduate students and their families to reconnect and experience a rich variety of activities on campus and in Hoboken. During the 2021 Family Weekend, the Mechanical Engineering Department opened its doors to families of Stevens students offering tours of their laboratories. Students and families of all majors attended the lab tours to see flying drones, 3D printing, and state of the art manufacturing and material testing facilities.

GRADUATE STUDIES

The Mechanical Engineering department offers five regular master's degree programs, four joint master's programs, and two special programs. Graduate students can pursue a Master of Engineering in Mechanical Engineering, Pharmaceutical Manufacturing Engineering, or Robotics. Graduate students can also choose to pursue a PhD through the Mechanical Engineering Doctoral Program. Additionally, the department offers fourteen ME Graduate Certificates for students interested in improving their skills or considering new career paths within the industry. The following outlines the Department's highlights, initiatives, and achievements in graduate studies in 2020-2021.

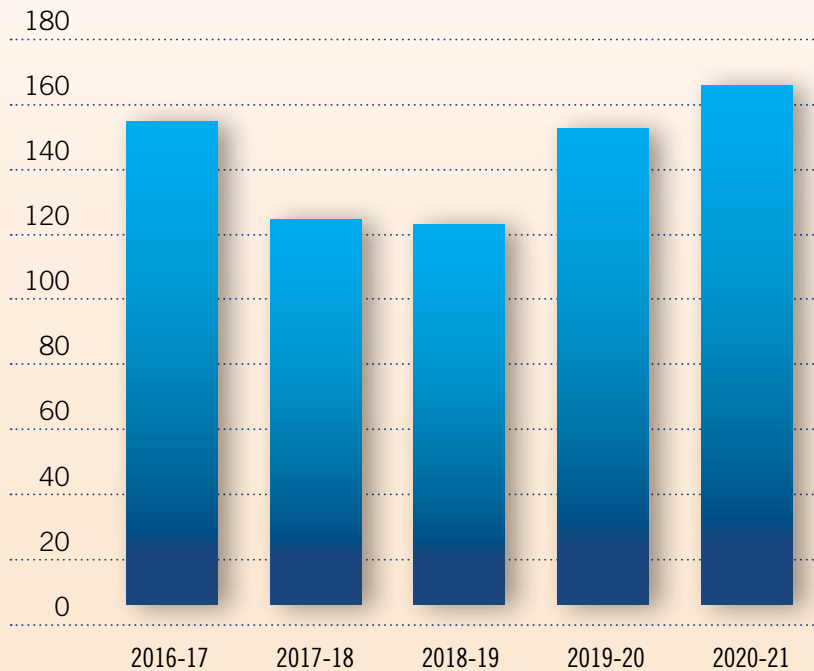


MASTER'S PROGRAM

The number of new master student enrollments has increased to 83 students in 2021 which represents a 118% increase from the 38 new enrollments in 2018. Of the 83 students in 2021, 58 enrolled in Mechanical Engineering, 13 enrolled in Robotics and 12 enrolled in Pharmaceutical Manufacturing Engineering. 106 Master's degrees were granted in the 2020-2021 school year showing a 56% increase from the previous 2019-2020 school year.

**THE NUMBER
OF NEW MASTER
STUDENT
ENROLLMENTS HAS
INCREASED TO
83 IN 2021**

TOTAL ME MASTER'S STUDENTS



**THE MASTER
OF SCIENCE IN
MECHANICAL
ENGINEERING
DEGREE WAS
LAUNCHED IN
2021 TO PROVIDE
MORE RESEARCH
OPPORTUNITIES**

The newly launched Master of Engineering in Robotics program gives students an edge in this competitive and multidisciplinary profession and helps students to master modeling, design, research, and implementation skills with thirteen enrollments in 2020-2021. The Master of Science in Mechanical Engineering degree was launched in 2021 to provide more opportunities and training to prepare students for pursuing research and more advanced degrees. This degree requires students to complete either a special project or a Master's Thesis.

To provide students with more opportunities to apply their knowledge in addressing real-world problems, the ME department has updated the Curriculum Practical Training program for international students so that students can integrate their real-life industry experience with their studies. Domestic students, as well as international students who do not satisfy the residency requirements of the CPT program, can participate in *Co-Op Engagement in ME*, an updated program that allows for students to include Co-Op experience with their education.

**THE 2020-2021 SCHOOL YEAR WELCOMED
83 NEW MASTER'S STUDENTS FOR A TOTAL OF
172 MECHANICAL ENGINEERING MASTER'S STUDENTS.**

**THE PROGRAM IS 55% FULL-TIME AND
45% PART-TIME STUDENTS.**

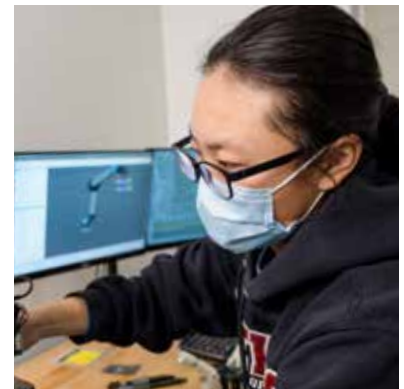
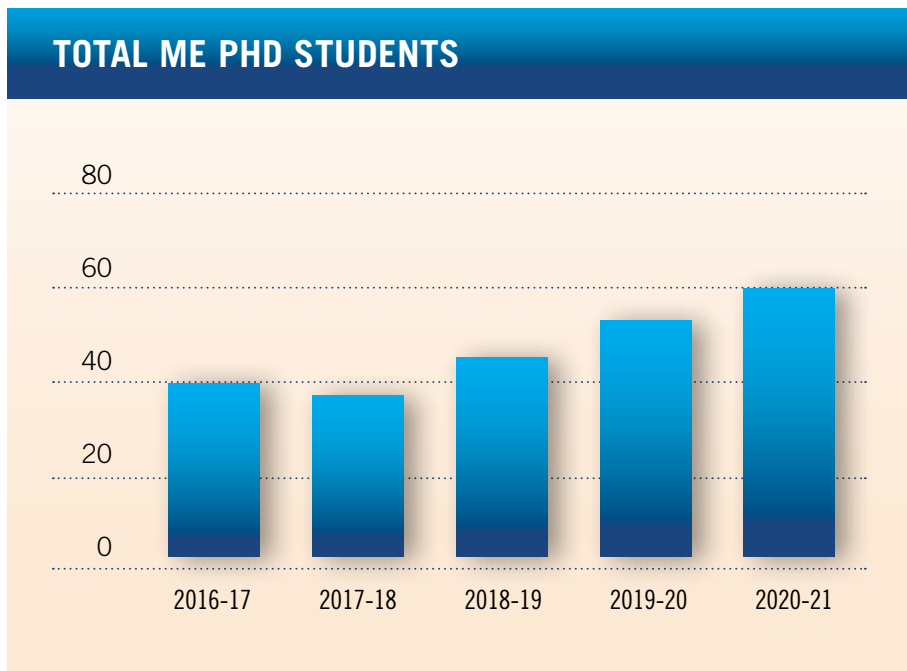
**THE PROGRAM IS COMPOSED OF STUDENTS
FROM ACROSS THE GLOBE WITH A
29% INTERNATIONAL ENROLLMENT.**



ME GRADUATE STUDENT RESEARCH SEMINARS

The ME Graduate Student Research Seminars were launched in 2020-2021 to promote community building among ME graduate students, as well as to encourage research integration and potential collaborations across the multidisciplinary research labs in the department. During the biweekly seminars, student attendees are exposed to a variety of research projects and activities to enrich their academic experience while student presenters can professionally develop their presentation skills and discussion of research topics in a public forum.

PHD PROGRAM



The Mechanical Engineering PhD program has been improving and expanding over the last five years. Enrollment has increased from 49 students in 2017 to 60 students in 2021. Degrees granted have increased by 83% from 6 degrees granted in 2017 to 11 granted in 2021. The PhD program consists of 68% international students and 32% domestic students.

During the past year, the doctoral student experience has been enhanced by the ME Department providing clear guidance and support. These improvements include overseeing the progress of all enrolled PhD students hinged on timely communication with students and providing support for improved student-advisor interaction.

**A RECORD
ELEVEN
MECHANICAL
ENGINEERING
PHD'S WERE
GRANTED
IN 2021**

STUDENT HIGHLIGHTS



ME undergraduate students Sarah Bertussi, Kevin Gmelin, Ryan Ludemann, and Ian Mauser of the 2021 graduating class earned a perfect 4.0 GPA and attained the highest academic honors. These four seniors share the distinction of being first in class.

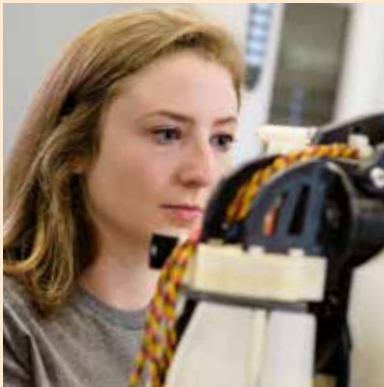
ME undergraduate student Brian Li '22 founded Rocket Fuel Ventures, a student-led venture capital initiative at Stevens Institute of Technology in August 2020. The organization hosted its first ever international undergraduate venture summit in April 2021. The summit brought together students from 20 universities and 25 countries.

ME undergraduate student Christine Huang won first place for Best Student Poster at the 11th Maritime Risk Symposium for her MSC 2020 Summer Research Institute project on sulfur emission.



The Stevens NASA Robotic Mining Competition – Lunabotics Team comprised of Louis Cantor, Stephen Forte, Ryan McAliney, Joseph Pelligra, Trent Slutzky, Andrew Underwood, and Robert Preston Wilmot won the L3Harris Senior Capstone project competition and award among a diverse pool of competing STEM institutions.

The ALTAIR - Multi-Robot Search and Rescue System Team, comprised of ME undergraduate students Margaret Carroll, Joi Ishikawa, David Onorevole, Tori Quan, and ECE undergraduate students were selected for the L3Harris Senior Capstone Mentorship Program and received funding from L3Harris Technologies.



ME PhD student Grzegorz “Greg” Hader – Mechanical Engineering PhD candidate Greg Hader was the co-chair for the Track 13 Micro and Nano Systems Engineering and Packaging at the 2021 ASME IMECE Virtual Conference. He led two sessions: “Computational Studies on MEMS and Nanostructures” and “Inertial Navigation: MEMS/NEMS to Bio-Inspired.”

ME PhD student Siwei Chen and Grzegorz “Greg” Hader— along with E.H. Yang, ME Professor, and Xiaotian Wang, ME PhD alumnus— were issued a U.S. patent titled “Location-Specific Growth and Transfer of Single-Crystalline TMD Monolayer Arrays.”

ME PhD student Shichen Fu was awarded “Best Talk; Symposium EL04: Beyond Graphene 2D Materials—Synthesis, Properties, and Device Applications; 2020 MRS Fall Meeting” in the EL04 Beyond Graphene Symposium. Fu also received the Paul Kaplan award from Stevens Institute of Technology for his distinguished doctoral work.

ME PhD student Emily R. Triolo received an Honorable Mention from her National Science Foundation GRFP fellowship application for her project “Understanding the Biomechanics of the Corpus Callosum during Head Impacts Through an Ultra-High Field MRI-informed FE Brain Model.”

ASME CONNECTION

A CONNECTION TO MECHANICAL ENGINEERING AT STEVENS THAT BEGAN IN 1880

In 1871, Stevens selected the first professor of mechanical engineering to be Robert Thurston. Inspired to lead the way in professionalizing and standardizing the mechanical engineering field, Thurston founded the American Society of Mechanical Engineers (ASME) in 1880. Dr. Henry Morton, the first president at Stevens, was an early and enthusiastic supporter of the effort.

In a gas-lit assembly hall in the Edwin A. Stevens Building, that first formal ASME meeting was held, announcing Thurston as the first president of the new organization. Two years later, President Morton would become vice president of ASME. Many more from Stevens would eventually serve as presidents or vice presidents of the organization. Today, Thurston's legacy is continued through a state-of-the-art educational program and world-class research in the Mechanical Engineering Department at Stevens.



**IN 1871, STEVENS
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MECHANICAL ENGINEERING DEPARTMENT

STEVENS INSTITUTE OF TECHNOLOGY, 1 CASTLE POINT TERRACE, HOBOKEN, NJ 07030