“The role of academia, as well as everyone else, is to do what they can to help humanity during this challenging time. . . . For those that have skills to offer, it is a critical time to work together to address the challenges that are upon us.”
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Academic year 2019-20 will go down as one of the most complex and challenging years the UConn School of Engineering has ever faced.

In Fall 2019, tragic events involving students in our School and the University required us to focus much attention on student mental health and wellbeing. We actively participated in a university-wide task force and contributed to an actionable strategic plan to improve awareness and recognition of stress signs and to improve the environment and resources needed to promote undergraduate and graduate students' mental wellbeing. We took immediate actions in the School of Engineering (SoE) to address student mental health issues. I am hopeful—and indeed determined—to see university-wide policies and resources established in the next few years to achieve a robust mental health infrastructure and a supportive environment for students at our University.

In March, the COVID-19 pandemic became one of the most challenging and disruptive forces hitting institutions of higher education nationwide, including UConn Engineering. UConn’s public-health-mandated campus closure after spring break put us in uncharted waters. We moved all of our courses to an all-online format with the utmost urgency and agility. All employees who were able to telecommute were asked to do so. All research and academic functions, to the degree possible, were taken to the digital space. I am happy to report that the educational goals and outcomes of our academic programs were met.

Our faculty and staff’s willingness to be flexible, resilient, and adaptable in light of events that are well beyond our control was beyond belief. In May, the research laboratories in the School opened gradually and under strict protocols. A number of our research labs were instrumental in supporting the state in production of hand sanitizers or innovative designs of personal protective equipment (PPE) and ventilators. Some of our research projects have significant potential to develop new methods for rapid and accurate testing for corona virus, for vaccines, and for therapeutic drug delivery.

We also continued to face financial and resource challenges in the School. We expect that these challenges will intensify as expenses and revenue loss in the State of Connecticut and UConn mount as a consequence of the COVID-19 pandemic. The resulting stress on our faculty-staff workforce and the support structure for our academic and research enterprise is significant. We discuss this problem in detail in various sections of this annual report.

In May, the appalling death of George Floyd in Minneapolis, Minnesota, again underscored the ugly reality of racial injustice in our country. This horrible event came in the midst of a pandemic that is disproportionately affecting African-American, Latinx, and Indigenous communities, and prejudice against individuals of Muslim faith and Asian descent is growing. The resulting pain and agony is tearing our nation apart and is deeply felt in the UConn community. At UConn and in the SoE we experienced the anger and the sadness resulting from these events.

We have explicitly reaffirmed our collective commitment to the values of social justice, equity, and inclusion. But we did not and will not stop there. As engineers, our strength is designing, developing, and implementing approaches that maximize outcomes and impact. Drawing on this training, we are collectively engaging our students and our wider community in the planning and implementation of strategic initiatives that will allow us to deliver on this commitment. You will hear a lot more on this from us in the near future.

Despite all the complexities and challenges we faced in the past year, our research enterprise experienced tremendous growth. We developed new innovative academic programs and experiences for our students. The entrepreneurial innovations in the School were more vibrant than ever. Our enrollment was at record highs. And our faculty’s achievements at the national level continue to be a source of pride.

In closing, I should mention how humbled and deeply honored I am by the strong support I have received. The faculty and staff of the School, the members of our advisory board, and our industrial and government partners have been exceptionally supportive and a pleasure to work with. I am deeply grateful for the opportunity to be the dean of the School at such complex times and am mindful of my personal responsibility to serve the citizens of Connecticut. I look forward to working with the university leadership, our faculty and staff, and our many partners and friends to realize our community’s ambitious vision for UConn and our State.

Kazem Kazerounian
Dean
This report documents the current state of the UConn School of Engineering (SoE), as viewed through the lens of our achievements in 2019-20 and as the continuation of our progress over the past several years. As documented in this report, the UConn SoE has emerged as a powerhouse for research and engineering education in the State of Connecticut.

Engineering for a Better Connecticut

Throughout the challenges of the past year, SoE has demonstrated an unwavering commitment to the betterment of society in Connecticut and beyond through:

• Research and public service initiatives that address socially-relevant challenges, such as the COVID-19 pandemic, brownfields remediation, cybersecurity, and engineering for human rights.
• A resolute pursuit of diversity and gender parity in engineering through initiatives targeted at all levels of the STEM enterprise, from K-12 initiatives, through undergraduate and graduate education, to faculty hiring and development.
• A strong commitment to developing philanthropy to support our students and faculty during tight budgets.

Next Generation Connecticut Commitments Fulfilled

Through the dedication of our faculty and staff and careful stewardship of resources, we have fulfilled the commitments made to the State of Connecticut under the Next Generation Connecticut program by:

• Increasing our undergraduate enrollments by 70% over six years to address the state-wide need for engineering talent. Our actual enrollment growth has been 100% between 2008 and 2018.
• Increasing our research expenditures—total and per Tenured/ Tenure Track (T/TT) faculty—by 10% per year in recent years.
• Establishing collaborative partnerships with industry and federal government that drive economic competitiveness among Connecticut’s core sectors. Engineering partnerships amounting to ~$100M place the Technology Park-Innovation Partnership Building in an exceptional position to serve as the main gateway for industry engagement with the University. This includes two major initiatives with the Navy and the Air Force.
• Strengthening and diversifying our sponsored research portfolio, bringing resources, engineering talent, and transformative ideas to our state.
• Pursuing innovation and entrepreneurship initiatives that turn our intellectual capital into economic growth.

Challenges

We have identified staffing levels, salary compression, and space as three significant challenges facing the School.

Staffing Levels: The SoE has achieved remarkable progress despite significant budget cuts over the past few years. Most seriously, our faculty and staff levels have not kept pace with the significant growth in our enrollments, research enterprise, and industrial engagement initiatives. The increase in our number of tenured and tenure-track faculty has been minimal, and, to comply with budget cuts, senior faculty positions vacated through attrition or retirements have been replaced with junior faculty positions.
resulting in a net loss of experienced faculty. The number of support staff in the School has remained relatively flat, despite our remarkable growth. Staffing constraints severely limit our potential for further impact. An independent external review of the School conducted in Fall 2018 independently affirmed this assessment, as follows:

“Many [faculty and staff] expressed concern about the rapid growth of enrollment in the School and the ability to add resources to maintain educational quality. The University is encouraged to consider adding resources to address faculty and staff compensation and workload.”

“The staff are treated well by the faculty in a culture of mutual respect. . . However, the staff support is lean, and maintaining staff support and morale will be challenged if the School grows in terms of faculty size or student enrollment without commensurate increases in the number of staff.”

**Salary Compression:** Equally threatening, the salaries we are able to offer our existing faculty and staff are now below national norms, placing us at risk of significant talent losses. In the past, direct and valuable support was given by the Provost to address specific retention risks, which lessened the potential damage of non-competitive salaries. In their report, the external review committee also noted and raised concerns about the implications of salary compression on the School:

“Salaries are severely compressed due to state-mandated cuts in operating budgets for the past several years. The School has done an excellent job of recruiting top talent, but will continue to face morale problems and loss of research productive faculty unless an open and transparent process to reward top performers is implemented.”

In May 2019, the School worked closely with the Provost’s Office to take a significant step in addressing the salary compression of more than 25 faculty members who, in our judgement, were at high risk of attrition.

**Space:** In Fall 2018, the University hired an architectural firm, Payette Associates, to conduct a comprehensive space assessment study of the School. The study concluded that the School currently has no excessive space and therefore space is a limiting factor for any future growth. Additionally, a significant portion of the current space was classified as unacceptable and needs to be addressed immediately to maintain vital School functions.

**Future Growth**

Looking forward, we have identified two areas for strategic growth: manufacturing and computer science with an emphasis on artificial intelligence and machine learning and their applications to research in materials, environmental science and engineering, biomedical engineering, biomolecular engineering, manufacturing, and other areas. Further investment in these areas will have an unparalleled impact on the University’s research enterprise and on our ability to support industry and economic growth in the State.

We will continue to move forward aggressively, undeterred by our challenges, to shape the engineering and economic landscape of Connecticut. While we are very concerned that further attrition in our operating budgets, and particularly staffing, threatens our ability to act as a driver for economic development and innovation in Connecticut, we remain excited about our achievements to date and our trajectory for the future.

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The National Academy of Engineering (NAE) on Oct. 6 honored UConn’s Dr. Cato T. Laurencin for his extraordinary impact on the engineering profession. Laurencin received the Simon Ramo Founders Award for his research contributions and leadership in engineering.

Laurencin is known worldwide as a leader in biomaterials, nanotechnology, stem cell science, drug delivery systems, and a field he has pioneered, regenerative engineering. He is being recognized with the Simon Ramo Founders Award “for fundamental, critical, and groundbreaking scientific advances in the engineering of tissues, guiding technology and science policy, and promoting diversity and excellence in science.” The award acknowledges outstanding professional, educational, and personal achievements to the benefit of society and includes a commemorative medal.

At UConn, Laurencin is the University Professor, the eighth to be designated by the School in its over 135 year history. He is professor of chemical and biomolecular engineering, materials science and engineering, and biomedical engineering; the Albert and Wilda Van Dusen Distinguished Endowed Professor of Orthopaedic Surgery; and CEO of the Connecticut Convergence Institute for Translation in Regenerative Engineering.
Leadership Milestones

On August 23 of 2019, Prof. Leslie Shor of the Chemical and Biomolecular Department assumed the role of Associate Dean for Research and Graduate Education. Prof. Shor is a leader in environmental research and brings a strong commitment to diversity to her new role. Prof. Shor has taken a leading role in our interdisciplinary research initiatives and in our work to achieve gender parity and diversity in our faculty and graduate student populations.

Also in August 2019, Prof. Pamir Alpay assumed the role of Associate Dean for Research and Industrial Partnerships at the SoE. Prof. Alpay continues as the Executive Director of UConn Tech Park where he leads engineering centers, applied research initiatives, and industry outreach efforts.

Acknowledgements

We gratefully acknowledge the commitment of our faculty and staff, whose tireless pursuit of excellence has made possible the achievements reported here. We are proud to be part of this team.

We also acknowledge the enthusiastic and strong support of President Katsouleas, Interim Provost Elliott, and Provost Lejuez, and their respective offices and staff. In particular, we are delighted that the home department of President Katsouleas is Electrical and Computer Engineering.

Kazem Kazerounian
Dean

Michael Accorsi
Senior Associate Dean

Pamir Alpay
Associate Dean for Research and Industrial Partnerships

Daniel Burkey
Associate Dean for Undergraduate Education and Diversity

Leslie Shor
Associate Dean for Research and Graduate Education

Daniel Burkey, Associate Dean for Undergraduate Education and Diversity, maintained a positive social media presence during the pandemic-related shutdown in support of our students, faculty, and staff. He worked tirelessly to transition our undergraduate engineering courses and academic programs online while continuing his active role in professional service and STEM education research. Dan is the 2020 recipient of the AIChE Award for Innovation in Chemical Engineering Education. August 2020 marks his ten-year anniversary with UConn Engineering.
Undergraduate Education

The following sections outline the SoE's major achievements and initiatives in undergraduate education.

Enrollment Growth
In response to ambitious growth targets mandated by the State's Next Generation Connecticut legislation, UConn SoE has nearly doubled the size of its undergraduate student body over the past 10 years and has increased its undergraduate count by 70% since 2012. Our projected enrollment for the Fall 2020 semester is 3454. In addition, the quality of our students is rising. The average SAT score of our admitted incoming freshmen is 1308.

Student Demographics
3310 Students enrolled on the Storrs campus, Fall 2019
799 Degrees conferred, 2019-20 ytd.
878 Female students
196 International students
1308 Avg. SAT of admitted students

Student Achievements
2 University Scholars
2 Holster Scholars
8 IDEA grant
3 SURF awardees
65 honors graduates

Scholarships
In addition to university scholarships, in 2019-2020 SoE Undergraduate Programs distributed $490,314 to support 256 undergraduate students.

Regional Campus Expansion

Four-Year Computer Science Program at the Stamford Campus
UConn Engineering launched a four-year computer science and engineering program at the Stamford campus in Fall of 2017. Our commitment is that students can now complete their entire degree program at Stamford. The Stamford program makes the computer science curriculum widely available to Connecticut's information-technology-based sectors, such as finance and insurance. However, further investment in teaching staff is required to fulfill this commitment. We expect the first graduates from Stamford's program in the Spring 2021 semester.

Freshman Engineering Curriculum at Regional Campuses
The freshman engineering curriculum is offered at all of the UConn regional campuses. We have also been working with regional campus representatives to offer coursework beyond the freshman year at all regional campuses, so as to maximize the number of students that can remain at the regionals to complete 54 credits. By offering sufficient coursework, it could be possible to support 20-30 engineering students per academic year at each of the regional campuses. In Spring 2020, 160 students (82 Stamford, 27 Hartford, 23 Avery Point, 28 Waterbury) were enrolled in Engineering at their respective regional campus. Regional campus deposits for Fall 2020 have increased significantly.

Regional Campus Support Network Initiative
Engineering faculty at regional campuses have developed a support network that adopts innovative course approaches to strengthen and expand curriculum offerings. Many regional campus faculty now offer flipped classes and post their lectures online to be available to all students. We are also working toward hiring full-time faculty in Hartford, taking advantage of the new downtown location and proximity to industry and employers.
Cornerstone Initiative: Freshman Experience

In 2016, the SoE launched the “Cornerstone Initiative,” which focuses on the radical redesign of the freshman engineering experience. The Cornerstone Initiative reworked the ENGR 1166– Foundations of Engineering course. In the 2019-2020 academic year (AY), this new course served ~450 freshmen in biomedical, chemical, civil, environmental, mechanical, electrical, materials science, and undecided engineering. With the COVID-19 pandemic shifting coursework online after spring break, the instructional team rapidly devised a do-at-home project for the second project, created all new learning materials, and conducted the remainder of the semester remotely. The students remained highly engaged through this project, with 86% completing all of the revised assignments. While the traditional Freshmen Expo was unable to happen, students still worked in groups while remote and completed a poster detailing their do-at-home project.

Cornerstone Design Laboratory. In January 2019, the updated ENGR 1166 course and other freshman activities moved into the newly-renovated ~2000 sq. ft. Cornerstone Design Laboratory located on the first floor of the United Technologies Engineering Building. With a modular floorplan, a makerspace, and creative student workspaces, this new centerpiece of the freshman experience served the entire freshman population in engineering as well as many students interested in exploring engineering. Eighteen sections of approximately thirty students each worked in the space during the Spring 2020 semester. A proposal has been developed and presented to potential donors to name the Cornerstone Initiative.

General Engineering Degree

The General Engineering Degree is a multidisciplinary degree path that will allow students to pursue an engineering degree with a broad skillset, allowing them to work across fields. Grounded in engineering fundamentals from multiple majors, it also provides unprecedented flexibility for engineering students to pair an engineering degree with other interests and majors at the University. The SoE will be developing several new joint programs with partners around the University that take advantage of the General Engineering Program’s unique structure.

International Engineering Program

The SoE consolidated its engineering and foreign language dual degree offerings into the rebranded International Engineering Program. The International Engineering Program is comprised of Eurotech, Baden-Wurttemberg, Germany (est. 1993); the Engineering Spanish Program, Valencia, Spain (est. 2013); AsiaTech, Shanghai, China (est. 2016), and Technopole France, Toulouse, France (est. 2018). The Technopole France program was established in the 2017-2018 academic year through a new exchange agreement with University of Toulouse. As part of our new relationship with the University of Toulouse, we are creating a strategic partnership that will include an aerospace workshop in Toulouse in 2020.

<table>
<thead>
<tr>
<th>International Engineering Student Data for AY 2019-2020</th>
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<tbody>
<tr>
<td>Students Enrolled</td>
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<tr>
<td>Eurotech</td>
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<td>90</td>
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<tr>
<td>Engineering Spanish Program</td>
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<td>38</td>
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<td>Asia Tech</td>
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<td>6</td>
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<tr>
<td>Technopole France</td>
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<td>28</td>
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</table>
Minor in Engineering for Human Rights

A new minor, Engineering for Human Rights, was developed in 2016-2017 as a result of collaborations between the SoE and the UConn Human Rights Institute. The minor provides students with interdisciplinary instruction in theoretical, comparative, and historical perspectives on human rights. In addition to classroom instruction, the minor requires a supervised internship in human rights in industrial settings, which gives students valuable practical experience.

Cooperative Education

In 2017, the SoE started to focus energy on Cooperative Education. The co-op program has strategically developed relationships with key employers in Connecticut. Engineering students take a semester or two off from school and work full-time during an academic semester. All co-op placements are paid, pre-professional experiences in industry.

Cooperative Education Student Data for AY 2019-2020

<table>
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<th>Students Enrolled</th>
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<tbody>
<tr>
<td>Fall 2018</td>
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<td>Spring 2019</td>
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ABET

All of the SoE’s programs (except Engineering Physics) are accredited by ABET. The school hosted the ABET evaluation team on-campus in October 2019, and has been working through the process of completing the needed follow-up documentation. The School anticipates final notification after the annual ABET meeting in July 2020. To streamline future visits, the School has adopted a common evaluation schedule and plan for all departments.

Advising

The 2019 ABET accreditation visit lauded Academic Advising as a top strength of the UConn SoE. Advising in the SoE is mandatory for every student, every semester. First- and second-year students are assigned to a professional staff advisor, and transition to a faculty advisor when they reach junior standing. Both professional and faculty advisors aim to create active partnerships between students and the University community in order to support and empower undergraduate students in making meaningful academic decisions in pursuit of their goals.

In 2019, along with the ABET visit, Engineering reviewed best practices in the Academic Advising field to best understand and serve our students. Grounded in scholarship, Academic Advising in the SoE is a holistic practice, focused on the complex and multifaceted cognitive processes related to student growth and development. Advising seeks to uplift the voices of students in the University community and prepare them to face the world’s current and future challenges.
Engineering House Service Learning

For the second year in a row, the 100 freshmen living in Engineering House participated in a Service Learning Project sponsored by the WeHa Business Club in West Hartford. WeHa supports young adults with moderate to severe autism by providing them opportunities to do meaningful work in their community. The group’s leader, Darlene Borre, worked with Engineering House students on identifying products or needs within the autism community where students could propose and prototype solutions. Using the resources of Engineering House, including the makerspace in Werth Tower, the students designed and in some cases prototyped creative solutions to the challenges proposed by Darlene. Their semester’s work concluded in December with a poster session in Werth Tower attended by Darlene and other members of the autism support community. Through collaboration with Julia Yakovich, director of Service Learning Initiatives, NPR attended the poster session, interviewing students, faculty, and community members. The corresponding story was aired nationally on NPR’s “All Things Considered…”

Krenicki Arts and Engineering Institute

Founded by a $5M donation from the Krenicki Family, the Krenicki Arts and Engineering Institute represents a bold new partnership between the SoE and the School of Fine Arts. The Institute offers unique programming between the two schools. In February 2020, Rhode Island design collective Pneuhaus gave a workshop and lecture on inflatable structures that highlighted the artistic and engineering challenges of such structures.

The Institute will provide scholarships and fellowships to support undergraduate and graduate students; the first awards were made to students for the Fall 2020 semester. Numerous new curricular plans are being implemented as well. Minors in Theater/Entertainment Engineering as well as Industrial Design are being offered starting in Fall 2020. The SoE successfully hired a new faculty member in Industrial Design, who will work closely with faculty from the School of Fine Arts to develop an Industrial Design major across the schools. Additionally, with the creation of the General Engineering degree program, the SoE stands ready to partner with numerous other programs to offer unique degrees with a solid engineering foundation paired with majors that cater to students’ individual interests.
UConn Senior Design Demonstration Goes Online for 2020

800+ SENIOR STUDENTS
12 MAJORS
220+ DESIGN PROJECTS
120+ INDUSTRY SPONSORS

UConn Engineering @UCconnEngineer - May 1
Today marks the day where we would have all assembled in Gampel Pavilion and showcased student's year-long projects for @UCconn Senior Design Demonstration Day.

Then, circumstances changed.

Join us today for #VirtualUCconnDesignDay, and tune in as we share these amazing projects.

CHITOSAN-BASED DEGRADABLE HYDROGEL FOR LOCALIZED DRUG DELIVERY

POLYMER SWELLING IN EXPANSION MICROSCOPY

THOMPSON, CT: RIVERSIDE PARK POP-UP VENDOR VILLAGE

COURTESY MESSAGING SIGNALING DEVICE

BIOMEDICAL ENGINEERING TEAM 3

CHEMICAL AND BIOMOLECULAR ENGINEERING TEAM 8

CIVIL ENGINEERING TEAM 16

COMPUTER SCIENCE AND ENGINEERING TEAM 34

NON-CONTACT TESTBED FOR RAILROAD APPLICATION

GROUNDWATER FATE AND TRANSPORT MODELING FOR PUMP AND TREAT REMEDIAL DESIGN AT THE ATLANTIC SHELLFISH SITE IN NORTH KINGSTOWN, RHODE ISLAND

AUTONOMOUS AIR VEHICLE OPERATIONS FROM MOBILE HOST PLATFORM

HEAT TREATING OPTIMIZATION OF HASTELLOY STRIP

MANAGEMENT AND ENGINEERING FOR MANUFACTURING TEAM 12

ENVIRONMENTAL ENGINEERING TEAM 6

ELECTRICAL AND COMPUTER ENGINEERING TEAM 2027

MATERIALS SCIENCE AND ENGINEERING TEAM 11

3D PRINTED POROUS TITANIUM FOR SMART IMPLANT

PRODUCTION OF ACTIVATED CARBON FROM WOOD WASTE

DESIGN, DEVELOPMENT, AND FABRICATION OF A 3D LASER SCANNER COOLING SYSTEM

MODEL-BASED DESIGN OF 3D PRINTS RESULTS INTERPRETATION AND VISUALIZATION

BIOMEDICAL ENGINEERING TEAM 24

CHEMICAL AND BIOMOLECULAR ENGINEERING TEAM 15

MECHANICAL ENGINEERING TEAM 63

SYSTEMS ENGINEERING TEAM 3
Online Educational Initiatives

Prof. Sarira Motaref, working in her capacity as Assistant Director of Faculty Development in CETL, has helped engineering faculty develop multiple online courses for the School. The School now has 21 undergraduate courses available fully online for the Summer 2020 session. These courses allow students who have transferred into the SoE a chance to align themselves to the UConn curriculum, provide flexibility for UConn students who may want to study abroad, and also give students a chance to get ahead on some required coursework or retake courses they want to improve in. The development of these classes as fully online also allows the School to offer them more frequently, sometimes in May term or intersession, and given the current COVID-19 pandemic, these classes are already fully developed and available in case a shift to online coursework is required again in the upcoming academic year.

Undergraduate Programs COVID-19 Response

The COVID-19 pandemic required significant and rapid changes to operations for the spring semester after spring break. The Undergraduate Programs team worked with the deanship and other University offices to move three of our biggest spring events online: Admitted Students Day (rebranded in 2020 as UConn Bound!), Senior Design Demonstration Day, and Undergraduate Commencement.

Undergraduate Programs supported Admissions in the University-wide UConn Bound! online event, and coordinated the departments in creating websites and online information sessions for students admitted to engineering. As of the deposit deadline, deposits for the SoE were up approximately 20% over 2019’s numbers. While we understand these numbers are preliminary, our strong outreach effort to our admitted students is reflected in these numbers.

The traditional Senior Design Demonstration Day in Gampel Pavilion was also unable to be held in-person. Undergraduate Programs coordinated departments moving to online evaluation of student projects, often by the same external judges who would normally attend in person. Additionally, Undergraduate Programs worked with the SoE Communications Team to collect video presentations of all 2020 design projects and host them on a special website that was broadly available to the School and the public.

Lastly, Undergraduate Programs supported the transition to an online commencement for the University. We facilitated the selection of the student speaker and the filming of her remarks to the School, as well as the creation of two retrospective videos – one which solicited video materials from our graduating seniors, and one a congratulatory video created from submissions from faculty and staff.

In addition to these events, Undergraduate Programs created two websites, one with resources for students, and the other with resources for faculty, and kept these up-to-date throughout the spring semester with the latest news and best practices. The Undergraduate Council, made up of associate heads or undergraduate directors from all departments and chaired by the Associate Dean for Undergraduate Education, has formed a task force for Fall 2020 course planning and has worked with CETL to provide workshops and training for faculty moving their classes to online or hybrid formats. The Undergraduate Teaching Assistant Program has also hired approximately 2/3 of the fall TAs for the months of July and August to support faculty in developing and organizing educational materials for the Fall 2020 semester.
## Undergraduate Education, *cont’d*

### School of Engineering Majors and Exploring Engineering ACES students, Fall 2019

Office of the Registrar, September 2019

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Overview

School-wide graduate education initiatives augment departments' academic programs by facilitating recruiting, supporting graduate diversity and outreach, supporting professional skills and enrichment programs, and developing interdisciplinary academic programs. Graduate education initiatives aim to produce M.S. and Ph.D. graduates with the highest caliber of academic achievement and the professional capabilities that enable graduates to thrive in a variety of settings including private industry and academia.

This has been an unprecedented year. In mid-March we were all experiencing uncertainty about temporarily ramping down and suspending laboratory research and in-person instruction and moving to a socially distant mode of operations. Our graduate students showed courage and dedication in adapting to the new "normal". In the face of increasing certainty about their own futures, they supported the pivot of instruction, adapted in their own coursework, and transitioned their research. At UConn our research shut-down was more complete, yet our resumption of research was faster than many of our peer institutions. By May we were ready to re-start in-person research, and throughout the 2020 summer our graduate students maintained their dedication to their research either on campus or remotely and have been valuable partners in establishing procedures and ensuring the safety of our entire SoE community.

On top of the COVID-19 pandemic, the legacy of unaddressed racial injustice that has gripped our nation has sparked pain and upheaval within the SoE community. Our SoE graduate students claimed a leadership role in the actions now underway to ensure the future SoE is more diverse, equitable, inclusive, and welcoming.

Challenges

Recruiting: Consistent with nationwide trends, the SoE struggles to recruit and retain high-quality graduate students, particularly domestic students. The debt incurred by undergraduate students makes them unwilling to enter graduate programs. In addition, UConn is competing with peer and higher ranked universities for a shrinking pool of students. The current COVID-19 crisis has also dramatically reduced our ability to recruit students internationally. As a result, faculty sometimes have difficulty securing adequate numbers of talented students, with serious implications for their research programs.

Cost: In FY19, the fringe benefits rate for graduate students was 18%. The indirect cost burden was 59.5%. The cost of supporting a full time graduate research assistant (an entry level M.S. student for 12 months a year working 20 hours/week) is $59,815 including stipend, fringe benefits and indirect cost. This cost per student is higher than most of our public peer universities in the US, placing significant competitive pressure on faculty researchers who need to support graduate students through their research grants. As the SoE does not typically provide service courses to non-engineering majors (compared to departments such as mathematics, chemistry, biology, and physics, to name a few), the SoE does not have large numbers of TA lines that are available to support engineering graduate students.

Professional Skills: One of the challenges facing our graduating M.S. and Ph.D. students is that they struggle to keep pace with the increasing emphasis placed by employers on leadership, interpersonal, and communication skills.

The SoE has undertaken major initiatives focused on addressing these challenges, as described below.
Major Initiatives

Recruitment Initiatives

To address our challenges in recruiting enough graduate students to fully staff our rapidly growing research programs, in Fall 2018, the dean’s office embarked on a multi-part graduate recruitment marketing campaign, encompassing email marketing, marketing automation, offline components, Skyping, and social media advertising. In Fall 2019, nearly 25% of our admitted students came from this campaign. This program was expanded in the past year, and by January 2020 our Ph.D. applications were up again nearly 30% year-over-year, but the effects of the COVID-19 global pandemic have significantly eroded Fall 2020 graduate enrollment, particularly for our incoming international students.

In the past few years, we emphasized diversity by building our presence at regional and national events hosted by NSBE, SHPE, SWE, and o-STEM. We will host the Fall 2020 regional GEM conference (virtually), and will resume our admitted graduate students orientation weekend in February 2021, health conditions permitting. Longer-term initiatives include developing collaborative relationships with the universities in the region that do not have undergraduate engineering programs. We have worked over several years to build a pipeline for top students in the physical or life sciences to pursue graduate degrees in engineering, and have just created a new partnership with Southern Connecticut State University (a diversity-serving institution) to provide graduate training opportunities for STEM undergraduates who are interested in innovation and entrepreneurship.

Fellowships Awarded to Supplement and Offset the Cost of Graduate Assistantships

In the past few years, we focused on developing philanthropic-based graduate fellowships or training grant fellowships to offset the cost of graduate education for tuition-paying graduate students or for principal investigators. Our success in these areas has been significant, totaling over $1.2M in the AY19-20 and includes the following fellowships. (Our students receive many other fellowships directly not reported here):

**Federal:** 7 NSF Bridge to the Doctorate, 36 ED GAANN, 7 NSF PIRE, 1 Naval STEM Coalition

**Industry:** 10 Cigna, 15 Eversource, 11 GE Innovation, 3 Synchrony Financial, 3 UTC

**UConn-Internal Competitions:** 3 Giolas Harriott Crandall Cordero, 1 Taylor Booth

John Lof Leadership Academy (JLLA)

In Fall 2017, we established the John Lof Leadership Academy supported by the proceeds of the John Lof Leadership endowment ($1M). JLLA is a first-of-its-kind professional development organization that has embraced a “for us, by us” principle for customized leadership training for and by graduate engineering students. JLLA develops leadership and professional skills, promotes and supports professional success, and engages communities outside the School to promote and provide mentoring support.

In Fall 2019, JLLA inducted 15 new members bringing the total membership to 30. Examples of events held over the past year include Effective Leadership, The Introverted versus the Extroverted Leader, Shark Tank Pitch Development, Motivating Yourself and Others, and an outreach event held at Illing Middle School, Manchester, Connecticut. JLLA has been featured in “Diversity in Action” Magazine. During the coming year, as we recruit our third cohort, we will also begin to implement a research project protocol led by UConn social scientists aimed at measuring the impact of the JLLA program versus a control group. Completion of this research study will further enhance the impact of JLLA by allowing the program to be described in peer-reviewed journals and enhancing the likelihood that it would be replicated elsewhere.
Professional Education

The Professional Education (PE) program delivers coursework required by graduate students toward completion of an engineering degree or advanced engineering certificate, courses of interest to students and corporate partners who wish to expand their knowledge and that of their employees, and courses for practitioners and students who are interested in advancing their knowledge of specific engineering subjects in a non-degree path. PE is a major component of the School’s industrial engagement effort.

Programs Offered through PE

- Master of Engineering (MENG) Degree
- Advanced Engineering Certificates
- Graduate Courses (non-degree)
- Corporate Education (customized training & development)
- Boot Camps (currently offering coding)

During AY 19-20, the PE program launched the following strategic activities, which support the program's growth and revenue generation trajectory:

1. Held regular PE Advisory Board meetings, consisting of members from the following organizations: Hanwha Aerospace, General Dynamics Electric Boat, Eversource, Fuss & O’Neill, GE Power, Langan Engineering, Medtronic, Pfizer, Pratt & Whitney, Unilever, Kaman, Raytheon Technologies and Collins Aerospace.

2. Extended digital presence of PE through extensive social media marketing, and continual expansion of online course offerings (40 online courses have been developed). Webinars, email campaigns, launch of a LinkedIn page, newsletters, virtual career fairs, networking sessions, open house activities, and Lunch & Learn sessions were executed to attract industry interest. Search engine optimization and website efforts led to 3.89 million impressions, and over 90K clicks.

3. Promoted excellence in curriculum by collaborating extensively with the Center of Excellence for Teaching and Learning for programmatic support and adding new offerings in advanced materials characterization, bridge engineering, engineering data science, computer science & engineering, manufacturing, transportation, and process engineering.

4. Collaborated extensively with the SoE departments, career services, development team, alumni relations, the senior design director, as well as UConn colleagues in other schools and colleges, to build industry partnerships.

5. Launched the 2020 Springboard Graduate Scholarship to assist recent 2020 spring and summer graduates with MENG full-time program costs, due to financial challenges that many are facing during the COVID-19 pandemic.
Enrollment and Actual & Projected Growth for MENG and Certificates

As a result of these efforts and according to preliminary registration data, revenue from PE is projected to continually increase during the AY 20-21, as follows:

Professional Education
Credit Program Offerings

Master of Engineering Concentrations
(by academic term first offered)

- General Engineering, Fall 2000
- Civil Engineering – Structures, Fall 2000
- Computer Science & Engineering, Fall 2000
- Electrical & Computer Engineering, Fall 2000
- Materials Science & Engineering, Fall 2000
- Mechanical Engineering, Fall 2000
- MBA/MENG Dual Degree, Fall 2015
- Advanced Systems Engineering, Fall 2017
- Clinical Engineering, Fall 2018
- Environmental Engineering, Spring 2019
- Global Entrepreneurship, Spring 2019
- Advanced Manufacturing for Energy Systems, Fall 2019
- Civil Engineering – Transportation, Fall 2020
- Manufacturing Engineering, Fall 2020
- Data Science, Spring 2021
- Chemical & Biomolecular Engineering, Spring 2021, Projected
- Biomedical Engineering, Spring 2021, Projected

Advanced Engineering Certificates
(by academic term first offered)

- Power Engineering, Spring 2016
- Contaminated Site Remediation, Fall 2018
- Advanced Systems Engineering, Spring 2018
- Composites Engineering, Spring 2018
- Process Engineering, Spring 2020
- Advanced Materials Characterization, Fall 2020
- Bridge Engineering, Fall 2020
- Power Grid Modernization, Fall 2020
- Engineering Data Science, Spring 2021, Projected
- Renewable Energy, Spring 2021, Projected

UConn Coding Boot Camp

The UConn Coding Boot Camp enrolled 173 students for AY 19-20 and was offered at the Harford and Stamford regional campuses. The program, which transitioned to online due to the pandemic, has made a permanent transition to fully online because enrollment increased significantly with the virtual modality. To launch the boot camp, UConn received $104,549 from its partnership with Trilogy/2U, of which $65,247 was disbursed to the two regional campuses and central administration. The remaining $39,302 was received by PE.

Professional Enhancement Modules

The PE program offers customized training and development to industry. PE adapts its programming to accommodate company needs and working professional schedules, and offers its programs at company sites. For AY 19-20, the PE program received $37,089 in net revenue.
Interdisciplinary Initiatives

Krenicki Arts and Engineering Institute

The establishment of the Krenicki Arts and Engineering Institute, a joint effort of the Schools of Fine Arts and Engineering, was announced in September 2019. John and Donna Krenicki provided a $5M endowment to launch and sustain research and educational programs that explore engagement of engineering and the arts across technological fields, industrial design, and advanced manufacturing.

The Institute will establish a major, a minor, graduate seminars and workshops, and an online graduate certificate. Opportunities to visit and intern at industrial design studios and advanced manufacturers and to participate in research initiatives will be part of every student’s experience.

Connecticut Brownfields Initiative (CBI)

The Connecticut Brownfields Initiative is an interdisciplinary service-learning program launched in December 2019 that teaches students how to transform polluted and abandoned property into usable land. UConn students work directly with Connecticut municipalities to revitalize and restore properties. The program helps municipalities to prepare and submit grant proposals for investigation and cleanup of contaminated sites, to collect background information and data, to draw up sampling plans, to develop brownfields inventories and prioritization lists, to evaluate redevelopment options, and to conduct community outreach. The program is supported by the CT Department of Economic and Community Development, the Community Foundation of Eastern Connecticut and an array of philanthropic supporters.

In AY 19-20, twenty-three students from seven majors participated in the fall semester course, working with four municipalities (City of New Haven, City of Middletown, City of New Britain, and Town of Canton), the Capitol Region Council of Governments, and the New England Museum of Motorcycles, a non-profit organization located in a former mill in Vernon. The students prepared grant proposals to the US Environmental Protection Agency; of five proposals submitted in December 2019 three were awarded up to $300,000 to conduct site investigations and promote redevelopment. In the spring semester, eleven students worked with four municipalities (City of Stratford, Town of Old Saybrook, Town of North Haven, and Stonington) and Saint Luke’s Development Corporation in New Haven. The students prepared three brownfields inventories with methodologies for site prioritization, an analysis of brownfields cleanup alternatives, and remedial calculations for a contaminated site.

CBI actively conducts outreach to promote brownfields redevelopment in Connecticut; in the last year, CBI organized multiple outreach webinars, hosted an educational session in the Connecticut Architecture Conference and Expo, provided a keynote presentation in the Connecticut Conference of Municipalities, presented at the Brownfields Informational Summit hosted by Congressman Courtney, and participated in the Brownfields 2019 conference. The Initiative is led by Prof. Maria Chrysochoou and managed by Prof. Nefeli Bompoti.
Engineering for Human Rights Initiative (EHRI)

The Engineering for Human Rights Initiative (EHRI), a collaborative venture between the SoE and the UConn Human Rights Institute, is the first of its kind in the world. The aim of the initiative is to make human rights an integral component of effective engineering practice. EHRI draws on a human rights minor open to all undergraduates, new curriculum in engineering and human rights, field experiences, and industry outreach. The initiative engages colleagues in the social sciences, humanities, business, law, agriculture, and natural resources at UConn and internationally.


During the past year, we were fortunate to hire both a postdoctoral fellow and an assistant research professor, each skilled in applied human rights methodologies. The Initiative has hosted multiple events including a September 2019 careers forum that gave our students access to leading industry experts on supply chain integrity and sustainability; an October 2019 curriculum workshop; and a forthcoming September 2020 virtual roundtable on COVID-19 research featuring faculty from Engineering, Social Work, UConn Health Center, and College of Liberal Arts & Sciences. A proposal for a named initiative in Engineering for Human Rights is under consideration by a donor.
Faculty

Faculty Head Count

The number of tenured or tenure track (T/TT) faculty in the SoE has stayed relatively constant in the last five years and has modestly increased in the last seven years. A total of 21 T/TT faculty positions were added since 2011. Of those, 11 account for the faculty lines in the newly developed BME Department, which was established by the Board of Trustees in September 2012 in response to the University’s commitment to the State’s Bioscience Connecticut initiative.

![Graph showing Faculty Count in the School of Engineering](image)

Engineering courses are not taught by graduate students. To accommodate the dramatic increase in the undergraduate enrollment, we have developed a cadre of passionate faculty focused on teaching (APIR- assistant/associate/full professors in residence). These positions are considered permanent (without tenure) after a seven-year probationary period. Individuals in these positions are largely recruited in national searches and are required to continuously work with, and go through training provided by, the Center for Excellence in Teaching and Learning (CETL) to improve their teaching skills. We have also developed rigorous standards for teaching faculty annual evaluations and for promotions.

Challenges

To accommodate budget cuts in the SoE, senior faculty who retired or left the School are generally replaced with more junior faculty. While this is an investment in the future, it creates challenges, including accommodating lower teaching loads for pre-tenured faculty. The SoE had a total of 50 pre-tenured faculty in Fall 2018.

We have been extremely successful in enhancing the School’s research portfolio and in supporting industry. However, future expansions in these areas require meaningful investments by the university in additional T/TT faculty lines. The external review independently affirmed this assessment, and noted that any further growth in the School would depend on additional resources to maintain educational quality.

Another challenge we face is that the salaries we are able to offer our existing faculty are now below national norms, placing us at risk of significant talent losses. In the past, direct support was given by the Provost to address specific retention risks, which lessened the potential damage of non-competitive salaries.

In their report, the external review committee also noted and raised concerns about the implications of salary compression in the School on faculty morale and on retention of productive faculty.

Faculty Data, 2019-2020 AY

- 145 T/TT faculty
- 29 Teaching faculty
- 17 Endowed chair professorships
- 7 Named professorships
- 20 Term professorships

Kristina Wagstrom, Assistant Professor of Chemical and Biomolecular Engineering, checks a precipitation collector at Spring Valley Student Farm.
Faculty Retention

Engineering is a competitive field, and faculty flux is the rule rather than the exception. In the absence of adequate financial flexibility to retain our faculty, we have focused on creating a positive environment and offering faculty support in research development skills and in teaching skills. As a result, our retention rate has drastically improved. The following table shows the trend for faculty attrition (not including retirement) in the SoE in the past six years. About 75% of the senior faculty who left the School have moved to senior leadership positions in academia.

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Chair, Named, and Term Professorships

In order to further support our faculty, we have worked extensively with industry and private donors to create chair, named, and term professorships. We currently have seventeen endowed chair, seven named, and twenty term professorships.

Enhancing Research Development Skills

Since 2015, the SoE has provided grant writing skills training to junior faculty through a series of workshops focused on the NSF CAREER competition. The workshops are offered monthly between November and May. Three workshop participants received the CAREER award in 2019 and five received the award in 2020. Since 2016, our faculty have received 24 early career awards from the National Science Foundation, the Office of Naval Research, NASA, and the Air Force Office of Scientific Research.

Enhancing Teaching Skills

To promote high-quality undergraduate instruction, the School has taken measures to support and promote the teaching mission of its T/TT and in-residence faculty. In 2017, Dr. Sarira Motaref was appointed the School’s Assistant Director of Faculty Development and its liaison with Center for Excellence in Teaching and Learning (CETL); her focus is on developing resources and identifying opportunities for teaching faculty.

In AY 19-20, workshops on teaching technologies, best practices in online teaching, and inclusive teaching were offered to faculty to explore their application in undergraduate and graduate courses. All departments designed an alternative course evaluation method to address SET+ requirements. The majority of faculty received training on “preparing for distance education” and “effective teaching in a virtual environment” to address challenges during the pandemic. In collaboration with the SoE academic advising team, multiple undergraduate courses were identified to be transformed to the online modality; a total of 20 courses were developed and offered online by eCampus in summer 2020. Faculty worked closely with CETL to develop high quality online courses. A total of 40 graduate courses were developed and offered in the online for the Professional Education program in AY19-20.

SoE Board of Trustees Distinguished Professors

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<td>Bahram Javidi</td>
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<td>Yaakov Bar-Shalom</td>
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Scholarship

The generation of knowledge through scholarship is vitally important to the SoE. The School promotes scholarship first and foremost by recruiting and retaining the highest caliber faculty. The School works to recognize its faculty by systematically recommending them for honors and awards that acknowledge the impact of their contributions to science and society. Our faculty actively advance knowledge in a broad spectrum of fields and raise the visibility of UConn through their many professional activities and appointments.

Summary of Scholarly Activity in AY 2019-2020

The scholarship metrics reported here for the most recent academic year show our faculty to be active at levels equal to the best universities in the country.

- 322 Journal publications
- 667 Conference publications
- 21 Patents issued
- 55 Editorships
- 186 Associate editorships
- 44 Early career awardees, including NSF CAREER and Young Investigator Program (ONR, NASA, and equivalent)
- 37 Faculty are fellows of learned national and international societies—many of them are fellows of multiple societies
- 52 Members of the Connecticut Academy of Science & Engineering
  - 1 Member, National Academy of Engineering (NAE), National Academy of Medicine, National Academy of Science
  - 3 Professors of Practice who are members of the NAE

Faculty Honors and Awards

We have a talented and accomplished faculty who have been recognized for their achievements through many prestigious awards and recognitions. A selection of these recognitions are listed in this section. A more comprehensive list can be found in the departmental reports.

Connecticut Academy of Science & Engineering (CASE)

CASE is Connecticut’s premier organization recognizing achievements in science and engineering. CASE identifies and studies issues and technological advances that are of concern to the people of Connecticut, and provides unbiased, expert advice on science-and technology-related issues to state government and other Connecticut institutions.

52 UConn Engineering faculty are currently members of CASE, and Prof. Baki Cetegen (ME) serves as CASE president. In the past two years, ten faculty were elected members of CASE.

2019 SoE Inductees: John Chandy, ECE; Bryan Huey, MSE; Luyi Sun, CBE.

2020 SoE Inductees: Jinbo Bi, CSE; George Bollas, CBE; Daniel Burkey, CBE and Associate Dean for Undergraduate Education, Outreach, and Diversity; Yang Cao, ECE; Thomas Katsouleas, ECE and UConn President; Ramesh Malla, CEE; Ugur Pasaogullari, ME.

Healing broken bones could get easier with a device that provides both a scaffold for the bone to grow on and electrical stimulation to urge it forward. Assistant Professor Thanh Nguyen and his UConn students and colleagues reported their findings on June 27, 2020, in the Journal of Nano Energy.

Although minor bone breaks usually heal on their own, large fractures with shattered or missing chunks of bone are more difficult to repair. Applying a tiny electrical field to the site of the fracture to mimic the body’s natural electrical field helps the cells regenerate. But the medical devices that do this are usually bulky, rely on electrical wires or toxic batteries, require invasive removal surgery, and can’t do much for serious injuries.

Prof. Nguyen and his colleagues from UConn and UConn Health have developed a scaffold of non-toxic polymer that also generates a controllable electrical field to encourage bone growth. The scaffold helps the body bridge large fractures. Although many scientists are exploring the use of scaffolding to encourage bone growth, pairing it with electrical stimulation is new.
Scholarship, cont’d

NSF CAREER Awards
The CAREER program offers the National Science Foundation’s most prestigious awards in support of early career faculty. In the past two years, UConn Engineering had nine faculty win the NSF CAREER award.

2019 Recipients: Yupeng Chen, BME; Bin Feng, BME; Sabato Santaniello, BME; and Ioulia Valla, CBE

2020 Recipients: Kelly Burke, CBE; Kazunori Hoshino, BME; Christine Kirchhoff, CEE; Sheida Nabavi, CSE; Dianyun Zhang, ME.

Other National Recognitions in 2019 - 2020
2020  AIChe Award for Innovation in Chemical Engineering Education, Daniel Burkey, CBE
2020  Fellow, American Association for the Advancement of Science, Radenka Maric, CBE, MSE
2020  Fellow, National Academy of Inventors, Radenka Maric, CBE, MSE
2020  James E. Bailey Award, Cato Laurencin, CBE, MSE, BME
2020  Simon Ramo Founders Award, National Academy of Engineering (NAE), Cato T. Laurencin

2019  Philip Hauge Abelson Prize, American Association for the Advancement of Science, Cato Laurencin, CBE, MSE, BME
2019  Fellow, American Academy of Arts and Sciences, Cato Laurencin, CBE, MSE, BME
2019  President of the Connecticut Academy of Science and Engineering, Baki Cetegen, ME
2019  C.E.K. Mees Medal, the Optical Society, 2019, Bahram Javidi, ECE
2019  William Streifer Scientific Achievement Award, Institute of Electrical and Electronics Engineers, Bahram Javidi, ECE
2019  Water Technology Idol, Global Water Summit Award, Jeffrey McCutcheon, CBE
2019  Doctor Honoris Causa, Czech Technical University, Nejat Olgac, ME

Jeffrey McCutcheon, the Al Geib Professor of Environmental Engineering Research and Education at UConn, is leading a team that is developing a prototype of an emergency ventilator that could be produced by Connecticut manufacturers to help ease the anticipated shortage of the devices as the novel coronavirus continues to spread across the State.
Sponsored Research

The UConn Engineering research enterprise encompasses an expanding federal research portfolio, state-funded research and service initiatives, and major industrial partnerships—many of which undergird the Technology Park/Innovation Partnership Building. Many projects are interdisciplinary and engage students and faculty across the university. The SoE’s scholarship, education, and outreach missions all depend on a vibrant research portfolio.

Sponsored Research Overview

The School’s research expenditures have been consistent and increasing over the past five years. The SoE achieved an approximately 10% increase in expenditures in the past year and an approximately 25% increase over the last five years, reaching $39.1M in FY19, as reported by the Office of the Vice President for Research (OVPR). These expenditures were augmented by research funds administered through the UConn Foundation and the UConn Health Center that are not included by the OVPR accounting, bringing our total FY19 research expenditures to $52.6M. With our current number of tenured and tenure-track faculty at 145, the average research expenditure per faculty reached $365K per year in FY19. The breakdown of the research expenditures by funding agency shows a healthy diversity of different agencies, including several that primarily support basic research (NSF, NIH) and several mission-driven agencies (DOD, corporate, DOT, DOE). Preliminary data from the OVPR indicates that research expenditures for FY20 have increased an additional 10% over FY19 expenditures.

In FY19, Engineering faculty submitted proposals requesting a total of $201.6M corresponding to $1.4M per faculty. The total amount of new awards received was $48.7M (OVPR only) corresponding to an average of $338K in new awards per faculty. The median requested amount was $250K whereas the median award amount was $128K indicating that more of our smaller proposals were selected for funding, which is expectable. In total, Engineering faculty received 157 new awards in FY19. It is noted that the largest 18 awards (12%) accounted for 50% of the new funding, whereas the smallest 78 awards (50%) accounted for only 8% of the new funding. This type of analysis suggests that improving our ability to secure large grants may be an effective strategy for increasing our research funding.

Sponsored Research Data

- $52.6M Total FY19 research expenditures
- $365K Average research expenditure per faculty
- 420 Proposals submitted
- 577 Active grants

Expenditures by Agency (OVPR Only)

Research Expenditures

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<td>2018</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>50</td>
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Sponsored Research Overview, cont'd.

The following two pie charts show data on proposals submitted (OVPR only) and new awards received (OVPR only) in FY19 by funding agency. Both indicate a healthy diversity of agencies from which our faculty members are seeking research support. A cursory look, however, suggests that the success rate in terms of funding requested versus funding awarded is not the same for each agency. The success rate by agency shown in the bar chart below strongly supports this preliminary observation. It is noted that the success rate for agencies that support more basic research (NSF, NIH) is significantly lower than for mission-driven agencies (DOD, corporate, DOT, DOE). This type of analysis suggests strategies for helping our faculty to be more successful in securing new awards and thereby increase our overall research funding.

Research Development Strategy

To expand the research opportunities available to our faculty and students, the SoE has implemented a three-fold research development strategy, as follows:

**Faculty Support:** Strengthen faculty members' ability to pursue funding through open competitions, such as federal agency funding opportunity announcements, by offering mentorship and grantsmanship skills training and by providing proposal development support.

**Mission-Driven Agencies:** Identify opportunities in mission-driven agencies that align with the School's unique capabilities and State of Connecticut priorities, initiate and pursue contacts and advocacy with program managers and agency personnel, and work with the Office of Governmental Relations to gain access to diverse funding streams.

**Industry Partnerships and Economic Development:** Work with industry partners to build applied research portfolio and capabilities. Increase likelihood of success on federal funding competitions by identifying and pursuing strategic industry partnerships. Pursue partnerships on national initiatives that can lead to increased support for industry-relevant research. Continue to build IPB presence as a gateway for industry engagement throughout UConn.
Faculty Support

Junior Faculty Skills Development
Since 2015, the SoE has provided grant writing skills training to junior faculty through a series of workshops, offered monthly between November and May which focus on the NSF CAREER competition. Our multi-year effort culminated in four CAREER awards to workshop participants in FY19 and five CAREER awards to workshop participants in FY20. We are particularly pleased that four of the five FY20 recipients are female engineering faculty. The cumulative success rate for the faculty who participated in the workshops since their inception is 42%. Since 2016, our faculty have received 24 early career awards from the National Science Foundation, the Office of Naval Research, NASA, and the Air Force Office of Scientific Research.

FY20 NSF CAREER Recipients
K. Burke: Liquid Crystallinity as a Tool to Probe Cell and Protein Behavior in Gel Biomaterials, $582,469
D. Zhang: Pushing the Performance Limit of Composite Structures: Integrated Modeling of Manufacturing Processes and Materials, $550,000
C. Kirchhoff: Humanizing Engineering and Resilience: An Integrated Research and Education Approach to Understand and Enhance Infrastructure Resilience, $500,076
K. Hoshino: Biomechanical Signatures in Vertebrate Embryonic Development, $500,000
S. Nabavi: Machine Learning and Signal Processing Methods for Analyzing Single-cell Sequencing Data, $499,991

FY19 NSF CAREER Recipients
B. Feng: Understanding Peripheral Neuromodulation to Enhance Non-Drug Management of Chronic Pain, $549,656
I. Valla: Revolutionizing Sulfur Removal in Transportation Fuels via Absorption in Ion Exchanged Zeolites, $500,000
S. Santaniello: Robust Identification and Multi-Objective Control Methods for Neuronal Networks Under Uncertainty, $500,000
Y. Chen: Assembly of Nanopieces for Controlled Penetration and Binding of Difficult-to-Reach Cartilage Matrix for siRNA Therapy Against Osteoarthritis, $480,625

Targeted Research Proposal Development Support
In 2014, the SoE engaged a full-time writer/editor with expertise in proposal development, academic writing, reporting, and strategic communications. The writer has supported junior faculty skills development, large-scale multi-investigator research proposals, and programmatic proposal support. To address an unmet need for proposal support, the SoE secured the services of additional part-time writer/editors who support proposal submissions on-demand.

Engineering Faculty CAREER Recipients

FY 20
Kelly Burke, CBE
Kazunori Hoshino, BME
Christine Kirchhoff, CEE
Sheida Nabavi, CSE
Dianyun Zhang, ME

FY 19
Yuping Chen, BME
Bin Feng, BME
Sabato Santaniello, BME
Ioulia Valla, CBE
Mission-Driven Agency Engagement

Over the past five years, the SoE has worked to build its funding base by identifying mission-driven agency funding opportunities that align with SoE’s unique capabilities and by pursuing contacts and advocacy with program managers and agency personnel. As shown earlier, the success rate for proposals to these agencies was significantly higher than for agencies that support basic research through general solicitations. Key agencies engaged include the Department of Defense (DOD), Department of Energy (DOE), and U.S. Department of Transportation (DOT).

Major new awards received in FY19 and FY20 from these agencies include:

- **NASA** Resilient Extraterrestrial Habitats, PI: R. Malla, $3,250,000
- **DOE** Catalyst Layer Design, Manufacturing and In-line Quality Control, PI: R. Maric, $2,000,000
- **DOE** AMES: M.S. and MENG in Advanced Manufacturing for Energy Systems at the University of Connecticut, PI: U. Pasaogullari, $1,257,254
- **DOE** Center for Research Excellence on Dynamically Deformed Solids, PI: A. Dongare, $905,052
- **DOE** Energy Management Systems for Subtractive and Additive Precision Manufacturing, PI: G. Bollas, $868,405
- **DOD** Human-AI Symbiosis for Agile Planning, PI: K. Pattipati, $1,534,020
- **DOD** Smart Materials and Structures Shock and Vibration Test Instrument for Real-Time Hybrid Substructuring of Advanced Marine Technologies, PI: R. Christenson, $1,270,107
- **DOD** Atmospheric Effects Analysis and Prediction, PI: K. Pattipati, $1,009,174
- **DOT** US DOT University Transportation Center - Region 1 (New England), PI: R. Malla, $1,250,000
- **DOT** CT Safety Circuit Rider Program, PI: D. Shea, $1,196,070
- **DOT** Disaggregate Artificial Realistic Data Generator Design, Development and Application for Crash Safety Analysis, PI: J. Ivan, $999,999
Industry Research Partnerships and Economic Development

The School has been highly successful in forming strategic partnerships with industry and federal/state agencies to pursue major research funding opportunities to establish new centers/institutes that target economic development areas for the State of Connecticut and the region. Our focus in the last three years has been on the aerospace and naval sectors in technical areas including materials characterization, advanced manufacturing, cybersecurity, and systems engineering.

National Institute for Undersea Vehicle Technology
The U.S. Navy is currently rebuilding its entire fleet of submarines, which provides a once-in-a-generation opportunity for Connecticut and Rhode Island for economic development associated with this ramp-up. The SoE worked with UConn’s Office of Governmental Relations, regional industry (Electric Boat), and Navy partners (NUWC and UWDC) to establish the National Institute for Undersea Vehicle Technology (NIUVT) in 2017. NIUVT is a university-industry-government partnership that collaborates with the Navy to advance the capabilities of the next generation U.S. undersea fleet by providing highly-trained workforce and by accelerating the research, development, and transition of key enabling technologies. The Institute is a partnership with the University of Rhode Island, which leverages our mutual strengths in naval science and technologies. NIUVT received $3.5M in funding from the Office of Naval Research (ONR) in FY19 and an additional $7.0M in FY20. Anticipated FY21 funding is $9.1M. The SoE received considerable additional funding from ONR above the direct grants received by NIUVT. UConn’s Co-Director is Prof. Richard Christenson.

AFRL Manufacturing Technologies Award
In FY19, the SoE received a $5.4M grant from the U.S. Air Force Research Laboratory, “Simulation-Based Uncertainty Quantification of Manufacturing Technologies,” PI Prof. Pamir Alpay. This award was a result of significant collaboration with multiple industry partners (Pratt & Whitney, Aerogear, and GKN). This major project directly supports the regional aerospace manufacturing sector and extensively utilizes the unique capabilities of UConn’s Tech Park. Since then, the industrial partners have expanded to include Collins Aerospace as well as Sikorsky Aircraft. Furthermore, an $8M award is expected from AFRL in Fall 2021 to add an additional nine projects and expand the scope to include work in advanced systems engineering. The new program is entitled “Materials and Processes for Smart, Agile Air Force Manufacturing Technologies,” and will bring together a plethora of engineering disciplines to create real-time manufacturing solutions for AFRL, aerospace OEMs, and their supply chain.

Connecticut Center for Applied Separation Technologies
As a result of a reorganization effort across Fraunhofer USA, the Center for Energy Innovation was renamed as the Connecticut Center for Applied Separations Technologies (CCAST) in June 2020 and became part of the University of Connecticut. During the past year, the CCAST team worked closely with the Connecticut Department of Economic and Community Development (DECD) to reexamine the goals of the Center. The focus of the Center shifted towards applied R&D for separations technologies including technology validation and project acquisition with industry. DECD awarded $1.2M to CCAST in FY19 to continue its operations. CCAST also received funding from the National Science Foundation (NSF), United States Bureau of Reclamation (USBR), National Alliance for Water Innovation (NAWI), and Department of Energy in FY19 and FY20.
Center for Hardware and Embedded System Security and Trust
The Center for Hardware and Embedded System Security and Trust (CHEST) received a $750K award through the NSF Industry-University Cooperative Research Center Program. The partnering universities are University of California – Davis, Northeastern University, University of Cincinnati, University of Texas – Dallas, and University of Virginia. The focus of the Center is to coordinate university-based research with the needs of industry and government partners to advance knowledge of security for electronic hardware and embedded systems including identification, detection, monitoring, mitigation, and elimination of vulnerabilities. Establishment of this new center will further strengthen UConn’s ongoing engagement with industry in cybersecurity while also bringing additional national recognition to our activities.

Centers and Institutes
The SoE has taken the lead to support the University in working with industry to establish impactful partnerships at the UConn Technology Park Innovation Partnership Building (IPB). The goal is to make the IPB the gateway for industry collaborations across the University. Engineering-led industrial partnerships, listed below, have brought $80M to UConn’s IPB/ TechPark in the past five years, thereby enabling a successful IPB launch in September 2018. Details on the below initiatives can be found in IPB and center reports located in the appendix.

Air Force Research Laboratory – Research in Advanced Materials (AFRL RAM)
Est. 2018, investment $5.3M (2018-2019); $12.5M (2020)

Center for Clean Energy Engineering (C2E2)
C2E2 focuses on all aspects of energy research and innovation. C2E2 has 16 core and 16 affiliate faculty, two research staff, more than 69 graduate and 42 undergraduate students, and eight post-doctoral scholars. C2E2 managed research of ~$5.6M in expenditures and received $3.1M in new awards in FY20. C2E2 has dedicated facilities of ~35,000 sq.ft.

Center for Materials Processing Data (CMPD)
Est. 2019

Center for Science of Heterogeneous Additive Printing of 3D Materials (SHAP3D)
Est. 2018, federal support $2.25M to be matched or exceeded by industry investment of $2.25M for five years

Collins Aerospace Systems Center for Advanced Materials
Est. 2016, industry investment $2.2M

Connecticut Advanced Computing Center (C3)
• Comcast Center of Excellence for Security Innovation est. 2014, industry investment $6M
• Center for Hardware and Embedded Systems Security and Trust (CHEST) est. 2012, industry investment $1.2M, federal investment $3.25M
• Synchrony Financial Center of Excellence in Cybersecurity est. 2016, industry investment $2.2M
• VoTeR: Center for Voting Technology Research est. 2006, state investment approx. $400K annually

Connecticut Center for Applied Separations Technology (CCAST)
Est. 2013, as the Fraunhofer Center, relaunched in Spring 2020 as CCAST. Industry/state investment $7.2M

The Connecticut Transportation Safety Research Center and the CTDOT are teaming up to build a crucial driver behavioral safety analytics tool—thanks to a new $453,000 research grant from the U.S. Department of Transportation—that could strengthen data-driven countermeasures for crash prevention. A continuation of work performed by the CTSRC over the past five years, the project adds to the modern web-based application, Connecticut Roadway Safety Management System (CRSMS), which implements state-of-the-art practices in roadway safety management.

Engineering faculty have a strong presence in the following standing university centers and institutes:

• Institute for Materials Science (IMS) est. 1965
• Center for Environmental Sciences and Engineering (CESE) est. 2006
Connecticut Transportation Institute (CTI)
CTI conducts integrated multidisciplinary research, education and related services that promote safety and efficiency in multi-modal passenger and freight transportation systems and, in turn, enhance livable communities, sustainable economies and the environment. In AY18-19, CTI had 54 active grants totaling over $11.5M and total grant expenditures of $6.8M.

Connecticut Transportation Safety Research Center (CTSRC)
Total investment in CTSRC since the center was established is now $25.4M ~ $25M from state and federal government. In the last year, investments have increased by $3.57 million.

Enterprise Solution Center
- Connecticut Manufacturing Simulation Center $2.5M
- Quiet Corner Innovation Cluster $1.5M
- Proof of Concept Center $500K
These centers were established in 2016 with support from the Economic Development Administration and Connecticut Innovations.

Eversource Energy Center
Est. 2015, industry investment $10M. An additional $6M investment was received in 2018.

IN-situ/Operando Electron Microscopy (InToEM)
Est. 2019, industry investment $250K with UConn match $250K

National Institute for Undersea Vehicle Technology (NIUVT)
Est. 2018 in collaboration with URI, Electric Boat, and NUWC. NIUVT received $3.5M in funding from the Office of Naval Research (ONR) in FY18 and an additional $7.3M in FY19.

Pratt & Whitney Additive Manufacturing Innovation Center
Est. 2013, industry investment $7.5M

Reverse Engineering Fabrication Inspection & Non-Destructive Evaluation (REFiNE)
Est. 2017, industry investment $9M

UConn Thermo Fisher Scientific Center for Advanced Microscopy and Materials Analysis (CAMMA)
Est. 2014, industry investment $25M

UTC Institute for Advanced Systems Engineering
Est. 2013, industry investment $10M

Challenges
The School’s research expenditures have had strong growth over the past five years. Despite this growth, the School faces a number of challenges that have impeded progress and threaten our continued research success. The primary challenges that we face in our research efforts are lack of research space; retention of top research faculty; insufficient research support staff; inefficient procedures and red tape; and lack of strong interdisciplinary research collaboration. Based on a recent space assessment by Payette, as of Fall 2018, the SoE has no space available for growth. As the School’s research expenditures continue to grow, lack of space has become increasingly difficult to solve.

Similarly, growth in research support staff, both pre-award and post-award, has not kept pace with growth in research activities. This places a larger portion of this work directly on faculty, which is a poor use of their time and impacts morale.
Industry Engagement

A central mission of the SoE is to collaborate with industry partners through education, research, and technology infusion, which contributes directly to economic development within the state and nation. The following section summarizes the School’s significant industry engagement activities during the past year. Some of our research and development initiatives with industry are also described in the sponsored research section of this report.

Senior Design Program

Each year, all graduating engineering students are required to complete a year-long design project, which is typically performed in teams of three to four students and in collaboration with an industry or government sponsor. In AY19-20, about 125 industry/government sponsors were involved in the approximately 255 senior design projects performed; some companies sponsored up to five separate projects. The Engineering Senior Design Program provides a multitude of benefits to UConn students and the sponsoring companies and provides an excellent vehicle for large-scale industry engagement and collaboration.

Engagement with Small and Medium Enterprises (SMEs)

Approximately 18% of the School’s research funding in FY19 came directly from industry. This includes projects with large companies, such as Pratt & Whitney, Electric Boat and Comcast, as well as numerous small and medium enterprises. In FY19, the School performed approximately 50 research projects with 25 different SMEs with total expenditures of approximately $2.2M. Additionally, the School secured approximately 22 new awards from SMEs corresponding to $1.65M in funding. Although the average award size for these projects is modest ($75K), the impact of these projects with SMEs is significant in terms of workforce training, economic development and opportunities to leverage federal research funding.

Centers and Institutes

Considerable industry engagement is performed by the School through its centers and institutes, which are identified in the Research section. Many of these centers/institutes are located in the Innovation Partnership Building (IPB). The IPB Annual Report also highlights industry engagement activities conducted by engineering faculty.

Over 200 companies, towns, and agencies have worked with UConn Engineering in the past two years, including the following:

- ABB • ACMT, Inc • CT Center for Advanced Technology • AECOM • AeroCision, LLC • Agrivolution, LLC • Air Force Office of Scientific Research • Air Force Research Laboratory • Anton-Paar • Army Research Laboratories • ASML • Associated Spring • Atlas Stampings & Manufacturing • Avitus Orthopaedics • Barnes Aerospace • Belimo Americas • Biomass Controls • Biosis • Blue Crest Inc • Cabot Corporation • Cadenna Innovation • Cando Tech • Carrier Center for the Ecological Study of Perception & Action • CGI • CHA Consulting • Chapman Manufacturing • Charles Gray Airboat • Charter Oak Environmental Services • Cigna • City of Hartford • City of Norwich • City of Stamford • Cloverleigh Farm • CME Associates • Cognizant Technology Solutions • Collins Aerospace • Colonial Bronze • Comprehensive Environmental, Inc • Connecticut Children’s Medical Center • Connecticut Department of Energy and Environmental Protection • Connecticut Department of Transportation • Connecticut Government Management Informational Sciences • Connecticut Transportation Safety Research Center • Control Module Inc • Convention Nation • Difftech, LLC • Department of Energy • Depuy Synthes Mitik Sports Medicine • Diameter Health • DigIPops • Dive Technologies • Dyadic Innovations • EA Patten • East Hartford Public Schools • EDAC Technologies • Encapsulate • Energid • Ensign-Bickford Aerospace & Defense • Eversource • Farrel Pomin • FM Global • Fuss & O’Neill • GE Power • Gems Sensors & Controls • General Digital • General Dynamics Electric Boat • Gentex Optics • Gerber Technology • GRN Aerospace • Global Steering Systems • Hartford Steam Boiler • Henkel • Holon Krome • Holologic, Inc • Hubbell Incorporated • Information Technology • Innovation Cooperative 3D (IC3D) • Interface Technologies • Institute for Collaboration on Health, Intervention, and Policy (InCHIP) • ISO New England • Jacobs Engineering • Guiding Light Orphans (GLO) • Jonal Laboratories Inc • Joshua’s Trust • Keney Park Sustainability Project • Kinsley Power Systems • KTI Technologies • L&T Info Tech (LTI) • Lake Charfield Improvement Association • Lambda Vision • Land Maverick • LBL Corp • Lefty EQ LLC • Lenard Engineering • Lenze Americas • LEVO International • Lockheed Martin • Logitech • Loureno Engineering • Manoff Brothers • Manchester Land Trust • Marmon Utility • Matern Construction, Inc • Mattershift • Medtronic • MITRE Corporation • MOOG Inc • Movia Robotics • NASA Ames Research Center • Nassau Re • Naval Submarine Medical Research Laboratory • Naval Undersea Warfare Center • Nel Hydrogen • NSF Solutions, LLC • Numotion • Otis Elevator Company • PepsiCo Frito-Lay • Pfrimmer • POWWR • Pratt & Whitney • Precision Combustion Inc • Prime AE • Proton OnSite • Qualitech Systems • Quantum Biopower • Radio Frequency Systems • RBC Aircraft Products Inc • RBC Bearings Inc • REA Resource Recovery • Reality Interactive • Reverse Anselmo • Rowheels Inc • RSL Fiber Systems, LLC • Rubber Labels USA • SESI Consulting Engineers • Silkskry Aircraft Corporation • Simvile LLC • Sonalytics • Sonics & Materials, Inc • Sperry Rail Services & Transportation • Infrastructure • Spring Valley Student Farm • Stanadyne • Stanley Access Technologies • Stanley Black & Decker • Synchrone Financial • ThayerFahan • The Carlyle Johnson Machine Company • The Jackson Laboratory • The Maritime Aquarium at Norwalk • Tighe & Bond • Towns of Bethel, Essex, Hamden, Manchester, Old Lyme, Stonington, Stratford, Thompson, and Wethersfield • Triumph Engine Control Systems • TRUMPF • UConn Center for Clean Energy Engineering • UConn Department of Kinesiology • UConn Department of Natural Resources • UConn Electric Motorsports • UConn Health Center • UConn School of Nursing • UConn Student Affairs • Ulbrich Stainless Steels & Specialty Metals • Undersea Warfighting Development Center • Uniliver • Unisoft Medical Corp • United States Bureau of Reclamation • United States Coast Guard • United Technologies Research Center • Universal Safety Net Solution • Urbowicz • US Army Natick Soldier Research, Development and Engineering Center • US Coast Guard Research & Development Center • UTC Climate, Controls, & Security • Veeder-Root • WNS Enterprises, LLC • Web Industries • Whitcraft LLC • WickAway • Winchester Interconnect • Windham Dental • Wright-Pierce • WSP USA • Yankee Casing • YouCOMM LLC • Zachry Nuclear Engineering • ZEISS
Student Career Development

The demand for engineering talent within Connecticut has been particularly high with the unprecedented growth in the State’s aerospace and naval sectors. In the past year, this trend was disrupted by the outbreak of the novel coronavirus. The SoE offers a number of programs and special events that cultivate workforce-relevant skills and connect students with potential employers. These initiatives include:

- Internships and Co-ops
- Senior Design Projects
- Undergraduate and graduate research projects sponsored by industry

Career Fairs

In AY19-20, in addition to University career fairs, the School held two career fairs, one in February and another in March, which were attended by over 100 companies and government agencies. In addition to participating in career fairs, many of our students accept internships with companies. Internships provide students with exposure to the engineering workplace and help develop professional skills.

The School also encourages students in their junior year to consider an Engineering Cooperative Education Program (Co-op) with key Connecticut employers. This program provides an extended experiential learning experience for students in industry beyond what can be attained in a traditional summer internship and often results in a post-graduation job offer.
Entrepreneurship

Over the past six years, the SoE has strategically pursued initiatives that promote a culture of technology entrepreneurship and provide entrepreneurship training and resources to students, faculty, and post-doctoral researchers. The School has been particularly successful in developing SoE entrepreneurial education capacity through development and deployment of state-of-the-art entrepreneurial infrastructure and facilities. The Proof of Concept Center (POCC) at the IPB provides facilities for rapid prototyping, reverse engineering, and CNC machining, as well as a consumer experience evaluation laboratory. Additionally, SoE has developed CMSC (Connecticut Manufacturing Simulation Center) for digital design and prototyping through computer modeling and simulations. This center also facilitates product design through Finite Element Modeling and Simulation. Combined, these facilities enable students and faculty to master technologies and innovations that are the pillars of Industry 4.0.

The School’s efforts have significantly contributed to the UConn entrepreneurial ecosystem and have led to led dozens of faculty-student startups. The School’s entrepreneurship initiatives are a direct response to Connecticut’s need to support innovation and entrepreneurship as drivers of economic growth.

Master of Engineering in Global Entrepreneurship (MEGE)

The SoE secured a CTNext grant in 2018, which was renewed in April 2019, to establish a Global Entrepreneurship Network in Connecticut. The network aims to energize Connecticut’s innovation economy by attracting and retaining science and technology entrepreneurs from around the world and to strengthen Connecticut’s higher education infrastructure in entrepreneurship by establishing best practices in entrepreneurship education, technology transfer, technology incubation, recruitment of student entrepreneurs, and creation of entrepreneur-friendly communities.

So far, the participating high-tech startups have multiplied the State’s investment by a factor of 10 in terms of funding, awards, grants and in-kind contributions. For example, the startup company “Encapsulate” received a Technology in Space Prize by NASA/International Space Station National Lab in partnership with Boeing in late 2019 for $653,000. Since Fall 2019, the startup company “QRFertile” has won $300,000 in Amazon web credit, Google cloud credit, and a UConn Innovation fund investment. The startup company LandMaverick has also attracted over $150,000 in competitive awards and private investment.

A unique Master of Engineering in Global Entrepreneurship program is the cornerstone of the program. The goal of MEGE is to cultivate student entrepreneurs capable of responding to emergent global trends in business and technology and to embed student-led start-up companies. MEGE provides structure and support to de-risk students’ technologies, build minimum viable product, develop their exit strategies, and win their first round of investments.

Our MEGE participants have been leading the State in personal awards and recognition. In both 2020 and 2019, our participants represented CT and were named finalists at the marquis innovation event in the region, MassChallenge. Also, Leila Daneshmandi and Armin Rad, Encapsulate’s COO and CEO, are the 2020 winners of the CT Entrepreneurship Award in the Scalable Venture Entrepreneurs category.

Encapsulate LLC co-founders and UConn MEGE graduate students Armin Rad (right), Leila Daneshmandi (center), and Reza Amin (left) at an awards ceremony late last year.

Encapsulate LLC, is one of only two winners of the 2019 International Space Station U.S. Laboratory and Boeing “Technology in Space Prize.” Encapsulate will receive $500,000 and the opportunity to conduct research projects onboard the International Space Station (ISS).

Encapsulate is developing an automated tumor-on-a-chip system that can grow patients’ cancer cells outside the human body to screen them against chemotherapeutic drugs for efficacy. This technology will help oncologists choose the most effective chemotherapy drug prior to starting treatment and on an individualized basis, reducing the number of unnecessary chemotherapy cycles a patient undergoes and increasing the success rates of cancer therapy.

The Technology in Space Prize gives Encapsulate the opportunity to leverage the microgravity environment on the ISS National Lab to advance and accelerate their promising technology, and further scale and grow Encapsulate.

The awarded flight project supports the preclinical stage of Encapsulate’s product development and optimization, where patient-derived microtumors will be grown and maintained on-orbit as a tool and base model to evaluate the performance of the microtumors grown in the company’s biochips.

Encapsulate LLC was launched with the financial support and guidance of multiple entrepreneurial programs and services at UConn, including UConn’s new Master’s of Engineering in Global Entrepreneurship degree, funded by CTNext; the UConn Technology Incubation Program; and Accelerate UConn.
Courses in Entrepreneurship

Over the past few years, the SoE established a two-semester engineering course, Experiential Technology Entrepreneurship I and II (ENGR/MGMT 5300), for graduate students. This course sequence has led to several dozen student and faculty led startup companies. The School also created two undergraduate courses on Technology Entrepreneurship, cross-listed with the School of Business (ENGR/MGMT 3500 and 3501). These courses are the foundation for a new undergraduate minor in technology entrepreneurship which was established in collaboration with the School of Business.

UConn Engineering Startups

Since 2017, the SoE supported the launch of approximately 40 startups through individual mentoring and entrepreneurship courses.

Funding for Startups

In the past few years, the SoE has been critical in securing the sources of funding for our entrepreneurship ventures listed below. Dr. Hadi Bozorgmanesh, who leads the mission of entrepreneurship and innovation in the School, has been instrumental in promoting startups:

- Secured The Third Bridge to support student and faculty entrepreneurs ($850K)
- Secured Bioscience Pipeline in collaboration with Yale and Quinnipiac ($3M) (PI, Bozorgmanesh)
- UConn Innovation Fund ($750K/year)

NSF Experiential Entrepreneurship Research Experience for Undergraduates (EE-REU) Program

The NSF Experiential Entrepreneurship Research Experience for Undergraduates program was completed in Summer 2019. SoE welcomed a select group of ten engineering students from schools across the country as well as UConn. The students presented an array of ideas, from using Matlab's App Designer as a software controller for a whole slide imaging platform to converting oils and fats to bio-diesel. Student research was done in consultation with Prof. Daniel Burkey, Associate Dean for Undergraduate Education and Diversity; Prof. Hadi Bozorgmanesh, Professor of Practice in Engineering Entrepreneurship; Kevin Bouley, President and CEO of Nerac, a Tolland-based global research and advisory firm; and multiple UConn faculty and graduate students.

The Connecticut Experiential Entrepreneurship Research Experience for Undergraduates, CT EE-REU

In Fall 2019, the School received a grant from CTNext for the Connecticut Experiential Entrepreneurship Research Experience for Undergraduates (CT EE-REU), which will support up to 50 junior and senior undergraduate students from Connecticut institutions of higher education to undertake a ten-week intensive residential summer research and entrepreneurship program. The students' summer activities will stimulate faculty to consider the commercialization potential of their scientific discoveries, thereby increasing the transition of university-developed IP to the marketplace and building a culture of entrepreneurship in the University and the State. Upon completion of the program, students will receive a certificate of achievement and will become entrepreneurship ambassadors at their respective institutions.
New Entrepreneurship Research Facilities and Infrastructure

The Proof of Concept Center (POCC) was utilized for workforce development and educational purposes. POCC continued to provide prototyping resources to the University. UConn Engineering and School of Business students were trained in rapid prototyping as well as proof of their innovative ideas emanating from their entrepreneurial courses. The students were also trained at the POCC in consumer usability and consumer experience protocol. POCC also hosted a three-day 3D systems Geomagic Control X training.

In addition, during the COVID-19 pandemic, we engaged with UConn’s health system and have been helping medical staff with prototyping and building ideas and solutions that will impact care in treating COVID-19 patients. The biggest project has been the development of Personal Protective Equipment (PPE) for frontline healthcare workers. The Proof of Concept Center has been a good resource for solutions for PPE, including 3D printed face shields and face masks.

Entrepreneurship and Innovation Consortium & Peter J. Werth Institute for Entrepreneurship & Innovation

In 2016, the deans of the Schools of Engineering and Business worked together to establish the UConn Entrepreneurship and Innovation Consortium. For the first time in the University, this initiative brought together more than 30 university units with activities in the entrepreneurship space. The Consortium’s success, activities, and achievements became the foundation for securing the gift/endowment and commitment (amounting to $22.5M) from Peter J. Werth to establish the Peter J. Werth Institute for Entrepreneurship and Innovation in December 2017. The Institute will bring together student and faculty programs fostering entrepreneurship and innovation that have potential commercial applications and can be used to create new companies. In addition to nurturing innovation, the Institute facilitates entrepreneurship speaker forums and hosts an entrepreneur-in-residence to instruct students.

Impact of COVID-19

COVID-19 has had a major impact on SoE entrepreneurial academic activity as well as development of prototyping at the POCC. Specifically, the undergraduate course Experiential Technology Entrepreneurship was shifted online and project development at POCC was cancelled. Students were guided in video development and virtual customer experiment testing. The graduate course, Masters of Engineering in Global Entrepreneurship, was modified to focus on consumer experience design, and the actual development of the prototype at the POCC was eliminated. At the same time, COVID-19 provided new opportunities, such as an EDA Cares proposal to develop innovative solutions for small and medium businesses for remote management of the enterprises. In addition, Third Bridge Grant recipients were affected by the social distancing state regulations and were unable to continue their work in laboratories from March to May. The CT EE-REU program was cancelled for the summer of 2020, but with the help of CTNext, the program will launch in the summer of 2021. The Bioscience Pipeline was also impacted due to inability of the faculty to access their office and laboratories; therefore, the proposal schedule was delayed by six weeks. Some of the programs, like Quiet Corner Innovation Cluster, were also put on hold, and we are hopeful we can restart them upon approval of no-cost extension by EDA.
The COVID-19 pandemic radically changed fundraising beginning in March 2020 and will continue to do so for the next year or more. Individuals and companies are reassessing their situations following investment and business losses.

Business turns always represent an opportunity. Nowhere is this more true than at the UConn SoE, which is dedicated to educating tomorrow’s workforce, helping Connecticut companies with economic development, and discovering new knowledge.

This year—together with all our SoE colleagues—we are going out to meet friends old and new to ask them how they are faring and how we can help. If they have curtailed inhouse research, need technical help, or lost workforce, we will engage them with our School. If they want to be part of Connecticut’s most vibrant engineering community, connect with Engineering alumni or be close to the tip of Connecticut’s economic development spear, we will invite them in. We will use this time to engage as many people and companies as possible in our mission. Seeking scholarships to help under-represented Engineering students is central—as many of those students have financial need. Only 256 of ~3,500 undergraduate students benefit each year from privately funded scholarships. We must do more.

**SoE: An Economic Driver in Connecticut**

An estimated 37% of the Connecticut economy is driven by various forms of engineering. By educating skilled graduates, helping professionals update their skills through Professional Education programs, conducting research and technology deployment projects in collaboration with industry, and through technology entrepreneurship, the SoE plays a critical role in Connecticut’s economy. Collaborations with industry help to create a climate that encourages innovation leading to economic growth.

**Need for Engineering Graduates**

UConn produces almost 52% of the engineering graduates in the state. These graduates are in high demand by industry and make a huge impact on Connecticut’s economy. The SoE works closely with industry and state partners, including Pratt & Whitney, General Dynamics Electric Boat, Sikorsky-Lockheed Martin, Eversource, ABB, the Department of Economic and Community Development, and others, who have a vested interest in the intellectual capital produced by the School. These partners have repeatedly emphasized to us the need for more, not fewer, highly skilled engineering graduates. This intrinsic interest by industry is the pillar of our development strategy.
Endowment

The SoE now has an endowment of $38.3 million, 42.9% above its value of $26.8 million just over five years ago. This growth has allowed the School to award $490,000 in scholarship support to 256 students in AY18-19 in addition to the scholarships awarded by the University that are available to engineering students. The endowment also secured 24 chaired and named professorships and 20 term professorships.

The following are examples of relationships built in the past few years:

2019-2020:
- **Total giving & philanthropic grants: $5,040,153. Individual giving included:**
  - Anonymous planned bequest for the use of Artificial Intelligence in Medical Diagnosis Excellence ($1.2M for joint work with the Schools of Engineering, Business and Nursing)
  - Anonymous planned bequest for scholarships ($1M)
  - Anonymous planned bequest for scholarships ($400K)
  - Planned IRA distribution gift for the Dean’s Fund ($400K)
  - Realized bequest creating the Tina & Blake Lewis Scholarship Fund ($202K)
  - A gift establishing a fund for study abroad ($101K)

2018-2019:
- John and Donna Krenicki gift to establish the Krenicki Arts and Engineering Institute ($5M) Announced September 2019
- Eversource Energy Center renewal ($5M gift)
- Altschuler Cybersecurity Laboratory (Samuel & Stephen Altschuler gift of $1M)
- James J. Boland and Owen F. Devereux MSE Scholarship ($1.87M bequest)
- Planned anonymous bequest ($1.3M)

2017:
- Gift of Vetra FIB for circuit edit system (anonymous $1.35M)
- Planned bequest of $2.4M
- Connecticut Brownfields Initiative (multiple donors $300K)

2016:
- Synchrony Financial Center of Excellence in Cybersecurity ($3.2M)

2015:
- Eversource Energy Center of Excellence ($9M)

2014:
- Comcast Center of Excellence for Security Innovation ($7.5M)
- Thermo Fisher Scientific Center of Excellence in Microscopy & Materials Characterization ($12.7M)

2013:
- United Technologies for Advanced Systems Engineering ($10M)
- Pratt & Whitney Center for Additive Manufacturing and Innovation ($8M)
Programs Cultivating Donor Relationships

The SoE supports a number of initiatives that steward external relationships throughout the year. For example, SoE’s Senior Design program supports full-year collaborations between teams of students and company sponsors. These projects address real-world engineering challenges, leading directly to technology transition and connecting companies with future employees. The Senior Design program generates approximately $600,000 per year from company partners.

In addition, sponsored research projects, distance learning and continuing education programs, and networking events engage industry partners throughout the year. Events like the Academy of Distinguished Engineers Induction Ceremony, GE Night, General Dynamics Electric Boat Alumni Reception, and Lockheed Martin-UConn Day are just a few examples of engagement between the School and our partners. SoE administrators have also held frequent donor events and alumni receptions around the country.

In Fall 2016, we held the Centennial Engineering Gala to mark the 100th anniversary of UConn Engineering as a four year degree program. Every major Connecticut manufacturing company and many state and university leaders were among the 370 attending—reflecting the close rapport and reliance that business and industry has developed with the SoE. Additionally, the Centennial Gala generated net income of $279,000 for engineering scholarships.

Above: Stephen Altschuler (far left) and Samuel Altschuler (far right) with their undergraduate scholarship recipients at a ceremony in 2015.

Below: UConn Computer Science major Christopher Vassallo, left, and Computer Science and Engineering student Alex O’Neill, work in the School’s new Altschuler Cybersecurity Lab. (Photograph by Mark Mirko/Hartford Courant.)
Faculty Diversity Initiatives

Recognizing the need for greater diversity in our faculty, the SoE has focused on outreach and active recruiting of outstanding faculty that enhance the diversity of the School. In recent years we have had significant success in recruiting outstanding female faculty. In AY19, four of ten new hires were women. In Fall 2019, 26 out of 145 T/TT faculty and ten out of 29 APIR faculty are female. Recruitment conducted in AY19-20 for new faculty starting in Fall 2020 resulted in three new female T/TT and two new APIR female hires. Additionally, in the last few years, we have been able to hire two exceptional faculty of Hispanic background as well as the School’s first African American female faculty member.

In Summer 2018, the School chose its first ever female department head (in the Civil and Environmental Engineering Department). In addition, in August 2019, Prof. Leslie Shor assumed the role of Associate Dean for Research and Graduate Education. In addition to building multidisciplinary research teams, she is working to promote gender parity and diversity in our faculty and graduate student populations.

Graduate Diversity Initiatives

Universities nationwide are struggling to attract and retain a diverse graduate student body. We recognize that successful recruitment of minority students requires a sustained national presence at conferences and other recruitment venues, so we worked to establish a presence at these conferences. In addition, we continued our mentoring and support of our existing minority graduate student population through our Bridge to the Doctorate program, the JLLA, and the Student Association of Graduate Engineers (SAGE).

Bridge to the Doctorate: We supported six minority students through our Northeast Louis Stokes Alliance for Minority Participation (NELSAMP) Bridge to the Doctorate Fellowship grant, awarded by the NSF in March 2017. The Bridge to the Doctorate provides mentorship and professional development tailored to the needs of minority students. At the GEM Grad Lab hosted by the NELSAMP, UConn’s Bridge to the Doctorate (BD) fellows participated as panelists and shared their experiences as underrepresented minority (URM) students in STEM. Our BD fellows also served as judges in the poster session hosted by NELSAMP, where about 100 LSAMP scholars presented their research.

Recruiting Efforts: In Fall 2019, we attended local chapters and national conferences such as NSBE and SHPE, and oSTEM (Out in STEM- LGBQTi+). Aida Ghiaei gave a presentation at the GEM GRADLab on “Applying to Graduate School” with information on the UConn Graduate School and the BD program. In addition, we worked to recruit female students from local colleges, including Trinity College and University of Saint Joseph, both of which have a high female student ratio, and Smith College in Massachusetts.

As a result of these efforts, 29 URM students applied to UConn Engineering in 2019 and six were accepted.

Graduate Chapter of the National Society of Black Engineers (NSBE): The first graduate chapter of NSBE started in late Fall 2019. Six members were supported to attend the 2020 NSBE national conference and presented their efforts to the NSBE board. Our current BD fellows from University of Puerto Rico in Mayagüez (UPRM) visited UPRM in November 2019 and January 2020 where they held workshops and talked to STEM students about graduate studies at UConn.
Engineering Diversity and Outreach Center (EDOC)

The Engineering Diversity and Outreach Center (EDOC) in the SoE Undergraduate Programs Office runs diversity and outreach initiatives targeting K-12 and undergraduate students. In the past year, we appointed Dr. Stephany Santos as Associate Director of EDOC. In her work with the School, she has already spearheaded the following initiatives:

**BOSS LADI: Building Our Sistas’ Strength, Leveraging Adversity, Diversity, and Intellect - A course for Black & Latinx women in STEM**

BOSS LADI, a new initiative was offered as one-credit course during the Spring 2020 semester. The course aims to increase the confidence, communication, and leadership skills of underutilized undergraduate women (specifically Black and Latinx) in STEM so that they have the agency and ability to step into leadership roles (especially in higher levels of management) in varying environments (academia, government, industry, etc.) and know they can affect change. The course also assists students in preparation for academic success through exposure to resources, guest speakers, and in-class discussions. Twenty-four undergraduate students participated in the course.

**Sisters in STEM (SiS)**

In the fall semester Engineering Ambassadors collaborated with NSBE and SHPE to host its inaugural one day conference for tenth grade high school Black and Latinx female students to show the allure of STEM fields. Representative role models lead laboratory tours, engaging experiments, and self-development workshops.

**Undergraduate Student Organizations Promoting Diversity and Outreach**

**Engineering Ambassadors (EA)**

EA has been an extremely effective student outreach program since its inception in the Fall 2010. In AY19-20, the EA Presentation Team delivered 34 off-campus visits to K-12 schools and hosted ten on-campus visits, reaching 3,800 students from schools across the state. This is particularly impressive given the cancellation of visits in the second half of the Spring 2020 semester due to COVID-19. EA tour guides provided more than tours of the SoE, including tours of UConn’s Cogeneration Plant, during the Fall 2019 semester. These tours reached more than 1,200 visitors, including 500 prospective students. Eighty EA tour guides led over 115 student volunteers for the fall SoE open houses, which reached 2,520 visitors. Finally, EA’s annual STEM Night at the Connecticut Science Center drew 184 middle school students from schools across Connecticut.

**Society of Women Engineers (SWE)**

SWE plays a leading role in planning and carrying out the Women in Engineering outreach activities, including helping to organize the on-campus tours for young women, spending one-on-one time with the visitors during the student lunch, and calling many of our prospective female students to give them a personal insight into how UConn Engineering is working to support female engineers. The SWE team also volunteered as workshop leaders and role models for Multiply Your Options (MYO), our program for eighth grade girls, and leading on-site workshops at local schools.
Undergraduate Student Organizations
Promoting Diversity and Outreach, cont’d

National Society of Black Engineers (NSBE)
NSBE works with student organizations on campus and throughout the region to fulfill its mission to increase the number of culturally responsible black engineers who excel academically, succeed professionally, and positively impact the community. NSBE students also serve as workshop leaders and role models for Engineering Your Future conferences for eighth grade boys. Unfortunately this year’s conference had to be cancelled due to COVID-19. Annual events hosted included Corporate Networking Night and the Black Women in STEM Brunch. Several UConn NSBE members held leadership roles at the regional conference, which hosted over 900 participants.

Society of Hispanic Professional Engineers (SHPE)
SHPE students serve as workshop leaders and role models for UConn’s Engineer Your Future conference for eighth grade boys. SHPE also partners with middle schools to give bilingual presentations on engineering.

Engineering Student Leadership Council (ESLC)
ESLC serves as a resource for all engineering student organizations. It plans events, activities, opportunities for the entire SoE and makes it easy for engineering organizations to communicate their activities to all students.

Undergraduate Diversity Initiatives

BRIDGE
BRIDGE is the lynchpin of undergraduate diversity initiatives. This program’s participants are underrepresented freshmen in the SoE. This cohort includes females, Black, Latinx, LGBTQ, autistic learners, and other underrepresented students. To date, more than 1,200 incoming underrepresented freshmen have completed the five-week intensive summer residential program. The Summer 2019 cohort numbered 67 students. Focused not only on academic enrichment and preparing students for the challenging freshman curriculum, BRIDGE participants also form a close-knit community that provides a safety net and peer mentoring for students as they progress through their academic programs. BRIDGE participants graduate from the SoE at higher rates than their peers. They become leaders on campus, in student organizations, in the workforce, and in the community.

BRIDGE is made possible by the School’s donors and endowments.

BRIDGE Mentor/Mentee
BRIDGE Mentor/Mentee matches freshmen who completed the BRIDGE program with upperclassmen to provide one-on-one social and academic support throughout the academic year. Ninety students participated in one-on-one meetings and monthly group events.

Students Served by Engineering Diversity and Outreach Programs

K-12 Students Served
1283  Total number of students on campus
687+  Female students
313+  Underrepresented Minority (URM) students

K-12 School Visits and On-Campus Tours by Engineering Ambassadors
8000+  Students and guests served
3500+  Female students

UConn SoE Student Volunteers – EDOC Hosted Programs
443  Total
K-12 Student Outreach, AY19-20

**SPARK:** Summer 2019 marked the third year for this summer residential STEM program for girls entering grades seven through ten. SPARK consists of four week-long sessions in disciplines such as Coding, Underwater Robotics, Designing and Flying Drones, and Engineering Through the Ages. 109 girls participated in 2019.

**Pre-Engineering Program (PEP):** Over 90 middle school students from underrepresented schools participated in this 11-week Saturday enrichment program. Students learn engineering concepts from female and minority undergraduate role models.

**Multiply Your Options (MYO):** This one-day fall conference drew over 250 eighth grade girls to UConn to participate in fun, hands-on activities under the guidance of female undergraduate students and young female alumnae. Two spring MYO’s conferences had to be cancelled due to COVID-19.

**Northeast Science Bowl:** UConn Engineering hosts the largest regional Science Bowl in the country. Over 500 high school students and their science and math teachers from CT, MA, RI and NH registered to compete this year. 310 UConn Engineering students volunteered to make this event possible.

**Engineer Your Future (EYF):** Our annual spring one-day conference for eighth grade boys from minority-serving schools was cancelled due to COVID-19.

**Explore Engineering (E2):** This popular summer residential program was redesigned to be offered as a two-week online experience for rising high school juniors and seniors. This program allows the high school students the opportunity to explore engineering disciplines using seminars, discussions, and hands-on activity.

**Connecticut Invention Convention (CIC):** Traditionally CIC is held in early May. This event was cancelled due to the COVID-19 pandemic.

K-12 Teacher Outreach, Summer 2019

**DaVinci Program**
Thirty-seven teachers, including 12 NSF-funded Joule Fellows, engaged in this weeklong summer program that introduces core engineering concepts to math and science educators. Teachers spend the week working in an engineering lab and visiting engineering facilities across the Storrs campus.

**Joule Fellows**
The NSF Research Experience for Teachers, "Joule Fellows: Sustainable Energy for an Inclusive Society" program offers an intensive six-week summer research and professional development experience for teachers serving grades K-14. The Joule Fellows program specifically targets teachers from underserved districts to promote educational opportunity among minority communities. Now supported by its third NSF grant, the Joule Fellows program supported 12 teachers in the summer of 2019 and 102 since its inception in 2009.
Engineering Advisory Board

The SoE has an active, engaged, and diverse advisory board representing industry, government, alumni, and higher education. Members are appointed for renewable three-year terms. The board meets as a group twice a year, but sub-groups may meet more often. Members are also contacted by the dean when guidance or support is needed. Current board members include three commissioners of State of Connecticut departments (Economic and Community Development, Energy and Environmental Protection, Transportation), the CEO of CT Innovations, two engineering deans (RPI, URI), one provost (Dartmouth College), and many senior state and national industry leaders. A list of the Engineering Advisory Board members can be found at: https://www engr.uconn.edu/about/industry-advisory-board/

Space Planning and Management

The Master Space Plan provided to the School by the Payette architectural firm in January 2019 states that “At the end of the Fall 2018 semester, there will be no available space in the SoE.” This study accounts for the opening of the Engineering Science Building (ESB) in June 2018 and the relocation of multiple Engineering research centers to the Innovation Partnership Building in September 2018. With continuing growth in the School’s student enrollment and research expenditures, availability of space to support the School’s core missions has become a significant challenge. The focus of the School’s efforts has been to optimize usage of all existing space through reassignments and renovations. During the past year, the School received $1.3M for renovations to address space needs and worked closely with University Planning, Design and Construction to perform 12 major projects.

IT Support for Education and Research

In 2018, the School worked closely with ITS and the OVPR Export Control Office to develop and implement an IT system that meets NIST 800-171 data compliance standards. This IT security standard is required for research projects involving controlled information or proprietary data. During the past year, the new system demonstrated its tremendous value to the research community. One example is support for the recently established National Institute for Undersea Vehicle Technology (NIUVT) which requires NIST 800-171 compliance on all of its projects. In its first two years, NIUVT has secured $10.5M to support 35 research projects and anticipates an additional $10M and 40 new projects in the upcoming year. This highly successful research initiative would not be possible without this specialized IT support. Another major success in the School’s IT support was the response to the COVID-19 pandemic. Within one week, the School deployed 650 virtual computers to support off-campus educational and research needs of its students and faculty.

Machine Shop and Electrical Shop

Engineering’s Machine Shop and Electrical Shop provided precision manufacturing services and technical assistance to hundreds of faculty members and students in support of the School’s educational and research missions. Support included assisting over 800 UConn Engineering seniors on their senior design projects, and supporting numerous research teams on prototype design and construction.
Staffing

Staffing Levels

One of the challenges stemming from the budget cuts is the shortage of support staff in the SoE. Despite dramatic growth in the number of students and in the scale of our research enterprise, the staff size in the School has stayed relatively flat or has been reduced in certain areas. One notable exception is the number of professional undergraduate advisors that increased from zero to eight in 2013 in response to a deficiency identified in an external ABET review in 2012. The new advising hires account for eight of the ten staff gains (from 48 to 58) between 2012 and 2014 (see chart below). Overall, we believe the SoE is operating on a very lean staff size.

![Deanery & Academic Support Staffing Levels](chart.png)

Research Support Staff

The University’s support for research support staff is minimal (see chart below). The support staff in the research centers are mainly supported by external grants and in most cases are project specific. In general, we consider the staff size in the SoE to be inadequate and an impediment to further growth in our research, industry engagement, or educational mission. This opinion was strongly corroborated by the external review committee, which cited lack of research support staff as a “drain on faculty productivity” and noted that Engineering’s staff is well below current metrics for Research 1 institutions.

![Research Center Support Staffing Levels](chart.png)
Departments

The SoE is home to seven departments:

Biomedical Engineering (BME)
Ki Chon, Head

Chemical and Biomolecular Engineering (CBE)
Ranjan Srivastava, Head

Civil and Environmental Engineering (CEE)
Maria Chrysochoou, Head

Computer Science and Engineering (CSE)
Sanguthevar Rajasekaran, Head

Electrical and Computer Engineering (ECE)
John Chandy, Head

Materials Science and Engineering (MSE)
Bryan Huey, Head

Mechanical Engineering (ME)
Horea Ilies, Head

The two tables below give an overview of our departments' key statistics.

Student & Faculty Data: 2019-2020

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* The Civil and Environmental Engineering Department supports degree programs in both Civil Engineering (CivE) and Environmental Engineering (EnvE)

** Students pursuing undergraduate degrees in Computer Engineering (CE) are supported by both the Computer Science and Engineering Department and the Electrical and Computer Engineering Department

† Teaching Faculty in the Professional Education and Entrepreneurial programs

Sponsored Research

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<td>Expenditures</td>
<td>3,333,793</td>
<td>3,109,543</td>
<td>7,157,508</td>
<td>3,614,234</td>
<td>5,781,611</td>
<td>4,915,581</td>
<td>3,673,392</td>
<td>1,053,692</td>
<td>1,753,990</td>
<td>163,875</td>
<td>34,557,219</td>
<td></td>
</tr>
</tbody>
</table>

* Other units includes: UTC-IASE, C2E2, Eversource Energy Center