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UCONN SCHOOL OF ENGINEERING ANNUAL REPORT 2021-2022

The UConn School of Engineering Annual Report is produced by the Engineering Communications Team based on information provided by the deans, department heads, unit directors, and support staff. Special thanks to the SoE Communications, research development, and administrative team members that helped put the final report together.

On the cover: Radenka Maric, interim president, gives Department of Energy Secretary Jennifer Granholm a tour of her lab during a visit to the Center for Clean Energy Engineering on May 20, 2022.
(Peter Morenus/UConn Photo)
After two years of challenges the pandemic placed upon us, and the incredible resilience our students, faculty, and staff exercised, Academic Year 2021-2022 was a year of new normality—leading to one of the most successful years in the UConn School of Engineering history.

With record enrollment, philanthropic gifts to our School, and research outputs, the School of Engineering saw a renewed vigor. For the first time in three years, students, faculty and staff were able to celebrate most large-scale events in person. Industry and our students shared accomplishments at Senior Design Demonstration Day, we were able to celebrate a new class of the Academy of Distinguished Engineers, and most importantly, we were able to celebrate the Class of 2022 in the familiar walls of Gampel Pavillion.

Focusing on one of our major priorities, increasing diversity, equity, and inclusion, we came away in 2021-2022 with some of the largest investments we have ever seen from private donors and major companies. In 2021, thanks to the generosity of Mark and Betsy Vergnano, we were able to establish the Vergnano Institute for Inclusion with a $3 million donation that has enhanced and expanded our DEI programs. On the heels of that endowment, our team has hit the ground running alongside companies investing in our talented students. As a result, 2021-2022 saw the addition of 42 new scholarships that will average $10,000 per student per year, with a focus on underrepresented minorities. During 2021-2022 we also had a record number of diverse faculty hires and set a new high-water mark for female undergraduates, with 31% of our Storrs students being female—the first time crossing that threshold in UConn School of Engineering history.

The mental health and wellness of our students has continued to be another priority of ours, following the tragic deaths we encountered over the past few years. As a school, we have been advocating for increased resources for our students, and in 2021-2022, we sought more resources for our graduate students as well. One of the

continued on next page
programs initiated this year was the creation of a summer institute for international graduate students, focused on lowering stress of the transition to an entirely new culture. A one-credit class was initiated to ease the transition to graduate school life for both domestic and international students. Additionally, to improve graduate student’s mental wellness, a faculty working group was formed and tasked with implementing new resources and initiatives.

Our faculty continue to push the envelope of what is possible and have been amazing me with their resilience and creativity. As a result of their efforts, 2021-2022 met a new record in research expenditures, a solid 12% increase from the previous year. Leading the charge for this success has been our National Institute for Undersea Vehicle Technology, with $18.2 million in expenditures in FY22 generated from 88 research projects.

As you will see in this report, despite our success, we face continued challenges such as budgetary cuts, salary compression for our faculty, and a lack of growth in faculty lines and staff support. Over the past decade, our faculty and staff numbers have narrowly changed, which creates an unsustainable model as we continue to increase our research awards and student enrollment. We have seen some success with new innovation professorships and newly funded chairs, but we continue to advocate strongly for more personnel.

All this success does not happen on an individual level, but rather happens when you have a great team surrounding you. I am humbled by the support and guidance I receive daily from our faculty and staff, our advisory board, our industrial partners, and my amazing leadership team. On the University side, our pathway to success would not be possible without the support from our President, the Provost and the Provost’s Office, and our many partners across the University.

It has been an honor to serve as the Dean of the School of Engineering for another year, and I am proud of what we have accomplished in 2021-2022. I look forward to continuing our mission, growing our school to new heights, and serving the economic engine of the State of Connecticut in the new year.

**Kazem Kazerounian**

*Dean*
Enrollment Growth

The ambitious targets mandated by the state’s Next Generation CT legislation have driven significant growth at UConn School of Engineering (SoE) over the past decade. Enrollment has increased by more than 65% since 2012 and for the first time female enrollment in the upcoming class reached 31% of total enrollment at the Storrs campus, a major milestone in the school’s efforts to achieve diversity and gender parity.

Enrollment for the Fall 2021 semester totaled 3527, with 3305 of those students at Storrs and 222 students at regional campuses. The quality of our students continues to rise. Admitted incoming freshmen had an average SAT score of 1377. Our Computer Science and Engineering Department has seen extraordinary demand and growth in the last three years. Growth across departments has not been uniform and SoE leadership is working to address the challenge of maintaining current enrollment levels and developing services and programs to enhance the student experience. To meet current enrollment demands, the SoE has been reallocating resources and encouraging department heads to collaborate with faculty at regional campuses and leverage opportunities to offer remote courses across campuses.

Engineering on Regional Campuses

Four-Year Computer Science Program at the Stamford Campus

Launched in 2017, the four-year Computer Science Program at the Stamford Campus allows students to complete their entire degree program in Stamford. The program makes the curriculum widely available to Connecticut’s information technology sectors, including finance and insurance. Our inaugural group of students graduated from the program in Spring 2021 and the number of SoE students graduating from the program continues to grow. A Mobile Systems Development concentration within the program is being formalized, but additional teaching and professional staff are needed to fulfill this commitment. The SoE has made staffing this concentration a priority for AY 2022-2023.
First-Year Engineering Curriculum at Regional Campuses
The SoE offers first-year engineering curriculum at all of UConn’s regional campuses. To increase accessibility to engineering, the SoE continues to work with campus partners to offer coursework beyond the first-year curriculum at regional campuses. Last year, the SoE also expanded offerings to include an engineering laboratory course in electrical circuits to maximize the number of students able to remain at regionals until junior year (54 credits). School leadership recognizes the need to align specific engineering programs at regional campuses while balancing the strategic goals and resource costs at those campuses and the SoE.

Regional Campus Support Network Initiative
Engineering faculty at regional campuses have developed an innovative approach to course offerings that provides a network of support while strengthening and expanding the curriculum. More flipped classes and online lectures are being offered at regional campuses, increasing accessibility to students. The Director of the Hartford Campus, in collaboration with the SoE, has submitted a proposal to the Provost to hire full-time faculty in Hartford to take better advantage of the proximity of the downtown location to industry and employers.

Advising
The academic advising efforts of the SoE were recognized as a top strength in its most recent ABET accreditation evaluation. Students are required to participate in at least one advising session per semester, but advisors encourage students to connect more often to discuss their academic and personal goals. First and second year students are assigned a professional staff advisor and transition to a faculty advisor when they reach junior standing. Both professional and faculty advisors strive to establish partnerships between students and the University community that support and empower them to make meaningful academic decisions in pursuit of their goals.

During the AY 2021-2022, advisors across UConn’s campuses piloted a hybrid advising model that combined in-person connections with more flexible remote options. Engineering students have reported being satisfied with having multiple options for academic advising support. To advance their support mission, faculty and staff advisors continue to develop new ways to engage students. For example, the advising team has trained a cohort of peer mentors to assist engineering students with navigating campus and connecting to support.
**Multidisciplinary Engineering Degree**
The Multidisciplinary Engineering (MDE) program welcomed its first cohort of students in Fall 2021, which had 31 students. MDE is a degree path that enables students to work across fields in pursuit of a broadly-skilled engineering degree. Grounded in engineering fundamentals from multiple majors, MDE provides students with the flexibility to pair an engineering degree with other interests and majors at the University. Several new joint programs with partners from around the University are being explored by the SoE to take better advantage of MDE’s unique structure.

In AY 2021-2022, MDE launched four specializations with university partners. Two of the specializations – Industrial Design (six students) and Entertainment Engineering (two students) – are joint programs with the School of Fine Arts through our partnership with the Krenicki Institute for Arts and Engineering. A third program – Human Rights and Sustainability (one student) – is offered through the SoE’s partnership with the Human Rights Institute. A fourth specialization is allowing four students to create individualized degree programs under the guidance of a professional academic advisor. The remaining 18 students had not picked a specialization as of AY 2021.

Additional opportunities for partnerships in MDE are being explored by the SoE with interested parties around the University.

**International Engineering Program**
The school’s International Engineering Program offers an unparalleled experience for students looking to become global engineers. By spending a year abroad, students benefit from the combination of a strong engineering program and immersion into a foreign language and culture. This life-changing program prepares graduates for rewarding and diverse engineering careers around the world. The SoE is also home to a variety of international students seeking cross-cultural interactions with students of many nationalities and backgrounds. Typically, International Engineering students graduate within five years and earn two degrees – a B.S. in an engineering discipline and a B.A. in French, German, or Spanish. With COVID restrictions lifting internationally, the opportunity for programming abroad will continue to grow. The SoE anticipates increased student participation in the program in coming years.

As part of the International Engineering program, students spend a year in several countries, where they work for some of the largest brands in the world, including Porsche and Merck.

Dual degree students (Engineering/Language) studying abroad in France, Spain, and Germany for AY 2022-2023:

- **4** Germany
- **7** France
- **5** Spain
Engineering House Living and Learning Community
Every year, the SoE invites approximately 100 first-year and 50 second-year students to join the Engineering House Learning Community (EHLC). EHLC is meant to provide a sense of community for students across engineering majors while offering specialized academic and experiential educational opportunities. Opportunities for more inclusive, in-person activities have grown significantly as COVID restrictions on campus have loosened in accordance with University safety standards.

First-year students engage in service and learning projects, such as engineering and building derby cars and other activities at labs and other sites on and off campus. Additionally, student leaders plan and run events to help students meet friends, navigate the University, and explore their majors. The EHLC student leadership team provides students with regular updates on daily and weekly activities taking place on campus and in the community.

EHLC sophomores are able to participate in a course introducing them to the year-long Senior Design process as observers. Students are paired with current Senior Design teams as interns to gain a better understanding of project design requirements, engineering design-builds, and how to work with industry partners. EHLC sophomores also participate in relevant design-process trainings, networking workshops, and presentations on resources and research methods.

Cornerstone Initiative: First-Year Experience & Design Lab
In 2016, the SoE launched the “Cornerstone Initiative,” a reworked version of our ENGR 1166 – Foundations of Engineering course, focused on the radical redesign of the first-year engineering experience. In January 2019, the updated course and other first-year activities moved to the newly renovated, 2000 square-foot Cornerstone Design Laboratory on the first floor of The Pratt & Whitney Engineering Building. With a modular floor plan, a makerspace, and creative student workspaces, the building is a centerpiece of the first-year experience for engineering students as well as students interested in exploring engineering.

In AY 2020-2021, Dr. Fayekah Assanah joined the First-Year Engineering team, and in AY 2021-2022 assumed a leadership role, overseeing and organizing the course as it transitioned to in-person learning. Under Dr. Assanah, the instructional team successfully partnered with the School of Nursing to have ENGR 1166 students build more than 100 Corsi-Rosenthal boxes – small, low-cost air filtration devices that help mitigate COVID-19 – as part of a service-learning project. The boxes were delivered to the Coventry School District for use in classrooms. Students returned to the Cornerstone Design Lab for the remainder of the semester to work on open-ended design projects that were presented at the First-Year Design Expo, held Friday, April 29, 2022 in the Student Union.

Student Professional Development
Career fairs are a SoE staple and help our undergraduate students connect to internships with companies that expose them to the engineering workplace and help them develop professional skills. Additional career development support is provided through the Cooperative Education (Co-op) and Senior Design programs. Co-ops offer an extended learning experience in industry beyond the traditional summer internship and often result in a job offer after graduation. Senior Design is a program requiring graduating engineering students to complete a year-long design project, typically performed in teams of three to four students and in collaboration with an industry or government sponsor.
## School of Engineering Majors and Exploring Engineering ACES Students
### AY 2021-2022

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### Totals

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### MAJOR

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2021-2022 Annual Report
Overview

Graduate education is at the heart of nearly everything we do at the SoE. Graduate students directly perform much of the research work that leads to new discoveries and innovation; graduate students are also directly involved in undergraduate education, student engagement, and mentoring life-transformative educational experiences. Our graduate students come from across the country and around the world and embody the full range of diversity including racial, ethnic, cultural, neuro-, sex, gender, LGBTQ+, and intersectional dimensions. Our graduate students have led our school in responding to racial injustice and changing the way we recruit, support, and celebrate diversity in our community to advance equity and inclusion in our educational, research, and outreach mission.

In support of our remarkable graduate students, the SoE continues to invest in a variety of initiatives to grow and improve the number, quality, and diversity of our student population and to enhance the training, support, experience, and outcomes for our graduate students to ensure they will thrive in a variety of settings including academia and industry. Leading initiatives for M.S. and Ph.D. students in 2021-2022 are a team of departmental and program graduate directors, as well as dedicated faculty and staff, which includes Leslie Shor, associate professor and associate dean for research & graduate education; Xinyu Zhao, associate professor and director of graduate studies; Aida Ghiaei, director of graduate outreach & diversity; and Nusaybah Quasem, program assistant.

Major Initiatives

Recruitment Initiatives

In the past few years, the SoE emphasized diversity in our recruiting efforts in part by steadily building our presence at regional and national events hosted by diversity-serving engineering organizations for African-American (NSBE), Chicano and Native American (SACNAS), Hispanic (SHPE), female (SWE), and LGBTQ+ (o-STEM) students. We attended national conferences of SWE and SHPE in person and collaborated with the UConn Graduate School by attending virtual conferences of o-STEM and SACNAS. In Fall 2021, UConn and Boston University cohosted the regional GEM GRAD (Getting Ready for Advanced Degrees) Lab virtually, where 80 underrepresented students attended. This event offers underrepresented students exposure to the benefits of research and technology careers in a highly interactive one-day event. GEM connects highly qualified students from underrepresented groups to STEM graduate programs with much-needed financial support that is often the deciding factor in pursuing graduate education.

In the past year, the SoE hosted a virtual open house and 10 other virtual webinars for prospective graduate students. Throughout the recruiting season, our Director of Graduate Outreach & Diversity hosted weekly office hours for prospective students, including times designed to accommodate international students. Our Director of Communications drove prospective students to these events by a comprehensive and aggressive social media and email marketing campaign that enabled prospective students to identify and chat virtually with prospective faculty advisors. Capping off our recruiting season, we hosted a hybrid visitation event where 70 admitted students attended. In August 2021, with funding from the president’s office and other STEM related programs, we started the BRIDGE+ program for minority graduate students, modeling it after our successful BRIDGE program for undergraduate students and Bridge to the Doctorate. The three-week intensive program provided a community, crucial information through seminars, workshops, tours and various activities to set them up for success.

For the AY 2021-2022, the SoE resumed the General Electric fellowship after revising our criteria, and welcomed a new cohort for AY2022-2023. The goal of the reformed GE Fellowship program is to entice outstanding students, to establish long-term recruiting relationships with underrepresented institutions (HBCUs, HSIs, international institutions that are less represented), to recognize exceptional service to the department, school, university, and professional societies, and to prevent excellent graduate students from leaving without completing their degree. Three categories are designed to achieve the above goals: the Next-Gen Scholar, Inclusion and Equity, and GE Excellence. Faculty advisors can nominate students for the first two categories and students nominate themselves for the last. Eighty-two nominations in all three categories were received by the award selection committee and 19 were awarded fellowships.
Fellowships Awarded to Supplement and Offset the Cost of Graduate Assistantships

In the past few years, we focused on developing philanthropic-based graduate fellowships and training grant fellowships to offset the cost of graduate education for tuition-paying graduate students or for principal investigators.

**Federal:**
- 26 Graduate Assistance in Areas of National Need grants (GAANN),
- 1 NSF Partnerships for International Research and Education grant (PIRE)

**Industry:**
- 27 Eversource, 19 General Electric, 5 Synchrony Financial

Equity & Inclusion Initiatives

Recruiting a diverse group of graduate students is not enough. We also work to ensure that the students we recruit feel welcomed and empowered to thrive and lead at the SoE. In Fall 2021, we received competitive funding to pilot a new BRIDGE+ program, which is a three-week long residential orientation and cohort-building program designed for incoming Ph.D. students of color from across STEM fields. This program is a partnership with other schools and colleges at UConn including CLAS, CAHNR, and Pharmacy. In August 2021, the first cohort was comprised of seven students including three from engineering. These students lived in the UConn dorms and participated in an intensive round of professional development and team-building activities designed to enhance self efficacy, student success, and leadership potential. The long-term goal of our BRIDGE+ program is to grow our underrepresented minority engineering population and become a model for diversity, equity, and inclusion in the state and nationally.

Student Transition & Wellness

A holistic approach was taken in the past year to improve graduate students’ experience and wellness. A summer institute for international students was initiated, which eased the transition of international students into American life. A webinar was organized before they arrive, followed by a two-week paid program with on-campus housing where intensive daily programs were provided to facilitate a successful and smooth transition. A one-credit first-year experience class was initiated, open to both international and domestic graduate students, to further facilitate the transition into their graduate life. Meanwhile, workshops for new faculty mentors took place, where more senior faculty mentors were invited to share their experience and best practice. The COVID-19 pandemic caused significant

**GRADUATE STUDENT HIGHLIGHTS**

Above: A meeting of the John Lof Leadership Academy for graduate engineering students in 2021.

Below, Left: Brandon D’Agostino, right: Joshua Dupont. Two UConn SOE undergraduates, pictured above, earned National Science Foundation Graduate Research Fellowships (NSF-GRFP) in 2021.
mental stress to everyone, especially graduate students who had to work in isolation the past two years. To improve graduate students’ mental wellness, a faculty working group was formed in 2022 to collect feedback from students and to address their issues.

Challenges

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

Cost: In FY 2022, the fringe benefits rate for graduate students increased from 15.5% to 15.7%. The indirect cost burden was 61%. 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) exceeds $62,000 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), we do not have large numbers of teaching assistant lines that are available to support engineering graduate students.

Professional Skills: One of the persistent 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 on the next page.

SAGE POSTER COMPETITION

Wen Zhao (right), competition winner from the Institute of Materials Science, presenting to the judges at the SAGE poster competition in March 2022.

Student Demographics

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Degrees Conferred AY 2020-2021

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<td>Ph.D.</td>
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Student Support

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</table>
**Professional Skills Course Series**

For AY 2021-2022, we introduced permanent professional skills courses for our Engineering graduate students, which was a step up from teaching these courses as only ‘special topics’ in previous years. In Fall 2021, students had the opportunity to enroll in the ‘Scientific Communication’ course where they were able to learn and practice presentation skills to communicate scientific data and prepare content for presentations and posters. A cohort of ten students also enrolled in the ‘Engineering Internships and Careers in Industry’ class where they were equipped with the skills to identify and apply for two-to-four industry internship positions or fellowship opportunities in national labs. Through this course, students had the great opportunity to meet and work with various guest lecturers from across UConn, including the Office of the National Scholarships and Fellowships, the Center for Career Development, the International Student and Scholar Services, to student entrepreneurs from the Masters of Global Entrepreneurship program and faculty with industry partnerships from UConn Tech Park. These courses were organized and taught as a collective effort between Fayekah Assanah, assistant professor-in-residence in the BME department, Aida Ghiaei, director of graduate outreach & diversity, and Nusaybah Quasem, program assistant.

In the Spring 2022 semester, we also provided courses called the “Teaching Engineering-Communication and Pedagogy” class where students learned how to design and develop a course. This course has also been approved by the Graduate Certificate in College Instruction (GCCI) as an elective for their program. We also offered the “Entrepreneurial Skills” course aimed to help students learn more about the infused worlds of business and technology, and an “Art of Negotiation” workshop to teach students how to get to a ‘Yes’ during negotiations in everyday life. These courses are part of a series of permanent courses we hope to offer continuously in the future, as shown in the table below.

<table>
<thead>
<tr>
<th>Group</th>
<th>Theme</th>
<th>Number</th>
<th>00</th>
<th>01</th>
<th>02</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technical Communication</td>
<td>5410</td>
<td>Scientific Communication -Fall 2022</td>
<td>Paper Writing Practicum</td>
<td>Writing for international students</td>
</tr>
<tr>
<td>2</td>
<td>Pre-Professional Tracks</td>
<td>5420</td>
<td>Engineering Internships and Careers in Industry -Fall 2022</td>
<td>Future Faculty Seminar</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Professional skills</td>
<td>5430</td>
<td>Teaching Engineering-Communications and Pedagogy -Spring 2022</td>
<td>Entrepreneurial Skills (ENGR 5300) -Spring 2022</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Interpersonal skills</td>
<td>5440</td>
<td>How to Get To ‘YES’ -Spring 2023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Orientation/Grad School 101</td>
<td>5450</td>
<td>First Year Experience</td>
<td>Summer Courses</td>
<td></td>
</tr>
</tbody>
</table>

**Collaboration with Local Industrial Partners**

Local industrial partners provide a rich resource of potential graduate students that might alleviate the pressure of recruiting and retaining quality graduate students through normal means. An initiative to iron out the path for a part-time Ph.D. program was started in 2021. Several roadmaps and logistics for companies participating in the SoE Ph.D. programs have been established and discussed with industrial partners such as Electric Boat, Pratt & Whitney, and Raytheon Technologies Research Center. We anticipate rolling out a pilot program in 2022 to measure whether a sustainable source of local collaboration can be established to ensure a win-win scenario between UConn and its partners.
Professional Education Students
The Professional Education program provides courses for:

- Graduate students toward the completion of an engineering degree or advanced engineering certificate.
- Industry students and corporate partners who wish to expand their knowledge to benefit their careers and businesses.
- Practitioners and students who are interested in advancing their knowledge of specific engineering subjects in a non-degree path.
- Students from worldwide markets interested in learning in a virtual modality that enable them to keep working full or part time and still be able to attend classes remotely.

Professional Education Strategy
During AY 2021-2022, the Professional Education team engaged in the following strategic activities to support the program’s growth and revenue generation trajectory:

- Held regular 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, Carrier, Raytheon Technologies, Mokavia Aerospace, and the CT Tech Council.
- Extended digital presence through social media marketing and continual expansion of online course offerings (62 online courses have been developed to date). Webinars, email campaigns, an active LinkedIn page, newsletters, virtual career fairs, virtual networking sessions, open house activities, and virtual lunch & learn sessions were executed to attract industry participants.
- Promoted excellence in curriculum by collaborating with the Center of Excellence for Teaching and Learning for programmatic support and adding new offerings.
- Collaborated directly 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.
- Hired a full time Program Manager (Spring 2021) to aid in the expansion of the Professional Education programs.
- Hired a Business Development Associate (Spring 2022) to aid in the promotion of Professional Education programs to industry partners.

Professional Education Programs

- Master of Engineering (MENG) Degree
- Advanced Engineering Certificates
- Graduate Courses (non-degree)
- Non-Credit Programs and Trainings
**PROFESSIONAL EDUCATION**

**Professional Education Credit Program Offerings**

Master of Engineering Concentrations:

- Advanced Manufacturing for Energy Systems
- Advanced Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Science & Engineering
- Data Science
- Environmental Engineering
- Electrical & Computer Engineering
- General Engineering
- Global Entrepreneurship
- MBA/MENG Dual Degree
- Manufacturing Engineering
- Materials Science and Engineering
- Mechanical Engineering

Advanced Engineering Certificates:

- Advanced Materials Characterization
- Advanced Systems Engineering
- Bridge Engineering
- Composites Engineering
- Contaminated Site Remediation
- Engineering Data Science
- Oceanographic
- Process Engineering
- Power Engineering
- Power Grid Modernization

**Enrollment and Revenue for MENG and Certificates (Credit Programs)**

As a result of these efforts and according to preliminary registration data, enrollment for Professional Education is projected to increase continuously during AY 2022-2023, as follows:
In addition, expected revenue for Professional Education is projected to increase continuously during AY 2022-2023, as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual and Projected Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>$500,000</td>
</tr>
<tr>
<td>2011-2012</td>
<td>$600,000</td>
</tr>
<tr>
<td>2012-2013</td>
<td>$700,000</td>
</tr>
<tr>
<td>2013-2014</td>
<td>$800,000</td>
</tr>
<tr>
<td>2014-2015</td>
<td>$900,000</td>
</tr>
<tr>
<td>2015-2016</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>2016-2017</td>
<td>$1,100,000</td>
</tr>
<tr>
<td>2017-2018</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>2018-2019</td>
<td>$1,300,000</td>
</tr>
<tr>
<td>2019-2020</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>2020-2021</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>2021-2022</td>
<td>$1,600,000</td>
</tr>
<tr>
<td>2022-2023</td>
<td>$4,500,000</td>
</tr>
</tbody>
</table>

Professional Education, International Partnerships (Credit Programs)

Professional Education is partnering with UConn’s Office of Global Affairs and Anglo Educational Services (AES) to provide a Master of Engineering (MENG) in Data Science and Advanced Systems Engineering degrees for students across the world. Students will have the opportunity to complete their degree online while interning in London with industry. This program is expected to launch Spring 2023. Negotiations are ongoing with the Office of Global Affairs to determine the cost of the program and potential future revenue generation for the School.
The cost of this program is $2,000 per module.

Programs in CS or DS after completing all three modules. The CyberLeap program consists of three independent modules, each 14-weeks long. Students can enroll in any of the modules — there is no requirement to complete all three modules. The CyberLEAP modules could also be of independent interest for career enhancement and knowledge acquisition. There is no requirement to complete all three modules.

The virtual Coding Boot Camp launched in May 2022. It is a 24-week program, providing the fundamental knowledge, skills and abilities needed to enter the multidisciplinary field of cybersecurity. Theory and practical application labs are combined to achieve proficiency in industry-standard tools and techniques. We are expecting 45 students to complete the Cybersecurity Boot Camp during FY 2023.

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The virtual Coding Boot Camp enrolled 171 students for AY 2021-2022. After transitioning to an online format during the pandemic, the program has successfully moved to online classes permanently. Per the UConn and Trilogy/2U partnership, the School has received $660,992 since the program’s inception.

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Professional Education offers additional customized training and development to industry. The programming is adapted to accommodate company needs and the schedules of working professionals and even offers programs at company sites. The Professional Education team is currently working on several modules that are expected to happen in AY 2022-2023.

In Fall 2022, Professional Education will launch CyberLEAP, a program specifically designed to provide holders of non-Computer Science bachelor’s degrees a path for fulfilling CS requirements for admission to the MENG degree in CSE and MENG degree in Data Science (DS). CyberLEAP is an online program covering the foundations of computer science, including discrete math, data structures and algorithms, and systems programming. The program will consist of three independent modules, each 14-weeks long. Students can enroll in any of the modules and can be considered for acceptance into the MENG programs in CS or DS after completing all three modules. The cost of this program is $2,000 per module.

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Faculty Head Count

The number of tenured or tenure track (T/TT) faculty in the SoE has stayed relatively constant in the last four years with only modest increases in the last five years. A total of five T/TT faculty positions have been added since 2013.

To accommodate the dramatic increase in the undergraduate enrollment, we have developed a cadre of passionate faculty focused on teaching (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 attend training and continuously work with UConn’s Center for Excellence in Teaching and Learning (CETL) to improve their teaching skills. We have also developed rigorous standards for annual evaluations and promotions for our teaching faculty.

Challenges

As with the last few years, our biggest challenges with supporting and retaining faculty have centered around salary compression and a lack of growth in our T/TT faculty lines over the past decade.

When it comes to faculty salary, our compensation has typically been below national averages, causing some of our senior faculty to seriously look at competitive offers from other institutions. While the Provost’s Office has been able to slow down some of the departures through a retention fund, other institutions have become increasingly aggressive with their offers. In the future, as those offers increase in size, it will become tougher to retain our best and brightest.

With the implementation of Next Generation CT during the former Governor Malloy administration, the School was tasked with exponentially increasing our student population, which hasn’t led to the requisite increase in faculty to accommodate that. Additionally, multiple leaders at UConn have spoken about doubling research expenditures over the next several years. Without more faculty, this puts stress on the current faculty, who have already been submitting grant proposals at a very high level. More faculty lines, a more competitive compensation structure, and a greater aggressiveness on faculty retention will lead to more success for the overall mission of the University.

Faculty Data Fall 2021

<table>
<thead>
<tr>
<th>DEPT</th>
<th>T/TT</th>
<th>TEACHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>CBE</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>CEE</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>CSE</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>ECE</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>INTD</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ME</td>
<td>25</td>
<td>9</td>
</tr>
<tr>
<td>MSE</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>147</td>
<td>35</td>
</tr>
</tbody>
</table>
Faculty Retention

Engineering is a competitive field, and faculty flux is the rule rather than the exception. In the absence of adequate financial capability to retain our faculty, we have focused on creating a positive environment and offering faculty support in research development and teaching skills. As a result, our retention rate has drastically improved. The table to the right shows the trend for the SoE faculty attrition (not including retirement) in the past eight years.

Faculty Achievements

Generating 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 SoE 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.

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Attrition T/TT Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>5</td>
</tr>
<tr>
<td>2015</td>
<td>2</td>
</tr>
<tr>
<td>2016</td>
<td>4</td>
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<tr>
<td>2018</td>
<td>5</td>
</tr>
<tr>
<td>2019</td>
<td>6</td>
</tr>
<tr>
<td>2020</td>
<td>5</td>
</tr>
<tr>
<td>2021</td>
<td>2</td>
</tr>
</tbody>
</table>

Funded Professorships

- 20 Term Professorships
- 7 Named Professorships
- 17 Endowed Professorships
Summary of Scholarly Activity in AY 2021-2022

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.

- 470 Journal Publications
- 355 Conference Publications
- 27 Patents Issued
- 54 Early career awardees, including NSF CAREER and Young Investigator Programs
- 54 Editorships of Major Journals
- 207 Associate Editorships
- 37 Faculty Fellows of National/Learned Societies
- 58 Members of the Connecticut Academy of Science & Engineering
- 2 Professors of Practice who are members of the National Academy of Engineering
- 1 Member, National Academy of Medicine; National Academy of Science, National Academy of Engineering

Honors and Awards

We have talented and accomplished faculty who have been recognized for their achievements through many prestigious awards and recognitions, and a selection of these recognitions are captured in this section.

A Selection of 2021-2022 Recognitions Across the SoE:

- 2021 Emmet N. Leith Medal, Optica, Bahram Javidi, ECE
- 2021 Fellow, Royal Academy of Engineering, Cato Laurencin, CBE, MSE, BME
- 2021 Hoover Award, American Institute of Chemical Engineers, Cato Laurencin, CBE, MSE, BME
- 2022 Spingarn Medal, National Association for the Advancement of Colored People, Cato Laurencin, CBE, MSE, BME
- 2022 Bernard M. Gordon Prize, National Academy of Engineering, Tom Katsouleas, ECE
- 2022 Optica Fellow, Optica, Tom Katsouleas, ECE
- 2022 Outstanding Early Career Engineer, US Frontiers of Engineering Symposium, Diego Cerrai, CEE
- 2022 PMSE Young Investigator, American Chemistry Society, Kelly Burke, CBE

Connecticut Academy of Science & Engineering (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. There are currently 57 UConn School of Engineering faculty that are members of CASE.

2022 SoE CASE Inductees:

- Rainer Hebert, Director of Pratt & Whitney Additive Manufacturing Center; Associate Director of the Institute of Materials Science, and Professor of Materials Science and Engineering
- Sangamesh G. Kumbar, Associate Professor of Biomedical Engineering
- Mu-Ping Nieh, Professor of Chemical and Biomolecular Engineering

NSF CAREER Recipients in AY 2021-2022

The CAREER program offers the National Science Foundation’s most prestigious award in support of early career faculty.

- Ben Fuller, Computer Science & Engineering
- Walter Krawec, Computer Science & Engineering
- George Matheou, Mechanical Engineering
- Kristin Morgan, Biomedical Engineering
- Anna Tarakanova, Mechanical Engineering
- Xueju (Sophie) Wang, Materials Science and Engineering
- Hongyi Xu, Mechanical Engineering
Staffing Levels

School-wide budgetary constraints have continued to result in a shortage of the SoE support staff. Despite continual growth in the number of students and in the scale of our research enterprise, the staff size has remained inadequate for SoE support needs. A notable exception is the number of professional undergraduate advisors that had previously increased from zero to seven in AY 2013-2014 in response to a deficiency identified in an external ABET review in 2012. Overall, we believe the SoE continues to operate on an extremely lean staff size considering the growth trajectory.

Research Support Staff

The University’s assistance for SoE research support staff has been quite marginal (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 continue to be an impediment to further growth in our research, industry engagement, and educational mission. This opinion was strongly corroborated by a 2018 external review committee, which cited lack of research support staff as a “drain on faculty productivity” and noted that the SoE’s staff is well below current metrics for Research 1 institutions.
The Vergnano Institute for Inclusion (VII) is a proactive, adaptive organization created to nurture and sustain an anti-racist and anti-discriminatory culture within UConn SoE. The VII is operated under a distributed instead of top-down form of governance as a resource for the SoE and the communities it serves. Inspired by the strength of diversity and inclusion, the VII is an equity-minded community where engineers of all backgrounds can innovate and change the world for the better.

In its first year, VII staff supported faculty, staff, students, and the community beyond UConn. Working with department heads, VII is developing a Diversity Action Plan that will assess current demographics, climate and initiatives with an eye toward improving diversity, equity and inclusion and effecting culture change schoolwide and at the department level. The VII is also working to expand programming and mentoring opportunities for undergraduate and graduate students that promote community-building and success. Over the course of the year, the number of student organizations supported by VII grew from five to nine – nearly double – which included three organizations serving graduate students. VII staff also represent the SoE in university-wide diversity, equity, inclusion, and justice initiatives.

The VII was established through the generous gift of $3 million to the SoE in 2021 by Mark and Betsy Vergnano, UConn alumni now living in Pennsylvania. The VII was led by Kevin McLaughlin, executive director, with the support of Stephany Santos, associate director and assistant professor-in-residence in the BME department, two full-time staff members, a post-doctoral student, and numerous part-time positions held by students. In its inaugural academic year, the VII was awarded $109,000 in grants and submitted six grant proposals totaling $192,000.

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In 2022, VII hosted a showcase to highlight the great work going on with students in the programs. Pictured are several members of the current and future executive board of the UConn Chapter of National Society of Black Engineers.

During the AY 2021/2022 VII also:

- Facilitated 42 peer mentor-mentee pairings/small groups for historically excluded or racially oppressed students in engineering.
- Organized impactful and meaningful virtual conferences for 400 students across Connecticut, which included 8th grade females (Multiply Your Options – MYO), 8th grade Black, Hispanic, or Indigenous males (Engineering Your Future–EYF), and 10th grade Black, Hispanic, or Indigenous females (Sisters in STEM – SIS).
- Celebrated nine SoE faculty and staff who successfully completed the year-long Justice, Equity, and Transformation (Inclusive JET) program.
- Hosted interactive social media takeovers highlighting Transgender Day of Visibility, Native American Cultural Programs, Earth Week, Autism Awareness, Women’s Herstory Month, and Black History Month.
- Partnered with Pratt & Whitney and Jacobs Engineering to create new scholarships that provide multi-year support of $10,000 per student per year as well as mentoring and internship opportunities.
Krenicki Arts and Engineering Institute

UConn’s Krenicki Arts and Engineering Institute is an innovative, interdisciplinary nexus of the arts and engineering that was established with a $5 million gift in 2019 from UConn alumni John and Donna Krenicki. The pairing of arts and engineering melds divergent kinds of creativity in ways that can yield imaginative solutions and radical breakthroughs in a broad range of fields that include robotics, music and sound engineering, digital media, and product design.

In AY 2021-2022, the SoE began promoting its new Multidisciplinary Engineering (MDE) degree program and enrolling its first cadre of students in the fields of entertainment engineering, industrial design and human factors and sustainability. Classes have been held with students from both schools at the SoE and School of Fine Arts (SFA) under the guidance of the Krenicki Institute. Activities have included the Spacesuit Competition, a weekend of student team-building promoting NASA’s Observe the Moon Day. The Institute also hosted students from the SoE and the SFA participating in the Women in Design Conference, organized by the Industrial Designers Society of America (IDSA).

Faculty from the Krenicki Institute are actively participating in discussions on a proposal to remodel a portion of the Francis L. Castleman Building as a maker and invention space, able to host student clubs, senior design students and a wide range of SoE class activities. Four MDE program classes in industrial design and entertainment engineering are also expected to take part in the development of the multidisciplinary makerspace.

Jorge Paricio, engineering co-director of the Krenicki Institute, oversaw a team of students from Mechanical Engineering and Materials Science and Engineering for their Senior Design project. The project involved creating a prototype of a shield for use by people with disabilities, especially the blind. The shield is designed to guide users in a way that minimizes the risk of exposure to viruses and reduces the chance of sexual assault.

JOHN AND DONNA KRENICKI

UConn alumni John and Donna Krenicki gave a $5 million gift in 2019 to the University’s Schools of Engineering and Fine Arts to launch the Krenicki Arts and Engineering Institute, an innovative, interdisciplinary partnership that offers groundbreaking classes in areas like entertainment engineering and industrial design.
The Biomedical Engineering and Mechanical Engineering departments also partnered with the Krenicki Institute to produce proposals for a NASA Reduced-Gravity Simulator for Field Environments grant, resulting in two proposals for SoE’s Senior Design. One proposal involved weather balloons, drones and a wearable harness. The other involved a mobile platform that moved with an astronaut in training. A third project led by Professor Paricio in Entrepreneurship & Innovation in Industrial Design involved writing a business proposal for a training harness and creating an initial prototype. For yet another project, SFA Professor Christopher Sancomb produced the first phase of a concept for a swing for Mirror Lake with students from the SoE and the SFA.

Technical Assistance for Brownfields Program (TAB)

As of October 2021, UConn and the team of the Connecticut Brownfields Initiative (CBI) became the new provider for the Technical Assistance for Brownfields (UConn TAB) program for EPA Region 1 under an agreement with the U.S. Environmental Protection Agency. The five-year, $1M cooperative agreement enabled the Connecticut-based municipal assistance program to evolve into a regional one, with an interdisciplinary team of faculty and staff working with communities across New England to provide technical assistance and continuing education around brownfield redevelopment. The team is led by Civil and Environmental Engineering Department Head Marisa Chrysochoou and involves faculty from the College of Agriculture, Health and Natural Resources, the School of Social Work, and the Institute for Population Health at UConn Health.

The scope of UConn TAB is to assist municipalities, regional planning and non-profit organizations across the six New England states with the investigation, cleanup and redevelopment of abandoned, polluted sites, also known as brownfields. UConn TAB also provides networking and community engagement support to stakeholders and communities. This engagement is accomplished through direct assistance from UConn TAB personnel, as well as UConn students participating in service learning across a wide range of disciplines. The Brownfields Corps is a two-semester sequence course taken by students in civil engineering, environmental engineering, environmental science, environmental studies, natural resources, geography, history, political science, and other majors. Students learn all aspects of brownfield redevelopment and work with communities to support grant proposals to the EPA and other technical projects.

The new UConn TAB program is expanding on efforts originated in CBI and replicating that model for any municipality, regional planning organization or non-profit located in EPA Region 1, which includes Connecticut, Massachusetts, Rhode Island, New Hampshire, Vermont, and Maine.

ENGINEERING FOR HUMAN RIGHTS INITIATIVE

EHRI involves 60 faculty affiliates across departments within the SoE and in UConn’s School of Medicine; School of Social Work; School of Law; School of Business; College of Liberal Arts & Sciences; and College of Agriculture, Health & Natural Resources.
INTERDISCIPLINARY INITIATIVES

During the AY 2021-2022, 33 students from seven majors participated in the fall semester Brownfield Corps course, working with the cities of Waterbury, Norwich and New London, the towns of Ansonia, Vernon, Stafford and West Haven and the non-profit St. Luke’s Development Corporation in New Haven. Students prepared grant proposals to the EPA to support brownfield characterization and redevelopment. In the spring semester, 12 students worked with six municipalities (Bethlehem, NH; Attleboro, Monson and Athol, MA; Lyndon VT; Waterbury, CT) on seven different projects. Students also prepared two brownfields inventories with methodologies for site prioritization, four analyses of redevelopment alternatives and one community engagement plan.

In the first six months of the project, UConn TAB staff responded to 12 additional direct assistance requests, conducted 19 grant reviews, organized six webinars, launched a website with educational materials and participated in numerous regional and national stakeholder meetings.

Engineering for Human Rights Initiative (EHRI)

The profile of UConn’s unique EHRI continues to grow, driven by over 60 affiliated faculty across the University who are collaborating on research, building new curricular offerings, and engaging policymakers, industry partners, and non-governmental organizations (NGOs) in efforts to promote the integration of human rights with environmental and social sustainability nationally and internationally. With support from both the SoE and the UConn Human Rights Institute, the Initiative is working to consolidate activities and practical applications across six key research areas: 1) Water, Health & Food Security; 2) Product Design, Manufacturing, and Supply Chain Management; 3) Community Planning, Resilience and Justice for a Changing Environment; 4) Engineering Education and Accessibility Rights; 5) Engineering Substances and Process Sustainability; and 6) Cybersecurity, Privacy, and Human Vulnerability.

Journal articles and book chapters written by EHRI faculty are helping define the contours of the engineering for human rights field. Other published work covers issues ranging from the social determinants of health to the implications of new forms of cybersecurity, new strategies for protecting health and safety through improved civil and systems engineering, and due diligence and compliance in supply chain management across varied political systems.

Research of EHRI affiliated faculty has practical policy relevance. Collaborative projects on the social dimensions of transportation design, for example, explore ways to increase older (im)migrant’s access to transportation resources and to decrease their caregiver’s transportation-related burdens using a social network intervention model. Research and teaching on climate justice straddles several of our core strength areas and has been a central focus over the past year. For example, a Fall 2021 public workshop on “Climate Change Research and Policy Updates: Strategies for Promoting Equity and Inclusion” drew together faculty from the Storrs and Avery Point campuses along with high-profile alumni active in Connecticut policy circles such as the Governor’s Council on Climate Change and the Long Island Sound Study. Faculty members central to the Initiative are also collaborating on the development of research proposals focused on decarbonization policy, climate adaptation, and grid modernization. The Initiative takes an interdisciplinary approach to assessing the social/cultural aspects of policy design and implementation.

EHRI’s grant-funded research tackles a range of issues, from energy auditing and industrial assessment to new external support for course development on ethical supply chain management. Core faculty continue to grow and deepen curriculum offerings, including a new team-taught course on Engineering for Human Rights. The SoE’s new B.S. in MDE with a specialization in Human Rights and Sustainability is now up and running and will enroll its first cohort of students in Fall 2022, and faculty continue to hone their courses to incorporate engineering for human rights themes and literature in areas ranging from nanotechnology and society to social policy data analysis.
The SoE research enterprise encompasses an expanding federal research portfolio, state-funded research and service initiatives, and major industrial partnerships – many of which undergird the UConn Tech 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.

SoE Research Development Strategy

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

**New Faculty Development via CAREER:** New faculty are often accomplished researchers and authors, but they have not always had deep experience in the skills required for winning research grants. New SoE faculty are provided special training and support through our CAREER proposal development workshops. This full-year program provides beginning faculty with a step-by-step roadmap and support for learning through doing as they develop their application for the NSF CAREER award, the most prestigious grant program for young faculty recognized by all schools of engineering nationwide. After intensive mentoring for CAREER, faculty not only often win the award, setting them up to be leaders in their field in the years to come, they also learn proposal writing skills that are transferable to other agencies and programs. The proof of this program is in our success rate, with nearly 50% of our assistant professors receiving the highly selective NSF CAREER since the establishment of this program.

**Focus on Mission-Driven Agencies:** UConn’s local industry network and major funded initiatives such as the National Institute for Undersea Vehicle Technology (NIUVT) and the Air Force Research Laboratory (AFRL) put UConn in a strong position to win funding from certain mission-driven agencies. Our strategy for continued success is to align new programs with our existing structural advantages; to cultivate, initiate, and pursue contacts and advocacy with program managers and agency personnel; to work with the Office of Governmental Relations to gain access to diverse funding streams; and to assist faculty that are new to UConn by establishing personal connections. In addition to supporting our research programs, these efforts also align the School’s unique capabilities and State of Connecticut priorities to help enhance the economy and jobs across the state.

**Industry Partnerships and Economic Development:** Research has the greatest impact when it connects with industry and society. UConn SoE works closely with industry partners to build a robust applied research portfolio and capabilities for the benefit of our students and research programs, as well as local industry, economy, and the high-tech job market in the state. A portfolio of diverse interaction opportunities, including capstone design projects, reduced-overhead exploratory grants, and major research projects help to establish confidence and form long-term strategic industry partnerships. These partnerships also position UConn to win major national awards created to support industry-relevant research. Our efforts in this area proceed primarily through the Tech Park’s centers and institutes as a gateway for industry engagement throughout UConn.

**Selectively Pursue Major New Initiatives:** New major funding programs are always being released, but faculty at our peer institutions are also keen to win these major awards, resulting in fierce competition. Only seldom does an individual faculty member with their deep but often narrow expertise have the time, vision, and commitment needed to recognize a major multi-disciplinary opportunity, form the right team, and create a winning program on time without dedicated support. With the help of the SoE research development officer, Tina Ryan, the research leadership team meets frequently to track progress of major engineering research proposals under development and step in if they need support. The team also identifies key funding opportunities, helps to catalyze the team formation and brainstorming process, monitors progress through the process, and brings in additional support as needed to enhance the probability of a winning outcome.
Research Development Support for Faculty

Currently, the SoE’s research development strategy is led by the School’s three Associate Deans and Assistant Dean and is supported by the Research Development Officer:

**Dan Burkey, Associate Dean** supports research operations through the Engineering Education Center. He supports pedagogy and DEI proposal management & research strategies for agencies like NSF, and focuses on programs for undergrad education, e.g., LSAMP, SSTEM, and REU/RET.

**Leslie Shor, Associate Dean** focuses on research strategy for biotech, healthcare, environment & sustainability; innovation & entrepreneurship; DEI. She supports faculty in their research with agencies like NSF, NIH, DOE, USDA, EPA, CTDEEP, and the Dept. of Education, while overseeing SoE Graduate Education programs, including, NRT, GAANN, and Innovation & Entrepreneurship (CI/CTNext).

**Emmanouil Anagnostou, Interim Associate Dean** is also the Interim Executive Director of the UConn Tech Park, which is home to several engineering centers and Institutes, including the Eversource Energy Center, where he is executive director. He supports research development for manufacturing, energy, electronics, data/information via mission driven agencies like the DOD, DOE, Army, Navy, Air Force, and NASA. He also supports industry-related projects such as IUCRC, INTERN supplements and small business programs (SBIR/STTR, CTSBDC).

**Kylene Perras, Assistant Dean** is focused on Transportation and Research Infrastructure via agencies like the DOT and NSF. She oversees activities under NIUVT, CT Brownfields, CT Transportation Institute, manufacturing, facilities, Engineering Technical Services, infrastructure, and communications. Kylene supports any research proposals that require equipment, instrumentation, or space.

**Tina Ryan** joined the team in 2021 as the new SoE Research Development Officer. She is a UConn alumni (B.S. & M.S. in M.E.), with a decade of experience working as an engineer at Pratt & Whitney. In addition to research proposal support, Tina is creating decision systems to help the SoE leadership team identify major funding opportunities of strategic importance to the School. These high-level and ongoing strategic analyses will ensure that the research teams have the support they need to maximize their chances of bringing in major new awards.

**Sponsored Research Trends**

The SoE’s research expenditures have been consistently increasing over the past five years. The SoE achieved an approximately 12% increase in expenditures in the past year reaching $72M, a record total for the SoE. This total reflects numbers reported by the Office of the Vice President for Research (OVPR) in addition to research funds administered through the UConn Foundation and the UConn Health Center that are not included by the OVPR accounting. The average research expenditure per faculty reached $421K in FY 2022, a figure aligned with many top-50 schools of engineering. Note OVPR FY 2022 data is preliminary.
SPONSORED RESEARCH

NSF CAREER Support

In 2021 and 2022, the SoE Research Development Officer helped support faculty in the CAREER submissions process by:

- Providing proposal and project management feedback
- Coordinating the SoE Research Development Proposal Team that reviewed faculty proposals
- Collaborating with the Office of the Vice President for Research (OVPR) Research Development Services (RDS) team for proposal development workshops and streamlining proposal requests and proofreading schedules

The efforts from this support resulted in a record seven faculty being awarded CAREER awards in 2022.

Research Funding

The three pie charts show FY 2022 data on expenditures and proposals submitted (OVPR only) by funding agency. The charts show a healthy diversity of different agencies, including organizations that primarily support basic research e.g., the National Science Foundation (NSF) and the National Institutes of Health (NIH) as well as mission-driven agencies, e.g., the Department of Defense (DOD), corporate sponsors, the Department of Transportation (DOT), and the Department of Energy (DOE).

**SPONSORED RESEARCH DATA**

|$72M$ Total FY 2022 Research Expenditures

|$421K$ Average Research Expenditure per Faculty

$513$ Proposals Submitted

$480$ Active Grants

**EXPENDITURES BY SPONSOR (OVPR)**

**AWARDS BY SPONSOR (OVPR)**

**PROPOSALS BY SPONSOR (OVPR)**
**SPONSORED RESEARCH**

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**FY22 RESEARCH ACTIVITY BY SOE HOME DEPT. (OVPR)**

- **BME**
- **CBE**
- **CEE**
- **CSE**
- **ECE**
- **ME**
- **MSE**

**CENTERS, OTHER**
*Other Engineering, C2E2, CTI, UTC-IASE*

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**Major Awards (FY21Q4 - FY22)**

<table>
<thead>
<tr>
<th>PI</th>
<th>AWARD</th>
<th>SPONSOR</th>
<th>PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric Jackson</td>
<td>$9.9M</td>
<td>DOT/FHA</td>
<td>Connecticut Transportation Safety Research Center Strategic Plan</td>
</tr>
<tr>
<td>Richard Christenson</td>
<td>$3.7M</td>
<td>DOD/Navy</td>
<td>ADMIN-04: NIUVT - Accelerating Technology Innovation for Current and Future Undersea Vehicles</td>
</tr>
<tr>
<td>Liang Zhang</td>
<td>$3.4M</td>
<td>DOE</td>
<td>Southern New England Industrial Assessment Center at the University of Connecticut</td>
</tr>
<tr>
<td>Alexandra Hain</td>
<td>$3.0M</td>
<td>DOD</td>
<td>The UConn &amp; URI Navy STEM Coalition- Addressing Engineering Workforce Needs in the Naval Sector</td>
</tr>
<tr>
<td>Yang Cao</td>
<td>$2.9M</td>
<td>DOE/ARPA-E</td>
<td>Substation in a Cable for Adaptable, Low-cost Electrical Distribution (SCALED)</td>
</tr>
<tr>
<td>Yang Cao</td>
<td>$2.7M</td>
<td>DOE/ARPA-E</td>
<td>Detection and Fixation - A Lifecycle-management Framework Towards an SF6-free Green Power Network</td>
</tr>
<tr>
<td>Jeffrey McCutcheon</td>
<td>$2.7M</td>
<td>DOE</td>
<td>A Digitalized Automation and Optimization Platform for Improved Resiliency and Consistency of Distributed Anaerobic Digestion for Wastewater</td>
</tr>
<tr>
<td>Yi Zhang</td>
<td>$2.7M</td>
<td>NIH</td>
<td>A Wireless, Multimodal Neural Probe for Simultaneous Membrane-Free Neurochemical Sampling and Neuropharmacology</td>
</tr>
<tr>
<td>Changchun Liu</td>
<td>$2.6M</td>
<td>NIH</td>
<td>Low-cost CRISP-on-paper for cervical cancer screening at the point of care</td>
</tr>
<tr>
<td>Carl Lejuez (SoE: D. Burkey, S. Santos)</td>
<td>$2.5M</td>
<td>NSF</td>
<td>Louis Stokes Renewal STEM Pathways and Research Alliance: Northeast LSAMP 2021-2026</td>
</tr>
</tbody>
</table>
Industry Research Partnerships and Economic Development

The SoE has been highly successful in forming strategic partnerships with industry, federal, and state agencies, pursuing major research funding opportunities to establish new centers and institutes that target economic development areas for the State of Connecticut and the region. Over the last five years, these efforts have focused on the aerospace and naval sectors in technical areas including materials characterization, advanced manufacturing, cybersecurity, energy, and systems engineering.

National Institute for Undersea Vehicle Technology

The U.S. Navy is currently rebuilding its fleet of submarines, which provides a once-in-a-generation opportunity for Connecticut and Rhode Island to expand economic development associated with this ramp-up. The SoE worked with UConn’s Office of Governmental Relations and University of Rhode Island (URI) in partnership with regional industry (Electric Boat) and Navy collaborators (Naval Undersea Warfare Center (NUWC) Newport, and Undersea Warfighting Development Center (UWDC)) to establish the Institute, launched in 2019. UConn’s Co-Director for NIUVT is Professor Richard Christenson.

NIUVT is a university-industry-government partnership that leverages cross-disciplinary expertise to address technology and workforce needs for the large naval ecosystem. Their partnership with the URI leverages mutual strengths in naval science and technology.

NIUVT active research grants total $33.9 million. To date, there have been 88 (47 UConn-led) short-term high-impact applied research projects engaging 47 UConn faculty members, 48 graduate students, and 15 undergraduate researchers.

Investment: NIUVT received $13.4M in new awards in FY 2022 with $18.2M in expenditures.

Project Daedalus – Air Force Advanced Manufacturing Initiative

Project Daedalus is a collaboration supported by three contracts with the Air Force Research Laboratory (AFRL) totaling $18.1M, led by Professor Pamir Alpay. Working with industry partners Pratt & Whitney, Aero Gear, GKN Aerospace, Collins Aerospace and Sikorsky, Project Daedalus will help the U.S. Air Force and their original equipment manufacturers (OEM) to further improve manufacturing technologies. It will apply highly specialized expertise in manufacturing simulation, extensive materials analysis, and process modeling to achieve its objective of improving the performance of key technologies used by aerospace manufacturing companies.

Most recently, Project Daedalus was awarded its third contract in FY 2021-2022 totaling $4.7M. This contract expands the research of the initiative to explore and advance the understanding of the electronic, photonic, magneto-optic, magnetic and multiferroic variable space, focusing on relating form and function across a number of materials systems. With this contract, Project Daedalus has also partnered with Raytheon Technologies, Carillon Technologies, and Aperture Optical Sciences to investigate and lay the framework for next generation technologies.

Investment: Project Daedalus received $4.7M in new awards in FY 2021-2022 with $5.9M in expenditures (projected through 6/30/2022) ($1.7M Phase 1, $2.6M Phase 2, $1.6M Phase 3).
Center for Hardware and Embedded System Security and Trust (CHEST)

In 2019, NSF designated CHEST as an Industry-University Cooperative Research Center Program (IUCRC), now the largest center in the IUCRC program. As a member, UConn partnered with Northeastern University, University of California-Davis, University of Cincinnati, University of Texas-Dallas, and University of Virginia. The CHEST is led by Professor John Chandy.

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. This Center has strengthened UConn’s ongoing engagement with industry in cybersecurity while also bringing additional national recognition to our activities.

**Investment:** $2.6M industry and $5.9 federal. CHEST received $671K in new awards in FY 2022 with $85K in expenditures.

Eversource Energy Center (EEC)

EEC, established in 2015 and led by Professor Emmanouil Anagnostou, is a dynamic partnership between UConn and Eversource that strives to solve complex challenges in weather, climate, and energy, particularly where they coincide with real-life events such as hurricanes and snowstorms. Current research areas include projects on storm outage forecasting, tree and forest management, electric grid reinforcement, resiliency, climate change and flooding, geomagnetic disturbances, integration of renewable generation, and cybersecurity.

The outage prediction model is one of EEC’s key developments. This sophisticated computational algorithm tool has been adopted by Eversource to develop its storm preparedness and restoration support system across their service territories in Connecticut, Massachusetts, and New Hampshire. With this tool, the Company is also making system forecasts publicly available through major TV channels in Connecticut. The system is currently being tested by other utilities across the country including Avangrid and Dominion, and is commercialized by a major analytics and machine learning solutions company (DTN LLC).

In December 2021, Eversource announced an additional investment of $14M, extending their joint commitment to the program. In addition to Eversource, Avangrid recently announced an investment of $5M to support research on grid resilience and clean energy integration, bringing the total funding in the Center to $42M.

**Investment:** EEC received $21.8M in new awards in FY 2022 with $3.1M in expenditures.

UTC Institute for Advanced Systems Engineering (UTC-IASE)

The UTC Institute for Advanced Systems Engineering (UTC-IASE) produces, disseminates, and commercializes new science and technology in the field of cyber-physical systems engineering through transformative research, education, and workforce development. The Institute serves as a hub for world-class research, project-based learning by globally-distributed teams of students, and industrial outreach activities focused on model-based systems engineering (MBSE) of complex systems that are built from and are dependent on the synergy of computational and physical components. Research applications are broad, and include, e.g., smart buildings and cities, aerospace systems, manufacturing and energy industries, robotics and cybersecurity. The institute is led by Professor George Bollas.

**Investment:** UTC-IASE’s research is supported by Raytheon with $10M in funding. UTC-IASE received $5.3M in new awards in FY 2022 with $4.0M in expenditures.
Centers and Institutes

The SoE provides effective leadership support to the University in establishing impactful partnerships at the UConn Tech Park Innovation Partnership Building (IPB) with the objective of continuing to cultivate the IPB as a gateway for industry collaborations across the University. The IPB features state-of-the-art laboratories, high-tech equipment, networking space, and staff that supports a diverse team of leading-edge university, industry, and government research programs and partnerships.

Several academic-industrial partnerships, listed below, have brought greater than $150M to UConn’s Tech Park in the last four years, enabling a successful continued growth of the IPB since its 2018 launch. Note that further details on Tech Park initiatives can be found on the UConn Tech Park website.

**Center for Materials Processing Data (CMPD) (Est. 2019)**

*Mission:* A member-driven research center dedicated to producing and collecting pre-competitive transient material property data used in materials process simulations; to be the premiere platform for the materials community to access transient materials data; and a data hub for accelerating the transfer of knowledge discovery in materials science to implementation in manufacturing. This center is led by Professor Lesley Frame.

**Center for Science of Heterogeneous Additive Printing of 3D Materials (SHAP3D) (Est. 2018)**

*Mission:* To develop critical insight into the fundamental structure-processing-property relationships for 3D printing, with a focus on multi-material printing and heterogeneous structures. This center is led by Professor Anson Ma.

**Collins Aerospace Center for Advanced Materials (Est. 2016)**

*Mission:* The Collins Aerospace Center for Advanced Materials offers research support to graduate & undergraduate students in materials development and characterization. It supports several co-op & internship positions and multiple senior design projects. This center is led by Professor Pamir Alpay.

**Connecticut Advanced Computing Center (CACC)**

*Mission:* CACC serves both the public and private sector in addressing research and educational needs in cybersecurity, machine learning, computer systems, and computational science. CACC is comprised of multiple centers focused on cyber and hardware security and is led by Professors John Chandy and Laurent Michel.

**Connecticut Center for Applied Separations Technology (CCAST) (Est. 2013)**

*Mission:* To provide contract R&D services that identify energy and cost-efficient solutions for separation needs through thoughtful consideration of innovative materials, differentiating techniques & robust process design and to identify opportunities to implement membranes into various industrial processes to lower energy use, reduce carbon footprint, limit waste, and prevent adverse environmental and health impacts. This center is led by Professor Jeffrey McCutcheon.

**Connecticut Manufacturing Simulation Center (CMSC) (Est. 2016)**

*Mission:* Promote innovation & economic development through modeling & simulation and develop the next-generation workforce with computing and simulation skills. This center is led by Professor Jeongho Kim.

**Pratt & Whitney Additive Manufacturing Center (PW AMC) (Est. 2013)**

*Mission:* To advance the fundamental understanding of additive manufacturing machine-material-microstructure linkages and to develop students into future leaders of additive manufacturing. This center is led by Professor Rainer Hebert.
SPONSORED RESEARCH

Proof of Concept Center (POCC) (Est. 2016)
Mission: To help Connecticut manufacturers achieve their production goals through access to rapid prototyping technologies. This center is led by Joseph Luciani, Tech Park.

Reverse Engineering Fabrication Inspection & Non-Destructive Evaluation (REFINE) (Est. 2017)
Mission: REFINE focuses on “correlative microscopy.” We make instruments “talk to each other” to bridge length scales and answer real world problems. This center is led by Professor Sina Shahbazmohamadi.

Thermo Fisher Scientific Center for Advanced Microscopy and Materials Analysis (CAMMA) (Est. 2014)
Mission: CAMMA is one of the world’s foremost facilities for electron microscopy. Its nine microscopy instruments include the Titan Themis for sub-angstrom analysis of materials and the Talos TEM for simultaneous quantitative energy dispersive spectroscopy and analysis of the chemical composition of materials. CAMMA equipment will be available for collaborative research with industry partners, including applications for clean energy materials and the testing of additively-manufactured components such as those found in medical devices and polymeric materials for biomedical applications. This center is led by Professor Steve Suib, Chemistry.

UConn DENSsolutions Center for IN-siTu/Operando Electron Microscopy (InToEM) (Est. 2019)
Mission: The InToEM center transforms transmission electron microscopes from an imaging instrument into a comprehensive research laboratory on a chip. This center is led by Professor Yuanyuan Zhu.

Joe Luciani in the Proof of Concept Center at the Innovation Partnership Building.
INDUSTRY ENGAGEMENT

A central mission of the SoE is to collaborate with industry partners through education, research, and technology infusion, as these aspects directly contribute to economic development within the state and nation.

The SoE performs considerable industry engagement through its centers and institutes, which are identified in the Sponsored Research section of this report. Many of these centers and institutes are in the Innovation Partnership Building (IPB). The IPB Annual Report also highlights industry engagement activities conducted by engineering faculty.

The following section summarizes the SoE’s significant industry engagement activities during the past year.

**UConn Tech Park**

Outreach and engagement are central to UConn’s efforts to increase the visibility of the IPB and cultivate sustainable growth within Connecticut’s key industry and manufacturing sectors, such as energy and aerospace. In keeping with the university’s land-grant mission, Tech Park aims to establish new business collaborations that benefit Connecticut citizens and contribute to IPB’s collective resources. Visitors engage with IPB centers through building tours, faculty consultations, seminars, scientific brainstorming workshops, and more, gaining keen insight into IPB’s sophistication, high-tech equipment, and academic excellence. Since opening in 2018, IPB has welcomed over 300 guests, 58 percent of which have come from industry.

**IPB VISITORS 2018-2022**

Sina Shahbazmohamadi, assistant professor of biomedical engineering, left, shows David Lehman, right, Commissioner of the Department of Economic and Community Development (DECD) and Pamir Alpay, center, Interim Vice President for Research, Innovation and Entrepreneurship, reverse engineering fabrication and non-destructive evaluation equipment at the Innovation Partnership Building (IPB).

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>177</td>
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<tr>
<td>Government</td>
<td>42</td>
</tr>
<tr>
<td>Academia</td>
<td>55</td>
</tr>
<tr>
<td>Other</td>
<td>31</td>
</tr>
</tbody>
</table>
Following the setbacks and slowed research work caused by the pandemic, the reopening of IPB has generated renewed interest in the facility and new outreach opportunities. Visitors in the first four months of 2022 include representatives from:

**IPB Visitors Jan-Apr 2022**

- ASM Hartford Chapter
- Assa Abloy
- Bridgeport/Goodwin Univ.
- Campbell Soup Co.
- Carey Manufacturing
- Collins Aerospace
- CT Next CT Tech Council
- Dept. of Economic and Community Development (DECD)
- Eversource
- Federal Bureau of Investigation (FBI)
- FM Global
- Grinergy Fuel Cell
- Hanwha
- Marmon Electric
- Northrop Grumman
- NY Port Authority
- Southeastern Connecticut Enterprise Region (seCTer)
- Travelers
- United Technologies Corporation
- Yale

**Planned visits at the close of FY 2022:**

**IPB Visitors May-Jun 2022**

- German University Delegation
- U.S. Secretary of Energy
- NSF Director
- Shap3D Board Meeting
- Mansfield Downtown Partnership Visit
- 3D Metals Printing Group Visits
- CMPD Industry Semi-Annual Meeting

**2022 IPB Outreach Highlights**

- Quarterly newsletter with 3000+ subscribers
- Summits, workshops, and conferences hosted include:
  - Assa Abloy North and South American summit, 25 attendees from 10 divisions and 3 countries (April 2022).
  - CT Women in Manufacturing, 21 attendees representing CT small businesses (2020).
  - SHAP3D Industry meeting, 60 attendees from 15 companies (May 2022).
  - National Shipbuilding Research Program Electrical Panel workshop, 100 attendees from over 10 companies (planned, 2022).
  - CMSC Symposium, 80 attendees from 7 countries (planned, August 2022).

**Small and Medium Sized Businesses (SMBs)**

At UConn Tech Park, there are two centers, Proof of Concept Center and the Connecticut Manufacturing Simulation Center, funded by grants from the EDA, which work directly with small and medium-sized businesses across the state of Connecticut. These partnerships have provided guidance, product design, and research support to companies that don’t have the resources or manpower to dedicate to R&D. Over the past few years, these centers have worked with the following SMBs to help grow their overall product lines and revenues.

- Aerogear (~65 employees)
- Acme Wire (~25 employees)
- LOOS & Co wire (~275 employees)
- Webco Plastics (~25 employees)
- Transtech (~25 employees)
- Carl Johnson Machine Co (~35 employees)
- Schwertle (~35 employees)
- Line Master Switch (~150 employees)
INDUSTRY ENGAGEMENT

Leading companies to visit IPB since it opened in 2018

3M
ABB
Acme Wire Products Co, Inc.
AddUp Solutions
Advanced Manufacturing LLC
Advanced Robot Solutions
Aero Gear Inc.
Altek Electronics Inc
Amastan Technologies
Amazon Lab126
Anton Paar
ARsome Technology Group
Assa Abloy
Associated Spring
AVANGRID
Ballard
Barnes Group
Bead Industries
BMA Ambiental (Brazilian delegation)
Boehringer Ingelheim Inc
Boeing
Brainstorm
Cabot Corporation
Cadenza Innovation
Campbell Soup Company
Carey Manufacturing
Carlyle Johnson Machine Co, LLC
Chasm Technologies
Cigna
CMT Materials
CNC Software
Cognizant
CohnReznick LLP
Collins Aerospace
Convergent Mission Solutions
Crimson Rook LLC
Cronin
Crunch Technologies
Cyient
Dante Solutions, Inc
Deloitte
Disruptive
Dive Technologies
Dur-A-Flex
Dynamic Systems Inc. (Gleeble)
ELDOR Group
Electric Boat
Ensign-Bickford Aerospace & Defense Company
Enviro Power LLC
Eversource
Exxon Mobil
FM Global
Fraunhofer ISE
Fraunhofer USA
GE Appliances
GE Power, Gas Power Systems
General Dynamics Electric Boat
Gentex
Gerber Technology
Giner
Giner, Inc
GKN Aerospace
Godman Energy
Graver Technologies
Greentown Labs
Grinergy Fuel Cell
GSW Software (Brazilian delegation)
H2Sonics
Hampford Research
Hanwha
Hartford Steam Boiler Inspection and Insurance Company
Health eSense
Henkel
Hitachi Cable
Honeywell
Hub55 (Brazilian delegation)
Hubbell Commercial and Industrial Group
Hydrogen South Africa (HySA) Systems
Imcorp
Infosys
InYou Health (Brazilian delegation)
Jonal Laboratories, Inc.
Kaman
Kidde
Komatsu Ltd.
Kurimoto, LTD (Japan)
KX Technologies LLC
Learn to Fly (Brazilian delegation)
Line Master Switch
Lite Sheet
Loos & Co, Inc.
Lubrizol
M Cubed
Macroscopic Solutions
Marmon
Marmon Electric
Marmon Water
Mastercam
Medigate
Methods Machine Tools
MetLife
Metro Hartford Alliance
Microsemi
Mirion Technologies
Mistras Group
Moore Engineering
Morgan Stanley
MSC Software
MSC Software /ACMT
N&N Manufacturing
National Shipbuilding Research Program (NSRP)
Navatek
Nel Hydrogen
NERAC
NGK-NTK
Northrop Grumman
Nustreem
NY & New England SCORE
Opus 12
Otis
OutSecure
Owl Cyber Defense
Parrillo Consulting LLC
Physical Electronics
Platinum Equity
Pratt & Whitney
Precision Combustion, Inc.
Proton OnSite
PURA
Qualitech Systems, Inc.
Queralt
QUEST
Raytheon
RC-Film Co.,Ltd.
Revision Military
Rite Solutions
Schwerdtle
Shipman & Goodwin LLP
Siemens
Sikorsky Lockheed-Martin
Simsbury Bank
Skyre
Solar Turbines
Sonalytics
Sperry Rail Services
Stanadyne LLC
Stanley Black and Decker
Synchrony
Synectic
TechStars
TERA-print
Thayer Mahan
The Carlyle Johnson Machine Company
The Hanover Insurance Group
The Lighting Quotient
Thermofisher Scientific
Tinnova (Brazilian delegation)
Torrecot Partners, LP
Travelers
Trumpf
TTM Technologies
U3 Advisors
Ulbrich
Unilever
United Technologies Corporation (UTC)
United Technologies Research Center (UTRC)
Updike, Kelly & Spellacy, P.C.
Weber Metals
Welco Realty, Inc.
Wepco Plastics, Inc.
Whitcraft LLC
Senior Design Project

The capstone Senior Design Project is a hallmark of success for engineering seniors. In this one or two-semester course, senior students are mentored by faculty and industry engineers as they work to solve real-world engineering problems for company sponsors. The 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.

In AY 2021-2022, there were 270 projects, 131 sponsors, and 800+ student participants. Some companies sponsored up to five separate projects.

On Demonstration Day, AY 2021-2022 was the first time in three years that sponsors, industry, and alumni were able to come together in-person. The SoE also created a brand new Senior Design website that hosts all of the project descriptions by year and serves as a resource to faculty and staff who work on these projects.

SENIOR DESIGN DEMONSTRATION DAY

In April 2022, students gathered for the first time in-person since 2019, to showcase their year-long capstone Senior Design projects.
The National Academy of Engineering recommends instilling innovative and entrepreneurial qualities in students as a part of their formal education to address pressing problems and maintain global competitiveness. Development of an interdisciplinary 21st century entrepreneurially minded STEM workforce that can meet the competitive and rapidly changing dynamics of the global economy will advance the country’s position in myriad sectors, including communications, health, defense, infrastructure, and manufacturing.

The SoE offered two three-credit courses, Technology Innovation and Entrepreneurship I and Technology Innovation and Entrepreneurship II in the Fall and Spring in continuum with one another. Leila Daneshmandi, Assistant Professor-in-Residence of Innovation and Entrepreneurship, is currently teaching these courses.

The courses are project-based experiential entrepreneurship courses that are jointly offered to students in the Schools of Engineering and Business. The courses offer a unique opportunity for students to form interdisciplinary teams from both schools to collaborate on technology-based ideas and serve as a stepping stone that expose them to entrepreneurial concepts such as: design thinking, user-centric need and problem identification, product-market fit, future of work, market trends, the business model canvas, business and revenue models, and value propositions; and foundationally trains them in idea generation, problem-solving, creative thinking, teamwork and communication, active listening, presentation skills, strategic thinking, resilience, adaptability, and agility, financial models, business models, startup cost and organization structures, revenue streams, go-to-market strategy, iterative prototyping and testing, product life cycle, project management, competitor analysis, user interface design, and user experience and testing; and further train in business management, big picture thinking, teamwork, project management, decision-making, problem-solving, perseverance, and executive interpersonal skills through an authentic learning approach. Students in the course have the opportunity to apply for a Third Bridge Grant, which provides $10,000-$75,000 in funding from CTNext and Connecticut Innovations.

Pisces Atlantic, and its founder Peter Goggins, a MEGE Fellow, hope to emerge into the mainstream fish and animal feed market.
In addition, two new entrepreneurial graduate-level courses have been added to the SOE curricula:

- **Research-based Entrepreneurship** (taught by Shiri Dori-Hacohen, assistant professor, CSE) – three credit project-based course that focuses on push innovation for science-based startups, in which graduate students in STEM fields are encouraged to form real venture teams and conduct extensive customer discovery for their research-based innovations, utilizing the lean launchpad methodology. The course is constructed entirely with an active learning approach: a flipped classroom with asynchronous video content is blended with student presentations during in-class meetings; participation and peer- and self- assessments contribute to 85% of the course grade; and students gain real-world experiences in hypothesis testing, risk mitigation, iterative prototyping, networking, public speaking, and giving and receiving feedback.

- **Entrepreneurial Skills** (taught by Leila Daneshmandi, assistant professor-in-residence, BME) – one credit course offered as a professional development course to expose STEM graduate students to entrepreneurial concepts and frameworks.

For entrepreneurship-oriented STEM graduate students, the SoE offers a Global Entrepreneurship concentration (MEGE) as a part of the Master of Engineering degree program. This is a full-time, tuition and residency based concentration that offers one-on-one mentoring and introductions to expert entrepreneurs and their networks. Additionally, the SoE offers full scholarships to prospective students that own Intellectual Properties (IP) related to high-tech venture ideas. Through a generous grant from CTNext, students receive up to four semesters of a graduate assistantship to develop their venture into a successful high-tech Connecticut business. So far, the participating high-tech startups have multiplied the state’s investment by a factor of ten in terms of funding, awards, grants, and in-kind contributions.

Below are some updates on fellows enrolled in the MEGE program:

- Aqualumos is a pre-revenue startup with founder Niko Franceschi-Hofmann. Aqualumos has received support from multiple university programs, including Connecticut Center for Entrepreneurship and Innovation’s (CCEI) Get Seeded, UConn Innovation Quest, and the Wolff New Venture Competition, and has received Third Bridge Grant funding. Externally, Aqualumos has participated in MassChallenge and participated as a regional finalist and national semi-finalist in Cleantech Open. Aqualumos plans its first pre-seed raise this summer.

- Kianjai Huggan and her startup company, Webquity, gained funding through UConn Innovation Quest and CCEI’s Accelerate UConn programs, Get Seeded and Get Seeded Demo Day. Webquity sponsored two UConn senior design teams in Computer Science and Engineering and Management Information System to develop a Minimal Viable Product (MVP). Webquity was selected to present at the Connecticut Education Network Conference. Next steps for the company include product testing and validation to guide continued development.

- Joining in Fall 2021, Pisces Atlantic has secured its first round of investment and is currently in the process of using that funding to build a new manufacturing and operations center. Prior to this, the company had successfully completed several years of R&D, market testing, and operational fine-turning. In the coming months, Pisces Atlantic, and its founder Peter Goggins, hope to emerge into the mainstream fish and animal feed market, delivering several tons a month of cutting-edge nutritional products into the industry.
I&E Faculty

Our faculty are excellent educators, as well as scholars who create new knowledge and invent the devices, systems, and processes needed to solve the grand challenges facing society today and in the future. In the past year, our faculty have received 27 patents. Faculty are also actively forming new companies and negotiating on IP licensures. I&E activity in the present is crucial to funding Connecticut’s high tech economy for decades into the future.

Professors Leila Daneshmandi and Shiri Dori-Hacohen are the first two hires into UConn’s newly formed entrepreneurial cluster hire. They were recruited to join UConn from established startups they co-founded and with which they remain actively involved. Each has raised over $1M in funding for their respective startups. Their unique positions were crafted to allow students access to their real-world founder experiences and gain from their knowledge, which is frequently inaccessible to academics.

LEILA DANESHMANDI
Leila Daneshmandi is an assistant professor-in-residence of innovation and entrepreneurship at SoE as well as the co-founder and COO of Encapsulate, a biotechnology startup in cancer precision diagnostics.

SHIRI DORI-HACOHEN
Shiri Dori-Hacohen is an assistant professor in computer science and engineering as well as the co-founder and executive chair (formerly CEO) of AuCoDe, an AI-based startup that detects controversies and misinformation online and turns them into actionable intelligence.
In 2021-2022 the engineering development team received commitments for 43 DEI scholarships and collaborated with UConn’s Eversource Energy Center for a $14M extension and expansion of its mission.

SoE development is part of the UConn Foundation, serving as the sole fundraising vehicle for the School. Our development officers and one alumni relations officer work seamlessly with the SoE faculty and staff to engage alumni and donors – enabling these constituencies to make meaningful contributions while improving UConn Engineering and Connecticut’s entire engineering community.

With the effect the pandemic has had on the SoE, our commitment to recruiting top students never wavers. That commitment begins with scholarships. This academic year we awarded $527,000 in scholarships to 230 undergraduate students. The average amount was $2,300. The 43 new scholarships will average $10,000 per student per year, significantly enhancing our ability to attract and retain students we’ve been losing to private schools with far greater scholarship endowments.

Last year, when UConn alumni Mark and Betsy Vergnano made a $3M gift to fortify our School’s Diversity/Equity/Inclusion (DEI) efforts, companies took notice. Since then, Mark has volunteered to help our development team, reaching out to corporate leaders for DEI scholarship and programming support. The value proposition is straightforward: There is a growing regional and national shortage of engineers, and the number of regional college-aged students is declining. If you want to hire smart, loyal, young engineers – if you want to plan your company’s future – work with UConn School of Engineering, support scholarships, offer summer internships and senior design projects, and engage with students in a meaningful way. We want companies to come to campus and be part of UConn Nation.

Finally, this year, UConn started planning a streamlined “Front Door” initiative. The goal is to be both cordial and efficient in reaching out to and responding to business and industry interested in learning what UConn has to offer in all of UConn’s schools and colleges. This will be especially helpful to the SoE, giving companies personal attention to find anything, including: research, recruiting, internships, co-ops, or professional education for people already in the workforce.

UConn School of Engineering is the nexus between science, industry, economic vitality, and a society that rewards talent, hard work and achievement. We are an integral part of Connecticut’s Land-Grant University and are charged with educating brilliant young people, creating knowledge, and feeding the State’s economic engine.

Examples of Recent Giving

2021-2022:

**Total giving to the School: $12,295,723**

*This total incorporates the total gifts from the year minus the distribution of $5.8 million to professional education initiatives; the College of Agriculture, Health, and Natural Sciences; and the School of Business from the $14 million Eversource Energy gift.

In Pursuit of Research:

Eversource Energy - $14M (Collaborating with the School of Business and CAHNR)

Diversity/Equity/Inclusion:

Pratt & Whitney - $1.35M
Jacobs Engineering Group - $80,250
Hubbell Inc. - $25K
Honoring Specific People:

Mr. Vijaya Raghavan - $250K – to create the Prof. Krishna Pattipati Fellowship

Bequests to the School:

Anonymous $700K
Anonymous $368,292
Anonymous $250K
Anonymous $100K

2020-2021:

- The Vergnano Institute for Inclusion (Mark & Betsy Vergnano gift of $3M)
- Pratt & Whitney Additive Manufacturing instruments (Raytheon - $533K)
- Anonymous pledge to the Dean’s Fund ($172k)
- The Peter Willett Fellowship (Vijay Raghavan - $125k)
- Catalyst research for Alkane oxidation (American Chemical Society - $110k)

2019-2020:

- 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)
- 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)

Development Team

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INFRASTRUCTURE

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 subgroups may meet more often. Members are also contacted by the dean when guidance or support is needed. 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

Between 2016 and 2022, we will have spent $7M toward consolidation and renovation of all research, teaching, and administrative spaces. We continue to work with The Master Space Plan provided to the School by the Payette architectural firm in January 2019, which stated that “At the end of the Fall 2018 semester, there will be no available space in the SoE.”

Business operational discussions have started to address space shortages as well as efficiency of our administrative, IT, research, teaching, and shop support systems.

The continued growth of the School’s enrollment and research expenditures, as well as availability of space to support the School’s core missions, has required the university to identify additional spaces and new buildings.

IT Support for Education and Research

COVID created an excellent team building opportunity for our IT and research support staff who worked tirelessly on campus during this period along with colleagues from UConn ITS. Transitioning from remote to in-person research and teaching was notable with over 600 remote accessible computers. Remote access into the CSE cybersecurity teaching lab was a critical service which never lost an hour of operational readiness. Our security teams have made major improvements and continue to identify, prioritize, and manage all computer and network systems.

The National Institute for Undersea Vehicle Technology (NIUVT), which requires NIST 800-171 compliance on all of its projects, continues to grow and Engineering Technical Services has provided support to improve the IT and administrative support structure to manage 40 unique groups.

Machine Shop and Electrical Shop

In response to state and national needs for engineering students with manufacturing skills, a SoE team is looking at major curriculum changes and at the possibility of reimagining 15,000 square-feet of machine shop spaces into a safe hands-on teaching and student use space.

Engineering’s machine shop and electrical shop provide 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 SoE seniors on their senior design projects and supporting numerous research teams on prototype design and construction. The shops are equipped with state-of-the-art metal, plastic and woodworking machinery.
Help a deserving student become an engineer.

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