**UNIVERSITY OF CONNECTICUT**
**SCHOOL OF ENGINEERING ANNUAL REPORT**
**2012-2013**

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I. OVERVIEW

The 2013 academic year was characterized by significant achievements in all areas of academic focus, from enrollments and distance education to industry engagement. Highlights appear in this and ensuing sections.

Research expenditures (OSP figures only) for the School of Engineering totaled: $30,887,268*

* Note that this figure is on par with expenditures for FY 2012 despite significant erosion in federal research dollars.

New grants and contracts for the School of Engineering totaled (approximately): $24,960,000

Proposals were developed for the creation of new departments: BME, in concert with UCHC; and CBE and MSE from the former CMBE Department. These proposals were approved by the Board of Trustees and scheduled to take effect July 1, 2013.

During the year, all bachelor’s degree-granting programs prepared thoughtful self-assessments in preparation for the accreditation review by ABET in October 2013. Since the last accreditation review, departments and programs have conscientiously conducted processes aimed at clarifying and assessing program educational objectives and student outcomes; demonstrating the efficacy of our continuous improvement measures; retaining samples of student work in demonstration of subject proficiency; and preparation of our comprehensive self-assessment documentation. We anticipate that all engineering programs will receive full ABET accreditation.

Major partnerships were formally announced during the year. These research and educational partnerships will develop more fully over the coming year and attain even greater depth with the 2015 opening of the inaugural Innovation Partnership Building in the UConn Technology Park. The most notable partnerships include:

- $7.5 Million General Electric Partnership for Advanced Materials
- $7.5 Million Pratt & Whitney Additive Manufacturing Innovation
- $5.4 Million Fraunhofer Institute for Energy Innovation – agreement signed, to be announced July 25, 2013 (with Fraunhofer Institute and DEEP)
- $1.8 Million/3 years Connecticut Transportation Safety Research Center (with ConnDOT)
- $795,000 in federal money and $1.24 Million in support from industry partners, since 2010, for the Center for Hardware Assurance, Security, and Engineering (partners include Honeywell, Comcast, Freescale, Cisco, GRC and Synokey)

The School of Engineering assumed a major role in helping UConn ensure the success of Gov. Dannel Malloy’s Next Generation Connecticut initiative, bringing contingents of student leaders and researchers, as well as industry supporters to the Capitol to demonstrate their support of this transformative STEM initiative; soliciting letters of support; and offering testimony on the anticipated impact of Next Gen CT on the State’s economy and technological future.

II. HIGHLIGHTS OF ACHIEVEMENTS FOR FY 2013
A. **Exciting/Innovative Research Programs**

Exciting original research is underway within every unit across the School of Engineering. A few examples of the most impactful ongoing projects are cited below:

**Connecticut Transportation Safety Research Center (CTSRC)** – This $1.8M collaboration with the Connecticut Department of Transportation (ConnDOT), involves faculty and students in the creation of a comprehensive “E-Crash” accident data collection system that involves electronic processing of 9,000 police reports/month. Center personnel are also developing a crash data repository allowing public safety personnel, town officials, and members of the public to easily access accident information (e.g., # accidents in a town by location, date, street, injury type, or collision type). The program distinguishing Connecticut as a national leader in transportation safety research and crash data distribution. In recent days, we have learned the original agreement has been enhanced with significant (20 percent) additional funding.

**Bridge Column Resilience** - Researchers in the Department of Civil & Environmental Engineering are testing a new style of bridge column construction with an eye to developing next-generation columns capable of withstanding catastrophic events such as earthquakes, explosions and fires. The research team is conducting a series of large-scale blast tests at the U.S. Army Corps of Engineers testing facility in Mississippi that will provide quantitative, objective performance data for concrete columns of conventional and a promising alternative design. The research is funded by the U.S. Department of Homeland Security Science and Technology Directorate.

**Center for Hardware Assurance, Security, and Engineering (CHASE)** - Established in 2012 to provide the University with a physical and intellectual environment necessary for interdisciplinary hardware-oriented research and applications to meet the challenges of the future in the field of assurance and security of hardware systems used in all aspects of modern life, from financial and transportation systems to aerospace and defense systems.

The MSE program hosts a $7.3 million Multidisciplinary Research Initiative (MURI) center, funded by the Office of Naval Research on the development of a new generation of dielectric materials. The multi-institutional, multidisciplinary project focuses on the use of computational methods to develop new classes of polymeric films, featuring specific dielectric properties, for use in high energy density capacitors. Such capacitors are used in a wide variety of applications, including power electronics, pulse power equipment such as radar and lasers, hybrid electric vehicles and implantable medical devices.

The Underwater Sensor Networks (UWSN) Lab research team and other collaborators at UConn have secured more than $3.5 million in National Science Foundation funding since August 2012 centering on underwater network technologies. This interdisciplinary team includes faculty from Computer Science & Engineering, Electrical & Computer Engineering, and Marine Sciences along with partners at the University of Washington, University of California at Los Angeles, and Texas A&M University.

**Pratt & Whitney Center of Excellence** – This center, funded by over $1.5 million, supports research, development and education in areas of interest to Pratt & Whitney, including advanced sensors, combustion, advanced materials, diagnostics, and controls for use in commercial and military aircraft propulsion systems. The center resides primarily within the Mechanical Engineering Department and represents a unique, highly relevant research collaboration.
Storm Modeling & Prediction – Over the last two years, this group has focused on modeling climate variability and extremes, including predicting the type, strength and duration of severe weather events; damage to state infrastructure resulting from wind, rain, flooding and snowfall; and likely locations of power loss in selected neighborhoods using advanced computer modeling and mathematical algorithms. This work is helping Connecticut better prepare for, and respond to storms during and post-occurrence.

NSF Emerging Frontiers in Research & Innovation (EFRI) project - An interdisciplinary team of researchers at UConn and CalTech is exploring how communities of microbes found in the guts of termites interact to efficiently metabolize wood cellulose, with the aim of developing novel energy applications in addition to shedding light on the complex signaling mechanisms that allow the gut community to convert wood into useful energy. The team includes faculty from Chemical & Biomolecular Engineering, Molecular & Cell Biology and CalTech.

B. Exciting/Innovative Teaching, Learning & Training Programs

UConn Engineering is leading a major multidisciplinary, multi-university educational initiative, funded by the U.S. Agency for International Development/Higher Education for Development (USAID-HED) and aimed at developing a skilled workforce and educational capacity within Ethiopia’s universities in the area of sustainable water resource management. The project involves partners with the co-lead, Addis Ababa University in Ethiopia. This year, the program received an additional $1.35 million in funding from USAID- to continue its work and also celebrated a milestone achievement, with the graduation of its first class of M.S. students. Additionally, a new program was developed in Water & Health; of the program’s 50 students, 50% are women.

With the goal of nurturing entrepreneurial skills and an affinity for innovation – and with the support of the School of Engineering and the UConn Office of Economic Development – Dr. Hadi Bozorgmanesh debuted a new, results-oriented two-semester course last fall, *Experiential Technology Entrepreneurship I and II*. The course is intended to prepare students to succeed as entrepreneurs or as innovators within a larger organization. Over a dozen businesses have been successfully launched from this innovative enterprise course. Advanced Column Solutions, LLC (ACS), founded by graduate student Alicia Echevarria and her thesis advisor, Dr. Arash Zaghi, is earning critical plaudits. In the 2012-2013 state-wide Connecticut Collegiate Business Model Competition, Ms. Echevarria won the Best Written Executive Summary and Best Venture Business Plan awards.

Building upon its successful Master of Engineering (MENG) degree program, the School of Engineering established a new unit called *Continuing and Distance Engineering Education* (CDEE), which embraces not only the existing MENG program but also continuing engineering education activities and programs at UConn’s regional campuses and corporate partners’ sites, and Advanced Engineering Certificate programs. CDEE expects to provide customized training and development programs to companies in Connecticut and neighboring states.

UConn Engineering maintained five NSF-sponsored Research Experiences for Undergraduates (REU) programs enabling college students from across the nation to conduct summer research in our faculty laboratories. These REUs enable UConn to recruit top students to our graduate programs. Current REUs are in:

- *Trustable Computing Systems Security Research and Education* (Electrical & Computer Engineering)
• Bio-Grid and Cyber-enabled Systems for Undergraduate Research and Education: Cyber Aquatic Systems (CAS) (Computer Science & Engineering)
• Engineering Next Generation Energy Processes and Systems (Mechanical Engineering)
• iREU: Promoting Innovation and Entrepreneurship through Academic-Industrial Partnerships (Chemical & Biomolecular Engineering)

Cigna continued its on-site internship center in the ITE Building that enables 10 qualified juniors/seniors to gain career experience working directly with Cigna employees to develop web and mobile programming applications.

During the year, UConn Engineering was awarded three new Graduate Assistance in Areas of National Need (GAANN) sites by the U.S. Dept. of Education, which provide $1.2 million for graduate student support in the areas of sustainable energy technologies, nano-scale materials and device behavior for energy generation and storage, and computer systems security. These were in addition to seven prior GAANN awards in: biomaterials for tissue regeneration, sustainable energy technologies, advanced computing targeting biomedical informatics and underwater sensor networks, advanced computer security, cloud computing, alternative and renewable energy, and environmental biotechnology.

A series of professional development workshops throughout the year enabled graduate students to improve critical skills needed to build successful careers. Workshops – many of which were presented by UConn Engineering alumni – covered subjects such as Writing and Library Resources, Health and Wellness, Interviewing for Academia, Managing Your Career, and Civility and Professionalism.

C. Faculty Productivity

For the 2013 academic year, UConn Engineering faculty produced:

3 scholarly books/monographs and 9 book chapters
414 full-length, archival journal papers in refereed journals
466 full-paper conference proceedings
8 patents
25 editors of major journals and 105 associate editors of major journals/organizer of major conferences
298 proposal submissions
25 plenary/keynote lectures at national/international conferences and 189 invited colloquia, presentations and symposia

Major faculty honors included:

• 2012 Mentor Award of the American Association for the Advancement of Science (AAAS) - Dr. Cato T. Laurencin
• American Chemical Society/ Petroleum Research Fund New Investigator Award – Dr. George Bollas
• DuPont Young Faculty Award – Dr. Jeff McCutcheon
• Gates Foundation Award – Dr. Leslie Shor
• IEEE Robotics and Automation Society (RAS) Pioneer Award for 2013 - Dr. Peter Luh
• Marie Curie International Incoming Fellowship (IIF) – Dr. Marisa Chrysochoou, to be embedded at the National Technical University of Athens
• *Microscopy Society of America’s (MSA) 2013 Distinguished Scientist Award for the Physical Sciences* - Dr. C. Barry Carter
• *NSF Career Award* – Dr. Anson Ma
• *SPIE Fellow* – Dr. Faquir Jain
• *U.S. Department of Energy Career Award* – Dr. Bill Mustain

At the international level, Dr. Anagnostou (CEE) is a member of the International Committee on Earth Observation Satellites (CEOS), the International Science Steering Committee of HyMEX Project and the advisory board of the European Meteorological Satellites (EUMETSAT) organization. Dr. Gebremichael (CEE) is a member of the Statistical Hydrology Working Group (STAHY) of the International Association of Hydrological Sciences (IAHS).

D. New Faculty

Following a banner recruiting year, the School of Engineering recruited and hired the largest number of new faculty in its history, 22 exceptional new colleagues will join us for the fall 2013 and spring 2014 academic terms. The year’s hiring was focused in three cluster areas:

- Advanced Manufacturing & Materials Genomics
- Genomics and Biomedical Sciences & Engineering
- Human Sustainability & Physical and Cyber Infrastructure Resilience

The Biomedical Engineering Department welcomes:

- **Kevin Brown** (PhD Cornell Univ.; expertise in mathematical modeling and inference in complex biological systems)
- **Yong-Jun Shin** (*dual appointment in Computer Science & Engineering*; PhD Univ. of Texas - Dallas; expertise in biological applications of estimation and control theory, multiscale modeling of biological tissues, and digital microfluidics/bioMEMs)
- **Guoan Zheng** (*dual appointment in Electrical & Computer Engineering*; PhD CalTech; expertise in high-throughput imaging/screening techniques for cellular, genomic and proteomic processes; and optofluidic/microfluidic technology for miniaturized analysis systems)

The Chemical & Biomolecular Engineering Department welcomes:

- **Kelly Burke** (*dual appointment in Polymer Program, under the Eminent Faculty Initiative*; PhD Case Western Reserve Univ.; expertise in protein modification strategies, tissue engineering, structure-property relationships of liquid crystals, and biocompatible multifunctional polymeric materials)
- **Yongku Cho** (PhD Univ. of Wisconsin – Madison; expertise in protein engineering, optogenetics, neuroimaging and molecular neurobiology)
- **Luyi Sun** (*dual appointment in the Polymer Program, under the Eminent Faculty Initiative*; PhD Univ. of Alabama; expertise in multi-functional nanostructured materials; polymeric materials and new polymer processing development; layered compounds; green science and engineering; hydrates and porous materials for energy storage)
- **Julia Valla** (PhD Aristotle Univ. of Thessaloniki, Greece; expertise in the design and development of novel catalysts for industrial applications and design of new, emerging technologies and processes for the clean and sustainable energy production)
- **Kristina Wagstrom** (Northeast Utilities Asst. Professor of Environmental Engineering Education; PhD Carnegie Mellon; expertise in sourcing and modeling atmospheric
particulates, air pollutants, health impacts of atmospheric particulate matter deposition, air quality models)

The Civil & Environmental Engineering Department welcomes:

- **Marina Astitha** (PhD Univ. of Athens; expertise in atmospheric modeling with an emphasis on physical processes)
- **Christine Kirchhoff** (PhD Univ. of Michigan; expertise in water resources policy, management and governance)
- **Wei Zhang** (Ph.D. Louisiana State Univ.; expertise in life-cycle performance design and reliability; and modeling of structural fatigue, damage and vibrations)

Joining the Computer Science & Engineering Department are:

- **Mukul Bansal** (*dual appointment* in Biomedical Engineering; PhD Iowa State Univ.; expertise in computational biology and bioinformatics)
- **Song Han** (PhD Univ. of Texas, Austin; expertise in cyber-physical systems, networked real-time and embedded systems)
- **Donald Sheehy** (PhD Carnegie Mellon Univ.; expertise in computational geometry, mesh generation and topological data analysis).

New to the Electrical & Computer Engineering Department are:

- **Yang Cao** (associated with IMS; PhD UConn; expertise includes the development of new dielectric materials based on emerging nanotechnologies for energy efficient electric machines for industrial applications, transportation and power generation)
- **Ashwin Dani** (PhD Univ. of Florida; expertise in nonlinear estimation and control, robotics, autonomous navigation, multi-agent systems, stochastic estimation and control, and vision-based control)
- **Domenic Forte** (Eminent Faculty in Hardware Security; PhD Univ. of Maryland; expertise in cyber-security, dynamic energy and thermal management in distributed systems, and green computing in large-scale datacenters)
- **Marten van Dijk** (PhD Eindhoven Univ. of Technology, The Netherlands; expertise in system and processor architecture security, and in cybersecurity)
- **Liang Zhang** (PhD Univ. of Michigan - Ann Arbor; expertise in modeling, analysis, continuous improvement and control of manufacturing, supply chain and service systems; and mathematical modeling, analysis and control of battery systems)

The Mechanical Engineering Department welcomes:

- **Leila Ladani** (PhD Univ. of Maryland; expertise in additive manufacturing, manufacturing of nanomaterial and micro/nanoelectronics, material characterization and mechanics, and multi-scale modeling and simulation)
- **Michael Pettes** (PhD Univ. of Texas - Austin; expertise in thermal transport physics at the micro- and nano-scale, and engineering of materials at the nanoscale for energy conversion and storage applications)
- **David Pierce** (dual appointment in the Department of Mathematics; PhD Stanford Univ., expertise in computational and experimental solid (bio)mechanics, finite element methods, biomechanics of cartilage and arteries, reliability prediction and design tools for MEMs)
II. MAJOR GOALS

A. UConn Tech Park

The UConn Tech Park affords UConn Engineering unprecedented opportunities for advancing the application of engineering discoveries collaboratively with industry. The partnerships established during the previous three years, including those with GE, Pratt & Whitney, Fraunhofer, and CHASE partners, will provide vital anchors for our expanded industry collaborations within the Tech Park. These partnerships will leverage our efforts to attract additional high-potential industry collaborators.

A signature aspect of the centers established with industry partners is that they open the door for additional industry collaborators to participate in advancing these research frontiers – in areas such as additive and advanced manufacturing, hardware security, sustainable energy and systems engineering – at UConn.

B. Next Generation Connecticut

With the successful passage of Next Generation Connecticut, UConn Engineering is slated to increase its undergraduate population by 70 percent over a 10-year period. This growth will present unprecedented opportunities but also require a rapid mobilization of resources to accommodate an enrollment increase of such magnitude. UConn Engineering will:

- Redouble its focused efforts to recruit excellent teaching and research faculty;
- Enhance intra-disciplinary relationships to assure sufficient general education course coverage;
- Strive to develop new mentorship/support paradigms aimed at creating a “small community” sensibility for students as enrollments rise, thereby increasing retention and experiential satisfaction;
- Assess the value of streamlining certain common core coursework during the first two years, to reduce departmental pressures and assure a unified educational foundation for engineering students.

C. Education

As Next Generation Connecticut gains momentum and undergraduate enrollments explode (note that fall ‘13 freshman enrollments are 45% higher than for fall ’12), it will become critical for UConn Engineering to recruit and train a cadre of superb teaching faculty, particularly in Biomedical Engineering and Mechanical Engineering, which are experiencing unprecedented growth.

Additional efforts will focus on:

- Exploring (with faculty participation) ways to refresh the undergraduate curriculum and to increase attention on ingenuity and agility.
- Enhancing the Management & Engineering for Manufacturing (MEM) program offered jointly by the Schools of Engineering and Business.
- Significantly increasing the number of successful entrepreneurial course/program offerings.
- Working with industry partners to place more students in worthy internships/co-ops, which afford students an unequalled opportunity to build practical experience before entering the workforce as permanent employees.
- Enhancing and initiating joint graduate programs with the School of Business.
• Continuing to develop a results-oriented and targeted approach to graduate recruiting.
• Continuing to develop a nurturing culture for graduate students that allows them to explore and hone professional skills such as proposal writing, instructional methodologies and toolsets, preparation of winning fellowship proposals, presentation skills, and job preparation.
Biomedical Engineering (BME) activities at UConn have had a rich history of success and accomplishment for more than 45 years. The BME program offers B.S., M.S. (Plan A and B) and Ph.D. degrees. In fall 2012, the University of Connecticut Board of Trustees approved the formation of a BME Department, to be organized and administered by researchers at the UConn Health Center, Farmington, and UConn Engineering, Storrs. The departmental formation is underway.

Its undergraduate curriculum offers students the opportunity to focus on various aspects of BME through tracks in bioinformatics; biosystems, imaging, and instrumentation; biomaterials; and biomechanics. In addition to core science and math coursework, undergraduate students are immersed in a variety of biomedical design and measurement courses and, by combining studies of engineering science and design with some of the core courses offered in other engineering departments and programs, the BME B.S. degree program ensures that graduates are well prepared for a team-centered workplace or for graduate studies in engineering and/or medicine.

The BME Department has a strong presence at the UCHC through its cross-campus collaborative relationships with several UCHC faculty members who offer BME courses and research opportunities to undergraduate and graduate students.

**Educational Highlights**

This past academic year, Dr. Donald Peterson served as the Undergraduate Program Director while Dr. Quing Zhu served as the Graduate Program Director. Dr. Monty Escabi continued to serve as the Courses and Curriculum Committee (CCC) Chair. Through regular meeting deliberations, the BME CCC is responsible for recommending changes to the BME courses and curriculum as an ongoing effort to develop and enhance the BME Department.

*BME Graduate Program*

The BME graduate program had 56 M.S. and 34 Ph.D. students for the fall ‘12 term census, and 52 M.S. and 41 Ph.D. students for the spring ‘13 term census. The BME program graduated four M.S. and one Ph.D. students in summer ‘12, three M.S. degree students in fall ‘12, and 16 M.S. degree students in May ‘13.

To encourage BME graduate students to present their research at national and international conferences, the BME Department awarded travel awards. Five such awards totaling $2,500 were presented to M.S. students, and eight travel awards totaling $7,090 were presented to Ph.D. students. In addition, four senior Ph.D. students - Caitlin Martin, Thuy Pham, Jamie Maciaszek and Umar Alqasemi - received research awards in May 2013 for their excellent research productivity.

*BME Undergraduate Program*

The undergraduate program had enrollments of approximately 300 B.S. degree students, including 90 University Honors Program students (~ 30%). Of these, 63 students graduated in May ’13, 13 of whom were in the Honors Program. During the past year, Rachel Adams, Michele Dalena and Mikhail Rudinskiy were awarded the Deligeorges Family Scholarship in the amount of $1,000 each.

**Faculty Recruiting and Departmental Personnel**

Dr. Patrick Kumavor will join the BME Department in fall 2013 as a full-time Assistant Professor in Residence (APR). Dr. Krystyna Gielo-Perczak was promoted to Associate Professor in Residence
effective August 2013. Three new faculty members (Drs. Kevin Brown, Yong-Jun Shin and Guoan Zheng) were also hired as tenure-track assistant professors for the upcoming 2013-14 academic year.
CHEMICAL & BIOMOLECULAR ENGINEERING DEPARTMENT
ANNUAL REPORT SUMMARY
2012-2013

CBE DEPARTMENTAL PHILOSOPHY
These are exciting times for the Chemical & Biomolecular Engineering (CBE) Department. The faculty, through their research, teaching, and public engagement, are addressing grand challenges and forging a better future for our society. We are attracting and educating a bright, diverse, and accomplished student body. Our students are gaining technical proficiency and life skills in the dynamic learning environment of CBE. And a growing number of our alumni are emerging as leaders of business, government, and academia.

To foster growth in the Department’s prominence and distinction so we may move up the ranks of public research institutions, we as a Department:

- Encourage and support faculty ambitions in academic research, educational initiatives, and collaborative ventures.
- Recruit, educate, inspire, and provide opportunity for a talented and diverse body of undergraduate and graduate students.
- Provide a collegial and inspiring environment where motivated people will work together on knowledge creation, transfer, and commercialization.
- Make CBE a hub of research, innovation, and training expertise that technology-based companies seek so our industry partners can better compete and thrive.
- Champion interdisciplinary coalitions that advance research, motivate intellectual growth, encourage economic development, and promote social progress.

DEPARTMENTAL REORGANIZATION
Thanks to the support of the Interim Dean of Engineering, Dr. Kazem Kazerounian, and UConn Provost, Dr. Mun Choi, this year the Chemical, Materials & Biomolecular Engineering Department has grown into two distinct departments:

- Chemical & Biomolecular Engineering
- Materials Science & Engineering

During the year, faculty invested significant time and energy in articulating a clear rationale for the change, preparing for the transition, and implementing the reorganization. This last step included dividing resources, space, and support staff.

CBE immediately followed with a rebranding campaign. The initial focus has been on a website upgrade designed to inform our current and potential students, their parents, our alumni, industry partners, researchers, funding agencies, our colleagues here on campus, and more. We have kept a steady stream of news items published to raise awareness of our contributions and successes. Please visit http://www.cbe.engr.uconn.edu/ to see the news.

FACULTY ACTIVITIES
The CBE faculty have much to be proud of in this first year as a reorganized, focused unit.

Dr. Bill Mustain received academic tenure and was promoted to the rank of Associate Professor. He also will assume the role of Associate Department Head and Chair of our Undergraduate Programs. Dr. Ranjan Srivastava is now the Program Chair for our new Biomolecular Engineering Program.
Significant faculty awards during the year included:

- *DuPont Young Faculty Award* – Dr. Jeff McCutcheon
- *American Chemical Society/Petroleum Research Fund New Investigator Award* – Dr. George Bollas
- *U.S. Department of Energy Career Award* – Dr. Bill Mustain
- *Gates Foundation Award* – Dr. Leslie Shor
- *NSF Career Award* – Dr. Anson Ma

In other highlights: Dr. Dan Burkey received the CBE Teacher of the Year Award (selected by CBE students); Dr. Yu Lei received a Top Cited Article Award in *Biosensors and Bioelectronics*; Dr. Cato Laurencin received a Technology Innovation Award from the Society for Biomaterials; Dr. Mu-Ping Nieh was the Principal Investigator on an NSF Major Instrument Award; Dr. Richard Parnas received a Guest Professorship to serve at a university in China; Dr. Ranjan Srivastava was the Principal Investigator on an NSF Emerging Frontiers in Research and Innovation Award; and Dr. Brian Willis was the Principal Investigator on a five-year NSF Collaborative Research Award.

Some important activities of note include:

- A two-day CBE faculty retreat was held in May to address teaching, research and service.
- The Department hosted an Innovation Connection networking event that enabled faculty conversations with representatives of 15 companies on possible research and entrepreneurial collaborations.
- The CBE seminar series included chaired professors and department heads from around the country.
- The Department hosted an alumni hospitality suite at the National AIChE Annual Conference in Pittsburgh.

**NEW FACULTY HIRES**

CBE completed a very successful recruiting year and is proud to welcome five impressive new faculty:

*Dr. Kelly Burke* joins the Chemical & Biomolecular Engineering Department, and has an appointment in the Polymer Program of the Institute of Materials Science. Dr. Burke, who joins UConn under the Eminent Faculty Initiative, earned her PhD at Case Western Reserve University in 2010 and brings expertise in protein modification strategies, tissue engineering, structure-property relationships of liquid crystals, and biocompatible multifunctional polymeric materials. Dr. Burke was a post-doctoral associate at Tufts University (2010-13), where she received an NIH National Research Service Award Fellowship.

*Dr. Yongku Cho* joins the Chemical & Biomolecular Engineering Department. He received his Ph.D. from the University of Wisconsin – Madison in 2010. Dr. Cho’s research centers on protein engineering, optogenetics, neuroimaging and molecular neurobiology. He was most recently a post-doctoral researcher at the Massachusetts Institute of Technology, where his work involved the molecular engineering of light-activated proteins.

*Dr. Luyi Sun* joins the Chemical & Biomolecular Engineering Department, and has an appointment in the Polymer Program of the Institute of Materials Science. Dr. Sun, who joins UConn under the Eminent Faculty Initiative, received his Ph.D. at the University of Alabama in 2004 and brings expertise in multifunctional nanostructured materials; polymeric materials and new polymer processing development; layered compounds; green science and engineering; hydrates and porous materials for energy storage. He was an assistant professor of chemistry at Texas State University (2009-13) and was a post-doctoral fellow at both Texas A&M and the University of Alabama.
Dr. Julia Valla joins the Chemical & Biomolecular Engineering Department with expertise in the design and development of novel catalysts for industrial applications and design of new, emerging technologies and processes for the clean and sustainable energy production. She earned her Ph.D. at Aristotle University of Thessaloniki, Greece in 2005. Dr. Valla was previously an assistant research professor in CMBE and the Center for Clean Energy Engineering and, earlier in her career, a Project Leader for River Technology Inc.

Dr. Kristina Wagstrom joins the Chemical & Biomolecular Engineering Department as the Northeast Utilities Assistant Professor of Environmental Engineering Education. She brings expertise in sourcing and modeling atmospheric particulates, air pollutants, health impacts of atmospheric particulate matter deposition, and air quality models. Dr. Wagstrom received her Ph.D. from Carnegie Mellon University in 2009. She conducted post-doctoral research at the University of Minnesota (2009-12), and was an AAAS Science and Technology Policy Fellow at the U.S. EPA (2012-13).

GRADUATE STUDENT SUCCESSES
The CBE Graduate Committee, chaired by Dr. Yu Lei, was formed to address the challenges of a new department. To enhance our success, we strengthened our proactive recruiting, upgraded the website, and held a successful open house for admitted students for this recruiting year. The quality of our incoming class of graduate students reflects this. The Department plans to create a CBE Graduate Student Council during the 2012-13, whose first charges will be to organize a graduate student seminar series and to participate in the recruiting open house for future students.

UNDERGRADUATE ACCOMPLISHMENTS
The CBE undergraduate community has blossomed, and all of the CBE faculty members have contributed. The strong leadership of Dr. Dan Burkey and the contribution of the rest of our faculty have supported this success.

Among the major achievements within the undergraduate population were:

- The transition to a full-year senior design sequence and groundwork laid with several companies to support new projects;
- The successful campaign to host the 2014 AIChE Northeast Regional Student Conference;
- Development of an excellent ABET self-study, with particular acknowledgement of the efforts of Drs. Bill Mustain and Dan Burkey for their efforts on our accreditation process;
- The addition of new experiments (bioreactor; heat engine) in our senior year laboratory sequence;
- A successful win by the CBE undergraduate team in the regional AIChE ChemE Car competition;
- A national AIChE conference poster win by undergraduate student Emily Anderson;
- The top GPA in the 2013 School of Engineering graduating class (Amanda Card);
- The selection of senior Kelsey Boch as the student speaker during the May 2013 commencement ceremonies.
CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT  
ANNUAL REPORT SUMMARY  
2012-2013

It seems that we keep repeating ourselves about Mother Nature and the challenges she brings to humanity lately. Several of the 2010-13 headlines deal with catastrophic events that affect human life in a profound way. Indeed, this year’s Hurricane Sandy followed the rare earthquake in the Northeast, Tropical Storm Irene, and the October snowstorm. These events deal with national and global challenges to our State’s and nation’s infrastructure, which continues getting older and obsolete. Civil and environmental engineers actively engage in all efforts to predict, minimize the effect of, and retrofit or repair the infrastructure affected by events that include global climate change, environmental pollution crises, water shortage crises, non-sustainable energy practices, transportation planning and land use. The Civil & Environmental Engineering (CEE) Department continues to address these global challenges through its didactic and research missions. Through our accredited Civil Engineering (CE) and Environmental Engineering (ENVE) programs, we educate and prepare engineers to face major societal challenges, and the CEE faculty members perform cutting-edge research to develop new solutions to global problems.

FACULTY & STAFF
The department welcomed one new faculty member in the fall of 2012. Dr. Karthik Konduri earned his Ph.D. in February 2012 from Arizona State University and also worked as a post-doctoral researcher at the same institution. Dr. Konduri’s research profile covers diverse thematic areas such as travel demand modeling, activity-based modeling, econometrics, synthetic population generation and urban logistics. Dr. Konduri has a record of 15 journal papers or book chapters in print/press and has made numerous presentations in national and international conferences.

The department hired three new faculty members who will join the university in fall 2013. Dr. Marina Astitha earned her Ph.D. in Environmental Physics at the University of Athens in 2007 and brings expertise in atmospheric modeling with an emphasis on physical processes. As a post-doctoral fellow at The Cyprus Institute, she was instrumental in the development of a new physical parameterization for mineral dust emissions in the atmospheric chemistry general circulation model, EMAC. Dr. Christine Kirchhoff earned her Ph.D. in 2010 at the University of Michigan. Dr. Kirchhoff’s research expertise lies in water resources policy, management and governance. She has held post-doctoral research positions at UMI and in the Center for Science, Technology and Policy Research at the University of Colorado, Boulder. Dr. Wei Zhang received his Ph.D. from Louisiana State University in 2012. He is an expert in life-cycle performance design and reliability, and modeling of structural fatigue, damage and vibrations.

There were four faculty promotions within the department, effective August 2013. Dr. Guiling Wang was promoted to the rank of Professor; Drs. Maria Chrysochoou and Nicholas Lownes were awarded academic tenure and promoted to the rank of Associate Professor; and Dr. Eric Jackson was promoted to the rank of Associate Research Professor. An important recognition was bestowed upon our faculty: Dr. Allison MacKay was appointed the UTC Professor in Engineering Innovation.

UNDERGRADUATE & GRADUATE EDUCATION
The CEE Department had a combined CE and ENVE program undergraduate enrollment of 407 students in spring 2013. Graduate enrollments in the CE and ENVE programs continued to be at all-time high levels with 111 M.S. and Ph.D. students registered in spring 2013. As much as the department welcomes this increase in our enrollments, serious space constraints are becoming problematic and must be addressed in the future. This year, our department graduated a total of six Ph.D. and 23 M.S. degrees.
Dr. Arash Esmaili Zaghi was this year’s recipient of the C.R. Klewin Award for Excellence in Teaching. The award recipients are chosen each year by the graduating senior class for their unique contributions to undergraduate teaching.

**Research & Scholarship**

The department’s research activities and scholarship remained very strong and, in fact, are projected to improve again compared to last year with more than $3.75 million in research expenditures generated from 81 active grants from a wide variety of funding sources including the National Science Foundation, NASA, National Oceanic and Atmospheric Administration, Federal Highway Administration, U.S. Department of Transportation (USDOT) and ConnDOT, United States Army, Department of Homeland Security, USAID, EPA, National Academy of Science, USDA, USGS and numerous private companies. Moreover, a record amount of $4.41 million in new research grants has been awarded to our department. Department faculty were involved in the publication of 74 journal articles, one book chapter, 75 full-length conference papers and made 60 conference presentations in the past year.

**Student Activities**

The department’s undergraduate student organizations continued to be highly active during the past year. The Steel Bridge Club and Concrete Canoe Club were very active this year under the leadership of Dr. Kay Wille and our Advisory Board member, Mr. Michael Culmo.
The Computer Science & Engineering (CSE) Department continues its remarkable record of accomplishments in a number of strategic areas including Bioinformatics, Information Security, Networking and Biomedical Informatics. The department attained more than $1.86 million in new research funding for FY2013. Our cumulative funding, including existing grants and contracts, totals more than $19 million, a sum that reflects the continued outstanding accomplishments of CSE faculty. Faculty also continued to collaborate on awards as co-PIs with other School of Engineering units, such as Electrical & Computer Engineering, Mechanical Engineering and the Connecticut Transportation Institute. These collaborations produced new funding totaling nearly $1.6 million for FY2013 in addition to the figures above. Grant expenditures totaled $2.47 million. The CSE department graduated 10 Ph.D. students and 12 M.S. students during the academic year. The department succeeded to hire three new faculty members. The department began to prepare for the accreditation (ABET) visit scheduled for fall 2013.

EDUCATIONAL PROGRAMS HIGHLIGHTS

The department continued its efforts in recruiting and retaining high quality undergraduate students. As a result, there is a strong demand for our graduates, as demonstrated by a steady flow of job and internship announcements. Cigna continued its on-site internship center in the ITE Building that enables 10 qualified juniors/seniors to gain career experience working directly with Cigna employees to develop web and mobile programming applications. In addition, during the year a greater number of companies indicated their interest in funding senior design projects. The 2012 freshman class was 40% larger than the 2011 freshman class. Our retention rate exceeds 80%. In addition to the new CSE students, the department expects to teach more sections of the introduction to computing course due to the large increase of School of Engineering enrollment.

The department completed the self-assessment of its three undergraduate programs. Dr. Alexander Russell leads this process for the Computer Science program; Dr. Reda Ammar leads it for the Computer Science & Engineering program; and Dr. Rajeev Bansal (Head of the Electrical & Computer Engineering Department) leads it for the Computer Engineering program with some help from Dr. Ammar. In addition, Dr. Robert McCartney chairs the School ABET Steering Committee. The ABET visit will be conducted during the week of October 19th, 2013.

The department serves more than 45 M.S. and 85 Ph.D. students, and continues to increase its enrollment of U.S. citizens in the graduate program through a variety of targeted programs that include two U.S. Department of Education Graduate Assistance in Areas of National Need (GAANN) awards, in Advanced Computing and Cloud Computing. CSE faculty members also participate in two other GAANN projects awarded to the School of Engineering, on Advanced Computing Security and Sustainable Energy. These GAANN grants provide significant resources to recruit more high quality Ph.D. students. We also continue to recruit high quality, funded international graduate students, and to establish faculty and graduate exchange programs with foreign universities.

FACULTY

The department conducted 4 successful faculty searches during this academic year. Three of the four positions will have CSE as their home department. The fourth position will be in the BME Department with a joint appointment in CSE. We were successful in filling all 4 searches with outstanding candidates. This will bring the number of faculty in the department to be 25. We also expect to hire more
in-Residence faculty next year to meet the enrollment increase of the School of Engineering freshmen class.

**RESEARCH HIGHLIGHTS**

Dr. Bamis received a new EAGER grant from the National Science Foundation (NSF) entitled Human Behavior Based Authentication for Smart Wireless Systems ($169,422); Dr. Swapna Gokhale received funding from MIT/USDOT for Automated Congestion Prediction with Smart Phones ($127,927); Drs. Jerry Shi, Jun-Hong Cui and Shengli Zhou received a new grant from the National Science Foundation entitled DoS Attacks and Countermeasures in Underwater Wireless Networks ($1,199,999). In addition, the department continued to enjoy increased support from Connecticut industry and State agencies. Drs. Steven Demurjian and Dong-Guk Shin continued to receive substantial funding from the State of Connecticut Insurance Department; Drs. Alexander Shvartsman, Aggelos Kiayias, Laurent Michel and Alexander Russell continued to receive federal HAVA funding through the Connecticut Secretary of State for their voting technology center.

This year, our faculty collectively published more than 150 archival journal and conference papers.

Our faculty continued their leadership as officers of professional societies, members of editorial boards, and members of steering committees and program chairs for international conferences. Dr. Ammar continued serving three major IEEE international conferences as the Registration & Finance Chair: the International Symposium on Computers and Communication (ISCC 2013 in Croatia), the International Symposium on Signal Processing and Information Technology (in Vietnam) and the 3rd International Conference on Computational Advances in Bio and Medical Sciences (ICCABS) (Florida); Dr. Ammar became an official program evaluator for ABET-CAC, Dr. Bi is Associate Editor of ACM SIGHT International Health Informatics Symposium; Dr. Cui is Editor, Elsevier Ad Hoc Networks and Conference Chair of ACM WUWNet (2006 – Present); Dr. Demjurian is Associate Editor of the *Journal of Software Engineering and Applications, Scientific Research*; Dr. Gokhale served as Cluster/Tract Chair for the International Conference on High Assurance Systems Engineering and is an Associate Editor for three journals and IETE Technical Review; Dr. Chun-Hsi Huang is the Associate Editor of *Biomedical Informatics Insights*. Dr. Kiayias is Editor of *IET Information Security Journal* and Editorial Board member for Crypto 2012, EUROCRYPT 2012, Africacrypt 2012, Provsec 2012, Financial Cryptography and Data Security 2013 and VOTE-ID 2013; and Dr. Mandoiu is Associate Editor of BMC Bioinformatics, Workshop Co-Chair for the 2nd Workshop on Computational Advances in Molecular Epidemiology and the 3rd Workshop on Computational Advances for Next Generation Sequencing; Dr. McCartney is Editor-in-Chief of *ACM Transactions on Computing Education* and Co-Chair of the 2012 Koli Calling International Conference on Computing Education Research; Dr. Michel is Associate Editor of *Constraints, Constraint Programming Letters* and *Mathematical Programming Computation*; Dr. Peters is Treasurer/Secretary for the Society of Industrial and Applied Mathematics, Special Interest Group on Geometric Design and Modeling; Dr. Rajasekaran is Associate Editor of *IEEE Transactions on Computers, Parallel Processing Letters*, and the *Journal of Parallel and Distributed Computing* as well as General Chair of the 3rd International Conference on Computational Advances in Bio and Medical Sciences (ICCABS); Dr. Russell is Associate Editor-in-Chief of *Theory of Computing* and the *SIAM Journal of Computing*; Dr. Shi is Treasurer/Secretary for the International Conference on UnderWater Networks and Systems; Dr. Shin is Editorial Board member of *Bioinformatics and Biology Insights*, and *Libertas Academica*; Dr. Shvartsman is Associate Editor of *IEEE Transactions on Computer*, the *Journal of Election Technology and Systems* and *Studia Informatica Universalis*, and Chair of the ACM Symposium on Distributed Computing; Dr. Wang is Chair of the GENI Research and Educational Experiment Workshop 2013 and Dr. Wu is Associate Editor of *IEEE Transactions on Computational Biology and Bioinformatics* and Finance Chair of the IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS) 2013. Faculty members have also been invited to
present their research directions and results, including keynote addresses in several major international and national conferences and at top ranked institutes.

CSE faculty also took the lead and played a major role in submitting multi-dimensional proposals. For example, Dr. Demurjian continued to serve as the Core Co-Director and Associate Director of Research Informatics, Biomedical Informatics between School of Engineering and UCHC, and Dr. Rajasekaran leads a team of 11 UConn investigators (three from the CSE department) recently submitted the proposal BIGDATA: Mid-Scale: DA: Collaborative Research: Novel Computational Techniques To Analyze Voluminous Heterogeneous Genomic Data to NSF.

**CONCLUDING REMARK**

The Computer Science & Engineering Department continues on an impressive growth path. We have a balanced faculty with full professors and associate professors with tenure, and a strong core of junior faculty. Our undergraduate and graduate educational programs are well developed, and we continue to fine-tune them, to even better serve the State and the nation. Our research accomplishments are exemplary with the new research grants. We are growing at an impressive pace in terms of research funding, publications, and national and international service and recognition.
UNDERGRADUATE EDUCATION
The Electrical & Computer Engineering (ECE) department offers undergraduate degrees in Electrical Engineering (EE), Computer Engineering (CompE, offered jointly with the Computer Science & Engineering Department), and Engineering Physics (EGPHY, offered jointly with the College of Liberal Arts and Sciences). Fall 2012 undergraduate enrollments were: 184 students in the EE program, 41 students in the CompE program, and 29 students in the EGPHY program. During the academic year 2012-2013, we awarded 40 B.S.E. degrees in EE, five in CompE and three in EGPHY.

RESEARCH AND SCHOLARSHIP
The ECE faculty conducts funded research in fields including systems and energy, communications and signal/image processing, biomedical engineering, microelectronics, photonics and optoelectronics, electromagnetics, nanotechnology, VLSI, computer engineering, and security. Scholarly productivity stimulated by research is strong. The faculty publications included approximately 150 refereed journal articles, 5 book chapters, and 195 full conference proceedings papers. ECE faculty members developed two software packages, offered many professional short courses, were keynote speakers at 5 international conferences, and delivered 48 invited talks. The faculty worked on 114 sponsored grants with annual expenditures of $6 million. During the year, the ECE faculty advised 134 graduate students; of these, 16 successfully completed their Ph.D. degrees and 26 students (including those in Clinical Engineering) garnered their M.S. degrees. Dr. Bahram Javidi was awarded three patents, and Drs. Peter Luh, Lei Wang and Quing Zhu were awarded one each.

FACULTY HONORS
ECE faculty members received several prestigious awards. Dr. Shengli Zhou was selected as the first recipient of the newly endowed Charles Knapp Associate Professorship. He was also selected for this year’s School of Engineering Outstanding Faculty Advisor Award. Dr. John Chandy has been named as a United Technologies Corporation Professor in Engineering Innovation. Dr. Peter Luh is to receive the IEEE Robotics and Automation Society (RAS) Pioneer Award for 2013. Dr. Faquir Jain has been named a Fellow of SPIE for his scholarly achievements. Alumnus and Distinguished Professor-in-Residence Anthony DeMaria received the 2013 CASE Distinguished Service Award for his contributions to the Academy as a charter member, fourth president and past-president. Dr. Mohammad Tehranipoor was named Director of the Center for Hardware Assurance, Security, and Engineering (CHASE).

Congratulations to Shengli Zhou, who was promoted to full professor as well as to Helena Silva and Ali Gokirmak, who received tenure and promotion to associate professor.

Drs. Yaakov Bar-Shalom and Bahram Javidi are Board of Trustees Distinguished Professors. Our endowed chairs include Dr. Yaakov Bar-Shalom, who is the Marianne E. Klewin Endowed Professor in Engineering; Dr. Peter Luh, who is the SNET Professor of Communications & Information Technologies; and Dr. Krishna Pattipati, who is the United Technologies Corporation Chair in Systems Engineering.

ECE faculty members are also leaders in many professional societies/organizations. Drs. Anthony DeMaria, Eric Donkor, Faquir Jain, Bahram Javidi and Quing Zhu are SPIE Fellows; Drs. Yaakov Bar-Shalom, Steven Boggs, Anthony DeMaria, John Enderle, Bahram Javidi, Peter Luh, Krishna Pattipati, Geoffrey Taylor and Peter Willett are IEEE Fellows; Drs. John Enderle and Bahram Javidi are American Institute for Medical and Biological Engineering Fellows; Drs. Anthony DeMaria and Bahram Javidi are Optical Society of America Fellows; Dr. John Enderle is an American Society of Engineering Education...
Fellow; Dr. Rajeev Bansal is a Fellow of the Electromagnetics Academy; and Dr. Anthony DeMaria is a Fellow of the American Physical Society as well as a member of the prestigious National Academy of Engineers.

Drs. Mehdi Anwar, Rajeev Bansal, Yaakov Bar-Shalom, Anthony DeMaria (who is a co-founding member), Eric Donkor, John Enderle, Monty Escabi, Faquir Jain, Bahram Javidi, Peter Luh, Krishna Pattipati, Geoffrey Taylor, Shengli Zhou and Quing Zhu are elected member of the Connecticut Academy of Science and Engineering (CASE). During 2012-2013, ECE faculty members held several conference chair posts and numerous positions on the editorial boards of journals.

**INDUSTRIAL CONNECTIONS**

The Department has an engaged Industrial Advisory Board (IAB), providing vital input on our curricula, recruitment, and strategies. Industrial feedback is essential in maintaining high-quality, relevant programs and is a major link in the ABET accreditation process. Additionally, the affiliated companies participate in collaborative research, sponsor senior design projects, provide internship opportunities for our students, and often hire them permanently. The companies represented on the IAB this year are Aptima, ARRIS Access and Transport, Coherent, Comcast, GE Corporate Financial Services, GE Consumer & Industrial Technology, Hamilton Sundstrand, ISO New England, JDS Uniphase, Naval Undersea Warfare Center, Northeast Utilities, Phonon Corporation, Pratt & Whitney, SAVANT, Sikorsky Aircraft Corporation, and Silicon DFx. The Department is also active in collaborative research and development projects with many other companies.

**GRADUATE STUDENT AWARDS**

Ph.D candidate Zhaohui Wang received the Collegian Innovation and Leadership Award for her exceptional achievement in the area of underwater acoustic communication and networking at the 2013 Women of Innovation Awards Ceremony. The fall 2012 recipient of the ECE Outstanding Teaching Assistant Award was Qihang Shi and the spring 2012 awardee was Kimberly Kaltenecker. Umar Alqasemi is working on technology that combines photo-acoustic imaging with ultrasound imaging for early tumor detection. A paper (on which he is lead author) describing the technology, appeared on the cover of the July 2012 issue of the *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*.

**STUDENT ACTIVITIES**

The UConn student branch of the Institute of Electrical and Electronics Engineers (IEEE) organized several educational and professional activities in the past two semesters. The officers made members aware of many scholarship or employment opportunities and kept them informed about companies visiting campus each week for networking. They held department feedback and study sessions and general conversations about members’ individual projects and offered ideas/support for them. The members suggested changes to the EE curriculum and some were approved. They engaged other undergraduate students by holding general electronic applications classes and solder workshops.

**ECE PERSONNEL CHANGES**

The department will be adding five new faculty (one in conjunction with IMS) in fall 2013. Drs. Ashwin Dani and Liang Zhang will be joining the systems group. Dr. Dani received his Ph.D degree from the University of Florida, Gainesville in 2011. He is currently a Post-Doctoral Research Associate at the University of Illinois Urbana-Champaign. Dr. Liang Zhang received his Ph.D. degree from the University of Michigan, Ann Arbor in 2009. He is currently an Assistant Professor in the Department of Industrial and Manufacturing Engineering at the University of Wisconsin-Milwaukee. Drs. Marten van Dijk and Domenic Forte will be joining colleagues in the computer engineering area as well as the CHASE center. Dr. Forte has just completed his Ph.D. at the University of Maryland. Dr. van Dijk received his Ph.D from Eindhoven University of Technology in the Netherlands. He is currently a
research scientist at the MIT Computer Science and Artificial Intelligence Laboratory. Dr. Yan Cao will be joining IMS with ECE as his home department. Dr. Cao received his Ph.D from UConn in 2002.

Celine Goorahoo is the new Administrative Services Specialist who joined our ECE staff in August 2012.
The Materials Science & Engineering Department seeks to prepare men and women for leadership careers in materials science and engineering; to perform research that advances the frontiers of engineering and science; to provide a State and national center of materials expertise; and to promote recognition, open communications and personal development among faculty, staff and students.

In fall 2012, the UConn Board of Trustees approved the formation of two distinct departments out of the former Chemical, Materials & Biomolecular Engineering Department:

- Materials Science & Engineering (MSE)
- Chemical & Biomolecular Engineering (CBE)

This development enjoyed strong support from not only the MSE and CBE faculty but also the Interim Dean of Engineering, Dr. Kazem Kazerounian, and UConn Provost, Dr. Mun Choi. Following the Board’s approval, during the year, faculty invested significant time and energy in preparing for the transition and implementing the reorganization. This last step included dividing resources, space, and support staff.

Dr. Pamir Alpay was chosen by the MSE faculty to lead the department, and his appointment was approved by Interim Dean Kazem Kazerounian.

**RESEARCH**

The MSE Department realizes approximately $3.7M in research expenditures per year. The Department hosts a Multidisciplinary Research Initiative (MURI) Center, funded by the Office of Naval Research, on the development of a new generation of dielectric materials and two Graduate Assistance in Areas of National Need (GAANN) programs from the Department of Education.

Dr. Radenka Maric, in close collaboration with MSE Industrial Advisory Board member Armand Halter and Dr. William Mustain (Chemical & Biomolecular Engineering), received a prestigious, $423k National Science Foundation Grant Opportunities for Academic Liaison with Industry (GOALI) award for research involving “One Step Direct Deposition of Durable Cathode for High Temperature Proton Exchange Membrane Fuel Cell (PEMFC).”

To advance awareness for its world-class research, during the year, our faculty published approximately 100 journal papers.

**STUDENTS**

Currently, the MSE program has 130 undergraduate and over 100 graduate students, and hosts research programs covering the processing, characterization, properties, theory, and engineering applications of metals, ceramics, polymers and composites.

The Department offers four MSE concentrations: Metallurgy, Biomaterials, Nanomaterials, and Electronic Materials. During the 2012-13 academic year, a total of 19 industry-sponsored capstone Senior Design Projects were enabled, providing our students an exceptional learning experience on the eve of their transition into careers.
During 2012-13, the Department graduated 14 Ph.D. and five M.S. students. The MSE Department hosts a U.S. Department of Education Graduate Assistance in Areas of National Need (GAANN) site in biomaterials for tissue regeneration. Our faculty also collaborate on two other GAANN projects involving clean energy and nanostructures/devices for energy production and storage.

During the year, two doctoral candidates were honored as finalists in the Connecticut Women of Innovation awards:

- Paiyz Mikael, whose research involves the development of three-dimensional, biocompatible scaffolding to aid in bone repair.
- Zengmin Xia, who is researching ways to improve the speed, longevity and success of bone and tissue regeneration and repair through the development of novel polymer/ceramic tissue engineering scaffolds.

Ph.D. candidate (Dr.) Jialan Zhang was awarded the Best Oral Paper Prize at the 22nd Connecticut Microelectronics and Optoelectronics Consortium. Jialan’s oral presentation focused on her work involving “Electrocaloric Properties of Epitaxial Strontium Titanate Films.”

Doctoral candidate (Dr.) Ghanshyam Pilania was presented the 2012 Materials Science & Engineering (MSE) Department’s Outstanding Graduate Student Award for his excellent research work and outstanding academic record.

On December 21st, 2012, six members of the UConn Materials Advantage student chapter (UCMA) visited Bacon Academy high school to educate and inform integrated science students about materials science and engineering. The UCMA student chapter is among the most active and successful chapters nationwide focusing on outreach. It has won the prestigious “Chapter of Excellence” award twice and the “World Materials Day Outreach” award a number of times.

**Faculty**

The faculty of the MSE Department includes 16 full-time faculty members, including 14 in the graduate program and 5 adjuncts.

UConn MSE faculty carry out state-of-the-art research covering all areas of materials science, including materials synthesis and processing, materials characterization, measurement of materials properties, and theory and modeling, with particular emphasis on:

- Advanced Materials and Advanced Manufacturing
- Nanomaterials/nanotechnology
- Biomaterials
- Functional Materials
- Materials for Energy Applications
- Multi-scale Predictive Modeling

In 2013-2014, MSE succeeded in hiring two outstanding faculty in the materials genomics area. Dr. Avinash M. Dongare (modeling of materials under extreme conditions) and Dr. Serge M. Nakhmanson (multifunctional ferroic materials by rational design) will strengthen our materials theory core.

Dr. Puxian Gao received a Fellowship for Experienced Researchers from the Alexander von Humboldt Foundation - Germany. As a part of this fellowship, Puxian will spend his sabbatical at Friedrich-Schiller-University of Jena and the Technical University of Ilmenau in Germany working on the three dimensional (3D) nano-photovoltaics and nano-magneto-electronics, and study the efficient manipulation of photon,
electron, and their interactions and couplings by virtue of 3D nanostructure assembly and high energy ion implantation.

Dr. C. Barry Carter was awarded the Microscopy Society of America’s (MSA) 2013 Distinguished Scientist Award for the Physical Sciences in recognition of his internationally acclaimed research and distinguished contributions in the field of microscopy.

Dr. Mei Wei was tapped to serve as Associate Dean for Research & Graduate Education and now splits her time between this administrative post and her academic duties as a member of the MSE faculty. In addition, she was inducted into the Connecticut Academy for Science & Engineering (CASE) during spring 2013.

Dr. Radenko Marie, the Connecticut Clean Energy Fund Professor of Sustainable Energy, was a finalist in this year’s Connecticut Women of Innovation awards, in the category Research Innovation and Leadership Award. Her most significant contribution has been in the development of a new manufacturing process for fuel cells that can make highly efficient fuel cell-powered vehicles a viable commercial option. She was co-nominated by her colleagues, Drs. Mark Aindow and Pamir Alpay.

Dr. Rainer Hebert was on sabbatical leave, conducting research with industry partners at Pratt & Whitney during the year. His close relationship with practicing engineers and researchers there helped the School of Engineering to establish a revolutionary new Pratt & Whitney Additive Manufacturing Innovation Center at the UConn Depot campus. Drs. Rainer Hebert and Bryan Huey were chosen as Director of Undergraduate Studies and Director of Graduate Studies, respectively. Dr. Hebert is also active with ASM International and currently serves as the vice chair of the ASM Hartford Chapter.

Dr. Harris Marcus retired from his 18-year tenure as Director of the Institute of Materials Science (IMS); however, he remains active as a faculty member in our department. Dr. Mark Aindow was appointed as the Associate Director of the IMS starting in fall 2013.

**INDUSTRIAL ADVISORY BOARD**

MSE continues to be guided by an outstanding industrial advisory board comprised of accomplished engineers from the local industry: Bill Fallon, Senior Technical Fellow, Sikorsky Aircraft, Dave Furrer, Senior Fellow Discipline Lead, Pratt & Whitney, Armand Halter, Vice President, Sonalysts, Inc., Peter Jarrett, Chief Technology Officer, Ocular Therapeutix, Joe Mantese, Fellow, United Technologies Research Center, and Howard Orr, President and CEO, KTI Inc. MSE was fortunate to add Katherine Saint to this excellent group. She is the President of Schwerdle Stamp Co., a 134 year old manufacturing firm located in Bridgeport, CT. Kathy is also the President of the Manufacturers Education and Training Alliance and brings years of experience in additive manufacturing.
MECHANICAL ENGINEERING DEPARTMENT
ANNUAL REPORT SUMMARY
2012–2013

The performance of the department over the last six academic years is summarized in the table below. The 2012–2013 academic year continued the productive trend set over the past years. Currently, the Mechanical Engineering department is home to 25 tenured/tenure-track faculty members and 3 professors in residence. The department’s research portfolio has a total value of approximately $25 million in 108 currently active grants and contracts, with research expenditures of $4.9 million as of April 13, 2013. Between July 2011 and April 2013, faculty received new research grants and contracts with a total value of $5.0 million. In this same period the Mechanical Engineering faculty published 106 journal articles, obtained two U.S. patents, and contributed 106 conference publications or presentations. Faculty members served as editors or associate editors of 24 major journals. Highlights of the year’s activities and accomplishments follow.

<table>
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<tr>
<th>Academic Year</th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
<th>10-11</th>
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<td>Faculty</td>
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<td>- Enrollment</td>
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<tr>
<td>- Enrollment M.S. / Ph.D.</td>
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<td>59/63</td>
<td>54/61</td>
<td>74/68</td>
<td>72/62</td>
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<td>- Graduates: M.S. / Ph.D.</td>
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<td>12/2</td>
<td>17/5</td>
<td>15/7</td>
<td>23/12</td>
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<td>- Journal articles</td>
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<td>- Total active research grants</td>
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<td>- New grants</td>
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<td>$9.1M</td>
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<td>$5.2M</td>
<td>$4.9M**</td>
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(*) Estimate, (**) Values are not for full fiscal year, but as of 04/13/13.

UNDERGRADUATE PROGRAM

The department’s undergraduate enrollment stands at 521 students. A total of 114 bachelor’s degrees were conferred in Mechanical Engineering between July 2012 and June 2013. The capstone Senior Design Experience courses featured 46 senior design projects sponsored by 30 different sponsors. Six projects were selected by a panel of judges and received cash awards ranging from $500 to $1,500. Information on the year’s senior design activities may be viewed at [http://www.engr.uconn.edu/me/cms/publications](http://www.engr.uconn.edu/me/cms/publications). This year’s D.E. Crow Innovation Prize was awarded to two teams of students with prizes of $10K each. Thirteen student teams competed for the total prize money of $20K. One of the two prizes was awarded to Alicia Echevarria (CEE) for her project on advanced structural reinforcement system to replace steel reinforced concrete pillars. The other prize was awarded to Matthew Eschbach and Martin Huber (both ME) for their invention of a minimally activated robotic knee brace.
In conjunction with the School’s overall outreach and student recruitment efforts, the department participated in *Explore Engineering*, a one-week residential program that engages high school students in engineering, as well as the *da Vinci Project*, designed to help math and science teachers in grades 7 to 12 learn more about the engineering opportunities available to their students.

The department continues its efforts to engage undergraduate students in summer research. It provides matching funds of $25K per year for the ongoing National Science Foundation Research Experiences for Undergraduates (NSF REU) grant. This summer 10 students from different universities are engaged in sustainable energy research in various department laboratories. This program allows students to gain research experience and provides an introduction to graduate work. Additionally, the department co-sponsored five additional undergraduate students for experience in faculty research laboratories. The department had been preparing for its ABET accreditation and has updated and submitted its self-study report. The accreditation visit will take place in fall 2013.

**Graduate Program and Research**

Fifty-six new students joined our graduate program out of 229 applicants. A total of 168 (97 full-time and 71 part-time students) were enrolled in the graduate program, of whom 69 (66 full-time, 3 part-time) are Ph.D. students. Forty-eight percent of the graduate student body is domestic. The department’s faculty served as major advisors to 21 graduating master’s and 8 graduating Ph.D. students. Twenty-five graduate classes were taught by the department faculty, including five on-site at UTC Pratt & Whitney. This year’s graduate research competition involved 11 graduate students presenting their research in a short seminar format to an audience of faculty, students, and a panel of judges. Four students (Bryan Weber, Stephen Stagon, He Li and Jinjiang Wang) received cash awards ranging from $100 to $2,000 for their top performances in the competition. Ten of 56 new graduate students were co-sponsored by a department initiative that matches faculty member funding of new research assistants.

The department’s research portfolio includes active grants and contracts totaling approximately $25 million from highly diverse federal and industrial funding sources. The yearly research expenditures have reached $4.9 million as of April 13, 2013 (latest figures available at the time of this report). In this fiscal year, faculty brought in research grants and contracts worth $5.0 million as of April 13. UTC Pratt & Whitney and Hamilton Sundstrand continue to fund projects under the Center of Excellence with a total funding of about $1.14 million per year of which $900K are for projects in our department.

**Faculty and Staff**

One new faculty member, Dr. Pinar Zorlutuna (Ph.D., Middle East Technical University, Turkey) joined the department in the fall 2012 semester. Dr. Zorlutuna is the first female faculty member in the history of our department and her area of expertise is in tissue and biological engineering. Three additional faculty will be joining the department in fall 2013. Dr. David Pierce (Ph.D. ME, Stanford) with expertise is in cartilage mechanics, Dr. Leila Ladani (Ph.D., ME, U. Maryland) with expertise in additive manufacturing and micromechanics and Dr. Michael Pettes (Ph.D., ME UT Austin) with expertise in thermodynamics, thermoelectrics and energy conversion.

Dr. Thomas Barber retired at the end of this academic year and has been replaced by Dr. Vito Moreno (Ph.D ME, UConn) who will take over our highly successful senior design program. Dr. Yen-Lin Han has left the department and been replaced by Dr. Kamal Kumar (Ph.D. Case Western Reserve) as Associate Professor in Residence. In anticipation of increasing undergraduate enrollments, we hired an additional faculty member Dr. Kenneth Gordon (Ph.D. Aeronautics, MIT) as Associate Professor in Residence. While we have been growing the department faculty to meet the increased enrollment, we have begun to experience some retention issues. Drs. Zhuyin Ren and Ikjin Lee hired in fall 2011 have decided to leave for academic positions in their home countries of China and S. Korea, respectively. There are two additional faculty members who are negotiating positions at other academic institutions.
Faculty Honors and Scholarship
Drs. Thomas Barber and Wilson Chiu were elected as members of Connecticut Academy of Science. The Mechanical Engineering department’s research excellence award was granted to Dr. Hanchen Huang. Dr. Michael Renfro was named as UTC Professor of Engineering Innovation for a term of two years. Dr. Jiong Tang was promoted to full professor.

External Relations and Outreach
The department held its first annual Alumni and Friends Day on October 27 to showcase its research and educational activities. This event gave a chance for alumni to visit and see the various research activities in the department and learn about new areas of mechanical engineering. The external Advisory Board met June 13, 2013 to discuss the department’s progress in education, research and outreach. Two new members Jennifer Duke (Director of Aerodynamics, Pratt & Whitney) and Richard Whipple (Manager of Engineering Services and Operations, Westinghouse) joined the Board, replacing Thomas Prete and Charles Kling.
The Center’s theme is High Performance Computation and its Applications. Its mission is to enable research, development and outreach aligned with this theme. BECAT recognizes the rapid rate of technological change and the increasingly interdisciplinary nature of research, and hence promotes and supports collaboration within and beyond the University. BECAT provides opportunities for interdisciplinary high performance computing research among faculty and students by providing shared facilities and software, and offering algorithmic, technical and administrative support.

**LARGE PROPOSALS**

BECAT continued to remain very active in writing large multidisciplinary proposals this year. For example, Dr. Sanguthevar Rajasekaran has taken the lead on an NSF Proposal entitled, “BIGDATA: Mid-Scale: DA: Novel Computational Techniques to Analyze Voluminous Datasets,” with a budget of around $4.6M. He also submitted a proposal to NIH entitled, “Enhancing the Accuracy and Functionality of MnM” with a total budget of around $1.9M. Recently, he has submitted a multi-university proposal entitled, “Efficient Algorithms for Sequence Assembly and Applications,” to NIH with a total budget of around $1.9M. An NSF proposal entitled, “III: AF: Medium: Efficient Sequential and Parallel Algorithms for Sequence Assembly,” ($1.1M) was also submitted.

Joining hands with Yale, BECAT submitted an NSF MRI proposal for the acquisition of a Hadoop cluster (total budget: around $1.6M). Proposals with faculty members in other UConn departments (such as Pharmacy – Bodhi Chaudhury; MSE – Rampi Ramprasad; CEE – Nicholas Lownes, etc.) have also been submitted.

**CTSA and Others:** BECAT is a collaborator in the recent resubmission of a proposal for a Clinical & Translational Science Awards (CTSA) program in which BECAT will help in such crucial areas as super- and grid computing, data warehousing, data mining and other areas. BECAT’s Director, Dr. Rajasekaran, will serve as an Assistant Director of BMI. BECAT personnel are also collaborators on two other significant proposals, one submitted to NSF by Dr. Peter Luh (the SNET Professor of Communications and Information Technologies) on smart-grid smart-buildings, and one submitted to NSF on the subject of human disease phenotypic subtyping – quantitative subtyping of clinically relevant phenotypes for genetic analysis.

**Industrial Collaborations:** With the goal of enhancing the economy of the State of Connecticut, Governor Dannel Malloy has been emphasizing UConn-industry collaborations. Keeping this in mind, BECAT has written several proposals with small and large companies, including Owlstone (funded), Interface Technologies (funded), Sikorsky (likely to be funded by ONR), and Sonalysts (submitted).

**Big Data Analytics** is another area of great importance not only in the USA but also across the globe, since we live in an era of data explosion. As a result, BECAT has been focusing enthusiastically on this topic lately.

1) As an example, the Department of Social Services wants to improve the administration of its Medicaid and Medicare programs via Big Data Analytics of historical data from the past several years. The Director of BECAT has been invited to be a member of a small group that is taking the lead in this direction.

2) A team of faculty members led by the BECAT Director is communicating with NU on big data analytics for revenue assurance. NU is losing billions of dollars per year on electricity thefts.
They want to be able to predict and locate potential thieves, mining through transactional data. Here again, BECAT is poised to play a key role.

3) With the help from the Office of the Dean, BECAT and CHASE are communicating with Comcast about the creation of a Comcast Laboratory of Excellence at UConn. One of the two thrust areas is Big Data Analytics. BECAT will take the lead on this theme.

4) BECAT will be meeting with ESPN soon to discuss big data analytics, algorithms, and related topics. BECAT plans to play a critical role here as well.

**MAJOR CENTER APPLICATIONS**

This year the center had to work on three major applications:

1) BECAT currently is a Provisional University Center. We will apply for University Center (UC) designation during the coming year. The Director met with Vice Provost for Research Suman Singha regarding this application and received a number of recommendations that were instituted into the 2013 application. This revised application has been strongly supported by the Vice Provost and Provost. It currently awaits review by the UConn Board of Trustees for approval.

2) This year, we were also required to submit a Five Year Review progress report. The Review Committee offered constructive feedback, which will be incorporated into our revised application, due July 1, 2013.

3) We have decided to recover a part of the investment made on HPC equipment. To achieve this goal, we prepared and submitted a Cost Center Application. The idea is to have BECAT as a research center as well as a cost center. We looked at similar centers in the nation. Learning from these models, we have come up with a charging structure for the various services provided at the center. For instance, each user of the Hornet cluster will be charged three cents per core hour. This Cost Center application went through several iterations, and the final application was approved.

**OPERATION OF HORNET**

BECAT houses the Hornet cluster, which is heavily used by researchers across the two campuses. This cluster consists of:

- 768 Intel Xeon X5650 Westmere cores on 64 compute nodes
- 48GB of RAM per compute node
- 32 NVIDIA Tesla M2050 GPUs
- QDR InfiniBand fabric
- Platform Computing HPC management software, including LSF scheduler
- 500GB of storage per compute node, plus 24TB of temporary storage available
- Academic Partnership with NVIDIA received donation of (10) NVIDIA GTX480 GPUs to be incorporated into a HPC system

The new cluster system dramatically advances the research of BECAT members in areas characterized by complexity and data intensiveness, such as:

- nanostructures and advanced materials
- environmental engineering and science
- biological cells and biomedical systems
- protein folding and biomedical imaging
- homeland and transportation security
- bio-informatics, biomedical informatics and motif search
- systems analysis and sensor networks
- cryptography
Although there were a number of hardware and software issues with this system at the beginning, all of them have been successfully resolved and it is fully operational now. The user base is steadily growing.

SEMINARS AND WORKSHOPS
A major focus of BECAT this year was to assist faculty in coordinating research groups and seminars that promote cross-disciplinary research. These included a Multiscale Computational Science and Engineering Working Group, Smart Building Smart Grid, and various HPC collaboration meetings. We organized a number of hands-on workshops for the users of Hornet. Also, in May 2013 we organized a Workshop on High Performance Computing. Around 20 faculty members gave presentations. This workshop was well attended and appreciated. All the attendees lauded the workshop.

BECAT continued to provide pre- and post-award services to its members.

PERSONNEL
BECAT maintains the computing environment for all the affiliated faculty members and their labs. HPC research issues are addressed by Mr. Rohit Mehta with help from our Graduate Assistants. All locations receive technical support from our 3 qualified student workers for computer hardware problems, and computer software issues. Services include: HPC account access; troubleshooting and installations for desktop PC’s, laptops and printers; installing new operating systems; installing specialized software packages on the Hornet; application upgrade installations, etc.
The Connecticut Transportation Institute (CTI) remains very active in its mission to conduct transportation related research, outreach and technology transfer. CTI personnel and affiliated faculty members have continued to serve on national, regional and state committees that have increased CTI’s prominence at all levels.

CTI serves as a focal point for transportation research in Connecticut. Throughout the past year there have been discussions and meetings among CTI and UConn personnel and officials from various departments within the State of Connecticut to increase awareness of CTI/UConn’s capabilities. These meetings have included the Commissioners of the Department of Transportation and the Department of Motor Vehicles. CTI’s continued success and growth are indicative of the important mission CTI plays in meeting the transportation needs of Connecticut and the nation.

During the past year, CTI continued to work with the Connecticut Transit Working Group, which comprises transit professionals from around Connecticut. The intent of this group is to connect UConn’s research capabilities with practitioners in the area of transit. From this work, a larger initiative has emerged, t-HUB. The intent of t-HUB is to collect transit data from the various transit groups operating in Connecticut and then provide data analysis tools that the transit districts can then utilize for their decision making processes as well as their reporting requirements.

The Connecticut Transportation Institute has emerged as a leader in the State of Connecticut’s reform of vehicle crash data records management, collection and analysis. The Connecticut Crash Data Repository project (www.ctcrash.uconn.edu) at CTI was established through ConnDOT and Federal 408 Funding to provide researchers, town engineers and planners, and the public unprecedented access to crash data for transportation safety analysis. The success of this project resulted in ConnDOT funding the Connecticut Transportation Safety Research Center at CTI, which will focus on aiding ConnDOT with improving transportation safety as well as crash data quality, timeliness, accuracy, completeness and access. The Connecticut Transportation Safety Research Group was officially established on September 1, 2012.

The following continuing programs operate within the institute: the Connecticut Advanced Pavement Laboratory, the Connecticut Technology Transfer Center, and the Connecticut Cooperative Transportation Research Program. In addition to these institute programs, the Connecticut Transportation Safety Research Center began operations during the past year.

Current research and educational projects at CTI are funded by a diverse set of agencies: the Connecticut Department of Transportation, U.S. Department of Transportation – including the Federal Highway Administration, the New England University Transportation Center, North East Transportation Technician Certification Program and the six New England states through the New England Transportation Consortium. CTI has continued to enjoy strong partnerships with industry, non-profit and government agencies while at the same time developing new strategic partnerships whenever possible. CTI’s main programs include strong advisory committees that ensure the programs are fulfilling each program’s mission.

**PROGRAM HIGHLIGHTS**

*Connecticut Technology Transfer (T2) Center*
- Provided 102 trainings and special events to over 3,100 participants in the areas of safety, infrastructure management, emergency response and workforce development.
- Launched the second cohort of the Connecticut Transportation Leadership Program for Public Works professionals.
- Honored a group of professionals who have completed the Connecticut Road Master, Road Scholar, Legal Traffic Authority Certificate Programs and the Public Works Academy.
- Hosted Connecticut’s first tabletop exercise for public works professionals to discuss fuel shortage strategies in an emergency response.
- Partnered with the CT Department of Transportation and the Connecticut Police Chief’s Association in the third annual Roadway Safety Poster Contest for Children.
- *Connecticut Creative Solution Awards* were presented to the Town of Vernon and the Connecticut Department of Transportation.
- T2 Staff served on many state, regional and national committees including the Federal Highway Administration LTAP/TTAP Strategic Planning Committee, the Connecticut Strategic Highway Safety Plan Steering Committee and the Connecticut Highway Work Zone Safety Council.
- Partnered with the Connecticut Highway Street Supervisors Association (CHSSA) to host the Technology Transfer Expo with more than 60 vendors and 500 participants.
- Coordinated educational booths for the Connecticut Association of State Highway Officials (CASCO) for the 2013 Equipment and Technical Show.
- Worked very closely with Connecticut Emergency Response agencies to bring important training and resources to the public works community.

**Connecticut Advanced Pavement Laboratory (CAP Lab)**
- Presented certificate and educational programs to transportation technicians and consultants from throughout the United States and Canada.
- Continued studies with the Connecticut Department of Transportation to improve the long-term performance of construction materials. These studies included:
  - Developed specifications for a pilot project to be placed in 2013 that uses higher levels of recycled asphalt pavements as compared to current specifications.
  - The placement of a high friction pavement to improve the tire pavement friction characteristics of the pavement.
  - Forensic testing of experimental test sections placed on Route 2 in 1997 to assess the pavement at the end of its service life.
  - Monitored the placement of the first placement of asphalt pavement by the Connecticut Department of Transportation using asphalt shingles removed from residential applications.
  - Developed specification for a pilot project to be placed in 2013 that uses recycled asphalt pavement and asphalt shingles removed from residential applications.
  - Evaluated the aggregate specification for flat and elongated particles and made a recommendation for a change that was implemented by the Connecticut Department of Transportation.

**Connecticut Cooperative Transportation Research Program (CCTRIP)**
- Working with ConnDOT to maintain partial funding of the program in the state budget to allow the funding of at least one research project in FY14 and FY15.
- Funded work on four continuing projects: (1) *Structure and Properties of Ionomer Modified Asphalt*; (2) *Assessing and Quantifying Public Transportation Access*; (3) *Experimental Testing of Controllable Damping Devices toward Extending the Lifespan of Existing Highway Bridges*; and (4) *Transforming NAD 27 and NAD 83 Positions: Making Legacy Mapping and Surveys GPS Compatible.*
Connecticut Transportation Safety Research Center (CTSRC)

- New Staff additions to CTI through CTSRC
  - Mario Damiata was hired as the Connecticut Crash Data Champion. He serves as the project manager for ConnDOT’s crash improvement initiatives.
  - Wei Zeng was hired as software engineer. She is developing the next generation of the crash data repository.
  - The CTSRC hired over 35 undergraduate research assistants to aid in crash data entry.
- The CTSRC processes over 9,000 police reports a month. The data from the reports are entered into an electronic database that includes a scanned image of the report.
- The crash data repository provides public access to the state’s crash data file for use in transportation safety analysis. Multiple demos of the repository were administered to expand the base of users in the state. This included ConnDOT, Yale New Haven Hospital, Hartford Hospital and members of the law enforcement community.
- The CTSRC is actively engaged in the complete redesign of the state’s crash reporting form, data elements and electronic data collection tools.
The Center for Transportation and Livable Systems (CTLS) was established in 2005 as a federal University Transportation Center (UTC). CTLS supports research, education and outreach activities that fall under its thematic focus “Sustainable and Livable Transportation Systems for Smart Growth.” The CTLS theme engages multi-disciplinary engineering and planning activities that promote a sustainable transportation system and livable communities connected by this system. The following Sustainability and Livability Principles, jointly developed by the U.S. Department of Transportation (USDOT), the Environmental Protection Agency (EPA) and the Department of Housing & Urban Development (HUD) are represented in the research activities of CTLS:

1. Provide more transportation choices.
2. Promote equitable, affordable housing.
3. Increase economic competitiveness.
4. Support existing communities.
5. Leverage federal investment.

CTLS pursues an innovative, integrative, and multi-disciplinary vision of sustainable transportation systems under the direction of Dr. Nicholas Lownes (Civil & Environmental Engineering). In addition to the previous principles, sustainable transportation systems also harness and integrate advanced technology for communications, sensing and monitoring. Sustainable transportation systems will be less dependent on fossil fuels, and as such will utilize alternative fuels and will require supportive infrastructure and policy—all guided by cutting-edge research and outreach.

During the 2012-2013 academic year, the University of Connecticut continued its partnership with MIT – along with the University of Massachusetts–Amherst, University of Maine and Harvard – in the New England University Transportation Center (NEUTC). UConn will receive $550,000 through this partnership to execute a variety of research, education and outreach activities through January of 2016. Included in this program is a new research grant competition, a continuation of the graduate and undergraduate fellowship programs and new initiatives in distance learning and transportation workforce development.

**RESEARCH HIGHLIGHTS**

During the 2012-2013 year, CTLS coordinated a new research competition for the latest partnership with NEUTC. Three projects were selected for funding, with work beginning in the 2013-2014 academic year. The total funding recommendation was $210,000 with a one-to-one match, bringing the total funded research to $420,000. The projects selected were:

- **Crowdsourcing Real-Time Traveler Information Services: Issues, Challenges and Recommendations** (PI: K. Konduri)
- **Assessing the Full Cost of Parking Provision from the Perspective of the Municipality** (PI: N. Garrick)
- **Effectiveness of Interventions at Midblock Crossings for Improving Senior and Other Pedestrian Safety** (PI: J. Ivan)

The past year also saw continued efforts in ongoing projects, including:
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The past year also saw continued efforts in ongoing projects, including:

- Investigation of Curb Management Strategies to Minimize Freight/Cyclist Conflicts in the Urban Core (PI: N. Lownes)
- The Impact of Infrastructure and Mobility Patterns on the Variation of Traffic Fatality Rates in Industrialized Countries (PI: N. Garrick)
- Evaluation of Surrogate Measures for Pedestrian Safety in Various Road and Roadside Environments (PI: J. Ivan)
- Quantifying Transit-Oriented Development’s Potential Contribution to Federal Policy Objectives on Transportation-Housing-Energy Interactions (PI: C. Atkinson-Palombo)

EDUCATION HIGHLIGHTS

CTLS also selected the third group of Transportation Undergraduate Research Fellowship (TURF) winners in May 2012. These undergraduates competed for fellowships supporting independent transportation research projects under the guidance of CTLS-affiliated faculty at UConn. The six TURF winners were:

- Eamon Flannery (Advisor, J. Ivan): “Evaluating and Improving Pedestrian Accommodation at Signalized Intersections in Connecticut”
- Joseph Buyonje (Advisor, J. Ivan): “Effectiveness of Red Light Running Cameras on Roadways/Highways as an Accident Control Measure”
- Edwin Olivos (Advisor, D-G. Shin): “Database Component Development for the t-HUB Title VI Project”
- Nicholas Langer (Advisor, N. Lownes): “Hazardous Material Route Evaluation in the City of New Haven”

CTLS supported a senior design project in fall 2012, partnering with the Central Connecticut Regional Planning Agency to guide a team of four undergraduates in designing an intersection configuration for the Forestville, CT redevelopment project.

CTLS chose graduate student Kelly Bertolaccini as Student of the Year, for which she was formally recognized at the Transportation Research Board (TRB) annual meeting. Ms. Bertolaccini was also selected as the NEUTC student of the year.

OUTREACH HIGHLIGHTS

With the help and expertise of the communications group in the School of Engineering, we put together a Horizons Lecture Series video (www.youtube.com/watch?v=lybTQDZDv64) describing CTLS and transportation research at UConn. Safety, public transit and urban planning take center stage – heavily influenced by CTLS research on transportation for smart growth over the past five years.

The Hartford Business Journal’s Connecticut Green Guide featured CTLS on the cover of their Spring 2013 issue (www.hartfordbusiness.com/article/20120525/SPECIALEDITIONS/120529981). Several CTLS projects and researchers were featured, including Dr. Peng Zhang’s work in electric vehicle charging station technology and Dr. Norman Garrick’s work on the impact of parking policy on urban design, economics and sustainability.

A video featuring CTLS Project 11-05: “Investigation of Curb Management Strategies to Minimize Freight/Cyclist Conflicts in the Urban Core” is currently featured on Transportation TV (www.transportationtv.org/Pages/default.aspx?VideoId=324) by the American Association of State Highway and Transportation Officials (AASHTO). The footage for this video was shot during the annual meeting of the TRB in January 2013 – where the project received much positive attention.

Looking forward, CTLS has invested in t-HUB, a public transit data hub designed to help transit operators and planners in Connecticut manage big data. The early application of t-HUB is to assist in meeting FTA Title VI reporting requirements. Information on t-HUB can be found at www.thub.uconn.edu with the online tool coming soon.
CONTINUING & DISTANCE ENGINEERING EDUCATION PROGRAM
ANNUAL REPORT SUMMARY
2012-2013

OVERVIEW

Quite a number of activities were started and finished during the period from November 2012 – May 2013. The new Continuing and Distance Engineering Education (CDEE) unit was created in January 2013. After many deliberations and discussions, the list of covered areas under this unit was completed. These areas include:

- Master of Engineering
- Non-degree program
- Advanced Engineering Certificate Programs
- Customized Training and Development
- Undergraduate Summer Courses
- Online and Distance Courses
- New master programs

The CDEE program had a good year that included the introduction of a number of new initiatives and activities. Highlights appear below.

Website: With the help of the Engineering Communications Group, a new website was created for CDEE. The updated web content that was developed for the MENG program during the first few weeks was transferred to this new website and new content was developed for the newly created programs. We continue to improve and update our website to better serve our current and future customers/students.

Marketing & Recruiting: A series of Open Houses were organized and delivered as part of our recruiting activities. So far, we have had two rounds of these types of recruiting activities, one in December/January for the spring semester and one in March for the summer session. We conduct these open houses in Avery Point, East Hartford, and Farmington. We are planning to recruit in the Stratford area, too, but to date have been unable to identify a suitable location.

We participated in United Technologies Corporation’s first Virtual Education Expo on May 15. The School of Engineering shared its presentation time with the Graduate School (Kent Holsinger) and School of Business (Michael Deotte). The results were good and the presentation is recorded and available on UTC’s educational website for employees who could not participate live.

We have identified and created a list of target companies to start with our outreach activities, coordinating our efforts with the Industrial Engagement (IE) group. As part of this initiative, we visited with Electric Boat executives in the first week of April, accompanied by Engineering Interim Dean Kazem Kazerounian, and discussed new initiatives with them. We have lined up follow-up visits with EB and new visits with Pitney Bowes, GE, and Sikorsky among others that will be confirmed for later in summer.

A comprehensive study of our competitors has been conducted. WPI, RPI, Stevens, and Bridgeport are our biggest competitors. They provide more programs and concentrations in addition to many online programs and courses. The market (prospective customers) does not distinguish between our programs/degree and those of these alternate providers. In summary, our competition is tough: they have advantages in scale, available online courses, and first offerings. We need to catch up. Our advantages include a better price point and relationships with Connecticut companies. Leveraging our existing relationships will be the key, but we must offer more classes, concentrations, and programs.

Comprehensive data collection and market analyses have been done on the market size, disciplines, trends, growth potential, etc. In summary, our market is saturated. We need to capture market share from our
competitors. We have the advantage of being the largest state university with locations, access, and relationships throughout the state.

We solicited the help of Makaris Media to identify and propose a marketing campaign for all programs across CT. The research revealed two areas with high concentration of engineering firms and employees: Danbury and New Haven/Stratford. They proposed a mixed-media advertising campaign for one year which would total about $288k. We hope to be able to implement part, if not all of the advertisings suggested in this proposal to increase our open house attendance and program awareness.

**Process Improvements:** While preparing for the spring semester, we reviewed all forms and documents that were used in the past and created new procedures and forms for application and registration purposes. New forms have been updated and posted on the new website.

A number of revenue sharing models were developed and discussed, and one was selected to replace the existing model for both the MENG program and the Customized Training programs. The new model was presented to the Executive Council in January and discussed during April’s meeting. A number of follow-up questions were answered and discussed with individual department heads. We expect to finalize the model and commence using it in fall 2013.

Students were unofficially surveyed at the close of the fall semester to determine their opinions and suggestions about the courses and the program. A number of areas were highlighted for improvement based on the survey results. One involved the possibility of having faculty traveling to the projected locations (CCAT & Avery Point) for a more personal interaction among the professor and students. We have shared this information with the professors and requested a rotating schedule of lectures among all sites. Professors have been very willing to accommodate this request. Another issue involved the use of high-tech equipment in the distance education rooms. To address this issue, we worked with personnel at the Institute of Teaching & Learning (ITL) to develop a training session for all School of Engineering faculty members who are or will be teaching in the distance ed classrooms. The first session, conducted in mid-January, was very well attended and received by the faculty.

**Academics:** With the guidance and help of Senior Associate Dean, Dr. Mike Accorsi, a faculty committee was created for the CDEE program. The first task of the program was to review the curriculum of the MENG program. The committee has been very active, meeting every two weeks. We have discussed and addressed a number of issues. In spring 2013, the committee voted to reduce the total number of credits for the MENG program from 28 to 27, eliminating the 1-credit “professional practice” requirement: to restructure the program core courses to 2; and to reduce the number of electives to 6 to afford departments more flexibility in choosing their discipline’s core courses and electives. This proposal will be voted on in the first faculty meeting this fall. After reviewing the status of current students and reaching out to them for suggestions, we identified courses that we need to offer this summer. With the help of Dr. Accorsi, we identified the instructors and started working with them to redesign their course with the ITL group. We intend to showcase these classes and their results as an inducement to other faculty members to do the same; this activity would benefit the existing and future programs in development.

**Enrollments:** In spring 2013 we had 105 enrollments vs. 91 in spring 2012. We have offered four classes for summer 2013 vs. only one class in summer 2012 with enrollments of 18 and 70 respectively.

**Outreach:** The Dean identified a need for the formation of the “Industry Engagement” group with the task to coordinate all of the School of Engineering’s activities with industry. This group included a number of members who have regular contact with industry, including the CDEE group. We have contributed to the establishment of a few procedures to better coordinate our outreach activities.

**New activities:** A new International Master of Engineering program was designed. We have met with the central administration and have received their support to proceed. We proposed a new fee structure for this
program that will be reviewed by the finance committee of the Board of Trustees this summer. We hope to start recruiting for the spring or fall 2014 course terms

We have presented the CDEE unit to a few departments at their faculty meetings and have generated faculty interest in getting involved with the CDEE’s activities, which would confer benefits to the departments as well. These presentations have been well received and have generated follow-up discussions.

We have also presented the CDEE to a few of the Department’s Advisory Boards. The feedback and comments have been positive and we are hopeful they will reach out to us when the need arises. Also, it will make the request for meetings at companies much easier when we reach out to them.

A new Global Engagement team was created in the School of Engineering at the beginning of the spring semester, with Dr. Reda Ammar serving as head. We are working with this group to expand our reach globally. We have identified a few programs that could have a great market internationally, especially in the Middle East.

Ongoing discussions with our industry partners regarding their training and development needs have led us to identify a great need for a Systems Engineering program. Each industry and company has its own definition of Systems Engineering and each school/program offers various courses for this program. A comprehensive data collection and analysis was done for current program offerings in CT. In summary, we need to develop this program soon and start offering it to our existing customers. This program would provide UConn a distinct advantage over competitors.

Continuing Education: In the Continuing Education (non-credit) area, we are working to develop workshops. These types of activities would be a new revenue/exposure/feeder source for us. Dr. Arash Zaghi and Ann Brickley are members of CSCE Structural Committee group, which has focused on the design, development and delivery of an Accelerated Bridge Construction workshop tentatively slated for September 18, 2013. Drs. Kay Willie and Zaghi will be presenting at this seminar. We are working to identify other areas/groups/industries that could benefit from such a program.

In addition to the Accelerated Bridge Construction workshop, we are working with Dr. Mohammad Tehranipoor to set up, organize and deliver a number of workshops in Hardware Security in the areas of Washington D.C., California and Texas.

Customized Training and Development: We offered the first ECE PEM (Professional Enhancement Modules) to EB employees and received excellent feedback along with confirmation that this module will be repeated again the fall. Next, we will work on the development and approval of the follow-up module. Our internal marketing efforts among faculty focus on increasing awareness in order to leverage existing relationships, which is the best and fastest way to promote this new offering. We proposed, and subsequently were successful in securing, a training program with DRS Technologies. Dr. Ali Bazzi has developed the content for the program and will deliver it to a group of 10-15 engineers during the summer/fall.

Summer/Online Undergraduate Courses: There are four undergraduate courses being offered this summer. Only one of these four courses is offered in synchronous and online format. We have upgraded our Lync software to better serve students and to make the process of recording and storing the online lectures more seamless. If the Lync platform is approved for continued use, a significant investment in new equipment is needed. We are exploring opportunities to expand on our summer offerings to reduce the “bottleneck” in enrollments for our most subscribed courses, allowing our undergraduate students to progress through the program with more ease and flexibility.

A new faculty member has been hired in the Civil & Environmental Engineering department with the charge to develop a new “redesigned” course that would leverage the new technology and tools available to enhance, update, and improve the courses with most enrollments. The first course identified for this upgrade
is “Statics,” which has about 400 enrolled annually. We have begun discussions with department heads and professors who are interested in redesigning courses in collaboration with ITL personnel.

We have also reached out to the Office of Summer Enrollments to re-visit the fees and cost structure for summer courses. We have been told that there will be a committee formed this fall to review the fees and charges. We will be playing an active role in this committee to make sure our interests are represented.
ENVIRONMENTAL ENGINEERING PROGRAM
ANNUAL REPORT SUMMARY
2012-2013

STUDENTS AND GRADUATES

The Environmental Engineering (ENVE) Program currently has 17 M.S., 24 Ph.D. and 95 undergraduate majors. Several other undergraduates from the School of Engineering and other colleges pursue a minor in ENVE. The vast majority of graduate students are full-time and financially supported. During the past academic year, the ENVE Program graduated 3 Ph.D., 6 M.S. and 14 environmental engineering undergraduates. 56 full graduate applications were received: of these, 29 were offered admission into the program and 7 have accepted admission, bringing our projected total number of graduate students to 36 for fall 2013. In addition, 9 post-doctoral researchers are associated with the ENVE Program.

FACULTY

Detailed activities of the ENVE faculty can be found in the annual reports of their home departments. However, as an indicator of their high level of collective scholarly activity it can be mentioned that the core of the ENVE faculty (i.e., those with primary appointment in the Department of Civil & Environmental Engineering) published 49 journal articles, authored 16 full-paper conference proceedings, and made 52 presentations during this past year.

Dr. Nelly Abboud (CEE) is on long-term disability leave. Drs. Mekonnen Gebremichael and Guiling Wang were Al Geib Term Professors in Environmental Engineering Research and Education. Dr. Allison MacKay is the United Technologies Corporation Associate Professor in Engineering Innovation. Dr. Emmanouil Anagnostou is the Northeast Utilities Foundation Endowed Chair in Environmental Engineering.

Across the program, external funding continues to be strong, with over $1.9 million in research expenditures and more than 47 active extramural and intramural grants totaling more than $4 million (for core ENVE faculty only). Our ENVE faculty members hold many positions of administrative authority. Dr. Glenn Warner (NRME) is the Director of the Connecticut Institute of Water Resources. Dr. Michael Willig (EEB) is the Director of the Center of Environmental Sciences & Engineering. Dr. Bagtzoglou (CEE) is Head of the Civil & Environmental Engineering Department. Dr. Anagnostou (CEE) is the Environmental Engineering Program Director. Drs. Anagnostou and Bagtzoglou are members of the Connecticut Academy of Sciences and Engineering; Dr. Bagtzoglou is also a Member of New York State Academy of Sciences. Dr. Bagtzoglou is Fellow of the American Society of Civil Engineers and of the Institution of Civil Engineers.

Dr. Anagnostou (CEE) is the newly elected chair of the AGU Precipitation Committee, member of the EGU Hydrology Committee, and member of NASA’s Precipitation Science Team. Dr. Gebremichael is a member of NASA’s Precipitation Science Team. Dr. Bagtzoglou (CEE) is a member of the AGU Hydrology Section Groundwater Technical Committee, the ASCE Groundwater Hydrology Committee, the IAEG Commission 14 (Underground Disposal of Waste), and the Science and Technical Advisory Committee for the EPA Long Island Sound Study.

Dr. Li is an Editorial Board member for Water Journal and Clean-Water, Soil, Air; Dr. Wang is an Editorial Board member for the Open Journal of Ecology; Dr. Gebremichael is an Editorial Board member for Remote Sensing, and Dr. Bagtzoglou is an Editorial Board member for Environmental Forensics, The Open Civil Engineering Journal, The Open Environmental Engineering Journal and Stochastic Environmental Research and Risk Assessment. Drs. Anagnostou, Bagtzoglou, Gebremichael, and Lanbo Liu (all of CEE) serve as associate editors for the Journal of Hydrology, the Open Environmental Engineering Journal, Atmospheric Research, and the Journal of Environmental and Engineering Geophysics, respectively. Dr. Xiusheng Yang (NRME) serves as Editor-in-Chief for Advances in Agricultural Science and Technology. Dr. Gebremichael
(CEE) serves as UConn’s representative to the Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI).

At the international level, Dr. Anagnostou (CEE) is a member of the International Committee on Earth Observation Satellites (CEOS), the International Science Steering Committee of HyMEX Project and the advisory board of the European Meteorological Satellites (EUMETSAT) organization. Dr. Gebremichael (CEE) is a member of the Statistical Hydrology Working Group (STAHY) of the International Association of Hydrological Sciences (IAHS). As in previous years, ENVE faculty had significant involvement in international conferences, including the AGU fall and spring meetings, the EGU general assembly and numerous other international conferences.

In addition to the more than 30 proposals submitted by core ENVE faculty this year, our faculty continued to develop several new international research proposals with colleagues from Denmark, Israel, Greece, Germany, France, Italy, Ethiopia, China, and the United Kingdom. We particularly note two of those proposals. The first is an NSF Partnership for International Research and Education (NSF-PIRE) proposal aiming to address water and human security issues in Ethiopia, building upon our ongoing international higher education development and outreach activities in Ethiopia. The second was a multi-institution proposal submitted to the Belmont Forum/G8 Research Councils International Opportunities Fund seeking to improve freshwater security and climate adaptation in Ethiopia. The program successfully secured a two-year continuation of the USAID/HED project in Ethiopia aiming at the development of educational capacity in the area of water resources through our newly established Ethiopian Institute of Water Resources. Furthermore, over the past year ENVE faculty have led the development of a proposal submitted to the Northeast Utilities for the establishment of a university-wide Center of Excellence on Resilient Energy. Initial bridge-funding for the proposed center was secured at a level of $2 million.

OUTREACH

ENVE faculty participated in many outreach activities and events for the undergraduate program. These activities included school career fairs, the Engineering 2000 summer program, the ENGR 1000 environmental workshop and the Connecticut Invention Convention. The program was well represented at the fall and spring open houses.

PROGRAM

ENVE faculty participated in a variety of important activities at the University and School levels: the National Research Council survey, high-profile fundraising events (e.g., IBM, Connecticut Department of Environmental Protection, U.S. Department of Homeland Security), the Provost’s Academic Plan Committee, and the INTD Courses & Curriculum Committee. The weekly seminar series continues to be a success, as evidenced by high and steady attendance. It is a forum that fosters interactions and enhances visibility. The ENVE graduate program has been ranked by the UConn Committee for Excellence in Graduate and Professional Program to have the potential to achieve national distinction. This evaluation was based on externally derived data for our program’s quality and performance. It is one of only two graduate programs in the School of Engineering and one of just eight UConn graduate programs (out of almost 70) to receive this distinction. ENVE received the highest rank (79th percentile) among these programs. Moreover, it was highly ranked in journal publications per faculty, and median time to degree.

Significant participation of ENVE faculty and students in national and international conferences, high-profile publications in archival journals and book chapters, professional accreditation, and involvement in seminars and collaborative research continue to bring national recognition and respect to the ENVE Program.
STUDENTS AND GRADUATES

The Management and Engineering for Manufacturing (MEM) program had 14 graduates during the academic year. For the fall 2012 term, the MEM program received 56 applications; 25 students were accepted, and of these, 12 matriculated.

OUTREACH

MEM faculty participated in many outreach activities and events for the undergraduate program. These activities included School of Engineering career fairs, the Explore Engineering and YESS Summer programs, the ENGR 1000 engineering presentations, and the Connecticut Invention Convention. The program was represented at the fall and spring open houses by Drs. Zbigniew Bzymek and Diane Van Scoter, along with members of the MEM Society. Dr. Bi Zhang also represented MEM at the spring open house. The MEM student society held their annual spring banquet. Current students, alumni, industry leaders, and family members of students receiving awards were in attendance.

EDUCATIONAL HIGHLIGHTS

This year’s senior projects were sponsored by Frito-Lay, MorphoTrust (3 projects), Dymax (2 projects), Pratt & Whitney, Sikorsky Aircraft and Clear Edge. Most projects were done by a team of two students, with the exception of the Pratt & Whitney and Sikorsky Aircraft projects, which were completed by individual students.

PROGRAM

The faculty adopted two changes in the program’s courses. The first of these, to accommodate changes to the Civil Engineering (CE) program, involved removing CE 2120, Dynamics, as a required course. With this course deleted, OPIM 3801, Program Management, was added to broaden students’ knowledge.

FACULTY RECRUITING

A new Assistant Professor in Residence with expertise in industrial engineering and materials science was hired this past academic year for a nine-month opportunity. Dr. Van Scoter, who received her Ph.D. in Industrial Engineering from Oregon State University, joined our program and taught several courses. She was named as the new School of Engineering director for the MEM program in April. Another change in leadership this year was the appointment of Dr. Robert Day as the School of Business director for the MEM program.
UNDERGRADUATE PROGRAMS OFFICE
ANNUAL REPORT SUMMARY
2012-2013

During the 2012-2013 academic year, the School of Engineering Undergraduate Program enrollment continued to grow at a rate much greater than the national growth rate for engineering programs. The School of Engineering experienced a 60% increase of paid deposits for fall 2013. The increase translates to the largest entering freshman class in the School of Engineering. The paid deposits of 694 will yield a class of 675 entering freshmen in fall 2013.

The fall 2012 entering class of 460 students exceeded our planned recruiting goal of 400 entering students by 15%. The undergraduate student body has increased to 2,135 students, a 9% increase compared to fall 2010. Enrollments in our Biomedical Engineering and Mechanical Engineering programs continue to show the largest growth. The combined student enrollment of these two majors represents 45% of the School’s undergraduate population. The academic quality of the entering engineering students continues to improve, due in part to our local, regional and national reputation for offering challenging programs, industry internships and co-ops, entrepreneurship opportunities and the strong demand for our graduates. The average SAT score of entering freshmen was 1320 (of a possible 1600 maximum), which is approximately 80 points higher than the average SAT score of freshmen entering UConn’s other programs. The School of Engineering’s first-year promotion rate was 92% for the second year in a row.

The School of Engineering hosts three career fairs annually and conducts many career workshops throughout the year; these activities contribute to our impressive 80-85% placement rate for graduating seniors even in today’s challenging economy. With the hiring of the School’s own career specialist, it is anticipated that our placement rate will increase in each succeeding year.

UConn Engineering continues its membership in the Global Engineering Education Exchange (GE3) Program, making it extremely easy for engineering students to study abroad in 17 countries and 41 universities. Additionally, UConn partners with Universitas 21 and the School of Engineering has formed several new relationships with other international universities (i.e., Lund University, Chulalongkorn University, Second University of Naples and King Saud University, to name a few).

UNDERGRADUATE DEMOGRAPHICS
The School of Engineering’s undergraduate student demographics are: 80% male, 20% female, and 34% non-Caucasian/no Indication. Female enrollment has increased by 37% since fall 2009, to 436 in fall 2012; 22% of the freshman class were female. Over the same time period, the ethnic diversity of the School’s undergraduate population has experienced a similar change. The percentage of students who self-identify as Black, Hispanic, American Indian, two or more ethnicities, and “no indication” totals 22%, while students who self-identify as Asian American total 12%.

For the 2012-13 academic year, we admitted 44 valedictorians and salutatorians. Thirty-two students are members of the Tau Beta Pi engineering honor society; 111 students are members of discipline-specific honor societies; and 453 undergraduates are members of the University’s Honors Program. The Dean’s List acknowledged 470 continuing students whose cumulative grade point average (CGPA) was 3.657 or greater in the fall ’12, and 451 continuing students in the spring ’13 with a CGPA of 3.616 or greater.

The University of Connecticut has an excellent Honors Program that enriches the undergraduate experience of 1,942 students throughout the four-year curriculum. The School of Engineering continues to have the highest percentage of Honors students among the eight schools and colleges at the University, with 453 engineering student members, or 23% of the total Honors population.
The Assistant Dean’s involvement as a member of the College of Technology advisory board has resulted in a significant increase of transfer students from this 12-campus state system. The number of enrolled internal and external transfer students continues to grow due to outreach efforts at the community and technical colleges as well as UConn’s Academic Center for Exploratory Students (ACES). Another factor driving the greater enrollment and retention of external transfer students and students transferring from one of UConn’s regional campuses is a one-credit seminar course taught by our Director of Advising. The four-year graduation rate from the School of Engineering is approximately 55% compared to the national six-year graduation rate of 41% from ABET accredited institutions. The four-year graduation rate of underrepresented engineering students who complete our five-week residential BRIDGE Program is 71%.

This year, 525 students graduated with a placement rate of 82%. In spring 2013, the School of Engineering awarded more than $710,500 in scholarships to 312 continuing students.

**OUTREACH**

The School of Engineering continues to support various outreach/recruiting initiatives throughout the year. In addition to the highly successful fall open house and spring Visitation Day involving faculty, students and staff, the School of Engineering conducts outreach to students and teachers in middle and high schools throughout the State and region. The largest event hosted by the School of Engineering this year was the Connecticut Invention Convention’s 25th Anniversary and our 12th year of supporting this event. Over 650 K-8th grade students representing 150 schools brought their inventions to Gampel Pavilion to be judged by more than 300 professionals and to be seen by more than 4,000 spectators. As an initiative to promote, motivate and support 8th grade CIC inventors, the School of Engineering awards an “Early College Experience (ECE)” certificate. This certificate will fund one three- or four-credit ECE course offered in their high school. This STEM initiative will result in students being able to take any UConn course offered in their high school at no cost to them.

The School of Engineering hosted its third school-wide Senior Design Demonstration day at Gampel Pavilion on May 3, 2013. The 142 senior design teams from across the School of Engineering – most of which were sponsored by engineering corporations – discussed, demonstrated and presented their year-long design projects. Some departments held competitions and selected winners based on specific criteria. The projects were open to the public for afternoon viewing. The event was well attended and gave the corporate team sponsors and student teams an opportunity to showcase the accumulation of a year of research and design into a final product. This year we hosted a 10-year alumni event that coincided with the School-wide Senior Design Exhibition.

As an outreach activity focused on bringing talented high school students to the School of Engineering, for the eighth consecutive year we organized, sponsored and hosted the 2013 Northeast Science ‘Super’ Bowl regional championship (NESB) for high school students. This year’s event included a **fuel-cell car race competition**. The NESB drew 42 science bowl teams from across New England. Our 2013 ‘Super’ Bowl NESB champions were Lexington High School, MA and Glastonbury High School, CT. Both of these schools represented our region at the Department of Energy’s National Science Bowl tournament, which took place in Washington, DC. Lexington High School earned third place out of more than 100 U.S. regional winners competing in the nationals.

The *da Vinci Project*, now in its 13th year, is a one-week residential summer program which introduces middle and high school science, mathematics, and technology teachers to engineering. It continues to be highly regarded by attendees. In July 2012, 16 teachers attended this program and participated in a variety of hands-on workshops such as mathematical optimization, fuel cell technology, solar cell technology and water processes.

Our one-week Explore Engineering residential program, now in its 15th year, introduces participating high school juniors and seniors to engineering disciplines via a variety of hands-on experiments and allows them...
to focus in a particular engineering discipline. This program continues to be popular as evidenced by over 190 applications this year. Attendees are nominated by their high school math and science teachers. In summer 2013, 102 students from eight states attended this residential program. Of these, 31% are female, up from 26% last year. We believe this program has helped to increase the number of undergraduate women in engineering at UConn to 20%.

Engineering Ambassadors has been an active student outreach program since the fall of 2010. This program partners with Penn State University, Rensselaer Polytechnic Institute, and Worcester Polytechnic Institute and an industry partner, United Technologies Corporation, to provide engineering activities to local schools and communities near each university. UConn Engineering Ambassadors consists of approximately 100 undergraduate students. This group provides on-campus tours to local school groups and prospective students, takes engineering presentations and hands-on activities to local schools for in class presentations and supports community events and STEM fairs across the state. For the 2012-2013 academic year, the group hosted more than 600 middle and high school students on campus and delivered presentations to more than 10,000 students in their classrooms. A subset of Engineering Ambassadors, the 32-member UTC Engineering Ambassadors Presentation Team, participated in an annual communications and presentation training workshop at Worcester Polytechnic Institute and continues to build and give presentations with a specific engineering message based on findings from “Changing the Conversation: Messages for Improving Public Understanding of Engineering,” a report from the National Academy of Engineering. This program and its outreach efforts continue to strengthen the relationships the School of Engineering forms with neighboring K-12 schools through our other programs. A major focus for Engineering Ambassadors is to increase the number of underrepresented students in engineering and to better educate the public about engineering. Through this program, the student Ambassadors gain oral communications and presentation experience, networking opportunities, and organizational and leadership skills that will better prepare them for positions of leadership in their future careers.

The First in Family S-STEM program, funded through the NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program, provides scholarships to students from the Connecticut Technical High School System who are interested in careers in energy engineering. This program funds 20 scholarships annually of up to $6,500 for students from economically disadvantaged families, with a particular focus on those who will be the first in their families to attend college. The First in Family Energy (FIFE) scholarship program at UConn started in September 2010 and completed its second year in May 2012. This program integrates five Ph.D. graduate mentors with FIFE students and provides a process for Technical High School graduates to earn a B.S. degree in engineering. The table below summarizes the demographic statistics of the partnering schools.

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<th>2010-2012 Statistics of First Schools in this Project</th>
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<td><strong>Tech School / Town</strong></td>
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<td>Goodwin/Newington</td>
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<td>Academy of Engineering and Green Technology/Hartford</td>
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Engineering disciplines – often requiring intensive study in mathematics, computing, physics and chemistry along with engineering coursework – are widely acknowledged as among the most rigorous courses of academic study. One result is that engineering programs nationwide exhibit relatively low retention rates from the freshman to senior years. Some studies suggest inadequate STEM preparation, lack of community,
and insufficient support networks contribute to lower retention rates across the four year curriculum. To enhance the success and retention of FIFE Scholars, the School of Engineering has applied a series of integrated measures aimed at building a sense of “community,” fostering a strong support network, providing learning tools and academic help.

An important first step to prepare newly-admitted technical students is to invite them to participate in the five-week residential BRIDGE Program at UConn the summer before matriculation. This 21-year old program provides intensive instruction in math, science (Chemistry and Physics) and computing to participating students. Read more about BRIDGE below.

**DIVERSITY**

Recruitment of ethnically, culturally and gender-diverse populations of faculty, staff and students is critical to a successful academic program. The School’s Diversity Director, Kevin McLaughlin, is the primary contact and coordinator of all Engineering Diversity Program (EDP) activities. Our fall and spring semester Saturday morning Pre-Engineering Program (PEP) for underrepresented students in grades 7-9, targeting primarily urban school districts, remains stable at 45–55 students. In 2012-13, PEP relied upon 15 engineering undergraduate student mentors who guided the PEP students with their hands-on projects each week and served as the younger students’ mentors, role models and confidants. Our 19th annual all-day Multiply Your Options (MYO) Conference for 8th-grade females was expanded to two days this year so that we could accommodate more students. Each day featured 12 different hands-on morning workshops led by a female engineering undergraduate. Other activities included Tool Clues, a “guess my occupation” game with engineers and scientists, many of whom were UConn graduates. MYO was attended by over 410 students and their teachers. In April 2012, the EDP organized and hosted its inaugural Engineer Your Future (EYF) conference, which is similar to MYO but intended for 8th-grade minority males. This year’s EYF conference was a great success: more than 106 boys participated in 12 different workshops and Tool Clues activities.

The EDP Program conducted the five-week BRIDGE program, a residential summer program for newly admitted freshmen from underrepresented populations. The program “primes” the students for the demands of the engineering curriculum through classes in calculus, chemistry, physics and programming, and includes study sessions, group activities and on-site industry visits. Fifty-three students completed the 2012 annual BRIDGE program. This year we initiated a collaboration between UConn Health Center’s Health Career Opportunity Program (HCOP) and UConn Engineering’s Diversity Program. The BRIDGE program now accepts up to 10 HCOP students for this summer program. Our biomedical engineering students with the 10 HCOP students are now introduced to the health care profession by touring various departments and laboratories at UCHC.

A number of the student chapters of professional engineering societies remained active and committed to the recruitment and retention efforts of the EDP. The NSBE, SHPE and student chapters have continued their recruiting activities in Hartford, East Hartford, Middletown, Bridgeport and Bloomfield. Members of the NSBE student chapter sponsored weekly study sessions, conducted biweekly technical seminars and current event discussions for all students, raised scholarship funds and organized their annual Thanksgiving Day food drive. This year NSBE was also very involved in helping the EDP host its first-ever EYF conference for 8th-grade minority boys.

On a weekend in September 2012 NASA representatives visited the campus to train our SHPE volunteers for the National Space Science Day (NSSD) conference. Subsequently, over two days in October, SHPE hosted 350+ Connecticut middle school students and their teachers. The School of Engineering and SHPE have applied to NASA to host another NSSD next academic year.

The Society of Women Engineers (SWE) had an extraordinary year culminating by hosting the Regional SWE conference. The conference’s keynote speaker was Mrs. Elizabeth (Betty) Shanahan, Executive Director and CEO of SWE. Three hundred and twenty-five students and professionals attended this 3-day
conference. Organizational efforts and participation of the SWE membership were instrumental in the success of this year’s two MYO conferences for the 410 8th-grade girls who attended.

In the spring of 2013, for the third year, the School offered a two-credit Engineering for Impact class. This class germinated during a presentation made to the school in 2010 by alumnus Scott Case, who suggested that the School offer a class that would help engineering student organizations and their leadership with retention, recruitment, organization’s mission and would also help students become more effective leaders. The class had 54 students, including the majority of the executive boards of EWB, NSBE, SHPE, SWE and Engineering Ambassadors (EA). In addition to volunteer work in the community, the class concluded with a very successful poster session. Student feedback was overwhelmingly positive in terms of the value of the class to themselves and to their organizations.

**ACADEMIC RESOURCES**

The School of Engineering continues to offer 84+ hours of peer tutoring weekly for lower division courses in mathematics, chemistry, computer programming and physics. Additionally, tutoring is available for upper division engineering courses. These academic resources have maintained our freshman-sophomore year promotion rate at 92%. Thanks to a sustaining grant from an anonymous alumnus and professional honor society student members, we have been able to expand our tutoring to include upper division courses in the junior year of many majors.

The Undergraduate Program office has instituted a Living Learning Community (LLC) for the Eurotech Program (which confers B.S. degrees in both engineering and German) in the same residence hall as Global House. The LLC, which has grown to 35 residents on the floor, serves as a great academic resource for students. The Engineering co-Director of the Eurotech Program is also our Director of Advising and is very engaged in the Eurotech LLC.

The School of Engineering continued to support the Engineering LLC in the Goodyear residence hall, which had 80 entering freshmen and 40 returning students as ‘Big Brothers – Big Sisters’ to mentor the entering students. Evening tutoring is available in the LLC and the Engineering Ambassadors continued to serve as additional mentors and to provide academic and moral support for our residents in the LLCs.

**ACADEMIC EXCELLENCE**

The School of Engineering has hired 22 new faculty members this year. The State of Connecticut: approved construction of the inaugural UConn Tech Park Building; successfully attracted the Jackson Laboratories to build a state-of-the-art facility next to the UConn Health Center in Farmington, CT; obtained funding for BioScience Connecticut; and approved the transformative Next Generation Connecticut legislation. All of these initiatives have resulted in new faculty hires this year and continued faculty growth until we reach 160 faculty members. The undergraduate student body is expected to grow to 3,000 students by 2016. As the demand for well-educated engineers with diverse experience continues to grow, the School is creating a new major, *Systems Engineering*. Two minors also directly address industry needs: *Electronics & Systems*, offered by the Electrical & Computer Engineering Departmentm and *Engineering Management*, offered jointly with the School of Business. As new faculty members are hired under the Eminent Faculty Initiative, the School is able to offer certificates and concentrations in emerging energy fields. As previously stated, the School continues to encourage students to become engaged in exceptional learning opportunities afforded by internships, co-ops and Study Abroad programs such as *Universitas 21* and GE3 programs.