

Annual Report

SCHOOL OF ENGINEERING

2011 2012



**UNIVERSITY OF CONNECTICUT
SCHOOL OF ENGINEERING ANNUAL REPORT
2011-2012**

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ANNUAL REPORT SUMMARY SCHOOL OF ENGINEERING 2011-2012

The School of Engineering continued to make significant strides in its educational, research and outreach missions during the 2011-12 fiscal year. Continuing the trend of the last 15 years, undergraduate and graduate enrollments continued to climb, research expenditures increased, faculty and students received prestigious honors, and the School of Engineering expanded collaborations with the business/industrial community in innovative ways.

With the State's successful courtship of personalized medicine giant Jackson Laboratory to Farmington, CT, the School of Engineering will become engaged in a greater number and quality of biotech and gene-related research and development. To this end, during the year we began to lay the groundwork for close collaborations among faculty at the UConn Storrs, UConn Health Center and Jackson Laboratory campuses. We are partnering in the University's emerging Genomics Institute, which will focus on advanced research and training in genome science and technology that will raise the profile of genomics at UConn.

Other high-impact projects took shape during the year, including plans for the new engineering building, slated for completion in 2015 and to be constructed near the University Infirmary. Similarly, plans for an \$18 million, 125,000 sq. ft. Innovation Partnership Building to be constructed in the state-bonded \$170 million Storrs Tech Park were more clearly articulated. With a focus on manufacturing and advanced product development in such industries as aerospace, defense, biotechnology, and energy, the building will include laboratories outfitted with specialized research equipment, space for business incubators and office space for existing companies.

The School of Engineering had research expenditures of over \$42 million (\$32M among Storrs faculty plus \$10 million in expenditures among Biomedical Engineering faculty at the UConn Health Center), for the period July 1, 2011 – June 30, 2012.

A 400 kW PureCell fuel cell power plant developed by UTC Power (South Windsor, CT), was commissioned at the UConn Depot Campus in April. The unit will serve as an educational and research tool, and will provide energy to critical research labs and offices, including those working on advancing fuel cell and microgrid technology at the Center for Clean Energy Engineering (C2E2). The installation was funded by a federal stimulus grant from Connecticut's Clean Energy Finance and Investment Authority. Each year, the PureCell system will reduce CO₂ emissions by over 831 metric tons and NO_x emissions by the equivalent of 110 automobiles relative to conventional power; and save 3.9M gallons of water. The official commissioning ceremony featured remarks by UConn President Susan Herbst, Interim Provost Mun Y. Choi, UTC Power vice president and general manager Joe Triompo ('79), State Senate President Pro Tempore Donald Williams, and other officials.

ADMINISTRATION

School of Engineering Dean Mun Y. Choi was tapped to serve as Interim Provost at the University of Connecticut and began his official duties June 1. Dr. Choi will remain in this role while a national search ensues to fill the Provost position. Also effective June 1, Associate Dean for Research & Strategic Initiatives, Kazem Kazerounian, stepped into the role of Interim Dean of the School of Engineering, and professor and former Department Head of Civil & Environmental Engineering Michael Accorsi was selected Associate Dean for Research & Graduate Education. Assistant Dean for Graduate Education &

Diversity Jun-Hong Cui has successfully completed her term and stepped down from her administrative role to return to the Computer Science Department and continue with her research activities.

INSTITUTIONAL RESEARCH

Faculty members were highly successful this year in securing interdisciplinary, multi-institutional large grants. A small, representative sampling of the largest grants are summarized below.

Drs. Brian Willis and Yong Wang of CMBE received a \$537k grant from the U.S. Department of Defense/Office of Naval Research (DOD/ONR) for work involving chemical sensing; Drs. Krishna Pattipati and David Kleinman of Electrical & Computer Engineering receive a grant totaling \$1.15M from DOD/ONR for research involving dynamic planning in command and control of unmanned and undersea systems; a team including Drs. Ranjan Srivastava, Leslie Shor, William Mustain and other collaborators received a prestigious \$2 million NSF Emerging Frontiers in Research and Innovation grant for work involving microbes found in the guts of termites and aimed at assessing their potential energy generation.

Dr. Ali Gokirmak (Electrical & Computer Engin.) received a five-year NSF CAREER Award to conduct research involving phase change materials and electro-thermal effects at the nanoscale. It is the 26th CAREER Award received by current UConn engineering faculty and the 14th awarded since 2007.

HONORS & AWARDS

Engineering faculty received a number of distinctions and awards during the year. Dr. Yaakov Bar-Shalom, Board of Trustees Distinguished Professor (ECE) and the Marianne E. Klewin Endowed Professor in Engineering, received the 2012 Connecticut Medal of Technology for his pioneering advancements in radar and sonar technology, and his significant contributions to strengthening the nation's defense and air transport systems as well as Connecticut's role in sonar research and development.

Three UConn engineering faculty were inducted into the Connecticut Academy of Science and Engineering (CASE) in the 2012 class: Radenka Maric, Pamir Alpay and Prabhakar Singh – all of CMBE. Two members of the School of Engineering Advisory Board were also inducted: Paul R. Adams, Senior Vice President of Engineering and Operations, Pratt & Whitney; and Peter J. Halvordson, Vice President – Engineering and Design, General Dynamics Electric Boat.

Interim Provost Dr. Mun Choi was elected a Fellow of the American Society of Mechanical Engineers (ASME). Dr. Amvrossios “Ross” Bagtzoglou, Head of the CEE Department, was elected a Fellow of the American Society of Civil Engineers (ASCE) and the Institution of Civil Engineers (ICE). Dr. C. Barry Carter (CMBE) was elected a 2011 Fellow of the American Association for the Advancement of Science (AAAS). In addition, Dr. Amir Faghri (ME) was awarded the Max Jakob Memorial Award by ASME and AIChE for eminent scholarly achievement and distinguished service in the area of heat transfer.

FACULTY

Five outstanding faculty members were named inaugural Castleman Term Professors in Engineering Innovation: Drs. Yu Lei (CMBE), Horea Ilies (ME), Nick Lownes (CEE), Laurent Michel (CSE) and Mohammad Tehranipoor (ECE).

Dr. Emmanouil “Manos” Anagnostou (CEE), the Northeast Utilities Endowed Chair in Environmental Engineering, received the UConn Alumni Association's 2011 Faculty Excellence in Research Award for his contributions to hydrometeorology.

The School of Engineering welcomed 10 new faculty members. Joining the Mechanical Engineering Department were Zhuyin Ren (Cornell University) and Ikjin Lee (University of Iowa); new to the Civil & Environmental Engineering Department was Arash E. Zaghi (University of Nevada, Reno); ECE welcomed Shalabh Gupta (Pennsylvania State University); joining CSE were new faculty members hired in relation to the Provost's Biomedical Informatics Initiative: Mohammad Maifi Hasan Khan (University of Illinois at Urbana-Champaign) and Athanasios Bamis (Yale University); and the CMBE Department welcomed Anson Ma (University of Cambridge) and Aravind Suresh (UConn).

STUDENTS

In May, the School graduated over 400 undergraduates during commencement festivities that featured honorary speaker Dr. Arunava Majumdar, Acting Under Secretary of Energy for the U.S. Department of Energy and Director of the Advance Research Projects Agency – Energy or ARPA-E. Dr. Majumdar also toured UConn's Center for Clean Energy Engineering (C2E2). More than 180 M.S. and Ph.D. students also received their diplomas in May, having completed their theses from August '11 through May '12.

In March, the School celebrated two important events: the 25th anniversary of the BRIDGE Program and the School's annual Scholarship Reception and Awards Ceremony. BRIDGE is an intensive, residential summer preparedness program for entering freshmen from populations traditionally underrepresented in engineering, who have been admitted for the fall term. Alumnus Tilton L. Hughes (B.S. Mechanical Eng., '73) served as ceremonial host. During the Scholarship Reception and Awards Ceremony, more than \$530,000 in merit scholarships – sponsored by generous alumni and industrial friends – were presented to over 235 continuing undergraduate students. In addition, graduate students were awarded more than 180 competitive federal, foundation, international and society fellowships.

A number of undergraduate and graduate students received honors during the year. Ragini Phansalkar ('14), a double major in biological sciences and computer science, was named an honorable mention for the Barry M. Goldwater Scholarship. Civil & Environmental Engineering doctoral student Kelly Bertolaccini (adv.: Dr. Nick Lownes) received a 2012 Dwight David Eisenhower Graduate Fellowship; Erik Carboni, a Ph.D. candidate (adv.: Dr. Anson Ma, CMBE) and senior Brittany Nkounkou (Computer Science & Engineering), received National Science Foundation Graduate Research Fellowships. Biomedical Engineering sophomore Lia Bonacci received a Naval Research Enterprise Internship Program (NREIP) award; Mechanical Engineering doctoral student Shaopeng Liu (adv.: Dr. Robert Gao), won the Philips Young Investigator Award 2nd prize presented by the IEEE Engineering in Medicine and Biology; Electrical & Computer Engineering students (adv.: Dr. Mohammad Tehranipoor) Nicholas Tuzzio, Xuehui Zhang, and Andrew Ferraiuolo won first and third-place finishes in two competitions at the Polytechnic Institute of New York University CyberSecurity Challenge (CSAW).

Senior Civil & Environmental Engineering students Scott Cipoletti and Dana Boyer, joined by their advisor, Dr. Marisa Chrysochoou, received an award and \$15,000 in funding from the U.S. EPA to support an ongoing project of the UConn chapter of Engineers Without Borders. The project involves the stabilization of a chronically washed out roadway connecting the impoverished shantytown community of la Prusia, Nicaragua with the nearby historic city of Granada.

The NSF-supported GK-12 Program, which immerses selected doctoral students in Connecticut Tech School math, science and technology classrooms, continued to achieve important successes. During the year, 11 GK-12 Fellows worked with students in eight participating schools to explore and apply scientific and mathematical principles to engineering projects. NSF honored UConn's GK-12 program as the co-recipient of the Outstanding Media Award during a March annual meeting in Washington, DC in recognition of the team's dedicated and effective efforts to publicize the results of its outreach efforts.

During the year, Dr. Jun-Hong Cui, aided by Ms. Andrea Caluori-Ramos, organized three professional development seminars that were intended to help engineering graduate students polish their skills. The workshop topics included Effective Teaching Skills, Technical Writing, and Effective Leadership. The programs received an enthusiastic response from attendees. The team also organized a first-ever poster forum for graduate students, held in conjunction with an Innovation Connection networking event. More than 80 graduate students displayed posters summarizing their scholarly research.

UNDERGRADUATE EDUCATION & OUTREACH

There are 2,006 full-time undergraduates in the School of Engineering. In fall 2011, 433 full-time freshmen were enrolled, with an average combined (verbal and math) SAT score of 1294: a 20-point rise from 2010. Continuing the trend of recent years, there was a rise in diversity of the undergraduate class: 25% of the freshman class was female, and 12% were students from diverse ethnic backgrounds. Approximately one-fourth of students in the freshman class were participants in the University Honors Program.

In March, the School of Engineering celebrated the 25th anniversary of the BRIDGE Program, an intensive, residential summer preparedness program for entering freshmen from populations traditionally underrepresented in engineering, who have been admitted for the fall term. The intensive, highly successful program provides qualifying students a suite of educational support activities, from summer coursework in math, physics, chemistry and computing, to mentorship and tutoring.

The greatest share of undergraduates resides within the Mechanical Engineering Department with 460 full-time undergraduates during the 2011-12 school year. The Biomedical Engineering Program enjoyed enrollments of over 311 undergraduates. Chemical Engineering and Civil Engineering had full-time undergraduate enrollments of approximately 220 and 212, respectively.

During the fall, Assistant Dean for Graduate Education & Diversity Jun-Hong Cui launched the STEM Pre-Grad Fellows Program, designed to nurture interest among undergraduates in pursuing graduate degrees. The program offered workshops on a variety of topics, from preparation for the GRE and grant-writing to academic careers and innovation.

Three faculty teams received funding from NSF to support new Research Experiences for Undergraduates (REU) sites enabling 20 undergraduates yearly, from across the nation, to engage in summer research at UConn involving Bio-Grid Initiatives; Cyber-Aquatic Systems; and Innovation & Entrepreneurship Through Academic-Industrial Partnerships. These awards bring our total number of active REUs to six.

ALUMNI

The School welcomed UConn alumna Kylene A. Perras ('01) as one of two UConn Foundation personnel who foster closer and more enduring relations with alumni and assist alumni and friends in supporting the School of Engineering's mission through donations and endowments. She works closely with Donald Swinton, Associate Director of Development, Before coming to UConn, Kylene lobbied the state and federal government on behalf of Murtha Cullina's Government Affairs Group, specializing in higher education and healthcare advocacy.

Also joining the School of Engineering was UConn alumna Heidi Seifert Douglas, as Director of Engineering Alumni Relations. A member of the Engineering Advisory Board and Chair of the Capital Campaign Committee, Heidi is an entrepreneur who has generously shared her expertise and vision with the School of Engineering for years.

In April, the School of Engineering recognized 10 alumni and friends for their exceptional records of accomplishment in engineering. The Distinguished Service Award was presented to J. Michael McQuade, Senior VP for Science & Technology at United Technologies Corp. Distinguished Professional Achievement Awards were presented to: Anne Bartosewicz (B.S. '81), Project Director in the Transmission Business Unit of NU; Mark S. Bennett (Ph.D.'89), Program Manager for General Dynamics Electric Boat's Independent Research & Development (IR&D) Program; Clifford Carter (M.S., Ph.D. '72, '76), Senior Civilian and Technical Leader in the Sensors and Sonar Systems Department of the Naval Sea Undersea Warfare Center; Janet H. Daniels (B.S.'84), President of Daniels & Associates, P.C. in Virginia; Ronald Jacoby (B.S.'87), VP of Yahoo! Inc.'s Connected TV; Jackson E. Morgan (M.S. '70), Director of Propulsion Plant & Ship Systems Design & Engineering at General Dynamics Electric Boat; Ryszard J. Pryputniewicz (M.S., Ph.D.'74, '76), the K.G. Merriam Professor of Mechanical Engineering at Worcester Polytechnic Institute (WPI); Paul H. Singer (B.S. '88), General Manager of Engineering for GE Energy's Industrial Solutions business; and Yungquan Sun (M.S., Ph.D. '96, '08), President of the ENN Group North America, Inc. and Senior VP of the ENN Solar Energy Group, Ltd.

ENGINEERING TECHNICAL SERVICES

This year, the School invested in a 64-node high performance computing cluster (codenamed Hornet), which is housed and hosted within the Booth Engineering Center for Advanced Technology (BECAT). The goal of this cluster is to advance UConn research by making these computational resources available to faculty and graduate students. The Hornet cluster is currently online and operational, and it is being used by a steady group of pilot users. BECAT and Engineering Computing Services personnel are working to rapidly install software and to create documentation on how to utilize the new system.

Leveraging the unique resources of Engineering Technical Services, the School of Engineering offered four distance education courses – in Mechanical Engineering, Materials Science & Engineering, Civil Engineering and Electrical & Computer Engineering subjects – last summer through a new program named Husky Pegasus. Each of the four classes featured synchronous and asynchronous components. The Microsoft Lync software system enabled the synchronous component; Lync is used at UConn by a few departments for instant messaging, video conferencing and collaboration. The synchronous sessions are recorded, post processed, and put online for asynchronous streaming by enrolled students. These recordings can be viewed through web browsers and mobile devices like the iPad.

LARGER COMMUNITY

During the year, our USAID-funded project aimed at building educational capacity in Ethiopia around water resources continued to be a major effort. UConn faculty and administrators helped to inaugurate the Ethiopian Institute for Water Resources (EIWR) at Addis Ababa University in February. UConn's Interim Provost Mun Choi, UConn VP for Research Suman Singha, top officials from Ethiopia's Ministry of Education, and UConn's USAID/HED-funded team participated. EIWR will help to build capacity in institutes of higher education in the area of sustainable water resources management. The School of Engineering-led team anticipates receiving over \$7M in USAID support for the first five years of the project.

In February, U.S. Sen. Joseph Lieberman visited the School of Engineering to promote the bipartisan Cyber Security Act of 2012, aimed at protecting the country's vital infrastructure from crippling cyber attacks. He chose UConn because of the University's leadership in developing advanced technologies to identify and protect against cyber security threats and visited the laboratory of Dr. Mohammad Tehranipoor as well as the VoTeR Center.

ENGINEERING/INDUSTRY INTERACTIONS

Cigna teamed up with the School of Engineering to expand its On-campus Developers Internship Program for computer science and engineering students. The initiative gives qualified junior and senior-year college students valuable career experience working directly with Cigna employees at the Storrs campus to develop web and mobile programming applications. Cigna outfitted a room in the Information Technologies Engineering building specifically for this internship program.

Building upon its previous designation of UConn Engineering as a Center of Excellence, Pratt & Whitney continued to invest in the School's educational programs, providing support for the purchase this year of state-of-the-art laser diagnostics system for combustion research and other applications, providing students valuable hands-on experience.

The School of Engineering expanded its academic/business network throughout the year. Under the leadership of Entrepreneur-in-Residence Robin Bienemann, *Innovation Connection* networking functions were held monthly at varying locations and pivoted around a variety of allied events, including a graduate student poster forum, and panel discussions on topics such as the health of Long Island Sound and strategies for enhancing entrepreneurial success across the state. The events foster collaborative relationships among UConn Engineering and practicing engineers, businesses and entrepreneurs. The School also provided sponsorship of Startup Weekend-Storrs and other entrepreneurship-focused programs across the Storrs campus. In December, UConn alumnus, inventor and entrepreneur Eric Knight joined the *Springboard* program as Manager and Entrepreneur in Residence. *Springboard* is a joint program of the School of Engineering, College of Liberal Arts and Sciences, and the Office of Technology Commercialization. As *Springboard* Manager, Eric shares his expertise and advises faculty and students to identify key markets and develop business cases for commercial services and products resulting from their expertise and research. A third member of the *Springboard* team, Dr. Hadi Bozorgmanesh, also taught a graduate-level entrepreneurship course while continuing to assist faculty and students in commercializing their innovative products/processes.

The practice-oriented Master of Engineering (MENG) program was continued, delivering graduate-level coursework for employees of General Dynamics Electric Boat (at the UConn-Avery Point campus) and on-site at United Technologies Corporation, Pratt & Whitney and UTC Power.

The second annual D.E. Crow Prize in Innovation & Entrepreneurship competition was held. Initiated by Dr. David (Ed) Crow, professor emeritus of ME and retired Senior Vice President of Pratt & Whitney's Engineering organization, the competition encourages student innovation and provides start-up funding, with \$10,000 in support for the top winners.

In addition, the capstone Senior Design projects continued to attract significant support from businesses of all sizes, from small dental practices to Connecticut's largest defense contractors. For a modest fee, Senior Design sponsors may pose a design challenge to a team of senior engineering students who, with faculty and company guidance, develop a design solution, build a prototype, test and present the solution.

COMMUNICATIONS

During the 2011-12 year, the School continued to expand upon its communications to members of our community. The *emagination* electronic news page was produced throughout the year, approximately every three weeks, and transmitted to alumni, students, faculty; industry friends; University leadership; and legislators. In addition, a series of tri-fold brochures, highlighting the top news throughout the year, was mailed (distribution of 25,000) to members of the National Academy of Engineering; Deans, Department Heads and directors of peer institutions; alumni; national and state Congressional

representatives; and corporate leaders as a means of enhancing the School's visibility and name recognition among top academic and commercial decision makers.

Social media remained a priority vector for disseminating news as well. This year, the School embraced YouTube as a means to reach a wider audience. During the year, the Engineering Communications team developed over a dozen videos covering events (commencement, competitions, etc.), presentations and educational subjects. In addition, the Facebook and Twitter pages, as well as a new Flickr page, were maintained as avenues enabling students and alumni to be informed of the latest developments and activities underway in the School. They are accessible from our website at www.engr.uconn.edu. In addition, the network of digital display monitors installed in seven high-traffic locations within School of Engineering buildings were updated with new content on a regular basis.

CHEMICAL, MATERIALS & BIOMOLECULAR ENGINEERING DEPARTMENT
ANNUAL REPORT SUMMARY
2011-2012

The Department of Chemical, Materials & Biomolecular Engineering (CMBE) has two strong programs: one in Chemical Engineering and the other in Materials Science & Engineering. The two programs essentially operate independently with completely separate budgets, faculties and student bodies, but the collegiality amongst the two groups of faculty is also strong and constructive.

During the year, one new faculty member joined the CMBE Department: Dr. Anson Ma, who performed postdoctoral research at Rice University after completing his Ph.D. at Cambridge University, UK. As a new member of our Chemical Engineering faculty, he joined the Polymer Program in the Institute of Materials Science (IMS). In August 2012, Dr. Daniel Burkey (Ph.D. MIT, 2003) is being promoted to Associate Professor-in-Residence and Associate Department Head. He was named Chemical Engineering Teacher of the Year by the graduating seniors for the second consecutive year! Dr. Kevin Brown will join the Chemical Engineering program as an Assistant Research Professor in August. Dr. Brown completed his Ph.D. at Cornell and has been conducting postdoctoral research at the University of California - Santa Barbara. He will strengthen our expertise in computation, thanks in part to his doctoral studies in Theoretical Physics, but also due to his postdoc studies in biological areas. Dr. Brown's Ph.D. thesis was entitled "Signal transduction, sloppy models, and statistical mechanics," and his current interests include mathematical modeling and inference in complex biological systems; data-driven inverse problems in neuroscience, systems biology, and physics; and statistical mechanical tools for dynamical models with many parameters. Dr. Brown will also spend time at UConn's Department of Marine Sciences on the Avery Point campus building a new link for us across the state.

Dr. Kristina Wagstrom will join the Chemical Engineering program in August 2012 as the newest tenure-track Assistant Professor. Dr. Wagstrom received her B.S. at the Illinois Institute of Technology (IIT), where Dr. William Mustain was among her TAs; she then completed her Ph.D. at Carnegie-Mellon University with a thesis entitled "Characterizing the Origins of Atmospheric Particulate Matter." She also carried out postdoctoral research involving air pollution in the University of Minnesota's Department of Civil Engineering. At UConn she will combine her studies of atmospheric pollution with her interest in the development of biofuels. Dr. Wagstrom's effective start date will be delayed one year as she spends a year as a new AAAS Science and Technology Policy Fellow at the EPA.

The department's interactions with industry, especially our regional businesses, continue to grow as industry comes to know our graduates and faculty. Chemical Engineering received its first sponsored Senior Design project. Dr. Harold Brody continued to facilitate the Senior Design capstone course for MSE with more projects than students. Several students were given positions in the sponsoring companies at the end of the semester. Four faculty members joined the Head on a visit to DuPont hosted by alumnus Mark Vergnano, an Executive VP at DuPont. Groups also visited Amgen, hosted by recent alumna Jennifer Cileli (now Carignan); Chemtura, hosted by Andy Clock, alumnus and Director of Commercial Development, and so on. Contact has also been reestablished with long-term supporter Rogers Corporation. With Chemical Engineering at UConn fully rebuilt and set to grow further in the next four years, and MSE an essential component of UConn's activities on the Materials Genome (Cyrus Wadia also visit the Department and gave a talk during the year), the future for both programs looks extremely promising.

Our department's Distinguished Seminar Speakers this year were Drs. William J. Koros of Georgia Tech and Dr. Joseph Michael of Sandia National Labs. Dr. Koros is the GRA Eminent Scholar in Membranes

and the Roberto C. Goizueta Chair for Excellence in Chemical Engineering; his public talk was entitled “Hiding in Plain Sight - The Invisible Energy Cost of Current Separation Processes.” His technical lecture was entitled “Evolutionary Steps towards a Revolution in Separation and Purification Processes.” Dr. Michael is a distinguished member of the technical staff at Sandia; his public talk was entitled “Microbial Forensics: Microanalysis and the 2001 Anthrax Letter Attacks,” while his technical talk was on “2D and 3D EBSD Characterization of Tin Whiskers.”

For the 2012-13 academic year, two speakers have already agreed to present lectures: Dr. Ned Thomas, Dean of Engineering at Rice University in Houston, and Dr. Knut Urban, the former Director of the Ernst Ruska Center in Jülich. Dr. Thomas is well known in the field of polymers as one of the country’s preeminent polymer scientists, who led MIT’s MSE Department for many years. Dr. Urban was awarded MRS’s von Hippel Award in 2007 and – with Max Haider and Harald Rose – won the 2007 Karl Heinz Beckurts-Prize for Innovation, the 2008 Honda Price for Ecotechnology and the Wolf Prize in 2011.

RESEARCH

The department’s research funding remains strong, with research expenditures for this period continuing to be strong, at \$8.5 million. Faculty productivity was high during the year. ChE faculty had a total of 36 archival journal articles published, 95 full-paper conference papers, and 55 active research grants. For MSE faculty, there were 37 scholarly archival journal articles, 70 full-paper conference proceedings papers, and 69 active research grants.

Our faculty members remain actively engaged in interdisciplinary research within the Institute of Materials Science (IMS), the Center for Clean Energy Engineering (C2E2), and the Center for Environmental Science & Engineering (CESE).

Special funding successes this year include the proposal led by Dr. Ranjan Srivastava with Drs. Bill Mustain and Leslie Shor (with colleagues from the Department of Molecular & Cell Biology) which was funded by the NSF Office of Emerging Frontiers in Research and Innovation. The proposal is entitled “*EFRI-MIKS: Creation and Manipulation of an Artificial Termite Gut through Control of the Microenvironment*” and has been funded at the level of approximately \$2 million for four years.

UNDERGRADUATE PROGRAMS

For the 2011-12 academic year, undergraduate enrollments were 243 students for Chemical Engineering (ChE) and 98 students for Materials Science & Engineering (MSE). The department continues to enhance its technical electives for our undergraduates in both programs. During the end-of-year Senior Design Demonstration Day, 54 Chemical Engineering seniors and 10 Materials Science seniors presented their projects. Three Chemical Engineering undergraduate students were recognized as 2011 University Scholars (of 5 in the School of Engineering and only 29 University-wide): Ethan Butler, Michael Ignatowich, and Britta Kunkamoeller. At the 2012 May commencement, Britta was a standard bearer and Ethan gave the student address. For the spring 2012 term, the CMBE Department was home to more than 320 undergraduate students.

Our Biomolecular Engineering Program continues to grow, thanks to efforts by Drs. Mei Wei, Ranjan Srivastava, joint faculty from the UConn Health Center (Drs. Yusuf Khan, Sangamesh Kumbhar, Lakshmi Nair and Syam Nukavarapu), and MSE graduate faculty at the UConn Health Center (Drs. Liisa Kuhn and Jon Goldberg). We now are able to offer an exciting five-year B.S./M.S. program combining either a Chemical Engineering or Materials Science B.S. with an M.S. in Biomedical Engineering..

GRADUATE PROGRAMS

The *US News & World Report's* survey of graduate programs for 2013 continues to undervalue our programs since the merger of the ChE and MSE programs in 2006. Our graduate program in MSE moved up two places to 46; the ChE graduate program was ranked 63. During the 2011-12 academic year, graduate enrollments in ChE were 41 Ph.D. and six M.S. students; in MSE, graduate enrollments were 64 Ph.D. and 17 M.S. students.

In May, the department graduated six Ph.D. students from ChE and 14 Ph.D. students from MSE.

STAFF & FACULTY

Dr. Brian Willis concluded his third year as the Chemical Engineering Program Director and was succeeded by Dr. Srivastava. Dr. Barry Carter, CMBE Head, concluded his three-year term as the Materials Science & Engineering Program Director. Assistant Professor-in-Residence Dr. Aravind Suresh succeeded Ephrem Hunde as Dr. Burkey's colleague in the ChE Senior Lab after Ephrem accepted a position in industry. Professor Emeritus Mike Howard continues to volunteer in the ChE Senior Lab. Dr. Doug Cooper returned to the Department after a two-year assignment as Vice Provost for Undergraduate Education & Regional Campuses.

Ms. Susan Soucy, Ms. Cathy McCracken and Ms. Leah Winterberger remained in the main office. They were joined in September by a team of three undergraduate students from the College of Liberal Arts and Sciences. Ms. Heike Brueckner joined the Department as our webmaster and production editor for all leaflets, newsletters and brochures. She has prepared a number of attractive brochures and has now synchronized activities with our web site in order to keep both continually up to date. Brochures and newsletters are distributed at every conference or campus visit. In May, Ms. Donna Balskus, who was on a one-year contract and helped the Department manage its myriad administrative tasks, especially the seminar series, left the Department due to the financial cutbacks.

The ChE labs were directed by Dr. Burkey, with the assistance of Mr. Richard Kozel. Mr. Adam Wentworth, an MSE alumnus, looked after the MSE undergraduate labs for his first year in the post. Dr. Leon Shaw will join IIT in August as a Chaired Professor. Drs. Ashish Mhadeshwar serves on the Computation Search Committee in IMS.

FACULTY HONORS & AWARDS

Dr. Leslie Shor was a finalist for a 2012 Connecticut Women of Innovation Award. Dr. Carter was elected a 2011 Fellow of AAAS; he was also appointed the Chair of the MRS Awards Committee in January 2012. Drs. Radenka Maric, Pamir Alpay and Prabhakar Singh were elected to the Connecticut Academy of Science and Engineering for 2012.

PROGRAM OUTREACH

Our Materials Advantage Student Chapter (Faculty Advisor: Dr. Rainer Hebert) had a slow year but has now been reinvigorated. Dr. Carter will stand in for Dr. Hebert while the latter is on sabbatical leave in 2012/2013. A group of undergraduate members of the UConn Chapter of AIChE (American Institute of Chemical Engineers; Faculty Advisors: Drs. Shor, Burkey and Jeff McCutcheon) participated in the AIChE Annual Meeting in Minneapolis. The Department hosted a very successful hospitality suite during the conference. ChE Professor Dr. Cato Laurencin was elected a Fellow of AIChE. The MRS (Materials Research Society) student chapter (Faculty Advisors: Drs. Bryan Huey and Barry Carter) continues to grow in activity. Our CMBE redesigned website went live in June 2011. Two issues of the CMBE Department newsletter (CoMBinE) were mailed to alumni, colleagues and friends in fall 2011 and June 2012.

CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
ANNUAL REPORT SUMMARY
2011-2012

It seems that Mother Nature has set a goal to showcase her power over humans on a yearly basis lately. Several of the 2010-11 and 2011-12 headlines deal with catastrophic events that affect human life in a profound way. Indeed, this year's earthquake in the Northeast, which was felt in Connecticut; Tropical Storm Irene; and the October snowstorm dealt challenges to our State's and nation's infrastructure. Civil and environmental engineers are actively engaged 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 2011. Dr. Arash Esmaili Zaghi joined us from the University of Nevada, where he completed his Ph.D. in 2009 and continued as a Research Scientist before joining our department. Dr. Esmaili Zaghi's research interests cover a variety of areas and topics, such as steel and reinforced concrete structures, and shape memory alloys. Dr. Esmaili Zaghi has well balanced capabilities in both experimental and analytical work, and as a licensed Professional Engineer, he is promoting the delivery of steel design courses in our department.

The department hired one new faculty member who will join the university in fall 2012. Dr. Karthik Konduri earned his Ph.D. in February 2012 from Arizona State University and has been a post-doctoral researcher at the same institution since his graduation. 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.

There was one faculty promotion within the department, effective August 2012. Dr. Lanbo Liu was promoted to the rank of Professor. Moreover, two important recognitions were bestowed upon our faculty. Dr. Nicholas Lownes was appointed the Castleman Term Professor and Dr. Michael Accorsi was appointed Associate Dean for Research and Graduate Education. Finally, Dr. Manos Anagnostou was appointed the Environmental Engineering Program Director. He succeeds Dr. Guiling Wang, who completed her successful three-year term. Dr. Anagnostou will be assisted in his administrative duties by Dr. Marisa Chrysochoou who was appointed Associate Director of Environmental Engineering.

UNDERGRADUATE & GRADUATE EDUCATION

The CEE Department had a combined CE and ENVE program undergraduate enrollment of 295 students in spring 2012. Graduate enrollments in the CE and ENVE programs reached an all-time high with 116 M.S. and Ph.D. students registered in spring 2012. 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 record-setting total of 8 Ph.D. and 22 M.S. degrees.

Dr. Rais Ahmad 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, significantly improved again during the last year with more than \$4.14 million in research expenditures generated from 60 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 Sciences, USDA, USGS and numerous private companies. Department faculty were involved in the publication of 60 journal articles, two book chapters, 91 full-length conference papers and made 93 conference presentations in the past year.

The department's international research programs continued to develop last year with major activities in water resources and natural hazards mitigation. Drs. Mekonnen Gebremichael, Michael Accorsi, Anagnostou, Guiling Wang, and Amvrossios Bagtzoglou serve as co-PIs for the USAID/HED project entitled: "Sustainable Water Resources: Capacity Building in Education, Research and Outreach." This project completed its first year of operations and positions the University of Connecticut as the lead institution within a consortium of five Ethiopian universities and Alabama A&M University, and is focused on the theme of Sustainable Water Resources Development and Management.

Dr. Bagtzoglou was elected a Fellow of the Institution of Civil Engineers (ICE) and the American Society of Civil Engineers (ASCE).

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 UConn chapter of Engineers Without Borders (EWB) completed its fourth year as an officially recognized chapter under new advisors. During the last year, the student chapter continued their project in rural Nicaragua under the guidance of Dr. Chrysochoou. Under her leadership, chapter members submitted a winning proposal to the EPA P3 (People, Prosperity and the Planet) program to support their investigation of alternative road repair strategies – using indigenous materials –for their efforts in Nicaragua; based on the impact of their phase 1 funding, the team submitted a second EPA P3 proposal and won more substantial funding that will be applied in the coming year.

COMPUTER SCIENCE & ENGINEERING DEPARTMENT ANNUAL REPORT SUMMARY 2011-2012

The Computer Science & Engineering (CSE) Department continues its remarkable accomplishments in a number of strategic areas including Bioinformatics, Information Security, Networking and Biomedical Informatics. The department attained more than \$2.78 million in new research funding for FY2012. 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 \$640,000 for FY2012 in addition to the figures above. Grant expenditures totaled \$2.78 million. The CSE department graduated three Ph.D. students and 18 M.S. students during the academic year. The department began to prepare for the accreditation (ABET) visit scheduled for fall 2013. During the year, two committees succeeded in developing and approving the departmental strategic plan and the faculty workload distribution policy.

EDUCATIONAL PROGRAMS HIGHLIGHTS

The department continued its efforts in recruiting and retaining high quality undergraduate students. As a result, there is a very large demand for our graduates, as demonstrated by a steady flow of job and internship announcements. Cigna set up an 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%.

The department started 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. Last May, a dry run was conducted for all School of Engineering programs, including those within CSE. The dry run team provided us with useful feedback. The CSE team will continue to enhance the self-study report and to fine tune the quality of our undergraduate programs before the official ABET visit in the fall 2013.

The department serves more than 45 M.S. and 74 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

Two new assistant professors in the area of Biomedical Informatics joined the department this year. Dr. Maifi Khan graduated from the University of Illinois at Urbana-Champaign and Dr. Athanasios Bamis received his Ph.D. from Yale University. In addition, Keith Barker returned back to the department after serving the University as the director of the Institute of Teaching and Learning for 16 years. The

department will continue its faculty search to fill the vacancy left by Dr. Ian Greenshields' retirement in 2011.

RESEARCH HIGHLIGHTS

Dr. Ammar received a new grant from the National Science Foundation (NSF) entitled Optimal Surface Gateway Deployment for Underwater Acoustic Sensor Networks (\$150,000); Dr. Jinbo Bi received funding from Penn State for an NIH grant; Drs. Jun-Hong Cui and Jerry Shi received two new grants from the National Science Foundation, one for an REU site and another for Collaborative Research (\$200,000 and \$1,100,000); Drs. Swapna Gokhale and Robert McCartney received funding from NSF for Integrating Open Source Software Projects into the Software Engineering Curriculum (\$200,000); Drs. Chun-Hsi Huang and Ammar received funding for an additional REU site program for the department (\$200,000); Dr. Ion Mandoiu received a new grant from Life Technologies Corporation; Dr. Yufeng Wu received additional funding from NSF for Algorithms for Reconstructing Complex Evolutionary History with Discordant Phylogenetic Trees (\$256,796). As stated above, this is an impressive record of new funding in one year.

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 and the U.S. Election Assistance Commission for their voting technology center.

This year, our faculty collectively published more than 80 archival journal and conference papers. Dr. Mandoiu edited two scholarly conference proceedings: *Proceedings of the 8th International Symposium on Bioinformatics Research and Applications* (with L. Bleris, R. Schwartz and J. Wang), and *2011 IEEE International Conference on Bioinformatics and Biomedicine Workshops Proceedings* (with B. Chen). Drs. Mandoiu and Sanguthevar Rajasekaran also edited the *Proceedings of the 2nd IEEE International Conference on Computational Advances in Bio and Medical Science* (with S. Istrail, M. Pop and S. Spouge).

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 2011 in Greece), the International Symposium on Signal Processing and Information Technology and the 2nd International Conference on Computational Advances in Bio and Medical Sciences (ICCABS); Dr. Gokhale served as Program Co-Chair for the International Conference on High Assurance Systems Engineering and is an Editorial Board member for four journals and IETE Technical Review; Dr. Chun-Hsi Huang is the Associate Editor of *IEEE Transactions on Information Technology in Biomedicine* and an Editorial Board member for *Biomedical Informatics Insights*. Dr. Kiayias is an Editorial Board member for Crypto 2012, EUROCRYPT 2012, Africacrypt 2012 and Provsec 2012; and Dr. Mandoiu is Associate Editor of *BMC Bioinformatics*, Program Co-Chair for the 8th International Symposium on Bioinformatics Research and Applications (ISBRA) and the 2nd International Conference on Computational Advances in Bio and Medical Sciences (ICCABS); Dr. McCartney is Editor-in-Chief of *ACM Transactions on Computing Education* and Co-Chair of the 2011 and 2012 Koli Calling International Conference on Computing Education Research; Dr. Michel is Associate Editor of *Constraints*; Dr. Peters is Secretary for the Society of Industrial and Applied Mathematics, Special Interest Group on Geometric Design and Modeling; Dr. Rajasekaran is Associate Editor of *Parallel Processing Letters*, *International Journal of Computers and Their Applications* and *Journal of Parallel and Distributed Computing* as well as General Chair of the 2nd International Conference on Computational Advances in Bio and Medical Sciences (ICCABS); Dr.

Russell is Associate Editor-in-Chief of *Theory of Computing* and Guest Editor of *SIAM Journal of Computing*; Dr. Shin is Editorial Board member of *Bioinformatics and Biology Insights*, *Libertas Academica* and *2011 IEEE International Conference on Bioinformatics and Biomedicine*; Dr. Shvartsman is Associate Editor of *IEEE Transactions on Computer and Studia Informatica Universalis*, and Steering Committee Member of the International Colloquium on Structural Information and Communication Complexity; and Dr. Wu is Finance Co-Chair of the IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS) 2012. 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.

ELECTRICAL & COMPUTER ENGINEERING DEPARTMENT

ANNUAL REPORT SUMMARY

2011-2012

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 2011 undergraduate enrollments were: 162 students the EE program, 43 students in the CompE program, and six students in the EGPHY program. During the academic year 2011-2012, we awarded 28 B.S.E. degrees in EE, five degrees in CompE and one 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 worked on 130 sponsored grants valued at \$27 million with annual expenditures of \$6.75 million. During the year, the ECE faculty advised 134 graduate students; of these, 17 successfully completed their Ph.D. degrees and 30 students, including Clinical Engineering, garnered their M.S. degrees. Drs. Mohammad Tehranipoor, Geoffrey Taylor and Peng Zhang were awarded three, one and one patent, respectively.

FACULTY HONORS

ECE faculty members received several prestigious awards. Dr. Yaakov Bar-Shalom was awarded the 2012 Connecticut Medal of Technology for his groundbreaking contributions to the advancement of radar and sonar technology. Dr. Mohammad Tehranipoor was named a Castleman Term Professor in Engineering Innovation. Drs. Yaakov Bar-Shalom and Bahram Javidi are Board of Trustees Distinguished Professors. Our endowed chairs include Drs. Yaakov Bar-Shalom, who is the Marianne E. Klewin Endowed Professor in Engineering, and Peter Luh, who is the SNET Professor of Communications & Information Technologies. This year, Dr. Ali Gokirmak received a National Science Foundation Early Career Development (CAREER) Award. Dr. Peng Zhang was elected a member of the IEEE PES Region 1 Scholarship Plus Initiative.

ECE faculty members are also leaders in many professional societies/organizations. Drs. Anthony DeMaria, Eric Donkor, 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

Dr. Mehdi Anwar was inducted into the Connecticut Academy of Science and Engineering (CASE), joining fellow faculty members Drs. 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. During 2011-2012, ECE faculty members held 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, 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 candidates Behnoosh Tavakoli and Xiao Xiao were awarded scholarships in Optics and Photonics by SPIE. . The fall 2011 recipients of the ECE Outstanding Teaching Assistant Awards were Marianne LaRosa and Supriya Karmakar, and the spring 2012 awardees were Kimberly Kaltenecker and Matthew Tarca. Bharath Pattipati and Chaitanya Sankavaram, along with their advisor, Dr. Krishna Pattipati, were awarded the Walter E. Peterson Best Paper Award at the 2011 IEEE AUTOTEST Conference.

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. They held department feedback and study sessions, and hosted the annual IEEE barbecue and the IEEE Distinguished Lecturer, Tom Perks (RF/Microwave Tech). The students held robotics project information sessions and initiated robotics project groups. The group co-sponsored guest speaker Paul Singer, recipient of a 2012 Distinguished Professional Achievement Award.

Members of the UConn chapter of the International Society of Optical Engineering (SPIE) attended a 2011 leadership workshop in San Diego and also toured IPG Photonics of Oxford, MA in February 2012. The company is the world's leading provider of high power fiber lasers. One student member of the SPIE chapter attended the 2012 SPIE Photonics Europe leadership workshop in Brussels. Members of the SPIE and the Optical Society of America (OSA) student chapters organized a middle school science and engineering fair at the State Middle School Fair in Worcester in June 2012. Dr. Quing Zhu is the SPIE chapter's advisor.

ECE PERSONNEL CHANGES

Drs. Ali Bazzi and Omer Khan will join the department in fall 2012 as Assistant Professors. Dr. Bazzi, who will join the power engineering area, obtained his Ph.D. from the University of Illinois at Urbana-Champaign in December 2010. He has gained industrial experience working at Delphi for the past year. His research interests are in the design and real-time control and optimization of energy systems including hybrid and electric vehicles, and both grid-connected and stand-alone renewable energy systems. His teaching interests include power electronics, electrical machines, and motor drives. Dr. Khan will join colleagues in the computer engineering area. He received his Ph.D. from the University of Massachusetts, Amherst in 2009. He also serves as a Research Affiliate in the Computer Science and Artificial Intelligence Laboratory (CSAIL) at Massachusetts Institute of Technology (MIT). His teaching and research interests can be generalized to the field of computer architecture, digital system design, and VLSI and has authored numerous papers in these areas.

**MECHANICAL ENGINEERING DEPARTMENT
ANNUAL REPORT SUMMARY
2011–2012**

The performance of the department over the last four academic years is summarized in the table below. The 2011–2012 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 \$26.6 million in 91 research projects, with research expenditures of \$7 million. Between July 2011 and June 2012, faculty received new research grants and contracts with a total value of \$7.5 million. In this same period the Mechanical Engineering faculty published 96 journal articles and 2 textbooks, and contributed 148 conference publications or presentations. Faculty members served as editors or associate editors of 30 major journals. Highlights of the year’s activities and accomplishments follow.

Academic Year	07-08	08-09	09-10	10-11	11-12
Faculty					
- Tenured/tenure track	21	25	24	23	25
- In-residence	1	2	3	3	3
Undergraduate					
- Enrollment	408	420	460	458	471
- Graduates	72	78	120	97	131
- Number of classes offered	43	43	46	54	57
Graduate					
- Enrollment M.S. / Ph.D.	34 / 33	59 / 63	54 / 61	74 / 68	72/62
- Graduates: M.S. / Ph.D.	11 / 5	12 / 2	17 / 5	15 / 7	23/12
- Number of classes offered	23	20	25	22	24
- Number of MENG classes offered	5	5	7	6	5
Research/ Scholarship					
- Journal articles	68	64	106	113	96
- Conference papers	80	79	142	148	148
- Total active research grants	\$14.4M	\$16.7M	\$24.7M	\$28.4M	\$26.6M
- New grants	\$4.5M	\$8.8M	\$9.4M	\$9.1M	\$7.5M
- Research expenditures	\$1.6M	\$4.1M	\$4.2M	\$5.1M	\$5.2M

UNDERGRADUATE PROGRAM

The department’s undergraduate enrollment stands at 471 students. A total of 131 bachelor’s degrees were conferred in Mechanical Engineering between July 2011 and June 2012. This is the highest number of graduates in the department’s recent history. The capstone Senior Design Experience courses featured a record number of 51 senior design projects sponsored by 34 different companies. Four 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>. This year’s *D.E. Crow Innovation Prize* was awarded to four teams of students with prizes ranging from \$10K (first place) to \$2.5K (third place). Twelve undergraduate student teams competed for the total prize money of \$20K. The first prize was awarded to Saeid Zanganeh (ECE) and Navid Zanjani (ME) for their project on water purification by nano zinc oxide impregnated plastic containers. 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. The department continues to support the ongoing National Science Foundation Research Experiences for Undergraduates (NSF REU) grant with matching funds. This summer ten 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 an accreditation practice visit in preparation for the formal accreditation visit of our mechanical engineering program in Fall 2013. This visit enabled the department to identify any potential issues and better prepare for the Fall 2013 visit.

GRADUATE PROGRAM AND RESEARCH

Thirty-seven new students joined our graduate program out of 211 applicants. A total of 134 students were enrolled in the graduate program, of whom 62 are Ph.D. students. Nearly 40 percent of the graduate student body are U.S. citizens. The department's faculty served as major advisors to 23 graduating master's students and 12 graduating Ph.D. students. Twenty-four graduate classes were taught by the department faculty, including five on-site at UTC Pratt & Whitney. This year's graduate research competition involved 14 graduate students presenting their research in a short seminar format to an audience of faculty, students, and a panel of judges. Five students (Jamie Masciaszek, Mehdi Karzar-Jeddi, Kathryn Gosselin, Sina Shahbazmohamadi and Thuy Pham) received cash awards ranging from \$750 to \$2,000 for their top performances in the competition. Ten of our thirty-seven 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 \$26.6 million from highly diverse federal and industrial funding sources. The yearly research expenditures have grown to \$5.2 million. In this reporting period, faculty brought in research grants and contracts worth \$7.5 million. UTC Pratt & Whitney and Hamilton Sundstrand continue to fund projects under the Center of Excellence with a total funding of about \$900K per year.

FACULTY AND STAFF

Two new faculty members, Dr. Zhuyin Ren (Ph.D., Cornell University) and Dr. Ikjin Lee (Ph.D., University of Iowa) joined the department in the Fall 2011 semester. Dr. Ren's specialty is in the computational fluid dynamics and combustion area whereas Dr. Lee's expertise is in mechanical design and design optimization. The ongoing biomechanics faculty searches led to the hiring of Dr. David Pierce (Ph.D. ME, Stanford) who will join the department in Fall 2013. Dr. Pierce's expertise is in cartilage mechanics. Another faculty hire in the biomechanical engineering area is being pursued. With these hires, the department will be home to 27 tenured and tenure-track faculty and 3 professors-in-residence. The department is in the process of initiating three additional faculty searches in the area of advanced manufacturing.

FACULTY HONORS AND SCHOLARSHIP

Drs. Mun Y. Choi and Zbigniew Bzymek were elected as Fellows of the American Society of Mechanical Engineers (ASME). The Mechanical Engineering department's teaching and research excellence awards were granted to Drs. Tai-Hsi Fan and Robert Gao, respectively. Dr. Horea Ilies was named as *Castleman Professor* for a term of three years. Dr. Wei Sun was granted tenure and promoted to Associate Professor.

EXTERNAL RELATIONS AND OUTREACH

The department's external advisory board met June 6, 2012 to discuss the department's progress in education, research and outreach. The board currently consists of nine leaders from industry and academia representing a broad spectrum of industries and perspectives. During the latest meeting, the board was presented with the department's progress in its educational and research activities. The board has also been engaged in department's fundraising activities.

TAYLOR L. BOOTH ENGINEERING CENTER FOR ADVANCED TECHNOLOGY

ANNUAL REPORT SUMMARY

2011-2012

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

During the year, BECAT led or contributed toward the development of a number of large, multidisciplinary proposals. Below are details on some representative examples:

- National Institute of Standards & Technology: This project sought funds for the construction of a 19.5k sq. ft. (approx.) stand-alone facility, to be located among existing buildings at the UConn Storrs campus, for the Center for Precision Measurement & Multi-scale Computation (CPMMC). We requested \$13.6 million from NIST, to be paired with \$4 million from the University of Connecticut.
- National Science Foundation MRI: This proposal was aimed at securing funding for the acquisition of a GPU cluster for research and training at a consortium of New England universities that included UConn, Yale, Dartmouth College, ECSU, etc. The theme of this project is large scale modeling and simulations, which are pervasive in all areas of science and engineering, with simulations built in industry and academia targeting specific application domains.
- National Institutes of Health: This proposal, which was funded under the R01 program for a total of \$1.5 million for four years, concerns efficient algorithms for motif searching. The main goal of this project is to devise efficient algorithms for motif searching, an important problem in biology.
- Clinical & Translational Science Awards: BECAT played a major role in the recent CTSA resubmission. BECAT will help in such crucial areas as super and grid computing, data warehousing and data mining, etc. The Director of BECAT will be an Assistant Director of the Biomedical Informatics core.
- National Science Foundation: This large proposal, led by Dr. Peter Luh, concerns research on smart-grid smart-buildings.
- National Science Foundation: This pending proposal concerns human disease phenotypic subtyping - quantitative subtyping of clinically relevant phenotypes for genetic analysis.

ACQUISITION OF A CLUSTER SYSTEM

BECAT, the School of Engineering, and University Information Technology Services (UITs), with strong support from Vice President Suman Singha, purchased a new high performance computing (HPC) system for use by BECAT members and faculty at UConn and the UCHC. This new system, built by the industry leading HPC vendor HP, replaced the current SGI Altix system and offers significantly enhanced capabilities:

- 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

BECAT currently operates an Altix 3700 BX2 server with 64 nodes and 64GB of memory. The capacity of this system has been eclipsed by the growing demand for high performance computing by faculty. The new HPC system, with speed and storage that exceed 20 times that of the Altix, system will enable BECAT members to pursue their exciting research efforts. Some examples are provided below:

- 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

The system was designed collaboratively by BECAT, the Computer Science & Engineering Department, Engineering Technology Services, the Center for Clean Energy Engineering and UITS. The system is operational now. Additional details regarding the transition from the Altix to the HP system, installation of specific software and scheduling of use will be provided to the BECAT members in the coming months.

SEMINARS

A major focus this year was on assisting faculty in coordinating research groups and seminars that promote cross disciplinary research. Examples include the Multiscale Computational Science and Engineering Working Group, Smart Building Smart Grid, and various HPC collaboration meetings.

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

PERSONNEL

Ms. Karen Slater, formerly an Administrative Services Specialist II in the Computer Science & Engineering Department, was hired in the capacity of Administrative Coordinator following the retirement of Sandi Lizee last year.

CENTER FOR CLEAN ENERGY ENGINEERING ANNUAL REPORT SUMMARY 2011-2012

During the reporting period, the Center for Clean Energy Engineering (C2E2) continued to develop and implement its expanded mission and vision for a broader research and development thrust encompassing the transformation of “Science to Systems” in fields ranging from advanced energy conversion systems to the efficient utilization of fuels and power management and delivery. The center’s efforts are geared toward catalyzing the development of a global “Sustainable Energy Economy” through academic basic and applied research, systems engineering, prototype development and demonstration as well as providing cost-effective solutions to current and emerging technologies. Advanced energy conversion technologies, fuels and fuel processing, energy storage, power management and smart grid and conservation of natural resources with a focus on water are part of Center’s continuing research and educational portfolio. This vision is enhanced by the skills and knowledge of the portfolio of multidisciplinary faculty hired through the Sustainable Energy Initiative, the incorporation of which better equips the center to provide timely solutions to global energy and environmental challenges.

EMINENT FACULTY INITIATIVE IN SUSTAINABLE ENERGY AND EXPANDED RESEARCH SCOPE

The ongoing Eminent Faculty Initiative in Sustainable Energy continues to be supported by a permanent \$2 million annual sum from the Connecticut General Assembly, paired with matching support from three industrial partners during the first year of operation: FuelCell Energy of Danbury, CT, the Northeast Utilities Foundation, and UTC Power of South Windsor, CT. The Initiative seeks to establish a program aimed at advanced research, education and training in sustainable “green” energy.

In recent years, 13 new tenure track faculty and three non-tenure track faculty have been added to the School of Engineering and the Center for Clean Energy Engineering. These faculty have over the past few years established their experimental areas and have worked aggressively to pursue new funding opportunities. Efforts of research span the following areas:

- *Advanced Energy Materials, Processes and Systems* - Improving the efficiency and durability while reducing the cost of high- and low- temperature fuel cells and other power conversions devices.
- *Combustion Science and Technology* – Creating novel techniques for chemical conversion of fuels; improving the quality of emissions and increasing the efficiency of existing methods of conversion.
- *Energy Storage and Power Management* - The storage and conversion of energy obtained from fossil fuels, biofuels, fuel cells, solar, wind, and hydroelectric sources for distributed generation applications through the development of enabling technologies for the “smart grid.”
- *Fuels and Fuel Processing* - Improving hydrogen production, catalysis, and heat integration for fuel reformation; improving waste heat recovery and reducing CO₂ emissions in coal refineries; thermo-chemical and hybrid cycles; gasification and extracting energy from sources of organic material such as coal, petroleum, biofuel and biomass.
- *Renewable Energy and Resources* – Developing innovative technologies behind solar photo-catalysis, wind and electrochemical conversion; hydroelectric and water filtration systems.

GREEN CAMPUS INITIATIVE

During the past fiscal year, C2E2 made great strides in advancing its “Green Campus initiative” at the Depot Campus. The Green Campus concept is intended to integrate new energy technologies on the campus to foster the idea of a sustainable community. Specifically, the following activities were initiated:

- In conjunction with the Clean Energy Finance and Investment Authority (CT Clean Energy Fund) and UTC Power, the university completed the installation and commissioning of a 400 kW fuel cell system. This effort was done by executing a 10-year Energy Service Agreement whereby UTC Power continues to own, operate and maintain the system. The unit provides the base load for the whole Depot Campus. In addition, the unit provides heat to the Longley Building and C2E2 high bay areas and cooling in the summer months for the C2E2 high bays. The installation and commissioning of the unit was completed in April 2012 and celebrated with a formal ribbon cutting ceremony attended by over 100 external partners from state agencies and industry partners.
- LED lights were installed during summer 2011 in collaboration with Northeast Utilities and provide lighting for the C2E2 parking lot and also for a portion of the lights on a parking lot on the main campus.
- Through a donation from the Stamford Waste Water Treatment Facility, C2E2 received a demonstration gasification unit. Plans are underway to operate the gasifier utilizing various feedstocks, such as UConn waste water residuals, residential life food waste, and various campus agricultural wastes.
- In August 2012 we expect to install two complete 3.29 kW solar PV arrays in the grassy area across from C2E2. The specs of the two arrays vary slightly: one allows for a grid tied inverter and the other has micro inverters. The grid tied inverter will allow future equipment and batteries for a grid tied with battery back-up system.

In response to the successful initiatives described above, we are reviewing the viability of making similar installations at one or two of UConn's regional campuses.

FACILITIES EXPANSION

To meet the needs of the expanded R&D activities, C2E2 has continued to invest in strategic laboratory space and equipment. The Center occupies 6500 sq. ft. of space in the Longley Building, which includes wet chemistry labs, electrical and power management labs, student rooms and space for high speed computing. C2E2 is in the process of renovating an additional 2000 sq. ft. in Longley that will be devoted to additive manufacturing efforts. This initiative, in collaboration with Pratt & Whitney, will position us to submit multi-disciplinary proposals for collaborative projects from NSF, DOD, DOE, NIH, NASA and other agencies. The first major piece of equipment from P&W is an ARCAM Electron Beam Melting Machine. Following completion of the renovation, a second ARCAM e-beam machine will be added, along with an EOS laser sintering machine and associated machining and finishing equipment.

This augmented, renovated space and equipment will allow C2E2 and UConn to further develop and expand collaborations with industry, state and federal entities, academia and national laboratories as our focus broadens to one of expanded energy technologies.

ENERGY RESEARCH PROGRAM HIGHLIGHTS

C2E2 serves as the major hub for activities associated with the sustainable energy initiative, pioneering new clean and efficient energy conversion technologies, training of the energy workforce, and fostering innovative spinoff opportunities. The center is committed to its mission to promote fundamental and applied research in sustainable energy in collaboration with Connecticut and national academic and industrial partners, with funding from diverse private and federal entities.

Since its inception, research expenditures for the C2E2 total over \$20 million. For the fiscal period 2011-12, C2E2 forecasts expenditures of approximately \$4.4 million, of which approximately 80% arise from federal sources and 20% from industrial funding. Our federal partners include the National Science Foundation (NSF), DOE, DOD, NASA, the Office of Naval Research, Pacific Northwest National Labs/Battelle Memorial Institute and the Environmental Protection Agency. Our regional, state and

industrial partners include Connecticut Innovations, the Clean Energy Finance and Investment Authority, CT Center for Advanced Technology, UTC Power, FuelCell Energy, the UTC Research Center, Rolls Royce, W.R. Grace & Co., Oasys Water, Advanced Power Systems Inc., Conoco Phillip, NzymSys, NanoCell Systems, Siemens Power, Northeast Utilities, Praxair, Sustainable Innovations, BC Hydro, Nissan Automotive and others. Research highlights from a few of the major programs are as follows:

- *“Improving Fuel Cell Durability and Reliability Initiative”* – PI: Dr. Prabhakar Singh
The objective of this DOE-funded, Congressionally Directed Program is to develop an understanding of the degradation processes in advanced electrochemical energy conversion systems. The overall research focuses on the development of novel cutting-edge materials and processes, optimized systems design capable of utilizing a variety of fuels, from hydrogen to hydrocarbons, and efficient balance of plant configurations that enable cost reduction and accelerate market implementation in the distributed, mobile and portable market segments. Using a novel internal solicitation approach, through which UConn faculty submit proposals to C2E2, we seek to develop collaborative research programs with industries to improve the performance stability and long-term reliability of advanced fuel cells and other power generation systems. During the past year this has resulted in the following programs being supported:

“Role of Multi-Scale Water Transport in Dynamic Performance of Polymer Electrolyte Fuel Cells” – PI: Dr. Ugur Pasaogullari, Industry Partner: **Nissan**. Status: In Process. This collaboration focuses on understanding the transport phenomena at very high current density operation of polymer electrolyte fuel cells (PEFC).

“Evaluation of Enzyme-based Sulfur Removal Technology for Gas Cleanup” PI: Dr. Ashish Mhadeshwar, Industry Partner: **nzymSys**. Status: Completed. The overall goal of this project was to test and demonstrate a novel enzymatic way to reduce the sulfur content in biogas, with a primary focus on hydrogen sulfide (H₂S) removal

“Modeling Resin Flow in PAFCs Gas Diffusion Layers” PI: Dr. Rajeswari Kasi, Industry Partner: **UTC Power**. Status: Completed. UTC Power (UTCP) was interested in attaining stable graphitized gas diffusion layers (GDLs) that are used in phosphoric acid fuel cells. This program successfully evaluated ways to improve GDL stability.

“High Performance Phosphoric Acid Fuel Cell Electrodes for Soluble Polymers and Alternate Fabrication Methods” PI: Dr. Ned Cipollini, Industry Partner: **UTC Power**. Status: In Process. Natural gas-fueled phosphoric acid fuel cells (PAFC) meet or surpass most 2012 DOE requirements for distributed power, including efficiency and lifetime, but factory costs are 5-10X target. This project addresses factory costs at a fundamental level.

“Matrix Stability Understanding Investigation” PI: Dr. Prabhakar Singh, Industry Partner: **FuelCell Energy**. Status: In Process. The objective of this research effort is to (a) develop an understanding of the electrolyte matrix coarsening mechanism for the state-of-the-art matrix material, (b) quantify the coarsening and structural changes occurring in the matrix structure, and (c) identify, test and validate advanced matrix materials with reduced coarsening leading to enhance the overall life of the system.

“Waste to Energy: Biogas Cleanup (Desulfurization) for Energy Generation” PI: Dr. Steve Suib, Industry Partner: **FuelCell Energy**. Status: In Process. In the past year this project focused on the optimization of adsorbents that can getter sulfur containing species. Results show that some of the adsorbents offer 40x better breakthrough times and adsorbed amounts than commercial activated carbon adsorbents.

“*Fuel Reforming Catalysts for Efficient Energy Usage*” PI: Dr. Steve Suib, Industry Partner: **APSI, Inc.** Status: In Process. This project seeks to develop next-generation high surface area fuel reforming catalysts and determine reaction mechanisms that will lead to enhanced efficiency, activity, and stability of these materials. The team has focused on the preparation of thin film reforming catalysts that have been made with a novel process; and on studying the mechanism of the fuel reforming process with an emphasis on mass spectrometry detection.

“*Structure-Activity Correlations in Soot Oxidation*” PI: Dr. Ashish Mhadeshwar, Industrial Partner: **Corning**. Status: In Process. This project seeks to develop structure-activity correlations for non-catalytic oxidation of soot to understand the dependence of oxidation kinetics on nature of soot. This work focuses on a comprehensive investigation of structure-activity relationships for 13 commercially available carbon blacks and two diesel engine soot samples (Corning).

“*High Reliability, Low Cost Thermally Integrated Water Gas Shift (TI-WGS) System Design Development Support*” PI: Dr. Ashish Mhadeshwar, Industrial Partner: **FuelCell Energy**. Status: In Process. The goal of this project is to support FCE in the design, development and scale-up of a thermally integrated Water Gas Shift (TI-WGS) system to efficiently process reformat gas, such as from FCE’s DFC® power plant anode exhaust.

“*Stannate-based Semiconductor Nanocomposites for Solar Energy Utilization*” –PI: Dr. Pu-Xian Gao, Industry Partner: **United Technologies Research Center**. Status: Completed. For this project, a unique family of ternary metal oxide semiconductor nanocomposites with graded semiconductor composition were developed, which could enable advanced applications in energy, environment and high temperature sensor technologies.

“*Optimization of FCC Selectivity Through Detailed Modeling of Catalyst Evaluation Experiments and the Contributions of Catalyst Components*” –PI: Dr. George Bollas, Industrial Partner: **W.R. Grace & Co.** Status: In Process. This work involves development of detailed models of state-of-the-art catalyst evaluation procedures for the Fluid Catalytic Cracking (FCC) process.

“*Evaluation of the Performance of Rapidly Quenched YSZ Electrolyte in a SOFC and its Comparison with Conventional SOFC Architecture*” –PI: Dr. Radenka Maric, Industry Partner: **NanoCell Systems**. Status: In Process. The project objective is to demonstrate the feasibility of solid oxide fuel cells (SOFCs), which incorporate NanoCell Systems’ materials technology. The electrode and electrolyte microstructures have not yet been fully optimized; thus, substantial performance improvement is envisioned.

“*Nanostructured Catalyst Support Systems for Next Generation Electrolyzers*” PI: Dr. William Mustain, Industry Partner: **Proton OnSite**. Status: Completed. The team identified a Pt/WC electrocatalyst that allows for only 20% of the Pt loading that is in the Proton commercial catalyst with 96% activity retention during ageing. This far exceeded the performance of other supported Pt commercial catalysts. In addition, the team demonstrated high activity oxygen evolution catalysts using a new flame-based synthesis approach that reduces the number of processing steps for membrane electrode assembly fabrication.

“*Reliability Evaluation and Enhancement of Synchronized Phasor Network*” PI: Dr. Peng Zhang, Industrial Partner: **BC Hydro**. Status: In Process. An invention disclosure was submitted and several innovations emerged that enable reliable integration of renewable resources into power systems. These include a new Monte Carlo-based method for reliability evaluation of active distribution systems with multiple microgrids; a combined statistical and fuzzy Markov method for reliability evaluation of phasor measurement unit; an accurate high-resolution and robust method called S-LMS

(Subspace-Least Mean Square) for reliable estimation of power system phasor, harmonics, and interharmonics; and a precise method to increase the accuracy of power system measurement by eliminating decaying dc components which expose during fault occurrence.

“Plasmonic Nanostructures for Solar Energy Harvesting” PI: Dr. Brian Willis, Industry Partner – **SciTech**. Status: In Process. Tunnel diodes were successfully nanofabricated and converged to nanodimensions using our atomic layer deposition processes. Particulate contamination was found to limit our progress due to the susceptibility of the devices to short circuiting via particulates landing on the devices. A new series of experiments is in the planning stages to overcome these difficulties.

- **NSF CAREER:** *“Role of Interfaces on Transport Phenomena in Polymer Electrolyte Fuel Cells”* – PI: Dr. Ugur Pasaogullari. This project deals with micro- and nano-scale interfaces and their role on transport phenomena in polymer electrolyte fuel cells. Using neutron radiography imaging facilities at NIST’s Center for Neutron Research and computational models, the project team discovered that micro-scale interfaces in polymer electrolyte fuel cells are quite different than what has been modeled and the treatment of interfaces in numerical models significantly impacts the results.
- **U.S. DOE - BES:** *“Understanding the Effects of Chemistry and Microstructure on the Activity of Pt Electrocatalysts on Non-Carbon Supports”* – PI: Dr. William Mustain. This project seeks to elucidate the effects of the chemical composition and microstructure of the electrocatalyst support on the activity and utilization of supported Pt clusters. The UConn team has shown significant enhancement in Pt electrocatalytic activity toward the oxygen reduction reaction on carbide and oxide supports; uncovered the primary degradation mechanism for tungsten-based electrocatalyst supports; and proposed new geometries and systems to address these concerns. Commercial applications are being explored with industrial partners due to the promising stability behavior found between the interaction of Pt and some non-traditional supports.
- **U.S. DOE – ORNL/United Technologies Research Center:** *“Evaluating Alumina Forming Austenitic Steels for Solid Oxide Fuel Cell Power System Balance of Plant”* – PI: Dr. Prabhakar Singh. This project involves the evaluation of AFA steels for fuel cell power system balance-of-plant (BOP) applications. AFA is a promising candidate for fuel cell BOP especially thermal management applications. Cost reduction and/or system performance enhancement is anticipated due to its lower cost compared to nickel-based alloys and high temperature capability compared to conventional stainless steels.
- **U.S. DOE/Praxair:** *“Development of OTM Electrode Degradation Mechanism”* – PI: Dr. Prabhakar Singh. This project focuses on the development of the mechanistic understanding of electrode degradation processes in oxygen transport membranes. Mechanisms for the structural and electrochemical degradation will be proposed and validated by comparison with experimental data. Upon validation of the mechanisms, approaches for the minimization of degradation will be developed.
- **NASA/Sustainable Innovations:** *“Modeling of the Hydrogen Reclamation Process”* – PI: Prof. Ugur Pasaogullari. The objective of the program is to perform a complete system analysis of the hydrogen reclamation system, to account for detailed operation of both the electrochemical hydrogen compressor (EHC) and the pressure-swing absorption (PSA) unit. This will enable optimization of the individual component design as well as the operational parameters.

ENERGY EDUCATION, COLLABORATION AND OUTREACH HIGHLIGHTS

C2E2 collaborates with myriad entities, ranging from state organizations and national agencies to industrial partners from across the globe. Several visitors presented seminars highlighting research activities and scientific scope of work to facilitate near and long term collaboration leading to a broader understanding of on-going research within the technical community. Among those visiting C2E2 during the year were Drs. Arun Majumdar, Reginald Tyler and Tom Benjamin of DOE; Drs. Pierre Corriveau and Gregory Jones of the Naval Undersea Warfare Center; Drs. Gerald Stokes, J. Patrick Looney, Stephanie Hamilton and Alex Harris of Brookhaven National Laboratory; Bill Jankowski of the Navy Submarine Base New London; and personnel from the NASA Glenn Research Center.

Numerous members of the Connecticut General Assembly visited, including Senate President Pro Tempore Donald Williams; Senators Toni Boucher, Beth Bye, Joe Markley, Andrew Maynard, John Fonfara, Gary LeBeau, Joseph Crisco; and many Connecticut State Representatives. Also visiting were Connecticut Department of Economic and Community Development Commissioner Catherine Smith and Deputy Commissioners Ron Angelo and Kip Bergstron, and others. From the Clean Energy Finance and Investment Authority, Brian Garcia and others toured the Center; Marie O'Brien of the Connecticut Development Authority; and Mayors Pedro Segarra (Hartford), Daryl Finizio (New London), and Ernest Eldridge (Windham).

International visitors included representatives from NGK Spark Plug-Corporate R&D Center, Nexterra, Fraunhofer IKTS, Korea Institute of Science and Technology.

Other outreach activities for C2E2 personnel included:

- Various center personnel actively participated in the planning for the 10th International Conference on Fuel Cell Science, Engineering and Technology, sponsored by ASME, to be held July 22-25, 2012 in San Diego, CA. Dr. Singh and Patricia Bergman serve on the Executive Committee and are conference co-chairs. Dr. Singh and Ms. Bergman also serve on the CT Planning Committee for the 2012 Fuel Cell Seminar to be held in November 2012 at Mohegan Sun.
- The Center hosted a September *Innovation Connection* event featuring the McPhee Lecture Series on "Entrepreneurship: Student Stories in the Sustainable Energy Heartland." This event drew UConn faculty and representatives from over 30 companies and state organizations. Tours of C2E2 were included.
- Education and outreach activities – C2E2 continued its active involvement in outreach activities within the local community and among middle and high school students and teachers. During the past year, the Center was visited by numerous middle schools and high school students interested in touring the center and learning about energy – during the past year roughly 200 students have walked through our center. In addition, C2E2 participated in the university's Earth Day event and the Mansfield Downtown Partnership Fair.

CONNECTICUT TRANSPORTATION INSTITUTE
ANNUAL REPORT SUMMARY
2011-2012

During the past year, the Connecticut Transportation Institute (CTI) has been 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 initiated the Connecticut Transit Working Group. This working group is comprised of 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 group, a large initiative has begun to improve the methods used to collect transit data from the different transit districts in Connecticut and coalesce the data into a single comprehensive data set.

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 has led to the discussions with ConnDOT to fund a Transportation Safety Research Group at CTI which will focus on helping ConnDOT improve transportation safety as well as crash data quality, timeliness, accuracy, completeness and access. The Connecticut Transportation Safety Research Group is expected to be established in September of 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*.

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 78 training and special events to over 3,000 participants in the areas of safety, infrastructure management, emergency response and workforce development
- Launched the first cohort of the Connecticut Transportation Leadership Program for Public Works professionals and selected the members of the second cohort.
- Honored a group of 99 transportation professionals who have completed the Connecticut Road Master, Road Scholar, Legal Traffic Authority Certificate Programs and new Public Works Academy.
- Partnered with the CT Department of Transportation and the Federal Highway Administration to develop the new “Every Life Counts in Connecticut” roadway safety initiative.
- *Connecticut Creative Solution Awards* were presented to the City of Bridgeport, the Town of Hebron and the Town of Vernon.
- T2 staff served on many state, regional and national committees, including the Federal Highway Administration LTAP/TTAP Strategic Planning 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 (CASHO) for their 2011 Equipment and Technical Show.
- Held the second annual Connecticut Roadway Safety Poster Contest for school children.
- Worked 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:
 - Reducing the placement temperature for asphalt mixtures to reduce fuel consumption and emissions during production and placement
 - The use of polymer modified asphalt binder on limited access highways
 - Forensic testing of experimental test sections placed on Route 2 in 1997 to assess the pavement at the end of its service life
 - The development of a specification for using recycled asphalt shingles in asphalt pavement

Connecticut Cooperative Transportation Research Program (CCTRP)

- Working with ConnDOT, obtained a partial restoration of funding that will allow the funding of one research project in FY13.
- Funded work on three continuing projects: (1) *Structure and Properties of Ionomer Modified Asphalt*; (2) *Assessing and Quantifying Public Transportation Access*; and (3) *Experimental Testing of Controllable Damping Devices toward Extending the Lifespan of Existing Highway Bridges*.

CENTER FOR RESILIENT TRANSPORTATION INFRASTRUCTURE
ANNUAL REPORT SUMMARY
2011-2012

The Center for Resilient Transportation Infrastructure (CRTI) was established in the School of Engineering (SOE) in July 2008 as part of the U.S. Department of Homeland Security (DHS) National Transportation Security Center of Excellence (NTSCOE). The mission of the center is to provide research, education and outreach programs that address DHS needs in the area of transportation security and infrastructure protection. The focus of UConn's efforts within the NTSCOE has been on modeling and simulation of risk and resiliency in complex transportation networks; development of advanced materials for protection of infrastructure; modeling and simulation of infrastructure under extreme loads; and development of sensor networks to monitor the behavior of structures.

RESEARCH HIGHLIGHTS

During the past year, CRTI secured approximately \$1.2 million in new support from DHS, which included approximately \$700K for three new research projects and \$500K to establish a new STEM program in Infrastructure Protection within the Civil & Environmental Engineering Department. In total, last year CRTI supported seven active research projects involving 14 faculty members and 15 graduate students from four engineering departments. The three new research projects selected by DHS in June 2011 were:

- Autonomous Wireless Sensor Network for Railway Monitoring (J. Tang, R. Christenson and S. Jang)
- Bond between Ultra-High Performance Fiber Reinforced Concrete and Steel Reinforcement Bar (K. Wille)
- High-Temperature Resistant Construction Steels and Steel Beam Connectors (R. Hebert and H. Brody)

The new STEM program is funded under a DHS HS-STEM Career Development Grant with Michael Accorsi as the Principal Investigator. The program will support 5 graduate students who will major in Structural Engineering with coursework and research focused on Infrastructure Protection. The following five projects were selected by the program's external advisory board for the students' research and will commence in the fall 2012 semester.

- System Level Study of the Blast Response of Highway Bridges with Focus on Vulnerability Assessment of Typical Bearing and Connections (A. Zaghi)
- Rapid Assessment of the Remaining Axial Capacity of Damaged Bridge Piers (A. Zaghi and R. Christenson)
- Bond between Ultra-High Performance Fiber Reinforced Concrete and Steel Reinforcement Bar - Computational Modeling under Static Conditions (K. Wille)
- Rapid Health Assessment of Partially-Damaged Buildings Using Wireless Smart Sensors (S. Jang)
- Ultra-High Performance Fiber Reinforced Concrete Under Elevated Temperature: Material and Structural characterization (K. Wille)

EDUCATION HIGHLIGHTS

Two Senior Design projects were sponsored by CRTI last year to provide strong outreach to the local homeland security community. The first project, conducted with the Mechanical Engineering Department, involved the design of a bollard (i.e., vertical post) security system for Bradley International Airport to

assist the Connecticut Department of Transportation - Bureau of Aviation and Ports. The goal of this project was to design a bollard security system that would provide enhanced vehicle access control at the airport. The primary challenge was to design a system that could resist the vehicle impact in locations with very shallow foundations. The design team utilized analytical, computational and experimental methods to develop and validate their design.

The second project, conducted with the Electrical & Computer Engineering Department, involved the design and integration of a port security video surveillance system for the town of Waterford, CT. The town received a major grant from FEMA to enhance their port security system and approached UConn to provide assistance with the system integration. The team was able to develop, test and validate a prototype system design that seamlessly integrates all the required video components for the actual system.

OUTREACH HIGHLIGHTS

As part of a DHS Office of University Programs (OUP) communications initiative, CRTI took the leading role in publicizing major accomplishments for the NTSCOE. This activity was led by Chandra Lownes who worked with faculty from across the NTSCOE and with DHS personnel to get the word out. This included development and publication of the NTSCOE newsletter and numerous news pieces for the DHS OUP website.

During the past year, CRTI participated in two programs focused on engaging Minority Serving Institutions (MSI) in DHS research. As part of a DHS-funded Summer Research Team Program received by the University of Puerto Rico, Mayaguez (UPRM), CRTI hosted two UPRM students for one month to conduct experimental work at UConn. The two students, whose research is in Structural Health Monitoring, were advised by Drs. Shinae Jang and Richard Christenson in the Civil & Environmental Engineering Department. CRTI also hosted three students from City College of New York (CCNY) as part of a DHS Scientific Leadership Award received by CCNY last year. During their week-long visit, the three students met with UConn graduate students involved in DHS research to establish collaborative working relationships.

OTHER ACTIVITIES

In July 2012, Drs. Arash Zoghi and Richard Christenson and their student, Alicia Echevarria, will conduct blast testing on quarter scale bridge columns at the U.S. Army Corps of Engineers - Engineer Research and Development Center (ERDC). The purpose of these tests is to validate the methodology developed by Drs. Christenson and Jiong Tang to predict the remaining strength of structures following an extreme event in order to assist first responders. This end-to-end project is characteristic of the high impact research that CRTI is conducting to meet DHS needs in transportation security and infrastructure protection.

CENTER FOR TRANSPORTATION AND LIVABLE SYSTEMS
ANNUAL REPORT SUMMARY
2011-2012

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 USDOT, EPA and 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.
6. Value communities and neighborhoods.

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 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.

In 2011-2012 the University of Connecticut continued its role in the UTC program by entering a partnership with MIT in the New England University Transportation Center (NEUTC) along with the University of Massachusetts –Amherst, the University of Maine and Harvard. UConn will receive \$550,000 through this partnership to execute a variety of research, education and outreach activities through December of 2013. 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 fifth program year (2011-2012), nine faculty members and two dozen graduate and undergraduate students associated with four departments (Civil & Environmental Engineering, Statistics, Geography, and Landscape Architecture) performed research on three CTLS projects supported by nearly \$165,000 in U.S. Department of Transportation funds. These projects required a one-to-one match, resulting in over \$330,000 of funded research efforts. The projects included:

- *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)

The past year also included continued efforts on fourth program year projects, including:

- *Quantifying Transit-Oriented Development's Potential Contribution to Federal Policy Objectives on Transportation-Housing-Energy Interactions* (PI: C. Atkinson-Palombo)
- *Effect of Low-Impact Sustainable Transportation Design as a Strategy for Alleviating Stormwater Runoff and Reducing GHG Emissions* (PI: J. Bushey)
- *Assessing the Relationship between Transportation Mode Choice and Transportation Land Consumption* (PI: N. Garrick)
- *Developing an Index for Comparing Sustainability of Statewide Transportation Systems* (PI: N. Garrick)
- *Transportation System Sustainability and Adaptation Using Physarum Polycephalum* (PI: N. Lownes)

2011-12 saw many impactful publications and presentations across the country resulting from CTLS projects, detailed in our annual report: http://www.ctls.uconn.edu/pdf/CTLS_2010-11_Annual_Report.pdf.

EDUCATION HIGHLIGHTS

CTLS also selected the second 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 three TURF winners were:

- Kevin McKernan (Advisor, N. Lownes): “Complete Streets Manual Research”
- Emin Basic (Advisor, J. Ivan): “The Effect of Pedestrian Timed-Crossing Signals and its Human Relationship in Conjunction with Accident Rates”
- Michael Gangi (Advisor, N. Garrick): “How Do Changes in Building Height Impact the Ratio of Useable Floor Space to Parking?”

CTLS supported a senior design project in spring 2012, partnering with CT Transit and research faculty member Eric Jackson to guide a team of five undergraduates in developing alternative designs for urban bus stop facilities in Hartford, CT.

CTLS chose graduate student James Mooradian as Student of the Year, for which he was formally recognized at the Transportation Research Board (TRB) annual meeting.

OUTREACH HIGHLIGHTS

With industrial partner Fuss & O'Neill and non-profit partner Connecticut Main Street, CTLS co-organized a series of workshops on “Complete Streets” in Connecticut. Complete Streets is a design philosophy for roadways that promotes the consideration of all users: pedestrians, cyclists, drivers and transit users, when designing roadway environments. The first workshop, held in March 2012, was highly successful, with over 100 attendees from across the state. The second and third workshops are scheduled for June 2012 and October 2012.

CTLS was a contributing partner in organizing the first Worldwide Symposium on Transport and Land Use Research (WSTLUR), which took place in summer 2011 in Whistler, British Columbia. WSTLUR brought nearly 150 transportation and land use researchers from across the globe to British Columbia for

two focused days of discussion, presentations and the identification of key research needs. Presentations from two CTLS projects were given at WSTLUR (projects CTLS 08-01 and CLTS 08-04).

CTLS further promoted the dissemination of research results by supporting the 8th Annual New England Student Research Symposium, held at UConn in April 2012. The event was organized by the UConn Institute of Transportation Engineers (ITE) chapter in partnership with the state and regional chapters of ITE. Over 100 students, faculty and transportation professionals from five New England schools spent a day in Storrs learning about the latest student transportation research and participating in several engaging tours and social activities.

We at CTLS are very excited about the future. Our partnership in NEUTC will provide new opportunities for regional collaboration – in “living lab” development and a regional workforce development conference. Our core activity, supporting scholarly research in transportation, will continue with the NEUTC research program and we will look to continued growth through the heavily anticipated transportation bill. For detailed information on CTLS activities, be sure to visit www.ctls.uconn.edu.

BIOMEDICAL ENGINEERING PROGRAM ANNUAL REPORT SUMMARY 2011-2012

Biomedical Engineering (BME) activities at UConn have had a rich history of success and accomplishment for more than 45 years. The BME Program in the School of Engineering offers B.S., M.S. (Plan A and B) and Ph.D. degrees in BME and is primarily located on the main campus in Storrs. Its undergraduate curriculum offers students the opportunity to focus on various aspects of BME through tracks in biochemical engineering, bioinformatics, bioinstrumentation, 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 Program has a strong presence at the UConn Health Center (UCHC) in Farmington through its cross-campus collaborative relationships with several UCHC faculty who offer BME courses and research opportunities to undergraduate and graduate students. In addition, the BME Program participates in a combined B.S. and MD, or DMD, degree program in conjunction with the Schools of Medicine and Dental Medicine, where selected students are guaranteed admission providing that 1) all academic standards and contingencies, including maintaining a 3.2 GPA throughout the undergraduate years, are fulfilled to the satisfaction of either Medical or Dental Schools and 2) the student successfully completes the B.S. degree in BME. Students must apply to this program when they apply for admission to the University and the School of Engineering.

For the 2011-2012 academic year, Dr. Donald R. Peterson continued his appointment as the Interim Director of the BME Program. Dr. Peterson previously served as the BME Graduate Program Director.

More than 50 faculty members contribute to the interdisciplinary BME Program, representing engineering, biomedical science, material science, chemistry, physics, medicine, and dental medicine. The BME faculty are leaders in their fields, have published widely in scholarly journals and proceedings, are significantly involved in their professional societies, and continue to receive substantial financial support from industry, foundations and government funding agencies, including the NIH, NSF, DoD, and NASA. Details on publications, service, and external research support appear in departmental submissions of academic accomplishments.

Dr. Peterson served as the vice-chair of the annual Biomedical Engineering Society (BMES) meeting, which was held in Hartford, CT, in October of 2011, with UConn and Brown University serving as co-hosts. This annual meeting is considered the premiere Biomedical Engineering meeting globally and it was a tremendous opportunity for UConn to demonstrate its commitment to advancing the discipline to the state, the region, and the nation.

EDUCATIONAL HIGHLIGHTS

Dr. Monty Escabi continued to serve as the Undergraduate BME CCC chair and Dr. Peterson served as the Graduate BME CCC chair until succeeded by Dr. Quing Zhu in the spring 2012 semester. Through regular meeting deliberations, the BME CCCs will be responsible for recommending changes to the BME courses and curriculum as an ongoing effort to develop and enhance the BME Program and to provide the best BME education that UConn has to offer.

BME Graduate Program

As of the academic year 2011-2012, the BME graduate program had 61 M.S. students and 29 Ph.D. candidates. Of the 90 BME students, 73% were full-time and 27% were part-time. A total of 64% of the full-time doctoral students were supported by a graduate assistantship. The BME graduate program proudly graduated three Ph.D. and 41 M.S. degree students.

The BME program offers students an opportunity to secure a B.S. degree and a Plan B M.S. degree within five years. To accomplish this, students are encouraged to take, at most, two graduate courses during their undergraduate curriculum (typically in the senior year), which transfers to the M.S. degree, provided the student is accepted into the BME Graduate Program. This option offers a structured plan for an accelerated course-based M.S. degree and is typically available to all UConn undergraduate engineering students.

BME Undergraduate Program

The undergraduate BME Program saw an enrollment of 319 B.S. degree students, including 83 University Honors Program students (~ 26%), and graduated 73 B.S. degree students, 22 of whom were in the Honors Program. Of the graduates responding to our surveys (n = 51), nine received jobs, at least 16 are continuing on to graduate school in BME, two are entering Medical or Dental School, and 26 have not shared their post-graduation plans as yet.

During the 2011-2012 academic year, Kaitlyn Clark, Christine Vogel, and Edward Ryan were awarded the 2011-2012 Deligeorges Family Scholarship in the amount of \$1,000 each. Three BME students received Summer Undergraduate Research Fellow (SURF) awards for summer 2012 research, while two BME students received a Travel to Conduct Research award and three BME students received a Travel to Present Research award. Seven students from BME participated in the Frontiers in Undergraduate Research Symposium, which is an annual poster exhibition of student research, scholarship, and creative projects.

The BME program continues to train global leaders in science and engineering by encouraging students to consider studying abroad. Currently, the BME Program has 13 Study Abroad agreements with BME programs around the world. In addition, in partnership with the Department of Modern and Classical Languages at UConn, the BME Program continues to offer a dual degree in BME and in French, German, Spanish, or Italian, which further supports the efforts to prepare global leaders in BME. During the 2011-2012 academic year and including the 2012 summer, six BME undergraduate students took full advantage of the Study Abroad programs. One student availed herself of a Summer Study Abroad experience in London, England. During the fall 2011 semester, one student each attended the Universities of Heidelberg, Hong Kong and Queensland, Australia; for the spring 2012 semester, one each attended the University of New South Wales and the University of Wollongong, both in Australia. The University of Hong Kong, the University of Queensland, and the University of New South Wales are members of the *Universitas 21* network, an international network of leading research-intensive universities in 13 countries; UConn is only the second U.S. university invited into the network.

During the 2011-2012 academic year, the UConn chapter of the National Biomedical Engineering Honor Society (Alpha Eta Mu Beta) was reactivated, including plans for the BME Mentoring Program which is a service organized by the Society members in which freshmen and sophomores are paired with upper-classmen who serve as academic mentors. Regardless of Honor Society membership, some undergraduate upper-classmen serve as undergraduate Teaching Assistants in the BME courses and laboratories.

This past academic year the BME Career Fair was integrated into the all-school Career Fair. This venue brings together exhibitors from industry, professional degree programs, government, health care providers and other arenas, where representatives meet with engineering candidates to discuss for the full spectrum of positions, from full-time employment to internships and co-ops.

All undergraduate BME labs, except for the senior design lab in the Castleman Building, are located in two large laboratories in the Bronwell Building, where the Biomechanics and Biomaterials activities are held in room 215 and the Biomeasurements, Biosystem Analysis, and Freshman Biomedical Engineering activities are held in room 212. One other lab, in LabVIEW, is offered in the Engineering Computer Cluster. To date, nearly all of the undergraduate labs are based on virtual instruments using National Instruments hardware and LabVIEW and, with the LabVIEW course and the BME laboratories, BME students are exposed to complex biomedical measurements using sophisticated industry-standard equipment before they graduate.

Finally, the undergraduate BME Program completed a mock ABET review in early May. The mock visit was a success and valuable guidance and suggested improvements were absorbed during the visit in preparation for the actual ABET visit in the fall of 2013.

FACULTY RECRUITING AND DEPARTMENTAL PERSONNEL

Two new Assistant Professors in Residence (APR) were hired this past academic year, both with expertise in biomechanics, for nine-month appointments. Drs. Krystyna Gielo-Perczak and Zahra Shabazi joined our program and taught several courses with BME topics on biomechanics, biomaterials, and biomedical measurements.

In August 2011, Administrative Specialist Kerrie Wenzler resigned. During the course of the 2011-2012 academic year, Ms. Wenzler's responsibilities were transferred to Jennifer Desrosiers, who has served as the fiscal manager for the Program.

ENVIRONMENTAL ENGINEERING PROGRAM

ANNUAL REPORT SUMMARY

2011-2012

STUDENTS AND GRADUATES

The Environmental Engineering (ENVE) Program currently has 14 M.S., 29 Ph.D. and 76 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 year, the ENVE Program graduated five Ph.D., eight M.S. and 17 environmental engineering undergraduates. 61 full graduate applications were received: of these, 30 were offered admission into the program and 13 have accepted admission, bringing our projected total of graduate students to 43 for fall 2012. In addition, four 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 41 journal articles, authored 29 full-paper conference proceedings, and made 56 presentations during this past year.

Dr. Thomas Torgersen (Marine Science) is on leave, serving as the Director of the Hydrological Science Program at NSF. Dr. Nelly Abboud (CEE) is on long-term disability leave. Drs. Mekonnen Gebremichael and Guiling Wang are Al Geib Term Professors in Environmental Engineering Research and Education. Dr. Emmanouil Anagnostou is the Northeast Utilities Foundation Endowed Chair in Environmental Engineering. Dr. Anagnostou was awarded the 2011 University of Connecticut Alumni Association Excellence in Research Award. Dr. Amvrossios Bagtzoglou was elected a Fellow of the American Society of Civil Engineers and of the Institute of Civil Engineers. Two of our faculty (Drs. Anagnostou and Baikun Li) received the 2012 School of Engineering Outstanding Faculty Advisor Award.

Across the program, external funding continues to be strong, with over \$1.4 million in research expenditures and more than 39 active intramural and extramural grants totaling more than \$4 million (for core ENVE faculty only). Our ENVE faculty members hold many positions of administrative authority. Dr. Kenneth Noll of Molecular & Cellular Biology (MCB) is Chair of the graduate program in Microbiology. 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. Wang (CEE) completed her three-year term as Director of the Environmental Engineering Program and was succeeded by Dr. Anagnostou (CEE). Drs. Anagnostou and Bagtzoglou are members of the Connecticut Academy of Sciences and Engineering; and Dr. Bagtzoglou is also a Member of New York State Academy of Sciences.

Dr. Anagnostou (CEE) serves on the AGU Precipitation Committee, EGU Hydrological Science Committee, and AMS Hydrology Committee, and is a member of NASA's Precipitation Science Team. Dr. Gebremichael is a member of NASA's Precipitation Science Team and of the AGU Precipitation Committee. 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 and numerous other international conferences.

In addition to the more than 43 proposals submitted by core ENVE faculty this year, our faculty continued to develop several new international research proposals with colleagues from Denmark, Israel, Greece, 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 USAID/HED proposal aimed at the development of educational capacity and an Institute of Water Resources within Ethiopia so that nation's citizens can effectively manage their 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 Storm Hazards Mitigation Center at the University of Connecticut. Support for the proposed storm center was recently included in the NU-NSTAR merger agreement with the State of Connecticut.

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, the Northeast Regional Science Bowl, the Connecticut Invention Convention, and visits to high schools throughout the state. The program was well represented at the fall and spring open houses. Drs. Bagtzoglou and Gebremichael (CEE) worked closely with the UConn chapter of Engineers Without Borders (EWB), serving as primary and secondary faculty advisors, respectively.

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.

MANAGEMENT & ENGINEERING FOR MANUFACTURING PROGRAM
ANNUAL REPORT SUMMARY
2011-2012

The Management & Engineering for Manufacturing (MEM) program continued its development in the past academic year. The following provides the highlights of the program during the 2011-2012 year.

PREPARATION FOR ACCREDITATION REVIEW

The MEM program participated in a dry run for its accreditation review by ABET. In preparation, the program prepared a “Self-Study” report that presented eight General Criteria and the Program Criteria. The report also included MEM course syllabi, MEM faculty vitae, MEM equipment, etc. The program evaluator for the program, Prof. Bidanda of the University of Pittsburgh, visited the MEM program in early May 2012 and made several comments on the MEM program and the “Self-Study” with an emphasis on Criteria 2, 3, 5, and 7. Our unit prepared and sent him responses promptly. Meanwhile, changes were made to the MEM program and to the “Self-Study” based on his comments.

SENIOR DESIGN PROJECTS

During 2011-2012, the MEM senior students were given the opportunity to apply their knowledge to the design projects sponsored by the local companies. Teams of two students each worked on design projects. They regularly visited the sponsoring company to update manager/engineers and discuss the problems with them. The MEM program managed 10 projects sponsored by Sikorsky Aircraft (one project), DRS (one project), Dymax Corporation (three projects), Frito-Lay (one project), UTC Power (one project), and Pratt & Whitney (three projects). The students delivered final project presentations, and participated in the all-school Senior Design Demonstration Day expo in Gampel Pavilion on April 27, 2012.

MEM INDUSTRY ADVISORY BOARD

Under the leadership of the School of Business and the School of Engineering Deans, as well as the Development offices of both schools, the MEM program is establishing an Industrial Advisory Board that tentatively has 10 members. The Board members are managers at Sikorsky Aircraft, Pratt & Whitney, Trumpf Corporation, Dymax Corporation, Frito-Lay, UTC Power, DRS, CCAT, Zygo Corporation, and General Electric.

MEM FACULTY HIRING

The MEM program is hiring an adjunct faculty member who can teach MEM courses, help review and develop MEM curriculum and courses (including the development of laboratories), and provide appropriate academic services to the Program. Eighteen applications were received by early July 2012.

OPEN HOUSE

The MEM program organized and hosted two Open House events in the past academic year, on September 18, 2011 and April 14, 2012. Each event was held at facilities provided by the School of Business and the School of Engineering. Both events were well attended by approximately 50 prospective students and their parents.

MEM BANQUET

The MEM program organized two banquets (networking receptions) to which the MEM alumni and industrial sponsors were invited. These were held on November 29, 2011 and March 26, 2012. Nine industrial sponsors were recognized for their enthusiastic support of the MEM Senior Design program.

UConn TECH PARK AND CCAT

The MEM program is actively seeking opportunities to work with the planned UConn Tech Park and CCAT. A meeting was conducted on February 21, 2012 to discuss collaboration issues with CCAT. The meeting was attended by Dr. Thomas Maloney, Mr. Thomas Scotton, and Mr. Robert Torrani from CCAT, and Profs. Ram Gopal, Raju Thakur, Zbig Bzymek, Manuel Nunez, and Bi Zhang from the MEM Program. The potential collaboration opportunities discussed at the meeting were: (a) CCAT laboratories (both hardware and software) open to the MEM students; (b) CCAT sponsoring MEM Senior Design projects; (c) CCAT sponsoring internships, etc.

INDUSTRIAL SCHOLARSHIPS

The MEM program has been successful in inviting industry to sponsor scholarships for our students. Dymax, Frito-Lay and UTC Power have committed three, one, and one scholarships, respectively.

MEM ENROLLMENT AND RETENTION

Current enrollment in the MEM program is 56, which is on par with the enrollment numbers of the past few years. Student retention has been stable.

MEM STUDENT EMPLOYMENT OPPORTUNITIES

Our MEM program graduates are eminently employable. The job placement of the MEM graduates was 100% with a high start-up salary. In addition, the MEM students have had many opportunities in getting internships in the local companies.

MEM PROMOTIONAL ACTIVITIES

Among the items the MEM program employs to promote its activities are the website and a dedicated brochure. Prof. Manuel Nunez maintains the MEM program website. The last major update was in April 2012. The MEM brochure is in need of an update; this activity is scheduled for September 2012.

UNDERGRADUATE PROGRAMS OFFICE
ANNUAL REPORT SUMMARY
2011-2012

During the 2011-2012 academic year, the School of Engineering Undergraduate Program continued to grow at a rate greater than the national growth rate for engineering programs. The fall 2011 entering class of 433 students exceeded our planned recruiting goal of 400 entering students by 8%. The undergraduate student body has increased to 2,006 students, a 9% increase compared to fall 2008. Enrollments in our Biomedical Engineering and Mechanical Engineering programs continue to show the largest growth. The combined student enrollment of these two majors represents 39.4% 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 freshman students was 1293 out of 1600 maximum, which is approximately 80 points higher than the average SAT score of freshman students entering UConn's other programs. The School of Engineering's first-year promotion rate was 98% 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. 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.

UNDERGRADUATE DEMOGRAPHICS

The School of Engineering's undergraduate student demographics are: 80% male, 20% female, and 35% non-Caucasian. Female enrollment has increased by 22% since fall 2008, to 382 in fall 2011 – 22% of the freshman class. Over the same time period, the ethnic diversity of the School's undergraduate population has experienced a similar change. The African American student enrollment has increased by 16% to 77 students, and our Hispanic population remains at 75 students.

The University of Connecticut has an excellent Honors Program that enriches the undergraduate experience for qualifying 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. The average percentage of Honors students within the various schools is 8.3%, while the percentage of undergraduate engineering students enrolled in the Honors Program is 15.7%. Of the 1,775 Honors students at the University of Connecticut, 395 are engineering students.

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 51% 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, 464 students graduated with a placement rate of 85%. In spring 2012, the School of Engineering awarded more than \$520,500 in scholarships to 237 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, for the 12th year. Over 650 K-8th grade students representing 130 schools brought their inventions to Gampel Pavilion to be judged by more than 200 professionals and to be seen by more than 4,000 spectators.

The School of Engineering hosted its second school-wide Senior Design Demonstration day at Gampel Pavilion in late April. The 160 senior design teams from across the School of Engineering, most of whom 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.

As an outreach activity focused on bringing talented high school students to the School of Engineering, for the seventh consecutive year we organized, sponsored and hosted the 2012 Northeast Science Bowl regional championship (NESB) for high school students. The NESB drew 36 science bowl teams and nine fuel cell car teams from across Connecticut as well as New York, Rhode Island and New Hampshire. Our 2012 NESB champion, Hunter College High School from Manhattan, NY represented our region at the Department of Energy's National Science Bowl tournament, which took place in Washington, DC. Hunter College High School placed in the top eight out of the 69 U.S. regional winners competing in the nationals.

The da Vinci Project, now in its 12th 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 2011, 11 teachers attended this program and participated in a variety of hands-on workshops such as mathematical optimization, fuel cell technology, and water processes.

In 2009, SoE introduced the Joule Fellows program, an NSF-funded Research for Teachers (RET) program. During the summer of 2011 this six-week summer program hosted 12 Connecticut middle and high school science, math and technology teachers. With faculty and graduate student mentorship, each teacher participated in a series of workshops, facility tours, and guided research in a lab whose research is focused on sustainable energy.

Our one-week Explore Engineering residential program — which 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 — continues to be popular as evidenced by over 220 applications this year. Attendees are nominated by their high school math and science teachers. In summer 2012, 120 students from eight states attended this residential program. Of these, 26% were female. We believe this program has helped to increase the number of undergraduate women in engineering at UConn to 20%.

In fall 2010, the School of Engineering initiated a new student outreach program called Engineering Ambassadors. 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 around 80 undergraduate students. This group provides on-campus tours to local school groups, takes engineering presentations and hands-on activities to local schools and supports community events at the New England Air Museum. For the 2011-2012 academic year, the group hosted more than 500 middle and high school students on campus and delivered presentations to more than 3,000 students in their classrooms. A subset of Engineering Ambassadors, UTC Engineering Ambassadors, participated in a training workshop at Penn State University and has begun 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 presentations will 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 experience, networking opportunities, and organizational and leadership skills that will better prepare them for positions of leadership in their future careers.

Our Director of Advising, Brian Schwarz, participated once again in the Middlesex County Career Expo held at Wesleyan University on April 29, 2012. This expo was attended by 800+ diverse students from 10 high schools. He also attended the National Association of Colleges and Employers (NACE) conference in June 2012 in Las Vegas, NV. This conference, which attracted over 1,000 participants, was a great opportunity to network with national and international corporations and to glean – and contribute toward – best practices in Career Services. Importantly, it helped to prepare Mr. Schwarz to guide our new initiative with Career Services, the centerpiece of which is a dedicated engineering career services representative. This individual will benefit our constituents, employers and alumni.

The Program Coordinator for Academic Advising attended a week-long NACADA seminar for assessment, retention and promotion in San Diego, CA. The seminar included novel strategies for assessment in academic advising, along with new ideas for increasing retention and promotion. Two hundred academic advisors and directors from around the country attended the conference to share ideas and promote new initiatives.

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 first year in May 2011. 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.

Participating Technical High Schools

2008-2009 Statistics of First Schools in this Project				
Tech School / Town	Setting	Number of Students	URM (%)	Attending College (%)
Prince/Hartford	urban	615	94.6	52.1
Cheney/Manchester	suburban	597	27.1	47.2
Windham/Willimantic	urban	522	28	61.8
Norwich/Norwich	urban	473	17.1	30.2
Ellis/Danielson	rural	568	7.2	21.4

Vinal/Middletown	suburban	583	17.8	43.8
Grasso/Groton	urban	618	40.8	48.9
Goodwin/Newington	urban	491	64.8	45.8

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. All of the newly-admitted Technical High School students participated in the five-week residential BRIDGE Program at UConn the summer before matriculation. This 24-year old program provides intensive instruction in mathematics, chemistry, physics, and computer programming to qualifying students. (Additional details concerning BRIDGE appear in the Diversity section, below.)

Four of the five students in this first FIFE Scholar cohort participated in the BRIDGE Program in summer of 2011. The fifth student was adjudged as not in need of the additional, sustained BRIDGE Program training and did not participate in the program.

As a cohort, the FIFE Scholars have been advised by Aida Ghiaei, who serves as a resource person and liaison with faculty and other engineering constituencies; and by staff from the Engineering Undergraduate Office, who help to cultivate an academically/socially successful environment. Ms. Ghiaei has been working with the Undergraduate Office to encourage FIFE Scholars to participate in various activities such as the Engineering Ambassadors program, National Society of Black Engineers (NSBE), Society of Hispanic Engineers (SHPE) and Society of Women Engineers (SWE). All of our FIFE Scholars are active in at least one of the mentioned programs.

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 2011-12, 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 18th annual all-day Multiply Your Options (MYO) Conference for 8th grade girls was expanded to two days this year so that we could accommodate more students. Each day featured 24 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 425 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 boys. The first EYF conference was a great success: more than 90 boys participated in 13 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. Forty-six students completed the 2011 annual BRIDGE program.

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 very involved in helping the EDP host its first ever Engineer Your Future Conference for 8th grade minority boys. On a weekend in September 2011 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. The active membership reached an all-time high; the UConn chapter had more students attend the regional conference than any other member school, including the host school (MIT); and the UConn SWE application to host the 2013 SWE regional conference was accepted. Organizational efforts and participation of the SWE membership were instrumental in the success of this year's two Multiply Your Options conferences for the 425+ eighth grade girls who attended.

In the spring of 2012, for the second year, the School offered the one-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 51 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 98%. 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 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 as they study both engineering and German. Our Co-Director of the Eurotech Program and our Director of Advising were very closely involved in the Eurotech LLC in the fall semester and will continue into next year.

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. The Engineering Ambassadors continued to serve as additional mentors and to provide support for our LLCs.

ACADEMIC EXCELLENCE

As the demand for well-educated engineers with diverse experience continues to grow, the School has created two new minors that respond directly to corporate expectations. They are: *Electronics & Systems* offered by the Electrical & Computer Engineering Department 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 the GE3 program.

SUMMARY

For the academic year 2012-13, we admitted 44 valedictorians and salutatorians to the School of Engineering. Thirty-four students are members of the Tau Beta Pi Engineering Honor Society, and 126 undergraduates are members of the individual major honor societies. The Dean's List acknowledged 437 continuing students with a cumulative grade point average (CGPA) of 3.567 or greater in the fall '11 and 466 continuing students in the spring '12 with a CGPA of 3.621 or greater.

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