



A PUBLICATION OF THE SCHOOL OF ENGINEERING

Engineering's Senior Design Projects

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The Senior Design Project course is, first and foremost, a transformative experience for engineering students. It helps them transition from the role of student to one of professional engineer. It acclimates the students to the requirements and constraints of good engineering design as practiced by professionals in industry. For this reason, the Senior Design Project course is a crucial aspect of engineering curricula.

“Working on this project really tested the limits of what I learned at Fairfield,” said Mechanical Engineering student **John Weichenrieder ’12**, a member of the engineering team that worked on the Human Powered Vehicle for its Senior Design Project. The vehicle was the result of a multi-year effort, he added, “and needed our dedication and time during one of the busiest semesters of our lives.”

With partners **George Romania** and **Musruk Siddique**, he plans to enter the vehicle in the ASME HPVC 2013 Spring Competition and outperform the previous design.

“Time management and stressful conditions were nothing new to us, but the experiences learned from our past semesters made the juggling act so easy that it became second nature to us,” Weichenrieder added.

The Senior Design Project is a two-semester course in which the students work in



Winners of the Dean's Award for their light-sport aircraft. From left, Kevin Richard, faculty mentor Dr. Ryan Munden, Neil Rodrigues, John Burke, and Clare McManus.

interdisciplinary teams with a faculty mentor. The culmination of the course is the presentation of the Senior Design Project, a seminal event that showcases the collaboration among students who have spent the year designing, creating and implementing their research project. Students use knowledge learned in prior courses and apply them to problems they will face in actual industrial or research environments. This year's projects included an automated microplate workcell to provide repeatable sample preparation in a biology or chemistry lab, an automated syringe-filling machine sponsored by the Dymax Corporation, and a survivor locator light to be used in search and rescue efforts. Working with engineers from Sikorsky Aircraft, one group of students designed a tail bumper for the S-92 commercial helicopter to guard against damage during

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Jerry Sergent Retires

This has been the fastest, happiest decade of my life, and I'm really going to miss the many friends I have here across campus," says **Jerry Sergent**, professor and chair of the Department of Electrical and Computer Engineering, speaking of his impending retirement at the end of the summer.

A fixture in the electrical engineering department for the past 10 years, Dr. Sergent was recruited from industry—he was a consultant with GE, GE India, and a few legal firms—by then-dean Vagos Hadjimichael. In that time, lab equipment has been upgraded and new courses added, but “our message has changed very little,” Dr. Sergent said. “We still work closely with students to prepare them to be successful in industry, gearing our courses to be as close to industrial needs as possible.” As an example, he pointed to the increasing need for students to be comfortable making and customizing integrated circuits, which have become prevalent in everything from ipads to cell phones and hearing aids, and to understand alternate energy sources.

“Jerry was always ready, willing and able to take on just about any task he encountered in his decade of service to the School of Engineering,” says Dean Jack Beal. “In the classroom and



Jerry Sergent, Ph.D.

in the lab, he gave his students a full and complete measure of the subject; they *wanted* to work for him. All of us here in the School of Engineering wish Jerry the very best.”

Dr. Sergent is retiring as a “professor emeritus”, an honor “which means I have all of the privileges and none of the duties” of a full professor. It’s a well-deserved honor for a guy who’s been

working since he was nine. “I grew up doing odd jobs on a farm in Kentucky,” he said. After joining the army, he was trained in electronics, then studied engineering on the GI Bill. He and his wife will be moving to Florida.

“You know, I taught at the University of South Florida for 10 years and could count number of friends I had outside of engineering,” recalls Dr. Sergent. “Here, I know half the campus.”

Dr. Hoffman Serves as 2012 Baldrige Examiner

Dr. **Harvey Hoffman** has been asked to serve as a member of the 2012 Board of Examiners for the Malcolm Baldrige National Quality Award. The Board of Examiners provides advice and guidance to the panel of judges in selecting Baldrige Award recipients.

The U.S. Congress established the Malcolm Baldrige National Quality Award 25 years ago to recognize quality and business achievements of U.S. organizations, and to publicize these organizations’ successful performance strategies.



Harvey Hoffman, Ph.D.

Now America’s highest honor for innovation and performance excellence, the Baldrige Award is presented annually to U.S. organizations by the president of the United States. Organizations from the education, healthcare, manufacturing, nonprofit/government, service, and small business sectors may apply for the Baldrige award.

Dr. Hoffman originally became interested in the Baldrige Award as part of his preparations for the course, Principles of Quality Management, that is part of the Master of Science in the Management of Technology (MOT) program, which he directs. “It is such a significant award, and I wanted to find out more about it from the inside, so I applied to be an examiner,” he says. As an examiner, he will be part of a team that reviews applications from industries around the country. “It typically takes an organization about three years to prepare for a review,” he adds.

Connections in Cameroon

Fulbright Scholarships aren't just for 22-year-olds. Just ask **Dr. Bill Taylor**, associate dean of the School of Engineering. Last year, he was awarded a Fulbright Scholar grant to help guide the development of a new engineering school at the Catholic University of Cameroon (CATUC) in West Africa.

"[Africa] needs a lot done, and engineers can do the job. So far, CATUC, the second engineering school in the country, has admitted 70 to 80 students," he said of the University, which has programs in electrical, mechanical, civil, petroleum and agricultural engineering.

Dr. Taylor is no stranger to Cameroon; he first lived there 15 years ago when he was involved with a National Institutes of Health biomedical research grant examining reproductive hormones in women for family planning purposes. This time, he taught three classes, brought over books and equipment donated by Fairfield's School of Engineering, and helped guide curriculum development. His work continues as he finishes the final few weeks of his Fulbright from Fairfield.

Though each area of Cameroon has its own language, English is used in CATUC classrooms. "Students have a tribal language, such as Lamso, and converse with one another in Pidgin English. I have some knowledge of their language and am working to gain fluency," said Taylor.

While his African students were very driven to learn, Dr. Taylor noted, the challenges are considerable. Among the most frustrating: the maddening pace of Internet connections, making it just about impossible to download books or programs of any size, and the intermittent outages of electricity and water. Lab equipment is in short supply as well – in fact, the students went on strike last semester in protest – so Fairfield's School

of Engineering donation of two digital development boards and microchips was much appreciated.

The semester was a family affair for the Taylor clan; Dr. Taylor's wife, Donna, a Montessori teacher, came along and spent some time in the schools, while daughter Maryclare, a pre-med student at Loyola University Maryland, spent two months interning at an area hospital.

Established more than 60 years ago, the Fulbright Program is the flagship international educational exchange program sponsored by the United States government and is designed to increase mutual understanding between the American people and the people of other countries. Dr. Taylor anticipates further collaborations after the Fulbright grant ends. "Some of us are working on point-of-care diag-

nostics, using a laboratory chip that you plug into your smartphone. This is the way we are heading in this field and it has great possibilities, especially in low-resource environments."



Engineering students from CATUC on a field trip to the African Centre for Renewable Energy & Sustainable Technology in Cameroon.



Dr. Taylor (far left) and his wife Donna (far right) with longtime friends in Cameroon.

News Briefs

The 16th annual ‘Excellence in Mathematics and Science Awards’, recognizing junior high school students from area schools, were recently presented on the Fairfield campus. The awards are sponsored by Fairfield University and Sikorsky Aircraft Corporation.

Dr. Jack W. Beal, dean of the School of Engineering, expressed his hopes that the honor will in turn inspire these students to pursue careers in science, technology, engineering, and math. “Today, we’re here to celebrate you and your achievements,” he told the 34 award winners, their parents, high school teachers, and Fairfield faculty members.

Dr. Beal and **Susan Hitchcock**, Sikorsky’s manager of community relations, presented the students with medals and certificates for their academic accomplishments. Acknowledging the “bright minds” before her, Hitchcock observed, “Some of you will make significant discoveries... We need students like you. Keep following your dreams.”



Photo: Tebben Lopez

Dr. Jack Beal (center) and Susan Hitchcock presented medals and certificates to each winner.

Lou Manzione, Ph. D., dean of the College of Engineering, Technology and Architecture at the University of Hartford, spoke last March on “Comparing Innovation and Technology Transfer in Industry and the Academy.” Dr. Manzione focused on the significant differences between the culture of invention and technology transfer in American industry versus American higher education.

While both provide important competitive advantages to the nation and are fountains of wealth creation and employment growth, he said, the culture and support structure for innovation and commercialization are very different, and universities are at a distinct disadvantage in the ability to convert intellectual assets into economic value.

Douglas Lyon, Ph.D., professor of computer engineering, said, “Dr. Manzione presented his observations of how the great corporate research labs were so effective in providing the nation with a steady stream of revolutionary breakthroughs, and how universities can learn from this model.”

Dr. Shanon Reckinger, the University’s Clare Boothe Luce Professor in the Department of Mechanical Engineering, presented her research, “Advanced Numerical Methods for Ocean Circulation Modeling,” at a symposium in March.



Dr. Shanon Reckinger

The Henry Luce Foundation’s Clare Booth Luce Program is intended to encourage women to enter, study, graduate, and teach in Engineering and the Sciences.

Dr. Reckinger is currently teaching fluid dynamics and numerical methods at both the undergraduate and graduate levels. Her prior research includes work at the Los Alamos National Research Lab in New Mexico and at the Swiss Federal Institute of Technology in Switzerland.

With the help of a grant from Google, the School of Engineering presented a three-day workshop for 17 area middle and high school teachers to learn how to use “computing education as the glue within science, technology, engineering and math (STEM) curriculum development and execution,” and create exciting ways to teach their students. The goal is to share educational methods for creating and integrating interactive educational computer games into the curriculum to help students learn and apply computer science and engineering concepts throughout STEM.



Dr. Amalia Rusu, assistant professor of software engineering, led the workshop. “The workshop delivered computer science content that teachers can start implementing in their classrooms right away,” she

said. “They are now part of a thriving network of professionals, continuing to foster the relationships built at this workshop. With a great number of teachers on the waiting list, we are hoping that this workshop becomes a tradition at Fairfield and we will be able to extend it to other school districts in the future.” Dr. Douglas Lyon was co-leader for the workshop.

Commencement 2012

Amid sunny skies and high spirits, Fairfield University awarded 883 undergraduate degrees, 419 master's degrees, 21 advanced study certificates and five doctor of nursing practice degrees - the first doctoral-level degrees in University history - at its 62nd Commencement ceremony on Sunday, May 20.

The speaker at the undergraduate ceremony was **Joseph P. Russoniello '63**, a Fairfield alumnus who went on to become one of the most prominent prosecutors in the United States, successfully arguing public corruption, espionage and murder cases while serving as the U.S. Attorney for the Northern District of California.

Longtime Fairfield residents **Bob and Suzanne Wright**, co-founders of Autism Speaks, both spoke at the graduate Commencement ceremony. After their grandson was diagnosed on the autism spectrum, Bob Wright, the former vice chairman of General Electric and chief executive officer of NBC and NBC Universal, and Suzanne Wright, committed their lives to making the public aware of the devastating impact the disorder has on children.

Among the many outstanding graduates singled out for honors were **Sridevi Valluri** and **Nirmal Kumar Vadivelu Amarender** who are among a growing number of graduate students (23) at Fairfield from India. Valluri earned an M.S. in software engineering and is a former college professor. Amarender, who received an M.S. in Management of Technology, is working at Rhode Island Hospital as part of a highly selective biomedical master's program.



Solar Cells Get an Upgrade

Assistant Professor **Ryan Munden** has some ideas about solar energy panels. Specifically, he wants to make them more efficient and ultimately more economical. And he's been working out his design at Long Island's Brookhaven National Laboratory, spending several days a week there last semester when he was on sabbatical.

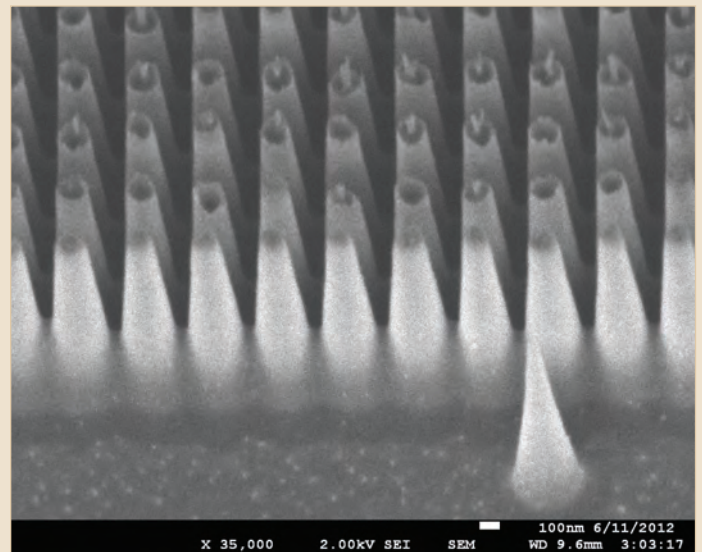
Sponsored by the U.S. Dept. of Energy, the facilities and staff of Brookhaven are open to all scientists whose proposals have been approved by the Brookhaven administration.

Dr. Munden's idea is based on the theory that creating nanopillars would convert solar energy more efficiently than the flat surface currently in use. This theoretical work has been around for several years, but thus far there has been no solid evidence that it can be achieved. "Right now, the solar cells currently in use are like mirrors. [Even though they are coated with a non-reflective coating] light bounces off the mirrors, so some of that solar energy is lost," Dr. Munden explains. "Now, consider a fuzzy blanket; the many fibers stand up on the surface, absorbing light much more efficiently. These nanopillars need to be roughly the size of photons, or about 300-700 nanometers." They may ultimately be created using masking plus wet etching, or eventually by growing nanowires, which would be more cost effective than using the current nanofabrication.

The second hoped-for advantage of Dr. Munden's work involves enhancing the extraction of electrons at the junction of the silicon layers of the solar cell.

The project is approved for two years, at which time Dr. Munden will submit a new proposal to continue working at Brookhaven. He hopes that the later stages of development will provide opportunities for graduate and undergraduate student internships. "A student interested in microprocessing or photovoltaics would find the work very beneficial," he says.

"If I can prove the concept, it would be worth the time to develop ways to mass produce the cells," Dr. Munden says. He is currently seeking funding from various sources.



Nanopillar formations, etched from a solid piece of silicone wafer and viewed under a Scanning Electron Microscope.

Senior design project *continued from page 1*

unconventional landings. Another group worked in conjunction with the University's Department of Residential Life to create a software program to automate residence selection, a process that is very labor-intensive when done manually.

Students, dressed in business attire, presented and discussed their work with peers, faculty, the dean and members of the SOE Board of Advisors in May. The Dean's Award, determined by a vote of the Dean's Council of Chairs, was given to the



team of **John Burke** (electrical engineer), **Clare McManus**, **Kevin Richard** and **Neil Rodrigues** (all mechanical engineers), for their Light-Sport Aircraft with a 4-Stroke Engine, a project with the ambitious goal of "making the personal aviation market available to a wider range of consumers."

University President Jeffrey von Arx, S.J., takes a ride on the human-powered vehicle created by seniors Musruk Saddique (center) and George Romania (right). Teammate John Weichenrieder is not pictured.

Faculty Publications and Presentations

- **Etemad, Shahrokh** and **Scheer, Anthony** (undergraduate). "Technology Review in IC Engine Applications," in ASME I.C. Engine Division, Fall Technical Conference, 2012, Vancouver, British Columbia.
- **Etemad, Shahrokh**. "Low Single Digit NOx Emission Catalytic Combustor for Advanced Hydrogen Turbines for Clean Coal Power Systems, GT2012-68128," American Society of Mechanical Engineers, ASME and International Gas Turbine Institute, IGIT.
- **Etemad, Shahrokh**. "Novel Glow Plug for Compact High Density Engine Applications Operating on Heavy Fuels," in 48th IAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, 10th International Energy Conversion Engineering Conference, 2012.



Dr. Hadjimichael

- Yeonwoong Jung, Aleksandar Vacic, Yong Sun, **Evangelos Hadjimichael** and Mark A. Reed (2012). "Mapping of Near Field Light and Fabrication of Complex Nanopatterns by Diffraction Lithography," Journal of Nanotechnology, vol.23.

- **Lyon, Douglas**. "The Java Tree Withers," IEEE Computer, Jan. 2012. Dr. Lyon was also named as Accreditation Board Engineering Technology Program Evaluator.
- **Reckinger, S. M., Vasilyev, O.V., Fox-Kemper, B.**, Shallow Water Model Using Adaptive Wavelet Collocation Method. February 2012 Meeting, Ocean Sciences, Salt Lake City, UT.
- **Reckinger, S. M., Vasilyev, O.V., Fox-Kemper, B.**, Shallow Water Model Using Adaptive Wavelet Collocation Method. November 2011 APS Meeting, Division of Fluid Dynamics, Baltimore, MD.
- **Reckinger, S. M., Vasilyev, O. V., Fox-Kemper, B.**, Adaptive Volume Penalization for Ocean Modeling, Ocean Dynamics, 1-15, 2012.



Dr. Lyon

Please remember in your prayers **Dr. Richard Weber**, retired Associate Dean of the School of Engineering, who passed away on July 9, 2012.



Save the Date

Tuesday, September 25 at 7 p.m.

"Web 2.0 Open Framework Revolution for Entrepreneurs, Inventors and Organizations"
by Brock Hotaling, CEO of Opstreams, LLC

Fairfield University Dolan School of Business Dining Room

Mr. Hotaling will discuss why the evolution of browsers, HTML, CSS and Javascript are often misunderstood in the context of business and non-business organizations.

Free and open to the public.

Attention Alumni!

Your knowledge, insights and work experiences are valuable resources for our students. If you are you working for a company interested in hiring students for internships, or you're willing to speak to engineering students about your work, we'd like to hear from you! Please contact

Dr. Jack Beal at jwbeal@fairfield.edu

Tickets for the upcoming art season at The Quick Center are available now! Visit www.fairfield.edu/newseason or call 1-877-arts-396.

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Letter from the Dean



Dr. Jack W. Beal, dean

The 2011-2012 academic year has been an eventful year for the School of Engineering. We started in September 2011 with a full-time, first-year class of 44 bright, eager students – up from 32 in 2010. It's obvious that the quality of our incoming students is also increasing: SAT scores continue to rise and more of our entering students have received AP credit. Overall, we are

seeing growth in both undergraduate and graduate student populations. We have worked diligently during the past year at Admission's activities, Open House weekends, and personal visits with the expectation that we will have an even larger class of over 50 in September.

In May, we granted 55 MS Engineering degrees and 34 BS Engineering degrees, a significant increase over previous years. Almost all of these graduates have jobs or are going on to graduate schools. (The others have internships and are awaiting offers.)

The School of Engineering welcomed Dr. Shanon Reckinger as our Clare Boothe Luce Professor of Mechanical Engineering.

She immediately jumped into the classroom with several new courses and began her faculty research agenda. She mentored a Senior Project team to construct a large, rotating water tank to observe experimentally fluid flow in a rotating system.

With external gifts and University support, the School was able to purchase several new teaching lab systems ranging from wireless communication to a vibration test system to new computer labs. Several students were supported in their project work by the NASA-supported CT Space Grant fund. Dr. Amalia Rusu was awarded a grant from the Google Foundation for a training workshop for Computer Science for High School teachers (CS4HS).

After a year of preparation, The School welcomed the ABET visiting review team in October, and we reviewed almost every aspect of our programs during their 2 ½ day visit. We expect to receive the final ABET Report in August-September 2012.

Overall, I am extremely pleased at the School's accomplishments. I personally want to thank all of those who supported the School of Engineering for their efforts in making all of this happen, and I look forward to new and exciting activities in the coming year.