STUDENTS TAKE ON THE CHALLENGE OF DESIGN
PAGES 4-5

SUMMER PROGRAM GIVES GIFTED UNDERGRADS UNIQUE RESEARCH OPPORTUNITY
PAGE 6

WHAT GOES UP:
REZA EHSANI INVESTIGATES AFFORDABLE AERIAL RECONNAISSANCE
PAGE 9

NEWSLETTER JANUARY 2011

UF UNIVERSITY of FLORIDA

agricultural *and* biological *engineering*

ENGINEERING - MANAGING - PACKAGING

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Meeting the Challenge in Haiti

The earthquake that struck Haiti in January 2010 was the latest shock to the poorest country in the Western Hemisphere. According to Brian Boman, an ABE professor who has traveled to Haiti several times in recent months, the devastation in Haiti's capital Port au Prince is difficult to explain or to show. To understand it, one has to drive the streets of Port au Prince and take in block after block and mile after mile of collapsed and destroyed buildings. Less visible but more devastating is the loss of over 200,000 Haitians.

photo: Brian Boman

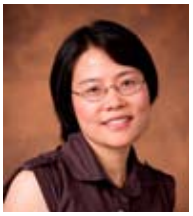
Many efforts have been made over the years to help this small nation -- not always with positive effect. Boman explains that food aid beginning in the 1960s was intended to help Haiti's hunger problem, but it had a negative effect over time. Local farmers could not compete with the steady stream of cheap, imported food, and this caused local production agriculture to collapse. Today, there is agriculture in Haiti, but it is small-scale and cannot supply the country's needs.

Boman is part of an effort to "resurrect" production agriculture in Haiti by bringing effective, appropriate, and sustainable technology to the island. The work is utlimately funded by the U.S. Agency for International Development (USAID), which has contracted with Chemonics International to conduct several projects in the country. Chemonics specializes in development projects. As part of this work, Chemonics has subcontracted with the University of Florida to assist Haitians by helping them increase agricultural productivity and develop new means of generating income. The UF part of this work is managed through the UF-IFAS Office for International Programs. It provides several UF faculty and as many as eight graduate students with a special opportunity.

As an agricultural engineer, Boman specializes in water use and irrigation systems. In his several trips to Haiti, he has worked with a team whose task is to develop demonstration farms and hoop houses, a type of greenhouse that can be constructed by local workers using basic materials. One question might be why one needs a greenhouse in a tropical environment like Haiti, but these hoop houses are more than just protective coverings. Inside the hoop house, vertically stacked spots are constructed that allow for intensive use of Haiti's limited resources. Because it is enclosed, the hoop house prevents evaporative loss of water, and because of the vertical alignment of pots, plants with different water and light requirements can share the same space.

story continues on page 2

ABE Welcomes New Faculty



Zhaohui Tong works with UF's biofuel program, but her vision and abilities go further, to the full range of biomass-derived products. She is skilled in all stages of biomass processing -- from pretreatment to the development of novel

Eric McLamore specializes in biosensors. His background is cell/tissue physiology and instrumentation, and his interests span agricultural, environmental, and biomedical applications. McLamore describes a biosensor as a device that uses

Senthold Asseng joined ABE/UF in December 2010, filling the position which will be vacated by Dr. Jim Jones at the end of January 2011. Asseng is well suited for this role, as he and Jones are both well known for their modeling expertise, organizational

bios continue on page 3

Brian Boman (second from left) and the Haitian Team pose before the hoop house under construction. Most of the materials for the hoop house had to be flown in from the United States, brought up the mountain in a truck, and carried the last few hundred feet of elevation. All photos on this page are courtesy of Brian Boman.

The completed hoop house is covered with plastic sheeting, It is shown here with the door open, revealing the vertical stacker system.

A closer view of the stacker system shows how each pot is fed individually by drip irrigation. More plants are grown in the aisles on either side of the stacker system.

Haiti, continued from page 1

Boman's project will create hoop houses at 8 demonstration sites, called CRDDs locally -- an acronym (in French) for "rural centers for sustainable development." The team started with its most challenging location, near the village of Kenscoff, at an elevation of 5500 feet in the mountains of central Haiti. This area of Haiti is much different than the crowded streets of Port au Prince. Here, it is generally cool, and rainfall measures about 40 inches per year, which is concentrated during the early summer. During the rest of the year, the area is too dry for agriculture without irrigation. The hoop houses are ideal in this setting because they make very efficient use of water, which must be piped in across the hills.

The terrain itself poses a challenge. Agriculture on much of the island has to take place on terraces because of the steep slopes. After carrying materials for a hoop house up into the Haitian mountains, Boman can testify personally that getting construction materials in and products out can be difficult, and motorized vehicles can only get so far. Manual labor or pack animals are needed in many settings, and part of the challenge for the engineer is designing appropriate technology rather than making solutions wait for infrastructure that a poor country cannot afford.

One of the main crops that will be grown in the hoop houses are chrysanthemums. When asked, Boman explains that flowers are an important part of the island's traditions, its many ceremonial holidays, and, therefore, its economy. Flowers can also be exported. So, this crop becomes a source of income which can drive local development. Currently, many flowers are imported from the Dominican Republic. Haitians have preferred imported flowers because of quality issues, but the hoop houses and better flower varieties can help develop a domestic flower market and keep Haitian currency working at home.

Boman compares upland Haiti to the Carolinas, and he says that a variety of crops could be grown there, including apples, peaches, strawberries, and vegetables. He says that there was once a thriving tomato industry in Haiti, and part of the USAID work will attempt to revive that crop. According to Boman, over 1.5 million plugs will be planted at a 150-acre site in Haiti, in a combination of greenhouse and field production for tomatoes. To conserve water, drip irrigation is being installed in the fields.

But tomatoes are not the whole story. When this local industry is up and running, producing tomatoes and tomato products such as ketchup (a great deal of which is used by the hospitality and cruise industries), it will bring an estimated 6000 jobs to the island. That many jobs would be a bonanza anywhere, but in Haiti, this will make a huge difference in the island economy.

The earthquake in Haiti drew attention to the continuing economic and social difficulties in that country, and it has started a new round of investment and problem solving. Boman expressed high hopes for these efforts -- as long as it depends on the Haitian people. Boman was impressed with the hospitality he experienced and with the work ethic of the Haitian people. He returned to Haiti for a fifth trip recently to take solar-powered LED lighting for the Kenscoff hoop house.

Boman works on the irrigation and production side of the project, but another ABE professor, Art Teixeira, is working on the harvesting and processing side. Teixeira is well known as a specialist in food processing, and he was recently named a fellow of the Institute of Food Technology. Haiti's climate is ideal for the production of mangoes, and Teixeira is working with USAID to improve Haiti's mango production in two ways.

Traditionally, mangoes are gathered in baskets and transported on the backs of donkeys. However, losses are great because of pressure created as fruit is piled in the baskets and as it is jostled on its long journey to market or to the processing plant. Teixeira is working on a pack frame that can be mounted in place of the baskets, allowing more fruit to reach its destination in good condition.

A second phase of Teixeira's work concerns the processing of fresh mangoes. According to Teixeira, a number of large U.S firms have expressed an interest in a reliable supply of mango pulp, which could be used in beverages. With the right processing techniques, Haiti could be a supplier of mango puree.

Watch your grocery shelves. Through these efforts and many similar ones, the label "Product of Haiti" may soon appear.

New Faculty, continued from page 1

Zhaohui Tong

photo: Charles Brown

Tong at work in her lab, where she focuses on novel products derived from lignin and composite materials.

polymer products.

Tong is already busy in the research-scale cellulosic ethanol pilot plant on the UF campus, and is helping to develop the biofuel production facility in Perry, Florida. She is also interested in modeling and computational aspects of biofuel engineering, and she collaborates with Dr. Guanghui Lan in UF's Industrial Engineering Department to simulate and optimize the biofuel feedstock supply chain and biofuel process.

Tong's training is especially suited to her position at UF. With a background in mathematics and chemistry, she studied Pulp and Paper Engineering, and spent a few years in the industry. Current biorefinery operations are adapted from the pulping process. Tong's experience with different feedstocks, processes, and final products exposed her to a broad range of scientific and engineering aspects of pulp production.

Biomass can also be used to replace many other products besides fuels that are made from petroleum. Production of high-value-added materials from lignocellulose, the primary component of biomass, is of great interest to Tong. She cites nanocrystalline cellulose which can dramatically strengthen plastics, oligosaccharides as growth regulators for animals and plants, and lignin-based products, such as nanolignin with its UV-blocking properties. Tong is also building an active research program in novel polymer and nanoparticle development.

Eric McLamore

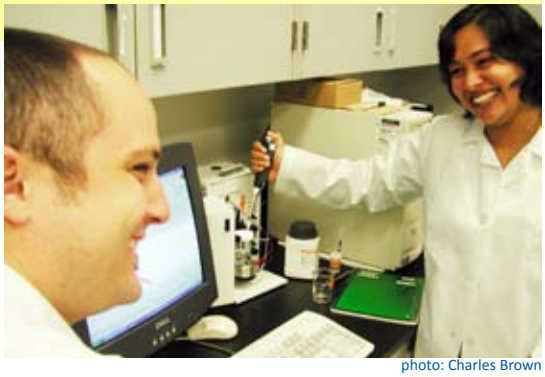


photo: Charles Brown

McLamore looks on as grad student Prachee Chaturvedi demonstrates a biosensor assay.

some part of an organism to generate a useful measuring or monitoring signal. The classic example is the canary miners carried with them to detect toxic gases. Modern biosensor specialists are more likely to use a single component of an organism -- biochemicals for instance -- and exploit its specific properties.

This technology has many applications. An example is the glucose test strip, which uses an enzyme called glucose oxidase to measure blood glucose quickly, accurately , and cheaply. As McLamore says, "Why reinvent the wheel?" The enzyme is perfectly designed to do its job. And this is just one example of the many kinds of biosensor technologies that are already available

McLamore tackles problems where the common thread is the presence of living cells and the ability to probe physiological processes with biosensors. He lists a few examples of the projects he is working on, such as: biosensors that monitor plant physiology non-invasively in real time to gain detailed knowledge of plant processes; engineered biofilms, like those formed by bacteria on many surfaces, for uses such as environmental monitoring and remediation; or in a biomedical application, McLamore describes a dramatic application in which a biosensor in the brain could give epileptics early warning of a seizure. This will be exciting research to follow as McLamore's biosensors appear in a wide range of applications.

Senthold Asseng

ability, and program leadership. Asseng comes to UF from Western Australia's Climate Adaptation Program (CAP), a multi-milliion dollar research program which coordinates activities across several Australian universities and their national science agency, the Commonwealth Scientific and Industrial Research Organization (CSIRO).

Asseng's specialty is systems analysis applied to atmosphere-crop-soil systems. His research focuses on understanding the interactions of these three systems and relating that to crop productivity and sustainability. He uses computer modeling extensively to understand how atmosphere-crop-soil systems evolve over time and under a variety of scenarios.

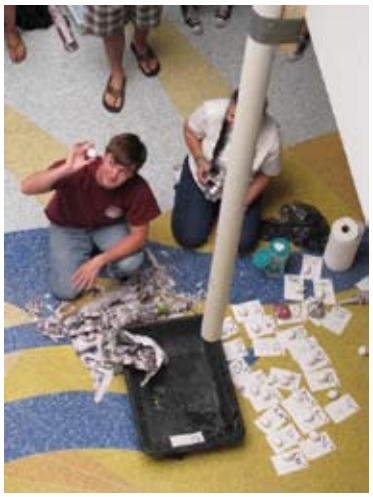
CAP is comparable to programs that Jim Jones established in Florida, especially the Southeast Climate Consortium (SECC). Both CAP and SECC are regional centers which work to deliver the latest in climate science, resources, and predictions to agricultural producers. With this information, producers can plan better for upcoming seasons with management tools provided by these programs.

As Science Coordinator, Asseng supervised the scientific component of CAP by coordinating and developing specific project proposals. He worked closely with stakeholders in Western Australia to make CAP research relevant to their needs. Asseng also made sure that CAP had strong links to the climate research community and a steady flow of funding to maintain and expand CAP's activities.

Dr. Senthold Asseng (striped shirt) poses with other key project leaders from the Climate Adapatation Program.

Design I

Students Grapple with the Challenges of Design



Top: In the Rogers Hall foyer, students line up on the second floor and prepare to to test their designs. **Middle:** A student in Design I prepares to drop her egg carrier down the chute. **Bottom:** Another student retrieves the egg from the carrier and holds it up to demonstrate that it has made the trip successfully.

Richard Scholtz

In early September, visitors to the Frazier Rogers Hall foyer were greeted by a ten-foot PVC pipe fastened to the second-floor railing. On that day, a plant sat under the pipe as if some strange irrigation experiment was underway. The next morning, the plant had been replaced with a black plastic tray, and the foyer was crowded with students from Richard Scholtz's Design I class. Each student carried a device made from newspaper that looked like a bomb, a rocket, or a piñata. Adorned with fins, streamers, and trap doors, each device carried a fresh egg, destined to travel down the PVC chute to the tray below. On the second floor, students lined up to drop their devices. They waited expectantly as assistants below carefully checked to see if the egg was intact. In one or two cases, liquid leaking from the device answered the question without any further investigation, but in most cases, the student designs worked, and the assistant held up the egg for everyone to verify the success.

The egg drop is just the first of several design challenges that students in Scholtz's class face. Scholtz says that egg drop introduces students to the design process -- the problem of understanding and meeting specifications -- but it does not really require any engineering. However, the remaining tasks of the semester require increasing levels of formal planning, teamwork, and reporting. In one semester, students advance from working with newspaper and eggs to four-week design projects requiring the integration of mechanical, electronic, and computer-control elements.

This is Scholtz's second year teaching this senior level course. Creating a design course is a design problem in itself, and each time Scholtz has taught the class, he has refined it. The tasks chosen for the students must be at an appropriate level yet challenging enough to be significant learning experiences. The tasks must help students integrate all the essential skills they will need as practicing engineers, including technical skills, problem solving, team work, formal design, and professional presentations and reporting.

Scholtz's students start out with a range of experience, from those who have never really built anything to others who already have a background as technicians or in the military, where they have received formal training and tackled real-world problems. Two aspects of the class help students in this regard. First, by working in teams, they are exposed to many working styles and learn from each other about the practical aspects of taking a design from concept to working mechanism. Second, students see the wide range of solutions that different teams explore to solve the same problem.

Scholtz lectures and meets with each team regularly to track progress and advise -- to make sure the teams don't get stuck either on an unworkable idea or in prickly team dynamics. Scholtz emphasizes to his students that beyond the fundamentals, communication is the key to effectively working in a team and with clients to solve challenges with engineering. He also encourages the students to be creative in discovering and using department resources. This is one part of the students' growth from a more isolated learning mode that characterizes much of their educational experience to thinking of themselves as part of a team and an organization.

Design I this year began with a team-building exercise in which students were given specific amounts of spaghetti, tape, and string, and asked to create the tallest free-standing structure that would hold up a marshmallow.

Scholtz says that the students encounter all the classic obstacles. Some want to dive in and build without designing, and some get stuck on paper, trying to refine a design until it is "perfect." Students may have difficulty estimating the amount of time and effort needed to turn paper designs into working devices. Scholtz is often impressed with how students mature during the course, bringing to bear all they have learned in their college careers and preparing for the challenges of Design II.

Design II

Integrating Engineering Knowledge through Design

Allen Turner

In ancient times, the Colosseum in Rome was often flooded to stage naval battles to entertain the emperors and people. The recent "flooding" of the Rogers Hall teaching lab was part of an equally epic and harrowing contest. Students in Allen Turner's Design II class competed, if not against one another, against computer models, relays, valves, and actual plumbing in a series of tasks meant to test their ability to implement an integrated solution to three design problems. A great deal of water was spilled in the process, but in the end, students and teacher gave the experience high marks.

The class was built around three tasks in which students had to regulate the flow of water. They worked in teams to develop their test set-ups in stages during the early part of the semester. Then they went on to see if their computer-controlled systems could perform according to stringent specifications in three tasks: an artificial kidney; a system to provide specified flow rates; and a system to establish and maintain a moisture profile in soil under varying conditions.

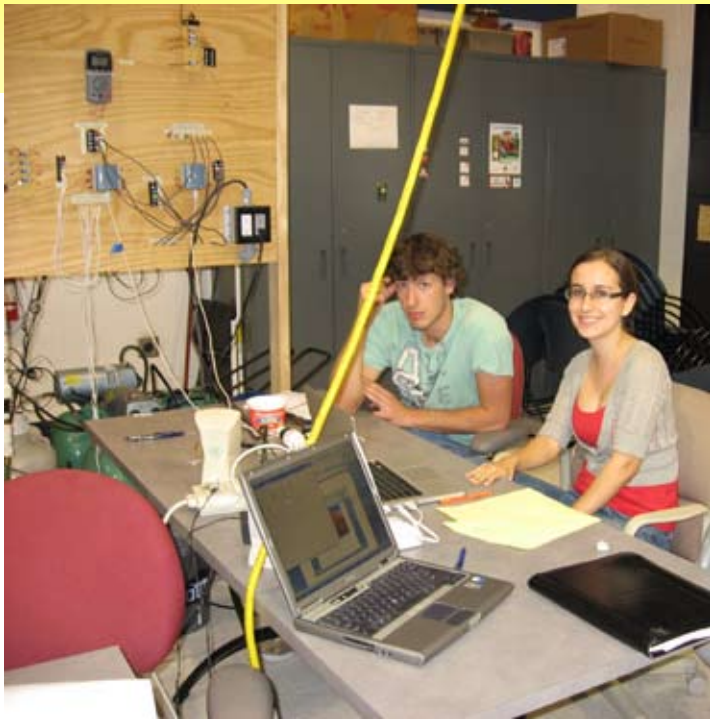
Turner set the requirements and limitations of the systems, and each student design was rigorously tested. Students were given all needed equipment and materials, but it was up to their ingenuity to design the systems and make them perform to specification. Some components were custom-designed for the class.

This approach to Design II is new. Turner revamped the course to make it more hands-on. He was also able to take advantage of his background as an electrical engineer -- in industry and academia -- to help the students use a wide range of modern tools and to confront the realities of engineering design.

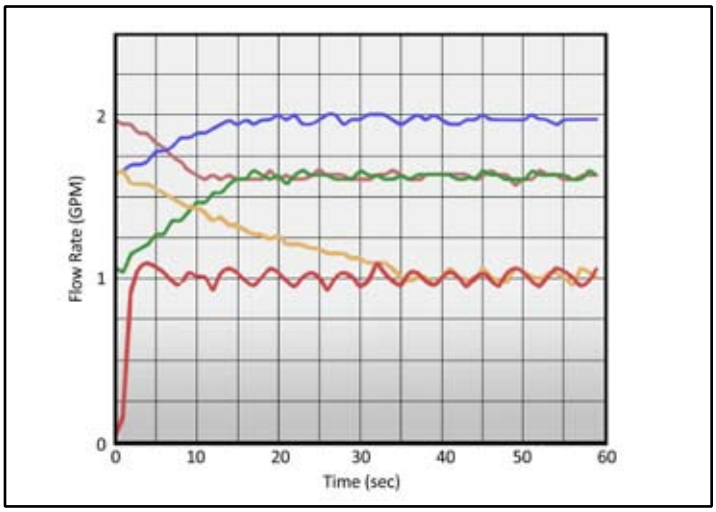
This is the first year that Turner has taught this class, though he has been in academia for a number of years. Design II is often one of the last students take before graduating. He and Richard Scholz, who teaches Design I, have coordinated closely to make sure that their courses work together and that students gain a wide range of experiences and skills in this capstone coursework.

Turner says that the precise control of fluid flow is central to many engineering processes. The tasks he chose for his students tested their abilities to create working systems in areas related to bioengineeing and agriculture. Turner met with his teams weekly to guide them, acting simultaneously as boss, teacher, coach, and troubleshooter.

Turner explained one of the philosophies behind his approach. He feels that students spend a lot of time in engineering classes getting the "right" answer, and that plays an important role in their learning. However, in the real world, there is often no right answer. As engineers, they will be confronted with situations in which they must define the problem and design and implement an appropriate solution. Their ability to work as part of a team is critical, as is their ability to understand and meet the requirements of a client.



A student team looks up from their work as they troubleshoot their flow control set-up. In the background, is a partial view of the project board which provided teams with needed relays, controllers, and valves.



This graph shows how the set-up by student team Prototype-X performed on the flow rate task. The combination of valves and controller were used to add water sources at different pressures to acheive the required flow rates. This set-up did not have the smoothest performance but it shows how the system used feedback to achieve and maintain an average flow rate in a few seconds.

Student response to the course was enthusiastic. Students enjoyed getting their hands on real equipment and making something work. They enjoyed the team aspect and learning how design on paper and real construction and testing work together -- and how they somethimes don't. In making recommendations for future classes, they suggested more time, more equipment, and more credit! Several students felt they needed more programming background to work effectively with the controllers. When asked about advice to future students in the course, one student wrote: Be prepared for long nights!

NSF Research Experiences for Undergraduates

REU Scrapbook

Undergrads from across the U.S. spend a summer with ABE

Students and mentors for the Summer 2010's REU program at ABE/UF pose for a group shot following their final presentations.

1. Daniel Preston, Program Coordinator (ABE)
2. Liliana Zepeda, North Arizona Univ.
3. Laura Merriman, Oklahoma State Univ.
4. Sanjay Shukla, Research Mentor (Immokalee, FL)
5. Katherine Marshall, College of Charleston
6. Jason Motsinger, Univ. of Illinois at Urbana-Champaign
7. Jasmeet Judge, Research Mentor/PI
8. Kevin Koryoto, Michigan State Univ.
9. Kati Migliaccio, Research Mentor/Co-PI (Homestead, FL)
10. Tyler Cheney, Hobart and William Smith Colleges
11. Dorota Haman, ABE Professor and Dept. Chair
12. June Fang, Rice Univ.
13. Eban Bean, Graduate Student Mentor
14. Melissa Benitez, Univ. of California-Irvine
15. Bin Gao, Research Mentor

In summer, 2010, Jasmeet Judge, an ABE associate professor who specializes in remote sensing, conducted the first "class" in ABE's Research Experiences for Undergraduates (REU) program. Almost 100 students applied from all over the U.S., and eight were selected to participate in the NSF-funded effort which gave students two months to work closely with faculty mentors and conduct research projects. Judge described the program as a prestigious opportunity offered at select universities. She said that the unique facilites of ABE and IFAS around the state allowed students to be assigned to faculty in Gainesville, Immokalee, and Homestead, and thus experience Florida more broadly.

Students arrived in Gainesville in mid June for orientation and a chance to develop project proposals. Student projects involved remote sensing, biochar soil amendements, moisture sensors, and biofuels, but they all focused on aspects of hydrology, giving the 2010 class a common theme and the students an additional connection.

Beyond research, the REU exposed students to extension activities. Judge said this taught the students that "an integrated approach is necessary to make and implement water policies."

REU was more than eight experiences. Judge described how the students bonded as a cohort with the goal of supporting and learning from one another. Video and audio teleconferences allowed students to meet weekly to share their experiences and hear from guest speakers. Students blogged about their experiences and provided feedback to the program directors and coordinators. A graduate student mentor gave guidance with a student's point of view and knowledge of the research process. In addition to weekly conferences, students participated in team-building acitivites, including an Everglades tour conducted by Kati Migliaccio, an ABE associate professor at UF/IFAS's Tropical Research and Extension Center in Homestead, Florida. We even hear there was a pool party at Dr. Haman's home. Students came back to Gainesville at the end of the eight weeks to wrap up their experience and present their research.

Clockwise from upper left: Kevin Koryoto mixes a soil sample. Liliana Zepeda adjusts a rain gauge. June Fang presents her research. Students get to know each other at an informal event. Students enjoy a cookout at their pool party.

Read more about the Research Experience for Undergraduates program at WWW. ABE.UFL.EDU/REU

Carol Lehtola Retires

The relaxed-looking person to the right is ABE/UF's latest retiree. After 25 years as an agricultural safety specialist, Dr. Carol Lehtola left UF on September 30. Lehtola's primary responsibility was supporting Florida's Extension Service with materials for safety training and education. She traveled the state widely and conducted training in her first few years in Florida to gain a first-hand knowledge of safety needs and to get to know the people she served. She was a devoted teacher and developed college-level courses in ag safety. She was actively involved for many years with the Ag Operations Management student club, to whom she was known as "Mama Doc" for her guidance and for the meals she often provided. Nationally, Lehtola was known for developing the first tractor safety program to promote the use of roll-over protective structures and for her involvement with child agricultural safety standards. In 2004, ASABE awarded Lehtola the NAMIC Engineering Safety Award, the highest award in the profession. Carol plans to remain in the Gainesville area. For the time being, her only specific goals are to enjoy some free time and her cooking hobby, which includes an impressive cookbook collection.

A Working Retirement for Wayne Mishoe

Wayne Mishoe no longer shapes young minds and careers in the classrooms at Rogers Hall, but since leaving ABE he has been focused on developing an engineering consulting firm which has lots of challenges and rewards. JWM Engineering has taken on a variety of projects ranging from site development, cellular phone tower equipment installation, solar panel installation and completing a design for new communication equipment that would be ready for the Super Bowl. The firm has done many photovoltaic solar panels design, including the largest roof top system in the South East.

"It has been most interesting to realize the things that I have been teaching for all those years are exactly the skills needed to do what I am doing now. There is no doubt that we underestimate the value of what we have been teaching. My students would tease me about my enthusiasm with wind effects on structures and now I am using this information every day!"

J.P. Emond Heads South!

As of February 1st, 2010, ABE Packaging Science professor Dr. Jean-Pierre Emond became the Interim Dean of the College of Technology and Innovation at the University of South Florida Polytechnic. The college encompasses the divisions of engineering, information technology, and business. He is developing various research centers that will specialize in the food, pharmaceutical, and cosmetics industries, retailing industry, radio frequency identification (RFID), energy efficiency, and environmental systems. Over the past 17 years Dr. Emond has conducted many projects related to the development of packaging for temperature sensitive products and optimization of the cold chain during storage, handling, and transportation. The ABE Department wishes him well in his new position.

Wangusi Awarded Rotary Fellowship

Nathan Barasa Wangusi, an ABE PhD student, received the prestigious Rotary Ambassadorial Research Fellowship and an African Studies Graduate Travel Grant to spend a year (August 2009-August 2010) doing research in the Republic of South Africa. Wangusi used adaptive management and computer modeling technologies to seek solutions for water and land resource conflicts between indigenous Southern Africans, wildlife in Kruger National Park, commercial and rural farmers, and industry owners, amongst other stakeholders in the Crocodile River Basin. He spent 5 months as a Visiting Research Scholar at the University of Kwa Zulu Natal in Pietermaritzburg/ Durban and another 5 months with the Department of Water Affairs in Mpumalanga Province and in Kruger National Park. He also spent time raising cultural awareness about the U.S., learning the local language, *isiZulu,* and doing community service as part of his obligation as a Rotary Scholar.

While there, Wangusi received an Akili Research Grant from South Africa's National Research Foundation. He was featured on *African Scholar* (www.africanscholar.com) and in Durban's *Highway Mail* for his research and community involvement. Originally from Kenya, Nathan is the only career African Gator having done his Undergraduate and Masters degrees through the United World College Scholarship program at the University of Florida.

Undergraduate Programs Change to Meet Future Needs

Universities are often described as "ivory towers," somehow distant from the professional worlds their students prepare for. In reality, academic departments like ABE/UF regularly evaluate their programs for relevance to the needs of society, industry, and the profession. Many ABE/UF professors have spent time in the private sector and cultivate connections with the industries and companies where ABE's graduates find jobs. Agricultural and Biological Engineering as a profession is in transition as its focus expands from mechanical production and agricultural infrastructure to include emerging technologies, environmental applications, packaging, energy, and others. Professors Jim Leary, Wendell Porter, and Bruce Welt are the advisors for ABE/UF's three undergraduate programs, and their job is to help students find their way to the education and career they seek. They also make sure that their programs are in touch with the professional world their students are headed for -- in this article, Leary, Porter, and Welt describe changes to ABE/UF's undergrad programs that will do just that.

ABE

In 1996, Agricultural Engineering at UF became Agricultural *and Biological* Engineering. This change responded to new aspects of engineering, such as energy, waste management, and the environment, that had become part of the department's activities. Similar changes were taking place around the nation as ag engineering departments added *biological* or *biosystems* to their names. As these departments, including UF's, have become even more diverse, the Accreditation Board for Engineering and Technology (ABET), which reviews and accredits college engineering programs, decided in recent years that agricultural engineering and biological engineering programs must be accredited separately.


Jim Leary

Jim Leary guides the engineering program in the department. He said that after much discussion about how to address ABET's requirements, it was decided to change the Bachelor of Science degree from Agricultural and Biological Engineering to Biological Engineering. The department considered offering two separate degrees, but this would have required a request for a new degree from the Florida Board of Governors, which oversees higher education in Florida. The most direct approach for students and the department was renaming the degree.

In 2011, the first students will be admitted under the new plan. They will have the similar program options as they have now — agrisystems, land and water resources, and biological engineering — with more elective credit hours, which will allow them to create a more customized education program. Leary will continue to guide these students and help them develop a roadmap that fulfills their educational and professional goals.

AOM

The Agricultural Operations Management (AOM) program was created in 1986 to combine business, management, and agricultural technology. It is one of the larger programs in the College of Agriculture and Life Sciences (CALS). Students would choose a specialization within AOM that prepared them to enter agricultural or natural resource-related businesses as managers. Graduates find work in ag technical sales, farming and ranching operations, environmental industries, forestry, and the like.


Wendell Porter

Wendell Porter, who guides AOM and advises its students, said the specializations depended on specific instructors, and when they left, students and advisors went through significant adjustments to the entire program. The core curriculum took up most of a student's time and often forced last-minute choices of electives, which might not be well related to the student's program.

In 2009 Porter and his AOM colleagues devised a new plan to address these issues. They reduced core courses and eliminated the specializations. The new program leaves more time for targeted electives. They met with advisors in several CALS departments to work out "courses of concentration." Students get management and technology in the ABE department and the 'electives' provide a minor in a specific subject area.

The new approach allows students to tailor their education more closely to their career goals. It also draws on the strength and diversity of CALS. The AOM committee's visits made other departments aware of AOM core offerings, and more students outside the ABE department are now taking AOM classes.

PKG

Considering that every product we make, ship, buy, and use requires packaging, it was surprising how few colleges and universities offered programs covering packaging. UF's Bruce Welt and Ken Berger seized the opportunity to launch an undergraduate major called Packaging Science, first offered in fall 2001. At the time, UF's packaging program was designed similarly to the programs at other universities, such as Michigan State and Clemson.


Bruce Welt

UF's Packaging Science program soon attracted interest from industry and alumni working for major packaging suppliers and end-users in food, chemicals, pharmaceuticals, and cosmetics. Industry feedback has led to recent major curriculum changes to encompass engineering design and problem solving. UF's packaging science program is now the only known packaging program with a full-fledged engineering undergraduate curriculum. The move is paying off as UF is becoming increasingly recognized as the place to find packaging students with real engineering knowledge and problem solving.

The four-fold undergrad packaging curriculum gives students a solid foundation for specialties they are likely to pursue. First, students grounded in the sciences, including biology, chemistry, physics, and mathematics. Second, they take core engineering courses, such as thermodynamics, statics and dynamics. Third is a series of specialized packaging courses that introduce them to the field and help them bring together their core knowledge with packaging. Finally, they take key specialized courses in polymers and engineering design, including package design, distribution and transport, materials, and computers in packaging. Students often participate in co-ops and/or internships at large and small companies, where they take the next step of bringing together their theoretical knowledge with real world problems.

What Goes Up...

Reza Ehsani Investigates Affordable Aerial Reconnaissance for Citrus

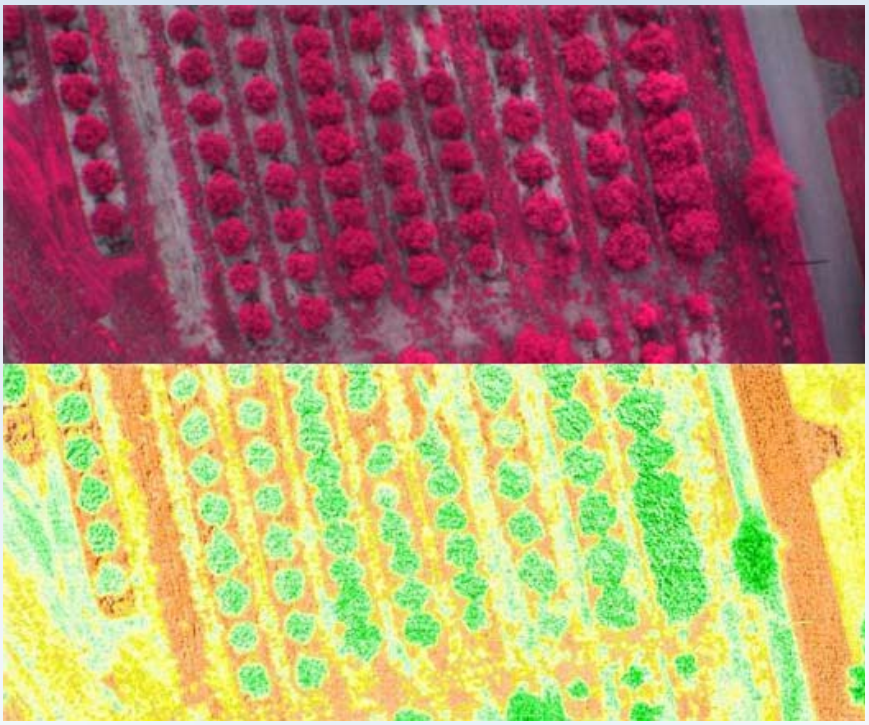
Reza Ehsani

Florida citrus is alive and well. While fewer acres are planted in citrus than in past years, the value of Florida's orange crop continues to increase along with world demand for orange juice. Florida's specialty citrus, especially grapefruit, is very popular in markets throughout the country.

Keeping Florida's citrus industry competitive is a demanding job for all concerned — for growers, for researchers, and for inspectors. A number of pests, such as Mediterranean and Caribbean fruit flies, citrus canker, and citrus greening disease, have had an impact on the citrus industry, and pest issues are likely to continue. Nevertheless, surveillance, eradication, and elimination of infected materials and trees — even development of new citrus varieties — are all available as tools to keep Florida citrus in business.

Reza Ehsani is an assistant professor in the Agricultural and Biological Engineering Department working at UF/IFAS Citrus Research Center in Lake Alfred, Florida. He sees the problems that growers face on a regular basis, but he is working with new technology that can help growers in their battle to keep groves healthy and producing.

In particular, Ehsani is a specialist in advanced technologies for production and harvesting. His goal is to give citrus producers the latest in technology that can improve their harvests and profitability. His background in electronics, mechanics, computers, and remote sensing gives him wide scope in looking for new solutions to grower problems.



All photos courtesy of Reza Ehsani

The upper image is the original false color image of the grove taken by the UAV. The lower image is a computer-enhanced "normalized difference vegetative index," or NDVI, version which reveals the health of trees in the grove. Healthier trees appear darker green.

Ehsani is especially interested in an established technology — aerial imaging— which is now available in a more affordable and easy-to-use form. Some citrus growers have been using aerial photography of groves for many years. An airplane flies over a grove and takes pictures which the grower can potentially use as another means of examining the health of trees and diagnosing problems that may affect entire sections of a grove. Growers and their managers regularly "walk" their groves, using a ground-based perspective to examine trees, but aerial views can provide invaluable information about yields, tree counts, and tree health. The time and expense of an aerial photographic flight would prohibit smaller groves from using these methods, but even when it is affordable, overflights can only be flown once or twice a season.

Now, a German company has developed a small, affordable unmanned aerial vehicle (UAV) called a microcopter, that could give even small operations regular aerial reconnaissance of their groves. The microcopter is made possible by the dramatic decline in the cost of computer and camera components, lightweight materials, powerful small motors, and the availability of GPS navigation. A rechargeable battery powers the motors for a 20-minute flight. The operator programs the device for a flight using a laptop computer and then sends it up. The UAV uses GPS to guide it over the desired course, taking high resolution images, which can be downloaded from the UAV's memory when it returns. The UAV can be equipped with either standard or multi-band cameras. Once the images are downloaded, they can be processed using special software to reveal more information about heat stress, plant health, or disease infestations.

Ehsani is working with the devices and growers now to standardize procedures to use the microcopter and develop new applications for agriculture and small growers that can significantly benefit from this technology. The package that he is putting together will give growers everything they need, including instructions and computer software.

Ehsani was recently invited to Oregon to conduct tests using the microcopter and special software to determine the types and numbers of different kinds of trees in an open field nursery. He is excited about the possibilities the microcopter presents for citrus and other tree-growing operations.

Accomplishments and Awards

Faculty

Dr. Mike Dukes
ASABE Blue Ribbon Award, 2010
Soil& Water Conservation Society Research Paper, 2010

Dr. Art Teixeira
Institute of Food Technology Fellow, 2010
IFAS International Teacher of the Year, 2009

Dr. John Schueller
ASABE Fellow, 2010

Dr. Carol Lehtola
ASABE Blue Ribbon Award, 2010

Dr. Rafael Muñoz-Carpena
GSD Junior Faculty Award of Merit, 2010

Dr. Dorota Haman
Distinguished Alumni Award, 2010

Dr. Reza Ehsani
ASABE Robotic Competition, 2010

Dr. Jose Reyes de Corcuera
ASABE Fl. Section Young Researcher, 2010

Dr. Greg Kiker
IFAS Jr. International Education Award, 2009

Dr. Richard Scholz
ASABE Fla. Section Teacher of the Year, 2010

Dr. Kati Migliaccio
Art Hornsby Distinguished Extension Award, 2010

Dr. Christopher Martinez
ASABE Fl. Section Young Extension Worker, 2010

Student

Stuart Muller
ASABE Grad Student Research Paper, 2010

Fernando Aristizabal
ASABE Fl. Section Outstanding Student, 2010

Sara Kovachich
Future of Southern Agriculture Scholarship, 2010

Wesley Taylor
Italian Packaging Competition, 2010

Nicholas Kiggundu
International Student Award, 2009

Oscar Perez-Ovilla
International Student Award, 2009

Isaya Kisekka
IFAS Best Thesis Award, 2010

William Pelletier
Jack L. Fry Excellence in Graduate Teaching Award, 2010

Bryant Shannon
Gator Engineer Service to Global Community Award, 2010

David Kaplan
GSD Graduate Student Award, 2010

Gaurav Ghai
IFTPS student paper competition, 2010

Nathan Wangusi
Rotary Ambassadorial Research Fellowship, 2009-2010

Dr. Dorota Z. Haman

Chair's Message

In the aftermath of the budget issues that affected the University in 2009, I'm pleased to report that 2010 was a good year for the Department. We have been busy reviewing undergraduate programs, preparing for the next ABET accreditation and, despite an uncertain economy, have hired three new faculty members. In the last 3 years, the demographic of the Department has changed from being heavy at the full professor level to having a large group of new assistant professors. With this influx came new programs, exciting new research, and new classes that reflect changing trends in our discipline. Our biological engineering contingent gained new strength through two new hires in bio-energy and biosensors. Our faculty and students are involved in many fascinating programs and projects – some of which are described here. Please visit us at the Department website, and call or email us if you have any questions or comments. We are keen to keep contact with you. You, as friends and alumni of the Department, play a vital role in spreading the word about our activities, encouraging students to engage in this challenging discipline, and, finally, informing the legislature, the general public, and the University as a whole about the excitement of new developments in Agricultural and Biological Engineering.

Donations make the difference between excellence and greatness. We appreciate our devoted and generous donors. Join us as one of the highest ranked agricultural and biological engineering departments in the nation, and contribute to greatness. Contact us through our website or contact IFAS Development at http://development.ifas.ufl.edu/.

Donors Make the Difference

Electric/Solar Car Making an Impact

Earlier this year, an unusual reception was held at Frazier Rogers Hall — unusual because the guest of honor was an electric/solar-powered cart, donated to the department by Barry Jacobson, vice president of Solar Impact, Inc., a Gainesville company dedicated to "making solar affordable."

photo: Robin Snyder

Elaine and Barry Jacobson present the solar car to ABE/UF department chair Dorota Haman.

Elaine and Barry Jacobson founded Solar Impact in 2007. Elaine (PhD, Food and Resource Economics, 1992) and Barry (PhD, Ag/Bio Engineering, 1988) built their experience into a company that can evaluate, recommend, design, install, and maintain photovoltaic systems -- they can even finance! Their clients can choose whatever they want from this menu that fits their planning and budgets. The key is that the Solar Impact team will find the most viable solution and guide clients to a solar solution that work and makes sense economically.

Solar Impact donated an electric/solar vehicle to ABE/UF to make the point that solar is practical now. The vehicle they gave has a top speed of 24 mph, goes about 60 miles on a charge, and is street legal. This vehicle can safely use most roads in a city like Gainesville, and it is ideal for running around the UF campus.

Special Thanks to Our 09-10 Donors

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ABE/UF

Agricultural and Biological Engineering
University of Florida
P.O. Box 110570
Gainesville, FL 32611-0570

Phone: 352-392-1864
Fax: 352-392-4092
Email: ABEinfo@ufl.edu
Web: www.abe.ufl.edu

Gator Engineer Service to the Community Award 2010

Bryant Shannon Takes ABE to Bolivia and Beyond

UF-ABE undergrad Bryant Shannon was awarded the 2010 Gator Engineer Service to the Community Award for his efforts to promote global health. Shannon plans a career in medicine, specialzing in public health in central Africa. He has already laid a strong foundation for this remarkable goal with numerous service activities abroad and research activities at UF.

In Africa, Shannon has worked in both Kenya and Uganda. He studied the 2008 cholera epidemic in Zimbabwe with support from the University Scholars Program, which each year gives about 200 selected UF undergrads the chance to work with a faculty mentor to develop and conduct a research project. In Central and South America, Shannon has worked in Nicaragua, and most recently, in Bolivia as the public health lead for UF's chapter of Engineers Without Borders (UF-EWB).

Engineers Without Borders projects are made possible through the cooperation of local communities and non-governmental organizations (NGO). For Shannon's trip to Bolivia, EWB worked with Engineers In Action, which coordinates projects with engineering groups and communities in the developing world. As the Engineers in Action website states: "We don't build the wells, we build the partnerships that build the wells and make them sustainable."

The UF-EWB project that was organized for Cachitambo, Bolivia, was to design and build greenhouses and an irrigation system. Cachitambo is located at over 13,000 feet, on a dry, cold plateau in the Andes mountains. Life there is challenging, and incomes are very low. The goal for Shannon's team was assessment, to meet with local leaders to determine their needs and interests and perform some basic water quality and hydrology tests.

Shannon blogged about his experience: "As an Agricultural and Biological Engineer, I was able to experience firsthand the issue of agricultural sustainability in a developing nation early this May.... we discovered that the local mines had made the surface water too acidic to use and that we would be forced to dig a well to access ground water... Our group of students and faculty plan to reach out to campus organizations with similar missions and local faith based groups to help raise funds for the well.... we met with the in-country director of USAID to learn about the local markets and those crops that USAID recommends production of for not only nutrition, but also to improve the community economy.... This assessment trip was... a great supplement to my formal engineering education...."