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enVision MAGAZINE

USF UNIVERSITY OF SOUTH FLORIDA

College of Engineering
50th Anniversary • 1964 - 2014

This is Just the Beginning!

A Group of Engineering Grad Students form an AAUW Chapter at USF

- By Samantha Szabo

A group of graduate students in the College of Engineering formed a new women's group on campus, The American Association of University Women (AAUW).

The goal of AAUW is to provide a lifetime of network and support systems. A few women on campus were unsure of where to turn to for professional developmental help, so the students began the process of starting AAUW in June. AAUW at USF is accepting all students from any major or level, and is not gender discriminative. The focus of the group is professional development for female graduate students, though undergraduates are more than welcome to attend meetings for more expertise on the graduate application processes. Women are the minority in the engineering field, and to have a group for support and guidance will better prepare them in both their studies and post college life.

Electrical engineering doctoral student Jayita Das, and co-founder of USF's AAUW local chapter, says that the typical job search takes 6-10 months in the graduate years for an engineering woman. Having help and aiding one another makes the process easier, and sometimes quicker. "You don't feel like you are the only one; we have a support system for one another," said Das. "Opening up helps a lot."

With events coming up such as a faculty and student workshop to become more prepared for jobs in faculty positions, and a transitional classroom-to-boardroom workshop to help students with communications, AAUW is determined to help the student body become working, able professionals. Graduate students are encouraged to become more aware of the issues of the women minority in the engineering world and workplace, and to know that with the help and support of one another, growing their professional efforts doesn't have to be difficult.

Men are encouraged to attend meetings as well. With the help and support of men, AAUW can effectively reach and attain their goals of awareness, while gaining insight into what it feels like to be a minority in the school and workplace.

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MISSION STATEMENT

The mission of the College of Engineering at the University of South Florida is to improve the quality of life in our community by providing a high quality education for our students and practicing professionals; by creating new knowledge and solving real world problems via innovative research; and by engaging in effective community service and outreach.

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USF UNIVERSITY OF SOUTH FLORIDA COLLEGE OF ENGINEERING

Moving Forward

Dean Robert H. Bishop has a Clear Vision for the College of Engineering

By Glenn Cook

For Robert H. Bishop, the future success of USF's College of Engineering comes down to how it handles the "three P's."

"For me, it is about people, programs, and places," says Bishop, who took over as the college's dean in August. "We will need to recruit, retain and mentor new faculty members — this is key to our future success. We also will need to recruit, retain, and graduate a diverse and exciting student body. Student success is the driver."

Bishop, the former dean of engineering at Marquette University, says USF has a "strong program base" upon which to build more opportunities for undergraduate research and leadership, growth in the graduate programs and high-impact research, and increased funding to foster a global "research footprint." He says he also hopes to see new physical spaces developed that will focus on "trans-disciplinary research and reach across the whole campus."

"Engineering continues to play a key role in the solution of global challenges, but technical approaches alone will not lead to workable solutions. As engineers, we must embrace all aspects of complex problem solving, including the non-technical aspects. Academics in general have not looked at their role in this trans-disciplinary world," Bishop says. "The boundaries between traditional academic silos are being slowly eroded. This is not happening because academic leaders are prescribing these changes, but rather because the global challenges we are addressing require it. It's a natural progression in academia."

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Bishop's own "natural progression" from practicing engineer to the academic world started in the early 1990s, when he moved from a position as member of the engineering staff at the Charles Stark Draper Laboratory to a teaching and research position at The University of Texas at Austin. Over the years, Bishop developed an international reputation as a leading specialist in guidance, navigation and control of aerospace vehicles.

"As a practicing engineer, the missing element was teaching as part of my main responsibilities," says Bishop, who rose from assistant professor to full professor and department chair during his two decades at Texas. "At Marquette, I was offered the opportunity to build a place for addressing global challenges in a trans-disciplinary setting — as I had envisioned during my time at UT."

Bishop says continuing to build USF's reputation as a top-tier research university is more important than ever, but so is making the real-life connections between research and industry.

"Applied research has always happened in academia," he says. "It's not new that universities are involved directly in solving real-world problems, but in recent decades, there has been an emphasis on fundamental, basic research. As research has grown in importance at universities around the country, having a strong applied research component to our work really makes good sense and is a space that provides many opportunities for USF."

Part of that, he says, is because of the strong industry support the College of Engineering receives from the high-tech companies in the greater Tampa area.

"Student-centered active learning is how I think about teaching these days," Bishop says. "One element of that is to provide students with opportunities to learn by doing, and the key is to learn by doing real things that meet the challenges provided by industry. Connecting us more intimately, more organically to industry has many benefits because they give our students real-world experiences."

Despite the myriad responsibilities he has, Bishop plans to remain in the classroom and continue to conduct research. A specialist in the application of systems and control theory to modern engineering products, he continues to work with NASA on advanced navigation algorithms.

"The reason we come to academia is to teach and discover, and I think leadership by example is important," Bishop says. "When we as academic leaders begin to separate ourselves from the fundamental activity of our organization, which is in my mind teaching and research, we're not as effective as we could be."

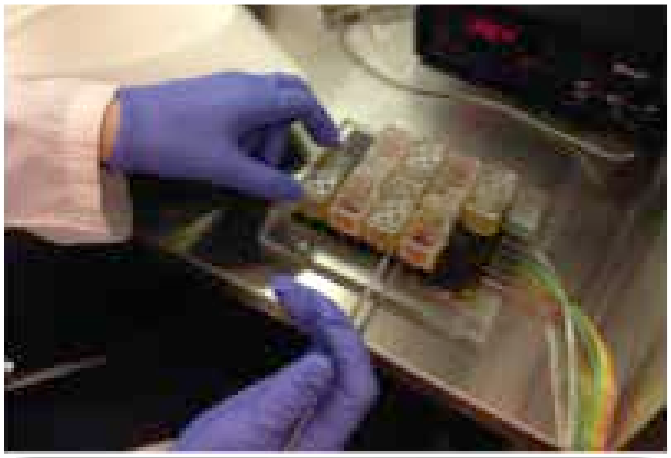
Bishop says teaching and research also allow him to stay in touch with students and stay on top of the advancements in his chosen field. As his career progresses more deeply into academic leadership, he says it is important to remain connected and active as a professor

"I can hear what the students are saying indirectly or directly. I prefer it directly," he says. "The same thing can be said for research, and pushing the envelope in my own chosen field of systems and controls. It keeps me at or near the leading edge of the state-of-the-art in my field. Remaining active is important, even if it is at a reduced quantity."

Jackie Shepard's Mentors Have Guided Her to Success

By Janet Dawald

Jaclyn (Jackie) Shepard looked hard at the classes offered in her freshman orientation at the University of South Florida. Accepted to the College of Business, the athletic freshman perused the subjects of macroeconomics and finance. Growing up in nearby Bradenton she looked forward to a career in accounting. With a head for numbers, and at the urging of her high school math teacher, she had entered and won regional math competitions in high school. Declaring that she had a "gift," her chemistry teacher implored her to go into chemical engineering. As with many students who have had their lives changed by a remarkable teacher, she listened to her mentors. The ledger entry was a loss for the College of Business, and a net gain for the College of Engineering.



Shepard works on the bioreactor in her laboratory.

Graduating with a BS in Chemical Engineering, and a BA in Mathematics in 2006, she continued her studies at Northwestern University, earning a PhD in Chemical and Biological Engineering. She followed that with a postdoctoral position at Massachusetts Institute of Technology (MIT) in the Griffith and Hammond Research Groups developing hydrogel scaffolds for drug testing in a perfused bioreactor. But how did she get into the biology business?

"I was co-advised by two professors, Ryan Toomey and Venkat Bhethanabotla," she explains. "I was funded through the NSF program Research Experiences for Undergraduates (REU). That is when I started working on hydrogels, and from there I knew I wanted to do something that was more biologically oriented. I realized that biotechnology will always be up and coming, a research topic that is never going to be outmoded."

Bhethanabotla, professor and chair of the Chemical & Biomedical Engineering Dept., encouraged her to do more undergraduate research. "I learned my research skills early on at USF," she remembers with fondness. "When I was there (USF), the undergrads were pretty much expected to drive their projects like grad students. We had to write our own protocols, and develop ideas. Other schools hand out tasks with the protocol and design in place, but not here (USF)." This experience was invaluable when she got to Northwestern. "I had never even cultured a cell," she laughs. "I had no biology experience. I was like a sponge, acquiring all the basics. I was just so interested, and it just took off from there."

At MIT Jackie is culturing various cell types into a hydrogel framework within a bioreactor mimicking organs such as the liver and ovaries. "Contact lenses and Jell-O are examples of hydrogels," she explains. "What we are working with is a framework of soft materials that you can

Continued on next page...

put cells into. The materials mimic the basement membrane of organ tissue, such as liver cells. You take the cells out of livers and they tend to die off in culture, or not function as they normally would. The scaffolding helps them maintain their functions, survive longer, and function more similarly to how they would in the liver. And all of this is done in vitro, or outside the body."

Jackie's work is part of a $32M grant at MIT funded by the National Institute of Health (NIH) and the Defense Advanced Research Projects Agency (DARPA). This work involves putting various types of organs together on a device in order to determine their interactions and reactions. "For example, we have put liver cells and lung cells on a chip and have them interact with each other," she explains. "You can target one organ with drugs, but detrimental off-target effects can be toxic to other organs. We are developing these associations in stages."

Called "Barrier-Immune-Organ: Microphysiology, Microenvironment Engineered Tissue Construct Systems," or BIO-MIMETICS, eventually ten organs will be placed on a chip and will be used to speed up drug testing and vaccinations, reduce the costs of using animals and better predict how drugs can benefit one organ at the expense of another. This "organ on a chip" venture includes MIT, Charles Stark Draper Laboratory, and CN Bio as the main players, while collaborations have been formed with the University of Wisconsin, Northwestern University, and the University of Pittsburgh.

Working with Linda G. Griffith, professor of Biological Engineering and Mechanical Engineering at MIT and Paula T. Hammond, David H. Koch professor at the David H. Koch Institute for Integrative Cancer Research and the Department of Chemical Engineering at MIT, Jackie specialized in fabricating hydrogels with physical and biochemical cues to guide tissue formation that are cultured in a bioreactor. Employing molding techniques, she established a nontoxic technique to bond soft hydrogel materials to filters enabling them to support tissue growth and withstand flow of recirculated media in the bioreactor.

In addition to her research, Jackie completed her eighth and ninth marathons this year, including Boston and California's Big Sur. "Boston and Big Sur were only six days apart," she laments, "But it was fun - and I actually ran faster at Big Sur." Like her athletic days in high school, keeping competitive is still part of Jackie's regime. "Running fits into my time with experiments, and it is a lot cooler running here in Cambridge than Bradenton," she adds with a laugh.

At the end of September, Jaclyn began working for the Diagnostics Division at Abbott Labs in Lake County, IL as a Sr. Scientist in a Diluent and Formulations Group for assay development. She will support research in developing tests for diagnosing infectious diseases.

For more information on Dr. Shepard's projects, go to:

- http://slate.me/1twc7mQ
- http://newsoffice.mit.edu/2012/human-body-on-a-chip-research-funding-0724

Drew Burgett Splits his Time Between NASA and USF

By Tom Edrington

University of South Florida doctoral candidate Drew Burgett has one very prestigious summer home.

It is not in the Hamptons of New York, but rather Hampton, as in Virginia, near the shores of the Chesapeake Bay.

That is the home of NASA's Langley Research Center, the oldest of NASA's field centers that sits next door to Langley Air Force Base.

Burgett was one of 65 outstanding graduate researchers selected for the NASA Space Technology Research Fellowship, class of 2013. It is a coveted prize among graduate researchers from across the nation. It provides students with the highest funding made possible by the Federal government. It includes tuition and fees, health insurance, funding for research supplies and professional travel.

"NASA was a perfect fit for my research. It was really a match for my work here at USF," Burgett explained.

He has spent the past two summers at Langley, which started out in 1917 as the Langley Memorial Aeronautical Laboratory. When the dawn of the space race came around 1958, it was renamed the NASA Langley Research Center.

The research fellows are part of the new NASA, part of its space technology directorate, which is dedicated to innovating, developing, testing and flying hardware for use in NASA's future missions, which one day might include a return to manned space missions.

Burgett is part of a program that is the super highway for new ideas generated by the brightest minds from America's graduate research community. His NASA work mirrors his PhD dissertation and it is a mouthful:

"Leveraging the Radiation, Resistance and Power Efficiency of Nano-Magnetic Logic to Develop More Affordable, Efficient and Reliable Space Technologies."

"I was working in the area of magnetic thin films," is how Burgett describes the core of his work. "The magnets are very small, less than a thousandth the size of a human hair."

Burgett's Nano Magnetic Logic work falls right into NASA's space exploration wheelhouse. "It doesn't require high power. Nano-Magnetic Logic tolerates high exposure to radiation and that's a big deal when you're exploring space," Burgett pointed out.

"It is also more tolerant to extreme conditions," he continued. "Like those found in outer space."

Burgett has also been able to get a feel for what might be described as "The New NASA."

With the end of the manned space flights, NASA has changed but still wants to be a force for the future.

"It is correct to say that it is getting smaller physically," Burgett said of NASA. "But they are also getting smarter. NASA has a vision for what they want. It's not a bureaucracy. They are in the process of handing a lot of things over to the private sector. Right now NASA is all about promoting research along with public and private institutions."

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Burgett will return to Langley next summer where he works in a world described by such terms as "sputter deposition, vibrating sample magnetometry and superconducting quantum interference device magnetometry."

But for this school year he is back at USF, getting closer to his PhD. His faculty advisor and mentor is Professor Sanjukta Bhanja. Burgett has spent his entire academic career at USF and it wouldn't be a surprise if he ended up as a faculty member there or at another engineering school. "USF is a good school and it's been good to me."

Once Burgett defends his dissertation and receives his PhD, he could head for the world of industry or academia.

"I can see myself teaching," he was quick to say. "I think I'm pretty good at explaining complex concepts and it would be pretty nice to see young people developing as engineers."

Pharmaworks Internship Program is a Community Investment

By Jessica Vander Velde

After months of classroom learning, rising USF engineering junior Nicole Vanderhoof wanted to know where her degree might take her after graduation. She craved hands-on experience. She wanted to find her passion.

Last summer, Vanderhoof and three other young students started exploring potential engineering careers while gaining valuable real-world experience at Pharmaworks, an Odessa manufacturer that designs, builds and repairs pharmaceutical packaging machinery.

The students learned about safety and shadowed employees in various departments – even doing some of the design and manufacturing work themselves. Toward the end of the six-week program, they built a conveyor belt as a capstone project.

Vanderhoof found her passion in Pharmaworks' machine shop, where she drilled, trimmed metal and used other techniques to make parts for machines.

"I'm a really visual learner," said Vanderhoof, 19. "This was hands-on, so I could see everything and learn quicker."

USF's College of Engineering encourages its students to pursue experiential learning and professional experience, and Pharmaworks' internship program is a prime example of how Tampa Bay businesses and USF students can benefit from each other.

Nicholas Harmon, 19, a USF student who completed Pharmaworks' summer internship in 2013, said the interactive learning complemented his USF classes and helped him refine his career goals.

Nicole Vanderhoof, USF engineering student, demonstrates a pill conveyor built by a team of Pharmaworks interns.

"This experience definitely sticks a lot more than just textbooks," he said. Meanwhile, Pharmaworks is building a base of knowledgeable set of students that will soon enter the workforce.

That can sometimes be a challenge, said Pharmaworks president Peter Buczynsky. He started hiring interns in 2010 as a long-term solution to shortages in quality talent. In 2013, Pharmaworks developed its current program, which is about 20 percent classroom learning and 80 percent hands-on work, completed side-by-side with Pharmaworks employees,

In 2014, Pharmaworks hired four student interns – two from USF and two from area high schools. Buczynsky said he encourages other manufacturers to create similar programs, which could attract companies to Tampa Bay and allow graduates to stay in the area.

"I truly look at our program as one of community investment," he said.

USF graduate, 21-year-old Mason Chilmoncyzk, continued working at Pharmaworks after his 2013 internship. He recently left to pursue a Ph.D. in mechanical engineering at Georgia Tech and credits his time at Pharmaworks with teaching him a lot about design and manufacturing.

These days, Chilmoncyzk said, an internship is vital for students who want engineering jobs, and

USF Engineering students, Michael Mills and Nicole Vanderhoof.

Pharmaworks' program is unique in that it offers a rotation through various departments, giving students a taste of different career options.

"It gave me more of a real-world perspective on what engineers do outside of academia," he said.

For the students, the internship was full of lessons in engineering and teamwork. They also picked up something they didn't expect: time management skills.

The students finished building their conveyor belts a few days early, so they decided to take their capstone project to the next level. They added a pill-feeder and a control box to the machine.

Each student found his or her niche as they worked toward their shared goal. USF engineering student Michael Mills, 24, designed the machine's additions on a popular computer program called SolidWorks. Vanderhoof built the parts. And one of the high school students focused on programming the control box.

The group worked a few late nights and faced many frustrations. Mills often found himself dependent on Vanderhoof for the machine's parts, and she faced a daunting workload.

At the end of the summer program, the students unveiled their pill feeder during a ceremony. In front of dozens of employees and the students' family and friends, Pharmaworks' intern coordinator, Jesse Kokotek, pressed the button.

It worked.

"Everything I learned from each department was so detailed," Vanderhoof told the crowd. "I learned how to be resourceful – to find answers and talk to people."

"With the capstone project, I learned time management is huge. I thought we might not finish it," she said, pausing to point at the machine. "But we got it done."

LIVING INDEPENDENTLY:

CARRT Researchers Work to Enhance the Quality of Life for Disabled - By Glenn Cook

Janet LaBreck was impressed. The commissioner of the U.S. Department of Education's Rehabilitation Services Administration toured USF's Center for Assistive, Rehabilitation and Robotics Technologies (CARRT) and received a VIP demonstration showcasing the center's work on behalf of those who have disabilities.

LaBreck, who is legally blind, was accompanied by staff from the Florida Department of Education on the tour, which included demonstrations of a smart wheelchair mounted robotic arm system, a hands-free wheelchair that is controlled wirelessly with Android phones, and various

Commissioner Janet LaBreck uses the Omni Haptic Feedback to read.

virtual reality projects to assess and train persons with disabilities.

"It was an interesting challenge, to describe the projects to a person who can't see them," says Rajiv Dubey, director of CARRT and chair of the Mechanical Engineering Department.

LaBreck was particularly interested in, and impressed by the development of an assistive device that helps the blind navigate through space using laser and sensor technology. "It was a good opportunity for us to show what we do," Dubey says of the demonstration. "They could see that we're doing things in an interdisciplinary way and are focused on helping the people we serve."

The tour was the latest in a series of victories for CARRT, which has received more than $25 million in funding from the National Science Foundation, the U.S. Department of Defense, NASA and private companies such as Draper Laboratories over the past 15 years for its research efforts. Just as important, the center helps more than 1,000 people with disabilities annually through its research and service projects at seven regional vocational centers in Florida.

"Education is in the context of real need, so is research, and it's all connected with service," Dubey says. "I don't think there's a program like this anywhere else."

Dubey, who moved to USF 15 years ago as the Mechanical Engineering Department chair, sought state funding to launch CARRT after then-Gov. Jeb Bush announced that he wanted to privatize rehabilitation services for people with disabilities. The proposal, which was accepted, sought to integrate research and education with services.

For the past decade, CARRT has had a contract with the Florida Department of Education to run the regional offices, which are staffed with an engineer who works with persons with physical and mental disabilities to help them find jobs and live independently.

"A person comes to them with a problem, and the engineers look for a solution," said Redwan Alqasemi, a research professor in the Mechanical Engineering Department and lead rersearcher at CARRT. "It could be a large or small modification, and sometimes they are able to recommend a solution that is available on the market. But when they can't, they bring it to us and we take it to the classroom as part of a Capstone design project."

Capstone is a senior level course in which undergraduate students are tasked with designing and fully developing assistive technology for people with disabilities. Students generally are separated into teams, Alqasemi says, and work as consultants with a person who has a

disability to see if the solution they develop is appropriate.

"You do the research in the lab, but you do the testing with the people," Dubey says. "All of this is for a good cause, which motivates the students because they get to work with the individual who will eventually use the device."

If the project requires more long-range research, CARRT seeks grant funding to fund the effort. Alqasemi, for example, has received an I-Corps grant from NSF to develop a lower-cost robotic gripper.

"I feel like a lot of this research stays in labs and publications, and it doesn't get to real people who can see it in front of their eyes," Alqasemi says. "I've found that it's really rewarding to do a project and see people using it right away. It's amazing to see it make a difference in people's lives."

Stephen Sundarrao, CARRT's associate director, says long-term research involves mostly graduate students and can take one to two years. The time is important, he says, because the solutions are complex and require more trial and error.

"They work on projects involving robotics and virtual reality simulators to determine how a person can work in certain environments, and the time spent on the research gives them more opportunities to try different things," Sundarrao says, noting that CARRT has received nine patents, four of which have been commercialized and taken to market.

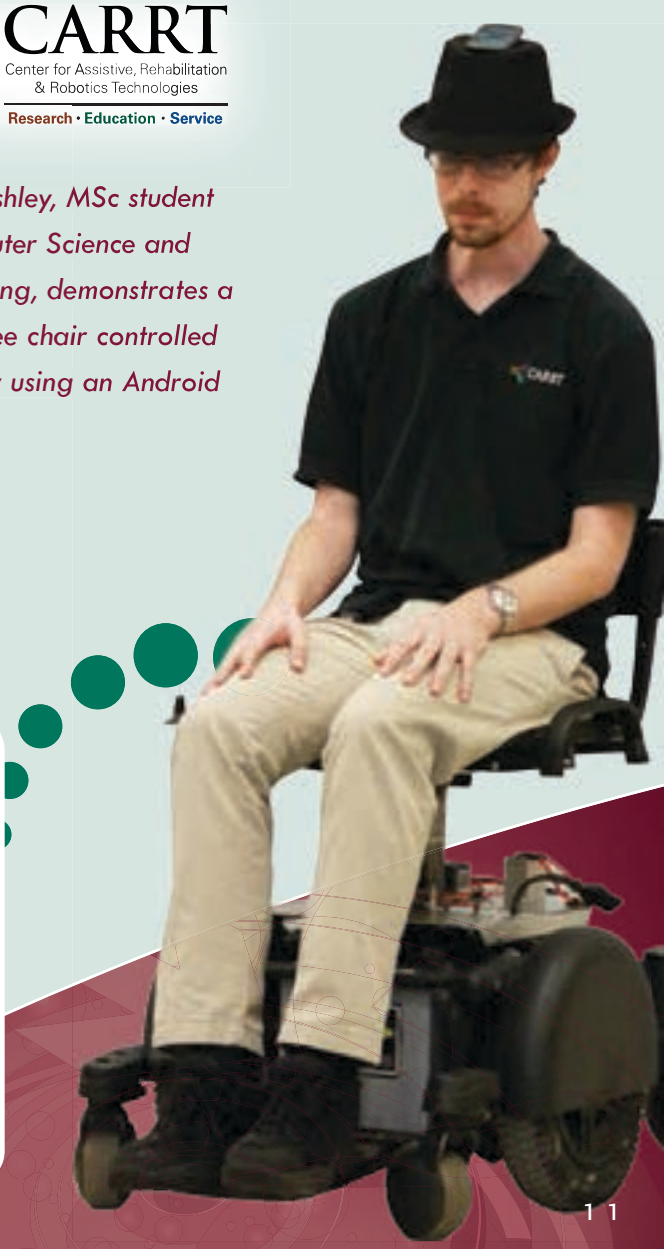
One reason CARRT makes such a difference is its location. Florida has the largest number of senior citizens in any state, and the university is across the street from a large Veterans Administration hospital that houses soldiers wounded in combat.

Sundarrao says the Americans with Disabilities Act has resulted in tremendous progress in terms of access for people with disabilities. But when you look at the products that have been developed, he says the industry "hasn't really been transformed."

"Lately, what we've been doing is trying to change how people view technology for people with disabilities. It should be inspirational. It should create a positive emotion," he says. "When you're looking at engineering and design, people need to learn how to use the technology. It's more than giving them a piece of hardware. It's about how they feel and how people perceive them. That means as much as the product itself."

CARRT
Center for Assistive, Rehabilitation & Robotics Technologies
Research · Education · Service

Daniel Ashley, MSc student in Computer Science and Engineering, demonstrates a hands-free chair controlled wirelessly using an Android phone.



Lal Bozgeyikli, PhD student in Computer Science and Engineering, presents the use of virtual reality for vocational rehabilitation during a training exercise.

Invent. Design. Make.

Makecourse challenges engineering students to design and build their own projects.

- By Glenn Cook

Matt Olson was looking for a challenge last spring. As an electrical engineering student, Olson wanted to use what he had learned in the classroom and lab. He needed to *make* something.

"I wanted something different in my coursework," says Olson, who found the opportunity in Professor Rudy Schlaf's Makecourse. "This was a chance to really do something with the theory and lab experience I picked up in other classes."

The Makecourse, which has 45 students enrolled this fall, was developed by Schlaf and Eric Tridas, a Ph.D. candidate in mechanical engineering, to give students a chance to design and build their own projects using modern manufacturing methods. By teaching the fundamentals of Mechatronics, a design process that combines electrical and mechanical engineering, and computer science, Schlaf says the class allows students to bring their ideas full circle.

"Engineering places an emphasis on scientific training, and classes and labs, but on the building end we're falling a little bit short," says Schlaf, who teaches electrical engineering. "Other than your one senior design project in your senior year, it's rare that students get a chance to see a project through to completion. Students learn much better when they are exposed to learning-by-doing, and this works especially well when implementing a project that is their own creation."

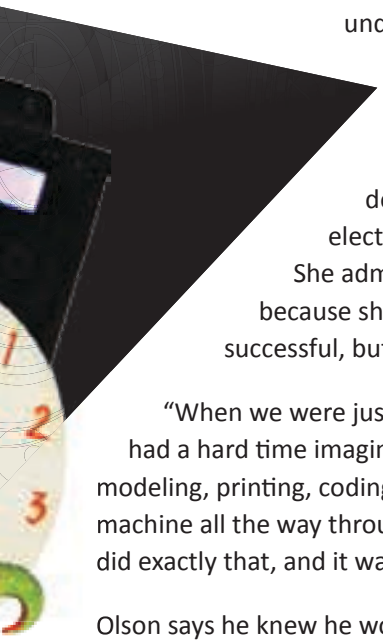
All students invent, design and make an animated object, in the process learning how to use 3D design software, develop an Arduino-based electronic control system, and program a microcontroller in C++. Final projects are graded based on their functionality, the precision of the manufacturing, and their originality. As long as those elements are in place, Schlaf says it does not matter whether the projects will be useful.

"We've spent the last 10 years democratizing software through the iPhone store and the downloading of apps," he says. "Prior to that, software was hundreds of dollars, and now you can buy it for 99 cents. Software development is much more competitive and fierce now, and the same thing is true with manufacturing. Because of the Internet, you can start a manufacturing company in your dorm room."

By focusing on animation, Schlaf says Makecourse gives students an introduction to the power of digital manufacturing.

"We don't tell them that it has to have a certain purpose or complexity, but it has to be perfect and it has to be complete," he says. "When we start the class, we emphasize that they should not try something that is too complicated, because in the design and manufacturing process they have to make sure they can actually build it. Without a perfect and completely finished device they can't get an A."

Schlaf says the course is rooted in the belief that anyone, regardless of interest or major, can be an engineer. As a result, Makecourse accepts students from all departments in the College of Engineering as well as any USF undergraduate.



Laura Schlittler, an information technology major, enrolled in the first class despite never having done "anything remotely related to electrical or mechanical engineering." She admits to almost dropping the course because she was scared that she would not be successful, but is glad she took the risk.

"When we were just getting ideas of what to make I had a hard time imagining actually dreaming up, designing, modeling, printing, coding and wiring an entire working machine all the way through to completion," she says. "But I did exactly that, and it was really cool."

Olson says he knew he would encounter hurdles working on his project, "but I didn't realize how many mistakes I would make."

"I made incorrect measurements, forgot design elements, and redesigned my project more times than I can remember," he says. "I was able to complete the construction and electrical components of my device about a week before the final presentation, but I didn't finish troubleshooting my program until an hour before it was due."

Despite those issues, Olson says the class "was probably the most fruitful course I've taken as an undergraduate." Schlittler agrees.

"I think I learned more in that one course than I have cumulatively in many other courses that I've been required to take," she says. "Now that I have these tools available to me, the next time I think of a problem that doesn't have a solution, I can just build it."

For more information and all course materials, visit **www.makecourse.com**

These Middleton HS Tigers Become Engineering Bulls Three Days a Week. - By Janet Dawald

Every Monday, Wednesday, and Friday Professor Kingsley Reeves faces an ambush of Tigers. Not just any tigers, but students from George S. Middleton High School enrolled in a unique STEM initiative at the College of Engineering. Every single student in the class is enrolled at the Middleton Magnet High School STEM program. For three days a week a single engineering class is bused from the high school campus to the University of South Florida to attend Reeves' Probability and Statistics course. This project differs from other dual-enrollment initiatives in that it provides reliable transportation to and from the USF campus, it keeps the students together in one cohort, and uses the same textbooks, on-line resources, lectures and grading processes that any regularly enrolled USF student would take in the College of Engineering.

"They take the same exams, the course has the same course number, everything is identical. They just have the special section dedicated to them," explains Reeves. "But the biggest benefit is they are actually USF students, using USF facilities. They have access to a USF doctoral student as their teaching assistant. The grading, everything, is as if they were a normal USF student."

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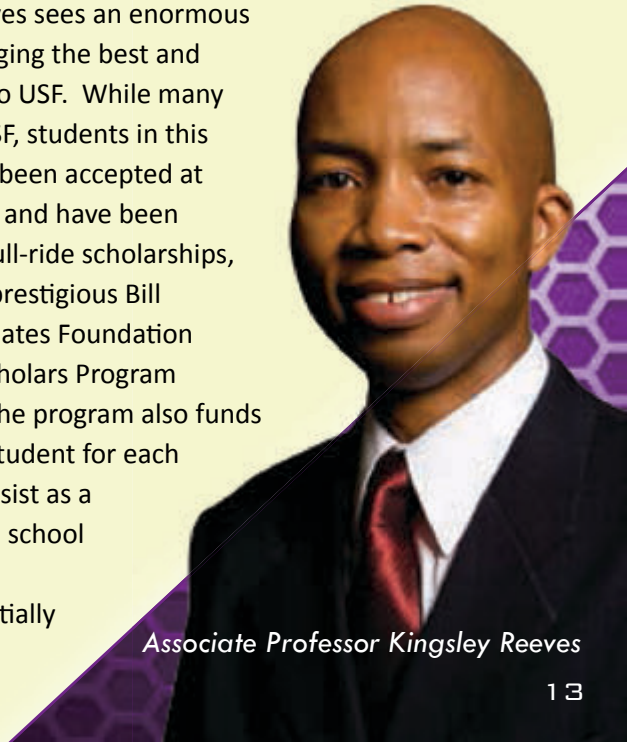
Reeves teaches two courses in this program, fall being Probability and Statistics for Engineers, and spring is Engineering Economics. The textbooks are reused by each cohort of students so there is no book cost for them and the students also are not charged tuition. For the six years that he has taught these high school students, Reeves sees an enormous benefit in bringing the best and the brightest to USF. While many do enroll at USF, students in this program have been accepted at MIT, Columbia and have been recipients of full-ride scholarships, including the prestigious Bill and Melinda Gates Foundation Millennium Scholars Program scholarship. The program also funds one doctoral student for each semester to assist as a TA for the high school students.
Reeves was initially



Associate Professor Kingsley Reeves

approached by Donna Elam, PhD, former Associate Director for Program Development and External Affairs at the David C. Anchin Center in the College of Education at the University of South Florida. Along with Kathy Freriks, Lead Teacher for Magnet Programs at Middleton, the group put together a process that originally involved Reeves and the TA going to the schools, but has morphed into the reliable transportation and college campus experience of the current model. "We are in a steady state right now; it is the best for all involved," he explains.

The two engineering courses are college-level, with very little coddling, according to Reeves. "They tend to perform a little better on average than a typical USF class," he admits. Homework is required and students learn quickly that it must be turned in. "Perhaps because they are hand-selected and all are in a STEM program at their magnet school improves their performance. But they are the best and brightest, so they perform extremely well." He stresses that the current model fits everyone's schedule and the fact that the high school students are reliably bused as a cohort reinforces not just their college experience, but allows them to discuss engineering issues to and from the USF campus and to work together on assignments.

As an associate professor in Industrial & Management Systems Engineering at USF, Reeves has taught these dual-enrollment classes for six years. He points out that the relationships that are built between USF and other educational professionals such as Donna Elam and Kathy Freriks is what it takes to build these programs. "Teaching is my passion, of course. I do programs like this simply because I love teaching. We do get many fringe benefits at the university level, and of course it is a service to the community. But for me, I simply love teaching."

Middleton's Magnet school-within-a-school is a novel approach to STEM programming. Only a part of the students on the high school campus attend "magnet" classes. The school itself is rich in local history. Named in honor of George S. Middleton, an African-American leader, it was established for black students in 1934. It was an all-black school for nearly 40 years, suffering two fires, relocation, integration, and has emerged with pioneering programs to prepare students for the rigorous experiences of college engineering courses.

TEACHING ROBOTS NEW TRICKS

- By Glenn Cook

Having a tea party? Boiling water, putting the tea inside a tea pot, pouring water into the teapot, pouring water from the pot into a cup. Simple, that is, unless your butler is a robot.

Yu Sun, assistant professor in the Department of Computer Science and Engineering, has received a $398,529 grant to construct a functional object-oriented network (FOON). Sun says the long-term objective is to allow robots to perform daily living tasks and provide needed help to senior citizens and people with disabilities.

"The robot needs to know what to do and what to look for, and a FOON is a representation of that knowledge," Sun says. "We're basically putting our knowledge into this network by observing the human demonstration of these basic tasks and giving it to the robot so the robot can perform it."

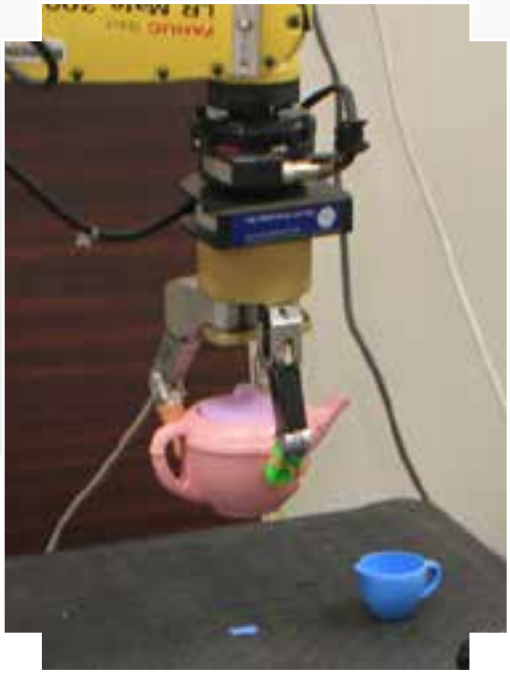
The National Science Foundation started to fund this research since August, and the project is expected to take three years to complete. Sun says students are working on "some simple tasks," starting by observing human behaviors and manually representing them in a step-by-step process to build the FOON. Once a simple network is completed, Sun says more sophisticated networks will be automatically built with computer algorithms to represent our daily living tasks by connecting objects with motions, and then a robot will perform those tasks represented in the network.

"To start, we're looking at things on a small scale," says Sun, who is setting his research in a kitchen environment with various objects. "For example, when you make a cup of tea, you have to have a series of motions in which you manipulate the main objects, such as pouring water into the cup. The pouring motion connects the two objects." Sun says you can go further, expanding the network so the robot knows how to put the tea bag into the cup, or stir the tea. Over time, he says, the FOON can be

expanded "for all kinds of different tasks."

"The knowledge can be observed from human behavior, and once it is extracted, the computer can understand this, represent it, and generate new behaviors," Sun says. "We believe that you can perform similar tasks and actually generate new tasks once the robot knows the connectivity between objects and all kinds of different motions."

Sun says the idea for the FOON was inspired by research in cognitive and neuroscience that showed the mirror neurons in human brains congregate visual and motor responses. He believes FOONs eventually can be used in more than just robotics.



Functional object-oriented manipulation

successfully."

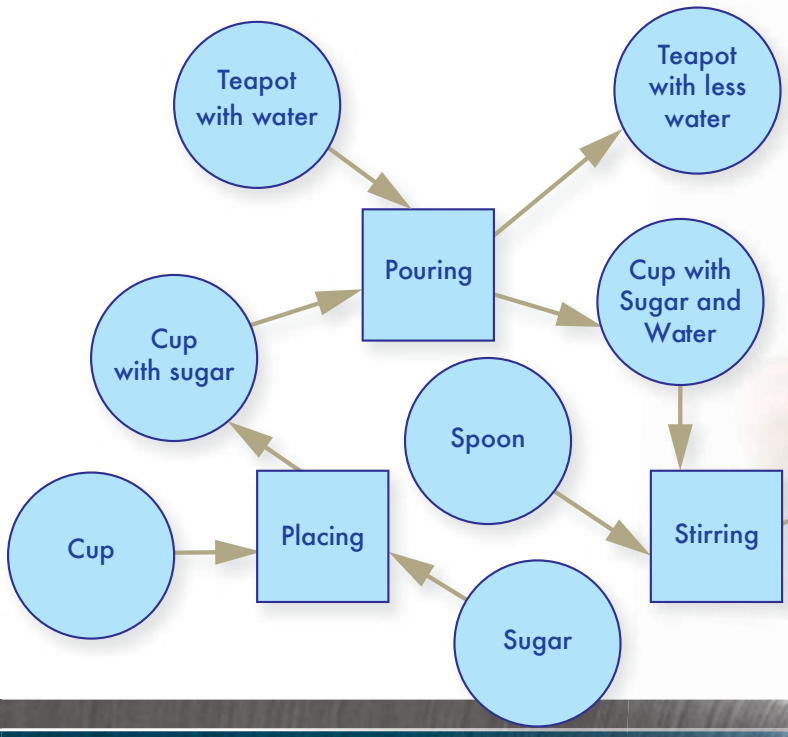
Another potential use for FOONs, Sun says, is manufacturing manuals for training purposes.

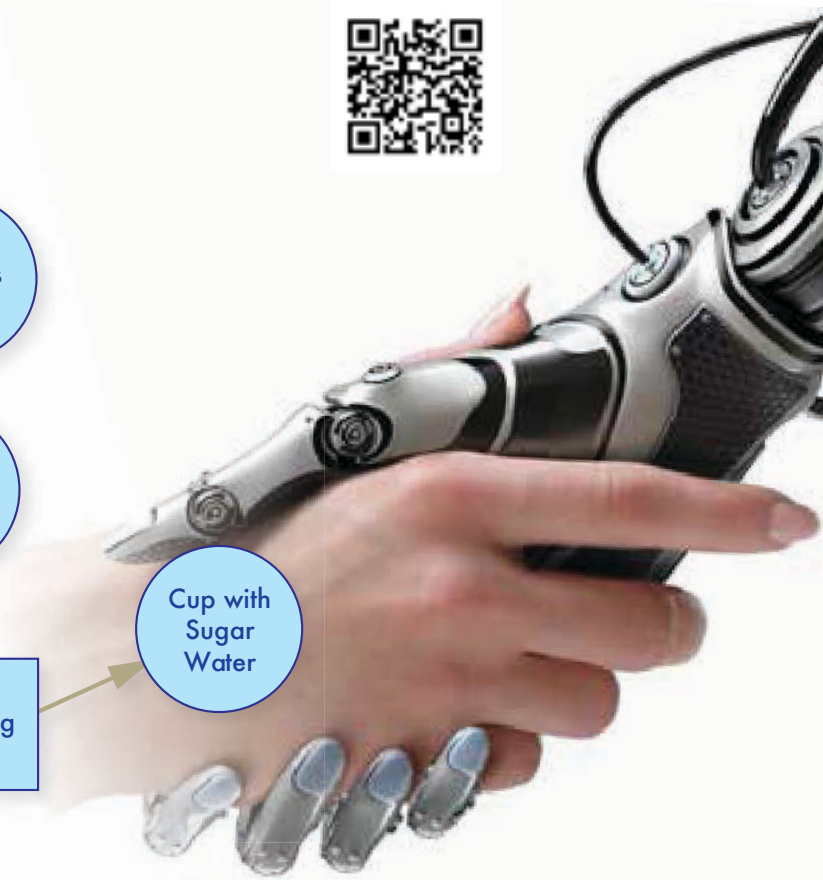
"A FOON can help you in reaching various learning styles," he says. "Instead of writing a manual for people to read, if the manufacturing knowledge is represented in this network, computer can generate training procedures automatically. For example, the training material can be presented as an interactive animation."

"A new person coming in to receive the training won't necessarily have to read the manual, but they can learn the same skills by watching and interact with animation instead," Sun says. "The possibilities really are endless."

"If you think about it, this kind of network can be used for very broad applications," he says. "Using cooking as an example, you observe people's behaviors in how they manipulate objects to make meals, then after you represent this in the network, computer can use the information to do many things. The computer can convert this knowledge into a recipe book, or if you want to make an omelet, computer can tell you what the steps will need to be to make omelet

For more information on FOONs and the process, visit Sun's website at **http://rpal.cse.usf.edu/project9/index.html.**





Engaging Transportation Students in Florida's Future Corridors Initiative

- By Janet Dawald

Imagine a project where you are part of a small team of visionary engineers, urban planners and architects tasked with creating the future of transportation in Florida for the next 50 years. No budget, no politics, no technological limitations. Just vision, imagination and the opportunity to actually present your ideas to top brass at the Florida Department of Transportation (FDOT). Oh, and don't forget the stipend, and the opportunity to work with leading engineers, architects and urban planners at the University of South Florida.

"I think the real opportunity here was to bring fresh ideas to the table from a group of young people that are studying transportation," explains Kristine Williams, AICP, at the USF Center for Urban Transportation Research (CUTR), who managed the project along with Maria Cahill, AICP, at the Florida Department of Transportation Office of Policy Planning, which provided funding support. "They will be the future users and our future professionals as well. What are their perspectives, and how do they feel about this issue?" Williams put together three teams of USF graduate students with full creative license to explore what they wanted to accomplish. The final project, which included producing a booklet, making web presentations and finally presenting to top FDOT officials, gave the three multidisciplinary teams the opportunity of a lifetime. "Presenting to the FDOT Executive Committee was a big deal," says Williams, "Some of us never do this in our entire careers - and students were even hired as a result of this project."

A multidisciplinary group of faculty provided input on student selection and technical expertise. Williams, a specialist at CUTR in corridor management and multimodal planning, was joined by Abdul Pinjari and Yu Zhang, both assistant professors of civil and environmental engineering, and Theodore Trent Green, associate professor of architecture and urban design at the College of Architecture/Community Design.

The three student teams devised three distinct, yet complementary, approaches to the question "What would a future transportation corridor look like and how might it operate?"

Team A studied the Tampa Bay to Central Florida Corridor (I-4). The members are: Singeh Saliki, urban planning; Christian Stanley, architecture; Mohammadreza Kamali, transportation engineering; and Casey Jarrell, civil engineering. Their vision is an environmentally-friendly corridor that moves both people and goods, with an eye on economic benefits. A dedicated lane for automated trucks, innovative pre-made modular roadway sections, a smart roadway and high-speed rail comprise their vision of one of the largest corridors in the United States. Intermodal centers on key points along the I-4 corridor would connect those traveling on high speed rail to their destination via local bus service, bus rapid transit, self-driving cars, and bike sharing programs.

Team B examined all corridors in Florida's Strategic Intermodal System. The members are: Daniel Shopf, urban planning; Jessica Dhaha Mata, urban design; Noureddine Elmehraz, computer science and engineering; and Patrick Buddenbrock, civil engineering. They envisioned "green corridors" complete with innovative pavement, such as inductive charging lanes for electric vehicles and solar energy generators, glow-in-the-dark lane lines, solar powered street lights, flexible zipper barriers, food distribution systems in rural areas and even rain gardens for those Florida downpours.

Team C concentrated on the movement of "People, not Cars." The members are: Josh McDonald, Sustainability; Eric Pohlman, urban design; and Nikhil Menon, civil engineering. Emphasizing urban form and community character, they

focused on redesign of existing corridors for "complete streets" and a multimodal system of regional and local routes and services, providing the user with many transportation options while reducing urban sprawl. Public transportation options were combined with wider sidewalks and bike lanes in urban areas, street amenities and businesses at street fronts encouraging pedestrian interaction.

The three groups made two presentations, a 20-minute team presentation to staff and another five-minute presentation to the FDOT Executive Committee. "High level decision makers want you to get to the point quickly," explains Williams. "Now the students understand how difficult a five minute presentation can be when you have a lot to say. They got a fabulous experience from this."

Top rows: (From left) Josh McDonald, Trent Green, Daniel Shopf, Jessica Dhaha Mata, Casey Jarrell, Noureddine Elmehraz, Singeh Saliki, Christian Stanley, Patrick Buddenbrock

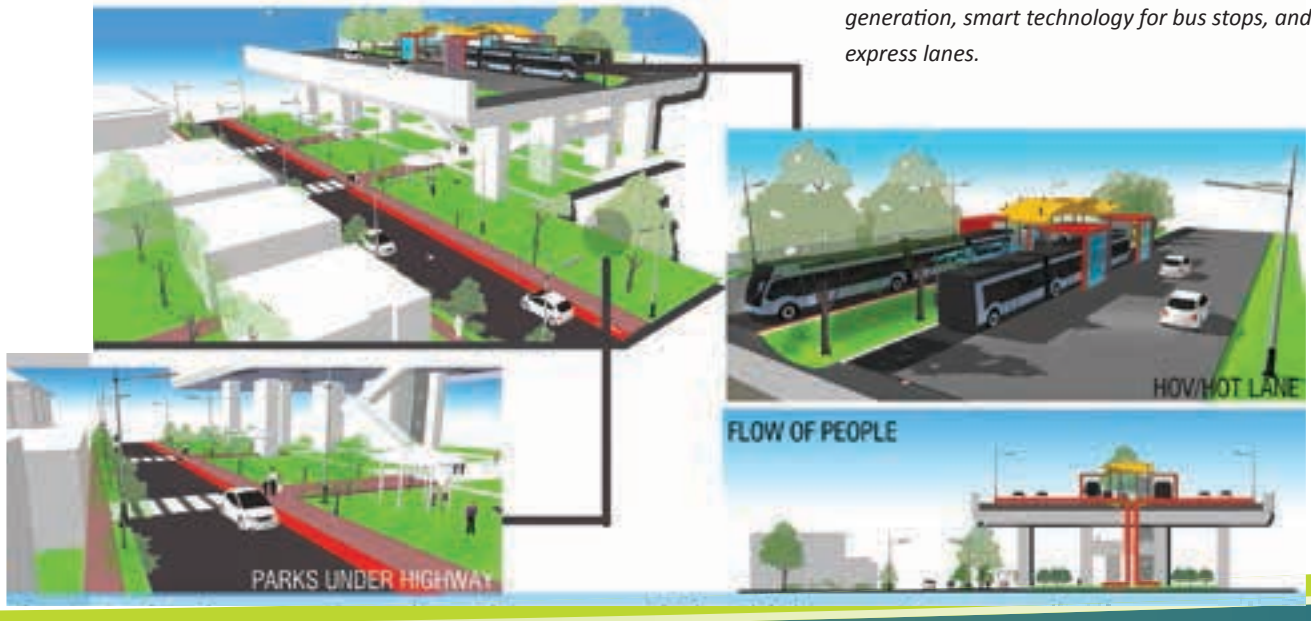
Front row: (From left) Maria Cahill (FDOT Project Manager), Kristine Williams (CUTR Project Manager/PI), Eric Pohlman, Mohammadreza Kamali

The teams also learned how to work with other disciplines effectively and efficiently. Architects and community designers with their visual skills, planners with their policy insights, and engineers with their technical knowledge brought it all together into a project that offered visionary and even revolutionary ideas. The needs of urban, suburban and rural corridors were addressed. The quality of life in Florida was considered. Emerging technologies were incorporated, in addition to current planning best practices and traits and values of the "Millennial Generation." The students were responsible for performing research, developing strategies and producing presentations and publications with minimal faculty input. The three teams produced a range of ideas that may well become standard operating procedures for a new generation of planners, engineers, urban designers and users.

The teams participated in a webcast, **"Visionary Student Concepts for Florida's Future Corridors."** The recording is available at: http://www.cutr.usf.edu/2014/04/cutr-webcast-recording-student-concepts-fl-future-corridors/

Their booklet, made with the assistance of Ryan Wakefield at USF, can be downloaded at: http://www.cutr.usf.edu/wp-content/uploads/2014/04/Future-Corridors-Booklet_final.pdf

The above grade highway concept (pictured below) incorporates parks and open space below the highway with easy pedestrian access to transit stops, piezoelectric energy generation, smart technology for bus stops, and transit-only express lanes.



50 Years in the Making: A Golden Milestone

- By Jessica Vander Velde

USF's College of Engineering welcomed back alumni at a Homecoming reception on Oct. 10, and Dean Robert Bishop greeted many who hadn't been back in years. "We have made some great strides," he told the group, "and we have a bright future." Here are the stories of a few of the festivities' attendees:

Bill Collins '80

Rachana Vidhi '14

Bill Collins, 71, brought his USF student ID to the Homecoming event. In it, he's wearing U.S. military-issued, thick black-frame glasses. Collins attended USF after he left the military in 1968 and was part of USF's first members of Tau Beta Pi, the Engineering Honor Society.

He had a long career in electrical engineering, both at Honeywell, where he worked on secure communication devices for the military, and Johnson & Johnson, where he developed medical equipment.

After moving back to Tampa about a decade ago, he didn't get around to visiting USF for several years. When he did, he was shocked by all the new construction. He also noticed a significant increase in the number of female engineering students and more ethnic diversity.

"All of these things are real improvements," said Collins, who now serves as an alumni advisor to USF's chapter of Tau Beta Pi.

Sandy Pettit's nametag was filled with numbers: 1994, 2010 and 2014.

Those were good years for Pettit. In 1994, she received her bachelor's in chemical engineering, in 2010, her master's, and then, just this last May, she received a PhD in chemical engineering. She now works as a lecturer at Georgia Tech's School of Chemical & Biomolecular Engineering.

Over the years, Pettit says she's watched USF put more emphasis on research, entrepreneurship and student life.

"Back in the early '90s, it was a commuter school. Nobody lived here," she said. "Now, students really have a sense of community."

For Rachana Vidhi, the Homecoming reception was less of a welcoming and more of a goodbye. She graduated in August with a PhD in chemical engineering and planned to start a new job in mid-October at NextEra Energy in West Palm Beach.

Though she's excited to work on designing renewable energy power plants, it's bittersweet, she said, to be leaving USF.

"I had a very good time here," said Vidhi, 26. "I'll miss the

people the most. I had some very good friends here, and the professors were very nice."

She'll be leaving a legacy. As a doctoral candidate, Vidhi started the first student group in the nation of the International Solar Energy Society. The group will continue without her now.

"I feel really happy about that," she said.

For Wayne Ries, 61, the homecoming reception was the first time he'd been back to USF in a long time. The new buildings impressed him, as did all the new technology that students are using.

He graduated in 1992 with a bachelor's in civil engineering and worked for a time as a traffic engineer in New York. These days, he's a Realtor for Re/Max, primarily selling in Tierra Verde.

His specialty is waterfront homes, which requires an unexpected application of his civil engineering background.

He wants others – both students and recent graduates – to know that what they've learned at USF will be helpful, even if their career takes an unexpected turn.

"It's going to have a practical purpose in your life, decade to decade," he said.

Robert Mott made the trip to the Homecoming reception from Florida's east coast, where he runs the materials science program for NASA at the Kennedy Space Center.

He's worked for NASA for 23 years, shortly after graduating from USF in 1985 with a degree in chemical engineering.

He tells people that he is where he's at now because of USF. And now his daughter, Brittany Mott, is a USF engineering student.

Robert Mott says he's impressed with USF's College of Medicine and all the opportunities such a strong medical center affords engineering students, whether they are chemical engineers doing cancer research or other applications.

Robert Mott, '85

Ruben Babun, '86

Ruben Babun says he loves coming back for alumni events, whether it's Homecoming or a tailgating event. But this one seemed bigger, he said. That's because the College of Engineering opened it's doors in 1964 – 50 years ago.

"The 50th anniversary, it's more like a landmark," he said.

He graduated in 1986 with a degree in electrical engineering and now works for KW Products in Oldsmar. When he first graduated, his focus was in electrical engineering, but now his job is primarily about mechanical engineering.

It wasn't a stressful transition, though, he said, because he learned all the basics at USF.

Ed Kopp, III (left), accepts the return of his father's beloved trumpet from former engineering student Bob Mason.

Dean Kopp Paid it Forward With a Trumpet

- By Janet Dawald

In 1965, a local boy from St. Pete joined a U.S. Air Force Field Band. A talented trumpet player, Bob Mason toured the South playing parades, military parades and community concerts. While the country became more embroiled in the war in Viet Nam and civil rights demonstrations made the nightly news, Bob had a front row seat in many of the defining issues in the sixties. He knew that he wanted to make a difference, and after the Air Force he was accepted to the newly formed engineering college at the University of South Florida.

"I had gotten out of the service as a musician, and I was determined to get out of college an engineer," Bob recalls with a laugh. So he sold his horn, bought textbooks and began engineering studies at USF in 1969. At the time, juniors and seniors had weekly seminars with founding Dean Ed Kopp. One day the conversation turned from physics to music. It turned out that Dean Kopp was also a horn player, having put himself through Georgia Tech in the 1950s playing the trumpet in small jazz bands. Kopp's father was also a brass player, and the dean regaled the engineering student with tales of playing with bid bands

Edgar Kopp, founding dean

and jazz-band gigs. Bob also had his own similar experiences to tell but confessed that he no longer owned a horn.

A few days later Bob was unexpectedly summoned to the Dean's office, a request that Bob thought might be not-so-good. When he came into the office, Dean Kopp presented the worried engineering student with a battered leather case covered with stickers from Georgia Tech. Inside was the very same trumpet that Dean Kopp had played in in his college days. "He knew I didn't have any money," Bob recalls with a trace of astonishment. "He had played that very horn for maybe 30 years, and he just gave it to me."

At the time, a legendary local broadcaster and "eye in the sky" Al Ford had started a big-band orchestra in Tampa. Ford's Police Band played Bob's beloved swing and big band music, and Bob joined the band with the Dean's trumpet. He discovered that about eight of the musicians in the Police Band were also professors at the University of South Florida. One was a professor of meteorology, which prompted Bob to take one of his classes at USF.

Bob Mason received his Bachelor of Science in Mechanical Engineering in

1973, and was inducted in both Tau Beta Pi and Phi Kappa Phi. He taught at USF as an adjunct professor for a few years, and got his masters in 1981. In the early 70s, the oil embargo and resulting energy awareness programs created positions in utility companies for engineers like Bob. He has designed energy efficiency studies for several utilities and now is involved in software for these programs.

When asked about his education at USF, Bob credits Dean Kopp and the early College of Engineering with instilling in their graduates the idea of giving something positive back to society. "It was Kopp's philosophy that USF wanted to have their engineering students graduate and be able to get out and do something positive in society. At that time they didn't have the budget dollars to be able to do lots of research, even though I know Dean Kopp supported the concept. The university didn't have the money for it then," Bob recalls.

The engineering philosophy was also different at the time, Bob recalls. "Dean Kopp really wanted people that would graduate, and then get out in the industry and work.

> "He tried to instill in us engineers, the ethics of being an engineer, the responsibility of being an engineer and then how to apply what we have learned to essentially better society."
>
> - Bob Mason about Dean Kopp

Practical knowledge was so important, and Bob provides a ringing endorsement for the education he received in the College of Engineering's early days. "What I had been taught at South Florida and how I was taught was incredibly valuable," he recalls. "I'm not going to be up there with Tesla or Einstein or Dean Kopp," he laughs, "But I've had a really good career, and I've always enjoyed my work. The whole basis of what I've been able to do, all of it, came from w hat I learned at South Florida and that's the truth. The working success I have had is all been based on what I learned at South Florida."

And the trumpet? Bob recently returned it to Dean Kopp's family. "I have quite a collection of horns now," chuckles Bob. So, yes, this engineer is indeed giving something back, just like he had learned at the University of South Florida.

I-CORPS / VENTURE WELL GRANTS

- By Glenn Cook

USF's College of Engineering has received four grants from the National Science Foundation program and two Venture Well grants to develop technology-based entrepreneurial programs that have the potential to be commercialized.

The grants, which are in various stages of completion, are designed to help researchers determine whether their work can be converted and translated into "a scalable and sustainable business venture," says Jose Zayas-Castro, professor and associate dean for research.

The six projects cover a wide spectrum, ranging from developing products that serve the clinical and consumer health markets to establishing a method to convert landfill gases into diesel and jet fuel (see sidebar). Zayas-Castro says doctoral students are leading most of the National Science Foundation (NSF) projects, with professors providing research assistance and serving as business mentors.

NSF established its Innovation Corps (I-Corps) program in 2011 to help scientists and engineers broaden their focus and look at ways to turn their research into commercial products. Participants in the federally funded program receive entrepreneurship training and learn to analyze the marketplace before determining whether their research has commercial potential.

"It's a great opportunity to stimulate economic development in our region and our state, and it also opens the eyes of our doctoral students who had not thought about doing this type of activity," Zayas-Castro says.

Continued on next page...

Sanjukta Bhanja

Ravi Panchumarthy

Clifford Merz

Venture Well, which started in 1995 as the National Collegiate Inventors and Innovators Alliance, offers grants to faculty in more than 200 colleges and universities to start programs on technology entrepreneurship. Like the NSF program, Venture Well's grants rely on the development of E-Teams — groups of students, faculty and advisors — that are working to commercialize novel ideas.

"This is about a start up, not a small version of an established company," says Zayas-Castro, who is serving as a business mentor on one of the two Venture Well grants. "You learn that these are the issues and this is the way you need to do it, and you go through a process of clearly discovering what the customers do need and what they do like."

Redwan Alqasemi, a research professor in the Department of Mechanical Engineering and co-director of the Center for Assistive, Rehabilitation & Robotics Technologies (CARRT), says the I-Corps project his team is working on has been scaled back as a result of the feasibility study. He says the team believed it could sell its low-cost robotic gripper to a variety of commercial users, only to find after interviewing nearly 100 potential users, licensees and other groups that the hurdles would be too difficult to cross.

"The results were unexpected and were eye opening," he says. "People who desperately need our technology the most — those with disabilities — can't afford it, and insurance companies don't pay for it. Emergency first responders can afford it, and would love to use it, but it needs to go through complicated bureaucracy and approvals before it is deployed. Other entities have long-term contracts with well-known multi-million dollar competitors and it will be next to impossible to sell them our technology.

Alqasemi says those facts would "never cross our minds" if his team had not participated in the I-Corps workshops. "It is really a wakeup phase. It made us discover that commercializing a product is not an easy task," he says. "No matter how good the technology is, many startups and technology-based products die down as soon as they start."

Zayas-Castro, who has been working to promote entrepreneurship in the research community since his days in Puerto Rico in the 1990s, says the six projects now underway will go through multiple iterations before they are brought to market. And some, in the long run, might not be as successful as first projected. But, he says, this is the type of work USF and others must continue for the United States to maintain the economic advantages it has attained.

"We need this type of activity, because otherwise we're going to have a major problem if we don't maintain our entrepreneurial spirit," he says. "If all of the research becomes a nice academic exercise and not something that can be developed into a real, sustainable application and then a sustainable business, then it will be hard for the United States to stay ahead of the curve.

Here are summaries of the grant funded, technology-based entrepreneurial research projects currently underway in the College of Engineering. The National Science Foundation has awarded grants for four projects through its I-Corps initiative, while two are funded by Venture Well, an alliance that helps nearly 200 colleges and universities bring their inventions to market.

Kinetic Shape Research

Kyle Reed, an assistant professor in the Department of Mechanical Engineering, and Ismet Handzic are leading this I-Corps research project, which also ends in December. The kinetic shape is a mathematical derivation of a shape "that allows a controlled rolling motion using only natural forces" and does not require an external energy source. Seen as a resource for people with disabilities, it originally was developed to specify the shape of the GEMS (Gait Enhancing Mobile Shoe) wheel and is being used for a new crutch. Patents pending include the method for customizing the shapes to a specific application as well as the crutch and the GEMS. Early results for those who have used the crutch have been "generally positive," and Reed says his team "should have a good sense of whether this has a commercial market" once the grant ends.

Mobile E-Network Smart Health (MESH)

Led by Hui Yang, assistant professor in the Industrial and Management Systems Engineering Department, this I-Corps project focuses on the design and development of mobile e-network smart health (MESH) technology that will offer a new approach to cardiac telemedicine with wireless sensors, smart mobile devices, and big data analytics. Yang, whose lab has devoted years to researching the technology, is working to translate his research into commercial products and services. Next steps are to create a start-up company, continue interviews with potential customers, develop a product for testing, and commercialize it.

Robotic Gripper

Redwan Alqasemi, research professor in the Department of Mechanical Engineering and co-director of the Center for Assistive, Rehabilitation & Robotics Technologies (CARRT), is in charge of this I-Corps project to commercialize a lower-cost robotic gripper that will be made available to other researchers. The 16-month project, which started in August 2013 and ends in December 2014, has included the production of four prototypes as well as extensive market research, which led to modifications of the gripper that will include the addition of an onboard processor, camera and proximity sensor.

Software to analyze Patterned Nanostructures (SPaN)

Professor Sanjukta Bhanja, Ravi Panchumarthy and Clifford Merz are working on SPaN (Software-based analysis of Patterned Nanostructures), an easy-to-use interface for nanotechnology fabrication engineers and researchers that would allow them to automatically analyze and characterize various microscope images. Bhanja says patterned nanostructures are routinely used for emerging computing and memory applications, but image-processing based characterization and analysis are limited in current electron microscopes. Research is focused on current and future market needs for nanomanufacturing equipment, but Bhanja says microscope manufacturers, nano-research faciliites and nanomagnetic fabrication companies are a promising customer base for the product.

Trash2Cash Energy

John Kuhn and Babu Joseph, professors in the Department of Chemical and Biomedical Engineering, are working on a Venture Well grant that would use new catalyst technologies developed at USF to convert landfill gases into diesel and jet fuel. The project, which started in 2013, is designed to show that an undesirable waste product can be captured and converted into a value-added commodity that is consistently in great demand, Kuhn says. Next steps: Once the feasibility of the process is demonstrated, likely by the end of this year, techniques will be established to remove impurities and poisons in landfill gases that can adversely affect the process.

SUMMER INTERNSHIPS PROVIDE HANDS-ON EXPERIENCE

- By Tom Edrington

Bernard Batson flashes a broad smile when the topic of summer internships comes to a conversation.

Batson, the associate director of Engineering Student Services and academic coordinator for the Florida-Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) program at USF, holds nothing back when he talks about the value of internships and co-ops for the college's students.

"They (internships) are the ideal vehicle for providing engineering students with hands-on experiences and translating what they learn in the classroom to the workplace," Batson explained. "We learn by doing. Internships and co-ops provide students with the affirmation that they are on the right path."

Batson pointed out. "Companies want outstanding student-leaders who can be team players and have solid communication skills. From a university perspective, I like it when our students are able to participate within internships both within this country and abroad and see that the education and training received here in the College is just as good or better than that of any other institution."

Batson refers to students as "our ambassadors."

Jose Carballo has been an ideal "ambassador" for the College of Engineering his entire collegiate career has been spent at USF and he is due to finish his doctoral work in December. This past summer he worked with Medtronic in Northridge, CA. He felt right at home there in the company's diabetes division. His work focused on new high-tech pumps and sensors to make life easier for those who suffer from diabetes.

"We worked on a new model pump. The general goal, among others, is to make medical devices smaller and more user friendly," Carballo pointed out. "It's a constant problem. The user lives with it and from a developmental standpoint, it is a constant path for medical devices in general – to improve the quality of life for the patients, to not interfere with their every day lives."

Carballo, who came to USF as an undergrad

Jose Carballo

from Venezuela, found Medtronic at the SHPE Annual Conference's Career fair last year. "I was looking in the area of medical devices and I met the guy who would become my boss at Medtronic," Carballo recalled. "They were looking, specifically, for what I was working on for my PhD.

His PhD dissertation is *Micro-scale fabrication and integrations – better way to assemble devices using liquids for assembly tools.*

He calls Professor Nathan Crane, "my supervisor, my boss, my mentor." Carballo is looking for an R&D engineering position in a high-tech company that works with medical devices.

"Given the aging population, it's a safe bet there will always be a need. The challenges are constant to come up with better designs," he said.

Carballo follows Batson's lead when it comes to an appreciation of the internships.

"It is the best thing you can do if you plan to work in industry. Even if you don't, if you plan to be in academia, it is a great thing. You learn a lot about yourself, your skills and you learn a greater emphasis on time management and efficiency. You become more than a person who knows a lot. You learn to be a person who gets things done."

Herby Jean wants to be a man who gets things done. The senior civil engineering student has a noble calling. His family came to the United States from Haiti when he was nine-years-old and made their home in West Palm Beach.

"I heard good things about USF," he remembered and his collegiate journey began in Tampa. "I was looking for something I could go back to Haiti with and help the country," he explained. "I started thinking civil, but have leaned toward environmental."

When Professor Daniel Yeh received a NSF Clean Water supplement to collaborate with partners at the University of Exeter in the UK for algae-focused research, Yeh recommended Jean along with three other students in the lab, and off he went on the longest journey of his young life.

He discovered the saying that the United States and Great Britain "are two countries separated by a common language." It was his first time out of the country since 2001 when his family came to the United States "I heard a lot of expressions I didn't understand," he said.

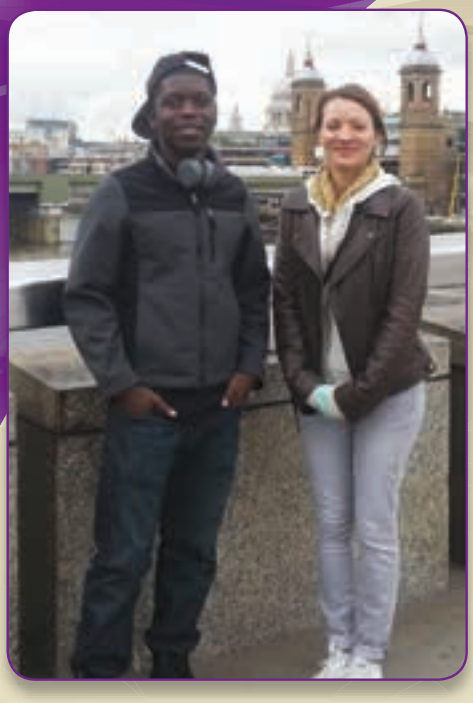
"From my first day there, I knew it was an entirely different world. I've now seen three – Haiti, the U.S. and England. I also found out how young the United States is. Over there I saw a lot of really ancient structures, including Stonehenge.

"Exeter was a quiet town but a very nice place," Jean continued. "The internship enabled me to experience a different culture, learn even more about my academic field [environmental engineering] and how it correlates to other fields."

His research with algae and water should serve him well in the future. "Sustainability is a very important topic in the world right now, especially in poorer countries. Providing clean water is a problem that needs to be solved," he said.

While he was taking on that research, Jean didn't have to look far to see a familiar face.

Anna Quinones was one of Jean's laboratory partners back at USF and Yeh asked her to join the Exeter experience. She and Jean were part of the ICARUS Project and they were a good fit for the Exeter research and it was Yeh's confidence in the two lab partners



Herby Jean and Anna Quinones

that earned them the trip.

"I'm so thankful that I had the opportunity and the experience at Exeter," Quinones said. "It really helps to narrow your focus and helps you form relationships with other students. You learn to work better in a group. I wanted to focus on water resources and this was perfect for that."

Jean will be graduating this December and hopes to further his education with a Ph.D. in Environmental Engineering while Quinones will complete her undergraduate studies in May 2016. As they look forward, they both look back with great memories from Exeter.

The future could find Jean helping people in Haiti, for Quinones, a job in industry is on her horizon. "I do want to work in industry," she said. "Water resources are an important field and that's the direction I see myself heading."

Senior mechanical engineering student Christine Dumas knows where she's heading. She will soon be going for a job in industry and she will carry some valuable experience with her.

Dumas is the past president of the USF's Student Chapter of the Society of Women Engineers (SWE). It was at the organization's national conference that she met recruiters from Honeywell. She has spent two summers in Phoenix at two separate Honeywell sites: Avionics and Engines facility.

She was assigned to the control systems team for the Honeywell Turbofan 7000 engine that is used by smaller business class jets produced by Embraer and Gulfstream.

"There were large groups, 60-70 that included contractors. They gave me my own project and we worked in simulation labs. The work was primarily involving engine control and alerting systems," she explained. "There's a lot of new material involved. One thing you do learn is to ask for help. You see a lot of things as well. You see how management pushes on the engineers, asking them to do what seems impossible and they do it."

Her work also involved a cost-analysis project. "We were collecting a lot of data," she recalled. "One important thing you learn is that your project will not always go the way it was planned. When these companies are doing business on a large scale, they are constantly negotiating for parts or equipment and you don't always know what goes on with that. It affects the project and in our case, it didn't turn out the way we thought it would."

Like the other students, she knows the value of her experiences. "You find out the good things about our field," she said. "There's always a need for good engineers."

Christina Marino

When it comes to valuable experience, Christina Marino is getting the thrill of her young life in Ringskiddy, Ireland. She graduated this past May with a degree in chemical engineering but some international red tape delayed her internship with Johnson & Johnson's DePuy Synthes. The company moved her placement and now she is discovering life in the corporate world and life on the southern coast of Ireland.

"It's been eye-opening," Marino said. "The first month and a half was tough, it was essentially a crash course involving the Irish immigration system, public transportation and how to live outside the U.S. Couple that with her position as a quality engineer working on DePuy's new on-site process for applying hydroxyapatite coatings to the hip-stem replacement products and she found herself beyond busy. The coating she works on is being developed to allow the hip stems to be implanted in hip-replacement surgeries without surgical cement.

"There is no typical work day here," she explained. "Every day there is something new to learn. I work with a team and everything we do is oriented to patients getting the highest quality products possible."

Marino's immediate goal is a place in industry. She is interviewing for Johnson & Johnson's Global Leadership Development (GOLD) Program and is keeping her options open in the medical industry realm. She says it's also a possibility that one day she could be teaching and is open to working toward a PhD in the biomedical engineering field.

Her internship work has left her confident. "I'm not afraid to dive straight into new situations and challenges," she said. "I'm more open to tackling tough problems. I've grown personally and professionally. The value of all this work is priceless. Whether I return to school, spend more time in industry or become a teacher, or perhaps all three, I believe I will always be able to reflect on these experiences and say 'I'm here because of how much I grew during my internship back then."

SOLVING HILLSBOROUGH's WATER DILEMMA

- By Tom Edrington

Competition is what makes the business world go round and that holds true as well in the College of Engineering at the University of South Florida.

Professor Sarina Ergas knows what it takes to produce a winner when it comes to national competitions.

This past September, a team of seven engineering seniors walked away with first place honors at the Water Environment Federation's Annual Technical Exhibition and Conference in New Orleans.

Michael Esteban, Lauren Davis, Herby Jean, Winsome Jackson, Richard Johnson, Andrew Filippi, Ed McCormick (WEF President). Not shown: Jared Faniel.

The team from USF was made up of Andrew Filippi, Herby Jean, Winsome Jackson, Lauren Davis, Michael Esteban, Jared Faniel and Richard Johnson. They made their way into the finals and faced teams from seven other universities. Like USF, all had competed in and won their regional competitions.

The USF team project was titled: "South-Central Hillsborough County Service Area Capital Improvement Project."

It was a timely and practical project. The southern part of Hillsborough County is facing the most population growth compared to other parts of the county and with it, comes a challenge on infrastructure, including water treatment systems.

"Students do it as part of their senior level Capstone design class," Ergas pointed out. "They have to make an early commitment and it requires more work than normal Capstone course work. Usually they work with a municipality. One year it was the City of Tampa. One year it was St. Petersburg and this latest project worked with Hillsborough County. The client (Hillsborough County) works with the students as they gain an understanding of the problem they are trying to solve.

"The project dealt with the growing population in south Hillsborough County, looking for more economical ways to make capital improvements," Ergas explained. "They worked on feasibility level designs, CAD drawings, mathematical modeling of treatment processes. Their work started last November (2013). They submitted to the Florida regional competition and their win there moved them to the national competition in New Orleans."

More important than walking away with first place, the USF team got a solid dose of real world experience and the invaluable experience of working with established professionals.

"This group did a terrific job spending time with the client (Hillsborough County)," Ergas explained. "I teach this class with a local professional, Tom Cross. Part of the experience put our students in a room full of professionals in county operations – engineers included. They (the students) had a very tough audience and they were really challenged. That type of environment is very helpful in preparing them for these competitions. My students know they are going to get grilled. We always try to push them toward presenting a clear rationale. Some complain it's too much work but after they've graduated, they often end up coming back at some point in time and telling me it's exactly the preparation they needed for their field of work."

The team's effort kept alive a three-year winning streak by Dr. Ergas' teams. It was the second straight year that a wastewater project took first place. In 2012, it was an environmental project that nabbed top honors.

In addition to the invaluable working experience, the team left New Orleans with a $2,500 cash prize, a first-place plaque and a subscription to computer programs offered by Bentley Systems, Inc.

Filippi, the team captain/project manager, conveyed his observations on the overall experience:

"Working with all the county professionals helped bridge the gap between school and the real-world work environment. With all of us graduating soon, it was a very valuable experience for the entire team."

The story does not end there, there will be more competitions, more titles on the line and Ergas will put her recruiting hat on in the fall.

She will have her eye on eager students in the Water Quality and Treatment course, a prerequisite for the Capstone class. "That's where I look for the next team," she said.

Her search will continue and there is always the next prize on the horizon.

STUDENT NEWS

USF Team 1 – Finished 2nd in Zone 6

Yufei Chai, Robert Zengal, Alexandra Reid, Jack Waldron, Bartholomew Smith, Ivan Dimitrov

USF Team 2 – Finished 1st in Zone 6 and 3rd Nationally among 62 teams

Zuly Garcia , Brittany Dugan, Cory Hill, Ryan Fiegel, Thomas Meagher, Daniel Buidens

- USF civil engineering students participated in The Big Beam Competition again this year. Team 2 took first place and Team 1 placed second in Zone 6. Nationally, Team 2 placed third out of 62 teams. Professor **Rajan Sen** is the faculty advisor.
- The Society of Hispanic Engineers named **Andrea Sanchez**, '14 PhD, civil engineering, the STAR Award recipient of the Student Role Model award for graduate students at the November 2014 SHPE Conference in Detroit.
- Computer science and engineering doctoral student, **Fillipe Dias Moreira de Souza**, won the best student paper award in the Pattern Recognition and Machine Learning track at the 2014 International Conference on Pattern Recognition (ICPR). The paper was titled "Pattern Theory-Based Interpretation of Activities." Professor **Sudeep Sarkar** is his major professor
- Chemical engineering doctoral student Philip Myers received funding through NASA to attend the NASA TEERM 2014 International Workshop on Environment and Alternative Energy at Kennedy Space Center. He received third place in the student competition for his presentation, "Heat transfer enhancement strategies for advanced thermal storage systems." Distinguished University Professor **Yogi Goswami** is his faculty advisor.

FACULTY / STAFF NEWS

- **Professor James Mihelcic**, civil and environmental engineering, was the Distinguished Lecturer at the ASCE Global Engineering Conference held October 7-11, in Panama City, Panama. Jim's lecture was titled, "Envisioning a Better World: The Making of Community and Globally Impactful Engineers."

- Professor **Gray Mullins**, civil and environmental engineering, received the 2014 Ben C. Gerwick Award for Innovation in Design & Construction of Marine Materials.
- **Maya Trotz**, associate professor, civil and environmental engineering, received the 2014 Award for Outstanding Contribution to Environmental Engineering and Science Education from the Association of Environmental Engineering and Science Professors (AEESP), for her ability to integrate her research with K-12 and university education. The award was presented at the AEESP Water Environment Federation Technical Exposition and Conference (WEFTEC) September 29 in New Orleans.

- Several College of Engineering employees were recognized. **Richard Everly**, research engineer in the Nanotechnology Research & Education Center, and **Cindy Vallaro**, unit research administrator, received USF Outstanding Staff Awards for 2013. Communications & Marketing Dept. members, **Janet Gillis**, **Marcy Kornfeld** and **Ryan Wakefield**, received the college's Outstanding Team Award.

TAKING ONE SMALL ANOTHER

- By Jessica Vander Velde

For four months, Annie Caraccio lived like a Martian. In March, Anne Caraccio, chemical engineering doctoral student, was selected as a HI-SEAS crew member along with five others to live along the slopes of a Hawaiian volcano to spend four months in a geodesic dome, all the while simulating life as astronauts on Mars.

NASA awarded a grant for a psychological investigation in collaboration with the University of Hawaii, which paved the way for the HI-SEAS (Hawai'i Space Exploration Analog and Simulation) program. The primary purpose of the study was to investigate the crew's psychological state, crew cohesion and crew performance in a confined, isolated environment. They recreated the close quarters, isolation, communication delay and outdoor missions that real astronauts would face on Mars.

The idea, Caraccio explains, is that as missions move beyond low earth orbit into deep space, where there is communication delay, there will be more autonomy amongst the crew, creating a gap of psychological research for the space program. Currently, the communication delay is 20 minutes each direction from Mars, something that the HI-SEAS participants attempted to recreate while in Hawaii.

Each morning, Caraccio would wake up early, work out, eat a breakfast of dehydrated food and perform her morning downlink of emails for the day.

The idea was to not have direct access to anything with streaming capabilities, such as Facebook or YouTube. Reading on her Kindle provided evening entertainment. Cell phones were off-limits.

Participants used solar energy as their primary power source, waterless composting toilets and 8 minutes of shower water per crew member week. Trying to stay as "in-simulation" as possible, most of the crew exercised about 2.5 hours each day, which is what astronauts, without the benefits of gravity, would have to do to maintain muscle mass and bone health.

The researchers also conducted their own studies onsite, which for Caraccio was a study of waste generation and human factors of waste on a long-duration mission. This data was sent to the Kennedy Space Center, where a reactor converted waste similar to what Caraccio was collecting during

STEP TOWARD GIANT LEAP

the HI-SEAS mission, was converted into useful products, such as water and methane from carbon dioxide production.

Caraccio has been working on this reactor with the Trash-to-Gas team at the Kennedy Space Center. She has worked at Kennedy since 2011 after completing three semesters in a NASA student co-op program.

A couple years ago, she jumped at the chance to apply for the HI-SEAS mission. It would give her a chance to test her trash-to-energy reactor and contribute to space exploration. Caraccio hopes to be an astronaut and says she would consider going to Mars if her research and time on the mission could contribute greater than what she could contribute here on earth.

She already knows some of the sacrifices she might have to make. Unplugging from technology was easy, she says. She enjoyed a fictional account of life on Mars in novelist Andy Weir's "The Martian." She also enjoyed exercising with the INSANITY workout videos, recording science data and monitoring daily utility consumption. The group sometimes played games and, in general, got along well. When one man fell ill during the mission and had to leave, they treated it like a lost crewmember.

"It was sad to see him go," she said.

NASA learned about all of these feelings.

They monitored the participants' physiological state with armbands that measured each person's skin temperature, sleep cycle and such. The participants also wore "sociometric badges" that tracked how loud each person talked, how frequently they interacted, how close they stood to others and more.

In addition, each participant kept a diary of his or her feelings, where university researchers had a computer algorithm interpret the words for emotional response and behavior. The culmination of the multiple experiments, analysis and reports will be sent to NASA after the completion of all three missions. The idea, Caraccio explains, is that many astronauts may not be the most forthcoming about their feelings with mission support all the time, but if they wrote them down and a computer algorithm would decipher them for issues or warning signs, then maybe they could get necessary help.

"A mission to Mars is going to be at least a one year round trip," Caraccio said. "You're going to be living in a confined space with your crew members, likely with no windows, a very small space, and you're going to have to live together and get along and keep your motivation up. It's important to get all this information."

She met challenges on her trip. The dehydrated food got repetitive. The stationary bike and treadmill broke down. The ventilation fan in her space suit stopped working during one exploration mission. The microbes in the composting toilet likely died due to cool habitat temperatures, causing the toilet to fail. She and her crew member Lucie had to empty and restart the toilet. Other crew members had to carry the waste out the habitat, while wearing suits.

"When we were in bathroom removing the waste from the toilet, there I was thinking, 'I can't believe this is happening right now,'" Caraccio recalled. "There were no windows to open. It was really gross. But we were just laughing. You have to keep a positive attitude in situations like that and just get the job done."

"Someone in the wrong mindset might just say 'I'm leaving. I can't handle this,' but, really, when you're on a mission it's just going to be you and your crew."

HI-SEAS launched an eight-month HI-SEAS program in October and also plans to do a year-long version. Each set will have new crewmembers, so Caraccio cannot return.

But she's already planning a bigger next step: Last time NASA's call for astronauts came out, Caraccio didn't have enough years of experience. Now she does.

"Next time," she says, "I'll definitely apply."

ALUMNI NEWS

Joie Chitwood, '95 MBA, president of the Daytona International Speedway, visited the with the Society of Automotive Engineers student group and reviewed their Formula Race Car. Mr. Chitwood shared his life experiences as an integral part of his family's entertainment business, Chitwood Thrill Show.

- **Collin Groff**, PE, '87 graduate in civil engineering, was named utilities director for the City of Boynton Beach in April. Congratulations on the new job.

- Congratulations to **Edward Brantley**, PE, '06 mechanical engineering graduate. He earned his Florida Professional Engineer license during the April 2014 certification class held in Lehigh Acres. Brantley is manager of engineering for Inovo, Inc.

- **Robert Andrew**, an '89 graduate in mechanical engineering and a '92 graduate in chemical engineering received the 2013 ASME Dedicated Service Award by ASME Florida West Coast Chapter on July 23. The award was presented by Richard Bunce, ASME Sr. Vice President of Knowledge & Communities. Bob is an active member of the USF Engineering Alumni Association and is currently serving as Past Chair and as Chairman of Bullarney, the EAS annual fundraising event to be held March 21, 2015.

- **Lakecia Gunter**, chief of staff at Intel Labs was recently named to Diversity MBA Magazine's Top 100 under 50 Diverse Emerging Leaders list. Lakecia graduated in 1995 with a bachelor's degree in computer engineering.

DONOR SPOTLIGHTS

USF College of Engineering Donors 2013-2014

Thanks to these donors for their support during the 2013-2014 fiscal year:

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Dean Robert H. Bishop, center, poses with donors Barbara McCue and Leonard McCue who provide the Q Motorsports Scholarship. Kat Moller, center, a sophomore majoring in mechanical engineering received the McCue's scholarship this year. At the ceremony, Kat, a jet car racer, received the International Jet Car Driver of the year award.

2014 *Donor Celebration*

On September 18, the College of Engineering held its annual recognition of donors who provide scholarships for engineering students. The event was held on campus at the Gibbons Alumni Center.

USF Engineering Alumni Society Proudly Presents

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All proceeds from Bullarney 2015 provide support for Engineering Alumni Society events, programs and sponsorships including but not limited to support engineering student scholarships, educational programs, travel grants and the Engineering II building renovation. The amount of your ticket, less the fair market value of goods and services received, may be tax deductible. Please consult your tax advisor.

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College of Engineering

Elizabeth Fontes
Director of Development

Major Alston
Director of Development

During this season of thanks, we would like to express our gratitude to our alumni and friends who have helped support the College of Engineering throughout the past year. Inside this issue, you will see the names of those who significantly supported the College in the 2013-2014 fiscal year with financial donations. These gifts are vitally important to the success of the college and students. This list does not include the many smaller donations that we have loyally received from many alumni, nor the countless hours of volunteer service provided by our Advisory Board and the Engineering Alumni Society.

As we wrap up 2014, the College has seen significant investments from major donors and alumni. Thanks to ***Engineering Matrix*** for sponsoring the College of Engineering football Suite and Building II renovation and ***Tierra Engineering*** for sponsoring the USF Engineering Alumni reception in Marco Island. ***Bracken Engineering*** sponsored our Eminent Scholar Lecture Series, while Del Kimbler endowed the ***Del and Beth Kimbler Lecture Series in Industrial Engineering***. New scholarships were formed by ***Anthony and Sheila James, Sunview, Nitro Mobile Solutions, Myra and Dug Cooley, the Florida West Coast Section of ASME, and Michael and Alvin Agana with the establishment of the Michael Agana Memorial Scholarship Fund.*** **Nielsen** supported the Computer Science Department with a gift for the Senior Capstone Design Course. These gifts have allowed the college to award more scholarships, provide more programs, and provide lectures from world class academics.

Keysight (formerly Agilent) gifted the College $80 million in Advance Design Systems software packages again this year, helping students learn about wireless circuit design. Students also graduate with a BSEE degree with basic training in ADS, which makes them attractive to potential employers.

Through benefactors to the College, we have been able to expand our ability to serve our students. Donations large and small are vital in helping the College reach its goal. If you haven't been involved in the Engineering Alumni Society, consider getting involved with Bullarney this year. The committee is underway and the date is set for March 21, 2015. Or serve as a Corporate Ambassador and be a link between your employer and the College of Engineering. For more information on how to get involved, contact Beth or Major.

It has been and amazing year and we are thankful for all our alumni, friends, faculty and staff who supported the College this past year. Your help makes USF and the College of Engineering ***Unstoppable!***