ENVISION
MAGAZINE

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COLLEGE OF ENGINEERING

THE OFFICIAL MAGAZINE *of the*
University of South Florida
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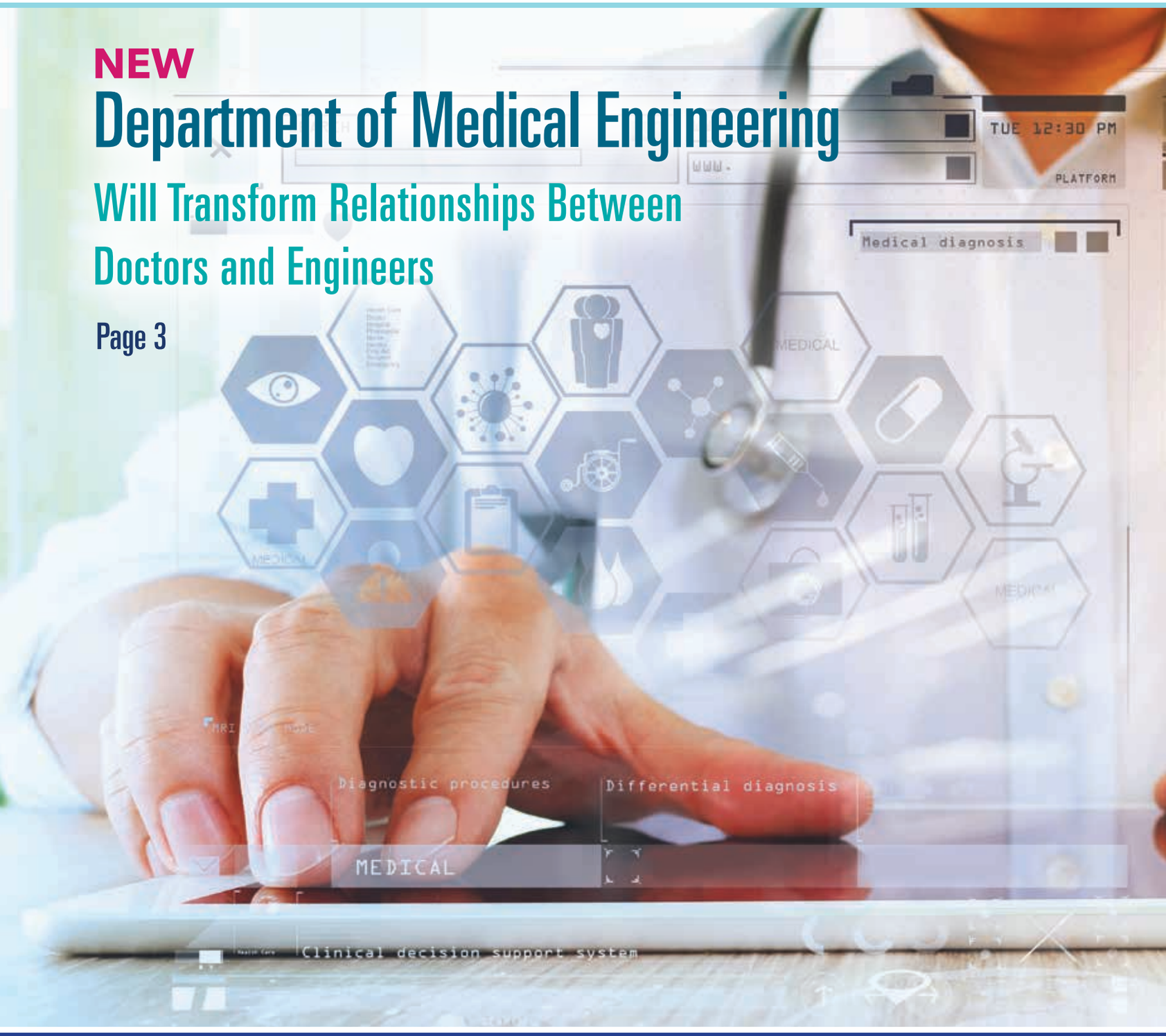

NEW

Department of Medical Engineering

Will Transform Relationships Between Doctors and Engineers

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2017 Engineering Honors

Seven engineers received Engineering Excellence Awards.

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2017 Engineering Expo

45 years and still going strong.

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Dr. Ranga Ranganathan

Professor Ranganathan Retires after a long, productive career.

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ENVISION
MAGAZINE

Message from the Dean

June 2017

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the College of Engineering at the
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MISSION STATEMENT

To profoundly shape and impact lives through the steadfast pursuit of world-class engineering research, education, and innovation.

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Envision is available as an app in iTunes or
Google Play. It's a free download.

Photo: Ryan Wakefield

This past year has been a remarkable one for the College of Engineering! We are truly #EngineeringLivesForTheBetter. Many new and innovative projects were initiated this year, including the new Department of Medical Engineering, our partnership with MacDill AFB at SOFWERX in Ybor, the development and presentation of the Bulls LEAD faculty and student leadership workshop, hosting the FIRST Robotics Competition in the Sun Dome, a sold-out Engineering Honors Banquet, and a very successful Engineering Research Day with more than 100 students presenting posters and a record number of faculty judges.

In May, we graduated the largest class of engineers in the college's history – 727 undergraduate and graduate students, a 15% increase since the May 2016 commencement. More students are choosing engineering because it offers varied career options and a higher than average starting salary. In fact, our engineering student population has doubled over the last 10 years. With more students choosing USF for their engineering education, we must be doing something right.

This fall we will welcome the inaugural undergraduate class of biomedical engineering students. The BME program is part of the newly formed Department of Medical Engineering, a unique transdisciplinary enterprise that combines the related aspects of engineering and medicine while providing access to real-world health care environments for education and research. The department faculty will consist of both physicians and engineers. A select group of students will also have the opportunity to take their BS in BME as an entrance into medical school. You can read more about this new venture with the USF Morsani College of Medicine on page 3.

Providing our students with meaningful career and internship opportunities got a boost from the College's recent partnership with Special Operations Command working with us to provide students for a variety of real-world work experiences in electrical engineering, computer science, mechanical engineering, data analytics, robotics, and cybersecurity. Our proximity to MacDill AFB as well as our diverse and accomplished academic capabilities make this the perfect partnership. Our internship opportunities have expanded dramatically in the past year with many local and national companies, and, in fact, have doubled each year over the past five years.

Though I've touched on only a few highlights here, this edition of Envision is filled with stories of student and faculty successes, a reflection of the quality education we provide. The 2018 U.S. News and World Report ranks our engineering graduate program at #55 among public institutions, a 9-point increase over last year. As we solidify our plans for the future, which include a much-needed new facility and increased faculty members, the College will continue to grow in strength and size, and expand our boundaries.

Robert H. Bishop, Ph.D., P.E. Dean, College of Engineering

▲ The new Department of Medical Engineering is unique in the composition of faculty which comprises of both engineers and physicians.

Photo: Chen Wang | Sweet Lighting Photography

New Medical Engineering Department Transforms Relationships Between Doctors and Engineers

By Brad Stager

Merging resources of two scientific fields to form the Medical Engineering Department is creating expectations that the University of South Florida's stature as a research institution will rise and new opportunities for students will be available.

The Medical Engineering Department was established in December, 2016, financed by some of the $5 million USF received from the State of Florida after being designated as an emerging preeminent state research university. The new department uses faculty from the USF College of Engineering and USF Health Morsani College of Medicine, with recruitment of new faculty and a permanent chair underway.

The College of Engineering's biomedical engineering program, which currently offers only graduate degrees, will keep that designation as it transitions from the Department of Chemical and Biomedical Engineering. The university recently received approval for an undergraduate biomedical engineering major that could also be compatible with medical school admission requirements.

Robert Frisina Jr., PhD, is the director of biomedical engineering at the College of Engineering and is also the founding interim chair of the Medical Engineering Department. He says there's a lot of enthusiasm for the new academic department.

Continued on next page

"It's one of those rare situations where the stars are aligned and most of the relevant players agree that this is a good idea."

Frisina cites trends in the health industry for creating a demand for the kind of knowledge, skills and products that can be produced by applied research in the biomedical engineering field.

"The biomedical engineer is trying to develop a new device or a new drug," says Frisina. "The medical healthcare crisis actually plays right into biomedical engineering, because people want better healthcare; new drugs, new devices, better techniques, but they want it cheaper at the same time and that's what a lot of biomedical researchers do."

Involving students in applied research is one way that Frisina says USF's Medical Engineering Department and its programs can stand out in an academic field that is growing more competitive when it comes to attracting talent and funding. One pilot program under consideration places biomedical engineering master's degree students with medical professionals in clinical environments. The goal is for the student to graduate with not just a degree, but with a patent, peer-reviewed publications and possibly a device prototype as well.

> "What we're going to try to do here at USF is to put some mechanisms in place to facilitate better interactions between engineers and doctors."
>
> - Robert Frisina, Ph.D.

"What we're going to try to do here at USF is to put some mechanisms in place to facilitate better interactions between engineers and doctors," says Frisina.

That level of cross-campus collaboration has been termed "transdisciplinary," meaning projects and research endeavors involve disparate disciplines that would not typically work together, with the goal being an innovative device, drug or solution to a problem.

That's what goes on at Global Center for Hearing Speech Research (GCHSR), where Frisina is the director. The center conducts applied research in the areas of hearing and speech, and is a collaboration between USF's College of Engineering and College of Behavioral and Community Sciences. The National Institutes of Health's (NIH) National Institute on Aging recently awarded GCHSR $9 million to research treatments for age-related hearing loss.

Andrea Lowe is a biomedical engineering PhD candidate who is researching drug and noise-induced tinnitus at GCHSR. She says working in a multidisciplinary environment is a good fit for her aspirations.

"I always knew I wanted to be in the biomedical field and focus on the auditory neurosciences." Lowe adds that USF College of Engineering's collaborative approach is helpful in her work. "You have a lot of freedom to take classes in different departments."

Because most engineering programs have the same basic academic requirements, Frisina says the biomedical engineering bachelor's degree will launch in the fall of this year. He also credits USF Health Office of Research Associate Vice President Phillip J. Marty, PhD, and Biomedical Engineering Professor Christopher Passaglia, PhD, as being instrumental in establishing the Medical Engineering Department.

For more information, visit: www.usf.edu/engineering/bme

Photo: Chen Wang | Sweet Lighting Photography

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Dr. Sarkar (center) at his induction into the National Academy of Inventors, May 2017.

Dr. Sarkar and his deck of playing cards that display optical illusions.

Photo: Brad Stager

Expanding a Digital View of the World

By Brad Stager

The adage, "A picture is worth a thousand words," is getting a 21st Century digital update through the work of Computer Science and Engineering Professor Sudeep Sarkar.

"My research is an area called computer vision," says Sarkar, who is also chair of the Computer Science and Engineering Department.

"It has to do with designing algorithms and writing software that will enable computers to extract information, in terms of what's there in images and video."

Sarkar says the challenge comes down to designing technology that not only emulates something that people routinely do, but performs the task at a higher level.

"One example would be face recognition, when you are trying to identify somebody from images. We humans do it all the time but when you start designing a computer algorithm, trying to do it from images, it's not that easy."

Face recognition technology is used in security and needs safety applications such as identifying people in public settings, restricting access to facilities and establishing or confirming the

COLLEGE NEWS

#55

The 2018 U.S. News & World Report graduate school rankings lists USF College of Engineering at 55 among public universities. That's a 9 point jump since last year!

identity of someone interacting with law enforcement. Businesses ranging from department stores to casinos also use it to manage customer relations and conduct market research.

As the technology is refined, new uses are found for facial recognition. The Chinese Athletic Association is now requiring runners in marathon races it sponsors to undergo biometric face scans to catch cheaters. A next step in that regard could be to develop technology based on gait recognition, another research interest of Dr. Sarkar.

Gait recognition is a behavioral biometric tool that analyzes how someone walks. It is used in the medical field as a diagnostic aid, but Sarkar's work focuses on its ability to establish someone's identity. He says awareness of people's unique movement patterns is not that new.

"The knowledge about this was there in psychology in the 1970s, when it was shown that people could recognize their friends by the way they walk and could distinguish between genders by the way they walk."

Eventually, necessity moved research forward as gait recognition's effectiveness under less than ideal situations drew interest and funding from government agencies looking for ways to deal with security risks.

"The real impetus in developing these algorithms started with a DARPA (Defense Advanced Research Projects Agency) program," says Sarkar, who was the principal investigator for a related DARPA-funded research project in early 2000s.

"There was a realization that you need to come up with technologies that will allow us to recognize somebody from a distance."

Gait recognition is also useful in poor lighting situations and in cases where people's faces are obscured.

Sarkar has also been the principal investigator or otherwise involved in computer vision research funded by the National Science Foundation (NSF) and other government agencies, as well as projects funded by corporations. In 2016, his work in gait biometrics and burn scar analysis earned him admission to the College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE). Sarkar was also been named a Fellow of the National Academy of Inventors (NAI) in 2016.

Collaboration between technological and academic disciplines is important to Sarkar, who earned his PhD in Electrical Engineering at The Ohio State University. One example he cites is an NSF-funded project he undertook with USF's College of Education to develop technology that interprets sign language and could be used to improve communication between hearing-impaired people and others, particularly in customer service situations.

"For example, if in a grocery store you have a deaf customer who now has to write something down, the idea is that you have these cameras that will look at the person (doing sign language) and translate it."

Sarkar says his current work involves developing technology that can interpret information from monitored or recorded activity and provide useful feedback about it.

"My latest research is how do you come up with descriptions from what is going on in the video. This is a very fundamental technology, and it can go into different application areas."

One use he suggests is to create efficiency in accessing large amounts of stored video data by describing the content to be retrieved. In 2016 he received an NSF I-Corps (Innovation Corps) grant to develop this technology and explore its commercial potential. Sarkar is the associate vice president of I-Corps programs at USF Research &

Continued on next page

Innovation.

The overall trend, says Sarkar, is closer collaboration between technology and people.

"As machines are getting smarter, there will be the expectation of the machine trying to infer what the human is trying to do."

According to Sarkar, making progress in ambitious endeavors like that will require expanding the concept of collaboration.

"We are good at interdisciplinary research at the University, but we need to be much better if we want to go forward," says Sarkar, who came to USF in 1993.

"Right now science and engineering are in a state where new fields are emerging. It's not like the disciplines are fixed and people are shaking hands across disciplines. What's happening now is the disciplines are getting redefined." Sarkar cites the emergence of the new Medical Engineering Department as an example of this trend, which is often referred to as transdisciplinary collaboration.

This kind of academic agenda creates challenges in the classroom as well as the laboratory.

"If you want to create students who can do this kind of stuff, where do you start?"

Looking beyond their immediate fields of study is essential to students being successful in fields like cybersecurity for example, where human behavior has as much impact as technology, according to Sarkar.

Sarkar's interest in pattern recognition, and eventually computer vision, began as a high school student in India when he came across examples of optical illusions in the pages of the magazine Science Reporter, one of the oldest English language popular science monthlies published in India, to which he subscribed.

"I was always fascinated by perception," he says, adding that the tricky illustrations he saw validated his skepticism about the expression 'Seeing is believing.' They also raised questions.

"Why should I believe what I see and how does seeing happen?"

Even now, Sarkar keeps a working deck of playing cards that instead of the Ace of Spades or Jack of Hearts, displays optical illusions that fool the eye and stimulate the imagination.

Looking ahead to the future of the Department of Computer Science and Engineering, Sarkar says as its chair, he's optimistic about not only growth in the number of students and research opportunities, but also in the ability to maintain a high quality of instruction and productive research.

"We are at a threshold in terms of the department. The caliber of faculty we are able to attract is very, very high, and we are continuing to hire." Sarkar adds that several of the young faculty have received recognition and funding from NSF.

"These are grants that NSF gives to new faculty on a very competitive basis; only the ones they think that are going to be the stars of the next generation."

Another way Sarkar hopes to grow the department is by collaborating with researchers at other universities, as well as those working in corporate labs. To that end, he extends an invitation.

"We are open and we'd like to start up a conversation."

Sarkar says he expects that graduates of the department's advanced-degree programs will continue to find research and leadership opportunities in academia and industry at a highly successful rate.

"We're very proud of our graduates. Our students are all over the place."

And when he steps back and views how the Department of Computer Science and Engineering fits in the overall picture of the University, he says, "It's a very good time to be Bullish about USF."

"These are grants that NSF gives to new faculty on a very competitivte basis; only the ones they think that are going to be the stars of the next generation.

- Sudeep Sarkar, PhD

2017 Eminent Scholars Lecture Series

The College of Engineering hosts an Eminent Scholars Lecture Series each spring on the Tampa campus. This lecture series brings prominent scholars and speakers in their field of expertise from universities across the country to stimulate the students toward thoughtful consideration of matters of great national and international significance.

Robin Coger, Ph.D.

Dean of the College of Engineering,
North Carolina A&T State University
"Transforming Research: A Perspective"

Liesl Folks, Ph.D.

Dean of the School of Engineering and Applied Sciences, University of Buffalo, SUNY
"Growing Diversity and Inclusion in STEM Disciplines; What will it take?"

Louis Martin-Vega, Ph.D.

Dean of Engineering,
North Carolina State University
"Engineering Research and Education; Past, Present and Future Perspectives"

Darryll Pines, Ph.D.

Nairman Farvardin Professor and Dean,
A. James Clark School of Engineering
University of Maryland College Park
"Evolving to a New Normal in Engineering Education"

Jonathan Cole Lecture

Presented by the College of Engineering and USF Health

Jonathan Cole, Ph.D.

John Mitchell Mason Professor of the University at Columbia University
"Higher Education and Problems Facing American Research Universities"

For fourteen years, from 1989 to 2003, he was Provost and Dean of Faculties of Columbia University—the second longest tenure as Provost in the University's 258-year history. He has spent his academic career at Columbia. From 1987 to 1989 he was Vice President of Arts and Sciences.

His scholarly work focused principally on the development of the sociology of science as a research specialty. In recent years, his scholarly attention focused on issues in higher education, particularly problems facing the great American research universities.

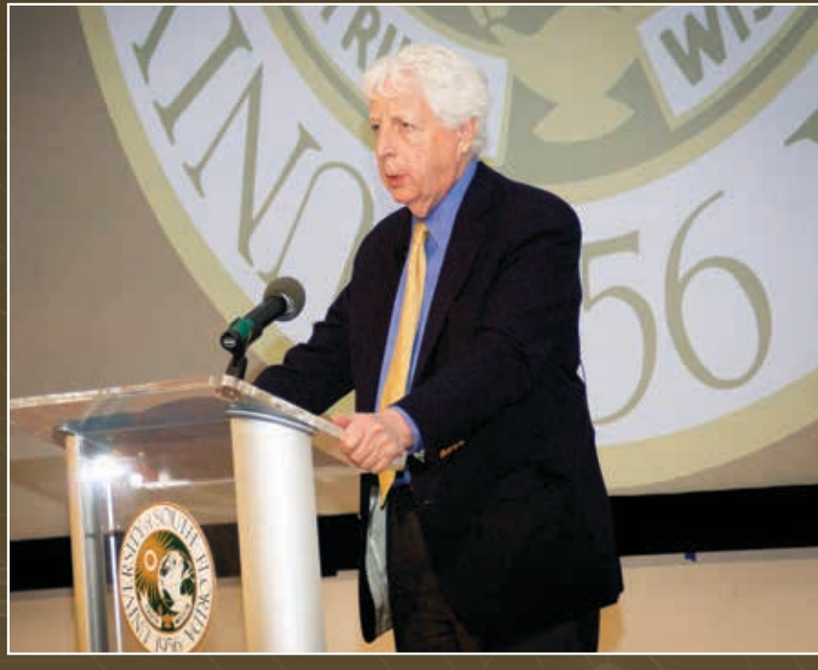

Photo: Ryan Wakefield

▲ Back row: William Serrano-Garcia, Ufuomaroghene Ikoba, Troi Williams, Steven Diaz Hernandez, Andrea Wright and Ilia Bautista Adames. Front row: Emma V. Lopez-Ponnada, Michelle Henderson and Laura Byrnes-Blanco.

Alfred P. Sloan Foundation Renews University of South Florida University Center of Exemplary Mentoring

By Bernard Batson

The University of South Florida is celebrating a significant achievement with renewal of its University Center of Exemplary Mentoring (UCEM) grant to the College of Engineering and the College of Marine Science by the Alfred P. Sloan Foundation. Managed by the National Action Council for Minorities in Engineering (NACME), the award provides an additional $630,000 over the next three years for a total of nearly $4 million from the Sloan Foundation to USF in support of minority doctoral education since 2005. USF is the only university in Florida to receive this distinction, and the only non-AAU institution, joining Cornell University, Georgia Institute of Technology, Pennsylvania State University, MIT, UC-San Diego, University of Illinois at Urbana-Champaign, and the University of Iowa.

The UCEM grant will continue under the direction of Jose Zayas-Castro, Professor and Executive Associate Dean in the College of Engineering, Frank Muller-Karger, Professor of Biological Oceanography in the College of Marine Science, and be managed by Bernard Batson, director of diversity programs at the College of Engineering. An expanded Faculty Coordinating Committee from both Colleges will guide the programmatic activities. Additional leadership and advocacy will be provided by Dean Robert Bishop of the College of Engineering, Dean Jacqueline Dixon of the College of Marine Science, and the USF Office of Graduate Studies (OGS).

“Over the past four years, USF faculty have received $4 million in research

grants from the Sloan Foundation and NSF to maintain our momentum in fostering greater diversity in STEM doctoral programs", according to Zayas-Castro, Principal Investigator of the UCEM award. "We envision the Center will help institutionalize these gains, while catalyzing new faculty mentoring and graduate student success initiatives for the entire University," says Zayas-Castro. According to Co-Principal Investigator Muller-Karger, "the UCEM grant prepares minority student into scientific leaders. They will be prepared to address the many challenges our country faces in dealing with living and non-living marine resources. They will measure life in the ocean, and study the physics, chemistry and geology of the sea. Ultimately, the UCEM is important to help our university and the science workforce be more diverse and look like our communities."

After a competitive review process, the Sloan Foundation awarded the UCEM renewal. They examined the USF record of accomplishment. USF graduates nearly 90 percent of Sloan minority doctoral scholars in engineering and marine science. The University is committed to making the institutional changes that support both graduate student and faculty diversity in all STEM graduate departments. Key metrics will include doctoral student recruitment, faculty outreach to minority serving institutions, implementation of a multi-dimensional mentoring model (MDM) for scholars, a new professional development certificate program to help PhD students develop "soft skills" for diverse career paths, and increased fundraising initiatives to ensure sustainability of the UCEM.

College of Engineering has Gone Green

www.eng.usf.edu/goesgreen

All marketing materials are now available in only electronic form in an effort to reduce greenhouse gases and eliminate landfill waste. Our efforts will:

- Increase carbon sequestering by reducing the number of trees being cut down to make paper.
- Reduce emissions produced by machines and manufacturing equipment that process paper
- Reduce fuel consumption and emissions through reduced transportation needs.
- Reduce the amount of paper that ends up in landfills
- Reduce the amount of water and hazardous chemicals that could pollute our environment and water.
- Reduce the amount of very toxic ink and toner that is manufactured.

The College now uses only a business card on 100% recycled paper that directs the user to the Goes Green section of the website where they can access materials and videos.

The Grandest Social Network Exists Between Your Ears

By Brad Stager

There are about 100 billion nerve fibers that carry signals within a human brain, or as Professor of Electrical Engineering Salvatore Morgera views the matter, 100 billion social media users.

"Social network really has become to have a meaning when we look at the brain," says Morgera, who made his case for that perspective in a recent TEDxUSF presentation titled, "The Grandest Social Network."

Morgera illustrates this concept by drawing an analogy between a brain's nerve fibers, which are organized in dense bundles, to human communities.

"Consider a neighborhood where you have a million or so people and they're tightly packed in," says Morgera.

"These people, or groups of them, will communicate, they'll collaborate and they'll compete. These are really human characteristics and they are exactly the characteristics we expect of individuals who are users of any of the traditional social networks like Facebook."

According to Morgera the key to this lies in how nerve fibers do more than receive and send signals on behalf of the human central nervous system, which he says, "controls everything we do."

"Dig deep into the fiber bundles and you'll discover a structured electric field that creates a wonderfully sophisticated quantum social network," Morgera says in an introductory video on his Global Center for Neurological Networks website (globalneuronetworks.com).
When Morgera dug deep, he discovered that "the elements within the brain had the same characteristics that we as humans do," he says. "We communicate, we collaborate, we compete."

Of particular interest to Morgera was the discovery that individual fibers interact with each other.

▲ Sal Morgera discusses the intricacies of the brain during his TEDx USF Talk presentation.

"It adds another dimension of sophistication and creates really, what I call a network," he says.

Fully understanding and exploiting how the brain's nerve fibers function will hopefully lead to drug-free, noninvasive diagnostic methods and therapies for neurological dysfunctions such as Autism Spectrum Disorder, Alzheimer's Disease and Multiple Sclerosis (MS), says Morgera.

> "It's all geared to really fulfilling the dream of helping the millions who suffer neurological dysfunction every day."

With more than five decades of experience, Morgera has designed and implemented networks that are used under water with oceanographic and submarine systems, in the air to meet aviation needs, as well as land-based wireless networks. To him, working in the neurological realm is a matter of applying well-established basic electrical engineering principles to structures related to the brain. One area he's researching is the role of endogenous electric fields in nerve fiber regeneration and remyelination.

"I'm an electrical engineer and I've always worked on networks," says Morgera, who earned his PhD in Electrical Engineering from Brown University in Providence, Rhode Island.

"It's all tied together by the concept of networks."

The transition from terrestrial to neurological networks came about when he left Raytheon Company after 10 years to move to Montreal in pursuit of academic opportunities at Concordia and McGill universities. He also worked with the Montreal Neurological Institute and Hospital, a world leader of neurological networks research. He also discovered new ways to use his knowledge.

"That's where I started to think about the bio aspects of the things I'd learned when it came to submarine communications or oceanographic data gathering all these other types of networks," says Morgera. "I realized that my electrical engineering skills could be easily applied to things that would be helpful to human conditions."

Morgera says those experiences provide a new sense of professional purpose.

"As soon as you're aware that your skill could be useful to humans and their condition, it raises up things to another level."

After 20 years in Canada, Morgera moved to Florida Atlantic University (FAU) in Boca Raton, Florida, where he served as Professor and Chair of Electrical Engineering. He also found an opportunity to apply his research and experience to the then emerging bioengineering field when he established the Bioengineering program at FAU and became its director.

"Engineers and bioengineers can make real contributions in the field of medicine, given the right team," says Morgera.

When it comes to neurological research from an engineering

Continued on next page

perspective, Morgera believes the right team should cut across academic and professional disciplines.

"It should be a team of a chemical engineer, a computer engineer and an electrical engineer," he says.

Morgera came to the University of South Florida (USF) in 2009 as a Professor of Electrical Engineering. He is also Director of USF's Bioengineering, Neurological Networks, and Defense and Intelligence Research laboratories.

In 2016 Morgera and a team of USF Bioengineering Laboratory researchers announced their discovery of a sophisticated electric near-field generated by the brain's millions of nerve fibers. In particular, the researchers discovered that the optic nerve has one million electromagnetic circuits that form a neurological network in which individual nerve fibers exhibit the social properties of communication, competition and collaboration Morgera cites as a pathway to developing better diagnoses and treatments for neurological disorders.

Morgera credits resources and connections available to him throughout USF as being invaluable to his research, especially in terms of providing new perspectives and insights. He says the motivation to seek out the expertise of others has served his research team well.

"USF in that respect, offers a richness of opportunity," he says. "But you have to go out and get it."

Cross-campus colleagues whose help he cites are Paul Sanberg, executive director of USF Health's Center of Excellence for Aging & Brain Repair; Edwin Weeber, chief scientific officer of the Byrd Alzheimer's Institute; and Eric Bennett, associate dean of Molecular Pharmacology & Physiology at the USF Health Morsani College of Medicine.

"These guys are fantastic," says Morgera. My connection to them has been invaluable."

Research often means one thing leads to another, and as Morgera discovers more about the brain's electrical system and the ability of its structures to communicate, collaborate and compete, he speculates about what might be just ahead.

"Does all this open up brain to brain communication?"

Morgera is a member of the USF Chapter of the National Academy of Inventors, a Life Fellow of the Institute for Electrical and Electronics Engineers (IEEE) as well as a Fellow of the American Association for the Advancement of Science (AAAS) and is an Emeritus Professor of FAU. His work was recently recognized by the McArthur Foundation.

View Sal Morgera's TEDx Talk:

https://youtu.be/CALd8DhH93E

COLLEGE NEWS

Engineering is Everywhere

The COE Communications and Marketing team recently produced a video for the Unstoppable campaign, titled "Engineering is Everywhere"

https://youtu.be/DA4Q4E-EPjU

THE ENGINEERING SCIENCE OF BEER

By Nigeria Stephens

Tampa is a nationally recognized leader in the craft beer industry, so it's not unusual that the engineering students at the University of South Florida would hold a beer tasting event. Beer and college – they just seem to go together.

Student members of the American Institute of Chemical Engineers (AICHE) and the Society of Women Engineers (SWE) held the third annual Sampling Science event on February 10, 2017, at the Nielsen complex in Oldsmar, Florida.

Sampling Science gives chemical engineering students as well as local vendors and inventors an opportunity to showcase their products. In addition to beer, other craft items such as jams and sauces were available for tasting.

Anna Hayes and Taylor Lubecki, both 2016 chemical engineering graduates, are the original founders of this event.

"We didn't just want to do normal selling cookies and stuff like that. We wanted to take it to the next level. We wanted to do something at one huge event and make money for it," said Lubecki. "We came up with the idea of doing a beer tasting event and that's what eventually led us to proposing it to the rest of our chapters and finally, you know, taking that huge risk and just going for it." Every year the event is a little different. In early 2015, the first-ever sampling science event took place on USF's Tampa campus in the alumni center. The event coordinators were then approached by Nielsen which offered a free space in their building to hold the event in 2017. The event has thrived and taken off and raised more money than it ever has in the past. Cristina Colon, Daniela Allbright and Patrick Hanson, seniors majoring in chemical engineering, were this year's event coordinators. They were each involved in the previous sampling science events as well. Colon and Hanson are the fundraising chairs for their organization AIChE while Allbright is the fundraising chair for SWE.

"One person can't plan this event. That's why Patrick and I are a part of AIChE and Daniela is a part of SWE. Together with a team of eight other directors we have been able to each assign an area of focus and really work on planning this event"

Sampling Science raises money for both USF's AIChE and SWE. That funding enables the groups to hold events promoting STEM education, such as the Engineering EXPO.

Professor Vinay Gupta has participated in two of the three years to show support for his students. He describes chemical engineering as the perfect position for craft brewing

"Craft brewing involves so many different chemical operations right from the chemistry all the way to the processing that chemical engineering is in one or all of those stages," said Professor Gupta. "Chemical engineers, probably more so than other disciplines in engineering, are craft brewers. [It's] good employment."

This year's Sampling Science was a sold out event with the profits increasing each year.

"My wishes are for it to continue to grow, to have bigger sponsors, to have more people recognize that this event inspires so many young students to become STEM majors," said Lubecki.

From Left: Dean Robert H. Bishop, Clyde Joseph, Wainella Isaacs, Gregory Roy, Jr., David Paulius, Engineering alum Mr. Anthony James, Ms. Sheila James, Jonielle McDonnough, Mandela Robin (far back), Darrell Griffin, Frederick Ngolya, Jordan Smith, and Dr. Jose Zayas-Castro.

USF Earns Top Honor at National Society of Black Engineers Convention

College of Engineering Chapter Recognized as Best in Region 3

By Brad Stager

The University of South Florida chapter of the National Society of Black Engineers (USF-NSBE) earned recognition as Region 3 Chapter of the Year, at the national society's 43rd annual convention, held March 29 - April 2 in Kansas City, Missouri.

Chapters were ranked on a variety of criteria such as number of members, scholarly achievement, growth and chapter programs and activities.

The USF chapter increased its membership to 57, up from 33 a year ago, with about nine percent of its members improving their GPA. Activities include workshops such as developing effective resume and interview skills, networking with engineering professionals and engaging in community outreach such as participating in Habitat for Humanity projects and establishing an NSBE Jr. chapter at a local high school.

According to the NSBE website, "Region III consists of Alabama, Florida, Georgia, Kentucky, Mississippi, Tennessee, Caribbean, South America."

"We used our own resources but we also reached out to people who helped us in the past, such as mentors and advisors who could help us professionally with interview skills and how to deal with different kinds of situations."

College of Engineering Diversity and Inclusion Programs Director Bernard Batson says the chapter's influence is substantial within the USF community, and beyond the campus.

"The chapter engages in signature programming throughout the academic year that promote greater diversity in the engineering professions. These activities range from serving as weekend tutors for local K-12 students within USF's Urban Scholars Program, establishing a NSBE Jr. chapter at Middleton High School, providing an organizational exhibit during USF Engineering Expo, and collaborating with other campus organizations through workshops and other events. All of which support USF's student success and community engagement missions."

Members of the USF chapter of NSBE have themselves become mentors to a succeeding generation of engineering professionals by sponsoring an NSBE Jr. Chapter at Middleton High School in Tampa. Middleton High School is a

magnet school with Science Technology Engineering and Math (STEM) programs in engineering, computer systems engineering, computer game design and biomedical-biotechnology.

McDonnough says USF-NSBE reaped great benefit and satisfaction from the project.

"It was our first time doing something like this and we learned a lot. It was awesome for us."

The relationship USF-NSBE members formed with the Middleton students reflects what they try to do for their members, as well as their peers who may be considering a future in engineering.

"We're an organization who wants to impact our community and help people reach their potential," says McDonnough.

Batson says he has witnessed the benefits students accrue by participating in USF-NSBE activities that help them achieve high expectations reflective of the organization's values.

"First, we expect the students to become outstanding engineering professionals whatever careers they decide to pursue.

It is wonderful for our NSBE members to see and interact with USF graduates and former officers of their chapter during the Annual National Conference who are now working at Intel, Boeing, J&J, Proctor & Gamble and other companies we have placed engineering alumni.

"Second, we hope that they will continue throughout their professional careers to stay engaged in supporting NSBE"s mission which is to "increase the number of culturally responsible Black engineers, who excel academically, succeed professionally, and positively impact the community."

The USF chapter began in 1976 as the Society for the Advancement of Minorities in Engineering and Sciences (SAMES), an affiliate chapter of NSBE, to promote recruitment, retention, and the successful graduation of prospective engineers. In 1998 the chapter renamed the organization to reflect its affiliation with the National Society of Black Engineers.

You can learn more about USF-NSBE by visiting its website at usfnsbe.com or sending an email to president.usf.nsbe@gmail.com.

NSBE members present engineering projects to grade school students during the 2017 Engineering Expo.

NSBE members accept their Best in Region 3 award.

Janice Sands Ash, '87, '89 MSCE, manager of SE Operations for Ayres Associates (Tampa), received a Distinguished Alumni Award.

Dr. Christopher Schemel, '87, '92, '94 MSCH, president and founder of Delta Q Consultants (Marco Island), Inc., received a Distinguished Alumni Award.

Jeremy Ramos, '99, vice president of engineering for Priatek (St. Petersburg), received the Outstanding Young Alumni Award

Julius Davis, '93, '14 MBA, president and CEO of VoltAir Consulting Engineers, Inc. (Tampa), received the Entrepreneurial Excellence Award

Ted Heil, president of Mini Circuits, accepted the Corporate Impact Award. Mini-Circuits (Brooklyn, NY) and its founder Harvey Kaylie have been long time supporters of the Center for Wireless and Microwave Information Systems (WAMI).

Photos: Chen Wang | Sweet Lighting Photography

2017 Engineering Honors

Presented by

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Five alumni and two friends of the College of Engineering received Engineering Excellence Awards during a program and celebration on April 8, 2017 at the Palma Ceia Golf and Country Club in Tampa. The sold out event was hosted by Dean Robert H. Bishop and President Judy Genshaft.

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▲ Mechanical engineering student Lance Corporal Lucas Cook assisted President Judy Genshaft and Dean Robert H. Bishop in handing out the awards to the honorees.

▲ Gordon Gillette, '81, '85 MSEM, president and CEO of Tampa Electric, received the Lifetime Achievement Award.

▲ Kimberlee DeBosier, vice president of Johnson, Mirmiran, and Thompson, Inc. (Tampa) received the Dean's Distinguished Service Award.

Susan A. Bracken Faculty Fellowship Benefits the College and Community

By Brad Stager

Adding the title of Susan A. Bracken Faculty Fellow to Assistant Professor Xiaopeng "Shaw" Li's CV and business card represents more than an academic position. It is an honor reflecting Li's eminence in the field of transportation and the contributions of the fellowship's namesake to the engineering industry.

As personal, commercial and public modes of transportation move into a future that seems destined for automation, Li's research addresses how to do that efficiently and safely. He outlined many of his ideas in the fellowship's inaugural lecture, "Towards Faster, Greener and Safer Transportation: Connected, Autonomous and Electrified Transportation Systems."

In his lecture, Li suggested using sensors that allow vehicles to communicate with each other as well as infrastructure systems, developing autonomous vehicle technology and relying more on electricity over fossil fuels.

As a faculty member in the Department of Civil and Environmental Engineering, Li teaches courses in traffic flow theory and transportation. Among his many awards, he received a National Science Foundation Faculty Early Career Development Award (NSF CAREER) in 2015. Li expresses appreciation for the recognition that the Susan A. Bracken Faculty Fellowship represents.

"I'm very excited and I'm very humbled and honored to receive the gracious support of the Bracken family. It means a lot of encouragement, a lot of inspiration and a lot of confidence. I hope I can use the support to strengthen our research and education here in transportation and other related interdisciplinary areas towards the common goal of making our engineering college a leading institute."

Li also acknowledges the support of the College's administration and faculty, as well as his family for his success.

The fellowship bears the name of Susan A. Bracken, who is the chief financial officer of Bracken Engineering, Inc., a nationally recognized, Tampa-based consulting firm providing a variety of engineering services, from design to forensic; for commercial, residential, agricultural and governmental clients.

Company Founder and President William C. Bracken says the fellowship recognizes the contributions that non-engineers such as Susan, to whom he is married, make to the field.

"It's not just engineers who promote engineering."

Bracken cites the various professionals engineers rely upon as they go about their work, such as insurance adjustors, which is the profession Susan was working in when they first met more than 25 years ago.

Photo: Qiong Chen

> "What I got from USF was a sense of community, networks and name recognition, because the business community respects USF.
>
> - William Bracken

▲ From left: William Bracken, daughter Mikaela, son, Liam, Susan Bracken, and Assistant Professor Shaw Li.

"The naming of the fellowship is in recognition for Susan's contributions to the business, which would not exist if not for her and her efforts," says Bracken, who earned his BSCE and MSCE degrees from USF.

Bracken also says that while he has two degrees from the university, it's not just the professional education that USF provides that helped Bracken Engineering grow.

"What I got from USF was a sense of community, networks and name recognition, because the business community respects USF."

Besides their business success, the Brackens share a sense of gratitude toward the College of Engineering.

"This is an opportunity for Susan and I to give back and support the college. We're doing what we can to help the college get some of the resources it needs to advance and grow."

Dean Robert H. Bishop says support like the Brackens' allows the College to invest in one of its greatest assets.

"Supporting the College through these fellowships, especially for junior faculty, is very important. It allows us to recruit and retain outstanding faculty like Shaw." According to Susan Bracken, supporting the College of Engineering and its faculty benefits more than the academic institution.

"I'm excited to help support a young professor with such enthusiasm for improving our community's transportation," she says. "People like Shaw is the reason we do this."

There are many ways to support the College of Engineering, from funding undergraduate scholarships to naming facilities and buildings.

For more information contact Senior Director of Development Gary Smallwood by calling (813) 974-1695 or via email at gsmallwood@usf.edu.

2017 Engineering EXPO
Blends Technology and Education to Create Fun

By Brad Stager

The University of South Florida College of Engineering's annual Engineering EXPO is a celebration of the field and how it relates to a wide range of scientific and technical disciplines. For many of the approximately 13,000 people organizers say attended this year's event, held Feb. 17 and 18, it was just a lot of educational fun.

There were robots to drive, experiments to conduct, lectures to attend and plenty of technology to discover. Displays and interactive activities geared toward middle and high school students were hosted by USF students, professional engineering organizations, government agencies, schools and community organizations. Event sponsors included TECO Energy, ITWomen, Honeywell, Florida Advanced Technological Education Center, Gopher Resource, Onicon Flow and Energy Measurement, and Museum of Science and Industry (MOSI) among others.

Engineering EXPO is organized and run by undergraduate USF engineering students like Martín Bucheli, who was this year's board president. He says EXPO has become a tradition among Tampa Bay area technology enthusiasts.

"If they come here once, they're going to want to come back," says Bucheli. "It's an event like no other." But EXPO isn't just about exploding ping pong balls, fire-breathing dragons and Tesla coils. For families considering a technology-oriented education for their children, EXPO was a good place to collect school brochures.

Shannon Fest, chair of Bell Creek Academy's science department, says students from the Riverview charter school attended last year's EXPO and wanted to be a part of this year's event as an exhibitor. Bell Creek has a STEAM (Science Technology Engineering Art Mathematics) oriented curriculum and their booth featured a school-made hovercraft made of plywood, duct tape and a leaf blower as an example of what goes on in its classrooms.

"The EXPO is an excellent experience," says Fest. "The kids have a lot of fun and learn so much."

Greco Middle School, which has a STEM academy option for its students, is just down the road from USF. Susan Cunningham is the lead STEM teacher at Greco and she says attending EXPO was an easy decision.

"We've got to be here because we're an engineering academy school. The students are excited to be here."

One of the Greco students demonstrating pneumatic powered robots was seventh-grader Taliah C. Wimbush, who has an interest in engineering and computer coding. She says EXPO is an enlightening experience. "I like to see some of the cool things people make and learn more about careers in engineering and technology."

Alicia Conner brought her three children to EXPO so they could explore technology through some of the many demonstrations of scientific principles.

"They get to see and touch some of the things in science and technology," says Conner. "There's some things we can't do at home."

One of those things might be Kevin Kohler's propane-powered flame sword. Kohler is known to almost 2.5 million YouTube subscribers as The Backyard Scientist and was featured as part of the USF X-Labs science show. Kohler is a biology student at USF's Sarasota-Manatee campus. He knows firsthand how a good show can ignite an interest.

Photos: Ryan Wakefield

Continued on next page

"I was inspired to join X-Labs when I saw them setting up for EXPO," says Kohler. "I saw the Tesla coil and knew I wanted to be a part of this."

Engineers often collaborate with other technology professionals and that was exemplified by the participation of the USF Department of Physics and College of Pharmacy.

Norma Bedell is an academic services administrator with USF's College of Pharmacy. She says advances in the pharmaceutical field such as using nanotechnology, are increasing the involvement of engineers.

"The more we can tie medicine and engineering together, I think we're going to see more advances in medical technology and make something great for the future."

For members of the Engineering EXPO board, the future is just around the corner as they transition to organizing next year's event.

"EXPO never really ends for us," says Bucheli, who is working his third and last event before he graduates with a degree in industrial engineering this spring. "We accept applications to be board members in March and select them this semester so we'll hit the ground running in the fall." Bucheli also says he would like a wide range of students to apply, especially from the College of Arts and Sciences.

This year's Engineering EXPO was the 45th edition of the free event, and its theme, Elemental: Properties of the Universe, emphasized molecular interactions that connect engineers and scientists.

EXPO - Student Perspective

By Nigeria Stephens

The Engineering Expo is an annual must see event that takes place on the lawn on the Engineering complex at USF. It is run entirely by USF students and it features K-12 grade schools from the surrounding area to test the experiments that have been set up by USF students.

The event is entirely free of charge and features everything from experiments to hands on learning to lectures. Ralph Fehr was in charge of the lectures at the Engineering Expo. Fehr specializes in Electrical Engineering. He even has a book titled, Industrial Power Distribution, 2nd Edition dedicated to his key area of electrical engineering, power distribution.

"I think students really need to see how all the theory that they learned in school from grade school on up through college comes together to form a final product…" said Fehr. Fehr believes the overall event that welcomes grade schools to learn about STEM (Science Technology Engineering and Mathematics) is needed to help students apply what they learn in school to real world STEM experiments and problems.

Many of the USF students have been working on their final STEM products for months. Setting up for the Engineering Expo is something that a few USF students have been working on since August of 2016, the beginning of fall semester.

One experiment called for working with paper airplanes to find which design of the paper airplanes works best to carry paper clips across the room. The experiment belongs to Patricia Tate, a senior that is in charge of girl scout activity for expo. "My favorite part is really working with the girl scouts," said Tate. "It's really fun watching even just walking around expo and seeing all of these kids, students, and parents having fun learning more about science [and] learning more about engineering." It is Tate's 3rd and final year being a part of the Engineering Expo.

The annual event has been running a total of 45 years. Each year new faces arrive. The looks on the children's faces as they learned and took part in these student run experiments were priceless.

Tom Szubka, a visiting student was able to learn a lot and also have fun while he did it. "My favorite thing about the engineering expo was the robot battle where the two robots had to pick up balls to put in their cage. I really liked it and I had fun with it." Said Szubka.

The lawn was filled with so many faces ready to learn and stare science in the eye. Overall, the Engineering Expo was a success not only because of the successful turnout but also because of the amount of knowledge each and every person was able to gain that attended.

COLLEGE NEWS

The USF **Whitehatters Computer Security Club** (WCSC) placed second during the first annual Raymond James Financial Capture the Flag (CTF) competition held on the Raymond James campus in St. Petersburg. Teams comprised of university sophomores from University of South Florida, University of Florida, Penn State University, University of Central Florida, University of North Florida, St. Petersburg College, and St. Leo University competed against each other to see who could solve the most computer security challenges. The teams had to exploit security vulnerabilities in websites and network services, reverse engineer software and cryptography systems, perform digital forensics and data recovery, and break into physical security systems such as mechanical and electronic safes. The CTF goal is to find the best hacker in the room.

Applying Technology to Aid Everyday Living

By Brad Stager

Photos: Sandra Roa

▲ Miguel Labrador, Ph.D.

Computers have long been proven capable of solving big transportation problems, such as landing astronauts on the moon. Computer Science and Engineering Professor Miguel Labrador researches how computer technology can assist with smaller ones, like helping bus riders successfully arrive at their destinations.

"I like to develop applications that have an impact on real people," says Labrador, who began his professional career working in the areas of telecommunications and computer networking, but now focuses on applications that benefit people.

"All my work goes around using cell phones, sensors and information to develop applications to help people with their health, their transportation needs and so forth."

Some of Labrador's work involves developing location-based information systems. One application he has worked with others to produce helps people use public transportation. It's called TAD, short for Travel Assistance Device. The mobile app is used with GPS-capable cell phones to let transit riders know via a voice or vibrating prompt when they are approaching their destination and should alert a driver to stop. Labrador says the application is especially useful in promoting independence for people who are cognitively impaired.

"The way people are trained to use the bus is to use landmarks," Labrador says. "There are many problems with landmarks. One of them is that landmarks change. Another is that the person gets distracted, and sometimes they ride a bus with limited visibility."

Labrador says TAD eliminates reliance on landmark recognition and can further promote safety by keeping people concerned about a user's journey informed about their progress to a destination through a Web-based interface.

"Caregivers at home can actually see where the person is in real time and the platform sends alerts to the caregivers in the cases where the person is out of their proper route."

TAD is a creation of The Location-Aware Information Systems Laboratory (LAISL) a collaboration between

Continued on next page

the College of Engineering's Center for Urban Transportation Research (CUTR) and Department of Computer Science and Engineering (CSE). Some elements of TAD have also been incorporated into an open-source transit project called OneBusAway that's used by public transit agencies from the Tampa Bay area to Sroda Wielkopolska, Poland, as an aid to help commuters plan their trips.
Human activity recognition is another research area of interest for Labrador, who says his focus is on developing related applications that combine cell phones, sensors and activity trackers, such as a wearable off-the-shelf product like Fitbit, to deliver medical benefits to users.

"Some of the activities that we try to automatically detect are when the person is seated, is walking, is running, is climbing or going down stairs and sleeping."

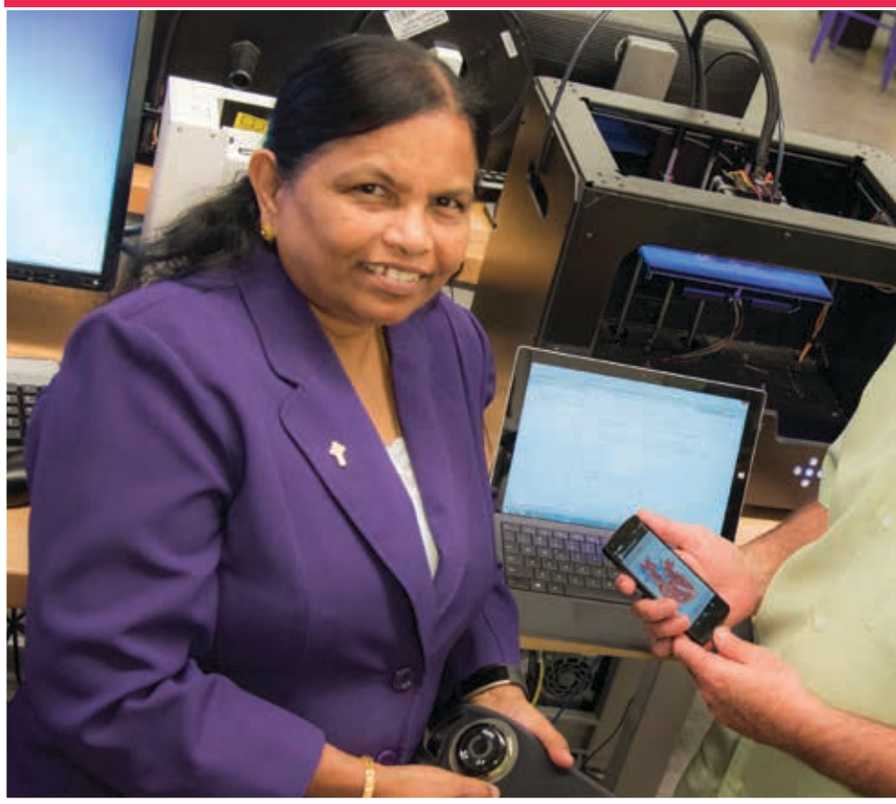
Labrador adds that manipulating acquired data with algorithms provides information that can be used to evaluate someone's daily routine and its possible health implications, such as whether they are getting enough exercise or whether physical, rehabilitative therapy is yielding desired results.

One example of Labrador's human activity recognition research is a collaborative project with Ponrathi Athilingam, PhD, an assistant professor at the USF Health College of Nursing, that combines wearable sensors with an Android smartphone application, called HeartMapp, to help congestive heart failure (CHF) patients monitor their cardiac health.

Patients can track their vital signs, receive prompts to take medication, read useful information on their condition, and get exercise coaching. As the application processes sensor and user input, feedback is provided to let them know whether things are under control or a trip to the hospital is required.

As with much of his research, what's important to Labrador is that those who might benefit from HeartMapp are able to access it.

"Hopefully it will be in the hands of many people with a heart problem, to help them deal with the problem," says Labrador, who began his engineering career by earning a BS in electronics engineering from Instituto Universitario Politécnico de las Fuerzas Armadas Nacionales (IUPFAN), in Venezuela.



▲ Ponrathi Athilingam, Ph.D., assistant professor at the USF College of Nursing, and Miguel Labrador, Ph.D., display their collaborative HeartMapp app.

He was working in telecommunications within the Venezuelan oil industry when he was provided an opportunity to earn his master's degree in telecommunications at the University of Pittsburgh. Labrador followed up with his PhD in information science - telecommunications, also at University of Pittsburgh. The research he conducted in earning his PhD interested Labrador so much, he pursued a career in academia over continuing in the private sector.

"I really enjoyed the research part of doing my PhD and the environment of universities," he says.

Since coming to USF in 2001, Labrador has conducted research in design and performance evaluation of computer networks and communication protocols, energy-efficient mechanisms for wireless sensor networks, and location-based services and ubiquitous sensing.

Research requires money and Labrador's work has received funding from the National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), Florida Department of Transportation (FDOT) and others. He is also the lead author of three books in his fields of interest and has published more than 100 journal and conference papers and holds 10 patents.

Among his many honors and awards, Labrador received the 2012 College of Engineering Outstanding Research Achievement Award and in 2009 he was inducted as a charter member in the USF Academy of Inventors.

As the Computer Science and Engineering Associate Chair of Graduate Affairs, Labrador is responsible for the success of students who are pursuing advanced degrees. He says ensuring their success and the vitality of the department's graduate program requires rigorous scrutiny of applicants' qualifications.

"We do not accept anyone in our graduate programs that we feel cannot be successful," says Labrador. "Our strength has always been research and we cannot do good research without good students."

The nature of research is one of the things that Labrador says has changed since he began his own career. He says it has become more collaborative, requiring the ability to work with others. It is a characteristic of modern engineering that he says has provided opportunities to expand his own research, such as with TAD and HeartMapp.

"I could not have accomplished pretty much anything if I had not had CUTR working on the same project, or having Pon, my collaborator in the College of Nursing to develop HeartMapp. Actually, HeartMapp was her idea, I just helped with the technology."

While Labrador's research and teaching is in the realm of computer hardware and software based on unambiguous calculations, he says his work ultimately is about solving human equations, "to help people improve their daily lives."

COLLEGE NEWS

May 2017 Commencement

Largest graduating class in the 43 year history of the College of Engineering with 727 undergraduate and graduate students receiving degrees. The College awarded 40 doctorates, 228 masters' degrees, and 459 undergraduate degrees.

The Induction into the Profession ceremony also saw the largest number of students (282) inducted into the Order of the Engineer and the Pledge of the Computing Professional.

http://bit.ly/2rUuS7x

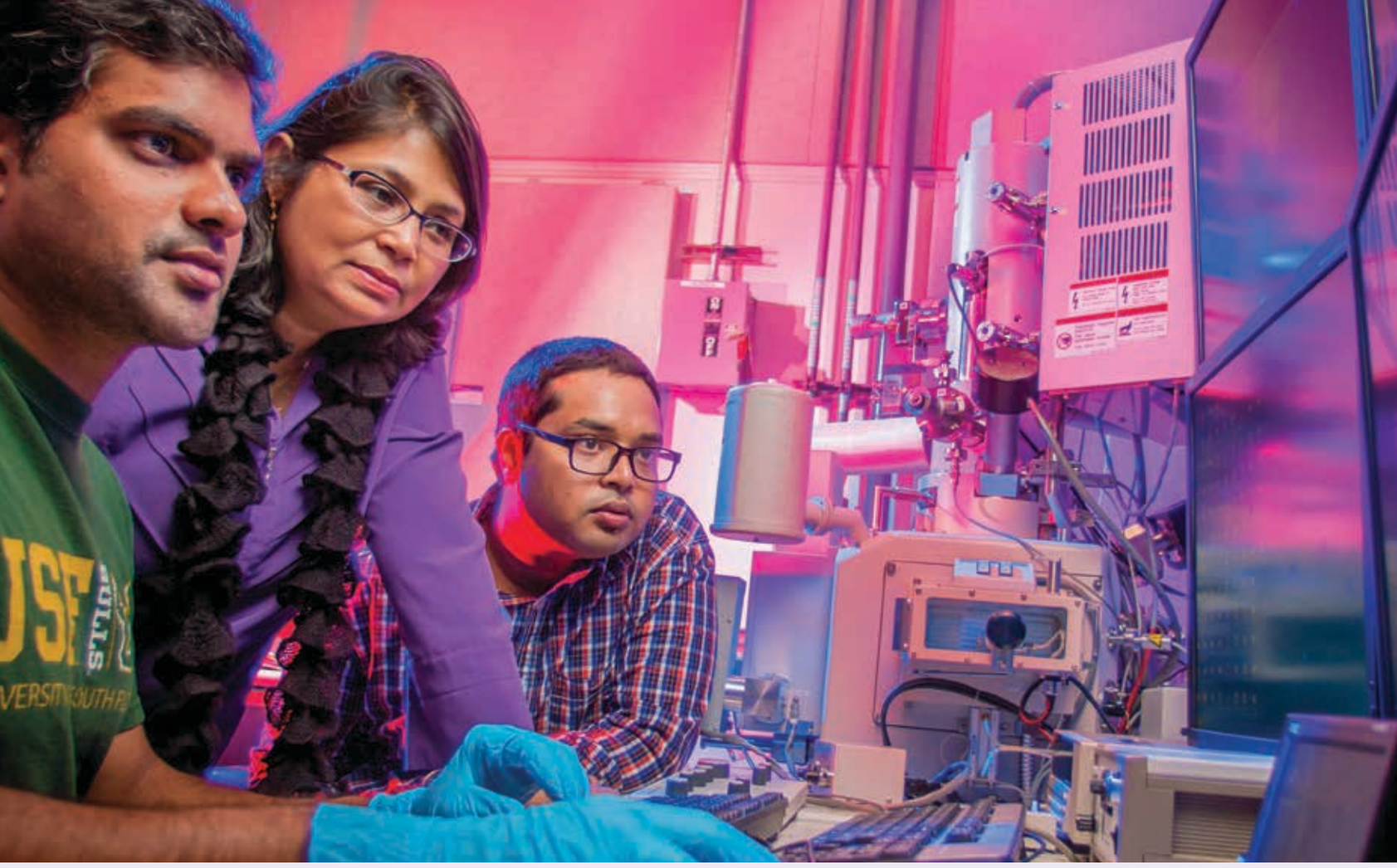


Photo: Chen Wang | Sweet Lighting Photography

An Attraction to Magnets and a Passion for Teaching

By Brad Stager

If you ask Professor of Electrical Engineering Sanjukta Bhanja, magnets are capable of doing more for your refrigerator than keeping photos, memos and shopping lists attached to the door - they just might be able to help you stock it with the best grocery bargains.

Bhanja employs the power of tiny magnets, called nanomagnets, in her research which focuses on non-CMOS nanocomputing. Some nanomagnets are so small, a million of them clumped together would be about the thickness of a hair. The magnets may not be big, but they have powerful characteristics that open up new possibilities in computing.

"When you have a group of magnets they try to minimize the system energy, so you can transform any problem that is like optimization (finding the best solution) into an energy minimization problem," says Bhanja, who earned her PhD in computer science and engineering from USF in 2002.

"The physics of the magnets are solving the problem."

Bhanja's research builds on the stable, nonvolatile memory of magnets which she says will advance computing in ways that current silicon based chips and processors can't, particularly in the area of machine learning and artificial intelligence (AI).

"The next generation of computing is going to be memory based," says Bhanja, who anticipates this kind of technology, known as Hierarchical Temporal Memory (HTM), will facilitate development of what is becoming known as the Internet of Everything; the intelligent and relevant connection of people, processes, data and things - like grocery stores and refrigerators.

Technology connecting devices and appliances to the Internet has been available since the early 2000s, but only goes as far as providing data, such as the quantity of an item, such as milk, within a refrigerator. Adding machine learning takes the feature a step further.

"It could connect with the Cloud and find out which retailer has the cheaper price," says Bhanja, who adds that nanomagnetic computer technology is already being used in things like automobiles, especially self-driving models.

"Yesterday's technology was just giving you data, but now it's making small decisions for you."

Her forthcoming book, "Non-Boolean Computing Using Spintronics," gives further details about her research. The book also exemplifies Bhanja's philosophy as a teacher, as one of her PhD students, Kawsher Roxy, is co-author of the work.

"I engage my students in research and publication early on as opposed to waiting until the last minute."

Bhanja's commitment to student success is evidenced by the eleven PhD students and 12 MS students she has graduated since joining the College of Engineering as a faculty member in 2002.

It is a commitment that Bhanja has taken to heart. "As a researcher I see myself as a mentor," she says.

That teaching philosophy should serve Bhanja well in her new position as associate dean for academics and student affairs, which she assumed in December. Bhanja says she wants College of Engineering students to graduate with more than technological competence as engineers.

"My main goal is I want our students to have an enhanced learning experience, and entrepreneurship and innovation have to be a key part of it."

Providing opportunities for students to do something with their ideas, such as applying for patents or designing apps to make them useful, is on Bhanja's agenda. She says some of the elements to achieve that are already in place at the College of Engineering.

"Our students are hungry for these types of things, our faculty are already doing entrepreneurship and innovation in their research, so now we have to take this little step and bring it into education." Bhanja also says that future engineers should be empowered early in their education to take the initiative to identify and solve problems that are impacting individuals and society in general.

Engineering has grown in popularity as a field of study at USF, as evidenced by a more than 50 percent increase in students at the College of Engineering in the last five years. Maintaining that growth by attracting highly qualified applicants from diverse communities is part of Bhanja's academics and student affairs mission. She says exposing young people to what goes on at the College is a good way to stimulate their interest.

"My plan is to bring some of these kids to campus so they can spend time in different labs, the makerspace, and the Nano Center, and give them the opportunity to see what engineers do." Bhanja says she is also interested in building relationships with STEM programs in Tampa Bay area school districts.

According to Bhanja, an academic career was something she was always interested in, following the career paths of her parents who were also professors. Like many prospective educators, she would as a child assume the role of a teacher and instruct a class of students, either imaginary or recruited from playmates. From that earliest experience, Bhanja has forged a guiding principle that has helped her achieve her lifelong ambition.

"My primary goal is mentoring my students. I have no ambiguity about this."

COLLEGE NEWS

Engineering Student Ambassadors

The College recently started a service program called The Engineering Ambassador Members – TEAM for short. These students will serve in a number of capacities from participating in events to assisting with campus tours.

Profiles in Engineering

By Brad Stager

▲ President of Voltair Consulting Engineers and Alumnus, Julius Davis.

View Julius Davis' Engineering Honors interview:
http://bit.ly/2sm6kZ4

While growing up in Tampa, Julius Davis got a look at his future when he dropped a favorite childhood toy, a handheld electronic football game. What he discovered within the broken case was the circuitry controlling the blinking LED lights that replicated gridiron action. In that moment, the world may have lost a quarterback, but it gained an engineer.

"I was amazed by what was inside, and I asked questions about it and that's when someone told me electrical engineers are the ones that design the guts of this toy, the circuit boards and everything else," says Davis.

That insight resonated with Davis, who had a talent for math and an interest in architecture, as well as construction experience at his father's masonry business.

"Ever since then, I wanted to be an engineer, specifically an electrical engineer."

Davis followed through on his goal by attending USF's College of Engineering, which he says turned out to be a good decision.

"USF had a great engineering program among the choices of schools I had and I received a lot of financial assistance between scholarships and grants to attend USF."

Besides financial support, Davis says the College provided guidance and networking opportunities to ensure success after graduation.

"The USF College of Engineering Minority Engineering Program, that was under Dr. (Joy) O'Shields at the time, had a few companies come in and do a panel discussion about careers after college. At that event I was introduced to an engineering firm that was interested in me working for them after I graduated. I was hired by them through that introduction and that has made a significant impact on where I am in my career today."

After earning his BSEE from USF in 1993, Davis worked his way up the ranks of an engineering firm to become a senior

project manager. Even though he had the security of being successful working for someone else, Davis wanted to discover what he could accomplish on his own,

"Both of my parents were entrepreneurs and it was one of those things I wanted to try. I didn't want this to be something in the future I would be wishing that I would have done."

Davis adds he believed in his own personal vision of what engineers can do for clients and communities.

"I felt like I could contribute more in the community and services to clients, whether it's to provide a different way of customer service or innovation."

He established VoltAir Consulting Engineers in 2006. On the company's website, voltairinc.com, they make a promise to prospective clients: "We'll Engineer Your Vision."

VoltAir provides design and project management services in the areas of electrical, mechanical, lighting, fire protection, security, plumbing and information technology systems throughout the United States, working from offices located in Florida and Texas.

The company's projects range from transforming the century-old Tampa Water Works building to become the home of local culinary landmark, Ulele Restaurant, to facility updates and expansions at major airports such as Houston's William P. Hobby and Tampa International, among others.

VoltAir's founding was the culmination of planning and preparation by Davis, who went about creating his business in a manner similar to guiding an engineering project.

"It was about two years of planning, reading books, talking with mentors, and taking every class available on how to start and grow a business at the USF Small Business Development Center."

From those initial ambitions and dreams of Davis VoltAir has grown to dozens of employees and expanded to an additional corporate entity, VoltAir Constructors, which focuses on general electrical contracting projects. In 2016 VoltAir Consulting Engineers was designated as a "Florida Fast 100" company by the Tampa Bay Business Journal, recognizing it as one of the state's fastest growing businesses. In 2015 VoltAir had reported revenue of $4.5 million dollars, according to Tampa Bay Business Journal, which also named VoltAir as one of the Tampa Bay area's "Fast 50" companies in 2016. The College of Engineering recognized Davis' achievements by presenting him with this year's Entrepreneurial Excellence Award at its annual Engineering Honors event.

One thing Davis has learned is that success as a business owner in a competitive industry like engineering comes with challenges,

"Trying to be in several places at the same time, trying to manage the business financially as well as maintaining client satisfaction; juggling all these responsibilities along with spending time with his wife and kids is the biggest challenge," says Davis, who keeps in mind a basic principle to guide him through his responsibilities.

"One of the things I always keep telling myself that keeps my head up is that God does not give you anything that you cannot handle. So, I know that whatever situation comes before me, I can handle it."

Many of VoltAir's engineering projects involve diverse groups of professionals and other community members. Davis says communication skills are important to ensure success in those situations.

"One of the things about being a leader is also being able to understand people, being able to communicate with people differently. It's almost like knowing multiple languages. The way I communicate with this particular engineer is going to be different than the way I communicate with the other engineer, or with somebody who's not an engineer, such as clients."

Davis adds that he developed those skills at USF by joining organizations and putting himself in situations where he would have responsibilities and be required to make presentations and address groups of people.

Now as a successful business owner, Davis continues his commitment to be a part of organizations, serving as a member of the USF College of Engineering Advisory Board, Greater Tampa Chamber of Commerce, 100 Black Men of Tampa, and was appointed by Florida Governor Rick Scott to serve on the Board of Directors for Enterprise Florida and Space Florida.

Setting out on the entrepreneurial path involved lots of preparation to get started, and Davis has found that being ready for what comes his way throughout the journey requires continuously building knowledge and skills.

"Engineers are supposed to create

Continued on next page

something that has a significant impact to the world or industry, or to the community. But if you don't understand supply and demand, what you're creating in your mind might be great, but the community may not find it as appealing as you do," says Davis who earned his Master of Business Administration through USF's Executive MBA program.

"If you understand supply and demand, the financial aspects and the marketing of a product that you're designing or researching that will help you become a more successful entrepreneur or inventor."

Over the past 11 years Davis' company has been involved in enough projects, including parks, office and commercial buildings and schools, that you can accurately say it has influenced the Tampa Bay area's landscape. He says good engineering is one way to make the region a better place to live. "It brings talent into our community. Just like the old movie, "If you build it, they will come," and that's the truth. If you go to any major city where there's diverse activities whether it's entertainment or career opportunities, that's what attracts people. It's good to see cranes up."

Dr. Clifford Henderson is Ready to Guide the Chemical and Biomedical Engineering Department to Growth Amid Change

By Brad Stager

Clifford Henderson begins his tenure as Chemical and Biomedical Engineering Chair at a time of change - and opportunity for the department. Having joined the department earlier this year in January, in our sit down interview he clearly appears enthusiastic and eager to tackle the many challenges that inevitably come with his position.

The shift of the Biomedical Engineering (BME) graduate program, which has been part of the Department of Chemical and Biomedical Engineering since BME program's inception only a few years ago, to the newly-formed Medical Engineering Department, a collaborative effort of the University of South Florida's College of Engineering and Morsani College of Medicine, is one of the most notable changes. Henderson says the realignment offers a chance "to grow the overall department to be positioned to where it's a leader in the area of chemical and biomolecular engineering and to advance the research mission of the university." He is also quick to point out though that health and biomedically related research will not be absent from his department, that instead it is a chance to focus on aspects of these fields where core chemical engineering principles and a molecular viewpoint can really help impact important problems.

Participating in research that innovatively deals with issues impacting people is also something that stimulates interest among prospective students, according to Henderson.

"What's intriguing to lots of students is that the variety of different problems chemical engineers can help address these days is really across the board," he says. "Whether it be something like energy, microelectronics, human health, clean water, or carbon emissions in the atmosphere which are affecting the environment; all of those are areas where chemical engineers will play vital roles."

Henderson attributes much of the recent substantial growth in the number of undergraduate students entering the chemical and biomedical engineering field to the wide variety of important problems that chemical engineers are tackling today.

Looking forward, Henderson also points to efforts to grow the graduate program coupled with greater emphasis by the College of Engineering on fostering entrepreneurship by students and researchers among the factors that will continue to result in growth and to move the department forward.

"Now, it's becoming part of the educational culture to let students and student groups have the tools to help them translate their ideas very quickly into objects and prototypes and things that they can test and play with."

Henderson witnessed the value of making technology available to students during his tenure at the Georgia Institute of Technology in Atlanta, where he was a professor in the School of Chemical and Biomolecular Engineering.

"At Georgia Tech where I came from last, there had already been a fairly large effort on campus to develop creativity initiatives and initiatives that would support entrepreneurial pursuits for students," says Henderson.

"Some of that is ongoing here at USF as well, so there are programs that are already in place or being developed that will help provide environments for, facilities for, and even funding for student groups to get together and translate ideas into prototypes and hopefully

ultimately into commercial products."

The College of Engineering's Mini Circuits Design for X Laboratory, which has 3D printers, laser cutters and other technology for student use, is an example of what Henderson says the department will consider developing as it looks at ways to support its students. He also cites a need to expand the number of faculty to accommodate the rapidly growing enrollment of undergraduate students.

"My hope is that in five to ten years from now we can say we've grown the faculty to roughly double its current number to serve the student population."

When it comes to bringing new faculty onboard, Henderson has in mind specific characteristics they should possess.

"Certainly someone who's passionate about teaching students, which is still the most important mission for the university," he says. "And we're looking for people with an equal passion for really addressing some of the world's challenging problems."

Henderson also says further developing and expanding the department's graduate program will promote its research effort and raise its profile as those with graduate degrees assume positions in academia and industry.

"That growth of our graduate program will both serve the community and the country better because highly trained individuals are key to the success of our economy these days. But also it helps the department in the sense that the more people that we graduate that can go out and communicate all the great things that are going on here that will certainly help us and the university as a whole."

According to Henderson, investing in academic programs and resources will ultimately help the department prosper to support its good works.

"We will grow the amount of research and the research dollars that are generated here to support the growing number of graduate students," he says. "Then also as we grow the faculty, the goal is to attract large research activities with major centers and other types of activities which can really help us amplify the impact on the students and also amplify the impact of our work on providing solutions to problems that we, in the country and the world, face."

Collaboration with entities at USF, as well as beyond the campus are likely, adds Henderson, whose career reflects that kind of effort.

"I personally have experience in trying to cross traditional disciplinary boundaries and combine the talents of what may be viewed as people from widely different fields to address interesting problems," he says.

▲ Clifford Henderson, Ph.D.

Professor Henderson received his bachelor of science in chemical engineering with highest honors from Georgia Tech. He then proceeded to The University of Texas at Austin where he completed his master's and doctoral degrees in chemical engineering. While he was completing his last two years of his Ph.D., he also had the opportunity to work as a lithography engineer in the Advanced Products Research and Development Lab of Motorola in Austin, Texas. Henderson credits that experience with really giving him an appreciation for translating basic research into viable solutions for real world problems. After completing his Ph.D., he returned to Georgia Tech to begin his teaching career as an assistant professor in the School of Chemical and Biomolecular Engineering.

His research lies at the intersection of chemical engineering, materials science, and nanotechnology. For now more than 20 years he and his research group have concentrated on developing advanced materials and material processing techniques that enable fabrication of micro and nanostructured materials as well as micro and nanoscale functional devices. Much of that work has focused on developing advanced nanomanufacturing materials and methods that enable the production of state-of-the-art semiconductor and integrated circuit devices like the computer chips that power all of the laptops and cellphones that are integral to people's lives today. His group's work though has had broad application in other areas as well including human health, telecommunications, energy, and clean water. He has received funding from a variety of governmental sources including the National Science Foundation (NSF), the National Institute of Health (NIH), and the Defense Advanced Research Projects Agency (DARPA). Since he makes it a mission to motivate much of his work with practical problems facing industry and society, he has also received significant industrial support from a number of different industrial collaborators including Intel, CibaVision, and the Semiconductor Research Corporation.

Henderson says "it's an exciting time for the department," which is likely to undergo a name change to reflect movement of the biomedical engineering program to the new Medical Engineering. Department. But whatever the Chemical and Biomedical Engineering Department is ultimately called, Henderson says its priorities will be guided by an interrogatively framed principle.

"The question I ask myself often in making any of the decisions that you end up making in my role is, 'How does what we're about to do help the students, help the faculty, help the college, and help the university?'. If I can answer pretty positively on one of those aspects, if not more, then that tells me that we're making the right decision."

Connecting the Dots for Cybersecurity

By Brad Stager

Computers are everywhere and do just about everything for us, increasing the speed, accuracy and convenience in living our lives and conducting business. But that digital omnipresence also brings increased risk through cyber attacks, such as computer viruses and other malware, that compromise information and can even put lives at risk.

Yasin Yilmaz, Assistant Professor of Electrical Engineering, is one USF researcher who's working to give cybersecurity white hats the advantage over malicious hackers.

Besides his research and instructional work at the College of Engineering, Yilmaz is affiliated with the Florida Center for Cybersecurity at USF, which provides educational and research opportunities related to cybersecurity. He says speed is of the essence when dealing with a threat to computer networks.

"You have to be timely to mitigate effects of a cyberattack." he says. According to Yilmaz, Big Data Analytics is one way to defend against such threats.

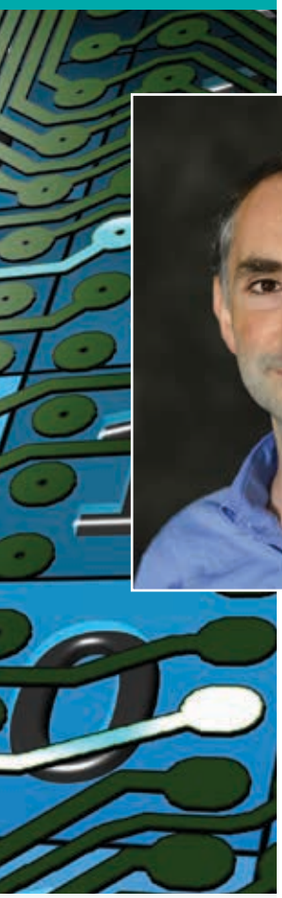
Through the Electrical Engineering Department's Data and Signal Analysis Group (DASA) which he directs, Yilmaz and his team use statistical data analysis and machine learning to solve big data problems related to cybersecurity and privacy, with applications to the Internet of Things, social networks, as well as major systems such as those involving communications, transportation and energy.

Much of DASA's research involves mining data for useful information and is guided by the principles of Statistical Inference and Learning, and Sequential Analysis of statistics. One of the group's favorite sources for research data is the social media platform Twitter, which even though it has a limit of 140 characters per tweet, makes up for it with more than 300 million monthly users who send out about 500 million tweets a day, according to Omnicore, a full service digital marketing agency (Omnicoreagency.com).

There's digital gold in those tweets, says Yilmaz, who earned his Electrical Engineering PhD in 2014 from Columbia University in New York City.

"Twitter is a very rich data source. Our goal is to fuse different data types, such as text, geolocation and the number of tweets, for each hashtag."

Yilmaz and his team extrapolate and organize information within the tweets, including how many times individual words are used, so the raw training data can be analyzed, manipulated, and applied in their research, which spans self-driving cars to electric power grids. A common thread



▲ Yasin Yilmaz, Ph.D.

through it all is cybersecurity.

"Cybersecurity is a broad field and we've had a cybersecurity problem for a long time, with computers and the Internet" says Yilmaz, who came to USF in August of 2016.

"But now, the challenge is that traditional methods will not work anymore for IoT (Internet of Things), for example. The emerging technology is about connecting more and more devices. We have smart phones, and we're starting to have smart home appliances and we hope to have smart cars. When they are smart, you can connect them and when you connect them there is the opportunity to improve the quality of life for people but at the same time you are increasing the risk of cyber attacks."

Yilmaz and his team focus on integrating IoT objects and systems with sensors and machine learning to advance their benefits and also enable them to recognize and respond to cyber threats automatically. The big challenge is balancing benefit and security.

"It is almost for sure, no matter how hard you try to make something secure, there will always be some security vulnerability because the more secure something is, the less flexible and beneficial to human beings it is," says Yilmaz. "If you want to make a system very secure, you should disconnect it from the Internet and you should not make it smart. It's kind of a trade-off."

> "Statistical inference and learning is a great field. It combines big analytics, cybersecurity and IoT, and affects our lives directly. It's a very exciting and promising field.
>
> - Yasin Yilmaz, Ph.D.

Narrowing the gap between security and usability requires new methods of threat detection and resolution, says Yilmaz.

"Antivirus software is built in a traditional way, the Internet is old enough, we know the threats very well. It is different now. With IoT security, it's a really open area. Most IoT devices today do not meet security needs at all." Yilmaz adds that developing algorithms that detect and react to anomalies that may indicate cyberattacks against a system is one way to defend them.

"We need to be fast and we need to do online processing and online decision making."

Reflecting on the path that brought him to his current field of research, Yilmaz cites an early interest in mathematics and problem solving while growing up.

"I loved dealing with the details of a topic, so I was always interested in doing research, and not only in mathematics, but also in geography and history."

When he discovered that signal processing involves applying mathematics in electrical engineering, he found a niche in what he considers a very broad field.

"When you say electrical engineering people think that you only deal with electricity generation, distribution and electric grids or electronic devices, but I'm not dealing with any hardware. What I'm doing is close to computer science, industrial engineering and of course mathematics."

Yilmaz says his work at USF enables him to develop his research interests into a fulfilling purpose.

"Statistical inference and learning is a great field. It combines big data analytics, cybersecurity and IoT, and affects our lives directly. It's a very exciting and promising field."

You can learn more about the Data and Signal Analysis Group by visiting its web page at dasa.eng.usf.edu.

Photos: Ryan Wakefield

Bullarney 2017

Raises Money and Profiles

By Brad Stager

Celebrating and supporting USF College of Engineering students is central to the Engineering Alumni Society's (EAS) mission, and this year's Bullarney Carnival brought together nearly 200 alumni, faculty, friends and students to do exactly that.

Guests attending the March 25 event, held at USF Gibbons Alumni Center, enjoyed an open bar, food, music, dancing, a silent auction, prize drawings, games of skill, and philanthropic wagering with a taste of Las Vegas-style casino gaming.

Bullarney is an annual event that began in 1996 and raises money for scholarships and other financial assistance to students, such as travel grants to attend conferences and leadership training. Over the previous 20 years, EAS has raised more than $500,000 that's been distributed to more than 500 students.

Robert Andrew earned two bachelor's degrees from the College of Engineering, in mechanical and chemical engineering, and served as chair of this year's Bullarney Carnival. He says that while fundraising is Bullarney's main purpose, there's another benefit.

"It's a chance to show that engineers are not just strait-laced nerds. We know how to have fun."

It was also a chance for alumnus Chris Johnson to demonstrate the fruits of the problem-solving skills he learned while earning his master of science in electrical engineering. After nearly two decades in the corporate world, his business card now reads "Owner/ Head Brewer" of Six Ten Brewing, a craft beer enterprise he started with his wife, Leslie, who has an undergraduate degree in computer engineering.

"The scientific method has many applications when you're trying to find a solution to a problem," says Chris, who expounded on the application of Boyle's Law to brewing while serving complimentary cups of his award-winning Magpie Rye to thirsty guests. "USF gave me an opportunity to study and work and I appreciate it. You gotta give back and perpetuate that."

By day, Kathleen Baumback, awarded a BS in chemical engineering in 2013, is a production engineer helping the Mosaic Company (a Scholarship Sponsor for Bullarney) manufacture crop nutrients and industrial products. Her other job is performing throughout the Tampa Bay area as

singer-songwriter Kat Anna, and Bullarney was her chance to share those talents by providing musical entertainment.

"It's my alma mater, I love USF," says Baumback. "I'm really glad I studied engineering because it forces you to use critical thinking skills and that's useful anywhere in life."

Her friend and Mosaic colleague, Harry Helmrich also entrepreneurially applies some of the knowledge he acquired in earning his bachelors of chemical engineering degree in 2013. Helmrich's side gig is Cranium Coffee Roasters, an endeavor in which he demonstrates his mechanical engineering skills as well as mastery of thermodynamic principles. The heart of his operation is a roaster that combines a propane barbecue grill, clothes dryer motor, beer keg, bicycle wheel and tubing. Helmrich concurs with Baumback about the merits of an engineering education.

"The kind of thinking it requires can be applied to anything you do," he says.

Besides alumni and faculty, current engineering students like senior Kenny Ezevillo were also in attendance. He was one of the USF Ambassadors helping out with Bullarney, and the value of being present was apparent to him.

"It's a good opportunity to meet fellow engineers and find out about the work world," says Ezevillo, who is a chemical engineering major.

One of the people he had a chance to talk with was College of Engineering Dean Robert Bishop, who expressed appreciation for the work of EAS.

"Any chance you can get the alumni together in support of the College of Engineering it's a good day," he says. "We have so many alumni we're thankful to for what they do to help out the College, and its students and faculty."

Some alumni have become established in the Tampa Bay area's engineering community and many of them and their companies provided sponsorship support for Bullarney.

John Gregos earned his BS in civil engineering in 1997 and is now vice president at Faulkner Engineering Services, which provides geotechnical engineering and construction materials testing as well as environmental site assessments. Faulkner Engineering was a conference sponsor for Bullarney. According to Gregos, the event was a chance to demonstrate some Bulls Pride.

"We're very proud to be part of Bullarney 2017," he says. "We appreciate what the Engineering Alumni Society is doing for students and future engineers."

Also among the alumni attending Bullarney was William Rovira, a geotechnical engineer with Tierra, Inc., a full service firm that provides geotechnical, structural, forensics, environmental consulting as well as construction materials testing. He earned his civil engineering bachelor of science degree in 2007 and says the company, a Scholarship Sponsor, values its relationship with the College of Engineering.

"This event is real important to Tierra."

Altogether there were 23 corporate and individual sponsors of Bullarney 2017. EAS Chair Connie Johnson-Gearhart (master's of civil engineering in 2012) says involvement by the engineering community is important in promoting student success.

"We appreciate the support we receive from sponsors so that we can help College of Engineering students achieve their goals," she says.

Johnson-Gearhart adds that Bullarney is becoming an increasingly popular event and that planning for it begins soon after school starts in the fall.

"We encourage anyone who wants to be a part of next year's Bullarney to contact us."

A final tally of the amount of money raised from this year's Bullarney will be known in about a month, according to Johnson-Gearhart.

Faculty News

Two Engineering Professors Named Fellows of AIMBE

Two engineering professors have been elected to the 2017 College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE): Chemical Engineering Professor **Venkat R. Bhethanabotla** and Computer Science and Engineering Professor **Dimitri Goldgof**. The AIMBE College of Fellows is composed of the top two percent of medical and biological engineers in the country, and includes distinguished scientists and researchers, clinicians, engineering and medical school chairs, research directors, professors, innovators and successful entrepreneurs. Fellows are regularly recognized for their substantial contributions in teaching, research and innovation.

Robert Frisina Named Distinguished University Professor

USF Provost Ralph Wilcox has named Robert Frisina, Professor of Chemical and Biomedical Engineering and Communication Sciences & Disorders, and interim chair of the newly created Medical Engineering Department, a joint collaboration between the College of Engineering and Morsani College of Medicine, and a Fellow of the American Acoustical Society of America, and a Scientific Fellow of the American Academy Otolaryngology—Head & Neck Surgery, a Distinguished University Professor (DUP) for 2017.

Dr. Frisina is an international leader in the sensory neuro-engineering area of multi-disciplinary research on age changes in auditory processing, a field that attempts to explain why people lose their hearing when they get old and what can be done about it. The research team he has led has uncovered the molecular and neural mechanisms of age-related hearing loss, which is a seminal achievement in the field. The National Institute of Health's (NIH) Program Project upon which he serves and has led is the largest grant award in the world on this topic—over $9 million.

Congratulations to Dr. **James Mihelcic** recipient of the Excellence in Environmental Engineering Education (E4) Award bestowed annually by AAEES and AEESP to an educator who has made significant contributions to the profession in the area of educating practitioners.

Engineering faculty **Thomas Weller**, EE professor and chair; **Sudeep Sarkar**, CSE professor and chair; and EE alumnus **Israel Morejon '88** were recently inducted as Fellows into the 2016 National Academy of Inventors.

Electrical Engineering Professor **Richard Gitlin** is among the 2017 inductees into the Florida Inventors Hall of Fame a varied collection of creative minds that hold a collective 260 U.S. patents. Gitlin is a State of Florida 21st Century World Class Scholar and the Agere Systems endowed Chair in the University of South Florida Department of Electrical Engineering. He holds 60 U.S. patents and is being honored for his work across two fields: digital communications and medical devices. During a 32-year career at Bell Labs/Lucent Technologies, Gitlin co-invented DSL (Digital Subscriber Line), which allows Internet access over telephone networks.

Robert L. Bertini, Ph.D., P.E., F.ASCE, director of the Center for Urban Transportation Research and professor of civil and environmental engineering at the University of South Florida, has been elevated to the status of Fellow by the ASCE Board of Directors.

Congratulations to Drs. **Norma Alcantar** and **Babu Joseph** professors in the Chemical and Biomedical Engineering Dept. on being named recipients of 2016-2017 Fulbright Scholar. USF is ranked as the number one producer of Fulbright Scholars in the United States for 2016-2017, according to new data recently released by the U.S. Department of State and Institute of International Education. With an outstanding 12 faculty members named as scholars, USF doubled its number from last year surpassing other top research institutions, including The Ohio State University, Pennsylvania State University, University of Michigan at Ann Arbor, and University of Southern California.

Distinguished University Professor and solar energy pioneer **Yogi Goswami** has invented a new air purification product called Molekule. He was recently interviewed by WEDU, the Tampa PBS station. Watch the interview by visiting: **http://bit.ly/2qklbwA**

Dr. Yogi Goswami, placed in the top 10-short list of candidates for the 2017 European Global Energy Prize. The Global Energy Prize annually honors outstanding and innovative achievements in energy research and technology that are helping address pressing worldwide energy challenges. This year is of particular importance because the majority of nominations submitted for the Global Energy Prize came from the field of renewable energy. Goswami's ranking in the top 10 globally is quite noteworthy given the breadth, talent and expertise of the worldwide pool; working in all the fields of energy including renewable energy efficiency, power systems and nuclear power.

He has done pioneering work in the areas of solar thermal power (CSP), solar photocatalytic detoxification and disinfection, passive cooling using underground air tunnels and nano-scale antennas for energy harvesting and solar energy conversion. His solar photocatalytic technology has been successfully commercialized. His work on thermodynamic cycles resulted in a new innovative combined thermodynamic cycle for power and cooling which is now known as the Goswami Combined Power and Cooling Cycle. He was also recognized for his invention of a photo-electrochemical technology to disinfect and clean indoor air which is helping people with allergies and asthma. **http://bit.ly/2ri73Kt**

Electrical Engineering Professor **Sanjukta Bhanja**, was named Associate Dean for Academics and Student Affairs. Dr. Bhanja is a professor in electrical engineering.

Outstanding USF faculty, staff and students who contributed to a record-breaking year for the university's student success initiative were recognized March 21 at an awards luncheon in the Marshall Student Center Ballroom.

Dr. **Mary Goodwin**, director of engineering student services, received a Champions Award, honors faculty, staff or students exemplary in inspiring excellence in the student success movement.

Dr. **Kingsley Reeves**, associate professor in industrial engineering, received an Academic Excellence Award, for outstanding contributions to improving student success by implementing technologies, techniques or practices that transform the student experience:

Dr. Clifford L. Henderson has joined the College of Engineering at the University of South Florida as Chair of the Chemical Engineering Department. Henderson is a nationally known author, educator and researcher and National Science Foundation CAREER Award recipient. Henderson comes to USF from the Georgia Institute of Technology in Atlanta, where he served as professor in the School of Chemical and Biomolecular Engineering. During his 18 years at Georgia Tech (1998-2016), Professor Henderson was promoted to associate professor, faculty fellow, and finally professor in the school. During his tenure at Georgia Tech, has advised more than 35 graduate students, graduating 6 Masters of Science in Chemical and Biomolecular Engineering students and 33 Ph.D. students in both the School of Chemical and Biomolecular

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Engineering and the School of Chemistry and Biochemistry. He has also supervised more than 65 undergraduate research students and 6 post-doctoral research associates.

Mechanical Engineering Professor **Autar Kaw**, an early pioneer of the flipped classroom, received an NSF grant to improve them through adaptive learning. Check out his story:

http://bit.ly/2r2rhlJ

Civil and Environmental Engineering Professor **Sarina Ergas** received a SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) Distinguished Research Mentor Award. Dr. Ergas has mentored 19 PhD students, 34 MS students, and approximately 100 undergraduates, visiting scholars, high school science teachers and students and postdocs in her laboratory. She is a licensed Professional Engineer and an American Academy of Environmental Engineers and Scientists Board Certified Environmental Engineer.

Juan De Dios Castro, a doctoral candidate in the Department of Electrical Engineering and the Center for Wireless and Microwave Information Systems (WAMI), is a recipient of a 2017 Dissertation Fellowship from The Honor Society of Phi Kappa Phi. The fellowship supports students in the dissertation writing stage of doctoral study for up to 12 months.

Industrial engineering senior **Daniel Guzman-Ramos** and his brothers all graduated May 2017. They grew up in Immokalee, Fla., and theirs is a fantastic story of success and hard work. Learn more:

http://bit.ly/2pFkbbd

Student News

Portraits and Pastries – Spring Week of Welcome Event

The College welcomed back students for the spring semester with Portraits and Pastries. Students were able to receive an electronic caricature of themselves, enjoy hot drinks and, of course, pastries.

Emma Lopez-Ponnada and **William Serrano-Garcia**, PhD students in the College of Engineering are recipients of the East Asia Pacific Summer Institutes (EAPSI) Fellowship program from the National Science Foundation (NSF). Both students will spend two months this summer conducting research at the National University of Singapore (NUS). The goal of NSF EAPSI is to help US graduate students become engaged in the global STEM workforce through 1) first-hand and cutting-edge international research experiences at partner locations; 2) an introduction to the science, science policy, and scientific infrastructure of the respective location; and 3) an orientation to the society, culture, and language of these locations. Graduate students are required to submit a peer-reviewed research proposal based upon the NSF criteria (intellectual merit and broader impact). Prior to submitting the NSF EAPSI proposal, they must contact and gain the support of a host researcher aligned with their thesis or dissertation research. Recipients receive a $5,000 stipend, round-trip travel, and housing accommodations over the summer.

Congratulations to **Ambermarie Dawdy**, a chemical engineering junior, on receiving the Encore Award during her Johnson & Johnson cop-op.

Matlock Mennu, a senior in the Department of Mechanical Engineering, received the first place undergraduate award for Best Oral Presentation in the Engineering/Technology category during the 2017 Emerging Researchers National (ERN) National Conference in STEM held March 2-5, in Washington, DC. Sponsored by the National Science Foundation, the goal of the 2-1/2 day conference is to help undergraduate and graduate students enhance their science communication skills and prepare them for science careers in a global workforce. Upon graduation in May, Matlock received a University of Florida Graduate School Preeminence Award for PhD program in Aerospace Engineering.

Three College of Engineering graduate students have been honored by the National Science Foundation (NSF) 2017 Graduate Research Fellowship Program (GRFP). This year, 2000 recipients were selected from over 13,000 applicants through a competitive review o based upon NSF's merit review criteria (Intellectual Merit and Broader Impact).

Shamaria Engram, a doctoral student in the Department of Computer Science and Engineering was awarded a three-year NSF fellowship. Her research areas include cryptographic protocols, authentication, and formal models of security. She is working in the Software Security and Programming Languages research group under the supervision of Jay Ligatti, Associate Professor in the Department of Computer Science and Engineering. Engram's other awards include the GEM PhD Fellowship (sponsored by The MITRE Corporation) and the Florida Education Fund's McKnight Doctoral Fellowship.

Michelle Henderson, a second-year graduate student in Environmental Engineering, received Honorable Mention Recognition. Her research is studying pathogen removal in Hybrid Adsorption Biological Treatment Systems (HABiTS), a novel method for wastewater treatment. She is advised by Sarina Ergas, professor and graduate program director in the Department of Civil and Environmental Engineering. Henderson has also been recognized by the NASA Florida Space Grant Consortium (FSGC) and the McKnight Doctoral Fellowship program.

William Serrano-Garcia, a doctoral student in the Department of Electrical Engineering, also received Honorable Mention Recognition. His dissertation research focuses on the study of organic, conducting and semiconducting polymers for nanoscale fiber-based electronic devices. Serrano Garcia is advised by Sylvia W. Thomas, associate professor in the Department of Electrical Engineering. His other awards have included the NSF East Asia Pacific Summer Institute (EASPSI) fellowship.

Osniel Quintana, an undergraduate studying computer science, and **Sanim Rahman**, an undergraduate studying chemical engineering both received honorable mention for the 2017 Goldwater Scholarship. To be considered for this highly competitive scholarship, students must be nominated by their academic institution. Osniel aspires to obtain a doctoral degree and work in the field of artificial intelligence. Sanim would like to perform research in the areas of neurodegenerative disorders and teach at the university level after obtaining a PhD in biomedical engineering.

The Barry Goldwater Scholarship and Excellence in Education Foundation has provided more than 7,600 scholarships since 1986. The foundation was established by Congress to serve as a living memorial tvvo honor the lifetime work of Senator Barry Goldwater, who was a U.S. Senator for 30 years.

Teams of **USF engineering students** demonstrated their interactive and hands-on projects at a public showcase on April 28 at MOSI called Minds and Machines. The afternoon demonstration offered students in the USF mechanical engineering program the opportunity to demonstrate their work to both peers and the public who were visiting MOSI. Learn more:

http://bit.ly/2shbF3L

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A team of **USF environmental engineering students** won the 2016/2017 EESF/AEESP Student Video Competition for their video titled "Change Climate Change." The video portrayed short clips of simple habits that can have a positive impact on climate change. The team comprised Kevin Orner, Team Leader, Jorge Calabria, Philip Dixon, Ryan Graydon, Charlotte Haberstroh, Emma Lopez, Christy Prouty, and Laura Rodriguez-Gonzalez. Dr. James Mihelcic, BCEEM, was the team's faculty advisor. Teams of undergraduates and graduates studying environmental engineering and science were challenged to create 2-3 minute videos on the topic "what can individuals do to help reduce climate change". The target audience was 8th grade and higher students as well as the general public. Entries were evaluated on their effectiveness in reaching target audiences, creativity, accuracy, and plans for distributing the final video product. Each video also addressed the roles of Environmental Engineers and Scientists in solving climate related problems. The students received the award at the American Academy of Environmental Engineers and Scientists' annual Excellence in Environmental Engineering and Science Conference and Awards Luncheon hosted at the National Press Club in Washington DC.

http://bit.ly/2sgVkMo

Congratulations to engineering student team of **Pete Zydek, Tyler Brenfleck, Steven Rousseau, Emanuel Delgado, Mike Tavlin** for taking first place in Florida Water Environment Association design competition in the waste water division. They now move to national competition in Chicago this September representing Florida. The team are students of Professor Sarina Ergas. Learn more:

http://bit.ly/2oMiCaz

USF Mechanical Engineering student and Graduate Pathways intern at Johnson Space Center **Kaitlin Lostroscio** was recently featured in the NASA Intern Stories. Learn more about Kaitlin here:

https://go.nasa.gov/2rYYvYB

Ph.D. Graduate says it's All About Applying Yourself

By Brad Stager

◀ Juan Castro prepares a material sample for thermal testing.

Photos: Brad Stager

Earning an engineering doctoral degree is a matter of directing one's skills, talent and time toward an ambitious goal and 2017 graduate Juan Castro illustrates how that can involve a lot of achievements along the way.

"I look for opportunities and when I see one like a graduate fellowship, travel grant or authoring a publication, I don't think twice about applying and working on them," says Castro, whose CV altogether lists more than a dozen publications and refereed conference presentations.

Among some of his recent accomplishments are a 2017 phi kappa phi dissertation fellowship, the 2016 Graduate Fellowship Award from the IEEE Microwave Theory and Techniques Society and First Place recognition for the Best Paper Award in the Applied Physics/Electrical and Computer Engineering session during the 2016 Society of Hispanic Professional Engineers (SHPE) Engineering Science Symposium.

Castro's Department of Electrical Engineering co-authors for the award-winning "High-k and Ultra Low-Loss Electromagnetic Composites Based on Sintered Titanates for Fused Deposition Modeling of Ku-Band Antennas and Filters" were Graduate Research Assistant Eduardo Rojas-Nastrucci, Associate Professor Jing Wang (Castro's academic advisor), and Professor Thomas Weller, who is also the department chair and director of the Center for Wireless and Microwave Information Systems (WAMI), where Castro worked as a graduate research assistant. The authors have applied for a patent based on their research.

The paper examines developing high-performance microwave devices, such as small antennas, using in-house composite materials and 3D printing technologies. According to Castro, the team experimented with different materials in an effort to decrease the size of devices while maintaining efficiency in 3D-printed microwave components and antennas.

"Additive Manufacturing (AM) it's an emerging technology and we're doing something that can make a good contribution for the microwave community," says Castro, who expresses appreciation for the resources WAMI offers.

"It's one of the best labs, nationally," he says. "We are not so far from what is going on in industry."

Castro will get a chance to apply the knowledge and skills he acquired while earning his Ph.D. with Cummins, Inc., a Columbus, Indiana-based company known for manufacturing engines and power-generation products. He says USF engineering graduates are finding a lot of employment opportunities.

"Everybody in my group graduated with a job, and some companies waited up to one year for them."

Working in industry is something that the 35 year-old Castro already has experience in. After earning his BSEE from Autonomous University of Baja California in Ensenada, Mexico (where he also received an MBA) he worked for Panasonic Corporation as a quality control engineer and Jabil Circuit, Inc. and Medtronic as a senior quality engineer before deciding furthering his education would be a good way to achieve personal and professional fulfillment.

"I was thinking I could do something more," says Castro. "I wanted to get my M.S. and Ph.D. and work in research and development (R&D) as well."

Finding the right school to pursue his graduate studies was harder than finding a job, says Castro, who also earned his MSEE in 2014 at USF, after considering programs at Arizona State University and University of California San Diego.

"Applying for grad school is a very exhaustive process. I can see I was very lucky to end up here with Dr. Wang and Dr. Weller."

Arriving at USF for graduate studies and earning a Ph.D. is a journey that began in his childhood, while growing up in Mexico. Not content to just watch television for its entertainment value, Castro wanted to open it up and find out what was inside. Soon,

Photo: Brad Stager

▲ Juan and his WAMI lab colleagues are working on 3D printing microwave devices like antenna.

other household electronic items came under similar scrutiny.

"I had this curiosity about electronics and sometimes would take them apart and try to put them back together."

Teaching is often a part of acquiring a Ph.D. and Castro credits his experience as a teaching assistant in wireless and integrated circuit courses with advancing his own knowledge.

"Working as a teaching assistant you really have a chance to understand a topic when students are asking 10 or 15 questions."

Instructing others also provided Castro an opportunity to excel and he was awarded the College's 2014-2015 Electrical Engineering Teaching Assistant Award. The perspective Castro gained from educating other students also validated his assessment of the College's microwave program and the opportunities available within it.

"They have a great microwave curriculum, even for undergraduates," he says. "Whoever is thinking of applying to it, I encourage them to do that."

▲ Dr. Ranganathan with his family: son Shiva, daughter Sheela and wife Radhika.

▲ Dr. Ranganathan with one of the many chips his research has developed.

A Career Spanning Generations of Computers and Students

By Brad Stager

In 1988 business and scientific computer systems primarily consisted of "dumb" keyboard and monitor workstations tethered to mainframes housed in refrigerated rooms that could measure thousands of square feet in size and Radio Shack defined personal computing with its Tandy 4000 model. The computing power at each end of that spectrum was less than what a $20 smart phone of today possesses and the Internet was still a novelty known only to a few researchers.

Such was the digital terrain when Assistant Professor Nagarajan "Ranga" Ranganathan, with a fresh PhD in Computer Science from the University of Central Florida in Orlando, joined what was then just a handful of University of South Florida Computer Science and Engineering faculty colleagues to begin his career. Nearly three decades later, in 2016, Distinguished University Professor Ranganathan would retire from the same Tampa campus where he began.

"USF was my first job and my last," Ranganathan says. "I spent my entire career at USF, except for a nine-month stint at (University of Texas) El Paso. My roots are here."

It may have been a small department at a young university, but Ranganathan says he saw lots of potential and opportunity ahead.

"The department had only two full professors and maybe six or seven assistant professors, so I was involved in building the program. I saw USF, the College of Engineering and my department headed toward a tremendous amount of growth." Ranganathan went to work teaching classes, mentoring graduate students and conducting research, particularly in the realm of Very Large Scale Integration (VLSI), and helping advance computer chip technology. It's an area that tied together Ranganathan's undergraduate and graduate fields of study.

"My PhD is in Computer Science, the theoretical, and my undergraduate degree (BE in Electrical & Electronics from the University of Madras, India) is in electrical," he says.

"My research then, was partly theoretical and software, and partly VLSI, the technology behind the chips."

Some of Ranganathan's research focused on special purpose hardware and circuitry that have applications in image processing, such as improving camera systems used by law enforcement helicopters. By the time he left USF, Ranganathan's efforts resulted in eight patents awarded to him and his collaborators, with two patents pending. He also wrote, co-authored or edited more than 300 publications, including refereed journals and conference papers, book chapters and books.

Photo: Brad Stager

"I was working simultaneously on seven or eight publications at a time," says Ranganathan.

Ranganathan attributes his research accomplishments to abiding by a simple work ethic: "I do my work and always focus on my purpose."

Being active in his professional community is important to Ranganathan who is a Fellow of the American Association for the Advancement of Science (AAAS) and the Institute of Electrical and Electronics Engineers (IEEE). He also served in various editorial capacities for professional publications, including two terms as Editor-in-Chief, "IEEE Transactions on VLSI Systems."

As a teacher, Ranganathan taught courses ranging from Computer Organization and Architecture at the undergraduate level to Bio-information Processing for graduate students. In 2009 his classroom work was recognized with the USF Outstanding Undergraduate Teaching Award. It's an award that reflects his greatest professional priority, which he says, was advising and mentoring students. "My greatest achievement or satisfaction I got out of USF is working with my students. That is the highest point of my life - that is my oxygen."

> "My greatest achievement or satisfaction I got out of USF is working with my students. That is the highest point of my life - that is my oxygen.
>
> - Nagarajan "Ranga" Ranganathan Ph.D.

By his count, Ranganathan advised 115 graduate students, about three dozen of them receiving PhDs. He is particularly proud that his students found meaningful and engaging work once they finished their studies at USF.

"None of my students waited longer than two months to find a job," he says. "Many of them had multiple offers." Among Ranganathan's graduates are executives and engineers working at top-tier tech companies like Intel and NEC. Others have started their own companies or gone into academia and research at institutions such as Penn State University, University of Mississippi, University of North Texas and USF. Ranganathan says many of them are seeking fellow USF alumni to join them as professionals or are teaching the next generation of computer scholars.

"Some of them are hiring USF graduates and others are graduating their own PhD students."

One of the doctoral students Ranganathan mentored is Sanjukta Bhanja, who is now a professor in USF's Dept. of Electrical Engineering, and is also the College of Engineering's associate dean for academics and student affairs. Ranganathan was Bhanja's academic advisor at USF while she pursued her PhD from 1997 to 2002. Bhanja says Ranganathan was supportive and empowered students to achieve success.

"Many of my peers that were his students are extremely independent researchers and have developed multiple research thrusts in a short period of time. I think his way of mentoring was instrumental for his students' success, as they were exposed to academic problem solving and research skills right from the beginning," said Bhanja.

One of the ways Ranganathan supported his students' work was by emphasizing their contributions on joint publications.

"About 99 percent of my publications have students as first authors," he says. "I strongly feel that students should be first authors. It helps give students a head start."

Graduating with a PhD should be about more than mastering technical knowledge, according to Ranganathan, who says the character his students demonstrated was as important as the quality of their research and publications.

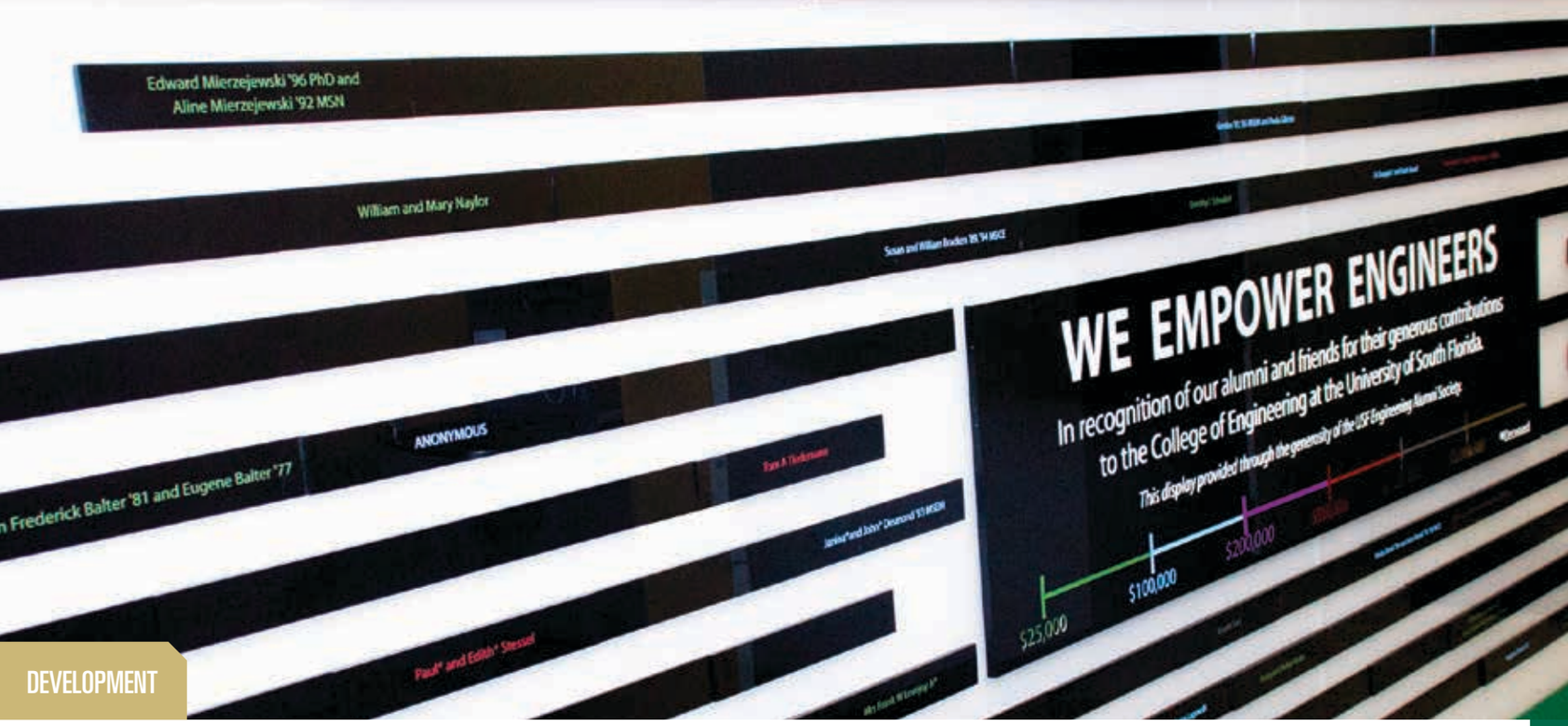
"Honesty, integrity and discipline are very important. They get molded in terms of being a researcher and their values in life. It gives me great satisfaction to see the changes in them, when they graduate."

Change has also occurred at USF and the College of Engineering since Ranganathan first arrived in 1988. The university now has enrollment nearing 50,000 students and the Department of Computer Science and Engineering has grown to dozens of faculty, including many with Emeritus status, like Ranganathan, who says the change isn't just reflected in numbers.

"In the last seven or eight years there has been a lot of emphasis on student success at USF and the College of Engineering. It's one of the things that will raise a university's quality and they're seeing results."

When Ranganathan formally retired from USF in 2016, about a dozen of his past students came from all over the country to honor him and share stories of marathon study and research sessions, which often occurred in the hospitality of the Ranganathan home. Some of his students still drop by to pay a visit and have a conversation over a cup of tea.

With more flexibility in how he can spend his time, Ranganathan says that besides enjoying more family time with his wife and two children, he wants to pursue activities that reflect his professional life, such as tutoring and writing. Even though he is not now engaged in the intense routine of research and teaching on a daily basis, Ranganathan says one thing remains constant: "Computer science is the future."



The College of Engineering recently erected a new donor wall in Glenn A. Burdick Hall (Engineering II). The E-Wall recognizes donors who've made significant financial contributions.

Here is the list of donors to date:

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Photo: Ryan Wakefield

Introducing Vic Teschel

Vic is the newest member of the College of Engineering Development Team, starting in July 2016 as the Associate Director of Development. He is tasked with assisting alumni and friends in supporting the University to help fund scholarships, research, faculty support, and facility improvements.

A proud USF Bull, Vic brings eight years of fundraising experience to the position, all within the USF Foundation. After graduating with his Masters in Higher Education in 2009 from USF, he started working in the USF Office of Annual Giving. Since joining the Foundation, he has had many responsibilities, including: managing the University's Faculty & Staff Campaign, planning and executing a state-wide program to engage alumni and friends and helping start the USF Young Alumni program. Because of these experiences, Vic considers himself a Higher Education advocate and feels that he has truly found his calling – to help the future leaders of the world obtain a first class education.

In his spare time, Vic is an active member of the Tampa Westchase Rotary Club, serving the community through various philanthropic and volunteer projects. He also enjoys spending time with his wife Jenna (also a USF grad) and their beautiful baby girl, Sienna. If he's not with his family, you can catch him on the golf course!

Photo: Ryan Wakefield

The Gold Envelope

The Gold Envelope, formerly Heart of Gold, is a new program designed to provide donors a meaningful, personal experience with their student scholarship recipient(s). The Development team in the College of Engineering will work with donors to arrange a unique visit at a time and location convenient for all parties.

Options include a meal with your student(s) on or around campus, or coffee and a campus tour, or a site visit to your business, to name a few options.

The idea of using a Gold Envelope is derived from Chinese and other East Asian traditions of giving a red envelope because red is regarded as the symbol of energy, happiness and good luck.

In the same manner, the Gold Envelope program celebrates charity, success and stewardship.

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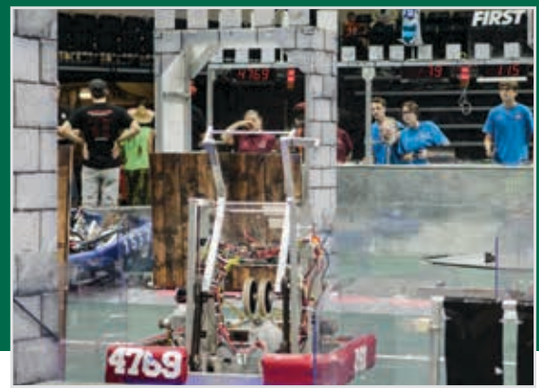
COLLEGE NEWS

College to Sponsor Roboticon Tampa Bay Event Again

The College of Engineering will sponsor and host the Roboticon Tampa Bay event in October 7 and 8, 2017, at the Sun Dome. The 2016 event drew 800 students from around Florida and as far away as China. This two-day event is open to the public and features K-12 robotics, workshops, and an innovation fair. Eureka Factory produces this large scale robotics event.

To learn more about Roboticon and other events: https://eurekafactory.net/



Grant Helps USF Students Engineer Solutions Across Borders and at Home

By Brad Stager

For most people living in the United States, accessing basic sanitation is one of the most accessible commodities; turn a handle and away it goes.

Although wastewater infrastructure is critical for protecting human health and the environment, continuous investment in wastewater infrastructure is lagging worldwide. In fact, many U.S. wastewater treatment plants were constructed in the 1970s and 2.4 billion people in the world still do not have access to basic sanitation. In addition, wastewater is increasingly seen as a valuable resource that can provide energy, fertilizer, and fit-for-purpose water. Real-world applications of knowledge and research to keep manage a waste that is now viewed by many as a resource in this country and improving availability of it in others through interdisciplinary research and global partnerships is the impetus behind a $3.9 million, five-year National Science Foundation grant awarded to USF in 2013.

▲ Laura Rodriguez-Gonzales works on a lab project in Delft, Netherlands.

The Partnerships for International Research and Education (PIRE) grant is part of NSF's efforts to meet the challenges that a growing global population exerts on natural resources, through engineering and science related educational institutions and their students.

▲ Kevin Orner poses with a family in Panama.

Civil and Environmental Engineering Professor James Mihelcic is the principle investigator for the PIRE grant. He says it provides opportunities for graduate students to apply their knowledge beyond the college campus and outside of their cultural comfort zone.

"One item related to the NSF PIRE grant is for part of the award, NSF wants us to increase the global competency of early career scientists and engineers. USF PIRE is preparing the engineers to make an impact as leaders at the local and global scale by innovating new technologies, rethinking the concept of "waste", integrating energy decisions into water management, and training students who can integrate engineered infrastructures with social and environmental systems".

That global competency includes developing engineering systems and solutions that recovers valuable resources from wastewater that are geographically appropriate and culturally relevant to the communities they serve, and it has been an essential element of the PIRE experience for about 100 USF students pursuing engineering and other degrees, such as anthropology.

Besides working with their peers from other disciplines, USF engineering students also travel to work on integrated water and energy related research and projects with professionals and students from educational institutions in Europe, Latin America and the Caribbean.

The aim is for participants to develop skills and perspectives that will facilitate development of a globally-engaged community of U.S. scientists and engineers who will be able to collaborate with people from other countries and cultures.

A lot of water ends up just going down a drainage system as waste. Laura Rodriguez-Gonzalez is a USF Civil Engineering doctoral candidate who is researching ways to not only minimize adverse environmental impacts of wastewater but to treat it as

Continued on next page

a resource. PIRE provided an opportunity for her to develop her ideas with professionals from other countries. She traveled to the UNESCO-IHE Institute for Water Education in Delft, Netherlands in 2016 to conduct research related to wastewater management. She says that large, centralized systems are not always available or are the best way to go when it comes to managing water resources, including wastewater nutrients.

"My research focuses on advanced decentralized wastewater treatment systems for nutrient mitigation. My hope is to be able to present wastewater treatment alternatives to the traditional centralized systems approach, especially in areas where this approach is not feasible due to geographical and space limitations as well as costs."

Rodriguez-Gonzalez says as an example, septic waste systems commonly used in the United States could benefit from her research as they can pose risks to the surrounding environment and people living near them if they are not maintained properly. Her research focuses on technology that enhances nitrogen removal in onsite wastewater treatment systems such as those that receive household waste. During her time at UNESCO-IHE she focused on using algae to accomplish that.

Adapting to other cultures and perspectives is an element of PIRE that proved valuable for Rodriguez-Gonzalez, who says the experience informs her research as she moves toward finishing her degree.

"It shows you also how culture shapes people's thinking and how that impacts the way they use and treat their water. This is particularly important in the development of water and wastewater treatment technologies that are appropriate both geographically and culturally."

Environmental Engineering PhD candidate Kevin Orner has been involved in projects in Latin America that provide clean water to remote village households and generate energy from animal waste. He says that wastewater contains useful materials that could be utilized if an effort is made to do so.

"Wastewater has resources such as nutrients, energy and water, so there's quite a few students myself included, who are looking at developing technologies that are able to recover nutrients from wastewater instead of just treating it as a waste that should be discarded."

Not a Drop of Water to Waste - Laura Rodriguez-Gonzalez

By Brad Stager

A career in environmental engineering seemed like a natural choice to Laura Rodriguez-Gonzalez.

"I liked math and I liked science and I enjoyed the problem-solving part, and I felt like I could apply all these and help people."

Her home in Salinas, Puerto Rico, on the island's south coast, provided an opportunity to grow up in an environment characterized by the natural beauty of its Caribbean beaches, lagoons and freshwater wetlands that also demonstrate the value of water as a resource, which is also the focus of her Environmental Engineering PhD research.

"Since I was a kid, I was always in the science club and recycling," says Rodriguez-Gonzalez, who earned her BS in Civil Engineering and MS in Environmental Engineering at the University of Puerto Rico, Mayaguez.

"When I discovered Civil and Environmental Engineering it was even better. I could apply what I am good at, enjoy doing it, and benefit society by developing technologies that will allow them to have access to sanitation and clean water."

She came to the USF College of Engineering in 2012 to pursue her PhD in Environmental Engineering. Working with Sarina Ergas, professor in the Department of Civil and Environmental Engineering, Rodriguez-Gonzalez's research emphasizes incorporating biological and physical processes in an innovative technology developed in her laboratory to better manage pollutants impacting our local springs and estuaries that are currently not treated in traditional decentralized household wastewater treatment systems.

"There's no cookie cutter technology that works for wastewater," says Rodriguez-Gonzalez. "Decentralized treatment is an option and sometimes might be the only option so we have to advance that."

She says USF is a good fit for her research interests.

"The Environmental Engineering program is phenomenal. There's lots of collaboration and opportunity to interact with faculty."

Rodriguez-Gonzalez says she would like to conduct research and teach after she graduates.

With research one thing can lead to another and Reclaim at USF was created to leverage the resources of the PIRE grant along with an EPA grant on nutrient management to promote resource management solutions that are culturally and geographically relevant to the communities being served. Its goals of resource sustainability, interdisciplinary collaboration and relevancy to culture and geography are aligned with PIRE's values. According to Mihelcic, helping students gain international experience greatly expands their knowledge and can open up further opportunities to them to innovate in U.S. and around the world.

"Laura was able to spend significant time in the Netherlands conducting research at the UNESCO-IHE water laboratory and Kevin had spent significant time in Panama as part of his MS degree at USF," says Mihelcic. "For his PhD we supported his travel to Costa Rica that ultimately led to him receiving a Fulbright Award to go to Costa Rica next school year."

While PIRE promotes a global perspective on sustainability, there are also benefits close to home. Orner and Rodriguez-Gonzalez are working with wastewater management officials in Hillsborough County where USF is located to test their ideas about mitigating, recovering and using wastewater nutrients there.

"Kevin and Laura have both had opportunities to also interact with practitioner organizations in the U.S. so the more sustainable technologies they are developing will be more likely to be adopted by user communities and help the people of Florida and the U.S.," says Mihelcic.

Graduates supported by USF PIRE have obtained 1) Fulbright scholarships to continue their global engagement (Spain, Costa Rica); 2) prestigious postdoctoral research positions (Yale University, Columbia University, University of Colorado-Boulder, Ecole Polytechnique Federale de Lausanne); 3) science policy positions with the U.S. Environmental Protection Agency and the Centers for Disease Control and Prevention; 4) entrepreneurial positions with technology startups; and 5) faculty positions (University of New Hampshire, University of California-Davis, University of California-Merced, San Diego State University, California State-Chico, Mercer University, Michigan Technological University, and Southern Methodist University).

For more information about PIRE and related projects visit usf-reclaim.org.

Engineer Without Borders

By Brad Stager

If you need to know how to say "water" in the Ngäbere language, Environmental Engineering PhD candidate Kevin Orner is a good person to ask.

The 31 year-old grew up in Eden Prairie, Minnesota, far from the lush, tropical regions of Panama and Costa Rica, home to the indigenous Ngäbe, but he has traveled extensively to use his engineering knowledge and skills to benefit people in those two countries and others in Latin America. Much of Orner's work focuses on potable water supplies in remote areas.

"I believe everyone should have access to clean drinking water and access to sanitation," he says. "In Latin America, it's a more rural context and they don't have similar access to resources like urban areas or in the U.S."

Working to provide equitable water access began with his experience as a project manager for an Engineers Without Borders wastewater project in El Salvador and continued with the Capstone Design Project for his BS in Civil & Environmental Engineering from the University of Wisconsin-Madison, for which Orner traveled to Ecuador to repair a system that provided water to 4,000 people in a rural community.

Orner decided he wanted to combine his graduate work with helping others.

"I was inspired to continue this work for my Master's degree," he says. "It clicked in my head that I could use my engineering skills to meet a real need."

That path led him to USF's Master's International Peace Corps program, which involved a lot of time in Panama to design and build a potable water supply system. Orner received his MS in Environmental Engineering in 2011.

Orner expects to graduate with his PhD in Environmental Engineering in about two years. For his PhD research, he has had the opportunity to work with a nationally recognized group of researchers on developing a novel technology that simultaneously recovers energy and fertilizer components from U.S. wastewaters. But before that, he's off to Costa Rica for 10 months next year as a U.S. Fulbright Research Fellow to develop ways to turn cow and pig manure into energy and fertilizer, using anaerobic digestion and struvite precipitation.

As for how to say "water" in ngb? Orner says, "Ñö. It sounds like "nyuh." You can learn more about Orner's work by visiting his website: kevinorner.com.

National Lab Internships Help Students Apply Classroom Lessons for Real-World Applications

By Nigeria Stephens

TAMPA, FL – Four talented College of Engineering students recently applied what they have learned in the classroom during internships at national labs in Summer 2016. Nichole Scarveles, William Serrano-Garcia, Francesca Moloney, and Matlock Mennu collaborated and received mentoring from world-class scientists to address real-life challenges in the areas of national defense, space technology, renewal energy, and the aerospace industry.

NICHOLE SCARVELES

Scarveles participated in the Air Force Research Laboratory (AFRL) Scholars Program at Eglin Air Force Base, Florida located in the Florida Panhandle. The AFRL program offers paid summer internship opportunities to undergraduate and graduate students pursuing STEM degrees, as well as upper-level high school students, to work full-time with lab scientists and engineers on cutting-edge research.

Scarveles decided to apply for the AFRL opportunity because both of her parents are 20-year retired active duty Air Force. Eglin AFB, the site of the internship, was the very same one she was born twenty-three years ago.

Scarveles worked on the technology of 3D printing and its applications for the U.S. Air Force in desert conditions or other harsh environments. 3D printing technology has the potential to be revolutionary for national defense by enabling the military to print new materials on the battlefield. According to Scarveles, a primary component of her internship was developing a collaboration at a state college with a 3D printing lab and learning about their materials, including the capabilities of each type of 3D printer. "Our team looked at how we might use additional nozzle heads to increase their capability for printing different materials", says Scarveles. She was also responsible for identifying various software for each printer and programming them. Moreover, Scarveles provided lab tours as Team Lead for visiting AFRL officials and other guests over the summer. Her mentor and principle investigator of the project, Amanda Schrand, nominated Scarveles for the AFRL Outstanding Scholar Award in recognition of her contributions over the summer.

"Working with peers from other engineering areas gave me a first-hand understanding of different engineering disciplines, how we can collaborate, and all benefit each other on different projects," says Scarveles. She graduated in May with a B.S. in Industrial Engineering, and now interning with the Retina Institute in Orange County, California.

WILLIAM SERRANO-GARCIA

Serrano-Garcia, a doctoral student in the Department of Electrical Engineering, also interned with the AFRL Scholars Program, but at Kirtland Air Force, in Albuquerque, New Mexico. He learned about the opportunity through the College of Engineering Diversity programs. Serrano-Garcia worked on the project "Advanced Nano-Devices for Space Applications"; where he studied a numerical model using Green's function method of transient time response in semiconductor devices. Serrano-Garcia applied mathematical tools learned in his coursework, and concluded when light or energy is applied to silicon, the behavior would be affected.

"I gained a mathematical approach to real-life problems which as an experimentalist will be useful for my PhD research in organic semiconductive polymers for nanodevices," says Serrano-Garcia. He is also collaborating with his AFRL mentor, Ashwani Sharma, on a publication from his work during the internship.

Aside from the research, Serrano-Garcia participated in STEM outreach during the Kirtland AFB 75th Anniversary Air Show, and was included on a video of AFRL summer scholars sharing their experiences in the program. A veteran of multiple internships sponsored by the National Science Foundation and the National Institute of Standards and Technology from his undergraduate program at the University of Puerto Rico-Humacao, Serrano-Garcia would like to return to AFRL as a research scientist after completing his doctoral degree. "I want to help address the present knowledge gap in organic electrospun semiconductors devices while working on problems that have impact for society in electronics, space exploration, or national security", says Serrano-Garcia. This summer, he is taking his passion for research to another lab at the National University of Singapore (NUS).

FRANCESCA MOLONEY

Francesca Moloney, a doctoral candidate in the Department of Mechanical Engineering, participated in the Mickey Leland Fellowship Program at the National Energy Technology Laboratory (NETL) in Morgantown, West Virginia. NETL focuses on applied research for the clean production and use of domestic energy resources. Sponsored by the Office of Fossil Energy within the U.S. Department of Energy (DOE), the Mickey Leland Fellowship Program encourages undergraduates and graduate students, especially women and minorities, to pursue STEM research and careers in energy.

Under the mentorship of NETL scientist David Tucker, Moloney's ten-week summer research was part of the larger DOE Hybrid Performance (HyPer) project. Specifically, her study focused on the integration of thermal energy storage to the system. "I analyzed the applicability of thermal storage in a fuel cell and worked on numerical modeling," says Moloney. The internship has led to one conference proceeding that Moloney will present in June, along with a pending journal publication. More broadly, the experience enabled Moloney to learn about different energy systems (fuel cells, hybrid systems, and others) outside the scope of her PhD research.

Along with the research training, Moloney received professional/career development guidance that will be essential for success in her PhD program and beyond. "I also enhanced skills on how to present research to scientists in my field as well to the general public, and how to technically prepare a journal publication", says Moloney. She also gained insight on non-academia employment opportunities in energy-related areas from her mentor who has a successful career in industry, academic, and governmental research.

Moloney is grateful for the educational opportunities she received at NETL and recommends that other USF students consider joining a national lab over the summer.

"They can help you explore an area either related or different than your current study that could provide a great perspective on how to approach one's career. In a short amount of time, this new environment can only enhance your future."

MATLOCK MENNU

Matlock Mennu, a graduating senior in the Department of Mechanical Engineering, spent his summer at the National Institute of Standards and Technology (NIST). Located in both Gaithersburg, Maryland (near Washington, DC) and Boulder, Colorado, NIST is one of the nation's oldest physical science laboratories. Mennu was selected for the nationally competitive Summer Undergraduate Research Fellowship (SURF) program at the Gaithersburg site. He worked with his NIST mentor Gregory Vogl on a sensor-based method for checking degradation of Computer numerical control (CNC) machines. "CNC machine tools are essential in the manufacturing of certain components in the automotive and aircraft industry", says Mennu. "However, billions of dollars are lost in the U.S. annually due to degradation of machine tools during production. My work was part of a larger effort to address this problem. It involved writing MATLAB functions to derive position data from acceleration data from the accelerometers in the sensor box."

Earlier this year, Mennu presented his summer research at the Emerging Researchers National Conference in STEM and was awarded first place for best oral presentation in the engineering -undergraduate category. After graduating summa cum laude in May, he has returned to NIST to continue his research. Mennu has been admitted in the PhD program in Aerospace Engineering at the University of Florida in the Fall, and plans to pursue a career either as a professor or in the aerospace industry.

Broadening STEM Perspectives by Increasing Participation

By Brad Stager

Innovation requires diverse perspectives and the Florida Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) is a program that helps ensure students from historically underserved backgrounds contribute their ideas and talents in solving problems.

The University of South Florida is a member of the alliance, which includes colleges and universities in Florida and Georgia. Its purpose is to increase the number of underrepresented minority students in Science Technology Engineering and Math (STEM) programs in academia and ultimately, the workforce. It does so by providing mentoring as well as research and professional development opportunities. The National Science Foundation provides funding for FGLSAMP.

College of Engineering Director of Diversity Programs Bernard Batson, who serves as USF FGLSAMP Bridge to the Doctorate Program Coordinator, says USF's long-standing participation in the alliance has reaped great benefits for students.

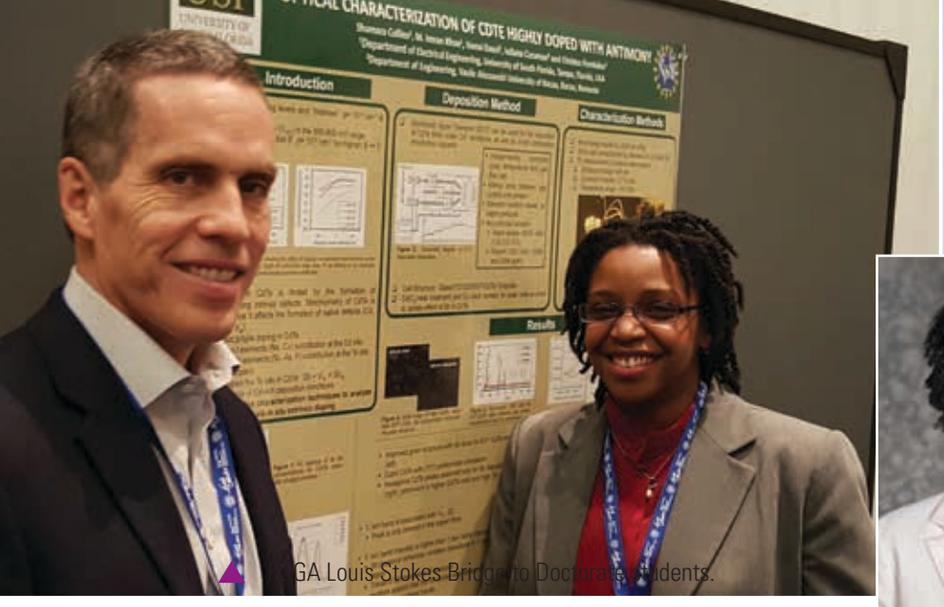
"USF has been an institutional member of FGLSAMP, a coalition of 14 institutions in Florida and one in Georgia, since it was established in 1992 with the first grant award from NSF. Our FGLSAMP undergraduate and graduate alumni have received national awards, gained admissions to prestigious graduate programs, and employment with Fortune 500 companies."

One of the key elements of FGLSAMP is the Bridge to the Doctorate initiative. LSAMP alumni admitted into STEM doctoral programs in the College of Engineering, College of Marine Science, College of Arts and Sciences or Morsani College of Medicine are connected to a range of academic development and research opportunities. The Bridge to the Doctorate program also provides a $32,000 annual stipend, as well as full tuition/fees and health insurance, for two years. To help students transition into their graduate program, they are provided coaching in graduate school expectations and "soft skills", including proposal writing. Fellows are also encouraged to participate in peer-to-peer and undergraduate mentoring activities along with STEM outreach.

According to Batson, FGLSAMP is an important tool for the College of Engineering's objective of promoting diversity in the classroom and the professional workplace.

"The NSF FGLSAMP Bridge to the Doctorate project has been the cornerstone for signature diversity initiatives at the graduate level in the College," says Batson. "Since 2004, it has enabled us to recruit and mentor nearly 60 minority engineering graduate students who would have otherwise never enrolled at USF. In particular, a significant number of the Bridge to the Doctorate fellows would never have enrolled in an engineering graduate program anywhere without the funding provided by the program."

Batson also says the success of USF's diversity efforts, including its FGLSAMP participation, has resulted in recognition from other funding programs and private foundations such as the Alfred P. Sloan Foundation, while bringing national



▲ From left, Electrical engineering chair, Tom Weller, and Shamara Collins.

Shamara Collins

William Serrano-Garcia

visibility to the university in conferring engineering doctoral degrees to African American and Hispanic students.

As a child, Shamara Collins nurtured her youthful aspirations to be an electrical engineer by watching "The Magic School Bus," an animated children's television series based on a book series of the same name that helped kids learn about science in a fun and entertaining way. She attended Morgan State University, a Historically Black College and University (HBCU) in Baltimore for her B.S. in Electrical Engineering. Now she's a PhD candidate in USF's Electrical Engineering program conducting solar cell research with Chris Ferekides, professor in the Department of Electrical Engineering, within the Thin Films Photovoltaic Laboratory. She says FGLSAMP's Bridge to the Doctorate is helping her reach her goals for a career focused on renewable energy policy.

"It's made a huge difference in my ability to do what I'm doing," she says. "The FGLSAMP Bridge to the Doctorate program has filled in a lot of the blanks you don't really understand. They provide professional development workshops, visiting minority scientists as role model speakers and external mentors, support for writing fellowship proposals, assistance in presenting at conferences, and overall guidance throughout the PhD process beyond the two-year fellowship."

William Serrano-Garcia's first laboratory was the family kitchen in Puerto Rico. Since then, he's moved up to the Department of Electrical Engineering's Advanced Materials Bio & Integration Research Laboratory with Sylvia Thomas, associate professor in the Department of Electrical Engineering, where he's a PhD student researching semiconductor polymers for nanodevices.

"With The Bridge to the Doctorate, there is both financial and comprehensive support to help me achieve my PhD," says Serrano-Garcia. "Without this help, at this stage of my life I wasn't going to be able to pursue a PhD at USF in electrical engineering."

Serrano-Garcia says he wanted to attend USF's College of Engineering because it has both the research and academic resources he needs to pursue his research interests in materials science.

Professor and Electrical Engineering Chair Thomas Weller is the USF Co-Investigator and Site Director for FGLSAMP BD. He says the future of STEM related research and commerce depends on helping young scholars like Collins and Serrano-Garcia achieve their goals.

"We don't have enough talented domestic students for STEM. We absolutely depend on this underrepresented population for PhD students."

Weller is unequivocal about the merits of ensuring people from all communities are engaged in STEM fields.

"There's a lot of innovation and enthusiastic exchange of ideas that comes from having diversity."

Looking ahead, Batson is optimistic that the scholarly alliance will continue to yield benefits to participants and society.

"The future is bright because USF and FGLSAMP share similar goals of diversifying and broadening the nation's STEM and technological workforce," he says. "Furthermore, FGLSAMP Bridge to the Doctorate is aligned with USF's strategic goals by fostering global engagement and social responsibility for our fellows through international research and STEM outreach opportunities."

For more information about the Florida Georgia Louis Stokes Alliance for Minority Participation Bridge to the Doctorate program, you can visit its website at

http://hosted.usf.edu/fglsampbd/ or call Thomas Weller at (813) 974-2740.

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