ISSUE 2—April 2010
USF College of Engineering

enVision MAGAZINE

REAL-WORLD EXPERIENCE

Civil Engineering students travel to Bolivia to work with local engineers on wastewater project

Bringing our 19TH CENTURY POWER GRID into the 21st CENTURY

Mitigating Pandemic Outbreaks—
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New Director for NNRC—
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EAS Bull-arney 2010 Event
14 years of fundraising in zany costumes

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"United States at Night" courtesy of NASA and DMSP

HURRICANE KATRINA PHOTO—
NASA image courtesy of the QuikS CAT Science Team at the Jet Propulsion Laboratory

PCUE Researchers Working to Transform our Fragile, Outdated POWER GRID for the NEXT GENERATION

by Janet Dawald

How do you transform a system that was built when steam locomotives and gas lights were the latest in technology? The power "grid" as we know it today was conceived in the minds of brilliant inventors, nurtured by a few wealthy entrepreneurs, broken up by presidents and regulated by commissions. And that was just the first 100 years. This mighty project of iron, copper and the mysterious flow of electrons is fragile. It is susceptible to hurricanes, ice storms, heat waves and human error. It cannot, in its present state, accommodate renewable and distributed power generation capabilities nor can it wean itself from fossil fuels. What does it take to bring one of the largest structures ever built by mankind into the 21st century?

Meet **Dr. Alex Domijan, Jr.**, Director of the Power Center for Utility Explorations (PCUE). "It's going to require a fundamental transformation," explains Professor Domijan. "Our grid really needs an infusion of new ways of operation, new ways of thinking. You have to capture people's imagination. And it will take leadership to infuse the system with the finances and collaborations necessary to just start actually doing things." And doing things is what Domijan and PCUE are all about.

In addition to providing power courses for undergraduate and graduate students in the Department of Electrical Engineering, PCUE explores all energy-related issues regarding generation, transmission and distribution of electricity and embraces a multi-disciplinary approach to current industry issues and future grid design and management. In just three years, PCUE went from zero to more than $7 million a year in competitive and sustainable funding. Its board of directors represents utilities, manufacturers and energy companies. Its Power and Energy Applied Research Laboratory (PEARL) which can monitor power systems worldwide is available for testing and analysis. But what sets PCUE apart is a series of successful initiatives that captures the public's imagination and the industry's collaboration.

About 20 years prior to establishing PCUE, Domijan gave a lot of thought to the aging U.S. grid system. "A group of professionals and I came up with what a power system should be," he explains. "We call it "FRIENDS" because it is a Flexible (can survive disasters), Reliable (energy 24/7), Intelligent (allowing for consumer interaction and many other items), Electric eNergy (power in all its many forms from renewable to central station) Delivery System." There are several major differences between the grid we have now and a FRIENDS infrastructure. The current grid is strictly a one-way road, with power generated from centralized stations, transmitted vast distances and distributed to consumers. The FRIENDS smart grid accommodates both centralized power and distributed power generation such as wind farms and photovoltaic power plants. It is also a multi-lane

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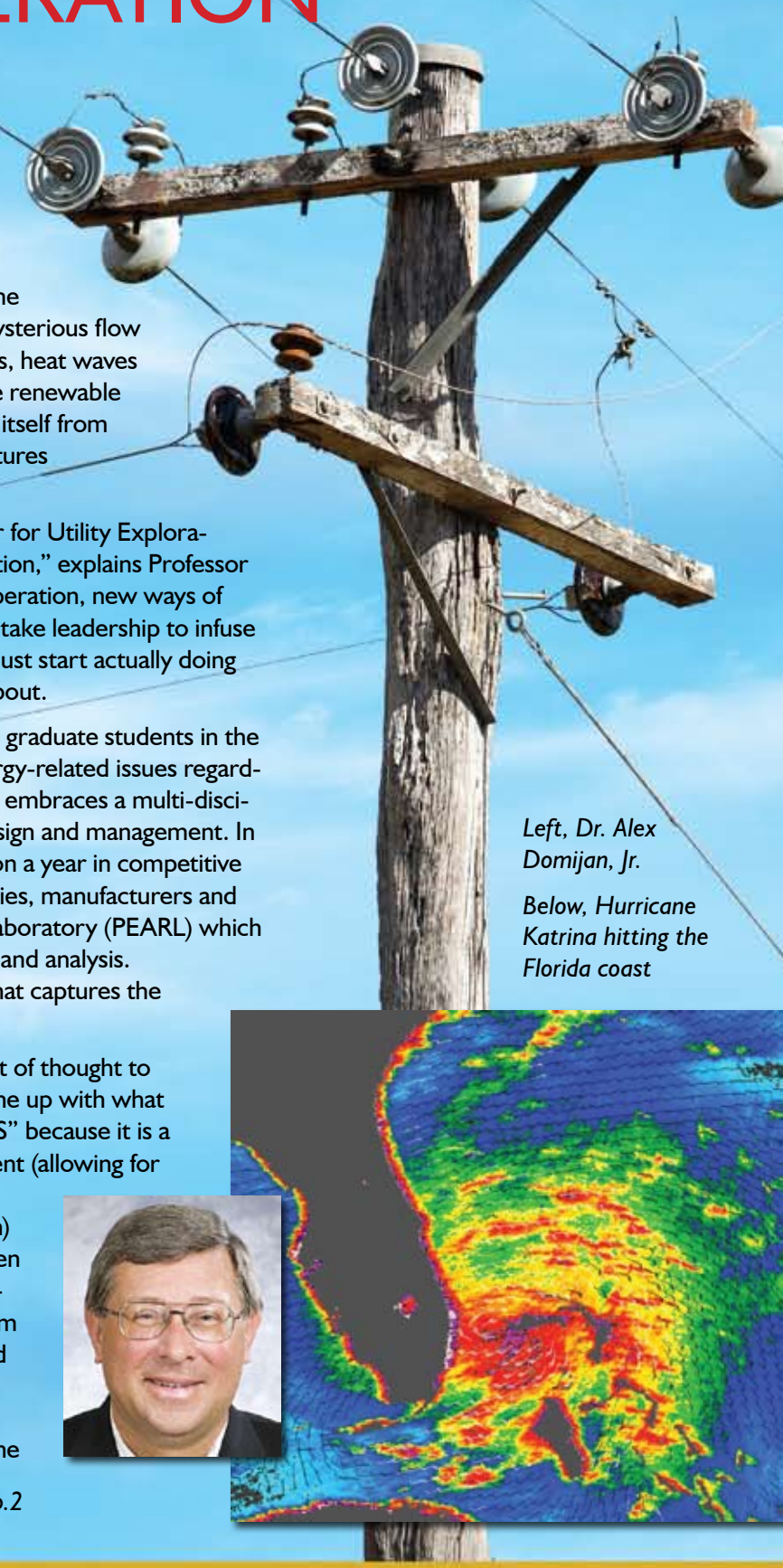
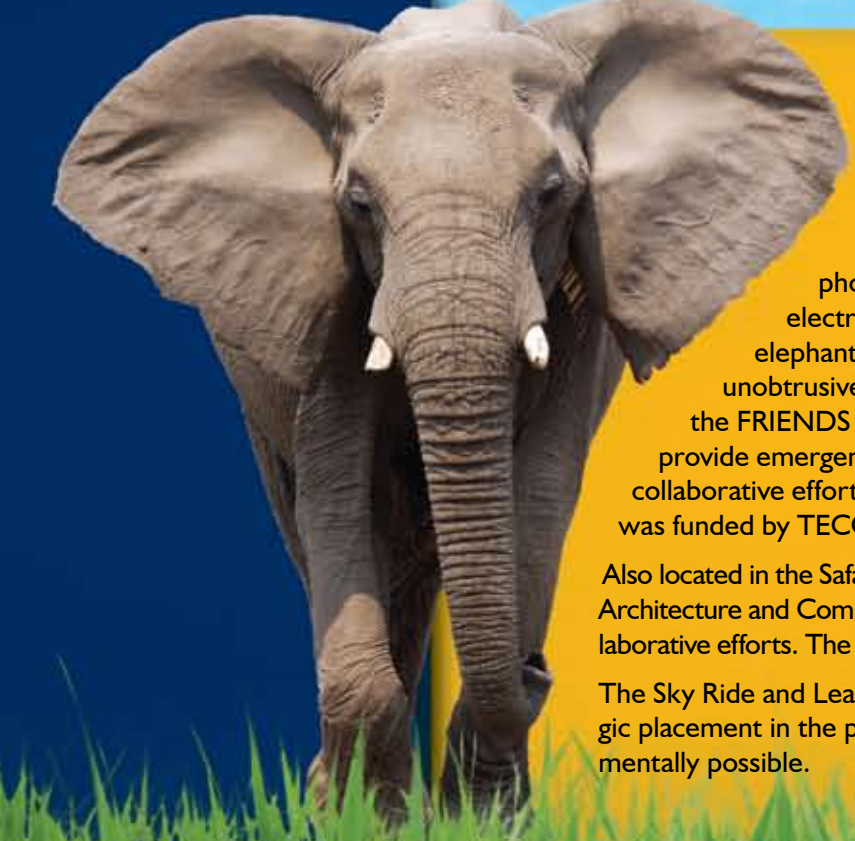


Left, Dr. Alex Domijan, Jr.

Below, Hurricane Katrina hitting the Florida coast



Riding on Sunlight at the Zoo

One of the most amazing examples of the energy SEEDS being planted is the Lowry Park Zoo's Treetop Skyfari Sky Ride. Located in Tampa, the popular zoo is home to over 2,000 animals and welcomes over a million visitors per year. A 15-kilowatt solar photovoltaic system has been installed that completely powers the Sky Ride. Generating enough electricity to power three homes, solar panels were installed on top of structures that provide the elephants in the exhibit with shade, cooling and convenient poles to scratch those elephant itches. Totally unobtrusive, neither people nor pachyderms are aware of the generating station placed in their midst. Using the FRIENDS design, the miniature "smart grid" can also return power back to charge electric vehicles or provide emergency power in an outage. In addition, the multiple benefits from the installation are a testament to collaborative efforts across many disciplines. Partnering with Tampa Electric Company (TECO) and USF, the project was funded by TECO and a grant from the Florida High Tech Corridor Council.

Also located in the Safari Africa plaza is the Renewable Smart Grid Learning Center. A contest among 200 USF School of Architecture and Community Design students provided "real world" experience for the students in concepts, designs and collaborative efforts. The Learning Center showcases the benefits of sustainable electric energy to over a million visitors a year.

The Sky Ride and Learning Center are just two of the FRIENDS projects undertaken by PCUE. Because of their strategic placement in the public eye, they provide tangible evidence that a clean energy future is economically and environmentally possible.

highway of information between supply and demand, consumers and utilities, and is an intelligent network aware of weather conditions, potential disasters and energy quality.

So how do you get your old 19th century grid into the 21st century? "It's going to be a long haul, and eventually it is going to happen. It took a hundred years just to get to our present point, so it will be at least 50 years or so before the whole thing will start coordinating and working together," explains Domijan. A look back at the last 100 years will help define where we are now.

In the 1880's, it was gas vs. electricity. People actually thought that electric light bulbs were more dangerous than gas lights. But it was the use of electric motors in homes and industries that created the tipping point. Electric lights and motors saturated the market, creating more demand and creating the first big spike in electricity consumption. The "vertically distributed system" that we have today was created by a handful of businessmen who joined the exclusive club of oil magnates, railroad tycoons and investment bankers. The vertically distributed system divided up the electric business into the three components we still use: generation (coal/oil fired power plants, hydroelectric dams), transmission (the high voltage lines stretching over vast distances), and distribution (the stepped-down power lines going to homes and businesses).

By the 1930's, economic turmoil, World War I and the Great Depression caused the demand to "flat line." Electric companies concentrated on the money-making metropolitan cities, ignoring the rural areas. Franklin D. Roosevelt was elected partly on the promise he made to break up the power companies, and in 1935 Congress passed the Public Utility Holding Company Act that regulated electric utilities by confining their operations to a single state or a limited geographic area. This breakup actually spurred more investment in the now state-regulated utilities. Eventually, power came to rural areas. Again, in the 1940's, World War II caused the second big spike in consumption, with manufacturing switching to wartime production and the expanding post-war economy.

Now we are at the threshold of the next big spike. In trying to get an idea of what we are facing, you have to do a little time travel. "Think back to your great-great-grandmother living back in the 1880's," challenges Domijan. "Could those people really imagine what things were going to be like in the 1940's with industrialization? Not even people in the 1940's could have predicted what we have today. And now we are at a similar point with economic turmoil. We are at a point where the grid is very fragile. People want electric cars and they want renewable energy," he continues, "but it is not cost-effective yet. It's going to require a fundamental transformation that may not happen unless well-trained people come in and start thinking about this."

So how do you get this transformation started? With seeds of course. One of the most visible and successful PCUE initiatives is Sustainable Electric Energy Delivery Systems, or SEEDS. The Lowry Park Zoo (see side story) is a working installation of a cost-effective and renewable smart grid. People can see it and touch it, which leads to businesses inquiring about it, which leads to television and Internet coverage, which leads to more and more consumers demanding their utility companies use it, and slowly but surely we will lug our outdated grid into the Internet age.

Professor Domijan goes on to explain, "You have got to really change the customer's perception and the customers have to see a value in what you are doing." Doesn't this sound like a marketing plan? "Well," he winces a bit and adds, "I'm an engineer, but I actually build stuff too. You have to deliver what you promise."

The interest generated by the various SEEDS projects is evident. "I have gotten the interest of developers for housing communities, for golf courses, and even the race track approached me about a battery system to light their track in the evening. So there are a whole bunch of people now, they start seeing it and now they want to do it. And that's how you begin."

Between 1880 and 1940, the average person used 1,100 kilowatt/hours per year. Today, that number is ten times that, or 11,000 kilowatt/hours per year. No one knows what that number will be in the future. There is a strong correlation between energy and people's quality of life. "We want to make it so that people have the ability to get good quality energy that is there when they need it," he explains. "It is up to people to accomplish or create businesses that will develop out of this. It will foster new businesses and new industries."

There is also the dark side of this issue. If we do nothing, we will not see that next big spike. What if the country's power supply had not

Tradition! ... Tradition!

One of my favorite songs from "Fiddler on the Roof" has been playing in my head of late. In the College of Engineering at USF, we have more than our fair share of the USF traditions. I am writing as my alter ego for this year, the Mad Hatter. For those of you who missed Bull-arney this year, Carissa Giblin and I were celebrity waiters with an Alice in Wonderland theme—and, yes, I did take the pie in the face for student scholarships. Traditions develop out of values and goals of an organization. So, how does a pie in the face match up with our values?

Dean John (The Mad Hatter) Wiencek at Bull-arney

Let's look at our traditions and how they all fold neatly into a package that makes a whole lot of sense for our students and our community. What are our traditions? From my vantage point, we have four important traditions in the College of Engineering. First, Engineering Expo is held every year during National Engineering Week. The event is coordinated with the regional middle and high schools to bring students on campus and show them the exciting things that Engineers do. The event is open to the public and the Saturday showings cater to the families that come to visit. Second, Bull-arney is a fundraising dinner held each Spring where Alumni and Faculty dress up in unusual costumes and serve as "celebrity" waiters to dinner guests. The event includes silent and live auctions as well as unusual "services for a fee," which help fill the fundraising coffers each year. Third, the Heart of Gold luncheon is an opportunity for our student scholarship recipients to be recognized in a formal setting. Sponsors of scholarships get a chance to meet and interact with students who are benefitting from the scholarship they sponsored. Finally, our Induction to the Profession ceremony occurs at the end of every Fall and Spring semester and allows our Engineering graduates to be recognized for having completed the rigors of their degree requirement in a more intimate setting with our faculty and staff.

As we surveyed faculty and staff about values in our Engineering College, they frequently came back to the student. This value encompasses all of our student graduates and clearly includes all the folks reading magazine. Engineering Expo enables our alumni to come on campus and join our students in showing the community how we, the engineering profession, daily impact lives. Expo is the hook to show the valuable projects our students are working on. A pie in the face at Bull-arney links those past students, now alumni, to the current students through scholarships and the vital financial aid which is needed during those lean years of collegiate life. The Heart of Gold Luncheon, the other bookend to Bull-arney, allows us to connect alumni to our student scholars directly and celebrates our success as a community. Finally, we come full circle when our students reach that transition and become alumni themselves at the Induction to the Profession ceremony.

It's all about students, it's all about alumni, it's all about tradition! I love it.

enVision April 2010

enVision is produced twice a year by the College of Engineering at the University of South Florida.

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MISSION STATEMENT

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

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kept pace with 20th century demands for industrialization or a few holding companies still controlled the nation's power? "We would still be in the steam age," Domijan ponders this question. "So try to imagine today, what it will be like in 2060? We have to be like Jules Verne, and try to imagine things, wonderful things. And you want those things to be good." He pauses and adds, "I think the common dominator here is just to increase the electrification and it will come about. Whatever it is. New things, new abilities to communicate with people, interactions between people, certainly the technology will enable some of those things to happen. So, hopefully, that will be good. It will increase productivity and increase the standard of living for people. That's the key, to increase everybody's standard of living."

But building more power plants and simply providing more electricity is not the answer. "At first it seems that you have a contradiction between energy use and electrification, but that's not the case," he explains. "If you increase your electrification you need to be doing it in a way that you're improving its efficiency." The only way to do this is working toward a FRIENDS approach. We want to make it possible. We want to be part of the process of change, rather than preventing anything from happening like that."

What can the average person do to bring about this change? "Make your utility company and your elected representatives aware that you are interested in renewables, that you are interested in the grid. Encourage representatives to fund and actually deliver something rather than just a lot of promises." Like the SEEDS projects that actually produce tangible results, Domijan urges, "Get involved with local universities and talk to professors and encourage them to work on applied efforts. It is a good point to deliver actual things." Of course, replacing incandescent light bulbs with compact fluorescents is a start, but in today's economy, not everybody can do that. There are many products available at the local big-box home improvement stores that can save energy. Just the fact that we now have ability to do that is really another seed planted.

A FRIENDS project for small businesses is the Advanced Commercial Energy (ACE) Technology initiative which partners with TECO. It will install tools for small businesses such as dental offices that will allow businesses to monitor and control their energy efficiency. About 500 businesses are slated for this FRIENDS project. "Again," says Domijan, "this is all very tangible, it affects people's daily lives. Being able to show the public and really getting these collaborations going, that's how I am able to generate so much interest and funding for our projects."

Another high-profile SEEDS (a subsystem of FRIENDS) has been installed at two sites in St. Petersburg with Progress Energy Florida and also with the Florida High Tech Corridor. These will serve as hubs and will test photovoltaic panels and an innovative storage system to supply additional power during times of peak demand.

FRIENDS projects also have multiple uses. For example, the Lowry Park Zoo Sky Ride not only provides power to run the ride, but the structure provides shade for the elephants. In an emergency, the power could be used to run pumps or other equipment. Future electric vehicles could be charged on this small smart grid. "So the more multiple uses you can have, the better it is," Dr. Domijan explains. "It requires a lot of vision and thinking to put this together. And that's what I am trying to do—have competent people work together not just at USF but also state-wide and nationwide as well." He adds, "The PCUE team, our Deputy Director, Arif Islam, and professors Aleksander Damjanovic, Lingling Fan, Zhixin Miao, Deok Kim, Carlos Alvarez, Jeremy Susac, Trent Green, our USF faculty associates and the many undergraduate and graduate students, and the PCUE board (Tampa Electric Company, Progress Energy Florida, Florida Power and Light Company, Sumter Electric Cooperative, Seminole Electric Company, Tampa Armature Works) along with many other collaborations such as with Draper Laboratories, have all helped to achieve our remarkable growth and innovations. The power area in which we focus deals with exploring modern power systems from generation and transmission to distribution and we prove it daily in all our activities."

"Our research is about is trying to make this transformation happen," concludes Professor Domijan. "Our children's children will be able to take advantage of these things in very creative ways. Who knows what the future holds?" We cannot answer that, but we all can work toward making it clean, renewable and reliable.

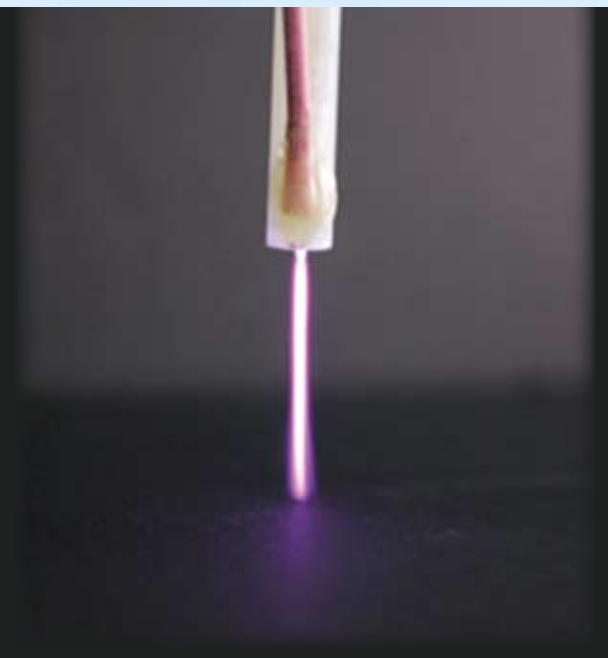
For more information, visit *http://pcue.eng.usf.edu*.

New Biomedical Emphasis in the College of Engineering

Growth of the Biomedical Engineering program received significant support and emphasis by hiring additional faculty and a University of Rochester research group's move to USF.

Robert Frisina joins the BME faculty this fall when the research group he leads moves here from Rochester. Three members of that group will join USF's College of Behavioral & Community Sciences. This group will establish a center for hearing disorders and conduct NIH-funded audiology research. Another BME professor will join the department in Fall 2010.

Approximately half the 85 graduate students are BME majors, and 22 of 40 graduate degrees awarded in 2008-09 were to BME majors. With an interdisciplinary approach, these students conduct their research with faculty in the ChBME dept. and other engineering depts., as well as faculty in the College of Medicine and natural sciences. The undergraduate degrees of BME graduate students vary. Some come from BME depts., yet many others come from traditional engineering disciplines—chemical, electrical, mechanical, and computer science. Others have life sciences backgrounds. The common tie is that all are pursuing research on the application of engineering principles to biomedical problems. Reflecting this truly interdisciplinary nature, a new curriculum design should be in place by fall 2011, consisting of core and elective classes taught by faculty from several engineering depts.



Helium plasma generating pen used to apply surface charge to tissues for delivering DNA.

The biomedical research efforts of some of the faculty are:

Venkat Bhethanabotla: Sensors Research Laboratory (SRL) develops fundamental science and technology for sensor systems, components common to the platforms which can meet significant sensing needs such as for medical diagnostics, national defense, energy security.

Vinay Gupta: Research in the broad area of surface science and polymer science with specific focus on design of novel nanomaterials critical in practical applications such as chemical detection in the environment, biocompatibility, drug delivery, smart materials.

Richard Gilbert: Research activities focus in two sectors; Cancer Translational Treatment Protocols and Advanced Technological Education.

Bill Lee: Investigation of the performance and design of orthopedic implant devices.

Featured Biomedical Research: Drug and Gene Delivery Research Laboratory

Professor **Mark Jaroszeski's** laboratory develops physical methods for delivering therapeutic agents for cancer, metabolic diseases, immunization. Research focuses on using millisecond—microsecond direct current electric pulses that cause temporary breakdown of the cell membrane barrier allowing entry of exogenous molecules such as DNA, drugs. The technology is known as *in vivo* electroporation. Research has included development of many tissue-specific electrodes for administering localized electric pulses to different tissues. It has also included the development of instrumentation to drive the electrodes and testing in multiple animal models. Different applications are transitioning from lab to clinic, others are active lab projects. Another technology under development, in parallel, is the use of surface charging for *in vivo* molecular delivery. This technology applies a stream of charge to tissue surface injected with DNA, inducing a potential difference across the tissue, inducing uptake of the DNA. The use of surface charge has advantages over the traditional application of direct current pulses to tissue. Primary, the charge source does not contact the tissue, eliminating electrolytic tissue damage that results when electrodes are used. Also, there is no sensation during surface charging methods. In contrast, the direct application of electric pulses to tissues can cause involuntary muscle contraction, pain. Both corona charge and helium plasma have been used to apply surface charge to skin in animal models with very promising results.

Simulation-based Optimization Model to Aid in Mitigating PANDEMIC OUTBREAKS

In 1918, a virulent form of H1N1 avian flu swept in three distinct waves across Europe, Asia and North America. The greatest pandemic in history killed an estimated 50 million, 3% of the world's population at the time. One-third of the world's population had been infected.

Misnamed "Spanish Flu," the disease probably originated in Haskell County, Kansas in March of 1918. In addition to raising farm boys about to be soldiers, Haskell County also raised chickens and pigs. The local doctor, Loring Miner, noticed that as the young men were being assigned into nearby Fort Riley, the strongest and most robust were laid low by influenza, many progressing into pneumonia. Dr. Miner wrote to the public health officials of his experiences. His report has provided historians and epidemiologists with one of the most remarkable clues in the search for the origin of the deadliest pandemic in history.

Today, the 1918 influenza pandemic is used as a model by the epidemiologists. It is an example of how a modern-day influenza pandemic can devastate populations thousands of miles away from its source. In World War I, as the young men from Kansas were shipped throughout the country for training, and then to England and France, the soldiers' morbidity (sickness) and mortality were well documented. But because the Allies did not want their enemies discovering the epidemic among their soldiers, the only flu coverage most Americans got was from the newspapers of neutral Spain.

Fast-forward to 2009. Three more Influenza Type A pandemic outbreaks have caused hundreds of thousands of deaths. Can we utilize data from the past pandemics to model future outbreaks? How do we control and mitigate the effects?

During outbreaks, the policy makers face critical decisions. When to close and reopen the grade schools, colleges, and universities? When to recommend workplace closure? When to call for voluntary quarantine and isolation? Which population strata should be vaccinated? Who should be hospitalized/isolated and who should be allowed to recover at home? When to call for mandatory quarantine?

Professors Tapas Das and Alex Savachkin, of the Department of Industrial and Management Systems Engineering, in collaboration with Professors Yiliang Zhu of USF College of Public Health and Heide Castañeda of the Dept. of Anthropology, have been developing a unique approach to modeling large scale cross-regional outbreaks to support national and regional policy makers in pandemic preparedness and response. Their model is a simulation-based optimization approach. It tracks every person's contacts with other individuals in a given region, hour by hour, during the entire pandemic period. The model incorporates regional demographics comprising population, business and social infrastructure and their spatial configuration, and inter-regional travel.

"Every model has to have two sub-models," explains Savachkin. "A disease progression model, which considers population transition among disease compartments including susceptible, contacted, infected, and recovered/deceased, and a disease natural history model that considers latency period of the virus, incubation, infectiousness, mortality rate and so forth."

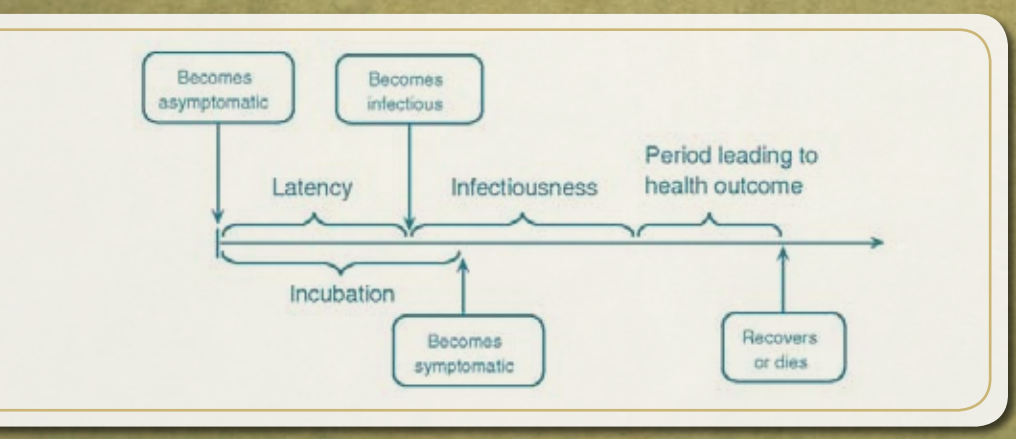


Figure 1. Schematic of disease natural history model

"There are also two main types of mitigation strategies," Savachkin continues, "pharmaceutical and non-pharmaceutical." Pharmaceutical interventions include vaccination and prophylaxis, whereas non-pharmaceutical intervention includes public education, tracking and isolation, school and workplace closure, voluntary social distancing, and travel restrictions.

"Our large-scale simulation-based optimization model generates predictive strategies to allocate a total available budget of mitigation resources over a network of regional pandemic outbreaks, progressively, from one affected region to the next," Das says. Mitigation resources include stockpiles of vaccine(s) and antiviral drug(s), hospital beds, capacities for vaccination and antiviral administration, social distancing enforcement resources, among others. The methodology subsumes a cross-regional simulation model and an overarching dynamic resource allocation optimization model.

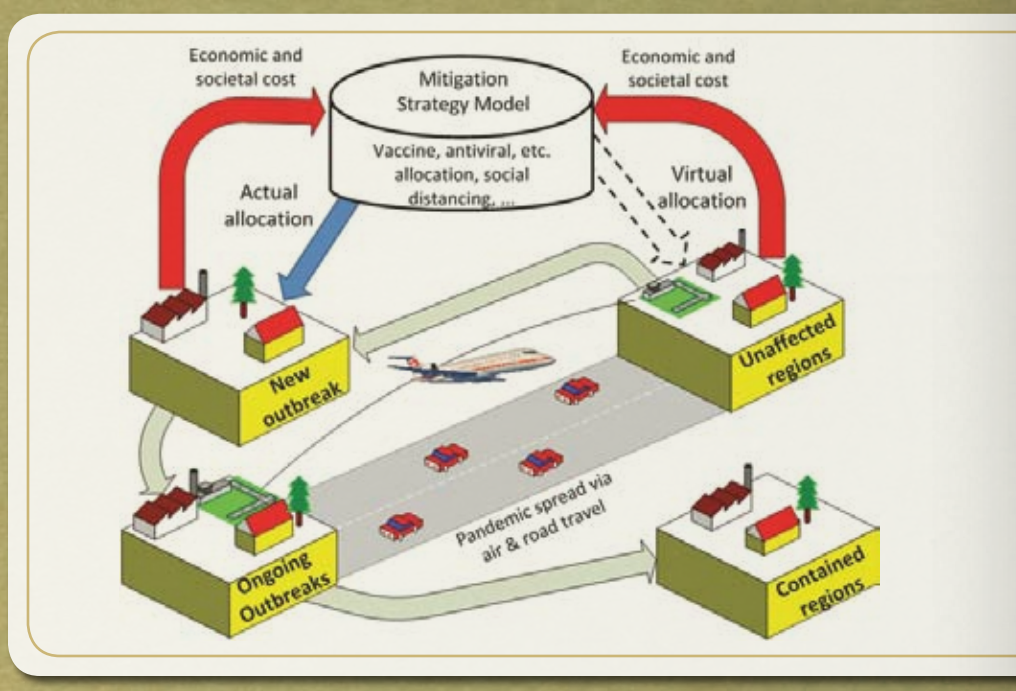


Figure 2. A schematic of the multi-region pandemic simulation optimization model

The regions inside the network are classified as unaffected, ongoing outbreak (which includes new outbreak), and contained (Figure 2). The regions are interconnected by air and land travel. The objective function of the optimization model incorporates measures of morbidity, mortality, and social distancing, translated into the cost of lost productivity and medical expenses. The model strives to minimize the cost of the new/ongoing outbreaks and the expected cost of the potential outbreaks, spreading from the ongoing regions. Detailed daily pandemic statistics are collected for each affected region, including the numbers of new infected, deceased, and quarantined cases, for different age groups. As the regional outbreaks become contained, the model estimates their actual societal and economic costs.

Das and Savachkin have examined a sample cross-regional H5N1 outbreak scenario affecting four counties in Florida: Hillsborough, Miami Dade, Duval, and Leon, with populations of 1.0, 2.2, 0.8, and 0.25 million people, respectively. Demographic and social dynamics data for each of the regions were extracted from the U.S. Census and the National Household Travel Survey. The disease natural history for H5N1 virus subtype was taken as the following: a latent period of 29 hours, an incubation period of 46 hours, and an infectiousness period between 29 and 127 hours. The simulation model was calibrated using two common measures of pandemic severity: the basic reproduction number and the infection attack rate.

The USF team compared their model-based allocation strategy with the existing governmental pro-rata policy, which allocates resources simply in proportion to the population size. The model-based strategy yields results which consistently outperforms those of the pro-rata distribution policy, for different levels of resource availability.

Obviously practicing on past pandemics fine-tunes your current model. But as Professor Das explains, "Part of our goal is to make our methodology connect to databases on a real time basis. The program has real value running off line with different scenarios. But the real use of this program is to make it run on a real-time basis while the disease is in progress. It can collect, in real time, the demographics of a region and how the disease is spreading. We could predict in advance, the number of infected people and the number of deaths. The computer model should also be accessible to the policy makers so that they can run various what-if scenarios and decide the best actions. This, we believe, will significantly advance the current means of public health pandemic response."

by Janet Dawald

The Topsy-turvy Factor in College Football

The other teams could make trouble for us if they win
—Yogi Berra

Discussing and disputing the games of the season against the games of the past is a time-honored tradition of sports fans. Passions are born and beer consumed when reminiscing about a particular season being "wild" or "topsy-turvy." Sportscasters become increasingly apoplectic each week in their attempts to describe this situation. Maybe this increases ratings. But what is it, exactly, that makes one season a ho-hummer (except if your team wins, of course) and another season turns into a chaos of triumph and tragedy. In these seasons of upsets and missed field goals, we are mesmerized by watching the mighty fall, over and over again, to the underdogs of Backwater U.

Since early man (and we know it was a man, for reasons not covered in this article), threw a rock and challenged his buddy to throw one farther, athletic accomplishments have always been lovingly recorded by those of a more analytical nature, the statisticians. Joe the Gladiator would have been just a smear of graffiti on the Coliseum wall if the scribes had not kept track of the number of lions, fellow gladiators and assorted Christians he dispatched in the prior season. Sports cannot survive without statistics.

So what kind of statistics do we have that describe not wins and losses, but the nature of a single week or season? How to quantify and define a "wild" season over another, more predictable season? Thanks to Dr. Autar Kaw, professor of Mechanical Engineering, and Dr. Ali Yalcin, associate professor of Industrial & Management Systems Engineering, we now have a metric, a number (always positive!) that will settle arguments and preserve friendships for seasons to come.

"Imagine a bunch of football fans sitting around the couch on a Sunday and talking about what a wild week it was," says Dr. Yalcin. "One claims 'It was the wildest he had ever seen in college football'! Another fan counters 'It wasn't all that wild, this team lost to that team that was totally predictable.' So our math ensures that instead of getting into a brawl and hurting each other, they can actually calculate it, put a number on it."

Dr. Kaw explains how he approached the definition of topsy-turvy, and we are not talking about the Middle English terven, to overturn. He wanted to quantify, or assign a value to a season that would immediately indicate its volatility or predictability. "I thought the more the guy talked about a wild week or a topsy-turvy week, the more people would tune in to see what the heck was going on with the college report. So, it was interesting figuring out how we can quantify this. That's how it all started in 2007," says Dr. Kaw.

Weeks make up a season, so it was necessary to assign a number to a week. Dr. Kaw calls this number Week TT Factor. This weekly number is handy when our couch-loving fans get together. Instead of one-upping each other in volume, eye-rolling and potential violence, they can discuss the Week TT Factor, a number between 0 and 200.

The resulting Season TT Factor is calculated after each week to gauge how topsy-turvy the season has been so far. At the end, the Season TT Factor is the defining value of the volatility, disarray, chaos or whatever mathematical term you choose for the entire season. According to this methodology, season 2007 came in with a whopping Season TT of 50, and Season 2004 with a snoozer of 33.

The complete Week TT Factor and Season TT Factor figures are available on the website at: http://www.eng.usf.edu/~kaw/ttfactor/index.html. This is one of the most popular websites at USF, and has produced some topsy-turvy bandwidth issues of its own.

Dr. Kaw explains how the weekly topsy-turvy figure is arrived at. "At the end of each college football week, the Associated Press (AP) poll rankings are calculated by polling 65 sportswriters and broadcasters across the nation. Each voter supplies his or her ranking of the top 25 teams. The individual votes are added by giving 25 points to the first place vote, 24 points to the second place vote, etc. The addition of the points then produces the list of the AP top 25 teams of the week." Those team rankings are compared to the previous week's rankings. The difference between the current and previous rankings is calculated and then squared. Why squared? "It allocates proportionately higher importance on bigger week-to-week changes in rankings for a given team," explains Dr. Kaw. These squared numbers are added together and then normalized by the average of the lowest and highest possible value of the sum and multiplied by 100. This produces a Week TT factor between 0 and 200.

So before you launch your spreadsheet program, be aware there are some serious pitfalls. What about the unfortunate teams who fall out of Week 3 rankings? And those lucky underdogs who were unranked in Weeks 1 and 2, but have now joined the, ah, ranks of ranked teams? This involves some serious drawbacks concerning the fact that a paltry one or two votes is not really a true ranking, not all teams get unranked, and a host of other issues best covered in the articles on the website. Normalization numbers, formulae and other measures of disarray are clearly defined; the numerically-challenged among us can actually get a grip on how the professors worked out these dilemmas.

In reality, the topsy-turvy factors are a measure of disarray. It does not measure individual teams' chances of winning. Because the base data is actually a set of opinions (albeit expert opinions), as opposed to win-loss statistics, the formula describes the changes between what is predicted and what actually happens. And if graphs showing parallel trends make your heart stop, be sure and check out the comparison on the website between the AP poll and the USAToday poll. Using the same formula, Drs. Kaw and Yalcin used the rankings by 63 head coaches in Division 1-A, the USAToday experts. Using the same 25 votes for first place, 24 for second, the top twenty-five teams were created. The difference between using AP and USAToday for calculation of TT factors was less than 5%.

If you are still a little fuzzy on this concept, try Dr. Yalcin's simplified explanation. Five teams, A, B, C, D, and E are ranked by experts. To make it easy, A gets the most votes, and E gets almost none. Teams C and D have just a couple of votes difference. It is a far bigger catastrophe if A gets thrashed by E, than if C gets beat by D. The disarray of A choking is measurably greater than C losing to D. And to prove all of this, if the rankings remain exactly the same, and the projected teams win, then the TT factor is a big fat zero. While the chances of this are practically nil, it proves the methodology. A number above 54 is considered "very topsy-turvy" and under 30 is "predictable."

The individual weeks and seasons since 2002 are all available on the website. This methodology can be applied to anything that is "ranked" such as baseball, tennis and basketball. The bad news is that the TT factors, both weekly and seasonally, are random - maybe not as random as roulette, but still, nothing here to take to the bank. But, if you are willing to bet that in 2007, week 5 beat the daylights out of week 5 in 2004, you can take that bet to the bank.

by Janet Dawald

Professor Kumar is New Director of **NNRC**

by Janet Dawald

MP3 players. Odor-killing socks. Sunscreen. LED lights. Plastic beer bottles. The dazzling shine of a Mercedes-Benz paint job. What do these products have in common? Nanotechnology—the science of designing, producing and using structures and devices in the realm of 100 millionth of a millimeter or less. A child's marble compared to the size of planet Earth is a good comparison of a nanometer to a meter. At the University of South Florida, the Nanomaterials and Nanomanufacturing Research Center (NNRC) provides cutting-edge equipment, support and research in this fantastic world of the very, very small.

NNRC Staff left to right: Sclafani Louis-Jeune, Staff Assistant; Yusuf Emirov, Metrology Scientist; Rob Tufts, Asst. Director; Ashok Kumar, Director; Richard Everly, Cleanroom Engineer; Jay Bieber, Metrology engineer.

Dr. Ashok Kumar, Director of the NNRC and Professor of Mechanical Engineering, brings an interdisciplinary approach to his work. Grounded in Materials Science and Engineering, he applies the concepts of syntheses, structure, properties and performance to understanding these principles at the nanoscale. "My research is focused toward the development of nanomaterials including nanocoatings, nanowires, nanotubes, and nanoparticles using various physical and chemical vapor deposition methods for multifunctional applications" says Dr. Kumar. "My other interests include K-12 educational outreach, gender and science education and nanotechnology industrial outreach."

Nanotechnology is a relatively new science, but the practice of controlling of matter on a molecular scale really took off in the 1980's with the invention of the scanning tunneling microscope. The Metrology Suite of the NNRC is home to several types of scanning electron and atomic force microscopes, diffractometers and focused ion beams. Dr. Kumar is awaiting delivery of a brand-new high resolution scanning electron microscope, equipped with enough enhancements and attachments to keep any scientist happy for years.

In addition to the Metrology Suite laboratory, the 15,000 square-foot Nanotech I building houses four additional laboratories. One of the most common applications of nanotechnology is the application of just a few molecules of a material to a surface. The Thin Film Laboratory specializes in this process, utilizing high-tech thermal evaporators and multi-chambered sputter tools. The Device Fabrication Lab/Cleanroom supports optical contact lithography, wet, dry and ion etching, low pressure chemical vapor deposition, plasma enhanced vapor deposition and other research techniques and processes. Electroplating in solvent and acid/base wet bench applications is the specialty of the Wet Chemistry Lab. The Electrical Test/Package Laboratory boasts semiconductor analyzers, micromanipulator probe stations and other microelectronics measuring equipment.

So who gets to use all this cool stuff? "Over 60 professors at USF use the Nanotech1 facility and send their students to train on our tools and techniques," says Dr. Kumar. "Our user base contains over 250 students, faculty and industrial users. Over 40 local companies use our equipment. These companies' products and services include nano-based energy scavenging, water quality, optics and failure analysis."

The NNRC facilities are used for both research and teaching. The Center supports faculty, undergraduates, graduate students and industrial researchers. The equipment and facilities in the Nanotech1 Lab facilitate research in nanomaterials and nanomanufacturing methods related to fundamental materials science, sensors, actuators, electronics, bio-systems, medical products, optics and integrated micro and nanoscale systems. The toolsets support fabrication of nano and micro devices, material characterization study, and thin film processing. The Center is constantly upgrading the equipment and facilities to keep up with technology and research demands. Support staff includes four engineers who give monthly instruction, consult to all users about the tool capabilities and techniques involved, and keep the high tech equipment running and available for use. One staff member coordinates training and billing, and many student assistants round out the team.

Dr. Kumar has several visions for the future of the Center. The first, he says, "Is to enable multidisciplinary nano-related research projects for all at the University of South Florida. The second would be to advance nanoscale science and technology to improve the quality of life," he continues. "And also to be a powerful engine that can drive the economic growth of the Tampa Bay region and beyond."

As many of the top USF scholars and professors agree, an interdisciplinary approach is critical to success. "The NNRC is a university-wide user fabrication and metrology center providing equipment, professional personnel and infrastructure to enable multidisciplinary research in nanomaterials and nanomanufacturing methods," Dr. Kumar explains. "We serve as a nexus for fundamental interdisciplinary research. We can elevate the research capacity of our faculty and students for cutting-edge research, technology transfer, cooperative and educational outreach and workforce development. The NNRC works closely with local industries and other scientific communities to enhance scientific activities, to develop novel technologies, and to train capable scientists."

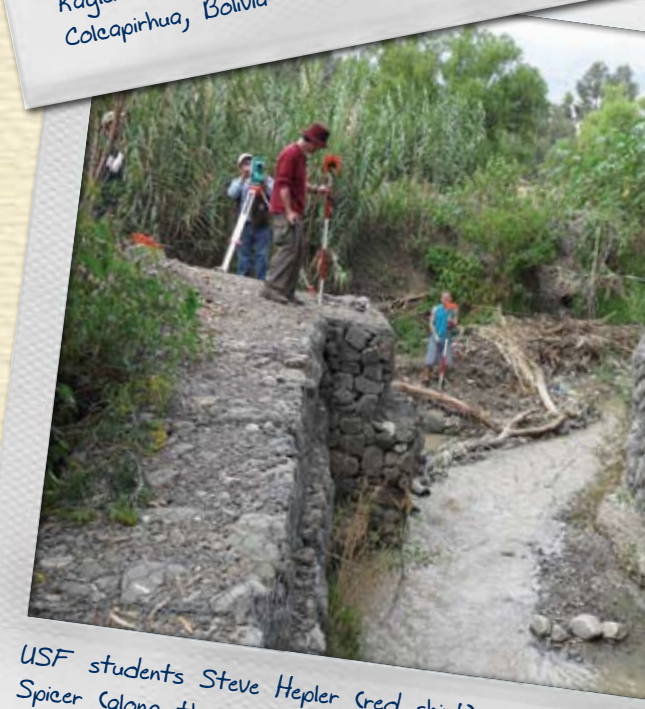
"This is a revolution," says Dr. Kumar. "Nanomaterials are continuously being discovered. These breakthroughs can be expected to continue. Nanotechnology holds great potential and stands to impact a broad range of fields. It offers, for example, the promise of new information processing systems, new disease therapies, and new ways to collect and store energy."

What does the future hold for this new science? "In the near term, nanotechnology will improve existing devices and systems. In the long term, nanotechnology will lead to an array of entirely new materials and products with new functionality and properties," Dr. Kumar continues. "Nanotechnology affects almost everyone, every day. The impact of nanotechnologies will continue to grow, benefiting health, security, environmental protection, food safety, and energy conservation. It is already taken for granted as part of everyday 21st century life."

For more information, visit *http://www.nanotechproject.org/inventories/consumer/browse/categories/*.

USF students Gary Spicer, Madelyn Rubin, and Eric Francis show their school spirit in Tiquipaya, Bolivia

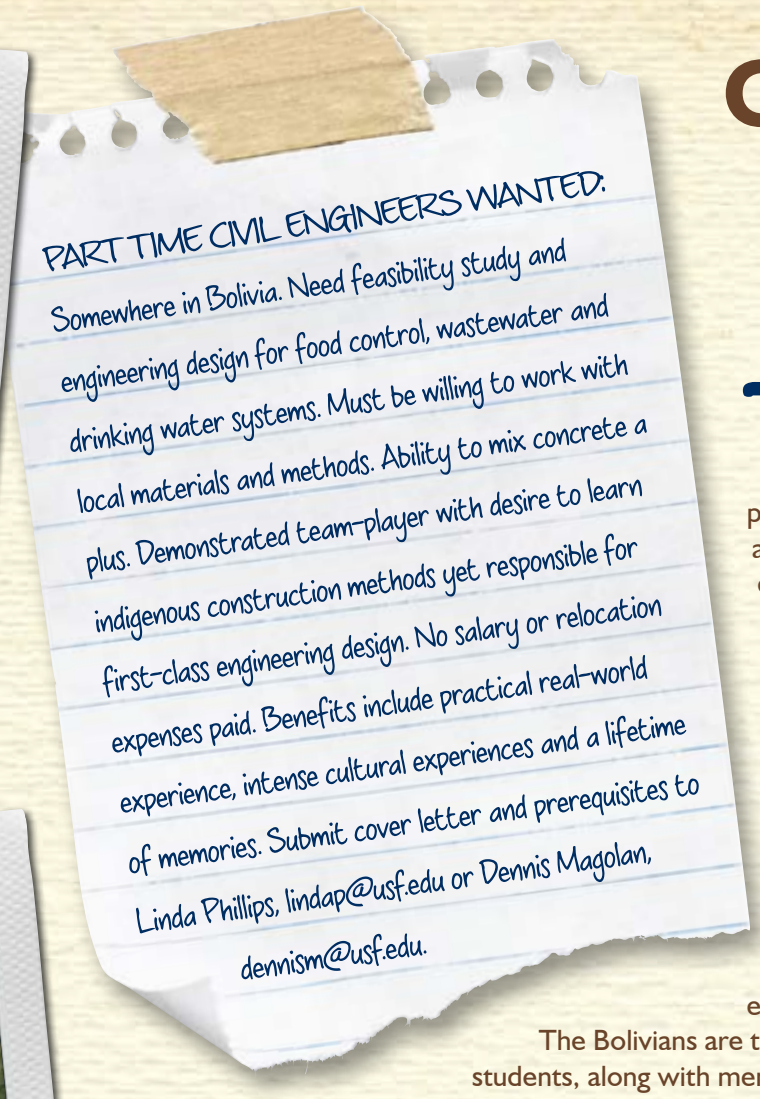
Students James BucKingham (Mich Tech) and Kaylene Hasto (USF) survey the Sirpita Canal in Colcapirhua, Bolivia



USF students Steve Hepler (red shirt) and Gary Spicer (along the canal bank) surveying with Univalle professor, Jhonny Vasquez along the Sirpita Canal.

Civil Engineering Students get Real-World Experience in Bolivia

by Janet Dawald



The International Capstone Design program provides juniors and seniors real-world experience in engineering. Concentrating its efforts in Bolivia this year, the ICD is under the direction of **Linda Phillips** and **Dennis Magolan**. The program provides field construction with engineering design that parallels what the students will encounter in industry. The Bolivians are the customer, and the students, along with mentors, provide the engineering feasibility and design reports for projects that have been identified by the customer. Students must take into consideration the social, financial and practical aspects of the project in addition to the engineering concepts of productivity, materials and procurement, scheduling and cost factors. The course consists of 6 semester credit hours and 1 credit toward professional/ethics course. Several weeks are spent in-country in small teams of 2-3 students, and the following semester on campus where the design reports and construction drawings are produced.

Linda Phillips has been working in Bolivia for over a decade, developing relationships with community leaders and government officials. She has over 20 years of practical experience as a project engineer and manager. "Most of the projects we work on are water-related. Whether it is storm water, drinking water or waste water, water is a precious commodity and is related to health issues in the developing world," says Linda. "Standing water has malaria and dengue, storm water that damages homes and businesses. Water affects peoples' lives."

Wastewater is also an issue in developing countries. Dennis explains: "We have seen septic systems in schools where wastewater was on the ground and children would walk in it at recess. There were schools with several thousand students where they would flush the toilets once a week with a five-gallon bucket." Dennis' professional experiences include more than two decades of project engineering and project management; 13 years with wastewater conveyance and treatment.

One of the current Bolivian projects is a matadero, or slaughterhouse in the town of Colcapirhua. A mixture of blood, fat and water is drained into a hole and then pumped into a local river. The students have to test the water and engineer a solution not for U.S. standards, but one for which the Bolivians can pay for. Dennis explains in no uncertain terms: "It may not always be the best solution, but it is one they can implement because if they can't pay for it, I don't care what you design with, they aren't going to have anything. And something is better than nothing. That's awful hard for us to convey to the students."

Dennis and Linda make it clear they are not going to a third-world situation devoid of technology. "It's not like we are going to an area where people are uneducated and have no clue how to solve their problems. That's not the case at all. They have a good education system, they have good engineers, they have people who understand and can solve these problems. They just don't have the money," Dennis explains. The unique nature of this project lies in identifying the problem, creating a viable solution, and determining the cost. This is then presented to the locals, who in turn take the project and its costs to the appropriate government level. Because it is presented in a neat, professional package, the project gets the attention and hopefully the funding necessary to complete the project. If the government is not forthcoming with the funds, there have been many instances where the locals have taken the project into their own hands. Using the designs from the capstone students, parents and school organizations have built the projects themselves. While it may not have been their exact design, it is a testament to the students' careful drafting of proposals which take into consideration local culture, technology and the financial resources of the community.

Designing engineering projects in developing areas cannot be done with an industrialized mindset. In their projects, students consider the social ramifications of their work equivalent to their engineering standards. A project was designed to bring water closer to a village. Unfortunately, it reduced the local boys' interaction with the elderly residents for whom they fetched the water. Often the collection of water is women's work, and this work provides social interaction with other women. For us, being able to turn on a spigot is far more desirable than hauling buckets of water. But we get our social interaction in so many other ways. When the only chance to learn of illnesses in the village, of deaths and births, is removed, the damage to the social structure could possibly negate some benefits of engineering. What is most impressive to Linda are stories from alumni that tell how this experience impacts their engineering still today.

In addition to the slaughterhouse wastewater situation, current Bolivian projects include taming the rainy season flooding in two towns not far from Cochabamba, one of the largest cities in Bolivia, situated at 9,000 feet in the Andes. In the town of Colcapirhua, a series of concrete canals overflow instead of properly channeling the water. In Tiquipaya a dry riverbed turns into a torrent that has swept several school children to their death. This same flooding is undermining a new bridge that was built downstream with inadequate hydraulic protection.

To maximize the experience, Dennis limits the teams to three or four students while in-country. "Any more than that and you get sleepers in the project," he notes wryly. "The students spend time at project sites gathering topographical data, water and soil tests, whatever they decide is necessary. They return to campus and do the feasibility study and the engineering report, then recommend a design. Since the Bolivians are our clients, the next step would be a presentation to them in Bolivia. Instead, we make a public presentation here in Florida. We skip going back, assuming that they will approve the project. Our next public presentation here will be April 10." Family, friends, faculty and next year's students are invited. Industry professionals and others are also encouraged to attend.

Linda requires her students to reflect on their experiences. Every one includes humorous, embarrassing or profound experiences. "Now that I am back and looking at my hometown, I notice the similarity of people; humanity of the world is so connected," writes one student. Another student described the bridge design as "Helping the community in so many ways and I get to be a part of that and improve the lives of so many children. Now that is a great reason to become an engineer." And one person who had never been outside of the United States wrote: "I may have spent a couple weeks in Bolivia in order to do my part as an engineer but it is not the project that will make me a better engineer. It is the people that the project is for that will truly make me an effective and qualified engineer."

Dennis observes that "One of the things that the students learn is that there is a different way of life there. Family, friendship, spending time together has more importance than having things. More important than having things, having stuff." Bolivia is one of the poorest countries in South America. "We work in some of the poorest areas of the towns. When the students see the dirt floors and muddy roads, all due to a lack of money, that is part of the cultural education they take with them," Linda adds. "The Bolivians have nothing, but they are a very giving people," she continues. At the end of one project, a grateful villager entrusted every student with meager objects gathered from his home. "Keep them always, never give them away," as he passed out a car-scent hanger, cheap jewelry and assorted objects from a brown paper bag. A Bolivian soccer player gives his third-place medal to a fellow soccer-playing student. Linda recalls that the astonished student sobbed that "These people have been kinder than anybody in the United States, including my own family." Linda adds quietly: "That's the way they are."

The cost for each student is roughly $3,000. Both Linda and Dennis recognize that earning the money for this experience should come from the student. A handout is not always appreciated as much as the honest effort to earn something. But three thousand dollars is nothing for large engineering firms. When engineering companies attend the public presentations, "They see who shines. That's a cheap investment for recruiting a future employee," says Linda, "very cheap." That may be so, but the benefit to the Bolivian people and the students is priceless.

For more information, visit the website at *http://cee.eng.usf.edu/icd/*.

Socially Aware Distributed Systems

by Janet Dawald

Dr. Adriana (Anda) Iamnitchi has received a five-year CAREER Award totaling $485,000 from the National Science Foundation to study the massive amount of social information data that is generated by social networking and collaborative sites. She will use this information to design distributed systems where the users own their computers in the system. Sometimes referred to as "Web 2.0," these systems are characterized by information sharing and user-centered design, as opposed to servers providing static data from a centralized location onto client browsers.

An assistant professor of Computer Science and Engineering, Iamnitchi puts it more clearly, "It is not so much that you are male, age 25, love sushi, living in Florida that I care about, but about relationships you have with your friends, family and colleagues." These relationships can be analyzed and used to help design and maintain intelligent, community-oriented, peer-to-peer systems. These systems are generally not administered by a central authority. The hardware is provided by the users who are free to download any application that will allow them to become part of that distributed network.

There are two major areas that generate this data, online social networks like Facebook and collaborative tools like CiteULike. Again, personal information is not the target, and a great amount of this study will delve into maintaining privacy issues. It is the information, freely generated by making friends on Facebook, or the act of tagging a scholarly article in CiteULike, that is at the core of the study.

Facebook, for example, allows you to declare other users as friends. "The fact that you declare that a relationship exists, that is the information I care about. To say that you have a relationship with somebody means that there is some form of trust between you two. That is one of the most obvious social ties." What if you have thousands of friends? "You cannot have meaningful relations with a thousand people, you don't have enough hours in the day," says Iamnitchi, "so we have to augment this information with other information. Of those thousands, with whom you communicate the most is important, for example."

What if you add other information, such as information that can be collected from a typical cell phone? "Perhaps we can see that of your thousands of Facebook friends, you called a certain person twice last month. This person is more meaningful to you than the other people. So now we are trying to aggregate social information from reliable sources based on activity." You can even take the activity to the location level. For example, if you are into hiking, you could label your activity on your cell phone. Using GPS-enabled cell phones to determine location is a common application now, you would just add another application to tag it and store it. Of course, you now have to make sure your cell phone has the proper set of privacy parameters, such as "Don't track me in the city," or "Only track me during work hours, from 9 a.m. to 5 p.m."

But tracking you is not the only option. Distributed systems, with the appropriate software, can be used to track other people. Iamnitchi cites the example of the computer scientist Jim Gray. In January 2007, his boat was reported missing off the coast of San Francisco. There was no sign of wreckage and his emergency radio beacon never transmitted a distress signal. However, Jim had friends in high places—high technical places. DigitalGlobe, the map provider for Google Maps and Google Earth, put their best images of the San Francisco coast together with a collaborative Amazon application called the "Mechanical Turk." The digital images were divided up between Jim Gray's friends and colleagues. This social network downloaded the application and examined the images, discarding images that did not appear to hold any clue to their friend's disappearance. Jim Gray was never found, but Professor Iamnitchi uses this as an example of a social networking collaborative.

"This was done because Jim Gray was a very well-known person in a very technical field," she explains. However, this kind of service

Mobility Fee Study

A perfect storm is brewing in Florida. Decades of population growth and urban sprawl have strained the transportation system, even as revenues to improve it are declining. Gas taxes are not indexed for inflation and increased fuel efficiency and reduced driving means less gas tax revenue. Raising taxes or fees is unpopular anyway, especially in a down economy. Some local governments are even considering further discounting their impact fees to stimulate development. Lower home values mean less tax revenue for everything. Add the propagation of new developments built far from urban centers and transportation infrastructure and the forecast is pretty grim.

In 2008, the Florida legislature considered enacting a new flat fee on development for transportation called a "mobility fee," but the idea failed to gain traction. Too many questions surrounded the basis of such a fee and how it would be implemented. Some also doubted the appropriateness of a flat fee in light of the diversity of needs and costs around the state. As a result, the Florida Department of Community Affairs (DCA) and Florida Department of Transportation (FDOT) to further explore the concept. FDOT and DCA commissioned a study with the USF Center for Urban Transportation Research (CUTR) to more fully explore policy options for a mobility fee.

CUTR is a nationally recognized center of excellence in transportation issues. The Center's staff is dedicated to achieving practical, objective solutions to contemporary transportation problems through multidisciplinary research that addresses all modes of transportation. The lead CUTR researchers for the study, **Karen Seggerman** and **Kristine Williams**, are members of the American Institute of Certified Planners with more than 40 years of combined experience in transportation and land use planning. They explained the rationale behind the study and how governments across the country are dealing with decreasing revenue and ever-increasing demands for transportation improvements.

"Three kinds of fees were examined as part of the study—a road user fee, a transportation utility fee, and a modified transportation impact fee," says Seggerman. "The State of Oregon and a few other states are currently looking at a road user fee that charges the driver based on mileage. There's a lot of national interest in this idea, but it's complicated and would likely take years to implement. The utility fee is similar to how we pay for sewer, water, and solid waste. It is an assessment on each business and household for its proportionate use of the system and would be a relatively small increase in utility bills. That money could go toward operations and maintenance." Because of the complexity of the road user fee, and Florida case law that categorized utility fees as a tax, the third candidate, the widely used impact fee, was selected as the most likely candidate for use in Florida.

Several modifications to the impact fee were recommended to achieve the goals of a "mobility fee." One was to make vehicle miles traveled (VMT) a more significant part of the rate structure. To put it simply, a developer that builds 100 new homes 35 miles outside of a city would pay a higher mobility fee than a developer who builds that same number of units within the city. Williams explains, "It's cheaper in terms of land cost and other factors to build in green field areas and that's why it's so attractive. People gravitate there because they can get more house for their money even if that means driving long distances to work or shop. Developing in and around urban centers is more expensive, but this is where we have the infrastructure and the ability to provide transportation alternatives such as buses. Research shows that people who live in these areas

could be available to anyone, using the systems she is designing on social information. Taken a step further, all mobile phones in a given area could be simultaneously contacted regarding a missing child, for example. Satellite images could be provided, and a host of searchers, who never leave their computers, could download an application to assist the people in the field.

Another aspect of the project is collaborating with USF's Department of Sociology in undergraduate and graduate courses. "All the students know how to use computers as tools. They don't solve problems the way a computer scientist would," Iamnitchi explains. "I think it is important for everybody to have deeper knowledge in computer science. Interdisciplinary studies are becoming more relevant for a well-balanced education. The computer science approach provides students with the opportunity to solve a problem by breaking it down into its smallest units, providing hands-on experience in problem-solving and logic. They don't need to know how to write an operating system," she adds, "but to think of a problem in terms of decomposing it and applying variables. This is becoming more and more important in the professional life."

She also would like to re-write the stereotype of the computer scientist. "We need a more diverse group, and by teaming up with sociology we hope to attract people who might have an interest in computer science, but do not know enough about the field to pursue it."

Did anyone anticipate the massive appeal of social sites and collaborative tools a decade ago? "No, we did not see it coming. Like the college student who developed Napster, he just wanted to share music. He did not mean for it to be a business," explains Iamnitchi. "Look at Facebook, started by another student," she adds. "Over 400 million people now use Facebook, started by undergraduates at Harvard. I think this is just human nature."

When asked about her favorite social networking sites, Professor Iamnitchi pauses, "I don't have time for that"! But you can find her on Facebook and LinkedIn. Then she laughs, explaining "I had to do it for my research."

by Karen E. Seggerman, AICP
Kristine M. Williams, AICP

drive less and make shorter trips. Yet most current impact fee systems charge the same rate in both situations. A variable rate based on vehicle miles of travel would reward developers who reduce the transportation problem by developing in urban areas." The CUTR study also recommended that the legislature consider authorizing local governments develop other concepts to help support operation of transit systems. "A one-time fee on new development is not sufficient to cover these continuing costs," says Williams.

Another issue is how the impact fees are currently being expended. "Today, local government impact fees often do not go to transit agencies or the state, but these agencies are impacted by those same developments," says Seggerman. "Also we see a lack of coordination even among jurisdictions in the same county on transportation issues." To address these problems the study recommended a coordinated approach to mobility plans and fees on at least a countywide basis and a fee that could be expended on any transportation mode, not just roads. The study also proposed a more equitable distribution of the mobility fee among the jurisdictions and agencies impacted by new development.

A countywide mobility fee program in Florida would improve transportation and land use coordination and allow government agencies to share and expend the fees on transportation services and improvements to benefit both the local area and the broader region. Better sidewalks, bike lanes, carshare/rideshare programs, parallel routes, coordinated signals, network connections, regional and express transit service and even high speed rail could all be part of the solution.

To read the actual Evaluation of the Mobility Fee Concept Final Report (November 2009) go to *www.cutr.usf.edu/programs/pcm/files/2010-02-EvaluationoftheMobilityFeeConcept.pdf*.

A Millennium of Service

The College of Engineering will be celebrating staff and faculty service anniversaries for 2008 and 2009 at a luncheon ceremony on May 12.

CHEMICAL & BIOMEDICAL		
Richard Gilbert	30	2009
William Lee	25	2009
Mark Jaroszeski	15	2009
Vinay Gupta	5	2009
Norma Alcantar	5	2008
CIVIL & ENVIRONMENTAL		
Rajan Sen	25	2009
Abla Zayed	20	2008
Ingird Hall	15	2008
Mahmoud Nachabe	10	2008
Peter Stroot	5	2008
Kenneth Trout	5	2008
Maya Trotz	5	2009
Daniel Yeh	5	2009
COMPUTER SCIENCE & ENGINEERING		
Dimitry Goldgof	20	2009
Les Piegl	20	2009
Sudeep Sarkar	15	2008
Daniel Prieto	10	2009
Nagarajan Ranganathan	10	2009
Rangachar Kasturi	5	2008
Henry Jeanty	5	2009
Hao Zheng	5	2009
Peter Schiavo	5	2009
Rollins Turner	5	2009
CUTR		
Gary Brosch	20	2008
Ed Mierzejewski	20	2008
Steve Polzin	20	2008
Xuehao Chu	15	2008
Dennis Hinebaugh	15	2008
Phil Winters	15	2008
Nevine Georggi	15	2009
Victoria Perk	15	2009
Joel Volinski	15	2009
Martin Catala	10	2008
Christopher Deannuntis	10	2008
Lisa Staes	10	2008
Alasdair Cain	10	2009
Lizette Charriez-Delgado	10	2009
Jeffrey Kramer	10	2009
Pamela Lapaugh	10	2009
Stephen Reich	10	2009
Alexander Kolpakov	5	2008
Karen Seggerman	5	2008
Sean Barbeau	5	2009
Pei-Sung Lin	5	2009
Deborah Sapper	5	2009
ELECTRICAL		
Irene Wiley	30	2008
Kenneth Buckle	25	2009
Yun-Ieei Chiou	25	2009
Andrew Hoff	20	2008
Gayla Montgomery	20	2008
Don Morel	20	2009
Bernard Batson	10	2008
ACADEMIC ADVISING		
Rafael Perez	25	2008
Patricia Homer	20	2009
John Morgan	5	2009
IMSE		
Geoffrey Okogbaa	20	2009
Gloria Hanshaw-Latter	10	2008
Jackie Stephens	5	2008
MECHANICAL		
Susan Britten	30	2008
Shirley Tervort	30	2008
Jose Porteiro	25	2009
Stuart Wilkinson	25	2009
Muhammad Rahman	15	2008
Rajiv Dubey	10	2008
Ashok Kumar	10	2009
Alexei Volinsky	5	2008
Frank Pyrtle III	5	2009
NNRC		
Robert Tufts	20	2009
RESOURCE MANAGEMENT		
Richard Buffington	25	2009
Becky Puskas	10	2008
John Giannoni	5	2008
Judy Skypack	5	2008
Jennifer Collum	5	2009
Sharon Li-Oula	5	2009
Daria Warren	5	2009

alumni&students

ALUMNI NEWS

Elting Mechanical Enterprises, Inc, Tampa, celebrates its third anniversary this year. The firm, started by **Steve Elting** (BSME '99), provides machine design and mechanical simulation services in the areas of manufacturing, medical, and defense industries. Steve is the Vice Chairman of the American Society of Mechanical Engineers, FWCS.

Paul Stevenson (BSME '95), owner and VP of McCormick Stevenson, Clearwater, has been named 2010 Engineer of the Year by the American Society of Mechanical Engineers (FWCS). Paul is the Engineering Alumni Association Corporate Ambassador. Congratulations.

Paul Stevenson (r.) accepts the Florida West Coast Section of ASME 2010 Engineer of the Year award from Peter Grotsky, Chairman.

STUDENT NEWS

Lauren Hunkins, sophomore in Computer Science & Engineering received a NASA MUST ((Motivating Undergraduates in Science and Technology) scholarship.

Praveen Sekhar (EE PhD '09) and **Vishnuteja Nanduri** (IMSE PhD '09) were each recognized with 2008-09 Outstanding Dissertation awards from the USF Graduate School.

Nagesh Nayak, doctoral student in CEE was awarded a $10,000 stipend from Graduate Research Award Program on Public Sector Aviation Issues sponsored by the Federal Aviation Administration (FAA).

If being a College of Engineering student at USF is in the future of someone you know, plan a visit to our campus for an informative visit. During that visit, we can discuss opportunities including programs, curriculum, types of engineering fields, scholarships, student organizations, academic support services, undergraduate research opportunities, etc., within the College of Engineering. If you would like to find out more about our programs, visit us, or if you have any other questions or requests, please contact *outreach@eng.usf.edu* or (813) 974-0773.

We look forward to hearing from you!

Two EE doctoral students **Frank Alexander, Jr.** and **Justin Boone** were selected as National Science Foundation International Research & Education in Engineering (IREE) China program awardees.

Adriana Chacon, a senior ME student, was awarded first place in the engineering category for best oral presentation during the 17th Annual NSF Florida-Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) Career Expo.

DOCTORAL STUDENT ASSISTANTSHIPS FALL 2010

College of Engineering
University of South Florida
Tampa Florida

The College of Engineering is accepting applications for full-time doctoral students for Fall 2010. The appointments include tuition waiver and full financial support for the academic year Fall 2010 and Spring 2011. The sponsorship is renewable annually and is contingent upon satisfactory progress toward degree objectives.

USF, a top research university, offers an intellectually challenging environment in a diverse student and faculty population.

http://www2.eng.usf.edu/phd2010

Bull-arney

The 14th annual Bull-arney fundraising event sponsored by the Engineering Alumni Society was held March 27 at the Embassy Suites. The event raised approximately $20,000 for programs, scholarships and conference presentations for USF engineering students. Thanks to Saintly Sponsors Ash Engineering, Inc. and HSA Engineers & Scientists, as well as all the other sponsors and volunteers who made this event possible. *All photos by Roger Cox.*

Top left: Keven Woodard as Ginger (from Gilligan's Island) and Alyssa Domek, mechanical engineering student and Bulls cheerleader, with Rocky.
L to R: Katie Giglio and Jamie Ellison; this year's celebrity waiters; Tom Ash as Gilligan; Robert Garcia as a Caveman Nun

faculty&staff

Ashok Kumar, professor of Mechanical Engineering and director of the Nanomaterials and Nanomanufacturing Research Center (NNRC) received an Honorary Professor award by the Universidad del Norte, Barranquilla, Colombia.

Salvatore (Sal) Morgera, professor and chair of Electrical Engineering, was designated an Eminent Engineer by the Tau Beta Pi, engineering honor society. He also was appointed Emeritus Professor at Florida Atlantic University.

Ralph Fehr, assistant director of the Clean Energy Research Center (CERC) and instructor in the Electrical Engineering department, was named Outstanding Engineering Educator for 2009 by the Florida Council of the Institute of Electrical and Electronics Engineers (IEEE).

Dmitry Goldgof, professor of Computer Science and Engineering, has been named to the Institute for Electrical and Electronics Engineers (IEEE) Systems, Man & Cybernetics (SMC) Society Board of Governors.

Adriana (Anda) Iamnitchi, assistant professor of Computer Science and Engineering in the College of Engineering, received a five-year award totaling $485,000 from the National Science Foundation, CAREER: Socially-Aware Distributed Systems.

Alberto Sagüés, PE and distinguished university professor of Civil and Environmental engineering, received a 2010 Technical Achievement Award from the National Association of Corrosion Engineers (NACE) International for his work in corrosion engineering.

Qing Lu (pronounced ching) recently joined the department of Civil and Environmental Engineering as assistant professor. Lu received a doctorate in civil engineering with emphasis on transportation engineering from University of California, Berkeley.

Several College of Engineering professors were recognized at the 2009 Faculty Honors and Awards Reception held in November. Receiving Outstanding Undergraduate Teaching awards were **Jeff Cunningham**, Civil and Environmental Engineering, and **Nagarajan Ranganathan**, Computer Science and Engineering. **Vinay Gupta**, Chemical and Biomedical Engineering, was awarded the 2009 Jerome Krivanek Distinguished Teacher award. **Venkat Bethanabotla**, Chemical and Biomedical Engineering, and **Jay Ligatti**, Computer Science and Engineering, received Outstanding Research Achievement awards.

Geoffrey Okogbaa, professor of Industrial and Management Systems Engineering, has been elected a Fellow to the Nigerian Academy of Engineering.

Autar Kaw, professor of Mechanical Engineering received the 2010 Outstanding Teacher Award from the southeastern Section of the American Society of Engineering Education.

SAVE THE DATE

USF Alumni are invited to a Reception sponsored by Tierra, Inc., at the FES/FICE Annual Summer Conference & Exposition, Marco Island Marriott Resort August 5, 5:30-6:30 p.m.

COMING SOON

NEW COLLEGE OF ENGINEERING WEBSITE

The college's website has been undergoing a complete renovation in the last few months. Initial efforts are focusing on the main areas of the website with departmental revisions beginning this summer. Visit the website *http://www2.eng.usf.edu/index.asp*.

A future engineer whose heart is in the right place

by Janet Dawald

Ana Ysabel Rioja is the President of the USF Engineering Expo. Majoring in chemical engineering, Ana moved from Lima, Peru with her family to Tampa, Florida when she was eleven years old. While attending middle school in the city, Ana recalls she attended a "great science fair." She was amazed at the numbers and engineering exhibits. After graduating from Middleton High School and a few years later, she is now in charge of that "science fair," the USF Engineering Expo.

Ana Rioja

"I remembered the fair, but forgot where it was," Ana explains. Then, when her freshman advisor asked for some help and showed his students the location and layout, "I realized that this was the science fair of my memory. It was the Engineering Expo at the University of South Florida." For the past four years she has helped the Expo, and for the last two years has been its president.

The February event draws over five thousand people from the USF area. For almost 40 years, the Expo targets middle school and high school students. Its primary purpose is to educate students on how math, science, engineering and technology affect our everyday lives.

Ana's duties as Expo president involve coordination with staff members, professors, sponsors and exhibitors. Asked about her favorite exhibit, she replies "Since I have to help make sure things run well during the event, I don't have an opportunity to see all of them." She pauses, "but the Chemical Engineering Department puts on an impressive magic show with chemicals. The kids really liked that one and that is our main goal which is to encourage and teach students that engineering is fun and anyone who has passion and dedication can be an engineer." With the presidential position comes diplomacy, and also responsibility for the tear-down when the Expo is over.

Ana will graduate this year with her major in chemical engineering. This past summer was spent at the University of California-San Diego (UCSD) researching an in-vitro method of probing the effects of substrate stiffness on stem cell-derived cardiomyocyte development. She is fascinated by the human heart, and has combined her love of mathematics with medicine to concentrate on coronary heart diseases. "The heart is an amazing organ. We are just starting to understand stem cells, and I want to do research that will find a way to cure heart disease without heart transplants."

A member of the Engineering Honor Society Tau Beta Pi and a College of Engineering Honeywell Hispanic Scholar, Ana is also a participant in the NSF Florida-Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) and NSF S-STEM Scholarship programs. "They are both great programs," says Ana. "They help you find research internships, provide scholarships, and support your travel to present at conferences."

"I recently presented at a national conference in Phoenix, Arizona and my next goal is to have an international research experience." LSAMP's goal is to increase the numbers of students from underrepresented groups who obtain degrees in science, mathematics, engineering and technology disciplines. The S-STEM Scholarship program, Engineering and Computer Science Scholars Targeted for Academic Retention and Success (E-STARS) at USF, is focused on providing retention support to financially needy students and assisting with their entry into the technical workforce or graduate school.

"I am very thankful for the opportunities for learning and research that USF has given me," says Ana. Her long term goals include graduate school and a PhD in Bioengineering. After school she will seek employment with a company that is a world leader in medical devices and coronary disease research. Good luck, Ana, in following your heart to help others.

COLLEGE OF ENGINEERING at the UNIVERSITY OF SOUTH FLORIDA
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Tampa, FL 33620

USF: UNSTOPPABLE
College of Engineering

Brett L. Woods, CFRE
Director of Development

Spring is here! As we enjoy warmer, longer days, our attention turns to new growth. For some, that means spring planting or cutting the grass. In the College of Engineering, we think similar thoughts but also look to commencement—that penultimate goal. It is a last "hoorah" for graduates, their fellow students, faculty, friends and family before embarking on a career.

Spring indeed brings thought of new growth and graduating seniors. It also brings to mind those of you that played a part in supporting the College, our professors and students—an integral role in the cycle of life and growth. Your gifts are part of the planting and nurturing process, without which commencement may not have been possible for some. We are grateful.

As commencement rolls around, this is your celebration too.

Speaking of celebrations, if you missed Bull-arney 2010, you missed a great event. Not just any party, Bull-arney featurs "celebrity" waiters such as Dean Wiencek, our Associate Deans, faculty, and prominent alumni—Jan Ash, Robert Garcia, Oliver Rodriquez and many others in zany costumes. Sandy Pettit, Engineering Alumni Society (EAS) Chair and her crew assembled a one-of-a kind event to raise funds for EAS Scholarships and Programs in support of our students. I can't thank them enough. A special word of appreciation is appropriate to acknowledge this year's co-sponsors, Ash Engineering, Inc. and HSA Engineers and Scientists.

The EAS has demonstrated strong commitment and philanthropy under the guidance of Sandy Pettit, P.E. ('94). Through their primary fundraiser, Bull-arney, EAS has awarded more than $25,000 to our students for research presentations at conferences, to support student engineering society activities, student scholarships and to support Engineering EXPO! Congratulations and thanks to the EAS.

As part of the *UNSTOPPABLE* campaign, Gene Balter, PE ('77), has agreed to serve the College as Campaign Cabinet Representative. Gene has been active in the College for many years serving as President-Elect and President/Chair of the EAS from 2005-2009. Gene currently serves on the USF Alumni Association Board of Directors. As Campaign Cabinet Representative, Gene interacts with Campaign leadership and other College Campaign Representatives. Gene will work with Dean Wiencek and the Development Office staff to share the *UNSTOPPABLE* message and opportunity with our many alumni and friends.

Gene strongly believes that before we ask others to give, we must lead by example. To that end, Gene and his son Daniel ('07) have announced the creation of the Balter Family Scholarship, which will support an undergraduate engineering student active in professional societies. Gene and Daniel are creating opportunities for undergraduate students through their generosity.

No matter how you support the College, your gift is extremely important in our life cycle. Your personal gift commitment ensures we are not only able to maintain, but grow. As our 2010 graduates set off on new career paths, thank you again for contributing to their success and ours. We hope you enjoy watching the seeds you planted grow and flourish!