The Florida Engineer

SPRING 2006

A Gift Close to His Heart

Inventor, surgeon, and entrepreneur J. Crayton Pruitt Sr. and his family donate $10 million to Biomedical Engineering

UNIVERSITY OF FLORIDA

On the cover :
J. Crayton Pruitt Sr. and his family recently gave $10 million to the Department of Biomedical Engineering. As a result, the department will be named in the family's honor. Here, J. Crayton Pruitt Sr. sits with his children (L-R): Natalie, Crayton Jr., and Helen. The background of the cover image features several elements of biomedical engineering research, including cutting-edge computer hardware, a microscopic view of neurons grown over a multi-electrode array, an anatomy textbook, and neural imaging. Cover design by Megan Gales.

The Florida Engineer

Dean & Publisher
Pramod Khargonekar

Publications Adviser
Cammy Abernathy

Managing Editor
Ron Franklin

Editor & Principal Writer
Martha Dobson

Contributing Writers
William Ditto
Megan Gales
Aaron Hoover
Meredith Jean Morton
Reshelle Smith
Joseph Tedesco

Photographers
David Blankenship
Ron Franklin
Linda Corsair

Designer
Christina Loosli

Printing
Boyd Brothers, Inc.

Published each semester by the College of Engineering at the University of Florida. The magazine informs college alumni and friends about the accomplishments of its faculty, alumni, and supporters. For permission to reprint any part of this magazine, contact the Managing Editor:

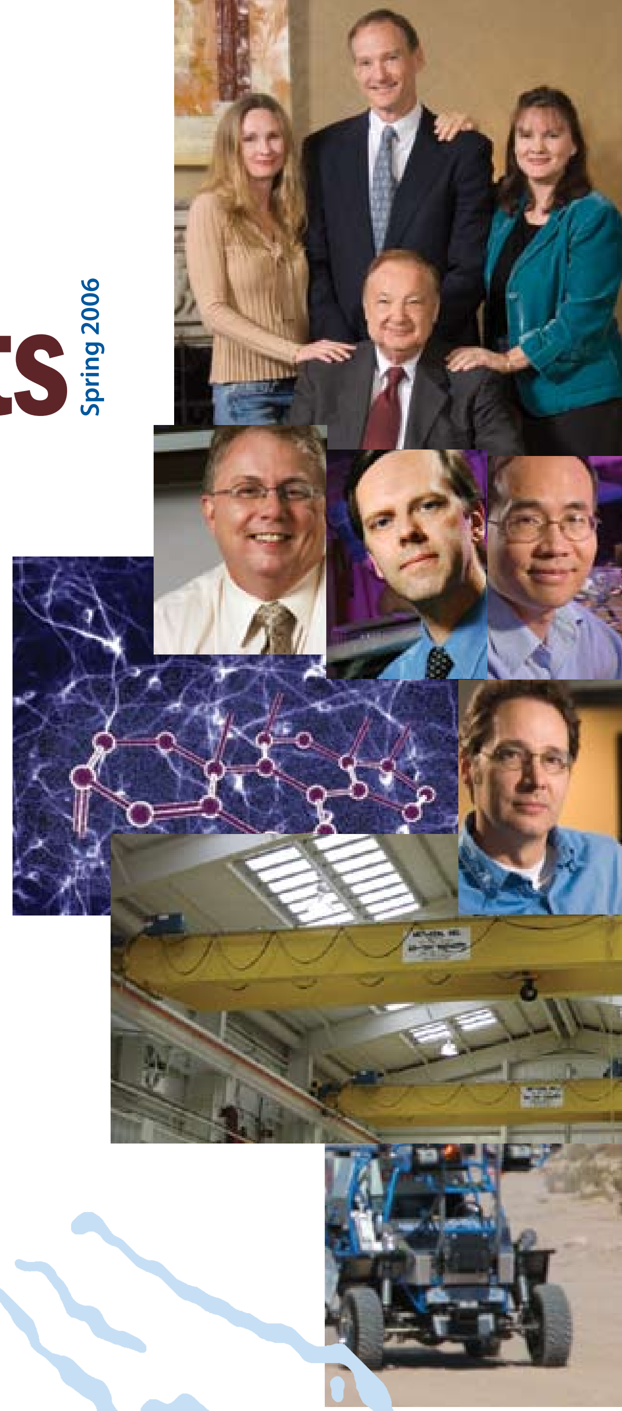
The Florida Engineer
PO Box 116550
University of Florida
Gainesville, FL 32611

P: 352.392.0984
E-mail: rfran@eng.ufl.edu
Web site: www.eng.ufl.edu

GATOR Engineering®

contents

Spring 2006



Pramod Khargonekar, Dean of Gator Engineering, and J. Crayton Pruitt Sr. at the announcement of the Pruitt family gift to Biomedical Engineering.

The human body is perhaps the most complex system in existence. It is both highly adaptable and frighteningly vulnerable. It can survive loss of organs and yet succumb to microscopic viruses. Basic discoveries in biological and medical sciences help us understand how it functions and enable us to fight diseases and disabilities. Because a healthy life is perhaps the highest priority for most human beings, the field of biomedical engineering is aiming squarely at this goal.

The promise of biomedical engineering, which brings to bear engineering knowledge, methodology, and mind-set on the key problems of human health, is truly inspirational. Past successes such as the implantable defibrillator, artificial knee, and various imaging techniques such as ultrasound, CT, and MRI are just the tip of the iceberg. There appears to be unlimited potential for applying the synthetic engineering methodology to biomedical problems and creating new devices, new systems, and new techniques that can advance human health. The recognition that the human body is a system and encompasses many subsystems opens the door to application of engineering principles. Opportunities for engineers range far and wide, from basic biological research to applied health research.

Our research discoveries may someday raise the standard of global health care. For providing the support to realize that hope, we are most grateful to the Pruitt family.

The University of Florida is home to an excellent and comprehensive Health Sciences Center and a nationally recognized College of Engineering. Inspired by the possibilities offered by interdisciplinary health care research, we established a graduate program in the emerging discipline of biomedical engineering in 1997. In 2002, the program became a new academic department, Biomedical Engineering, thanks in large part to Dr. Crayton Pruitt.

I met Dr. Pruitt a few months after I became dean in July 2001. I was deeply impressed by this amazing man. He is not only a very successful surgeon, inventor, and entrepreneur; he is a great human being. I have cherished my relationship with him and his family since that very first meeting. Indeed, one of the privileges of being a dean is the chance to know people such as Dr. Pruitt. In this issue of The *Florida Engineer*, you, too, will have the chance to meet this fine man.

Dr. Pruitt and his family have demonstrated unmatched generosity to the College of Engineering with a $10 million endowment for the Biomedical Engineering department. In recognition of their exceptional commitment to the college, the department will henceforth be known as the J. Crayton Pruitt Family Department of Biomedical Engineering. We are deeply grateful and honored to be able to forever associate the Pruitt family name with the Biomedical Engineering department at the University of Florida. This endowment will benefit students and faculty working to realize the unlimited potential of biomedical engineering for the benefit of humanity.

Multidisciplinary collaborations are at the heart of biomedical engineering research at UF. All of our engineering disciplines are highly relevant to creating effective solutions to biomedical problems. Our approach at UF is to focus on a problem-solving paradigm which creates a seamless integration across many fields of knowledge. The health care problems our biomedical engineering researchers address are not just profoundly personal; they are often life-long afflictions that affect millions of people worldwide. Our research discoveries may someday raise the standard of global health care. For providing the support to realize that hope, we are most grateful to the Pruitt family.

It is gratifying that multi-disciplinary research and education on important societal problems is taking strong root all across the College of Engineering in partnership with other academic units at the University of Florida. For example, we recently received a major NSF grant under the Integrative Graduate Education and Research Traineeship (IGERT) program. This project is focused on adaptive management of environmental systems. I hope you will enjoy reading about this and other noteworthy activities in the College of Engineering at the University of Florida in this edition of The *Florida Engineer*.

Biomedical Engineering Receives $10 Million Gift

A name often associated with a device that has revolutionized stroke-prevention therapy will soon also be associated with the College of Engineering.

UF President Bernie Machen announced on Jan. 17 that St. Petersburg inventor, surgeon, and entrepreneur J. Crayton Pruitt Sr. has committed $10 million to UF for its Biomedical Engineering department. As a result of the gift, university officials will name the department in honor of the Pruitt family, making it the first-ever named department at UF.

Pruitt's gift is among the largest cash gifts received by UF. It is eligible for matching funds from the state of Florida Major Gift Trust Fund, which could result in a $20 million endowment for the newly named J. Crayton Pruitt Family Department of Biomedical Engineering.

"Dr. Pruitt and his family are helping to make a major statement regarding the future of biomedical engineering in the state of Florida," Machen said at the gift's announcement. "This truly transformational gift will enable us to take full advantage of the remarkable multidisciplinary resources available on our campus - including the College of Engineering, Shands at UF, and the UF Health Science Center - and places further focus on Florida as a center of research and discovery."

Biomedical engineering plays a crucial role in modern medicine. Often described as the fusion of engineering with medicine, research initiatives typically focus on discovering materials and inventing techniques, technologies, and devices for improving health care.

Biomedical Engineering at UF began with a program formed in 1997. In 2002, it became the 11th department within the College of Engineering. William L. Ditto was chosen that same year to become the department's founding chair. The department currently has nine faculty members, dozens of researchers, and more than 75 graduate students. Research expenditures last year approached $2 million.

"It is because of Dr. Pruitt's generosity and vision that we are able to ensure the future of the biomedical engineering department," said Pramod P. Khargonekar, dean of the College of Engineering. "This wonderful commitment will be critical in helping the University of Florida create one of the world's best biomedical engineering research and teaching institutions."

Pruitt's gift will support teaching, translational research, technology enhancements, and academic programs for faculty and students.

"It will allow us to attract the most outstanding faculty and students," Khargonekar said. "Their work will have a great impact on the quality of life, and it will create economic activity by stimulating industry growth."

Pruitt, 74, pioneered the surgical treatment of carotid artery arteriosclerosis for the prevention of stroke. Among his many inventions is the Pruitt-Inahara Carotid Shunt. The device, which Pruitt co-invented, is frequently used during a delicate surgical procedure to clean out the arteries that carry blood to the brain. He founded his own company, Ideas for Medicine, to manufacture and distribute the shunt and other surgical products. Pruitt's interest in biomedical engineering is not limited to his professional life, though. In 1995, he received a life-saving heart transplant at Shands at the University of Florida. A biventricular assist device kept him alive for 10 days while he waited for a heart.

"Without that device, I was gone," Pruitt said. "And the biomedical engineer operating it, without him I was gone. No matter how good my surgeons were, without him, I wouldn't have made it."

Pruitt said he chose to make one large donation instead of several smaller ones because he felt it would likely do more good to focus the money on a single organization.

"I think that the University of Florida is doing a fantastic job," he said. "I have a lot of confidence in Dr. Khargonekar and Bill Ditto and what they're trying to do."

Chris Brazda and Megan Gales

J. Crayton Pruitt Jr. and his family at the gift announcement on Jan. 17.

Left to Right: J. Crayton Pruitt Sr. receives his degree from Emory University School of Medicine in 1956; Pruitt in 2006; Pruitt in an undated portrait; Pruitt with Dr. Alberto Elizalde at St. Petersburg General Hospital; J. Crayton Pruitt Sr. with his son, J. Crayton Pruitt Jr.; Pruitt and his children in an undated photo: (L-R) Helen, Mark, Natalie, and Crayton Jr.; Pruitt and his children in 2006: (L-R) Natalie, Crayton Jr., and Helen. Portraits by David Blankenship; all others courtesy of the Pruitt Family.

J. Crayton Pruitt Sr.

A Gift Close to His Heart

By Megan Gales

On an ordinary night in 1995, J. Crayton Pruitt Sr. went to bed thinking he was in perfect health. He awoke the next morning weak and unable to stand. He knew immediately something was wrong. Pruitt is a cardiothoracic surgeon – his symptoms were all too familiar. He'd had a silent heart attack while he slept.

A physician's assistant from his practice called an ambulance and helped rush Pruitt to the hospital. His son, J. Crayton Pruitt Jr., an open-heart surgeon, met them there. Doctors quickly performed coronary bypass surgery, but three days later, Pruitt's heart slipped into ventricular fibrillation.

Eight times in the next six hours, Pruitt Jr. placed defibrillator paddles to his father's chest and shocked his heart back into proper rhythm.

"He'd say, 'Hate to do this to you, Dad,'" Pruitt Sr. said, imitating his son holding the paddles. "Then…bzzz!"

Pruitt Sr. was born in Jackson, S.C.– the same city where his grandfather practiced medicine in the 1880s. Pruitt's mother fostered her son's interest in medicine, and when he was just three years old, he began telling people he wanted to be a doctor. In turn, Pruitt Sr. encouraged his son toward a similar path.

"I'm a big fan of telling a child if you have something good for them to do," Pruitt said.

The younger Dr. Pruitt, a graduate of the UF College of Medicine, knew his father needed a heart transplant. Pruitt Sr. was flown by helicopter to Shands Hospital at UF, where transplant surgeon Mark Staples waited. Staples connected Pruitt to a biventricular assist device that would keep him alive while he waited for a donor heart.

The biventricular assist device is an example of the vital role biomedical engineering research plays in modern medicine. Fusing engineering with medicine, biomedical engineering typically focuses on the search for new materials, techniques, technologies, and devices for improving health care. In 1995, the apparatus was the size of a washing machine and sat at the foot of Pruitt's bed. Today's assist devices are small enough to be entirely implanted into patients.

Pruitt Sr. is himself an accomplished researcher and inventor. He chose to attend Emory University in Atlanta because of the reputation of its premedical program. He earned his bachelor's degree rather quickly and continued into Emory's School of Medicine. He moved to St. Petersburg in 1963 and soon built a thriving private surgical practice. Pruitt devoted his career to the treatment of stroke. His father suffered a debilitating series of strokes, which motivated Pruitt to vigorously research methods of improving upon the available technology.

He pioneered the surgical treatment of carotid artery arteriosclerosis for the prevention of stroke - he is thought to have performed more of these surgeries than any other surgeon in the world. He's an inventor, too. Unhappy with the shunts available to him for these surgeries, Pruitt co-invented his own shunt in the late 1970s.

In a hospital 150 miles north of his home, a different kind of device kept him alive. Ten days after Pruitt arrived in Gainesville, a woman in the Florida Panhandle suffered a stroke and died. Her heart was donated to Pruitt, who

continued on page 20

Endowments at Work

For more information contact the Engineering Development Office:

Ann McElwain
Senior Director of Development

P: 352.392.6795
E-mail: amcel@eng.ufl.edu

The Pruitt Family donation is an historic occasion for Gator Engineering: It is among the largest cash gifts the university has ever received, and is the largest the college has received to date. Biomedical Engineering also has the distinction of becoming UF's first named department. Matching funds from the state are expected to double the gift's value and create a $20 million endowment for the J. Crayton Pruitt Family Department of Biomedical Engineering (BME).

Matching Gifts:

Get more for your money

Private gifts of all sizes are crucial to the university's success. The University of Florida Foundation, Inc. (UFF), the 501(c)(3) non-profit organization that receives, invests, and administers private support for UF, works to maximize each donation's potential. Major gifts are often eligible to receive matching funds from the state of Florida.

Gifts of $100,000-$599,999 receive a matching grant equal to 50 percent.

Gifts of $600,000-$1 million receive a matching grant equal to 70 percent.

Gifts of $1,000,001-$1.5 million receive a matching grant equal to 75 percent.

Gifts of $1,500,001-$2 million receive a matching grant equal to 80 percent.

Gifts of $2,000,001 or more are matched dollar-for-dollar.

Endowments: Gifts that keep on giving

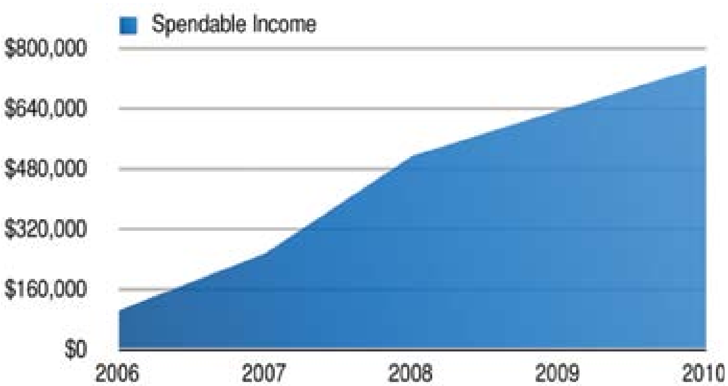
Gifts of $20,000 or more may be used to create permanent endowments. UFF invests the gift, including any matching funds, through the University of Florida Investment Company (UFICO). About 4 percent of the investment value becomes spendable income each year, and the remainder is continually reinvested. Some donors ask that their money be spent in a certain way. Others leave the details up to the university. The Pruitts requested that their gift be used to support teaching, translational research, technology enhancements, and academic programs for faculty and students in the BME department. For BME, this means hiring the best professors, attracting the brightest students, and funding the most cutting-edge research.

We want to pursue high-risk/high-gain research. Even if there's only a small chance that an idea will turn into a major discovery, we want to go after it. That's how we'll change the world.

—William L. Ditto
Professor & Chair, Biomedical Engineering

Spendable Income from Pruitt Endowment

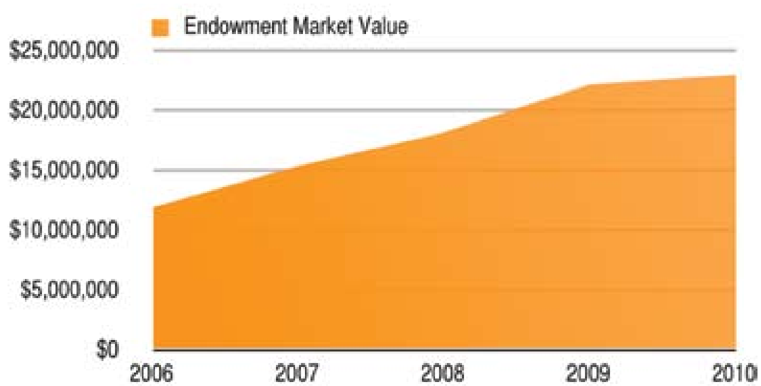
[in dollars]



More than $100,000 will be immediately available to the J. Crayton Pruitt Family Department of Biomedical Engineering. The investment will grow over the next several years, and by 2010, UFF projects the endowment will create for BME more than $750,000 annually and have a market value of nearly $23 million.

Pruitt Endowment Market Value †

[in dollars]



† Market Value based on an assumed 8% annualized rate of return. All figures based on receipt of state matching funds, to be paid out over four years.

Looking ahead: The future of Gator Engineering

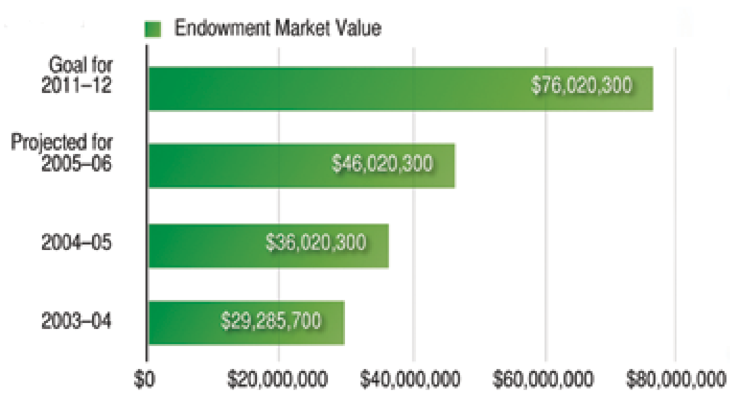
A top priority for the College of Engineering in the next five to seven years is to raise at least $40,000,000 in new gifts to create endowments for named professorships, graduate fellowships, and named chairs, and at least $20,000,000 for new buildings and unrestricted operating support.

Endowments provide the financial foundation necessary for a world-class engineering college like ours to attract and retain the best qualified and most talented faculty members. This outstanding group of people in turn educates the next generation of engineers and produces research that stimulates the economy and profoundly impacts society.

—Pramod P. Khargonekar
Dean, College of Engineering

COE Total Endowment Market Value ‡

[in dollars]



As of June 30, 2005, the UFF total endowment value was $835.7 million, including the COE's portion represented above. The FY 2004-05 annualized rate of return was 9.5% on endowed investments.

‡ Market Value based on an assumed 8% annualized rate of return.

David Blankenship

Biomedical Engineering at the University of Florida

Birth of a Powerhouse

Observations by Biomedical Engineering Chair William Ditto

The emergence of a new academic department at any university is rare and exciting. I arrived on July 1, 2002, to take on duties as founding chair of the University of Florida's Department of Biomedical Engineering (BME). That first day, after meeting the administrative staff of three who were awaiting my instructions, all I could think was, "Now what?" It was a good thing that Dean Pramod Khargonekar, who hired me, couldn't read minds. Before panicking, however, I took stock of what preceded the founding of the department – the Biomedical Engineering program.

For decades, physicians and engineering faculty at UF had worked together on projects, and for about that long, students had asked about having a formal BME program. In the mid-80s, faculty members George Piotrowski (mechanical engineering), Gary Miller (orthopedics), Bob Hirko (aeronautical engineering), and Chris Batich (materials science and engineering) started a course of study in BME. It was a start, but lacked a continuing presence.

A decade later, Dean Win Phillips asked Chris Batich to make a significant effort to start a formal Biomedical Engineering program. Chris organized the Biomedical Engineering Graduate Academic Program Committee (BEGAP), formed by picking key faculty participants from several involved departments. The committee included Rich Dickinson and Dinesh Shah (chemical engineering); Roger Tran-Son-Tay and Ed Walsh (aeronautical engineering); Andy Laine (computer and information science and engineering); John Harris and José Principe (electrical and computer engineering); Wes Bolch and David Hintenlang (nuclear engineering); Bill Tiederman (mechanical engineering chair); and Rich Melker and Hans van Oostrum (anesthesiology).

Subsequently, after much hard work, the Whitaker Foundation provided a $1M grant (with a $1M match from the state) to get the program up and running in anticipation of its becoming a full-fledged department in the future. In 1997, a curriculum was produced and the first class of 13 students enrolled that fall. Tony Brennan (materials science and engineering) became the first graduate coordinator in BME, a position he still holds. Tony's hard work allowed the program to grow to 75 students.

In 2000, medical doctor J. Crayton Pruitt Sr. generously endowed the BME program with a $2 million gift to get the department started. In 2001, the new engineering dean, Pramod Khargonekar, accepted the challenge of making the BME department a reality.

Now, back to my initial panic. I realized that Chris Batich and the BME program faculty had laid a strong foundation for the department. My challenge was to build on that foundation a department UF could be proud of. My unwavering philosophy in building the department rests upon determined adherence to the concept that there is no distinction between biology, engineering, and medicine. I knew that such determination

Visit the Biomedical Engineering Web site to learn about our research and education projects.

www.bme.ufl.edu

David Blankenship

William Ditto, center, talks with potential BME students at a graduate recruitment breakfast sponsored by the College of Engineering.

would enable us to recruit the best and brightest faculty in the world, with the single goal of bettering the human condition. Easier said than done! However, over the last three years BME has made tremendous progress toward this goal.

In terms of people, our most important metric, we have grown to nine primary faculty members, more than 40 affiliate faculty members, 75 graduate students, and six staff. Everyone associated with BME is of the highest quality, and all are dedicated to our mission. I am proud to say that we all wake up every morning burning with the desire and brimming with the talent to make us a department that has no equal in the country and the world. They know every day may bring a discovery that could be the key to easing human suffering, adding to the library of human knowledge, or educating the student who will make the key breakthrough in the next generation.

In terms of infrastructure, we have started building a $90 million, state-of-the-art engineering and medical research facility. The building will house the BME department, as well as some of the best biomedical researchers from the UF Health Science Center and its associated colleges. We expect the building to be complete in 2008. This will usher in a new era for the university in which disciplinary boundaries do not exist and our only limits to success are those of imagination. But we could not attain our dreams without the financial infrastructure to enable us to take the chances in curriculum, faculty recruiting, and research.

Such was the situation as I was sitting in my office in November 2005, again contemplating the question, "Now what?" Dr. Pruitt's generous gift in 2000, the program's foundation, and the dean's determination to get us off the ground had led to a fast-growing, successful department that needed a stronger financial infrastructure to grow to its full potential. An endowment of $10 to 20 million would allow us to move forward. I had been told a gift of that size had never been bestowed upon a department in the university's history.

"Now what?" This was the greatest challenge BME had ever faced and it seemed insurmountable. Then once again Pruitt entered the picture. I received a call from the dean's office saying that Pruitt was visiting campus. David Woodall, the assistant vice president for development-major gifts at the University of Florida Foundation, arranged for me and Dean Khargonekar to meet with him. On that day, the dean and I laid out for Pruitt our progress and were candid in our need for a total endowment of $10 million (which, with matching funds from the state, would likely become the $20 million we needed).

To our surprise, Dr. Pruitt simply uttered the phrase that the Dean and I will never forget: "Yes, I can do that." He agreed to supplement his previous gift of $2 million with an additional $8 million, to bring it up to the needed $10 million. First with stunned silence and then an almost giddy sense of shock, the dean and I realized that our wildly ambitious and idealistic goals, dreams, and aspirations for the department were attainable. Pruitt, and subsequently his family, shared our vision and made our department a full reality that day.

Dr. Pruitt is a true co-founder of our department, and for this reason it will now be known as the J. Crayton Pruitt Family Department of Biomedical Engineering.

If you come to the UF campus today, you can feel the heightened level of enthusiasm, purpose, and excitement in the department. Biomedical Engineering no longer has any insurmountable barriers to our goals of bettering the human condition and educating the next generation to do the same. UF makes daily progress to take its rightful place among the top 10 universities in the world and Biomedical Engineering is right alongside to take its place amongst the top 10 biomedical engineering departments as well.

Biomedical Engineering Research

Re-Imagining Epilepsy Treatment

By Martha Dobson

We have all the team that we need here at Florida. We are going to look at a problem from every angle that is important. And we are going to try to integrate and understand each aspect and try to work toward a greater understanding by combining the results.

– Paul Carney

Paul Carney is an associate professor in the departments of Pediatrics, Neurology, Neuroscience, and Biomedical Engineering. He holds the B.J. and Eve Wilder Epilepsy Research Professor Endowed Chair, is chief of the Division of Pediatric Neurology, and is medical director of the University of Florida Health Science Center Pediatric Epilepsy Program.

Paul Carney is a multidisciplinary team by himself. A physician and an engineer, he is currently the chief of pediatric neurology and director of the pediatric epilepsy program at the University of Florida. He has academic appointments in UF's Pediatrics, Neurology, Neuroscience, and Biomedical Engineering departments.

Carney has been collaborating with the Biomedical Engineering faculty for the past four years to find a new understanding of how epilepsy develops, with the goal of developing a technology and a therapy that would better control seizures.

Epilepsy is fairly common: One to 5 percent of the population - in Florida, that's about 300,000 people - have epilepsy. It's also one of the most costly neurological disorders because it can be lifelong. Most people with epilepsy have their first seizures in early childhood. Then they may go several years, even one or two decades, without a seizure. At that point, they often develop chronic epilepsy. Most of these patients, 70 to 80 percent, can be treated with anticonvulsant medications, which are not effective for the remaining 20 to 30 percent.

About 5 to 10 percent of the patients who do not respond to medication are candidates for epilepsy surgery. If the area of the brain where the seizures are coming from can be identified and surgically removed, the seizures can stop. The remaining patients generally have non-focal seizures that involve multiple areas of the brain, for which there is currently no treatment available.

Finding better treatments to control or even prevent seizures requires a fundamental understanding of how the disease begins and develops. This is still an open question, but Carney and his research partners believe the answer may be that the brain functions as a kind of closed-loop feedback network.

"The brain has electrical signals that most of the time behave normally," Carney says. "There are signals that correspond to wakefulness, to emotion, to sleep, and so forth. Sometimes, for reasons that are unclear, these signals go awry. They can behave just like a cardiac arrhythmia, and the patient begins to convulse, or seize."

Carney believes the lessons learned in controlling abnormal heart rhythms could be applied to controlling brain arrhythmias. Traditionally, cardiac arrhythmias were treated with medicines. Today, many are treated with automatic defibrillators, devices surgically placed in patients' chests. The devices monitor heart rhythms, and when the rhythms become abnormal, give a very small jolt of electricity to put the heart back into its normal rhythm.

"We believe that epilepsy may respond to a similar kind of closed-loop feedback warning system," Carney says. The team is interested in developing a device that would record the brain activity of an epilepsy patient continuously. The device would predict the onset of a seizure and would prevent the seizure before it occurs.

Carney believes it would also be essential to record the brain signals, particularly the abnormal ones, that occur during the latent period between the first seizures and the onset of full-blown epilepsy.

"There is this period of time when the seizures are ramping up," he says. "We would like to understand more about that latent period and when the critical moments are occurring that really lead to the epileptic state. We believe that if we can understand that period of time, we can begin to develop technologies, particularly feedback systems, which can begin to control those seizures before they occur."

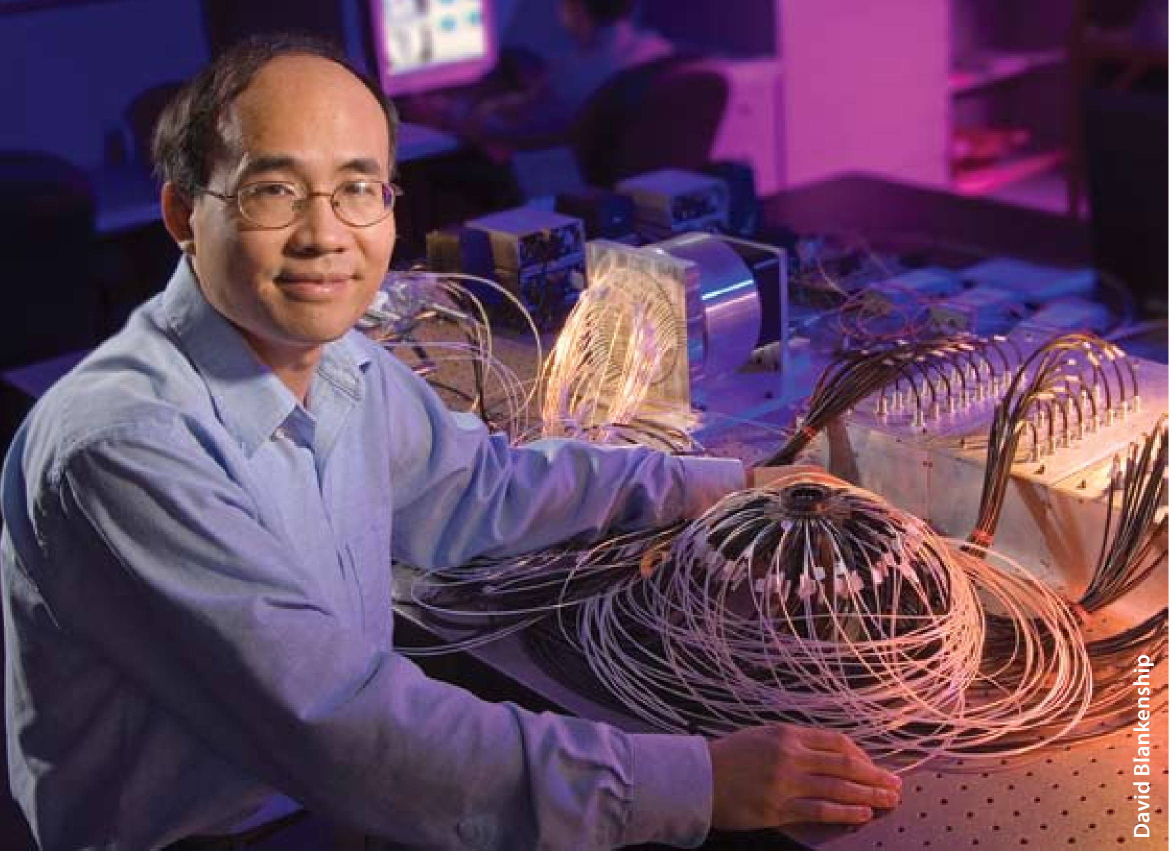
In his laboratory at UF's Brain Institute, Carney and his collaborators have begun study on this aspect of epilepsy using laboratory rats to model human temporal lobe epilepsy, which takes place in the limbic system. This part of the brain is used for memory and language, and is the part most commonly involved with seizures. The studies are funded by grants from the National Institutes of Health, which has placed a national priority on epilepsy research.

Epilepsy is not just a problem of electrical signal malfunction, however. The seizure events also cause structural changes

continued on page 20

Paul Carney is part of a team that is expert in clinical epilepsy, physics, math, biomedical engineering, experimental neurology, and neurophysiology. "We have been able to take advantage of this collaboration. I am very excited that our findings are showing a novel way for people to look at this disorder that can probably be transferable to other disorders as well, in terms of how networks form and how diseases evolve, and how one might develop technologies that control or reverse the actual process."

David Blankenship



Huabei Jiang is a professor in the Biomedical Engineering department and was previously a professor of physics at Clemson University. He is a pioneer in the field of near-infrared diffuse optical tomography, and for his contributions was named a Fellow of the Optical Society of America in 2006.

Huabei Jiang has found ways of Making Diseases Reveal their Secrets

By Martha Dobson

Professor Huabei Jiang is doing pioneering work in alternative medical imaging techniques. Some of the methods being tested use familiar tools, such as lasers and ultrasound, in ways never tried before. They are revealing information about diseases at the molecular and functional level that may lead to better treatments and possible cures.

One technique is futuristic: The use of bioluminescence cloned from fireflies to track and locate genes delivered for gene therapy.

"Genes that go to the wrong spot could trigger some unwanted disease," Jiang says. "Right now there is no material that can image the pathway of the genes in this way. Combining the bioluminescent material with the genes gives a way to image and monitor the gene therapy."

Bioluminescence occurs when an enzyme called luciferase oxidizes, or mixes with oxygen. In the laboratory, Jiang and his collaborators are using luciferase to tag tumor cells, which are then implanted in laboratory rats. The cells show up clearly with three-dimensional tomographic imaging of the tissue. Tomography is a technique that shows details of a solid object in planar cross sections, or "slices."

Also, with researchers in pharmaceutics, Jiang is doing gene therapy studies to deliver genes to brain tumors and track them using bioluminescence tomography. "I think we are the first to demonstrate this capability," Jiang says.

Much of Jiang's research has involved optical tomography, an imaging technique that uses lasers instead of X-rays. "We use lasers a lot," he says, a notable understatement.

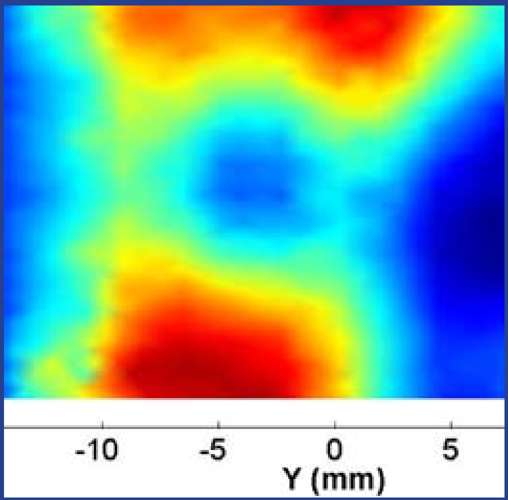
Jiang and his collaborators are using near infrared lasers in several projects. They shine the near infrared light - which refers to the wavelength, or color, of the laser - on tissue at different angles, and then collect the scattered light to create the image.

"We have used the light to detect skin cancer," Jiang says. "We shine the light along the skin and measure the reflected light to determine the cellular sizes and densities, because cancer cells are a different size than the normal cells."

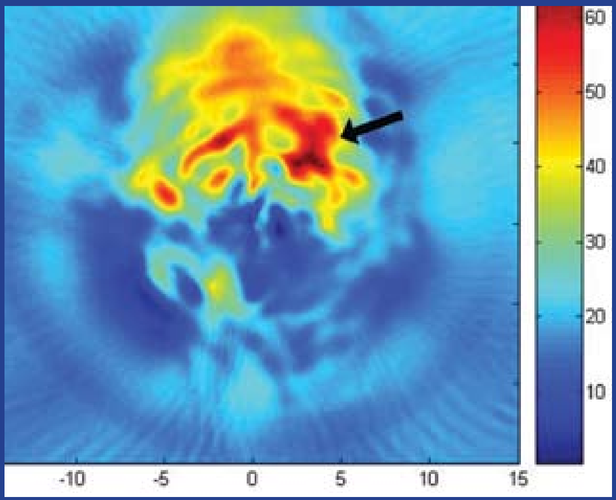
Jiang also uses lasers in photoacoustic tomographic imaging. The researchers shine a pulsed laser light on tissue to generate local heat that expands the tissue. The tissue expands when the light is on and contracts when the light is off. The expansion and contraction of the tissue creates vibrations that can be detected acoustically using ultrasound techniques.

This use of photoacoustic tomography to image epilepsy is the focus of a groundbreaking study Jiang initiated with UF pediatric neurologists soon after arriving at UF in January 2005.

"One of the main driving forces for me to come to UF was to work with the strong program here in neurology," Jiang says.



Diffuse optical tomography (DOT) is a promising method for detecting changes in cartilage and inflammation process in synovium. It can also provide information about the progression of osteoarthritis. This DOT image clearly shows the two bones and the space between them in a finger joint.



Photoacoustic tomography (PAT) is able to image epileptic events as they are happening. The arrow in this image indicates the detected seizure.

Imaging epileptic brain activity is difficult, especially in very young children, the age when epilepsy usually has its onset and when treatment needs to begin for best results. Neither CT scans nor MRI are useful for imaging children, particularly babies, because they do not stay motionless as the test requires, and binding them on papoose boards to hold them still is traumatic. Plus, even though CT and MRI scans can be done relatively quickly, they still take several minutes to complete.

"Our photoacoustic method can do this imaging in a second, or less," Jiang says. "Nobody else in the world is pursuing this."

A better method of imaging breast cancer is also a major research focus for Jiang. He and his team are working with optical tomography as well as contrast-based fluorescence tomography, a technique that is showing promise for increasing diagnostic accuracy.

The fluorescence technique is to inject a fluorescent chemical contrast agent into the bloodstream, as is done with CT and MRI scans. The fluorescent material locates and binds to the tumor tissue, and shines when the laser light touches it. The optical tomography itself is non-invasive.

"You can detect breast cancer earlier using optical tomography, and can distinguish better between benign and malignant tumors," Jiang says. "This will be especially helpful in younger women and those with fibrocystic tissue disease, whose dense breast tissue is difficult to scan with conventional X-rays. The contrast between normal and abnormal tissue is just too small."

Jiang's research on breast cancer detection began before he came to UF and has reached the stage of clinical trials on patients whose cases are managed by UF physicians at the College of Medicine.

"The women like participating in the study because it is less unpleasant than mammography," Jiang says.

Jiang is also doing research on applying optical imaging to detecting osteoarthritis. Right now, X-ray technology is the only imaging method used for that purpose, but X-rays cannot image soft tissue or cartilage.

The advantage of optical imaging is the ability to detect early changes in joint cartilage and inflammation in the synovium, the non-cartilage tissue that lines the joint space. Physicians can treat the disease by trying different medicines, but must wait for observable results before they can tell if the medications are effective. This can take months. With optical imaging, physicians can monitor the condition of the joints and determine quickly if the medicine is working.

"We are working with human subjects on the osteoarthritis study, primarily middle-aged women with healthy joints to establish baseline data," Jiang says. "We are the only research group in the world doing this."

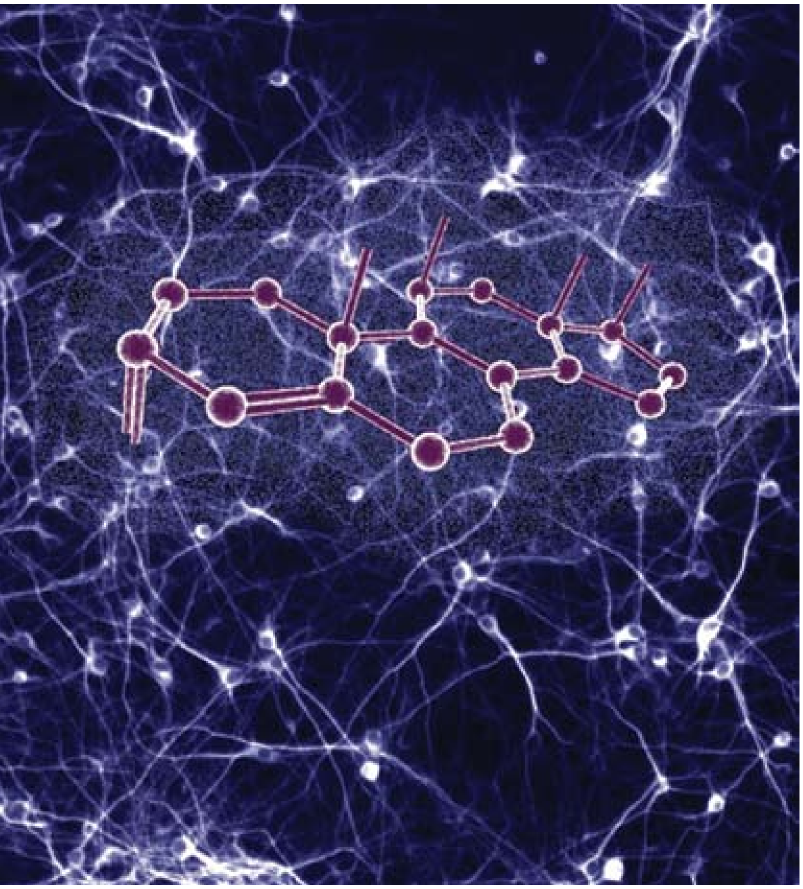
Jiang, who is a biomedical engineer and a physicist, feels a strong commitment to put all his knowledge to work studying these problems. "It would be ideal if I could help create an imaging research center at UF," he says.

"With the imaging techniques we are studying, you can not only image the structure of the body, you can also obtain information on the tissue functions," Jiang says. "This is very important information for physicians to tell how diseases arise and progress. That's the beauty of this work."

With gene therapy, there is

Hope for the Brain to Heal Itself

By Martha Dobson



Steroid molecule on a background of neurons.

Assistant Professor William Ogle is one member of the new team of dedicated researchers who have joined the Biomedical Engineering faculty, attracted by UF's work in multidisciplinary gene research. Since his arrival in fall 2005, he has been busy setting up his laboratory in UF's Brain Institute, where he will do research on the application of gene regulation to problems of memory loss caused by disease and by aging.

"I want to develop real life therapeutics that will apply and actually help people," he says.

Ogle is specifically interested in what happens when neurons in the hippocampus, the part of the brain that acts like a switchboard for acquiring and retrieving memories, are damaged by age, disease, or injury.

"Aging is my primary interest. I am interested in any disease which involves a decline in memory," Ogle says. "I would like to come up with strategies and therapies that can help prevent age-related memory decline. The idea is to protect your hippocampus as you get older and retain your ability to create and retrieve memories up until extreme old age, to maintain cognitive function, so you can live an active mental life until the end."

Diseases that cause damage to the hippocampus include Alzheimer's, Huntington's chorea, and Parkinson's. Nothing can prevent these diseases, or cure them, although Parkinson's can be treated and Alzheimer's can be slowed.

Ogle explains that cells experience gradual systemic failure as they age. Small errors occur in the regulatory events that maintain the cells, and the errors accumulate. Eventually, the cell can no longer repair itself and malfunctions. This is what happens when memory declines. The neurons can't respond to stimuli or maintain the internal cellular memory component.

Ogle believes a solution would be to reinforce the brain's neurons with gene therapy so that they can resist the incremental damage that builds up with age, enabling people to have cognitive function for a longer period of time.

One potential aspect of restoring neural function is to get neural precursor cells to differentiate to fit into specific locations and restore function. Apparently, Ogle says, part of the way memory works is that these precursor cells build new connections and integrate into the hippocampus.

Memory loss caused by injury or stroke is caused by a different mechanism than that seen in aging. With stroke or seizure or heart attack, there is a major energy deficit due to oxygen depletion resulting from compromised blood flow to the brain.

"Then you have a cascade of events where the neurons experience a calcium influx," Ogle says. "That is followed by a glutamate release which causes overstimulation that uses up the energy reserves in the cell. The cells go into necrotic death basically because they are exhausted."

Ogle thinks it may be possible to identify a key point within cells where genes can be inserted that would correct the function of injured cells. Accordingly, he wants to design and implement artificial multi-gene networks to modulate neuron function. The networks would take advantage

William Ogle is an assistant professor in the Biomedical Engineering department. His academic background is in biochemistry and molecular biology. He has done gene research at the University of Chicago and Stanford University.

of the sequence of chemical events that occur when the neurons are damaged by age or injury.

A buildup of stress hormones, or glucocorticoids, is one chemical change that aging and injured cells experience. Ogle believes the glucocorticoids can be put to work to help protect the brain against a second stroke. After the first stroke, surgeons could insert into the damaged brain tissue a network of neural protector genes. A second stroke event would cause the glucocorticoids to trigger the neural protective genes. The protective genes would prevent the energy cascade that causes neuronal death and maintain the surviving nerve cells so that they would not be degraded even more.

Over time, as the patient gets older and stress events accumulate, the neural protective genes would be fully activated by the stress hormones to prevent cognitive decline.

Ogle believes another possibility is a feed-forward system in which the neural protecting genes are triggered by event-response genes. With an injury event like a stroke or heart attack, the lack of oxygen, or hypoxia, would turn on the gene to provide neural protection. After the injury event, the gene expression turns off.

"It would be an on and off event in case of an injury as compared to the glucocorticoid model, where it is constantly on," Ogle says. "It will be necessary to work on very tight control of gene expression in the cells, because you will want to be able to shut off the genes if they start causing problems."

Controlling gene expression with a drug is a possibility Ogle has considered. However, he has misgivings about current research at some companies which are looking at creating genes that are activated by a drug, need the drug continually to remain active, or that once activated by the drug, cannot be shut off.

"I don't like the idea of people having to rely on a drug for the rest of their lives with a company controlling the price of that drug," Ogle says. "My idea is the opposite. The gene is turned on by natural chemical changes after an injury event. If, after a number of years, this gene is causing problems, you can take a drug to shut it down. Then, if there is another injury event, the gene will be automatically turned back on by the injured cells," he says.

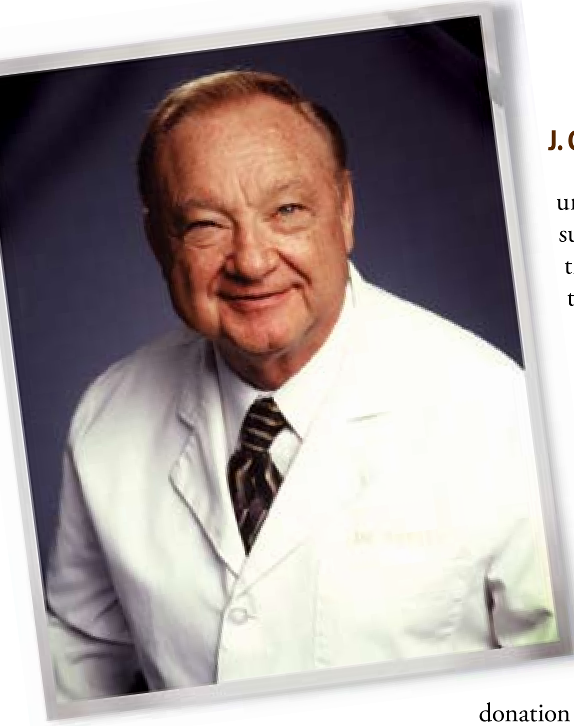
This type of gene therapy could also be applied when signs indicate an Alzheimer's decline.

In other research, Ogle will also look at how similar cells function differently in the hippocampus and the amygdala, another brain area involved in memory. Under high stress, the amygdala reinforces memory; in the hippocampus, stress causes memory loss.

The difference is that the amygdale turns on genes that result in synaptic formation and memory consolidation. In the hippocampus, the stress glucocorticoids turn the genes off.

"I will be looking at specific genes and trying to come up with correlations and identify pathways that can be manipulated," Ogle says. "It comes back to the injury and the age system, where if you understand how the basic regulation for memory consolidation in the cell and the neuron occurs, then you can control it.

"I am not a big believer in magic pills, but I may be able to identify sites for therapeutic drug intervention," Ogle says.



J. Crayton Pruitt Sr. A Gift Close to His Heart continued from page 9

underwent open-heart surgery for the third time to receive the transplant.

The experience left Pruitt with a deep appreciation for biomedical engineering and for UF.

In 2000, Pruitt expressed his appreciation through his first donation to the biomedical engineering graduate program at UF's College of Engineering. Largely because of Pruitt's $2 million gift, in 2002 Biomedical Engineering became the college's 11th department. In Dec. 2005, he and his family added to the first gift, bringing their total investment in Biomedical Engineering to $10 million.

The Pruitt Family Foundation funded a large portion of the gift. Pruitt's son and two daughters, Helen and Natalie, comprise the foundation. Pruitt's second son, Mark - an alumnus of the UF College of Law - is now deceased. Pruitt and his family decided to make one large donation to UF instead of several smaller ones to various entities because they felt it would do more good to focus the money on a single organization, especially one eligible to receive matching funds.

Besides, UF is close to his heart. Pruitt said he began feeling better the day after the transplant.

"It's been over 10 years now, and I consider that a miracle," Pruitt said. "When you look at it like that, this is a small gift."

Biomedical Engineering Research

Re-Imagining Epilepsy Treatment continued from page 15

in the brain. Carney and his co-researchers are using very sophisticated MRI tools to actually look at the fibers of the brain and how they structurally change as the epileptic network evolves from a state of normalcy. They are also culturing brain tissue onto a multi-electrode array to look at the activity and behavior of the brain over an extended period of time. They believe this novel technique will give insight into how the brain, particularly the hippocampus, is behaving.

Carney says that it is the change in its structures that makes the brain prone to going into arrhythmias. "We believe that the initial insult, an injury or first seizure, changes the rhythmicity of the brain," he says.

Structural change in a fully developed brain is rare. At that point, a brain doesn't develop new cells or new neurons, except when injured. It also typically does not form new structural connections, a process called sprouting, except after injury.

"It is believed, and we have seen some of this in our own work, that after an injury like a prolonged seizure, the brain goes through a recapitulation of something that would have occurred during brain development. New neurons are born, new axons are formed or sprouted, and that leads to a network that behaves abnormally," Carney says.

They have also found that following an injury, the brain's electrical activity shows certain features that were not seen before the injury.

"We have discovered features that we describe as high-frequency oscillations," Carney says. "They are very fast bursts that appear in a very specific pattern and in a very specific sequence in the brain that is becoming epileptic. Those features also appear when the animal or human is learning something. These very, very fast oscillations in the brain appear to set down the network and strengthen it such that the network takes on a behavior, whether it be learning, memory, or as in the case of seizures, epilepsy."

The researchers also believe that it is very difficult for the brain to have a significant electrical event like a seizure without the rest of the brain participating at some level in that seizure, and remembering it at a later date.

"We know that many epilepsy surgery patients, after surgeons have removed the seizure focus area, go on to have seizures five or six years later. The brain somehow retains the memory of the disease. There is no other theory right now that has been tested or has been shown to

J. Crayton Pruitt Sr. poses with a sculpture created by artists Arturo Sinclair, UF Digital Worlds Institute, and Bradley Smith, UF College of Fine Arts. Digital Worlds director James Oliverio, Digital Worlds student Anthony Maligno, and Biomedical Engineering PhD student Cecile Perrault also contributed. The base is made from cocobolo, an exotic Central American wood. Two pieces of alabaster surround three knee replacement implants, which are a classic example of biomedical engineering technology. The implants, donated by BME affiliate faculty member B.J. Fregly of the Mechanical & Aerospace Engineering department, are made from a cobalt chrome alloy and manufactured by Smith & Nephew.

The Pruitt–Inahara Carotid Shunt

In the late 1970s, Pruitt became increasingly dissatisfied with the shunts he used during surgery to keep blood flowing through the carotid artery. Metal clamps held them in place, and he worried that the clamps might damage artery walls. He noticed also that they sometimes scraped into the bloodstream the very particles he was trying to remove. Potentially, these particles could cause a patient to have a stroke during the stroke-prevention surgery.

To solve the problem Pruitt helped create the Pruitt-Inahara Carotid Shunt. The shunt, pictured here, uses balloons to stay correctly positioned and includes a special side arm to divert stray particles away from the bloodstream. The device is now considered one of the most widely used shunts for this type of procedure. Pruitt formed the company Ideas for Medicine to manufacture and distribute his invention. He later sold the company, and the shunt is now produced by LeMaitre Vascular, Inc.

---

explain how the brain becomes epileptic and why seizures occur when they occur," Carney says.

"The brain is a complete entity. It is richly connected. Parts are constantly talking to each other, even though they seem remote. If one tries to approach this problem by just looking at some very specific regions, you are really missing the big picture," Carney says.

"We believe that if you look at the whole brain as a fully embodied entity, you are more likely to begin to tease out some of the fundamental features that lead to the epileptic condition. We believe that it will probably lead to a more effective therapy versus trying to cure the disorder by looking at some very small parts of the whole."

Homeland Security Research Is the Focus for New Civil Engineering Center

Joseph W. Tedesco, Chair
Civil & Coastal Engineering
www.ce.ufl.edu

The Department of Civil & Coastal Engineering is pleased to announce the establishment of the Center for Infrastructure Protection and Physical Security (CIPPS) with an initial contract from the U.S. Army Research and Development Center (ERDC). CIPPS researchers will perform collaborative R&D with government and industry to develop innovative technologies for the protection of critical infrastructure systems, and will transfer the knowledge through various engineering education and training programs.

The end of the Cold War in 1989 was a watershed event for the world. Nations across the globe began reducing their armed forces in response to the perceived increase in world stability. Unfortunately, the euphoria was short lived as international terrorism became a major concern. Prior to 1993, the United States had been relatively unaffected by terrorism within its borders. However, in February 1993, externally supported terrorists attacked the World Trade Center in New York City. In April 1995, the U.S. was shocked by the devastating domestic terrorist attack against the Alfred P. Murrah Federal Building in Oklahoma City.

More emphatically, the events of Sept. 11, 2001, demonstrated the ability of terrorists to cause civilian deaths and property damage at levels not seen since the waning days of World War II. These horrific terrorist attacks changed forever the way American federal, state, and local government agencies, and many other organizations around the world, would look at national security and the need for protection from terrorism.

The need to protect military facilities, civilian populations, and infrastructure systems from terrorist attacks and social/subversive unrest has increased in many parts of the world. It dramatically underscores the need to develop protective technologies over and above those related to military-sponsored work on fortifications.

The Center for Infrastructure Protection and Physical Security (CIPPS) will be located in this office building on UF's Waldo Road Campus in East Gainesville.

The new 10,500 square ft. Powell Laboratory, co-located on the East Gainesville Campus, will further enhance the CIPPS' capability.

It was for this reason that CIPPS was created: To develop innovative theoretical, numerical, and experimental approaches to protect society from terrorism and weapons of mass destruction in a well-coordinated collaboration between governments, academic institutions, and private organizations. Such technologies are vital for insuring the safety of the people and the preservation of valuable national assets.

Current CIPPS research includes the progressive collapse of multi-story buildings, software development for structural response analysis, explosive load definition, material response to high rate loading, and improved vehicular armor design. Other current and future programs in the College of Engineering on related topics funded by various sponsors in the U.S. and abroad will also take place at CIPPS.

CIPPS research reflects the reality that warfare has changed. Unlike the politically and ideologically motivated global conflicts of the past, dominated by well-organized military forces, most of the armed conflicts in the last two decades have been local or regional, and dominated by social, religious, economic, and/or ethnic causes. Attacks are carried out by a few individuals or small groups against selected strategic targets and are intended to inflict considerable economic damage and loss of life.

The causes for this terrorism are related to a broad range of important areas (e.g., culture, history, sociology, politics, economics, religion, life sciences and medicine, psychology, etc.). In addition to the serious need for innovative developments in these areas, society must invest in developing effective capabilities in intelligence, law enforcement, and preparedness. Therefore, the scope of the research conducted by CIPPS will likely extend beyond engineering to include the physical sciences, health sciences, agriculture, law, and the social sciences.

Defense against this form of rapidly evolving warfare will remain a challenge. Any successful response will require a well-planned, multilayered approach that strikes a fine balance between assuring a nation's security and maintaining the freedoms that a modern society enjoys.

Team CIMAR: Engineers with the Instincts of Explorers

By Aaron Hoover

It is Oct. 7, 2005, in Primm, Nev. Twenty-three teams from universities and private companies have converged on this tiny town on the California-Nevada border. They're here to pit custom-designed robot cars against each other in a race across the Mojave Desert for a $2 million prize. The race's sponsor, the Defense Advanced Research Projects Agency, says its goal is to accelerate the development of robotic vehicles for military purposes.

It's the second DARPA Grand Challenge in as many years. No one came close to finishing the first. That's because crafting a robotic car, one that drives with zero assistance from people across unknown and hazardous terrain, is a new frontier. The machine must not only sense landscape, it must also avoid collisions, all while proceeding rapidly toward its destination.

Ground zero for the race this year is the parking lot behind Buffalo Bill's Casino and Resort, an enormous hotel dolled up as a faux red barn surrounded by a yellow roller coaster. The day before the main event, the lot looks like a cross between a technology convention, a used car sale, and a carnival. Trailers, buses, and vans surround the robot cars, which range from TerraMax, a 16-ton Oshkosh military truck used by the Marines, to CajunBot, a small six-wheeled affair that resembles a moon lander.

The University of Florida team is busy on last-minute touchups to their car, NaviGATOR. With a frame of blue tubular steel and an array of electronics, it looks like a juiced-up, off-road go-cart.

Team CIMAR, named for UF's Center for Intelligent Machines and Robotics, has been working on NaviGATOR for 18 months. Its performance has already vastly exceeded last year's version, which traveled just six-tenths of a mile in the first Grand Challenge before becoming ensnared in barbed wire and stalling. But the 12-hour days, breakdowns, and assorted tribulations have made the team familiar with the extraordinary difficulty ahead.

"There's perception, decision making, and control, and if you screw up any one of those you're going to get stuck or fall off a cliff," says Bob Touchton, a UF mechanical engineering doctoral student. "I think it's possible for us to finish the race, but it will surprise me if we have that much break our way."

They love the challenge

For Touchton and other senior members of Team CIMAR, the project began when the first Grand Challenge was announced. At the helm were team leader Carl Crane, a UF mechanical engineering professor, and David Armstrong, project manager and UF engineer.

Crane is the head of CIMAR and UF's chief robot researcher. Armstrong is a mechanical expert who has defined his life with ever-more outsized projects, including building his family's 5,000-square-foot home. "I like a challenge. That's the way I am," Armstrong says, speaking a mantra repeated almost verbatim by other team members.

UF's first NaviGATOR car, a modified Isuzu Trooper that looked like a cross between a Hummer and a tank, placed eighth at the 2004 Grand Challenge. That year's top robot, raced by Carnegie Melon University, traveled just seven and a half miles. The results were almost laughable, considering that the course was 142 miles, and the race was widely lampooned by pundits.

NaviGator on the race course.

Crane and Armstrong put their heads together with their students and team members Mike Griffis, of Eigenpoint, a Florida robotics company, and staff members of the Utah-based robotics company Autonomous Solutions to plan their next entry. Their decision: To rebuild NaviGATOR from the ground up. They hired All Terrain Monsters, a Georgia company, to build the frame and install the powerplant. In Dec. 2004, the company delivered the first bare-bones version of the new NaviGATOR.

That winter and spring, the engineers outfitted it with 10 mainframe computers, three cameras, three laser range scanners, one radar, two GPS units, and five emergency kill switches. They also installed a North Finding Module/GPS system that provides NaviGATOR's computers with constant, real-time location and orientation. The module was donated by Smiths Aerospace, a Grand Rapids, Michigan-based engineering firm that was the team's chief sponsor.

More than 200 teams applied to enter the 2005 Grand Challenge. The agency selected the best 118, then sent staff to assess each entry. In June, UF made the cut of 40 semifinalists. Three months later, at the Grand Challenge's National Qualification Event in Fontana, California, NaviGATOR's performance was good enough to snare one of 23 spots in the main event.

Sleek and carefully engineered, NaviGATOR looks far more professional than some of its competitors. That was managed despite Team CIMAR's relatively small budget totaling $250,000 in cash and donated equipment, a fraction of the sums spent by Stanford, Carnegie Melon University, and others. But on race day, Crane feels NaviGATOR still needs more testing and development.

"The biggest problem we have is we don't have any fault tolerance built in," he says. "If a computer goes down or a sensor starts giving us bad data, we're going to be in trouble."

'It's not meant to be easy'

At 5:23 a.m. on Oct. 8, race day, it is still dark outside the modest white truck trailer that doubles as Team CIMAR's mission control and NaviGATOR's garage. Armstrong, doctoral student Danny Kent, and technician Sarah Gray huddle over laptops checking out their route description data file (RDDF)–an electronic map of the course handed to the team a few minutes earlier. Armstrong programs NaviGATOR's speed for each leg of the 131.6-mile course, which travels through a mountain pass, dry lakes, and tunnels.

The job is tough. If its speeds are too low, NaviGATOR has no hope of winning in the allotted 10 hours. If the speeds are too high, the chances of hitting something or running off the road go up. Armstrong has the time down to eight hours, 18 minutes, with NaviGATOR reaching 24 miles per hour on some stretches – very high numbers for the car.

"I feel pretty good, but the path is a lot harder than we expected, in terms of the geometry of the path itself," he says.

The opening ceremony starts at 6:20 a.m. under a red dawn. The announcer reminds the crowd that the military wants 30 percent of its vehicles under robotic or "autonomous" control by 2015.

The race is a way to galvanize the engineering that will achieve that goal. In light of that, "It's not meant to be easy," the announcer says.

The event is a race against the clock, so the robots' departures are staggered, with those that performed best at qualification earning the top positions. Carnegie Mellon's Highlander, a modified red Hummer with a Star-Trek-like dish on top, is first out of the gate at 6:40 a.m. The driverless car turns by the grandstand and heads out into the desert with almost eerie confidence.

Highlander is followed by Stanford University's Stanley, a sleek modified VW Toureg, and Sandstorm, Carnegie Mellon's other entry. DARPA officials in Ford F-250 trucks follow each robot at a distance, their hands on kill switches designed to stop the robots in their tracks if they get off course or threaten other vehicles.

Other cars follow at 10- to 20-minute intervals. At 8:09 a.m. the first robot to wash out is Cornell's Spider. By 8:50 a.m., three more are "dead bots." At this point, NaviGATOR is nearing the launch gate. Shortly after 9 a.m., Kent leads everyone in a rousing version of the Gator fight song, and NaviGATOR leaves the gate.

"We did everything we could," says Steve Velat, one of the team's two undergraduate students. "She's as good as she's going to get."

'Like being on the cutting edge of computers'

That may not be good enough–for UF and many of the other teams. Any toddler can find his or her way around chairs, couches, and a dining room table en route to the kitchen and the cookie jar. But the same task is nothing if not challenging for robots. Elongate the distance and the number and variety of obstacles, and getting there proves downright daunting.

The problem lies partly in perception. As Galuzzo notes, scientists still do not really understand how people make sense of their surroundings. "It's unclear how we do it. It's all subconscious," he says.

With no biological model, engineers have to be inventive. The lasers, radar, and camera sensors used on most of the robot vehicles are pretty good at sensing obstacles, such as boulders. They have more trouble with "negative" obstacles such as holes – things that aren't so much presences as absences. "You have to sense nothing," explains doctoral student Sanjay Solanki. "Not many people have come up with good ideas on this problem, but everybody is facing it."

Even if the perception is perfect, the machine's computers have to make judgments on the best way to respond – and then these judgments have to be translated rapidly and accurately into mechanical motion.

It adds up to a challenge so huge that the most remarkable thing about this year's Grand Challenge is the progress made by all the competitors.

Last year's NaviGATOR never traveled more than a mile. The current vehicle made 40 miles. Team members are particularly high on a September practice in the desert around Stoddard Valley, Calif. Team CIMAR downloaded a route map through desert mountains from Team TerraMax. They didn't look at the map and had no idea where it might lead NaviGATOR.

"We are looking at cliffs on one side and hills on the other with some serious washouts running across the road. We are not ready for this level of difficulty! The NaviGATOR drives on fearlessly as it weaves near the edge of the cliff…," recounts a race blog maintained by Armstrong in the months leading up to the race.

At qualifying events in Fontana, UF completed three out of five runs and wound up 18th. Other competitors did even better. Stanford's top-ranked Stanley completed all qualifying runs without a hitch. The rapid progress is exciting to all the people involved. The vehicles are far from perfect. Some still look more like college science projects than future military hardware. But there's a sense that the technology is on the verge of taking off.

As Galuzzo says, "It's kind of like being on the cutting edge of computers 30 years ago before they exploded."

An impressive start

Judging from the first moments of the race, robot cars may not be far from the showroom floor.

After leaving the starting gate, all the robots head off, then circle around and make another pass by the crowd before driving into the desert. It's impressive, in part because the cars are moving quickly and seemingly effortlessly. At 10:15 a.m., NaviGATOR roars past at top speed to the cheers of the UF team.

But after following the road for awhile, NaviGATOR stops and does a couple of loops in the dirt–not part of the plan. "Come on, get back on the road again!" Kent urges, cheering when NaviGATOR regains the road and heads in the right direction.

NaviGATOR next flawlessly traverses a bridge over a railroad track and disappears into the brown desert haze. But the optimism left behind by that image doesn't last long. Shortly before 11 a.m., the chase truck following NaviGATOR reports that the car has inexplicably run off the road and stopped. NaviGATOR appears reluctant to move forward into and out of low brush in front of it, although its off-road capabilities would easily carry it through.

The team is incredulous. "He says it's just brush and we should be able to go," Griffis says after talking to the chase truck driver.

After several attempts to pause and restart NaviGATOR, the driver calls back to say the car is moving, but slowly and off the road. NaviGATOR drives slowly over brush, then regains the road and takes off again at high speed, following it perfectly. But after about another mile, the car again gets off the road and stops in front of a bush. This time, DARPA quickly declares NaviGATOR dead.

The time is shortly before noon. NaviGATOR has traveled 23 miles. "I thought we had a pretty good system. I knew speed was going to be a problem, but I thought we could get farther," Crane said.

Later, the team determined the cause was probably a failure of the GPS system, which reported a position almost 10 feet off–prompting NaviGATOR to drive off the road. Armstrong said the car might still have recovered, but its last position was a high-traffic area, and DARPA officials may not have wanted to give the car more time to think its way back onto the road because other robots could hit it.

NaviGATOR placed 18th among the 23 finalists. Five teams completed the entire course. Stanford's Stanley took the $2 million prize for the shortest time of six hours, 53 minutes and 58 seconds.

The team's disappointment is obvious. But everyone feels they benefited from the experience. Like several of the other doctoral students, Touchton will base his thesis on the work he did on the car.

"Where do you find a lab like this?" he asks. "This is like night and day with what we could have contrived in a laboratory."

http://cimar.mae.ufl.edu/CIMAR/

FACULTY FOOTNOTES

Agricultural & Biological Engineering

Ray Bucklin, professor, has received the Gamma Sigma Delta Senior Faculty Award of Merit from the Florida chapter of Gamma Sigma Delta, the national honor society of agriculture. Bucklin's research focuses on agricultural structures and aquaculture.

Biomedical Engineering

Huabei Jiang, professor, is now a Fellow of the Optical Society of America. Jiang is known for his research on breast cancer imaging techniques and was cited for his pioneering contributions to the understanding and advancement of near-infrared diffuse optical tomography.

Chemical Engineering

Tim Anderson, professor and associate dean for research and graduate programs, College of Engineering, has been named a Fellow of the American Institute of Chemical Engineers. Anderson was cited for pioneering the application of chemical engineering to the processing of advanced electronic and photonic materials.

Civil & Coastal Engineering

John Davidson, professor, is the College of Engineering's 2005-2006 Teacher of the Year and will be in consideration for the University of Florida Teacher of the Year award. Davidson is also the associate chair for undergraduate programs for the department.

Y. Peter Sheng, professor, has been appointed to the National Academies/National Research Council Committee on New Orleans Regional Hurricane Protection Projects. The committee will review data on the design capacity of the original hurricane protection system, the forces exerted against the system and the system's response, and the factors that resulted in overtopping, breaching, or failure of levees and floodwalls.

Electrical & Computer Engineering

José Principe, BellSouth professor and director of the Computational NeuroEngineering Laboratory, is now a member of the College of Fellows of the American Institute for Medical and Biological Engineering.

Industrial & Systems Engineering

Don Hearn, professor and chair, is now a Fellow of the Institute for Operations Research and Management Science (INFORMS). Hearn is also the co-director for the Center for Applied Optimization.

Panos Pardalos, professor and co-director of the Center for Applied Optimization, is now a Fellow of the American Association for the Advancement of Science (AAAS); he also received the degree of Honorary Doctor from the Nizhni Novgorod State University in Russia.

Materials Science & Engineering

Jennifer Horton, program assistant, was named the College of Engineering 2005-2006 Adviser of the Year. She will be in consideration for the University of Florida Adviser of the Year award.

Nuclear & Radiological Engineering

Robert E. Uhrig, distinguished professor emeritus, received the ASME Medal for eminently distinguished engineering achievement at the International Mechanical Engineering Congress and Exposition held by the American Society of Mechanical Engineers in Orlando during November 2005. This is the most distinguished award given by the ASME.

David Blankenship

The University of Florida and the Universidad Privada del Norte (UPN), Trujillo, Peru, have formally agreed to a research and education collaboration between their colleges of engineering.

The agreement was signed by UF engineering dean Pramod Khargonekar, UF International Center dean Dennis Jett on behalf of UF president Bernard Machen, and Jaime Zarate Aguilar, UPN academic vice president.

The UF and UPN engineering colleges will work together in the areas of research, student and faculty exchanges, graduate programs, distance learning graduate education, and energy management.

Initial proposals include an energy management program and the establishment of an Industrial Assessment Center, similar to that in UF's Industrial & Systems Engineering department, at UPN's campus in Cajamarca, Peru.

Tulane Students Found a Warm Welcome at UF after Katrina

By Reshelle Smith

Roger Matthews

Hurricane Katrina left a city in ruins and brought New Orleans students a semester no one expected.

In fall 2005, UF's College of Engineering took in 11 students displaced by Hurricane Katrina. They made UF their temporary home during one of the most tumultuous semesters of their lives.

Amy Stein, a senior in civil engineering from Palm Harbor, was working in California when she first heard of an impending hurricane. She followed through with her plans to come home for a few days and then visit friends in Gainesville before leaving for the beginning of class at Tulane University. She ended up staying in Gainesville a little longer than expected.

She was in classes at UF by the Thursday after the hurricane. "I might have been the first one here," she said.

After convincing three other civil engineering friends from Tulane to come to UF, they rented an apartment together for the semester. She said one of the best things to come out of this experience was the opportunity to connect with old friends she hadn't seen since high school. And although UF's engineering program is much larger than Tulane's, she still enjoyed a sense of community with those in her classes and found that professors still knew and cared about their students.

That doesn't mean the semester was easy. She began classes about two weeks after everyone else. "It was hard jumping into these classes two weeks late and completely thrown off," she said. "I didn't have a schedule down. It was hard." She had a lot of catching up to do, but the professors were very understanding and helpful, allowing her extra time to catch up.

Stein returned to Tulane for the spring semester. As vice-president of the American Society of Civil Engineers at Tulane, she wants to help rebuild the city. She was planning to help out with a paint rally for the schools in New Orleans, Habitat for Humanity, and a new program to help employees of Tulane with the rebuilding process.

Roger Matthews, a senior in mechanical engineering at Tulane, feels similarly. He wants to give back to the city that has given him so many great memories.

He was on a beach trip with friends when the he got news of an impending storm. He rode out the storm in a motel in Panama City, and then ended up waiting for news about school closures at home in Bluffton, S.C., with just the clothes in his bag. A high school friend in Gainesville with an available room prompted his journey to UF.

"If you have a plan set up for six months, and then all of a sudden, one day it just doesn't work, you're aimless," he said. "I had to go somewhere, and Florida was the obvious choice."

Once he arrived, about three weeks after classes began, the UF administration did its best to get him exactly what he needed. "My experience with the administration couldn't have been better," he said. "I had gotten to UF and 45 minutes later I was sitting in class, and by the end of the day I was a complete, registered, legal student. They were very understanding."

Without even a transcript, it was hard to figure out exactly which classes he needed and which ones were equivalent to those at Tulane. "The teachers were as helpful as they could be," he said, "but there's really not a lot they can do for you when you are three weeks behind."

The football season at UF was one experience Matthews never expected. Football isn't a popular sport at Tulane, so seeing a campus full of tailgaters was very unusual for him. "People wake up early to start partying here when there's a football game, and you'd be hard pressed to find someone that knew there was a football game that day on Tulane's campus," he said.

He returned to New Orleans during the fall semester to survey the damage. The floodwaters severely damaged the house he had planned to live in, leaving almost everything in the first floor and all the cars in the street pretty much destroyed.

"It doesn't really occur to you that it's your backyard until you're standing in it," he said. He was not sure whether repairs to his house would be done when he went back for the spring semester or not, but it didn't matter to him.

"I'll do whatever I have to," he said at the time. "I'll live in a hotel if I have to. I'll live in a trailer."

He felt he had a duty to return to Tulane for his graduation and to help rebuild the city. "I feel like I owe the city to hammer a few nails and clean out a few driveways, things like that," he said.

After the rebuilding effort, he is contemplating graduate school at UF, mostly as a result of his experience during his semester's exile.

Environmental Graduate Program Receives $3.1 Million Grant

By Meredith Jean Morton

Starting in summer 2006, the University of Florida will take an innovative approach to graduate student education through a program that will give students a wider range of knowledge and experience through fellowships that take an interdisciplinary approach to research.

The National Science Foundation awarded $3.1 million to UF's Center for Environmental Policy to conduct the Integrative Graduate Education and Research Traineeship, or IGERT, program over five years.

"This is a (National Science Foundation) program meant to change the culture of graduate education," said Mark T. Brown, director of the UF Center for Environmental Policy. "In typical PhD work, the student finds a discipline, becomes steeped in it and develops little or no knowledge in other areas."

The UF IGERT program will be one of 125 nationwide, each providing a special opportunity for students interested in pursuing a doctorate in the natural and social sciences, mathematics, engineering, or technology.

"The problems of the world are not narrow and limited," said Brown, a wetlands and systems ecologist. "They are complex and integrated, and it's important to shift the PhD programs from narrow to integrated."

UF's IGERT program will provide fellowships for 25 to 30 doctoral students in different disciplines to conduct research around an integrated theme that focuses on wise use of water, wetlands, and watersheds. The program's key feature is adaptive management, a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

"This is a training and educational grant, not a research grant," Brown said. "Almost all of the money goes toward the graduate students."

UF's IGERT program is unique in that it forms partnerships among UF's Institute of Food and Agricultural Sciences, College of Engineering, Fredric G. Levin College of Law, and College of Liberal Arts and Sciences. Fifteen departments within the four colleges will participate in the program. It has research partners locally in the Florida Everglades and internationally in Africa, South America, Australia, and Central America. Each summer, the IGERT fellows will work and study abroad in these locations to gain hands-on experience, but they'll start with a two-week intensive study of the Everglades.

"Our fellowship begins with a summer visit to the Everglades because it gives the students an opportunity to see a system that is costing $8 billion to put back together," Brown said. "Then we go to one of the other continents because the ecosystems there are very similar to the Everglades, with all kinds of competing factors trying to maintain a viable ecology."

Brown stressed that students in any discipline are welcome to join the IGERT program, and even doctoral candidates focusing on exercise science, fine arts, or tourism could be tapped.

The educational component of the IGERT program emphasizes basic science in each student's discipline, coupled with training in systems, law, policy, ethics, and communication.

"We are gearing up to bring the first group of students into the program in June 2006," Brown said. "I believe in experiential learning, and that immersion in the international ecology will give the students a greater potential for an integrative education. The senses come alive when studying and traveling in unusual places."

The idea for the program originated in Brown's own experiences in graduate school at UF, where he forged numerous professional relationships with fellow graduate students.

"As a result of the experiences in graduate school, you develop a camaraderie that lasts a lifetime," he said. "We're trying to foster that camaraderie for lasting professional relationships between our students."

www.ees.ufl.edu

Engineering students learn

New Tools for Better Communications

By Reshelle Smith

This year, some of UF's Mechanical & Aerospace Engineering (MAE) graduate students are trading thermodynamics for tone, statics for simile, and physics for parallelism.

Following the lead of other top engineering programs such as the University of Michigan, which holds an annual fiction and poetry writing contest for its engineers, UF has brought creative writing to the MAE department.

This year, students meet once a week in a graduate seminar course to discuss writing and how to improve their writing skills. The course includes creative writing, a talent engineers are generally not known for.

The students are tackling writing assignments like poetry and how to describe something ugly as something beautiful with enthusiasm, said instructor Christine Schmitz.

Christine and her co-instructor and husband, MAE assistant professor Tony Schmitz, believe that the class emphasizes needed skills that sometimes don't get enough attention.

Being able to write intelligently is a huge benefit to anyone who wants to advance in any field, Tony said.

"As graduate students, you are being prepared to assume leadership positions in engineering when you leave here," he said. "I don't know of any leadership role in engineering where you do not need strong communication skills. We're just trying to add to the students' toolbox, so they can just be that much more successful."

He first began thinking about a writing class for engineers while working at the National Institute of Standards and Technology in Gaithersburg, Md.

"By and large, it was the people that were the better communicators that did a better job attracting funding and identifying interesting things to work on," he said. "I think that's what planted the seed."

He discussed the idea with his wife, Christine, who has taught English, creative writing, and technical writing to a wide variety of students.

"Engineers as a group, to stereotype them, are not very good writers," she said. "There's no stress on writing, but yet you can't be a research scientist and not have to write. You can do all the research you want, but if you can't communicate it when you're done, no one is even going to know about it."

The idea came to fruition when they ran into one of Christine's former creative writing professors at UF, Debora Greger, an award-winning writer. They discussed their idea with her, and her enthusiasm was obvious. Together, they wrote a proposal to modify the lecture content of the graduate seminar course, which Tony is co-organizing with MAE professor Jacob Chung this year, in a new direction.

After receiving approval from engineering dean Khargonekar and interim MAE chair Gene Hemp, they began teaching the class in fall 2005. Greger taught the poetry section, Christine taught creative writing, and Tony taught oral presentations and proposal writing. Greger is in England for spring 2006, so Christine has taken over the poetry section this term.

This is more than a technical writing class. The instructors' focus is less on the mechanics of writing and more on the students' expression and creativity.

English is not the first language for five of the seven students enrolled this semester, making writing an even bigger challenge. While they may be more comfortable speaking Korean, Hindi, German, or Spanish, they are doing a great job writing creatively in English, Christine said.

"There's no limit to what I can put at them," she said. "I'm giving them assignments that I wouldn't give until the last week of the semester in a regular creative writing class."

While the long-term effects of the class are yet to be seen, Christine and Tony both believe this is something the students both need and enjoy.

"The engineer is the scientific equivalent of a poet," said Christine. "They are taking all of these things, all of these expected things, such as the equations they know, the formulas they know, the outcomes that they know, and they are having to use them in creative ways to come up with new ideas and new inventions."

Christine and Greger have submitted a proposal to continue the class as a three-credit course in the fall. They would like to continue working on innovative ways to educate engineers.

Poem
By Aaron Fancher
written the first week of class

How does one write a poem
when one is not a poet?
If he's going through the motions
will the unsuspecting reader know it?

And what of rhyme or meter,
will an ABAB do?
For even an artless Philistine
can write a Limerick or Haiku.

Does he write of life as simile
or use pretentious metaphor?
Can he trick the reader into thinking
his poem means something more?

EES Programs Help Environmental Protection and Water Resources Management Professionals Stay Current

By Warren Viessman Jr.
Professor Emeritus
Environmental Engineering Sciences

Rachel Carson's 1962 book *Silent Spring* and the inaugural Earth Day in 1970 catalyzed a firestorm of environmental activism that has been sustained for more than 40 years. An outgrowth of this has been the passage of a host of federal and state laws and rules devised to protect the environment, ensure clean air and water, protect endangered species, and encourage the restoration of ecosystems.

Development and implementation of these laws, rules, and policies requires input from a spectrum of specialists and concerned stakeholders. Engineers, scientists, sociologists, economists, ecologists and others are involved in policy making and analysis, and in planning and management related to environmental protection and water management.

These specialists all need a broad understanding of the full dimensions of the issues they face. Recognizing this, the Environmental Engineering Sciences (EES) department developed two online graduate level programs to help those seeking to strengthen their ability to function as team players in the water/environment field or to obtain better credentials for employment in that area.

The certificate program in Environmental Policy and Management began in 1998. It consists of five courses covering environmental policy, environmental planning and design, environmental law, global environmental policies and institutions, and environmental economics. To date, 27 certificates have been awarded and 117 students from various disciplines and affiliations are enrolled in the program.

The second program, launched in 2003, is an online master's degree with specialization in Water Resources Planning and Management. Students may earn a Master of Engineering or a Master of Science degree, depending upon their background. Thirty credit hours (10 courses) are required to complete the program.

The online master's degree began as a cooperative program with the U.S. Army Corps of Engineers (USACE). Five universities participate in this venture: The University of Arizona, Southern Illinois University, Harvard University, Johns Hopkins University, and the University of Florida. The UF program is not limited to USACE students, but is open to all students who qualify for admission.

Students are admitted to the master's program through the EES department. The curriculum is broad and designed to provide planning and management professionals with a strong academic base in the fundamentals of water resources planning and management. The program includes formal courses on water resources planning and institutions, decision support systems, environmental policy, ecology, water resources infrastructure, economics, hydrology, hydraulics, and quantitative methods. An advanced planning practicum is the capstone for the program.

Currently, 33 students are pursuing this program. Seventeen are USACE civil works students and 16 are from water management districts, state agencies, consulting firms, industry, water utilities, and the military (Army, Navy, Air Force, and Coast Guard). The students are from Florida, Washington, New Mexico, Alabama, Georgia, and Mississippi.

The online master's program attracts a broad range of professionals, ranging from a trial lawyer to an Air Force pilot. During the fall semester of 2005, one student was Lt. Melissa R. Smith, a graduate of the U.S. Air Force Academy with a degree in environmental engineering and a 2005 recipient of her wings (see photo). Her comments exemplify the interest of professionals in continuing their education in the environment/water field.

"As a military officer I feel it is my responsibility to know what consequences my actions and the actions of those around me are having on any given situation," Smith says. "Often I think we overlook the environmental impact of situations and I hope that studying the environment keeps that impact on the forefront of my mind.

continued on page 33

DEVELOPMENT REPORT

Spring 2006

Ann McElwain
Senior Director of Development
E-mail: amcel@eng.ufl.edu

Edward M. Kominowski
Director of Development
E-mail: ekominowski@eng.ufl.edu

C. Ellis Pope
Director of Development
E-mail: epope@eng.ufl.edu

P: 352.392.6795
F: 352.846.0138

Ann McElwain is New Senior Development Officer

Ann McElwain joined the College of Engineering as senior director of development in October 2005.

McElwain is a 1990 University of Florida alumna in Economics. She also has an MBA from Nova Southeastern University in Fort Lauderdale. Before coming to UF, she was the managing director for fundraising at Jack and Jill's Children's Center in Broward County. She was named the Outstanding Fundraising Executive for Broward County in 2004 by the Association of Fundraising Professionals.

Silver Society Welcomes 25th Anniversary Graduates

A new Gator tradition, the Silver Society, has been created for UF alumni who graduated 25 years ago, or more.

The first reunion of the Silver Society will be held Saturday, April 22, 2006, at 7 p.m. in the Emerson Alumni Hall. The event is part of Spring Weekend, which will also feature a concert and pep rally on Friday, as well as a pre-game barbecue prior to the Orange-Blue game on Saturday.

For more information, visit the Alumni Association Web site at **www.ufalumni.ufl.edu**.

Gator Engineering Honors Donors with New Recognition Wall

Last fall we announced plans to create a donor recognition wall, which will be installed at the entrance of the Dean's suite in Weil Hall. The wall is designed to be a prominent interior feature of the college and will recognize the generous support you and your families have given to the educational and research mission of Gator Engineering.

The first installation will recognize individuals and corporations whose lifetime donations totaled more than $10,000 as of Dec. 31, 2005. Each year, we will add to the wall the names of donors who achieve the $10,000 mark by the end of the previous December.

Plans are underway to hold a dedication and reception for the donor wall in fall 2006. If you have any questions, or would like to participate, please contact the Development Office at 352.392.6795.

Honor Roll of Donors Goes "Live"

For the first time, the College of Engineering is posting our Honor Roll of Donors online. The Honor Roll recognizes donors by giving levels and by class year for the fiscal year 2004-05. The list is available on the college's Web site.
www.eng.ufl.edu/honorroll

To report any inaccuracies, or if you do not wish to have your name posted electronically, please contact us at:
Engineering Development Office
UF College of Engineering
P.O. Box 116575
Gainesville, FL 32611-6575
P: 352.392.6795
E-mail: mmcel@eng.ufl.edu

Florida Fund for Alumni Support

UF Outpacing Peers in Young Donor Competition

The Florida Fund is UF's annual fund. Many of you who give back to the College of Engineering do it through the Florida Fund, responding to phone calls and letters from students with gifts to your college or departments.

To add a new dimension, Florida Fund has established the SEC GOLD (Graduates of the Last Decade) Challenge with participating SEC universities to see who has the most loyal alumni. Check out the Web site at **www.sec-challenge.org**, a one-stop source for information about alumni giving, to see how the participating universities are stacking up compared to each other.

As you would expect from our loyal alumni, UF is well ahead of its peers. We sincerely thank all of you who have participated. We greatly appreciate your loyalty and gifts to make the College of Engineering the best in the SEC. Go Gators!

Progress Energy gives $205,000 Annual Gift

Progress Energy, a longtime corporate partner of the College of Engineering, made a significant contribution of $205,000 to support the college's programs and departments. Specifically, the gift will provide:

- $100,000 to establish and name the Progress Energy Advanced Radiation Detection Laboratory (ARAD) in the department of Nuclear & Radiological Engineering. Funds will be used to purchase and install equipment for the development and testing of new materials for the design of advanced detectors.
- $50,000 to renovate a lab in the Mechanical & Aerospace Engineering department, providing space and equipment for student projects. Renovations will allow students to compare analytical solutions with measured data by applying conservation principles to a moving boundary control volume, conduct data acquisition measurements on a transient system, and reinforce fluid dynamics and thermodynamic principles taught in lecture class.
- $20,000 to support Industrial & Systems Engineering's innovative Integrated Product and Process Design program (IPPD), in which businesses contract with student teams to tackle a design challenge for their company.
- Eight undergraduate scholarships in the departments of Civil & Coastal Engineering, Mechanical & Aerospace Engineering, Nuclear & Radiological Engineering, and Environmental Engineering Sciences to support junior and senior level students.

This extraordinary annual gift was presented by Progress Energy representative Rose Fagler on December 20, 2005. The college is proud of its association with Progress Energy and is grateful for this gift, by far the largest made to the college by Progress Energy.

Lt. Melissa R. Smith (center, blue uniform) received her wings from Commodore Little, commander of Training Wing 6. Also pictured (L - R) are her father Karl, mother Robynne, and brothers Karl and Rowland.

EES Programs Help Environmental Protection and Water Resources Management Professionals Stay Current

continued from page 31

I also believe that we need to constantly be learning and continuing to educate ourselves and for me the environment is a great and important thing to study since so much of what we are doing now will affect future generations."

The certificate and master's programs are offered by streaming video through the college's UF EDGE Program, and are accessible to students anywhere in the world who have appropriate Internet connections. The programs afford excellent continuing education and life-long learning opportunities for students engaged in water resources planning and management and in environmental policy and management. As the half-life of engineering, science, and other educational programs decreases, the need for opportunities such as these special online programs accelerates. The EES department is committed to providing online opportunities for professionals engaged in protecting and managing the nation's environmental and water resources systems.

www.ees.ufl.edu

Harbert Scott Gregory

BS EE 1938

Inspired the UF Sales Engineering Program


David Blankenship

College of Engineering alumnus and friend Harbert Scott Gregory of Covington, La., died at age 91 on Feb. 13, 2006. Gregory is survived by his wife, Jane; five children, Anne, Kathleen, Mary Lee, Scott, and Margaret; and 14 grandchildren. Gregory resided in New Orleans for 60 years, and retired to the Covington area.

Gregory was always an outstanding and motivated student. A native of Tallahassee, he started working at age 8 as a newspaper boy to help his widowed mother support her family of six during the 1920s and the early years of the Great Depression. At Leon High School in Tallahassee, he was president of the student body and graduated with top honors in 1932. He went on to UF, receiving a BS degree in electrical engineering in 1938. At UF, he was president of the Benton Engineering Council, clerk of the UF honor court, and vice president of the student body. He was elected to Florida Blue Key and was inducted into the UF Hall of Fame.

After graduation, Gregory joined General Electric in 1939, then served in the Navy in World War II. During his last year in the Navy, he was stationed on Okinawa as the electrical officer, degaussing officer, and supply officer under the command of Captain Hyman Rickover, who later led the creation of the Navy's nuclear submarine force. After leaving the Navy, in 1946 he founded an electrical engineering sales agency in New Orleans to buy and sell war surplus goods. The company became Gregory, Salisbury & Company, Inc., and is still in business today.

Gregory's experience with this business made him realize that engineers also need business skills. He believed that creating technology and selling it were equally important, and that trained engineers make the best salesmen because they have the best understanding of the technology and how it can benefit the customer. Business skills also prepare engineers to start their own companies.

To encourage engineering students to consider careers in the sales, entrepreneurial, and business aspects of engineering, he established the Harbert S. and Jane R. Gregory Distinguished Lecture Series in 1986 with a $200,000 endowment. The lecture is given once each year.

The lecture series was followed three years later with a new interdisciplinary Sales Engineering Certificate Program. At the time, there was only one other sales engineering program in the nation. In 1998, the Harbert S. Gregory Sales Engineering Scholarships were established for undergraduate students enrolled in the program.

The University of Florida honored Gregory in 1996 with its Distinguished Alumnus Award. At that event, then-UF president John Lombardi said, "He is an example of what we all expect of our graduates: Commitment, quality, energy, vision, and statesmanship."

1982

Marty E. Sanders, BSCE, P.E., is the executive director of growth management, land acquisition and intergovernmental relations for the St. Lucie County school board. Last year Sanders received the Engineer of the Year Award from the Treasure Coast chapter of the Florida Engineering Society for his work in leading the school district's $116+ million recovery from hurricanes Frances and Jeanne.

As the executive director of growth management, he is responsible for long-range planning and implementation of school concurrency for the school district. Previously, Sanders was the school district's director of facilities for three years. His community activities include serving as president of the St. Lucie County Chamber of Commerce and serving on the boards of the Treasure Coast Gator Club, St. Lucie County Economic Development Council, Leadership St. Lucie, St. Lucie County Education Foundation. He was also co-chair of the 2002-03 United Way campaign for St. Lucie County.

Sanders is married to Gator grad Sue-Ellen Apte Sanders (ADV '81), and they have two children, Jake, 12, and Chloe, 11. They reside in Fort Pierce.

1997

Celia D.A. Earle, BS ENV, MS ENV, has been honored as an Exceptional Woman of 2005 by Planned Parenthood of South Palm Beach and Broward Counties. Earle holds four degrees from UF: a bachelor of science in environmental engineering sciences and in microbiology and cell sciences, a master of science in environmental engineering sciences, and a PhD in environmental chemistry. She is an associate with Malcolm Pirnie, Inc., a national environmental engineering consulting firm, where she is responsible for business development in southeast Florida. Born in Jamaica, she was the first female president of the UF Caribbean Student Association and is a past vice-president of the Caribbean Heart Menders Association, which provides life-saving heart surgeries for children unable to afford it.

She is a member of Kiwanis, and currently serves on the Kiwanis Florida District Foundation Trustee Board, on the board of directors of the coalition to End Homelessness, and as chair of Kiwanis Division 23's Annual Christmas in July Project for Homeless Children in Broward County. This project was originated by Earle four years ago, and has provided essential clothing, school supplies, and toys to over 2,300 homeless children in Broward County.

She is the daughter of Jonathan F.K. Earle, associate dean for student affairs of the UF College of Engineering.

2001

Sara Beresheim, BS CE, has passed the Professional Engineering examination with the State of Florida. Beresheim is a project engineer in the traffic engineering department in the HNTB Corporation Tampa office. She has more than five years of experience in traffic engineering including traffic studies, signalization design, traffic signal retiming and signing and pavement marking design projects. HNTB is a national, employee-owned infrastructure firm that offers comprehensive design, engineering and planning services to federal, state and local public and private clients.

Grand Guard 2005

The Grand Guard met for its annual reunion weekend at the University of Florida on Nov. 4. This year several new members joined the Guard, which is exclusively for alumni who graduated 50 years ago or more.

Guard members retain a lively interest in the college's activities and progress. They were particularly impressed when Dean Pramod Khargonekar told them that the entering freshmen in fall 2005 had, as a group, an average SAT score of 1340. Many speculated that they wouldn't be admitted to the college if they had to do it today.

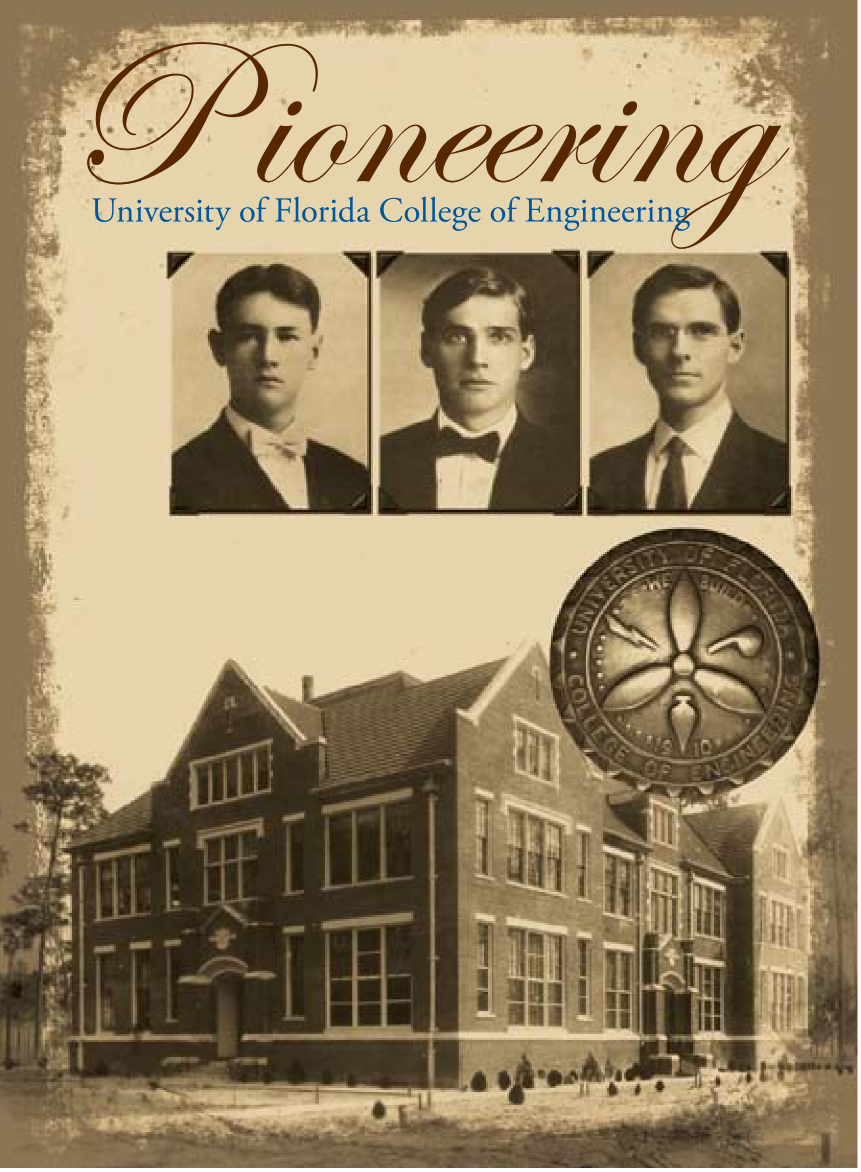
They were being modest. In fact, their accomplishments are impressive. This group of Gator Engineers includes pioneers in lasers, space engineering, miniature electronics, and the electrical engineering that gives theme parks their flash.

As the graduates shared memories of their careers, they all made the point that their UF education had made their careers possible. The dean said he hoped the students now enrolled would someday be able to say the same about their education.

David Blankenship

Attendees included:

William E. Adams, BS IE 1949
Hillard H. Allen, BS ME 1955
George W. Campbell, BS ME 1936
Roger L. Cox, BS EE 1955
Ronald M. Finch, Jr., BS IE 1954
Roland L. "Tad" Fraser, BS EE 1950
L. Freeman Good, Jr., BS ME 1955
James A. Henderson, Jr., BS IE 1951
Harold L. Hess, BS EE 1955
Sid Hodge, BS EAE 1955
Jefferson R. Kirkpatrick, BS CE 1952
Eugene A. Lichtman, BS ME 1955
Henry H. Nichols, BS ME 1954
Vincent B. Pickett, BS CE 1952
Lee H. Scott, BS EE 1949
C. Vernon Shaffer, BS EE 1944, MSE 1960
Howard W. Sims, BS EE 1955
Curtis H. Stanton, BS ME 1940
Andrew E. Stevenson, BS AGE 1955
Edward J. Telander, BS EE 1952
Roy L. Turknett, Jr., BS ME 1955



the FUTURE 1910-2010

Engineering studies began at the University of Florida in 1906, before the College of Engineering was officially founded in 1910. As our centennial approaches, we will explore our history and growth and share the story with our friends and alumni.

This year, we honor the first Gator Engineers. Three young men came to Gainesville to enroll as engineering students in 1906. They were accomplished scholars, leaders and athletes. Above all, they were a bright beginning to the college's brilliant future. As pictured (L-R): Ossian W. Drane, B.S. Electrical Engineering, Lakeland; Ralph D. Rader, B.S. Civil Engineering, Miami; Harry L. Thompson, B.S. Civil Engineering, Pensacola.

Dr. John R. Benton (1876-1930), professor of electrical engineering and physics, was the college's founding dean. He served from 1910 until his death in 1930. Known for his scientific understanding, steadfast character and innovative ideas, Benton established a strong foundation for future Gator Engineers to build upon. Benton Hall, also pictured on the front, was the first College of Engineering building at the University of Florida. It was completed in 1911 and named in honor of the Dean.

LETTERS

Sometimes our Gator engineers send us mail that can't be easily encapsulated in the Alumni Notes column. We are happy to print your letters when space permits.

Dear Florida Engineer,

I have the greatest job in the world and I owe it all to the University of Florida. I graduated from UF with a bachelor's degree in computer engineering and a minor in mathematics. While at UF, I attended every football game as a member of the Pride of the Sunshine Gator marching band. The combination of engineering and Gator game day experiences gave me all the tools I needed to do what I do everyday.

I am a software engineer for Electronic Arts Sports in Maitland, Fla. I specialize in making/designing NCAA Football and Madden video games. During my three years at EA sports, I've put out a total of 12 football titles spread across the Xbox, Playstation 2, and GameCube.

The thing I love most about my job is the ability to pour all of my passion for the University of Florida into the game. I always do my best to make sure the University of Florida is represented well. With the upcoming release of NCAA Football 06, I hope that Gators everywhere will be happy with all the personal touches and polish I put on every aspect of the Florida Gators.

I thank the College of Engineering and the University of Florida for giving me the tools, talent, and passion to do what I do today. I look forward to seeing you in the fall!

Felix Rivero, '99
Lake Mary, Fla.

Dear Ms. Dobson,

I enjoy each issue of *The Florida Engineer*.

I would like to give you a belated thank you for the piece you published a few years back about Wood and Wiggins, student editors of the first issue of the magazine.

Since that time, we haven't had any more '52 engineers mentioned, except in the obits. In order to remedy that situation, I am enclosing a copy of a book written by a fellow mechanical engineering graduate from the June '52 class, Melvin Eisenstadt.

[The book is *Noah's Millennium*, a science fiction novel about the effects of global warming.]

The university had lost track of him, but in searching for '52 engineering grads to attend the 50th Grand Guard Reunion in Sept. 2002, we managed to locate him. He apparently has had an interesting career. I thought that someday you might find the space and time to do a short piece about him.

Anyway, thanks again for a great magazine and keep up the good work.

Bill Der Garry
BS ME '52
Sarasota, Fla

You had a good idea, Bill, so we contacted Melvin Eisenstadt.

Mel Eisenstadt writes:

Many thanks to Bill Der Garry.

I received a Bachelor of Mechanical Engineering from UF in 1952. After a short stint in the aerospace industry, my ROTC caught up with me and the Air Force had me for two years, one of which was in Korea. After a couple more years in aerospace, I got my master's from UF in 1959, specializing in solar energy.

Then it was back to the aerospace industry, this time at the Martin Co. plant in Orlando. Tiring of that, I went back to school and received a PhD in mechanical engineering from the University of Arizona. I joined the faculty of the University of California at Santa Barbara and then the University of Puerto Rico at Mayaguez. Finally, I left there and obtained a JD (law) degree at the University of New Mexico.

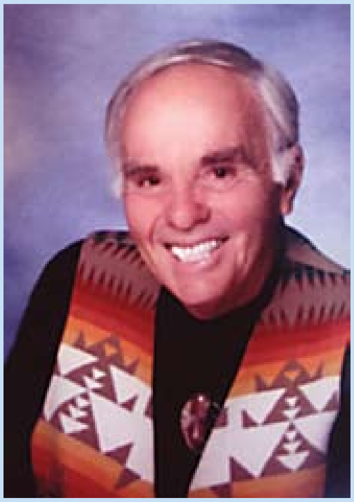
During all this time, I did research in the energy area. I also did research into the legal problems of solar energy, ran a solar company in Albuquerque for a year, and practiced law. I was elected municipal judge of Corrales, N.M., our small town on the outskirts of Albuquerque. That was a two-night-a-week thing, and I practiced law for my real job.

After about 15 years, I concluded that the study of law was more interesting than the practice. I had always wanted to write - in 1971 I had written a materials science textbook entitled *Introduction to Mechanical Properties of Materials* - and about 15 years ago I quit and began writing fiction and making silver jewelry.

My first novel *Navajo Afterglow* was published in 2000. It was a story of two Navajo uranium miners who contracted lung cancer because of what the feds didn't do, and they took some (good) revenge.

I suppose you're right about my being a bit of an activist [in response to a question from *The Florida Engineer*]. *Navajo Afterglow* is an objection to the government's behavior with respect to the uranium miners when all the government wanted was uranium ore, even when it killed the miners who were helping them get it. A few simple things, like ventilation in the mines, would have helped greatly.

In 2005, *Noah's Millennium* came out. One point I was trying to make is that we have to start cleaning up the atmosphere early if we want to prevent the global warming disaster since it will take two or three decades after we begin the clean up to bring the atmosphere back to where it used to be.



Mel Eisenstadt

Next year, a novel entitled *The Dynamite Campaign* will come out. In a nutshell, it is about a man who blows up a building and is then elected to Congress. . . all very logically, of course. I've got some experience in this, having run for judge twice and helping my wife, Pauline, with her elections to the New Mexico House and Senate. (After eight years in the House and four in the Senate, she got smarter and quit.)

After that, I've got one more novel done, *Water War*, about the Navajos trying to convert Colorado River water into hydrogen for use as a clean fuel. Solar electricity powers the conversion. If you do the calculations, draining the Colorado River and breaking down all the water will fuel the country. All of the water in the Colorado has been spoken for, but a quirk in water law called the Winters Doctrine (this is real) may provide the Navajos with a legal way to steal the water. In the book, a water war erupts between the Navajos and Nevada gamblers, who want the water for golf courses, swimming pools, etc.

The jewelry making has been a method of getting my mind off writing occasionally. Making jewelry keeps your entire head busy and away from what you're writing. I learned how to silver solder very well in grad school, making ultra-high vacuum systems. My wife is also an artist, and paints in oils and does a little real estate investing.

Anyone who is interested in my books can contact me at P.O. Box 658, Corrales, New Mexico, 87048. They can also get them online at Amazon.com or Barnes & Noble.com, or from their local bookstore. If they order from me, it's complete with a free autograph.

Lee Scott addresses the Grand Guard.

A Conversation with Lee Scott

Lee Scott (BS EE '49) took a few moments during the Grand Guard celebration to share some memories with *The Florida Engineer*.

Scott has had an interesting life since his graduation from UF. He spent his entire career with the Florida Power Corporation, steadily rising through the ranks of a company that has often changed its name. He eventually became president and chief executive officer of the FPC and served as director when it became the Florida Progress Corporation (now Progress Energy). But originally he was a high school boy in Tallahassee during World War II, who enlisted in the Army Air Corps right after graduation.

After he was discharged, he registered at the University of Florida. "The university wrote back and asked if I would be willing to go for a couple of quarters to TBUF – Tallahassee Branch of the University of Florida."

The TBUF was created in 1946 at the Florida State College for Women because UF didn't have enough space to serve the flood of veterans wanting to go to college on the new G.I. Bill. In 1947, the state legislature made the women's college coeducational and renamed it Florida State University.

"Some of my friends in the same situation went there. There were 3,000 women and only 50 of us boys. Most of them didn't want to leave there, but they had to come back to UF to get a degree to make a living with. I wanted to continue in engineering. Most of what they had at FSU was home economics," Scott says.

"So I can say I went to both FSU and UF, and when they say, why did you go to both, I say I went to FSU until I could get into the University of Florida." And he laughs.

Scott said all the reminiscences at the Grand Guard reunion reminded him of many things that happened, as he says, "way back when." But he thinks that graduating and looking for a job turned out to be the best thing that happened for him personally, because he was employed by the Florida Power Corporation, and that meant he could stay in Florida.

"In those days, some years you had many job offers and other years, you didn't have so many," Scott explains. "In my year, we didn't have so many. It had to do with the economic situation. GE and Westinghouse, who normally recruited heavily, weren't recruiting much that year. But it happened that Florida was expanding rapidly, so the power companies were hiring a lot of people."

Scott is proud of being an engineer, but he is most proud of becoming a complete person. As he explains it, "I was interested in many things and never really wanted to go into pure design. I guess that's why I did many other things besides engineering. And this is probably why I progressed in my company," he says.

Scott has been very active in local causes in St. Petersburg, like the United Way and Red Cross, and was a member of Suncoasters, a local civic group that puts on activities around St. Pete. For his work, he was named "Mr. Sun," St. Petersburg's leading civic honor.

Scott was president of the Florida Chamber of Commerce in 1988 and chaired the College of Engineering's first capital campaign at about the same time.

"I did a lot of things. It's kind of unusual for engineers to be doing that," Scott says.

Martha Dobson

FRIENDS WE WILL MISS

1934 James L. McCall, Jr., BS CHE, of Vicksburg, Miss., died December 13, 1998.

1937 John P. Lenkerd, BS EE, of Altoona, Fla., died June 10, 2005.
Kenneth D. Lister, BS º, of Dothan, Ala., died November 1, 1986.
William A. Ostner, BS CHE, of Jacksonville, Fla., died March 16, 2005.

1938 Charles E. Blanton, BS EE, of Perry, Fla., died December 1, 1980.
William L. Duncan, Jr., BS EE, of Jacksonville, Fla., died September 28, 2005.
Alfred R. Major, BS ME, of St. Petersburg, Fla., died March 11, 1979.

1939 Albert J. Jackson, BS, of Altamonte Springs, Fla., died April 6, 2003.

1940 Vernon G. Adamek, BS ME, of New Port Richey, Fla., died September 20, 2001.
George J. Vila, BS ME, of Lake Worth, Fla., died September 23, 2003.

1942 John W. Bennett, BS CE, of Colorado Springs, Colo., died April 8, 2004.
Claude W. Coffee, Jr., BS ME, MS IE '47, of Newport News, Va., died September 7, 2005.
William G. Morgan, BS CHE, MS CHE '48, of Beaumont, Texas, died December 1, 1986.

1944 Harold L. Sherron, BS ME, of Fort Lauderdale, Fla., died November 11, 2005.

1946 Arthur H. Smith, Jr., BS EE, of Gainesville, Fla., died March 15, 2005.

1947 Glen L. Taylor, BS EE, of Orlando, Fla., died July 15, 2005.

1949 Charles R. Ford, BS CE, of Gainesville, Fla., died September 13, 2005.
Thomas E. Keeter, Jr., BS IE, of Greensboro, N.C., died September 29, 2004.
Edwin H. Stewart, BS IE, of Fort Pierce, Fla., died August 14, 1988.

1950 George T. Lohmeyer, BS CE, MSE '57, of Jacksonville, Fla., died June 1, 1986.

1951 James T. Henderson, Jr., BS ME, of Springfield, Ohio, died December 5, 2004.
Ralph Maxwell, Jr., BS IE, of Carriere, Miss., died January 16, 2003.
John W. Meyer, BS EE, of Annapolis, Md., died July 29, 2005.

1952 Charles A. Anderson, BS CE, MS CE '53, of Young Harris, Ga., died August 10, 2005.
Larry W. Hudson, BS ME, of Mesa, Ariz., died December 14, 2001.
Francis W. Mohme, BS CE, of Fountain Valley, Calif., died January 24, 2002.

1953 James H. Robbins, BS EE, of Phoenix, Ariz., died October 8, 2005.

1955 William D. Givens, BS CE, MS CE '56, of Miami, Fla., died January 24, 2002.
Waylon A. Lacey, BS ME, of Jakin, Ga., died May 6, 2005.
Roy L. Phillips, BS ME, of Jacksonville, Fla., died December 30, 2004.
William H. Riley, Jr., MS, of Crawfordsville, Ind., died June 17, 2004.

1956 Alfredo Arias, BS CE, of Panama City, Panama, died January 1, 1979.
Herbert J. Crenshaw, of Coleman, Fla., died February 6, 2005.
Abraham Levine, BS EE, of St. Petersburg., Fla., died September 1, 1976.
Mason D. Wade, Jr., BS CE, of Anchorage, Alaska, died December 29, 2003.

1958 J. Ping Alberdi, BS ME, of Crystal River, Fla., died September 25, 2005.
John E. Fennimore III, BS ME, BS IE, of Orlando, Fla., died June 25, 2005.
John O. Lanier, Jr., BS EE, of Fort Myers, Fla., died March 31, 2005.
James M. Locklair, Jr., BS EE, of DeLeon Springs, Fla., died January 14, 2005.
Thomas M. Wheeley, Jr., BS IE, of Haines City, Fla., died August 22, 2001.

1959 Robert J. Levesque, BS EE, of Jacksonville, Fla., died July 15, 2004.
John H. Mathis, BS EE, of Grenada, Miss., died December 7, 1995.
John F. McFarlin, BS IE, of Hawthorne, Fla., died May 3, 2005.
Emmett L. Miller, BS EE, MS EE '61, of Los Angeles, Calif., died September 19, 2005.
Eduardo H. Villaseca, MS EE, died October 16, 2001.

1960 John D. Charles, BS EE, of St. Petersburg., Fla., died July 16, 1999.
Charles W. Goodman, BS CE, of Tallahassee, Fla., died April 21, 2005.
Allen A. Jenkins, BS IE, of Jacksonville, Fla., August 9, 1996.
Wilbur G. Moore, BS EE, of Mayo, Fla., died February 26, 2005.
Robert D. Waterbury, BS IE, of St. Petersburg, Fla., died October 15, 1990.
Charles F. Wishart, BS IE, of Tampa, Fla., died February 8, 2003.

write send

Editor, The Florida Engineer
University of Florida
PO Box 116550
Gainesville, FL 32611-6550

www.eng.ufl.edu/pubs
pubsmail@eng.ufl.edu

Have new e-mail?
Let the Alumni Association know!
ufalum@uff.ufl.edu

1962 James L. Grove, BS ME, of La Porte,Texas, died July 19, 2005.
Harry H. Watters, BS ME, of Huntsville, Ala., died July 14, 2000.

1963 Captain William J. Barnes, BS ME, of Hobbs, N.M., died April 1, 1994.

1964 Thomas T. Wilson, BS CE, of Chipley, Fla., died August 14, 1997.

1965 William C. Petersen, BS IE, died November 15, 2003.

1966 James A. Chupka, BS AE, of Miami, Fla., died November 16, 1993.
William Linkovich, BS CE, of Daytona Beach, Fla., died March 14, 2000.
Howard R. Lyttle, BS EE, of Melbourne, Fla., died June 7, 2000.
Robert W. Marshall, BS EE, of Alexandria, Va., died October 1, 1983.
Willet D. Steih, BS IE, of Woodstock, Ga., died July 12, 2005.

1967 Joseph P. Hartigan, ME ISE, of Ormond Beach, Fla., died June 22, 2005.
Larry L. Lester, BS EE, of Fayetteville, Ark., died October 4, 2000.

1968 Thomas C. Watts, BS CHE, of Kerrville, Texas, died October 1, 1995.

1970 Yee-Tak Fung, ME, PHD ENM, of Bethesda, Md., died June 20, 2004.
Benton S. Murphy, BS CE, of Pensacola, Fla., died August 15, 2005.

1973 William L. Settlemyre, MS ISE, of Richland, Wash., died December 8, 2003.

1975 Coy L. Mitchell, BS CE, of Abbeville, Ala., died February 18, 2002.

1978 Michael E. Maxfield, BS ENE, of Green Cove Springs, Fla., died February 16, 2005.
William J. Schonfeld, BS EE, of San Jose, Calif., died October 25, 2000.
Leroy C. Stables, MS EE, of Pensacola, Fla., died October 29, 2005.

1979 Melva J. Charles, MS ENE, of Davis, Calif., died October 4, 2004.

1983 Davis C. Holden, MS ME, of Gulf Breeze, Fla., died July 16, 2005.

1986 Fadi I. Serhan, BS EE, of College Station, Texas, died March 6, 2005.

1992 Veretta J. Sabb, PHD CE, of Greeleyville, S.C., died November 25, 2004.

1995 Joseph E. Whalen, BS CE, of Spring Hill, Fla., died January 1, 1999.

1998 Anson L. Holley III, BS EE, of Pensacola, Fla., died July 9, 2005.

Information is provided by the University of Florida Foundation, Inc. Academic major or hometown data may not be available.

Please fill out this form or drop us a note–with your photo, comments, and suggestions. Please include mailing label below.

NAME IN FULL (INCLUDING MAIDEN NAME)

RESIDENCE ADDRESS (IF DIFFERENT FROM LABEL)

CITY **STATE** **ZIP** **PHONE (AREA CODE)**

YEAR OF GRADUATION **DEGREE** **MAJOR**

NEWS OF INTEREST ABOUT YOUR ACTIVITIES, RECOGNITIONS, ETC.

JOB TITLE **EMPLOYER**

BUSINESS ADDRESS

Send to:
Editor
The FloridaEngineer
P.O. Box 116550
Gainesville, FL 32611-6550
fax: 352.392.7063
pubsmail@eng.ufl.edu

Send address and e-mail changes to the UF Alumni Association:
ufalum@uff.ufl.edu

UNIVERSITY OF FLORIDA

College of Engineering
PO Box 116550
Gainesville, FL 32611-6550

www.eng.ufl.edu

NON-PROFIT ORG.
US POSTAGE
PAID
UNIVERSITY
OF FLORIDA