Barge vs. Bridge
Engineering Better Infrastructure
As I write this letter, a major news event dominates national attention. Large parts of the Northeast and Midwest are without power for the second day following a massive failure of the power grid, the causes of which remain unclear.

In the aftermath of the Sept. 11 terrorist attacks, we have become much more cognizant of the critical, pervasive role of civil infrastructure in our lives. Many of us have had the unfortunate opportunity to learn first-hand how much we depend on transportation, water, electricity, and the telecommunications systems. This has given us insight into the situation in developing societies, where economic growth and quality of life are very strongly dependent on the development of modern civil infrastructure. For example, China has made dramatic progress in this arena in the last few years as its economy has grown at a rapid pace.

Engineering is at the heart of many of these systems. Electrical engineers have contributed to the development of modern telecommunications systems, including the Internet. Similarly, civil engineers made very significant contributions to the transportation system. We can add many other similar examples of the role of engineering in developing major components of our infrastructure.

The power grid breakdown is just one among several major events that have raised very important questions regarding the future of the civil infrastructure in the years to come. Heightened awareness of terrorism has caused us to question the potential vulnerability of our water supply and transportation systems. The periodic outbreaks of computer viruses, meanwhile, suggest that our information system is not as reliable as we would like.

As we look to the future, some trends seem clear. Parts of our infrastructure are aging -- our bridges, roads, power grid, and more. Systems are increasingly globally interconnected -- the Internet being the obvious example. We will need to develop new technologies that can help make our systems extremely reliable against natural and man-made attacks. We will need to preserve this reliability while enabling increased interconnectedness. It is possible that we can inject much greater levels of “intelligence” and “self-awareness” in our infrastructure through the use of distributed sensors, actuators, processors, and control/coordination algorithms. At the same time, we need to make our proposed technological solutions economically feasible.

In this edition of the Florida Engineer, we have chosen some activities in the College of Engineering that highlight the work of our students and faculty on these issues. I hope you will find these and other stories informative and interesting. While we have focused on a few interesting stories, I should emphasize that all departments have activities that are making valuable contributions to addressing the issues discussed above.

A final thought: Research universities, such as the University of Florida, are a key pillar in the infrastructure of the society. They provide new knowledge, an educated citizenry, and valuable services for the betterment of society. In such difficult economic and social times as today, it is critical that universities receive support from all sectors of society, in order to help our country solve and work past the problems we face.

Pramod Khargonekar
Dean, College of Engineering
Sometime this fall, a tugboat will push a barge up the Apalachicola Bay, point it at a major bridge, and nudge it toward a head-on collision.

In the close-knit world of civil engineering, the barge’s impact with one of the bridge’s major supports will make history: It will be the first-ever planned collision between a real barge and a real bridge.

The barge is not expected to bring down the bridge, which connects the small town of East Point with the barrier resort island called St. George’s Island in Florida’s Panhandle. At worst, the barge may sustain a large dent and the pier may shift slightly, which won’t pose a safety problem since a newly completed replacement for the 1960s-era St. George’s Island Causeway Bridge will be open to traffic. Instead, the collision is intended to jiggle the innards of a gaggle of carefully placed sensors, providing the first-ever microsecond-by-microsecond glimpse of the forces that unfold when a 150-foot, 1,000-ton barge slams into a major concrete bridge pier.

In the wake of two recent barge-vs.-bridge tragedies, the massive experiment, headed by the University of Florida, may help reduce the cost of bridges while making them safer. It will certainly influence bridge design for decades to come.

“There is very, very little information available that deals with the actual impact load when a barge strikes a bridge. This will fill in the blanks, and it will affect national codes,” says Henry Bollmann, senior bridge designer for the Florida Department of Transportation, the main sponsor of the research.

Planning for the worst case

Few motorists have crossed a bridge without shuddering at the thought of driving over a precipice caused by an errant vessel taking out a support below. Although they are rare, accidents stemming from just such a scenario are not unheard of. In Florida, the most infamous occurred in 1980, when a freighter took out part of the Sunshine Skyway bridge, sending 35 people plunging to their deaths. More recent tragedies in other states have been caused by errant barges. Last year a barge struck the Interstate 40 bridge spanning the Arkansas River in Oklahoma, killing 14 motorists. Two years ago, another barge-vs.-bridge incident in Texas took eight victims.

Although these tragedies generate the most publicity, less serious accidents are more common. Between 1992 and 2001, there were 2,692 barge-vs.-bridge accidents nationwide, according to a report released this spring by a working group of the U.S. Coast Guard and American Waterways Operators, a tug and barge industry trade group. Some 2,532, or 94 percent, caused less than $100,000 in damage while 61, or slightly over 2 percent, resulted in damages exceeding $500,000, or injuries or deaths.

With its extensive coastline and lengthy Intracoastal Waterway, Florida is a hot spot for barges toting fertilizer, coal, petroleum products, and other cargo. Several hundred of the state’s roughly 10,000 bridges span bays and rivers deep and wide enough for barge traffic. Although there hasn’t been a fatal barge-vs.-bridge accident in the Sunshine State recently, the possibility worries Bollmann.
"We're fortunate in that so far we've had good luck, that the tow boat operators are doing a good job," Bollmann says.

He added that, although the project was in the works before the Sept. 11 terrorist attacks, engineers are eager for better data on protecting bridges in vulnerable areas. "People are concerned that terrorists could use a vessel to knock a bridge down," he says.

Like other states, Florida's state engineers design all bridges using widely accepted standards intended to help the structures remain standing even after major impacts from barges or ships. The major shortcoming of the standards is that they are based on tests with scale models, not the real thing, say Bollmann and Gary Consolazio, UF civil engineering assistant professor and lead researcher on the experiment.

"Quite simply put, you can't run a barge into a bridge intentionally if the bridge is in service," says Consolazio. "There are just massive safety issues involved, so there has not been an opportunity to conduct full-scale tests on structures."

After the Sunshine Skyway incident, Bollmann floated the idea of such an experiment, but it never went beyond the conceptual stage, he says. Over three years ago, when the DOT began working on replacing the 4.1-mile St. George's Island Causeway Bridge, he pitched his idea again. He says he suggested UF civil engineers head the research because others at the DOT had worked with a UF-developed bridge design program called Florida Pier. The program, which helps automate the bridge design process, has become a popular tool in the US and other countries.

Bollmann's proposal proved workable. Whereas most replacement bridges are built on top of or very near old bridges, leaving them vulnerable to damage from such an experiment, the new St. George's Island Causeway Bridge is a short distance away. The contractor heading up construction of the new bridge, Boh Bros. Construction, also says it would accommodate the experiment, even renting UF the barge.

The engineering planning for the project, now in its third year, fell to UF's Consolazio. Perhaps his biggest challenge was determining how to ram the barge into the bridge, a collision expected to generate more than 1 million pounds of force, without bringing down the bridge.

**From simulation to metal vs. concrete**

Leaving the bridge standing is crucial to the DOT, which doesn't want to foul the channel or pollute a bay famous for its oysters and considered one of Florida's most pristine. Consolazio, an expert in computer modeling, crafted virtual versions of barges, the bridge, the soils surrounding the supports, and other elements. Like a bridge builder gone mad, he then orchestrated virtual collisions, winnowing the realm of possibilities to a specific type of barge, weight, speed, and so on. The expected result: a collision forceful enough to produce good data but weak enough to leave the bridge standing.

"The simulation has been an incredibly useful tool," Consolazio says. "Really, in this project, I don't think we could have planned adequate physical testing without it."

A new bridge will open to replace the 4.1 mile St. George's Island Causeway Bridge this fall. The experimental collisions will begin shortly later.
Researchers plan to ram the barge repeatedly into two different piers, a massive one next to the shipping channel and a smaller pier farther from the channel. The big pier will get maximum punishment, with a tug slamming the barge into the pier at speeds up to five miles per hour, fairly typical for barge traffic. One series of tests will occur with the bridge superstructure in place and another after the contractor has taken it down as part of the demolition process. That's important because the difference in how the bridge piers respond to the barge impact will help engineers determine the role the superstructure plays in distributing the impact's force, Consolazio says.

The next task is to ready the bridge and barge for the planned November collision. Still planning the details as of this summer, Consolazio says he expects to place as many as 150 sensors or instruments on the barge and bridge, and in the muck below. Load cells attached to the pier will record the load during the one or two seconds of the collision, and accelerometers will measure the pier's sway. A specially manufactured miniature bridge pile, equipped with myriad gauges and sunk into the soil beneath the bridge's foundation, will record the load force and movement experienced by piles, the hidden supports for the bridge foundation. The sensors may help determine how different soil types, such as sand or clay, conduct the collision load's force against the pier.

"There's a lot of conjecture about what the response will be. Now we'll have actual data on what the response was," says Paul Bullock, an assistant professor of civil engineering involved in the soils part of the experiment.

The experiment is planned to last a couple of weeks, with sets of collisions occurring on separate days. Consolazio and Bollmann have high expectations for the resulting data. Tops on their wish list: the world's first quantitative data on the dynamic or changing load a bridge faces when a barge smacks it. That's important because, under current standards, static or unchanging impact loads dictate how tough bridges should be made. Engineers typically design bridges over waterways to remain standing while sustaining between 1 and 4 million pounds of static load, which significantly increases their cost, Bollmann says. The tests may reveal that the load declines precipitously following impact, meaning the standards could be loosened in some cases, significantly reducing the cost.

Or, maybe the reverse will be true.

"If it turns out the loads are smaller than what we are currently designing for, that could have a major economic impact because the foundations of a bridge are such a massive component of the cost of construction," Consolazio says. "On the other hand, if it turns out that the loads are larger than what we are currently designing for, then obviously from a public safety standpoint we want to know that so that adjustments can be made to the relevant bridge design specifications."

Consolazio says the project's end goal is a new load prediction model that will more accurately gauge impact loads. That model, he predicted, is unlikely to make a blanket determination that current standards are either too stringent or too lax. Rather, he says, it will likely require tweaking the standards for each bridge's unique circumstances.

"We may find that certain piers have to be increased in strength slightly, but other piers can be dramatically reduced -- it probably won't be all or nothing," he says. "There's going to be a great deal of interest in this because of the unique nature of the data that will be recorded. This doesn't just impact Florida, it impacts any state that has navigable waterways."

Aaron Hoover

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Hurricane forecasters tracking storms along the Florida coast soon will have access to more information to help make predictions about the location and speed of severe ground level winds. Civil engineers at the University of Florida have developed a wind speed reporting system that can send new data in real time to National Oceanic and Atmospheric Administration (NOAA) meteorologists.

The researchers gather wind speed data as part of the Florida Coastal Monitoring Program (FCMP). The Florida Department of Community Affairs funds the program, which is a coordinated research effort by UF, Clemson University, the Federal Emergency Management Agency, and the Florida and South Carolina Sea Grant programs. The project began five years ago to study the way hurricane-force winds at ground level affect structures. The real-time reporting system, developed by Forrest Masters, a civil engineering doctoral student at UF, was initiated during the summer of 2003.

NOAA needs wind speed data to feed into macroscale models of storms as they move onshore. “The people at NOAA take information from various sites as hurricanes flow over land to predict as close to real time as possible where peak wind speeds will be in the immediate future,” says Kurt Gurley, who coordinates UF’s participation in the FCMP.

“The real-time data that we are now providing is going to be broadcast directly to NOAA. They intend to use this and other sources of data to help calibrate their models as they run,” Gurley says.

Wind speed, direction, pressure, and other data are collected by instruments installed on four portable towers that can be towed into the path of an oncoming hurricane and deployed to a 10-meter elevation (a commonly used reference height for wind engineers). The data, including the GPS location of each tower, are then transferred using cellular equipment to the FCMP Web site and to NOAA. The data transfer is done every 15 minutes, providing near real-time reporting of the wind field behavior as the storm approaches, then passes by the instruments.

The improved forecasts may provide emergency managers with better information about the storm as it moves onshore, allowing them to better allocate response resources and make more informed decisions. Better predictions are important because ground-level winds behave differently than upper-level winds of the kind measured by hurricane hunter aircraft, Gurley says. Structures, trees, and other local terrain can deflect the winds, resulting in local changes in strength, direction, and gust behavior. Digital cameras are used during the tower set-up to upload pictures of the area surrounding the towers to NOAA researchers, who use the pictures to better interpret the wind speed data for their models.

A better understanding of ground-level winds could also result in building more hurricane-resistant homes, Gurley says.
“Not only is it important how fast the wind is moving, but it is also important how well coordinated wind is as it envelopes a home. If there is one small gust hitting in one corner and another hitting a different corner, it has a different effect than one large gust flowing over the entire home. These differences in the behavior of the wind can result in a varying likelihood of damage to the structure at the same average wind speed,” Gurley says.

“Such behavior is what we are trying to characterize using the tower instrumentation,” Gurley says. The team puts four 10-meter-tall towers in the path of a storm, two of which have two additional 5-meter-tall towers about 50 feet off to either side. “That allows us to measure the lateral size of gusts. A gust flows past three instruments at one time, and we can estimate its width,” he says. Once the width is estimated, the ensuing effects of such gusts on homes can be studied. The team’s two other 10-meter towers will be equipped with their own shorter companions in the near future.

In addition to the towers, the FCMP also has 30 homes along the Florida coast ready to receive sensors that measure the pressures that produce damage. In return for allowing their homes to be used in what amounts to full-scale wind tunnel tests, the home owners receive $5 to $10 thousand worth of upgrades to their houses, in the form of hurricane shutters, new roofs, and other retrofit measures to make them more hurricane resistant.

The researchers are thus able to measure both the behavior of the wind as it approaches a populated area using the towers, and the forces these winds impart directly to the homes. When a storm is coming, Gurley and his team put the towers in its path and set up the houses about 12 hours in advance of any serious weather, then get out of harm’s way themselves.

This research program is one of a kind, and provides information crucial to the goal of finding cost effective means of reducing the loss of life and property to hurricane winds. The Florida Department of Community Affairs has been supporting the project for five years, and is dedicated to finding real solutions to reduce Florida’s hurricane vulnerability.

Martha Dobson
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Wind sensors are placed on homes along the Florida coast.
Smoothing the Way

UF civil engineering researchers have a new toolkit for solving some very old problems with roads.

Radial Tire Contact Stress

Vertical Contact Stress  Transverse Contact Stress

Roads have been around for millennia. So have the cracks, ruts, and potholes that roads develop in their concrete and asphalt pavements.

What is new are the high-tech methods engineers are using to figure out why pavements fail. Researchers Bjorn Birgisson and Rey Roque of UF’s Center for Pavements and Infrastructure Materials are studying highway cracking and rutting with advanced micro-level analysis and computer modeling techniques. Their aim is to characterize what causes the damage and what pavement materials would be most durable.

The biggest problem in road pavement is cracking that starts in the top surface and works down, Roque and Birgisson say. They cite studies that show 18 percent of all paved roads in Florida have premature cracking. Pavement ruts are also a major problem, they say, because ruts can hold water and create safety problems.

More than one condition is causing the pavement damage. The aging of materials at the surface and temperature and moisture in the environment all take a toll. However, the biggest cause of pavement cracks is radial tire contact stress. Radial tires create large transverse contact stresses that pull pavement apart, Roque and Birgisson say.

Pavements are complex composite materials, which complicates the problem further, the researchers say. Every pavement mixture is different, depending on the source of the rock or cement or other materials. The mixtures can even vary on the same project from one truckload to another, and each mixture reacts to stress differently.

To get a better understanding of pavement materials and systems and the mechanisms of pavement failure, the center researchers are applying high-tech tools adapted from other technical disciplines.

With advanced modeling tools, they are able to do computer simulations of microstructural behavior and fracture damage in pavements. The researchers have developed a self-adapting, crack growth computer modeling system that can predict how cracks behave in asphalt. The simulations of the discontinuities in the cracks have revealed that asphalt experiences previously unknown stresses.

The behavior of asphalt is controlled by the fact that it is viscoelastic— in other words, it flows. Asphalt ruptures are caused by accumulated damage from stresses that pull it apart; it doesn’t shatter. The researchers have had to develop a new kind of analysis process, viscoelastic fracture mechanics, to demonstrate how asphalt behaves at the microstructural level.

Asphalts and other pavement materials need to be studied at the microstructural level because cracking behavior depends on how the materials interact at the smallest particle level, the researchers say. By creating x-ray tomography images of asphalt pavement mixtures consisting of
Roque also has developed a strength test for different materials, aggregates, and asphalts. Models based on these tests have predicted cracking behaviors that have been verified in actual field conditions throughout Florida.

The modeling techniques developed by the engineers can also accurately represent the beneficial effects of polymers on pavement mixtures. Tests have shown that fewer ruts develop in pavements with added polymers. The polymers reduce the flow characteristics of asphalt and help keep it from coming apart. The polymers create a tighter matrix, giving the asphalt better cohesion.

The polymers used are elastomers, synthetic elastic substances which are readily available on a mass scale. They are coming into common use in pavements, the researchers say, and should be increasingly cost effective. The computer model developed at UF will help determine how much more cost effective they will be by predicting how much improvement occurs.

The researchers will soon be looking into materials at the nano level, thanks to a new environmental scanning electron microscope (ESEM), the first to come into use at UF. The ESEM will allow investigations down to 5 nanometers. The ESEM will also enable studies of materials that are uncoated, a real advantage in examining pavement materials, the researchers say. (Older version electron microscopes required that materials under examination be coated.)

Roque and Birgisson believe that a better understanding of materials behavior at the nano level will make it possible to start engineering better pavement mixtures. The payoff will be that potential mixtures can be modeled and guidelines developed for the best materials for each circumstance, they say.

Martha Dobson
http://www.ce.ufl.edu/
Transportation system infrastructures are complex and costly to run. To be economically viable, operations need to be efficient. UF industrial and systems engineers, who have studied the problem, believe they have some innovative ideas that would help.

For example, locomotives cost railroads billions of dollars a year to operate. Industrial engineering professor Ravi Ahuja and his students have developed software that, if adopted, could reduce the number of locomotives needed to move the trains and save the railroads time and money.

Ahuja, who specializes in network optimization algorithms, began working on the problem in 1999 for CSX Transportation. CSX operates the largest rail network in the eastern United States. It has about 3,500 locomotives, worth 2 – 3 million dollars each. Each one costs about $400,000 to operate each year, for a total outlay of about a billion dollars, Ahuja says.

Railroads assign locomotives to trains based on how much pulling power is needed to move the weight the train is carrying. For cost efficiency, a train should be assigned the fewest number of locomotives that can produce the right amount of pulling power.

Ahuja explains that several variables must be considered in assigning the locomotives. CSX must determine which of its seven types of locomotives should be assigned to each train. Some types of engines cannot be used together; some cannot be used to pull certain types of trains.

The transfer of locomotives from one place to another must also be considered. After completing a trip, a locomotive may need to travel to another location for its next assignment. When making the transfer, locomotives sometimes “deadhead”; they are attached to a scheduled train but pull no weight. Locomotives also “light travel” – that is, they make a group and one locomotive pulls the other locomotives to take the group from one location to another. Light travel differs from deadheading in the sense that deadheading is restricted by the existing train schedule, whereas light travel can take place between any pair of locations. “Active” locomotives actually pull the train.

“The railroad network has an imbalance of power; there are some power sources and some power sinks. For example, Chicago is a major consumption city. Freight trains come full with goods pulled by several locomotives but leave empty, requiring fewer locomotives. It thus makes a power source. Consequently, Chicago is a power source and locomotives must deadhead or light travel from there.
“The decision problem is to assign active locomotives while simultaneously deciding deadheading and light travel in the most cost efficient manner, which gives an optimization problem with millions of decision variables,” says Ahuja.

Larry Shughart, former director of the locomotive division at CSX, authorized the project, which was originally planned in two phases. The first phase was spent working out how many locomotives could be saved using optimization analysis. The project looked at optimizing the use of about 2,000 locomotives. Shughart hoped that the project would show the way to use 50 fewer locomotives per year.

“The software developed by Liu Jian, a Ph.D. student, demonstrated that about 400 locomotives could be saved, pointing to a substantial improvement over CSX’s current operating practice,” Ahuja says.

The second phase of the project was intended to include additional features to the software so that it could generate implementable solutions. But the project was not funded for the second phase as Larry Shughart was transferred and the new management of the locomotives division adopted a different approach for locomotive scheduling.

CSX is still working out locomotive assignments using simple rules which leave room for major efficiency improvements. As a result, Ahuja says, the locomotives are pulling appropriate loads about 30 percent of the time. The pulling efficiency could be improved by 5-10 percent by proper computerized scheduling. However, Ahuja says, changing business practices in a large organization is always difficult and requires taking risks. There is often some reluctance to do that. Ahuja is hopeful that his software eventually will be used by CSX or other railroads.

“The railroad would be willing to buy and use a pre-existing software package that had a decision support system, had proven savings, and is maintained,” Ahuja says. “But they are less interested in a unique system developed by students, especially since the students who write the software graduate and move on, leaving the system unsupported,” he says.

Despite stepping back from the locomotive problem, CSX asked Ahuja to work on its blocking problem. “Blocking” refers to the need to group rail cars together according to their destinations. A similar problem is encountered by the mail service, where parcels and envelopes must be sorted and sent to a regional destination, then resorted there into local destinations. Efficient sorting procedures reduce materials-handling time and costs.

The same is true for railroad cars, Ahuja says. Each group, or bundle, of cars going to the same destination is called a “block.” To reduce costs, each bundle needs to travel by the shortest route. Each bundle costs $50 per car to create, with blocks costing a total of a half billion dollars annually.

“The cost of developing a mathematical model and software would be about $200,000 and would have a 50 percent chance of success, but the savings are substantial enough to justify the risk and investment,” Ahuja says. Applied across the industry, the model potentially could save US railroads tens of millions of dollars annually, he believes.

The railroads may not be ready to implement programs like those developed by Ahuja and his students, but he feels academic researchers need to work on real-life problems like those posed by the railroads. “Optimizing a system using mathematical models alone is not enough to solve real problems. We need to incorporate business rules or practices which are critical to generating an implementable solution. We academicians worry too much about optimality of the solution, but in the real world, implementability is more important than optimality,” Ahuja says.

Martha Dobson

http://www.ise.ufl.edu/cao/
Lightning vs. Power Lines

Lightning usually wins. UF researchers are looking for ways to even up the odds.

Lightning strikes are beautiful, dangerous, and can be very expensive. Lightning damage to power lines in the US costs almost $1 billion annually and 30 percent of all power outages are lightning related, according to studies by the Electric Power Research Institute (EPRI).

The cost to industry of power failures led EPRI in 1993 to create the predecessor to what a year later became UF’s International Center for Lightning Research and Testing (ICLRT) at Camp Blanding, Florida. “Industry wants power that stays steady at 60 cycles per second, with no impulses or failures caused by lightning,” says Martin Uman, UF Electrical & Computer Engineering (ECE) Distinguished Professor.

“The power should be pure and uninterrupted,” says Uman, who, with ECE Professor Vladimir Rakov, is co-director of the ICLRT.

Florida, with its high incidence of lightning strikes, is the ideal location for the ICLRT, but its research has worldwide significance. For that reason, researchers from more than 13 countries have conducted experiments at the ICLRT on atmospheric electricity, lightning, and lightning protection during the last several years.

“There are few places that are without lightning or with very little lightning,” Uman says, “examples being cold, wet regions such as the coast of Oregon and very dry regions such as the Sahara desert.”

The ICLRT’s triggered lightning experiments involve underground and overhead power distribution lines built on the site. Presently, there are two different types of overhead lines that are identical to those used by power companies such as Florida Power & Light, which funds the present experiments.

Lightning is triggered by wire-trailing rockets fired toward overhead storm clouds. Lightning vaporizes the wires and follows their traces down in a manner that can be observed and studied. The researchers have investigated what happens when lightning hits power lines, how they fail, how to fix them, how to protect them, and equally important, the physics of that lightning.

A power line collects natural lightning that would otherwise strike in an alley about 100 feet wide on either side of the line. To protect against the effects of lightning strikes, power lines are often equipped with arresters and overhead ground wires. An arrester behaves like an open circuit when the line is in normal operation. When the line is hit by lightning, the arrester acts more like a short circuit. Like throwing a switch, it diverts lightning current to the ground, holds the voltage at safe value, and thereby keeps the line from harm.

The tests at the ICLRT revealed that up to half of all natural lightning strikes will cause the nearest arresters to fail, according to Uman.

The studies revealed that underground power lines are also vulnerable, contrary to previous beliefs, Rakov says. Ground lightning strikes affect underground distribution lines almost as often as they affect overhead lines. Further, the ground rods intended to dissipate the current actually act as interceptors. A percentage of the current does enter the system through the ground rods and can cause damage in the system.

As a further test, the ICLRT conducted an experiment on ground rods of the kind commonly used to protect homes from lightning. The observation that ground rods appeared to transmit the bulk of the current from lightning into the system rather than to “ground” was unexpected.
The researchers built a small structure with a typical lightning rod system at the ICLR T. Lightning rods placed on a home's roof are supposed to route the current from a strike into the soil via wires connected to buried vertical ground rods. The established international standard for these systems allows no more than 50 percent of a lightning strike's current to enter a home's electrical system.

The experiment demonstrated that more than 80 percent of current from a lightning strike flowed into an electrical system when the ground rods were in sandy soil of the kind found in the southeastern states. Sandy soil tends to remain dry beneath the surface and therefore does not conduct electricity well.

Rakov says more research needs to be done to determine how lightning current is distributed through a system. The ICLR T studies have shown that in 50 percent of lightning strikes, the strong initial pulse of the current is followed by a tail of continuing current of variable duration. It is not now known how the continuing currents divide or if they flow through arresters. This is important because arresters are designed for and tested against strong pulses only, Rakov says.

In the meantime, the studies indicate that homeowners should probably use surge protectors at the electric meter and in the home. Wire ring grounding systems are also desirable. These systems involve lightning rods connected to a buried wire loop that circles the house. Because the loops have more surface area than ground rods, they can better dissipate current into the ground.

As for power lines, the solution lies with the power companies, Uman says, given the available results of the experiments. It is theoretically possible to make power lines lightning proof if overhead ground wires are combined with line arresters of the proper power and energy rating. And although there are several types of new lightning elimination or dissipation devices now sold that are advertised as able to protect against lightning by diverting it away from the power lines, they have not been proven to work in that situation, he says.

Martha Dobson

http://www.lightning.ece.ufl.edu/
Imagine trying to build a house or start a business without a loan. You might get a loan if you could use your land for security. But you can't prove the land is yours because you can't find—or never had—documents showing you have legal title to the land. So you build outside the law.

Millions of people in underdeveloped nations live and work in extralegal situations because they cannot, for many reasons, prove that they own their land. UF geomatics engineer Grenville Barnes has focused his research on ways to solve this problem. He has developed a methodology to use the worldwide Global Positioning System (GPS) to document local property boundaries in remote areas. Defined boundaries are an essential step along the path to legal ownership.

In 1994, Barnes, an associate professor in Civil & Coastal Engineering, began doing research on using GPS to define and map parcels more cost efficiently. Through this research, he developed a surveying methodology that is 10 times faster than standard methods and one-tenth the cost.

“I have worked in more than 20 countries, literally from A to Z, Albania to Zaire. These countries are located in Latin America, the Caribbean, eastern Europe, Africa, and the old Soviet Union,” said Barnes. Barnes serves as the cadastral specialist (dealing with the spatial aspects of property) on projects sponsored by government agencies in the host countries and funded by such agencies as the World Bank and USAID.

With the GPS system, accuracy is possible to within a meter, Barnes said, which is adequate for rural land parcels in these countries. In fact, GPS can measure the coordinates of a landmark anywhere in the world to an accuracy of a few centimeters, decimeters, or several meters, depending on the type of receivers used. Often property corners are physical features such as canals, trees, or fences and are known to local people. A field surveyor goes to the property with a GPS receiver, finds the corner, and stays in that spot for a minute so the receiver can collect satellite data for determining the coordinates of the point. The process is repeated at each corner. A ground base station with known coordinates is used to provide error corrections to the receiver coordinates.

The purpose of GPS mapping is to define boundaries and create documentation so that the land and its resources can be used as capital for loans and improvements, Barnes said. “In the U.S., for example, 70 percent of businesses use land to secure loans for startup capital. Most homeowners also use their land as collateral to secure mortgages,” Barnes said.

By contrast, Barnes commented, in developing nations many people are poor, live in remote areas, and have little access to the legal system. They live on land that they have occupied often for generations, but because they have no adequate legal documentation, they are not secure in their ownership and are unable to use the land as mortgage collateral.

“In some places, getting the piece of paper that establishes first title to the land can take more than 10 years,” Barnes said. “The cost of surveying and mapping property using conventional methods can often...
cost more than the value of the land itself. So, informal systems sprout up where land is passed among friends and family. But these systems leave no records to enable landowners to take loans or have legal protection. And in many cases, because people cannot establish a long-term interest in the property, they are less apt to maintain it or conserve its resources and environment,” Barnes said.

Barnes did the first test mapping project in Albania. Like every other country where he has worked, Albania proved to have special problems. The base stations usually require electricity. Even though the base station was set up on a rooftop in Albania’s capital city, Tirana, electric service was spotty at best, requiring use of a generator. Even this proved inadequate at times.

“Eastern European countries also have an unusual situation because when they were communist nations, there was no private property. Most of these countries did have private property before communism, and a few have chosen to reestablish the status of property as it was just prior to communism. In other countries, they were essentially determining boundaries for the first time,” Barnes said. Variable tree cover, legal requirements, and local social structures are other considerations Barnes has had to cope with in the countries he has visited.

Barnes has proven that the methodology can work. But its adoption is slow because the technology is new to the people and does not build on the old surveying methods, he said.

To bring the technique into wider use, Barnes sees a need to do what he calls “capacity building” - in other words, to educate local people in the various options for defining and registering property rights. To do this, he developed a distance education course on this topic, in Spanish, for delivery via the Internet. He has given the course once in Central America, and hopes, with additional funding, to give it again soon.

“To encourage acceptance of the process, it is necessary to understand and work within the realities of the local societies,” said Barnes. “I see myself as a mix between engineer, anthropologist, and lawyer.”

“I like the interdisciplinarity of the work. It stimulates creativity,” Barnes said.

Martha Dobson

http://www.surv.ufl.edu/
University of Florida researchers have been leading a national effort to leverage the embedded electrical wiring in homes and other buildings for broadband powerline (BPL) communications. HomePlug system adapters and other products make it possible to use existing electrical wiring to access the Internet, and to network computers and peripherals such as printers. Powerline networking technology can provide more consistent service than competing wireless systems and reduce the need for expensive cable installations in homes built before the Internet boom.

"Powerlines for many years have been ignored as a communication channel because they were too noisy and unpredictable," said Haniph Latchman, Electrical & Computer Engineering professor. "But recent advances at UF and elsewhere have changed that scenario, and those advances are now reaching the consumer."

Latchman is among several UF engineering researchers who have worked with engineers at Ocala-based Intellon Corp. in the research, development, simulation, and testing of the "no new wires" technology over the past three years. Intellon builds the computer chips at the heart of wall outlet adapters, cards, and other products that several companies market nationwide.

Latchman and Intellon's VP for Research and Development Larry Yonge were guest editors of a Focus Theme in the April 2003 issue of the IEEE Communications Magazine on Powerline Local Area Networks. Richard Newman, assistant professor in the Computer & Information Science & Engineering department, and Latchman were also guest editors for the June 2003 Special Issue of the International Journal on Communication System on Powerline Communications and Applications.

Latchman said the need for simple and effective local area networks (LANs) is skyrocketing as people add more computers to homes and so-called "smart" appliances steadily become a reality.

The main barrier to such developments is that millions of older homes are not equipped with the computer cable that supports high-speed networks, and many newer homes do not have the network cable in every room. Laptops and handhelds, meanwhile, are most useful when they can access the network virtually anywhere, such as poolside or on the patio.

One solution is wireless networking, but the commercially available technology has limitations, Latchman said. The service may become severely degraded or disappear entirely if multiple walls or structures impede the signal from the network access point, or if the user becomes too far away. Also, current wireless technology does not prioritize data streams, meaning video or voice can appear or sound choppy when the system is busy, he said. Cable TV and phone wiring also are candidates for
Powerline communication within the home uses the existing low-voltage 110/220 volt lines that deliver electrical power to outlets and lights in every room in a building. Electrical wires inside the home were not designed to convey the high-frequency signals needed to send and receive data, so they produce interference and noise. Electrical appliances are the main sources of noise. Other sources include halogen and fluorescent lamps, motors, dimmers and broadcast radio frequency signals.

Powerline communication researchers have developed ways to maintain clear communication through new or improved digital signal processing, signal modulation, error control coding, and novel protocols, Latchman said. A coalition of manufacturers, the HomePlug Powerline Alliance, established a new industry standard for Ethernet-class home networking via power lines, the HomePlug 1.0 Standard. The coalition members offer adapters and other equipment for power-line communication containing chips which adhere to the HomePlug 1.0 standard.

The technology is similar to wireless in that it distributes the Internet to the in-home network from a central digital subscription line (DSL) or cable modem access point. But in contrast to wireless, it is available wherever there is an electrical outlet, and it recognizes video or voice data and ensures smooth delivery at a rate of about 10 M b/second.

The technology is ideal for smart homes because it makes the network so accessible. “If you plug your refrigerator or air conditioner in, they’re automatically part of the network,” Latchman said.

The cost of equipping the average home is presently about the same as wireless technology, Latchman said. But because the technology does not require a radio transceiver or other basic wireless components, he said, the cost is likely to undercut wireless as the technology gains popularity.

The powerline communication system is designed to cope with such events as intermittent power surges, or switching to a back-up generator, but a complete power outage will disable the powerline communication system.

Although consumers have to use specialized Ethernet or USB powerline adapters now, developers hope the technology soon will be directly integrated into computers and smart appliances. Manufacturers are developing HomePlug AV, scheduled to be out in 2004, which will deliver multistream digital video and audio, including high definition television, at 100 M b/second, available in every room in the house.

In addition to its use for in-home local area networks, several companies are also pioneering the use of powerline communications for broadband Internet access, as a competitor to DSL or cable modems. This potential is particularly appealing in providing Internet access to homes in areas where the telephone network and cable TV are not available. On the other hand, electrical power is generally available and this infrastructure can be used to provide Internet connectivity. Telephone service can then be provided over the broadband powerline Internet connection.

To study the effectiveness of such a system in developing nations, Latchman and his associates will be field testing a system for Internet access via powerline communication in Jamaica over the next several months.

Martha Dobson

http://www.list.ufl.edu
The culprit in more than 1,000 fatalities and 40,000 injuries annually nationwide, construction zones are notoriously dangerous places for road workers and motorists.

But help may be on the way. Using a combination of computer simulations and traditional crash tests, a team of University of Florida civil engineers has designed and successfully tested a new barrier for secondary roads that prevents errant vehicles from entering construction zones while minimizing danger to motorists.

The Florida Department of Transportation, or FDOT, expects to begin using the barrier on urban and suburban roads with maximum speeds of 45 mph as early as next year. The barrier also could be adopted by other states, according to FDOT officials.

“As the crash tests on this new device have shown, we believe this device will be an effective and safe way to shield motorists from hazardous objects and drop-offs and work zones,” said Jim Mills, an engineer with the FDOT’s Roadway Design Office.

With 56 deaths in 2001, Florida ranked fourth in the nation in roadway construction fatalities behind Texas, California, and Georgia, according to the National Work Zone Safety Information Clearinghouse at the College Station-based Texas Transportation Institute. Between 1997 and 2001, an average of 27 motorists and workers died and 2,475 were injured in work zone crashes annually in Florida, according to FDOT statistics. Road worker injuries and deaths have become such an issue nationally that many states, including Florida, double the fines for speeding in construction zones, while others add points to driving records for speeding in construction zones.

The FDOT does not track how many accidents happen in work zones on highways versus those on secondary roads, Mills said. However federal rules now being phased in seek to increase the safety of all road barriers.

The rules prompted the FDOT to seek an alternative to its traditional work-zone barrier for slower-speed roads, which consisted of 9-inch-high curbs. The agency hired UF civil engineering researchers Ralph Ellis, Kurt Gurley, and Gary Consolazio to come up with the new design.

The goal: Devise a barrier that could prevent a 4,400-pound pickup approaching from an angle of 25 degrees or less from crashing into the work zone. The rules specify the pickup because it is as heavy, or heavier, than most cars and SUVs, while 25 degrees is the maximum angle at which a...
vehicle can reasonably be expected to encounter the barriers, which are typically placed along roadsides. The new barrier also had to be relatively safe for those in the colliding truck or car and break down into 12-foot segments that were inexpensive, and easy to install and move around.

Using a UF Civil & Coastal Engineering supercomputer and computer simulation software, the engineers conceived, designed, and tested four new designs without ever building a single physical version. The supercomputer contains 20 high performance processors that work together simultaneously, performing tasks in hours that would require months to solve if only personal computers were used.

The result: moving digital images of simulated crashes that allowed the engineers to estimate what would happen in collisions. The simulations not only produced data on impact-related stresses in the barriers helpful in the design work, they also saved the cost of multiple real-life crash tests, which run $20,000 each.

"We did all of the concept development using simulation," Consolazio said. "Even the size of the bolts connecting each segment of the barrier was tested based on computer simulation - whether a 1-inch or 1 1/2-inch bolt worked best."

A simulation of one design showed the pickup truck "snagged" shortly after the collision, bringing it to such a rapid stop that the accident likely would cause serious injury to any occupants. The engineers rejected that design and three others, finally settling on a version shaped like an upside-down pyramid with the tip cut off. Each segment of the barrier is connected to the next with a bolt, but none are connected to the roadway. When a truck hits the barrier, the force of the impact disperses down the barriers.

"When one segment is hit, essentially all the barriers down the line absorb the impact, so they all work in unison," Gurley said.

The research team ordered 15 of the barrier segments built and hired a California company that specializes in vehicle impact testing to pit them against a real-life collision with a pickup. The result mirrored those of the computer simulation. In a video replay, the pickup approaches and slams into the barrier then barrels along its perimeter, without either flipping over, stopping too fast, or jumping the barrier and entering the construction zone.

Mills said it is possible other states will begin using the UF-designed barrier as well.

"We definitely have an interest in doing what we can to make our roads safer as well as our work zones," he said.

Aaron Hoover
The University of Florida has been selected to participate in a research consortium funded by a contract from the Defense Threat Reduction Agency (DTRA). DTRA’s mission is to safeguard the United States and its allies from weapons of mass destruction, including chemical, biological, radiological (electromagnetic pulse), nuclear, and conventional high explosives, by reducing the present threat and preparing for any future threat. DTRA’s strategic partnership objective with the university consortium is to obtain innovative ideas and products related to its mission. Such ideas and products will address issues in technology, policy, strategy, and related infrastructure considerations.

In addition to UF, the consortium includes Pennsylvania State University, the University of California at San Diego, the New Mexico Institute of Mining and Technology, Florida A & M University, and North Carolina A & T University.

Professor Joseph W. Tedesco, chairman of the Civil & Coastal Engineering department, and Dean Pramod P. Khargonekar will serve as technical director and administrative director, respectively, for the University of Florida. The initial three-year award is for $51 million, with two consecutive three-year awards at $51 million each pending, for a total of $153 million over nine years.

The award elevates the University of Florida into a nationally recognized leadership position for homeland security. It is anticipated that UF researchers from the College of Liberal Arts and Sciences and the College of Medicine, in addition to the College of Engineering, will participate in this major research initiative.
New Master’s Program Targets Army Corps of Engineers

Facing a loss of expertise to a wave of retirements, the US Army Corps of Engineers has formed a partnership with the University of Florida to create a new master’s program in water resources planning and management for its planners and engineers.

The program requires students to spend the first semester on the UF campus, but they may complete the remaining course requirements through online or transfer coursework.

“Like a lot of federal agencies, the Corps has a huge number of people leaving in the next decade due to retirement,” said Warren “Bud” Viessman, Environmental Engineering Sciences professor. “The agency is worried about the loss of skills and institutional memory, so the goal of this program is to help bridge that gap.”

The Corps will select the students and pay their costs. Students must complete 30 semester hours of coursework revolving around the theory and practice of water resources planning. The program concludes with a “capstone” project that requires students to apply what they have learned in a real-world Corps project. The courses are taught by faculty from the Environmental Engineering Sciences and the Civil & Coastal Engineering departments, and the College of Law.

Four other universities have similar programs: Johns Hopkins University, Southern Illinois University, the University of Arizona, and Washington State University. Corps employees likely will attend the university nearest their place of employment, although the programs are open to employees wherever they work.

Viessman said he believes other agencies may soon seek similar collaborations with UF as they face retirement losses.

“I see a very good potential market with Florida water management districts and other state agencies,” he said.

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Mark Law Named ECE Chair

Mark E. Law, professor of Electrical & Computer Engineering, was named chair of the ECE department effective August 8. Law, who joined the department in 1988, also served as co-director of the Software and Analysis of Advanced Material Processing (SWAMP) Center.

Law received his PhD from Stanford University in 1988. He has received numerous awards and honors including the NSF Presidential Faculty Fellowship, Semiconductor Research Corporation Technical Excellence Award, IBM Young Faculty Development Award, University of Florida Research Foundation Professorship, and the UF College of Engineering Teacher of the Year award. He is a Fellow of IEEE.

Law succeeds Professor Martin Uman who served as chair of ECE for 12 years. In this capacity, Uman provided outstanding leadership in all aspects of the department’s work. In particular, he fostered tremendous growth in graduate programs and research activities. Uman, a world-renowned scholar in electromagnetics with a specialization in lightning, will return to his research and teaching duties.

Patricia Casey

http://www.ece.ufl.edu/

Environmental Engineering Sciences Names New Chair

James P. Heaney, professor of Civil, Environmental, and Architectural Engineering at the University of Colorado, Boulder, became chair of Environmental Engineering Sciences at UF effective September 12.

Heaney taught environmental engineering at UF from 1968-1991 and served as director of the Florida Water Resources Research Center. In 1991, he joined the University of Colorado at Boulder where he was chairman of Civil, Environmental, and Architectural Engineering until 1994.

Heaney received his PhD from Northwestern University. He is an internationally prominent scholar in urban water infrastructure systems and earned many honors and awards. He won the New York Water Environment Federation Best Paper Award in 1991 and the Association of Environmental Engineering Professors Montgomery Watson Award in 1996. He is a diplomate of the American Academy of Environmental Engineering and chair of Urban Water Resources Research Council of the American Society of Civil Engineers. He is a member of the National Academies’ Panel Evaluating Restoration Alternatives for the Everglades. He has served as associate editor of several journals including Water Resources Bulletin, International Journal of Environmental Engineering and Policy, and Urban Water.

Patricia Casey

http://www.ees.ufl.edu/

Dean’s Office Reorganizes

The new team in the College of Engineering dean’s office is now in place.

Timothy J. Anderson is the Associate Dean for Research and Graduate Programs. Professor Anderson was formerly chair of the UF Chemical Engineering department.

Jonathan F.K. Earle is now the Associate Dean for Student Affairs. He has served for many years as Assistant Dean for Academic Programs in the college. He is also an associate professor in Agricultural & Biological Engineering.

Marc I. Hoit has assumed the responsibilities of Associate Dean for Academic Affairs. He served as Associate Dean for Research and Administration in the college for the past two years. He is also a professor in Civil & Coastal Engineering.

Karen Kirkman is now the Director of Finance and Personnel and reports directly to Dean Khargonekar. She was formerly Business Manager for the college.
Faculty

W in Phillips Receives ASEE Lamme Award

W in Phillips, former UF engineering dean, received the most prestigious honor offered by the American Society of Engineering Education (ASEE) this year. He received the Benjamin Garver Lamme Award at ASEE's annual conference and exposition in Nashville on June 25.

"Dr. Phillips is highly deserving of the Lamme Award," said Frank Huband, ASEE executive director. "The vision and leadership he's shown as a classroom teacher, university administrator, and officer at ASEE and other engineering societies have expanded the boundaries of the field."

The award recognizes excellence in engineering education administration. Criteria include excellence in teaching, improvement of engineering education through research, and a record of achievement in the administration of engineering schools.

Phillips is now UF vice president for research and dean of the Graduate School. Phillips served as dean of the UF College of Engineering from 1988 to 1999. He was a professor of mechanical engineering and head of Purdue University's School of Mechanical Engineering from 1980 to 1988.

Benjamin Garver Lamme (1864-1924) was a prominent engineer and inventor who developed direct-current railway motors. He produced the first commercially successful induction motor, among other achievements.

Aaron Hoover

Chemical Engineering

Timothy J. Anderson, professor and Associate Dean for Research and Graduate Programs, received the American Institute of Chemical Engineers 2003 George Lappin Award.

Spyros Svoronos, professor and associate chair, is now the interim department chair as of July 1, replacing former chair Tim Anderson who has been named Associate Dean for Research and Graduate Programs.

Civil & Coastal Engineering

Fazil Najafi, professor, gave several presentations at the American Society for Engineering Education's 2003 Annual Conference and Exposition held June 22-25 in Nashville, Tenn.
Electrical & Computer Engineering

Jose Principe, distinguished professor and director, Computational NeuroEngineering Laboratory, led a plenary session at the International Conference on Intelligent Control Systems and Signal Processing in Faro, Portugal. He attended the DARPA Bio-Computation Joint Principal Investigators meeting in Fort Lauderdale, May 13-16; the Portuguese Science Board in Lisbon, Portugal, May 19-22; the Portuguese Ministry of Science and Technology in Lisbon, May 23-26; and was a guest speaker at the Emotion and Brain Workshop in Lisbon, May 28-31.

Vladimir A. Rakov, professor and co-director, International Center for Lightning Research and Testing, gave an invited lecture on “Review of Triggered-Lightning Experiments at the ICLRT at Camp Blanding, Florida” at the 2nd Seminar on Lightning Physics and Protection in the South of Brazil May 9-10 in Porto Alegre.

Industrial & Systems Engineering

Panos Pardalos, professor and co-director, Center for Applied Optimization, was elected a Foreign Member of the National Academy of Sciences of Ukraine. He was co-organizer of the 4th International Conference on Frontiers in Global Optimization at Santorini, Greece on June 8-12. On July 7 2003, he spoke on “Recent Advances and Trends in Global Optimization” at the international workshop on Energy Minimization Methods in Computer Vision and Pattern Recognition in Lisbon, Portugal.

Materials Science & Engineering

Reza Abbaschian, Vladimir A. Grodsky professor, received the 2003 American Society for Engineering Education Donald E. Marlowe Award in recognition of his outstanding accomplishments as a scholar and educator.

Brij Moudgil, professor and director, Particle Engineering Research Center, received an honorary appointment to the University of Melbourne, Australia, as a Professorial Fellow with the title of Professor effective from July 1, 2003 – Dec. 31, 2005.

Mechanical & Aerospace Engineering

D. Yogi Goswami, professor and director, Solar Energy & Energy Conversion Laboratory, was elected president of the International Solar Energy Society. His term will run from January 2004 to December 2005.

James F. Klausner, professor, was named a Fellow of the American Society of Mechanical Engineers for outstanding contributions to the understanding of two-phase flow and heat transfer with phase change, highly recognized archival publications, and creative and high quality research in heat transfer and power transport.

Win Phillips, professor, UF vice president for research, dean of the Graduate School, and former dean of the College of Engineering, received the American Society of Engineering Education’s Benjamin Garver Lamme Award.

Charles E. Taylor, professor emeritus, received an Honorary Doctorate degree from Purdue University. Taylor is internationally recognized for his scholarship and mentorship.
As the University of Florida celebrates its 150-year history, Weil Hall may soon reach a milestone of its own: The half-century old building is on a short list of campus buildings to be considered for the National Register of Historic Places.

Over 50 years ago, the College of Engineering experienced tremendous growth following World War II. Weil Hall was built to accommodate the need for more space. At that time, the building housed the entire College of Engineering. The college now spreads across the university campus and beyond, but Weil Hall retains its historical significance.

UF recently received a $150,000 Getty Campus Heritage Grant to develop a Preservation Master Plan and Training Program and a $25,000 grant from the Florida Division of Historic Resources to define the campus historic impact area and prioritize significant buildings of the post World War II era. One goal of the project is to study campus buildings that have reached the 50-year benchmark and nominate these buildings to the National Register of Historic Places. Generally, properties eligible for the National Register are at least 50 years old and are significant in American history, architecture, archeology, engineering, or culture.

Twenty-two UF campus buildings are currently on the National Register of Historic Places, according to Susan Tate, principal investigator for the grant research. Tate is a professor in the College of Design, Construction and Planning and a registered architect and general contractor specializing in historic preservation and interior design.

“A boom in construction occurred on campus after World War II,” Tate said. “We will select only the buildings of the most historical and architectural significance as examples of that era. Weil Hall is a key element in the compatible transition to the new directions of the post World War II era. Weil interprets the materials and form of Collegiate Gothic with a streamlining of detail and horizontal emphasis associated with new social and architectural directions.”

Many buildings in the northeast corner of the campus are listed as part of an Historic District on the National Register. “This project proposes to expand the existing historic district,” Tate said. “Newly eligible buildings are scattered throughout the campus but are connected by their function and architectural significance.”

The two-year project proposes the nomination of six to 10 additional buildings to the National Register. In addition to beginning development of a Preservation Master Plan for the UF campus, the project team will examine historic campus plans, study the visual linkages of historic buildings and pedestrian ways, and develop a walking tour map.

The team began its evaluation of Weil Hall in August. If Weil Hall is added to the National Register, the listing would acknowledge not only its historic value to the College of Engineering but its contribution to the history of the university.

Patricia Casey
Edmund Moore has a serious commitment to minority students and young engineers. He developed a program to bring more blacks, women, and other minorities into science and research jobs with the Air Force. Outside work, he actively mentors youngsters in the hope that they will take up technical studies in college.

Moore is carrying forward the caring commitment shown to him by parents and teachers.

He son of George R. Moore, Sr. and Ruth H. Moore, he was born in Newnan, Ga. He and his brother, George Jr., were raised in LaGrange, Ga., about 60 miles southwest of Atlanta.

“My father was a brick layer and an assistant principal. My mother was a teacher and always encouraged me to do my best in anything that I did,” Moore says.

He also found strong role models in his uncle, M. Cecil Moore, a chemist, and Herbert Jones, a physics professor at Florida A & M University.

Moore never took the easy path in school. “I was blessed to have the background that I received. Growing up in LaGrange, I was fortunate to be in the highest level classes. That allowed me to take geometry, trigonometry, and calculus. I also was able to take chemistry, physics, and biology. When I started college at Florida A & M University, I was ahead of many of my fellow students,” Moore says.

“My worst subject in high school was physics,” he says. “Being a competitive person, I decided to major in that field in college.” In studying physics, Moore took so many math courses that he decided to do a double major. He graduated with a BS in math and a BS in physics in four years from Florida A & M University (FAMU) in Tallahassee.

Moore chose FAMU because it was far enough from home to let him assert some independence. Once enrolled, he discovered that FAMU faculty and students had an excellent rapport.

“My instructors expected the best out of us. They were also accessible if one needed assistance. The biggest factor was that students worked together to learn,” Moore says.

Summer programs offered Moore interesting challenges. He did high energy physics modeling at Fermi National Accelerator Laboratory in Batavia, IL. He was also introduced to materials science and engineering research at Bell Laboratories in Murray Hills, NJ, which ultimately changed his career direction.

Moore decided to study materials engineering at MIT, where he did research in chemical metallurgy on plasma processing of metal powders. After receiving his master’s degree in 1989, he joined the Air Force civilian Palace Knight program as a materials engineer in 1991.
Palace Knight is a program designed to increase the number of civilian PhD engineers and scientists working in Air Force research laboratories. The program pays full salaries to students while they pursue degrees and work in an Air Force laboratory. Palace Knight interns agree to continue in federal employment for a time after receiving their degrees.

The program allowed Moore to attend UF for his doctoral work. With his principal adviser, Professor David Clark, Moore did research on the removal of polymeric binders from ceramic compacts using microwave energy. After receiving his PhD, Moore continued in ceramics research at the Air Force Research Laboratory Materials and Manufacturing Directorate (AFRL/ML), Wright-Patterson Air Force Base, Ohio.

Moore now manages a materials evaluation program for the Air Force. His research measures mechanical properties of carbon foam materials and ceramic matrix composites and ceramic coatings for aircraft exhaust environments.

In October 2000, Moore took on responsibility for implementing the Directorates Historically Black Colleges and Universities (HBCU)/Minority Institutions collaborative R&D effort. The collaboration is part of a very active effort toward recruiting talented black, women, and Hispanic engineers and scientists.

"The collaboration is based on our Science and Technology Workforce for the 21st Century Initiative," Moore explains. "Our objectives are to identify and characterize HBCUs with materials and manufacturing R&D backgrounds and experience to become major technology collaborators with AFRL/ML. Our long-term goal is to expand to Hispanic-serving institutions and tribal colleges," Moore says.

The agreements allow the transfer of surplus laboratory equipment to the HBCUs. Air Force lab employees teach courses at the HBCUs, which in turn send faculty and students to ML to conduct research. ML also hopes to recruit qualified graduates from the collaborative universities.

The HBCU program has worked so well that it has been selected as a "best practice" model and been adopted at the AFRL level and at the Air Force Materiel Command (AFMC) level, Moore says.

Moore is taking the recruiting message into the community. He hopes to encourage young minority students to try technical studies. His outreach work began at UF when he worked with the Program for Academic Counseling and Tutoring (PACT). He was also a coordinator for the Bridge Program, an Upward Bound program which allowed college eligible high school students to enroll at Santa Fe Community College.

"Any day that one comes across a minority youth or young adult is a day to encourage them to consider a career in the exciting fields of math, science, and engineering," Moore says.

To that end, Moore spends a lot of time at workshops, career fairs, advisory boards, and task forces speaking about opportunities in math, science, and engineering. Among the many groups he belongs to are the National Minority Science and Engineering Institute and the National Society of Black Engineers.

Moore favors starting young, as early as fourth grade, when offering math and science programs for pre-college students. As he explains, "Most students and youth grow up to glamorize sports, entertainment, and business. Why work hard to become an engineer and make $50K a year if I see an entertainer, sports star, or successful high school drop out become a multi-millionaire business person?"

Moore believes that elementary and high school teachers could benefit from more math and science education, too. "Universities must adopt local schools and educate teachers, administrators, and youth about science, math, and engineering. The focus must be long-term and involve university faculty and students. Technical organizations can help spread the word as well," Moore says.

For students who decide to try technical studies, Moore strongly supports efforts like UF's STEPUP freshman mentoring program. He cites a study done while he was working in UF's PACT office.
The study showed that minority freshmen who were admitted with higher GPAs and SAT or ACT scores actually did less well at UF than special admission minority students with lower GPAs and test scores. He attributes the difference to the support system offered by programs like STEPUP.

“These programs provide students with a more focused experience. In light of the University of Michigan Affirmative Action Supreme Court cases, some universities have voluntarily ceased offering these types of programs or opened the program to everyone. I do not have a problem with opening the program to everyone, however, minorities, women and educationally disadvantaged youth may benefit more from these technical opportunities and should receive additional consideration,” Moore says.

Alumni can take a valuable role in partnering with universities to recruit minority students, Moore says. If minority alumni are not involved, universities should ascertain why and make an attempt to resolve the situation.

“We should all strive to become ambassadors for our home universities and serve to encourage minority students to attend college, period,” Moore says.

Martha Dobson

Marking Time

The College of Engineering clock tower is currently under construction after several years in planning and re-designs. The clock is an unusual blend of old and new. Located at the west entrance of Weil Hall, the 26-foot-tall tower boasts four different faces, each a replica of an antique pocket watch. Time is kept by a 1913 Howard clock movement, which was donated by alumnus Dr. Theodore Crom. Because the clock movement is not capable of running the four-foot-diameter dials concurrently, a laser will read the clock movement and transmit the elapsed time data to the electric stepping motor of each dial. The tower was initially planned by the UF chapter of Chi Epsilon, the National Civil Engineering Honor Society. Funding has come from many generous donors, including hundreds who purchased bricks incised with their names that will be installed around the tower.
Alumni Update

1984
William H. Dunlop, P.E., MSCE, was named 2003 Engineer of the Year by the Illinois Chapter of the American Public Works Association. The award is for major achievements and exceptional technical innovation in public works. The city of Champaign, IL, nominated Dunlop for his work on the Campus Infrastructure Streetscape Project completed in August 2002. He is a consulting civil engineer with Daily & Associates Engineers, Inc. in Champaign. He retired in 1994 from the US Army following service as the Deputy District Engineer, US Army Engineer District, Rock Island, IL.

1991
Robert Lindsay Wells, P.E., PhD, is the chair of the Mechanical Engineering department, University of Texas at Tyler. He completed his doctorate in the UF Machine Tool Research Center with the late Dr. Jiri Tlusty, specializing in vibration analysis and machine condition monitoring. UT-Tyler is an East Texas regional component of the University of Texas system. The engineering program was founded in 1997 and offers B.S.M.E., B.S.E.E., and M.E. degrees.

2000
Eric Otoo, MECE, has worked with the Turner Construction Company, Orlando, FL office, since graduating. He is currently a cost engineer working with the joint venture of Turner/PP on the Ben Hill Griffin Stadium expansion project. Otoo received his bachelor's degree in civil engineering from University of Science and Technology in Ghana. He has over three years' experience in construction supervision and project engineering. He is a registered engineer intern and a licensed general contractor with the State of Florida.

Letter

Dear Ms. Dobson:

I read your article "Engineering Advisory Council" (Spring 2003) with interest. I must take issue with your statement that “Motivation is complicated by the fact that public awareness of engineering is poor.” I submit that the public is all too aware of the status of engineering in our society. One need look no farther than the comic pages where the very successful strip Dilbert exposes daily the experiences of a typical working engineer. The degrading cubicles, the politician management, the wage compression, the lack of support etc. are displayed daily. You may say this is just a comic strip but you can be sure it would not be so popular if there was not a whole lot of truth in it and a lot of people didn’t identify with it.

I also note the way your article contradicts itself. On page 11 you state “... resulting, in turn, in a critical need for engineers, scientists, and technologists.” Then on page 12, you make several contradictory statements:

• “The demand for new hires in many areas will be less than in years past”
• “The EAC members predicted the market for computer and electrical engineers will be tough”
• “The need for aeronautical engineers also will be down”
• “The members reported a limited need for nuclear engineers”
• “The students also spoke of experiences at large recruitment fairs where they were given discouraging feedback on the likelihood of jobs being available.”

So which is it, critical need or discouraging feedback?

By the way, the pointy-haired boss wasn’t on this council by any chance was he?

Also telling is another quote: “The members also expressed concern about a trend toward outsourcing technical work to engineers in other nations.” This is a situation that is a feature of Dilbert. It is done to keep engineering salaries down in this country and will be a fact of life for anyone foolish enough to go into engineering.

In both the space shuttle disasters, engineers tried to warn management but they were ignored, and at least one engineer was forced out for pressing the matter. So much for the status of engineers.

Finally, when the public thinks of engineers, what words come to mind? I submit they include geek, nerd, pocket protector, etc. What an image!

Sincerely,

Edward J. Telander, BEE, 1952

Editor’s note:
Pointy-haired managers may not appreciate critical thinking, but we do. Thank you for your comments.

1932 Robert A. Thompson, BSME MSME 1937, of Naples, FL, died January 13, 1992

1933 Robert I. Sarbacher, BSEE, of Palm Beach, FL, died July 1986

1938 Frederic W. Sutton, BSCH, of Port Saint Joe, FL, died April 20, 1998

1939 Clyde M. Turner, BSCE, died September 23, 2002

1940 Gregory J. Hobbs, BSCE, of Tampa, FL, died June 1984

1941 Thomas N. Evans, Jr., BSEE, of Jacksonville, FL, died February 13, 2003

1942 John S. Telfair, Jr., BSEE, of Cedar Key, FL, died January 1986

1943 George R. Clark, BSCE, of New Smyrna, FL, died May 9, 2003

1946 Weaks G. Smith, BSCE, of Providence, NJ, died February 1, 1983

1947 Dewitte T. Thompson, Jr., BSME, of Inglis, FL, died July 1982

1948 Bernard D. Kitching, BSME, of DeLand, FL, died March 29, 2003


1951 George L. Walters, BSIE, of Vero Beach, FL, died June 8, 2003

1952 Leslie E. Phillips, BSCH, of Plainfield, IL, died December 18, 2002

1953 James V. Anderson, BSEE, of Succasunna, NJ, died April 19, 1995

1955 Emil F. Anderson, BSME BSIE 1956, of Massena, NY, died December 14, 1992

1956 Harold Easton, Jr., BSEE, of Huntington Beach, CA, died September 10, 2001

1957 Ralph A. Saffer, BSIE, of New York, NY, died August 17, 2002

1958 Thomas A. Nichols, Jr., BSEE, of Milton, FL, died December 15, 2002

1959 Herbert L. Oliver, BSME, of Huntsville, AL, died January 11, 1997

1960 Frederick W. Weber, BSCE, of Chula Vista, CA, died April 25, 2003

1961 Donald J. Belz, MSEE PhD 1964, of Washington, DC, died December 1, 1985


1964 John R. Todd, BSCE, of Malabar, FL, died August 17, 2001

1965 William M. Bunker, BSME PhD 1969, of Ormond Beach, FL, died December 4, 2001

1966 Claude M. Adams, BSCE, of Port Saint Joe, FL, died November 1, 1980

1967 Gustavo Vargas, BSCH, of Mission Viejo, CA, died September 4, 2000

1968 Edward A. Fitzgerald, BSEE, of Myakka City, FL, died June 1, 2003

1969 Brian G. Sander, BSME, of Venice, FL, died November 18, 2001

1970 Robert E. Conant, Jr., BSEE, of Trenton, TN, died July 11, 1999

1971 Orville J. Porter, BSME, of Beaufort, SC, died January 10, 1999

1973 Gary L. Smith, BSCH, of Hillsdale, NJ, died March 8, 1994

1974 Philip C. Thomas, BSCEN, of Clewiston, FL, died May 28, 2003

1975 Karl G. Morley, BSEE, of Tallahassee, FL, died April 22, 1995

1976 Rodney M. Powell, MEEE, of Cantonment, FL, died February 26, 2003

1977 Brian G. Sander, BSME, of Venice, FL, died November 18, 2001

1978 Alanson D. Morehouse II, BSIE, of Satsuma, FL, died July 1977

1979 Francis A. Silva, Jr., BSEE, of Concord, NH, died October 8, 1997

1980 Frederick D. McLeod, BSCE, of Panama City, FL, died June 1994

1981 Harold Easton, Jr., BSEE, of Huntington Beach, CA, died September 10, 2001


1983 Brian G. Sander, BSME, of Venice, FL, died November 18, 2001

1984 Frank I. Redding, BSEE, of Orange, CA, died October 12, 1995


1986 Francis A. Silva, Jr., BSEE, of Concord, NH, died October 8, 1997

1987 Ralph A. Saffer, BSIE, of New York, NY, died August 17, 2002

1988 Paul G. Shupe, BSEE, of Melbourne, FL, died May 24, 2003

1989 Brian G. Sander, BSME, of Venice, FL, died November 18, 2001

1990 Tazewell Saunders, BSIE, of Pompano Beach, FL, died July 1977

1991 Max V. Robinson, BSEE, of Boulder, CO, died September 1972

1992 Bill E. Bardi, BSCE, of Coral Springs, FL, died August 17, 2002

1993 Thomas A. Nichols, Sr., BSEE, of Milton, FL, died December 15, 2002


1995 Gary L. Smith, BSCH, of Hillsdale, NJ, died March 8, 1994


1997 Frank I. Redding, BSEE, of Orange, CA, died October 12, 1995

1998 Sean V. Becht, MSBME, of Gainesville, FL, died March 9, 2003

1999 Brian G. Sander, BSME, of Venice, FL, died November 18, 2001

2000 Philip C. Thomas, BSCEN, of Clewiston, FL, died May 28, 2003
Recognizing the value of industry partnerships, the College of Engineering has created an Industry Programs Office dedicated to building collaborative relationships with major companies and industries.

Erik Sander, the program director, points out that it is unusual for an engineering college to have a dedicated office focused on industry programs. Usually these contacts are driven by individual faculty members or by grants and research offices, Sander says. This has also been true at UF, where industries have provided advice, research support, and education opportunities to the college for many years. Industry currently provides 14 percent of the college’s sponsored research funding, which is higher than the national average.

Now, Sander says, the college wants to build even closer ties with major industries whose research interests dovetail with some of the college’s strongest programs. The plan is to create multidisciplinary programs of value to targeted industries and encourage an industry focus to college research. Industry Programs will help develop these ties, working closely with the UF Office of Technology Licensing on technology transfer and intellectual property issues.

“Equitable intellectual property agreements that benefit all parties are becoming ever more important to academic researchers,” Sander says. “In order to build our industrial partnerships, it’s critical to work closely with industry in understanding how universities treat this.”

The college also wants to encourage an entrepreneurial culture among the faculty and students, Sander says. Industry Programs is ready to help faculty and students who want to launch spinout companies and can connect them with groups and individuals on the outside who can offer help. The college, in collaboration with the Warrington College of Business Center for Entrepreneurship and Innovation, is also offering students an Entrepreneurship for Engineers course.

The role of the Industry Programs Office is built on that of the Industrial Collaboration and Technology Transfer office at UF’s Particle Engineering Research Center, where Sander was associate director since 1998. In his role, Sander has built close relationships with entrepreneurial groups such as the Center for Entrepreneurship and Innovation in the Warrington College of Business; the Entrepreneurs’ Club on the UF campus; the Gainesville Technology Entrepreneurial Center; the Gainesville Area Innovation Network; and the Buchholz High School Academy of Entrepreneurship, a magnet program.

Sander welcomes contact from companies wanting to work with the college. For those not already familiar with the process or ways in which the college can work with industry, Sander can serve as a first contact. His job is to make the relationship as easy and mutually beneficial as possible.

“I am here to be a facilitator,” Sander says. “My office augments and coordinates with other campus entities like the Office of Technology Licensing and the UF Foundation. My role is most akin to that of business development in industry – I develop contacts and help close deals,” Sander says.

Sander also hopes to hear from alumni working in industry. “I would like to bring them back to the college, to involve them as mentors and advisers, in giving talks, or in other ways to help connect faculty and students more closely to industry,” Sander says.

Martha Dobson
Edward M. Kominowski has been named a Director of Development for the College of Engineering. Kominowski received his bachelor’s degree in telecommunications and master’s degree in college student personnel administration from Indiana University. He served for almost 10 years in various capacities with the Indiana University Foundation. From 1997-1998, he was Assistant Director of Capital Campaigns. In 2000, he became Director of Development. Since 2001, he served as Regional Development Director covering the territory of Indiana and Louisville, Kentucky.

Kominowski can be contacted at the Development Office, 352-392-6795 or e-mail ekominowski@eng.ufl.edu.

Patricia Casey

Research Pact Signed with Harris

The College of Engineering has signed a new partnership with Harris Corporation to do research projects, technology transfer, and other activities. Harris supplies communication equipment for broadcasters and the government. The UF/Harris collaboration will be in the area of wireless communication networks.

The agreement builds on the long-time support Harris has given the college for student projects and laboratories. Harris is also a major employer for UF engineering graduates.

Subscribe to E-Links

A alumni who are interested in receiving news about the college can subscribe to E-Links, the bimonthly electronic newsletter of the College of Engineering. E-Links is sent directly to your e-mail in box and offers a short update on activities and successes of the college.

To add your name to the E-Links mailing list, go to the Alumni home page on the College of Engineering Web site at http://www.eng.ufl.edu/enews.html.

Stay Connected

You can help the UF Alumni Association “Stay Connected” by updating your biographical information online. Click on the Alumni Association link on the Alumni home page, or go to http://www.ufalumni.ufl.edu/.

Research Pact Signed with Harris

Kominowski Named Development Officer

Edward M. Kominowski has been named a Director of Development for the College of Engineering.

Kominowski received his bachelor’s degree in telecommunications and master’s degree in college student personnel administration from Indiana University. He served for almost 10 years in various capacities with the Indiana University Foundation. From 1997-1998, he was Assistant Director of Capital Campaigns. In 2000, he became Director of Development. Since 2001, he served as Regional Development Director covering the territory of Indiana and Louisville, Kentucky.

Kominowski can be contacted at the Development Office, 352-392-6795 or e-mail ekominowski@eng.ufl.edu.

Patricia Casey
Richard V. Scholtz, a Native American doctoral student in Agricultural & Biological Engineering, became the first University of Florida student to obtain a degree through a unique National Science Foundation program aimed at recruiting more minorities to enter academic careers.

Scholtz is working as a post-doctoral student at UF after earning his doctorate in December 2002 through the National Science Foundation’s Alliance for Graduate Education and Professorate program.

Scholtz, who also obtained both bachelor’s and master’s degrees in engineering from UF, is the first graduate from among about 20 UF students enrolled under the program. His adviser for both master’s and doctoral work - which centered on water reuse techniques and technologies - was agricultural engineering Professor Allen Overman.

“He’s a highly motivated student with a lot of initiative,” Overman said.

Among other things, the program stresses the development of instructional skills by requiring that all students serve as teaching assistants or in similar roles. Scholtz, who was the lead instructor in at least three classes, said he believed this experience would prove especially useful to graduates seeking faculty positions.

“You can always do better with more diversity,” Scholtz said. “But I think it’s more important to have people who are trained more effectively in the professorate, especially in the teaching area, and I think that’s one element this program addresses.”

Scholtz, 29, whose mother is a member of the Seneca-Cayuga tribe of Oklahoma, earned his doctorate in three years. Along the way, he co-authored a book with Overman, Mathematical Models of Crop Growth and Yield, as well as several journal articles.

Aaron Hoover
UF Mechanical & Aerospace Engineering students came home from the American Society of Mechanical Engineers HPV challenge with four first place trophies and a $500 check from ASME. The University of Missouri at Rolla hosted the competition May 2-4. Teams of top engineering students from 16 universities competed in ASME’s 20th Annual HPV East Coast/Midwest Competition.

UF’s two-seater HPV, the InstiGator, weighed about 150 pounds and consisted of thick-walled steel tubing, the material used for race car roll cages. The race went smoothly until the last competition when the InstiGator suffered a broken faring. The front rider had to maneuver the course while holding the faring out of the way as the InstiGator dashed to the finish.

UF won four first place trophies: multirider sprint (second overall which includes single rider bikes), multirider endurance, utility endurance, and overall multirider.

“Last year we won five first places,” said Jared Greenberg, team treasurer. “Due to lack of funding this year, we couldn’t build a new design, so we didn’t win the design part of the competition.”

Although only eight team members attended the event, the efforts of the whole team made it possible for UF to go to the competition. The team especially thanks its president, Josh Blower, who has since graduated, and secretary, Shawna Snow.

Next year, the team plans to build a new bike and compete with two bikes. However, funding will be a deciding factor.

“Our goal is to beat University of Missouri Rolla in the single rider category,” said Greenberg. “We won the multirider category for the last two years, so next year we want to compete in both categories. Since Rolla is the main powerhouse in the single rider event, with their all carbon-fiber bike, we have our work cut out for us.”

The UF team also has submitted a bid to host next year’s competition.

“The University of Missouri at Rolla did a really nice job hosting last year’s event,” Greenberg said. “It will be difficult to beat their hospitality, but we definitely will have a more grueling course that will really put the bikes through their paces.”

Patricia Casey
Steel Bridge Team Is Third in National Competition

The UF Steel Bridge Team, sponsored by Civil & Coastal Engineering, placed third at the 2003 National Student Steel Bridge Competition held May 23-24 at San Diego State University.

UF has placed in the top 10 nationally eleven times and won first place once. This year, again, UF placed in the top 10 for all categories. The UF bridge weighed 101 pounds, ranking sixth in lightness. The deflection of the structure with 2,500 pounds was a mere 0.59 inches, low enough to score eighth in stiffness.

UF placed sixth in structural efficiency. The minimum structural score, a function of weight and deflection, was 100 pounds and 1 inch, respectively.

“The bridge was nearly under both of these values, meaning that we designed and fabricated an incredible structure,” said project leader Chet Zabik.

Assembly time was also important. The team assembled the bridge in 1 minute 19 seconds without any penalties, fast enough to place third in construction speed. The team earned fourth place in construction economy and fifth in aesthetics.

“While we did not finish first, we are still proud of our accomplishments,” Zabik said. “The level of competition was much tighter this year than in the past, and a difference of 4 seconds slower on our assembly time would have cost us two places in the overall rank.”

To qualify for the national competition, the team took first place for the eighth consecutive year at the 2003 Southeastern Regional Student Conference held in March at Florida International University. The 2004 team will begin designing in September, working toward another national championship.

The American Institute of Steel Construction and The American Society of Civil Engineers sponsor the national competitions, which allow students to put their engineering knowledge, organizational skills, and fabrication ideas into practice.

Patricia Casey

http://www.ce.ufl.edu/~steelbridge/
Mechanical & Aerospace Engineering students from the Center for Intelligent Machines and Robotics (CIMAR) placed first in two of four categories at the 11th Annual Intelligent Ground Vehicle Competition held May 31 – June 2 at Oakland University in Rochester, Mich.

The UF vehicle, named Tailgator, placed first in the navigation challenge and follow-the-leader competitions.

As part of the navigation challenge, teams were given the latitude and longitude of nine goal points located on an 80 x 80 meter field. The vehicle had to navigate autonomously to within two meters of each goal point without colliding with any obstacles. The UF team finished first and was the only team to reach all nine goal points.

In the follow-the-leader competition, the vehicle had to autonomously follow a lawn tractor through an obstacle course. The UF team finished first and was the only team to complete the entire course.

UF finished third in the autonomous obstacle course challenge and sixth in the vehicle design competition.

Twenty-six teams registered for the competition, sponsored by the Association for Unmanned Vehicle Systems International (AUVSI).

The UF team received support from the Air Force Research Laboratory, Tyndall Air Force Base, Florida and input from the members of the Joint Architecture for Unmanned Systems (JAUS) Working Group. The vehicle used JAUS Reference Architecture, which greatly accelerated the systems integration process.

Martha Dobson

http://www.me.ufl.edu/CIMAR

UF team members (left to right) and the Tailgator: Carl Crane, Tom Galluzzo, Duk Sun Yun, David Armstrong, Donald MacArthur, Erica Zawodny, Roberto Montane, and Danny Kent.
John V. Atanasoff, who created and built the first electronic calculating machine 60 years ago, was born October 4, 1903. He graduated from the University of Florida in 1925 with a BS degree in electrical engineering. He received his MS degree from Iowa State University in 1926 in mathematics and his PhD in physics and mathematics from the University of Wisconsin in 1930.

In the late 1930s, Atanasoff sought a way to facilitate linear algebraic calculations needed for his research. In 1939, he created a prototype of the first digital calculator, which possessed many features of modern computers - a binary system, regenerative memory, logical schemes as elements of software, and electronic components for storing data. The prototype, built with his student, Clifford Berry, was finished in 1942. The concepts were borrowed, without permission, to build ENIAC in the 1940s. A 1973 lawsuit established that Atanasoff was indeed the inventor of the digital computer.

Atanasoff received the National Medal of Science and Technology in 1990. He died in 1995.

In 1984, the Florida Engineer magazine published a profile of John Atanasoff. Excerpts from the article are reprinted here.

Science Prodigy Huck Finn
By Patricia A. Morris

Selected by what he terms “an accident of fate,” a young physics professor named John Vincent Atanasoff built the first electronic digital computer.

That fact has gone largely unrecognized, in spite of the ruling of a federal judge that established Atanasoff’s original contribution to the computer age and declared his right to be noted by his colleagues and in history as “the inventor of the computer.”

A Atanasoff, “J.V.,” to his friends, is one of the most distinguished alumni of the University of Florida College of Engineering. He was so recognized with an honorary doctorate of science degree from UF in 1974. He received his bachelor’s in electrical engineering from the University of Florida in 1925.

“I always wanted to be a theoretical physicist,” said A Atanasoff. “But of course offerings were limited at the time and electrical engineering was the next best choice.”

A Atanasoff’s father, John, came to the US from Bulgaria in 1889. He, too, was an electrical engineer. He is mother, Iva Purdy, taught mathematics. The family moved to Polk County, Florida, in 1912. A Atanasoff attended a two-room public school. He learned to use the slide rule and studied logarithms when he was only nine years old.

A Atanasoff finished high school in 1920 and worked during the summer as a prospector for a phosphate mine for $3 to $4 a day to save money to attend UF. He saved about $500, but the money ran out shortly after his first year at UF. He began working odd jobs to make ends meet.

At that point, he met Fritz Buchholz, Alachua County public school superintendent. Buchholz asked A Atanasoff to head the high school science department. A Atanasoff, then in his junior year in engineering, would first have to pass the state exam in physics, agriculture, and biology. A Atanasoff studied for three days and passed the tests with flying colors.

A Atanasoff, who was nicknamed “Pelican” at UF, was active in Sigma Tau, Phi Kappa Phi, the Polk County Club, and the Benton Engineering Society, which he served as both vice president and president.

After graduating with his BS degree, A Atanasoff wanted to teach physics at UF during summer school. He job was given to someone else, because, he was told, he didn’t have the needed background in education, so he worked as the campus electrician.

After that summer, A Atanasoff did his graduate work in mathematics and theoretical physics. He began his university teaching
career at Iowa State University, where he and his graduate student, Clifford Berry, began work on the ABC (Atanasoff-Berry Computer) in the basement of the physics building.

The ABC was the subject of a lengthy patent trial almost 30 years after the prototype was built. The suit was initiated by Sperry Rand Corporation, holder of the ENIAC patent assigned to its inventors John Mauchly and J. Presper Eckert, when Honeywell challenged the royalties it had been paying Sperry Rand for the ENIAC. In 1973, Judge Earl Larsen concluded that the builders of the ENIAC, long considered the first computer, “did not themselves first invent the automatic digital computer, but instead derived the subject matter from one Dr. John Vincent Atanasoff.” Atanasoff never received any financial compensation or royalties from the outcome of the patent suit.

Atanasoff left Iowa State University at the start of World War II. He held various positions in the US Naval Ordnance Laboratory and several other military programs. He received the Navy’s highest civilian honor, the Distinguished Service Award, for his work.

He started his own corporation, the Ordnance Engineering Company, following the war. He sold the company to the Aerojet General Corporation and stayed on as its vice president until he retired in 1961.

Whether or not he was “selected by an accident or fate” to move in the direction of computers, it is evident that Atanasoff has had a tremendous, if not well known, impact on the development of the computer and the course of history which can probably never be fully measured.
October 2, 3, & 4, 2003

Grand Guard Reunion
The Grand Guard Reunion, honoring the Class of 1953 and all prior years, will be held October 2, 3, & 4, 2003, by the University of Florida Alumni Association. For additional information on this festive weekend of events, please e-mail Tracey Douglas at tdouglas@uff.ufl.edu or call (352) 392-7619.

November 8, 2003

Homecoming Alumni Barbecue
This year the University of Florida Alumni Association and Florida Blue Key will hold a university-wide barbecue preceding the UF versus Vanderbilt football game on November 8, 2003. Engineering alumni, family, and friends will enjoy free barbecue tickets sponsored by the Harris Corporation, Melbourne, FL. For additional information, please e-mail Tracey Douglas at tdouglas@uff.ufl.edu or call (352) 392-7619.