

FOCUS

Technique • Friday, October 11, 2002

"Battle" raging hit

A new play about on the trials and tribulations of a group of local Atlantans is filled with comedy; catch the review by Joey Katzen. Page 19

The band plays on

Annual tournament pits Tech against UGA, UF and FSU in Savannah this month. Tech almost didn't participate out of loyalty to the band. Page 28



Response Center at forefront of first responders' technology

Tech's Center for Emergency Response Technology, Instruction and Policy improves the tools utilized by first responders to emergencies and terrorist attacks by integrating wireless technology and everyday components.



By Robert Hill / STUDENT PUBLICATIONS

President Bush visited Tech's campus last March. One of the topics he was briefed on while here was innovations that were made by Tech's CERTIP for making the communication and safety of first responders better and more timely.

By Jennifer Lee
Contributing Writer

At the 9/11 memorial at the Campanile a month ago, several members of the Georgia Tech community, including President Clough, addressed Tech's role in continuing to provide advancements in science and technology in regards to the threat of terrorism.

The Center for Emergency Response Technology, Instruction and Policy (CERTIP), a branch of the Georgia Tech Research Institute, is doing just that. The Center, created in 1999, has been developing new and exciting approaches to counterterrorism, and it is preparing for a counterterrorism conference that will take place on Tech's campus October 16-17.

Dr. Thomas Bevan, the Director of CERTIP, is one of the main people behind these technologies. "The first responders really bore the brunt of the problems" during the World Trade Center attacks, he said. First responders—those people who arrive first on the scene and includes firemen and policemen—had to deal with various crises, including both physical destruction as well as the threat of biological and chemical terrorism. During the immediate aftermath of the attacks, first responders were reduced to scribbling notes on pieces of paper because the cellphone network had gone down. Also,

Bevan said, "After the anthrax letters, there were all kinds of responses they had to make for anyone who had a suspicious-looking envelope."

"So we took a look around at where we could be helpful," said Bevan, "and said, 'we said we can do better than that.'"

Actually, the Center has been developing counterterrorism technology since even before September 11th. In the past, then governor Zell Miller and late Senator Paul Coverdell had meetings at Tech to alert the public to and raise concern for the issue. Also, the bombing at Centennial Olympic Park during the 1996 Olympics forced first responder organizations to deal with the shortcomings of existing technology. At CERTIP's Hazardous Materials Training Center in Cobb County there have been town meetings where the fire and police departments came in and discussed improvements that needed to be made.

One problem, for example, was with communication. Usually in a crisis, a fire chief gets to the scene first, and then tries to isolate the area and decide how to deal with it. Also, Bevan pointed out, "Often, the responders are in a protective environment [such as rubber suits when dealing with bioterrorism], which makes technology insertion more difficult."

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Campus Research Review

Professor invents air sample collector, measures air pollutants

By Kimberly Rieck
Senior Staff Writer

Recent studies have linked aerosols, a class of atmospheric pollutants, to human health problems such as heart attacks and respiratory problems. Scientists at Georgia Tech have developed a new instrument that may provide valuable insights to the problem.

The Particle-Into-Liquid-Sampler (PILS) automates the collection of air samples for analysis through the use of sensitive ion chromatography equipment. The PILS measures particulate pollutants several times an hour, which gives scientists time-dependent information that has not been available before. A recent study that used the PILS system showed previously unknown morning and afternoon peaks in the levels of two key pollutants.

Rodney Weber, assistant professor in Georgia Tech's School of Earth and Atmospheric Sciences, received the idea from the EPA's 1999 Supersite study in Atlanta. The study focused on the need for the development of

new techniques and instruments to measure pollutants in the atmosphere. Weber was also looking to expand his research horizons. "When I started looking into it, it was a new developing field. There was a lot of opportunity and there still are a lot of opportunities because aerosol is a new field that hasn't been researched that much," said Weber.

Weber and Douglas Orsini developed the device with help from the Brookhaven National Laboratory and the College of Sciences Machine Shop. Sponsors of the research and development of the instrument included the U.S. Environmental Protection Agency, the National Science Foundation, the National Aeronautics and Space Administration, the Georgia Tech Foundation and the Southern Company. Other researchers on the project include Yilin Ma, Amy Sullivan, Kari Maxwell, William Chameides and CS King.

"We can measure the plumes and get an idea of where it's coming from. Nitrate aerosols come primarily from cars. A lot

of atmospheric chemistry is limited by observations so if you can come up with an instrument that gives you new instrumentation" then you've made progress.

The PILS system uses small quantities of steam to form water droplets on individual aerosol particles. Scientists then capture and analyze the water droplets containing the dissolved aerosols through ion chromatography techniques. Scientists can detect as many as 15 different chemical species using the instrument. The PILS system can also operate, unattended, for long periods of time on the ground and in research aircraft, and takes samples every four minutes.

Before the PILS system, scientists had to rely on filters that collected aerosol particles over long periods of time, usually 24 hours. They then would have to remove the particles from the filters and dissolve them in water for ion chromatograph analysis. The EPA used this technique to form the current particulate matter standards. However, the

See *Pollution*, page 15

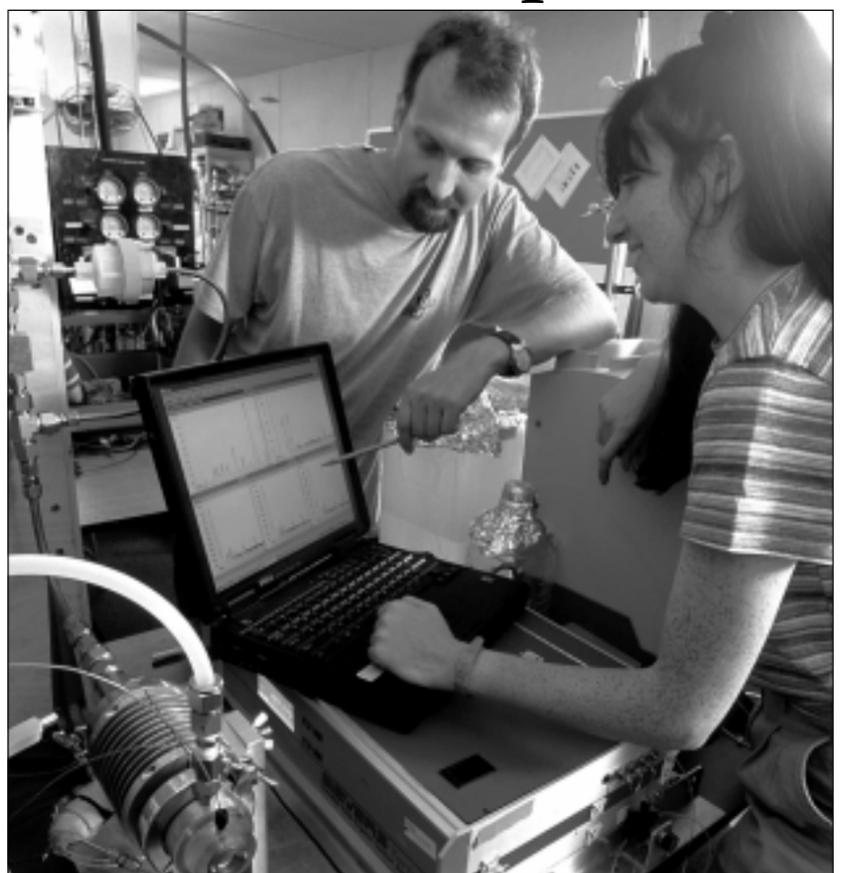


Photo Courtesy Institute Communications and Publications Affairs

EAS professor Rodney Weber and researcher Amy Sullivan check measurements being made by a Particle-in-Liquid-Sampler connected to an ion chromatograph.



By Robert Hill / STUDENT PUBLICATIONS

The skyline of Atlanta changes throughout the day, but not just in brightness as the sun rises and falls; a Tech professor, Rodney Weber, has invented a machine that detects pollutant particulates in the atmosphere. The concentration of these pollutants above the city vary throughout the day, a revolutionary discovery made possible by Weber's machine.

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EPA is now moving toward more real-time measurements for assessing air quality.

"We made a measurement that's much faster than what's available. When you're making a measurement on an airplane, speed for your measurement is everything because the plane is traveling so fast," said Weber.

Another advantage of the PILS system is its efficiency and accuracy. The instrument has shown 97 percent efficiency at collecting particles with diameters of between 0.03 and 10 microns, including the PM 2.5 particles of concern (due to their health effects). By attaching the in-

strument to an ion chromatograph, scientists can choose which aerosol components they want to study. Georgia Tech has focused on nine major chemical species—sodium, ammonium, potassium, calcium, magnesium, chloride, oxides, nitrates and sulfates. If the analysis time is increased by 15 minutes, it is also possible to analyze acetate, formate and oxalate.

"Many of the limitations are understanding where the aerosols are coming from, how it changes after it's been emitted by the various sources [and] the atmospheric chemistry. It's all really constrained by how well you understand the chemical composition of the aerosol particles," said Weber.

However, the PILS system can

only measure aerosols that are soluble in water. Despite its limitations, the instrument has given air quality

"There are times of the day when it is a lot more polluted than others."

Rodney Weber
EAS Professor

researchers a better view of the pollutants in the air and clues on finding a solution to cleaning up the air.

Weber first tested the system in

a 1999 Atlanta study that looked at particulate matter. Since then, the machine has undergone minor redesigns and modifications each year to the point where Weber said that he thinks the machine is almost complete and will not need many more changes. The data from the study showed that particulates in Atlanta varied dramatically over different times in the day and revealed a previously unknown set of trends in pollutant levels. The trends are that carbon containing particles peak in the morning and sulfate levels peak in the afternoon. The sources and causes of the peaks are still being investigated.

"The older measurement system produced an average reading for Atlanta during the course of the

day, but it turned out that there are times of the day when it is a lot more polluted than at other times," Weber said.

Weber's instrument has been in use around the world in studies conducted from aircraft, ships and ground stations since its original prototype came out in 1999. Researchers have used the system to study plumes in the Asian atmosphere and the composition of particles responsible for haze in Yosemite National Park.

Weber recently presented information about the instrument's capabilities at the 224th national meeting of the American Chemical Society in Boston. He plans to continue his research of Atlanta's air conditions.

CERTIP

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Also, in these situations, first response units generally all have different radio frequencies and communication devices. "So what you typically see," said Bevan, "is that all the different units give the fire chief a communications device, and that fire chief is stacked with cell phones, walkie-talkies, all kinds of things," which is inefficient, as well as overwhelming.

CERTIP decided that the solution to improving communication was to take advantage of wireless network technology and give everyone digital communication, which is much easier to use than current systems, and, most importantly, much less susceptible to interference than radio-based communication. "The idea would be that a fire chief pulls up to the scene, opens his truck, pulls out a generator, plugs in the wireless device, and puts it on top of his fire truck," says Bevan. Then, a laptop,

palm pilot, wearable computer or any other wireless-card-based technology could connect to the same network. Not only would communication between responders in the area be more efficient, data transfer from the first responders to virtually anywhere in the world would also be possible.

The Center has also taken an active role in demonstrating the fruits of these new methods and technologies to the Georgia Tech and Atlanta community. Two demonstrations have already been held at Tech: one for the President of the United States last March, and one in November 2000. The demonstration involved what Bevan called a "medical reach back experiment," where a situation is simulated that involves biological warfare.

The ability of data to be transmitted both to and from the simulated crisis scene was tested. "The idea," said Bevan, of data broadcasting, "is that a medic does an examination, gets all the information, and then puts the symptoms

he observes on a Palm, which is on the wireless network, so every [patient] has a webpage. Then a doctor from anywhere in the world can look at the data and authorize treatment." Since a medic is not allowed to administer medication without a doctor's permission, the wireless network provides a "virtual medical presence." For the demo, Grady Hospital participated by serving as the doctor base.

To test data for getting into a dangerous building, building plans were downloaded and sent to the firemen on the scene, reducing the risk involved. Also, Bevan said, "we downloaded models of the spread of the chemical agent, to see where the plume was and where it was going."

The technology takes advantage of easy access of expert knowledge. In a situation where decisions are crucial and yet must be made quickly, the technology allows information to be at the fingertips of whoever is in charge of the crisis. Bevan said, "The fire chief would reach back not only for medical help, but also

decontamination help, or logistics support. He really has access to experts around country, even the world."

Bevan also emphasized the practicality of this new technology, noting that affordability is also high on the list of requirements desired by first responders. In developing all these new technologies, Bevan said, "We tried to identify technologies that were intrinsically affordable or those that had economies of scale with broader markets."

Much of it consisted of "off the shelf" technology: for example, in today's market, a wireless access point costs about \$800, which is comparable to the cost of a contamination prevention suit. Another example is a sensor that CERTIP is developing for more reliable detection of chemical levels of a contaminant. Bevan pointed out that many of its components are familiar items: one part of the sensor employs a laser tube similar to those used in CD players. "We think that the piecemeal parts of this are well under \$100, so \$200 or \$300 for this sensor would

not be unreasonable."

CERTIP is also involved in other areas besides first responder technology.

For example, they have worked to improve passenger/employee screening at Hartsfield Airport. Collaboration with other schools and the government has also taken place, although much of the research goes on here at the Center. For example, CERTIP has a partnership with the University of Georgia to deal with agricultural terrorism, where radiological, biological, or chemical agents are put into the food chain.

Also, Bevan says, "The Homeland Defense Agency, when formed, has plans to put a network of laboratories around the country." Bevan hopes that a national laboratory here at Georgia Tech would provide even more development for counterterrorism technologies, as well as encourage collaborative efforts between Georgia Tech, UGA, Georgia State and other organizations that would come together to work on these projects.

Tech Up Close

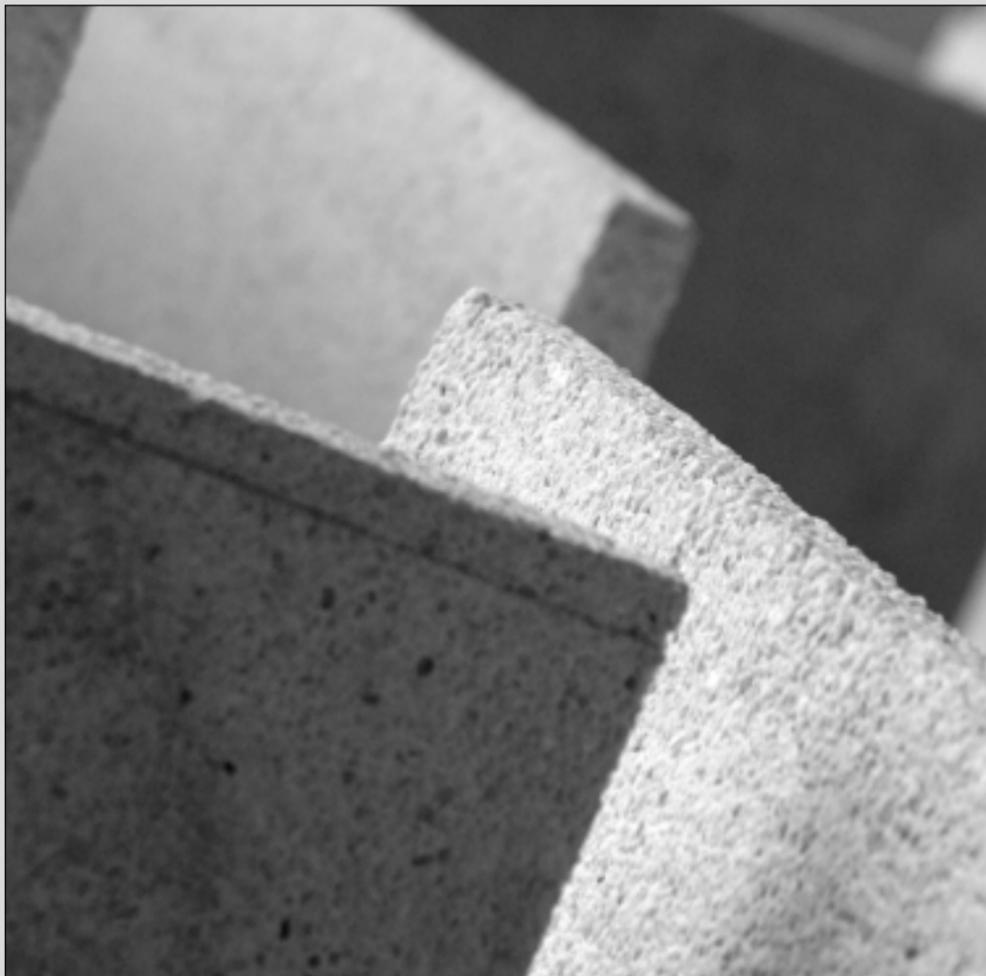


email: focus@technique.gatech.edu

Winner of the Tech Up Close contest receives a *Technique* T-shirt and a coupon for a free student combo at Li'l Dino's.

Last week's Tech Up Close:
Grill on lights on North parking deck

Last Week's Winner:
Cristal Gordon



By Scott Meuleners / STUDENT PUBLICATIONS

The Sliver Box

www.nique.net/sliver

How do I get my jollies agan?
Oh yeah! By being a vindictive, manipulative SOB who tricks people and lies!
TV Haiku: Cheesy Dialogue, Heart melting out of my chest, I love Dawson's Creek.
Peanut butter jelly with a base ball bat!
Crawson's Deke: This guy named Crawson tries to trick girls into sleeping with him. I hate the Yankees!!! and that baseball team, too!!!
How do I make this longer? Don't

answer that!!
Kele Eveland's a babe and a half! open it, I command you! (oh the memories)
It's somebody's birthday, and I want to give her 19 spankings. Is that so wrong?
My love is on a dimmer switch. It's never all the way on or all the way off.
Sliver me timbers!!!
How do I love thee? Let me count the way: one. Number one... one, one, one. Nope. Nada. Aaaand I'm done.

I want my Vice City! dammit a bad feeling is going to sleep after your roommate, and then the next morning, waking up before her
for fall break I am going to Athens, where there is clean air and cheap alcohol
Bring back the Sliver!!!!!!!!!!!!!!
Please don't be hot today. Damn. And I'm not sorry... it's human nature...oops! I didn't know we couldn't talk about sex
Where is the Sliver Box?
I got a strawberry tattoo!!
I want an all American white boy.
This chair be high says I. Rrrr!