

The GTRI Connector

Quote of the month

"Don't expect gratitude to last any longer than it takes for the recipients to say they're eternally grateful."

— Harvey Mackay

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Giant field probe ready for delivery to Army outdoor range

By Martha Ann Stegar, RCO

A giant precision field probe, one and one-half years in the making, went on the outdoor antenna range at GTRI's Cobb County Research Facility for final testing the third week in April. Barring unforeseen difficulties, it will be shipped to the sponsor, the U.S. Army Electronic Proving Ground (USAEPG), around the first of May for installation at their large outdoor compact range at Ft. Huachuca, Arizona.

A large team of GTRI researchers in the Microwave and Antenna Technology Development (MATD) Lab, headed by Henry Cotten, developed, designed and fabricated the probe with major assistance from the GTRI Mechanical Services Department.

The probe is designed to accurately measure the quality of the 50-foot-diameter electromagnetic "quiet test zone" generated by the feed horn and 70-foot-diameter reflector of the compact range.

"We designed the outdoor compact range several years ago so that the Army could measure the characteristics of radar antennas mounted on full-size target vehicles, such as tanks, helicopters and airplanes," Cotten says. "Now the Army needs the field probe to prove to prospective customers how good the range is." He says the Army will need to retest the range at least once a year to requalify it and make sure there are no changes in its performance.

Complex design for a sophisticated task

The complex field probe system comprises a 30-foot-long boom, a positioner that rides on a carriage that travels the length of the boom, and a set of five microwave horn antennas that fit on the positioner to cover different frequency bands ranging from 6 to 40 gigahertz. The system is designed to be mounted on a 40-foot-high pedestal (or target positioner) at the compact range and is capable of six axes of motion, including elevation. The entire probe system can be rotated 360 degrees by the compact range positioner, and the probe positioner also can travel radially along the field probe boom from 0 to 25 1/2 feet.

The probe positioner provides the other three axes of motion. A linear axis moves in the direction of the compact range reflector from the positioner. The probe horn is positioned in this axis, with an active laser correction system to keep the probe in a true plane for accurately measuring the phase and amplitude of the electromagnetic field. A detector axis positions the laser detector so it is always pointing at the spinning laser, which is operated from the ground below. A polarization axis keeps the probe horn at the same polarization, regardless of the boom's angle of rotation, much as ferris wheel seats stay upright as the wheel turns.

Cotten adds that they hope to use some of the technologies developed for the field probe on other projects. For instance, the concept of an active correction system using a spinning laser for this type of measurement was developed by the GTRI researchers. It corrects within a few thousandths of an inch over the whole 50-foot test plane. "I don't think anyone else has a similar system in place anywhere," Cotten says. "For its size



and for an outdoor location, its accuracy is very impressive, considering temperature and wind variables. With a temperature swing reaching 50 degrees a day, a 30-foot metal boom with a 26-foot travel can require frequent correction."

Continued on page 2

The field probe system designed by engineers in MATD for the outdoor compact range at Fort Huachuca is undergoing testing on the antenna range at the Cobb County Research Facility. The probe positioner is on the left end of the boom. (Photo by Anita Edwards)

Observed & Noted

A team led by Jim Scheer (RIDL) has developed a computer simulation for estimating contaminant effects on coherent radars. Details are in an article on pages 2 and 3 that is the first of a series on internal research projects funded by the STGC. ■

Charles Estes (EDL) gives his observations on the difficulties faced by two former Soviet republics—Kazakhstan and Kirghizstan—in emerging from 70 years of Communist rule. See page 3. ■

Former GTRI research scientist Susan Wheeler died March 29 at the age of 42. On page 4, several of her friends pay tribute to her. ■

On pages 4 and 5, RCO's Lea McLees gives some tips on writing successfully for newspapers and magazines. ■

Fred Cain talks about TQM training and development opportunities on page 5. ■

What's happening to PROFS? Find out on page 6. ■

You'll find a host of Professional Activities described on

pages 6 and 7. ■

Also on page 7, Bob Cassell is honored for leading EDL's Basic Economic Development Course for 25 years. ■

More "people" news is on page 8, along with information on a re-

search symposium at the University of Georgia and lectures at the College of Computing.

Georgia Tech
RESEARCH INSTITUTE

**News
&
Notes**

"The Machine Shop fabricated the parts to amazing tolerances with a success rate of nearly 100%. Not a single bearing didn't fit, not a hole failed to line up. It was a near-perfect job. Those guys know exactly what they're doing."

— Mark Hudgens

Field Probe

From page 1

In addition to the field probe itself, the MATD team developed software to acquire, process and present the results of the data taken. Scott McBride, who was the task leader for analysis software, came up with some innovative mathematical techniques for analyzing the data and pointing out mathematically if there are imperfections or anomalies (called "scatterers"). Cotten says they will try to market this one-of-a-kind software in the future.

Machine Shop builds precision parts

The entire field probe system was fabricated by GTRI's Machine Shop. According to Manager Carroll Garrett, the work involved most of its personnel at both the main shop in Hinman and at the Cobb County shop. They made and welded some 200 parts, with only one job being sent out to another shop in Cincinnati for machining of extra-long surfaces.

According to Mark Hudgens (MATD), who designed the most complex part, the positioner, "The Machine Shop fabricated the parts to amazing tolerances with a success rate of nearly 100%. Not a single bearing didn't fit, not a hole failed to line up. It was a near-perfect job. Those guys know exactly what they're doing."

Garrett adds: "All personnel from the Hinman shop were taken to Cobb County and given a full demonstration of the positioner by Mark Hudgens. All were pleased with the opportunity to see something they built in final use, which they don't get to see very often. We're proud of the workmanship and the quality of our work, and of the engineering by the research personnel. It was a great team effort. The results show that when we are fully involved with a project from the beginning, the outcome is positive for everyone."

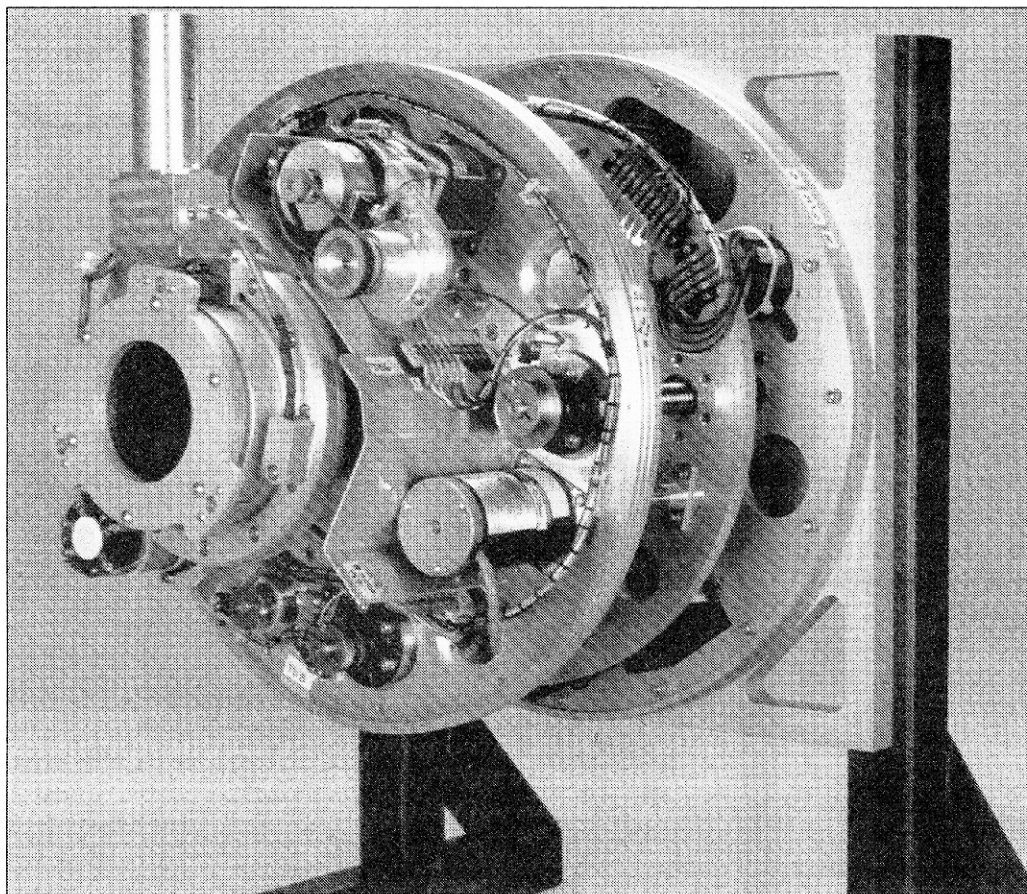
The MATD design team

MATD personnel put in many extra hours, including nights and weekends, on the project. In addition to Cotten, McBride and Hudgens, they included Howard Atkinson, project coordinator; David Asbell, the mechanical task leader and the person responsible for optical system design; John Jones, the systems engineer and electrical task leader; and Cindy Milum, the software task leader.

Software development was a complex task. Cindy Milum and Scott McBride wrote programs to integrate the probe's computer system with the computer system that runs the compact range at Fort Huachuca. Andy Dugenske was responsible for the tracking software for the linear and detector axes. John Bradberry worked on a major portion of the software, developing the computer interfaces and the communication software.

The control box, which contains computers, amplifiers and other electronic controls, was the responsibility of John Jones, Michael Horn, Frank Sawyer, and Rick Moser. Moser and Jones, assisted by Neal Alexander (MAL) in the early stages, designed the radio frequency portion of the system.

Co-ops Rusty Reeves (ME) and Mark Fisher (computer science) also worked on the field probe. □



A close-up view of the innards of the field probe positioner designed by Mark Hudgens (MATD) and fabricated by GTRI's Mechanical Services Department. (Photo by Anita Edwards)

**Spotlight on
Internal Research**

Editor's Note: *With this article we begin a monthly column reporting on internal research projects funded by GTRI's Senior Technology Guidance Council (STGC).*

Estimating contaminant effects on coherent radars

By Lea McLees, RCO

Preparing to design, improve or test coherent radar systems has often included an element of the treasure hunt—radar engineers find themselves conducting tedious literature searches to learn about commonly recognized contaminants and their effects on radar system performance.

But a recently completed GTRI research project may eliminate the hunting element, saving radar engineers and their employers time and effort—and, in some cases, offering them information to which they might not have had access. Radar specialists led by Jim Scheer of the Radar and Instrumentation Development Lab (RIDL) have developed a computer simulation that details coherent radar system contaminants, their effects, and how to test for them, Scheer says.

"A lot of the knowledge base in this arena is in private companies, but it's not advertised or disclosed and not reported very thoroughly," says Scheer, the lab's chief engineer. "We embarked upon this program to develop that knowledge base here. It is designed to give the working engineer a hands-on answer to how well his radar will perform and how good he has to make the devices to get the performance he wants."

How the simulation works

The computer simulation runs on BASIC and MATLAB software on DOS- or Macintosh-compatible desktop computers. The engineer enters the parameters of a particular radar system, including what size target the system must detect and the characteristics of the contaminants. The simulation presents a graphic display indicating how well the system will perform. The program shows color plots of Fast Fourier Transform (FFT) response to contaminants, in both one- and two-dimensional formats.

"The simulation helps engineers decide what modifications they might make," Scheer says. "Or they can use it to plan ahead for a radar they are designing."

The program performs quantitative analysis in some instances, and is continually being improved to provide more useful information.

Other project results

The simulation is just one of the results of a three-year internally funded research project dedicated to building understanding of coherent radar performance determination. The simulation software is distributed at short courses radar specialists are teaching at locations around the United States and Europe, including Eglin Air Force Base and near Munich, Germany. Their findings will be published in book form in 1992 by Artech House, followed by a 1993 publication including the software.

The researchers conducted extensive literature searches, talked with experts, used the information they collected to predict radar performance, and then tested their predictions. "We got good correlations between predicted and measured results," Scheer reports. "For the selected validation tests performed, the lab results agreed with the predicted results within a fraction of a decibel."

Among the contaminants the researchers compiled information on are the following:

- Phase noise in oscillators, which can reduce a radar's ability to detect and measure target velocity in the presence of background clutter;

- Errors in in-phase and quadrature detector methods, which can result in "ghost" targets that do not really exist; and

- A-to-D quantization effects, errors in amplitude that result when a signal is converted from analog to digital.

The researchers also addressed ways to test components, subsystems and systems to determine the value of contaminants without taking the radar into the field and using it to track a target. They have developed a short course specifically geared to contaminant analysis in specific types of radar systems, including frequency-modulated continuous wave (FMCW), pulse compression, coherent tracking, moving target indicator, pulse Doppler, phased-array, imaging, high-range resolution, and high cross-range resolution, Scheer says.

"Radar engineers generally know which companies have the expertise, but it is not always possible to locate and contact the particular person having the knowledge," he comments. "The upcoming book will provide the designer with the information he needs—in one place."

Portions of this research are featured in "The Quantization Noise Spectrum of a Sinusoid in Colored Noise" by J.D. Echard and M.L. Watts, which appears in Volume 1 of the 1991 GTRI TECHNICAL JOURNAL, released in April 1992.

Researchers participating in the project included George Ewell, Fred Nathanson, Jim Echard, Mark Richards, Sam Piper, and a co-op student, Brian Drachman. The research was funded by one of GTRI's Senior Technology Guidance Council awards. □

NATO seeks technology forecasts

The NATO Advisory Group for Aerospace Research and Development (AGARD) has commissioned a study to assess the potential of unmanned aerial vehicles to contribute to future (circa 2010) maritime operations, with particular reference to sensor packages carried in support of maritime requirements set forth by the NATO Supreme Allied Commander—Atlantic (SACLANT).

Georgia Tech has been asked to represent the United States on this international panel as the voice for U.S. industry. This gives the Georgia Tech community a unique opportunity to obtain international visibility by providing technology forecasts over the broad range of disciplines for which it is renowned. Disciplines for which technology is sought include:

- Active and passive RF sensors, jammers, decoys, links, and ESM
- Active and passive OPTICAL sensors, jammers, decoys, links, and ESM
- Active and passive ACOUSTIC sensors, jammers, decoys, links, and ESM
- Active and passive METEOROLOGICAL, MAGNETIC, NUCLEAR, CHEMICAL, and BIOLOGICAL sensors



Georgia Tech had an exhibit booth at the Dixie Crows Symposium held at Warner Robins in March. The photo shows Brian Keeton of the Concepts Analysis Lab manning the booth. (Special Photo)

- AVIONICS (guidance and control: navigation sensors, stability sensors, advanced actuators)

- COMPUTING (expert systems, self-healing architectures, miniaturization, processing power)

- Advanced AIR VEHICLE concepts (fixed wing, rotary wing, compound, lighter-than-air)

- Advanced PROPULSION concepts (engines, fuels, propulsors)

- SIGNATURE REDUCTION

- Air vehicle LAUNCH and RECOVERY systems

If you have performed any technology forecasts in these areas, know of such forecasts existing elsewhere, or would like to provide such a forecast based on your knowledge as an expert in a particular discipline, please contact Rob Michelson to have your information included or referenced in the AGARD proceedings. Direct inquiries and submittals to:

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Emerging from the USSR

By Lincoln Bates, EDL

It was, in a way, a trip through time for Charles Estes during late February, and not only in terms of crossing 11 time zones. As part of a private foundation's humanitarian mission, he visited the republics of Kazakhstan and Kirghizstan in south-central Asia and found a different world.

The quality of architecture and building construction, of industrial production, and of the consumer side of the economy reminded him, he says, of the Depression-era 1930s and '40s. In the Kirghiz capital of Bishkek, people lined up at curbside for gasoline, bread and milk. Basics such as toilet paper and light bulbs were in short supply. On the outskirts of the city, mules pulled rubber-wheeled carts.

In an orphanage for mentally and physically handicapped children, he noticed that some of the afflictions probably would have been remedied by neonatal treatment readily available in the West. Hospitals were cramped and dingy, and almost primi-

tive by our standards. Medical personnel sometimes reuse syringes, due to shortages. "They have a great need for antibiotics and vaccines," he says, adding that his group brought in eight footlockers of medicine and syringes.

A large pharmaceuticals factory in Bishkek seemed decrepit on the exterior despite the fact that it was only a few years old. Inside, Estes found employees making folk remedies from dried rosebuds. "There was no mechanical capping operation for the small medicine bottles, so employees pounded stoppers in with mallets," he says.

An apparel plant was in better shape, a vertically integrated operation from shearing sheep to making garments. It employed a modular concept with four workstations in one production area. But here, too, old methods remained. At a congested cutting table, workers used scissors. At another point, he observed the plant's "computer"—a woman calculating with an abacus.

Most of the plant's basic manufacturing equipment, he recalls, was similar to that of a rural Southern apparel plant. The finished products carried European designs and were of good quality.

He also visited the huge Lenin Machine Tool Factory, a former defense plant now making everything from grinders and milling machines to injection-molded plastic toys. "They're a full generation behind," says Estes. "Also, they're undercapitalized and making too many products. I suggested that they develop a strategic plan for producing priority products and allocating scarce resources."

Manufacturing, distribution and trade previously were dictated by Moscow, but no more. "Their old trade relationships are gone, and they've got to develop new ones," Estes observes.

Better pay might help, too. The average factory wage rate is about \$15 per month.

Still, he saw some hopeful signs. "They've got an educated work force and considerable natural resources," Estes says, adding that some entrepreneurs will make money eventually.

He also traveled to Kazakhstan's capital, Alma-Ata, an attractive city near lofty mountains, a bit like Denver sitting at the foot of the Rockies. "It has a lot of tourism and recreational potential," comments Estes.

While there, he visited Eldos Aziev, a physicist-turned-entrepreneur who was part of a delegation that came to Atlanta last fall. Some American investors are evaluating a process-tube cleaning device designed by Aziev and his colleagues. A principal in an ATDC firm has shown some interest in marketing the item or the technology in this country, Estes says. □

Economic development specialist Charles Estes (EDL) found many examples of hardship and antiquated procedures during a recent visit to two former Soviet republics.

**Profile
&
Insight**

**"Susan's brilliant mind and determination showed in her work. But as time passed, some of us learned that she had a tougher future to face than any of us. Then came the tumor operation she went into, knowing she would never hear a sound again. Most of us would have given up right then. But not Susan. She evoked the admiration of many by her courage and determination to continue living."
— Berry Pyron**

A remarkable life
In Memoriam:
Susan Wheeler

By Martha Ann Stegar

Susan Wheeler, an RS II who took a disability retirement from GTRI in 1988, died March 29 at the age of 42. She was a victim of neurofibromatosis, a hereditary disease which also claimed her mother when Susan was five years old. She is survived by her father, George F. Wheeler, a former physics professor at Georgia Tech; her sister, Pamela E. Wheeler; and a host of friends.

A graduate of the University of Georgia, Susan was the first deaf student to receive a master's degree in computer science at Georgia Tech. She worked as a computer programmer and technical writer at GTRI from 1971, when she was graduated from college, until her retirement 18 years later. She worked primarily for Nick Faust, principally in the development of software for geographic image processing.

A paradox

Susan Wheeler was a paradox: weak in body but strong in spirit; thorny and demanding on the outside but caring and concerned on the inside. She lived in a silent and shadowed world—able to hear nothing and to see very little—but was, above all, a communicator. For the last 14 years of her life, she maintained communication with her friends by responding to scribbled notes on a tablet or by electronic mail. Her computer was her lifeline.

Susan liked people and was full of curiosity about their families and activities. As Nick Faust once said, she liked nothing better than to "get somebody with a problem together with somebody with the solution."

Perhaps her greatest gift was as a focal point for bringing together many people of disparate backgrounds and interests—all sharing a love for Susan. We admired her courage and determination, loved her inimitable wit and salty comments, sometimes got exasperated with her demands, but always found her fascinating and inspiring. She, perhaps more than anyone else I've ever known, made the most of her life—determined to experience all she could and to live life to the fullest extent of which she was capable.

Memories of friends

Following are reminiscences from some of her Georgia Tech colleagues:

Berry Pyron: There were many Susans, and some of us are lucky enough to have been enriched by more than one. First there was the child and young girl Susan, before she knew her fate. Then there was the working, pre-deafness Susan—a vivacious, attractive young lady with a keen wit, who drove a little blue sports car, lived in a garret apartment near campus, gave great parties, and always stayed after someone else's party to help clean up.

Her brilliant mind and determination showed in her work. But as time passed, slowly she changed. Some of us learned then that she had a tougher future to face than any of us. Then came the tumor operation she went into, knowing she would never hear a sound again. Most of us would

have given up right then. But not Susan. There was yet another Susan—one who evoked the admiration of many by her courage and determination to continue living.

The happy memories are of working with Susan in the early days, when her hearing and other faculties were reasonably normal. Susan, Elmer Rhodes, and I worked together on a project where we were trying to dope out the electronic and electromechanical equipment that produced signals represented by endless reams of signal records. Elmer and Susan came up with a completely new analysis technique to use the computer to predict what was producing the signals.

Once, after she was deaf, Amy and I, with Archie and Shirlie Corriher, took Susan to A Taste of Atlanta. It was wall-to-wall people jammed together. Fearful that we might lose her, we held her hands and waded through the mob to get little bites of food here and there. Outside, afterward, there were fireworks, so we stopped to watch them. The noise was unbelievable, and the rest of us were holding fingers in our ears. Suddenly, Susan grabbed my arm, hit her chest, and said, "I can feel it, I can feel it, right here in my chest."

Betty Ann and Elmer Rhodes: Her joie de vivre and willingness to cope were paramount. When there was disagreement with a position or idea, her turn-of-phrase was apt, neatly expressed, always with good will.

Mary Ann Burke: Susan Wheeler and I met in autumn 1987. A coworker asked me to assist on a project that he and Susan were working on. Susan immediately gave me the "thumbs up" sign and pronounced, "I like her. We'll be friends." One day, long into our friendship, I commented to Susan that I had met so many nice people through her. She said, "That's because I only choose the best people to be my friends, and they choose me." She continued by saying that she knew being her friend was hard work; therefore, she needed many, many friends so she wouldn't wear anyone out. Susan was a very smart lady.

Gerald Mackey: I remember Susan for her vitality and interest in all things around her, even baseball. Susan had never attended a professional baseball game before she, Jay Gowens, his son, my wife Connie, our Ethiopian friend, and I attended a Braves game. The game was interrupted several times by rain and finally ended at about 4 a.m. By about 11 p.m., we had reached the third inning and some of us had grown tired of it all. Not Susan. She reasoned that she would be unlikely to ever attend another game, so she should take it all in. Jay Gowens, ever the good sport, agreed to stay with her to the end. After it ended, Jay took Susan home, took his son home, took a quick shower, and came straight to work. Susan showed up late in the day, full of enthusiasm about the adventure and with a vow, which she kept, to never attend another baseball game.

Connie Mackey: The most precious memories I have of Susan begin about two years ago—the day she said, "I want you to know that I believe in Jesus, maybe not in the same way you do, but in a special way for me." From then on, Susan "grew where she was planted," having found forgiveness in her heart for herself and others. We had many joyful conversations, especially the day she said, "Even though the medicines and treatments have eased the pain, the only times it really goes away are when I pray." □

Sharing your knowledge with readers

Writing tips for "hungry samurai"

By Lea McLees, RCO

The staffs of magazines, newspapers and other printed publications scan their horizons for what Steven J. Marcus, editor of Massachusetts Institute of Technology's *Technology Review*, calls "hungry samurai." These "elite warriors," as Marcus dubs them, are scientists, technologists and other professionals who are excited about their work and want to share professional ideas and knowledge with the public. What better author for a story about recent robotics advances, for example, than a researcher who is making some of the progress in the field?

However, budding "hungry samurai" will find writing an article for a newspaper or magazine slightly different from compiling a final research report or a journal article. Following are some tips on writing successfully for such publications.

Submit a proposal. Sometimes editors will contact you, requesting that you write a particular article—at other times, you develop the idea and suggest it. Either way, Marcus advises summarizing the structure of the proposed story for your editors. The six main questions editors like to see answered in proposals and stories are who, what, when, where, why and how.

Narrow your subject. If the area you specialize in is very general and broad, discuss just a portion of it. Cover the potential applications of military radar technology to transportation, for example, rather than to human life in general. This limits the topic to something you can cover well and your readers can digest.

Discover your audience. Who reads the publication you will write for? Retired scientists? Amateur CB radio operators? Physicists? Newspaper subscribers? Convey to readers how your subject affects them. Could the robotics advances you research drive auto prices down one day? Might your algorithm eliminate certain problems plaguing computer users? If so, say so—and remember to say so soon. Convince readers why they should read your story by the third paragraph, at the latest.

Ask about rules. Must your article be a maximum or minimum length? If no one offers exact limits, ask or notice what the average length of articles like yours is, and use that as a guide. Ask whether the publication follows a certain writing style, as well. Many newspapers follow the *Associated Press Stylebook*—which, for example, decrees that commas shall be omitted after the next-to-last item in a series ("red, white and blue," not "red, white, and blue"). The more you can follow the publication's style and length requirements, the less revision is required and the less chance for error exists.

Include other sources. If you maintain that a certain type of polymer is increasingly important today, show supporting evidence. You might cite statistics reporting that the polymer is used in 10 times more applications than it was two years ago. Include comments from colleagues and other researchers, as well—most editors require a minimum of three sources per article.

Keep paragraphs short. Long blocks of gray type are a psychological roadblock to reading—they slow the eyes, and the person the eyes belong to may give up reading the article altogether. Short, succinct paragraphs are easiest to digest.

Keep writing simple. Packing more meaning and information into fewer words is more difficult than writing reams of copy, but the result is better reading. Vary sentence lengths, but keep each one under about 20 words. In general, move attributions—"he said," "Brown said"—to the ends of sentences, because what is said is usually more important than who said it. For more writing tips, see Strunk and White's *The Elements of Style*, a tiny, readable book packed with ideas on creating good prose. *The Elements of Editing*, also by Strunk and White, will encourage you to revise ruthlessly.

Read the story aloud. Usually prose that sounds good to the ears is easily read and understood. If a sentence sounds awkward or stilted, revise it until your ears are pleased with the results.

Be prepared for editing. The amount of editing your work gets depends on many factors, including how well you adhere to requested story length and follow writing style. Try to arrange to read the edited version before the pages it will appear on are designed. If you have questions about editing changes, talk to your editor.

Writing an article for a publication can benefit a researcher in many ways. It offers potential sponsors—and people who know them—more chances to learn about what you are doing and get interested in your work. Getting published also shares your knowledge with the world, preparing the public for the benefits and consequences of its applications.

If you have questions about writing an article for publication or would like some help doing so, you may call Lea McLees or John Toon in Research Communications at 894-3444. We will be glad to assist you in any way we can. □



GTRI research in the news

During December and January, news of GTRI research reached readers of the following national publications:

◆ A wastewater simulator being developed jointly by GTRI and the Environmental Engineering Department was featured in *Computerworld* (135,000 circulation) and *Engineering Times* (75,000).

◆ *Aviation Week & Space Technology* (144,115) reported on a project to analyze the components carried on NASA's LDEF satellite. The analysis is being performed by Don Blue in GTRI/EOL and Russ Callen from the School of Electrical Engineering.

◆ Opening of the Manufacturing Research Center gained attention in several trade publications, including *Manufacturing Engineering* (130,000), *Design Management* (41,000), and *Circuits Assembly* (40,758). □

Focus on Quality

In-house development—a high priority

By Fred L. Cain

Many of you have strongly expressed that training and educational needs are high on your priority list. In many cases, the needs may be different and/or unique for a particular unit.

As a leading research organization, we must constantly remain vigilant and provide continual growth opportunities for all levels of responsibility. Diverse needs are apparent, and moves are afoot to accommodate them in an orderly fashion. A mention of a few of these initiatives is in order and should give an idea of the broad spectrum of activities that not only are being considered, but that are being implemented.

As many of you know, some attention is being given to internal development courses for project directors and others. Last November, for example, the Introductory Contract Development Course was given. This course was updated to reflect the new GTRI organizational structure and included new additions such as the role of the Program Development Office in the overall program development process and the key steps in putting the proposal together.

Another important activity currently in progress is the revision of the Project Directors Manual, which is expected to be completed by this fall. This, too, will reflect the changes resulting from the new GTRI structure and will be a key instrument in deriving the next internal training course for project directors.

Several GTRIers have taken advantage of three external-to-GTRI training courses. One of these opportunities was the ISyE 4897 course entitled "Special Topics in TQM." Ten GTRI staffers, ranging from a co-op student to lab directors, not only audited this course last fall, but also volunteered positive comments about the usefulness of the concepts presented.

The course, which I believe was the first-ever formal TQM course at Georgia Tech, was so successful that many students were turned away when the course was offered again this quarter. Fortunately, some GTRI folks made the cut and are currently attending. Due to its popularity, the course obviously will be given again in the future, so you may want to consider taking it.

If you cannot see your way clear to attend class for a full three months, you may want to take advantage of one of the Deming TQM seminars. Last September, 45 GTRI folks attended the two-day Deming seminar in Atlanta. Next month (May), a satellite downlink of the four-day Deming seminar (cosponsored by the Atlanta Area Deming Study Group and Georgia State University) will be received at Georgia State University. I recommend that you take the four-day course, as I believe it is more applicable to us at GTRI than the new two-day Deming seminar also being downlinked to Georgia State in May.

Other development initiatives are also in the mill. For instance, a draft proposal outlining an approach for developing and implementing a continuous, ongoing, training process for GTRI people is currently being pursued. An important part of this approach would be to focus on a methodology for determining what the training needs and desires of the various GTRI units are. Once determined, various priorities, such as course development and scheduling, could be established. It is presently anticipated that the activities will be conducted and/or managed by existing GTRI units, and that no new offices or departments will be created.

One new experimental development exercise has just been field tested and was a resounding success. Interactions with and inputs from the leaders of both the Radar Systems Applications Lab and the MAPS group made it crystal clear that they wanted a hands-on TQM-Tool Training Course as opposed to a TQM-Theology Course. Ned Ellington, director of EDL's Georgia Productivity and Quality Center, took an existing TQM-Tool Training Course that he had developed for the industrial environment, adapted it for the GTRI environment, and presented it March 23 at the Cobb County Research Facility.

Every response from the attendees giving their views of the course (86% responded) was very frank and extremely positive about the value of the course. Several gave valuable suggestions on ways to improve as well as expand the course. Typical responses:

➤ "The TQM training session was a good first step in exposing our lab leadership to the basic tools of the process."

➤ "The format of the class was excellent, as the hands-on approach results in clearer understanding of the material than is possible from just a lecture."

➤ "I think it is safe to say that we were all pleased with Monday's seminar."

➤ "Thank you for Monday's TQM seminar. You obviously were listening to what we wanted the course to be. Ned Ellington did a great job of presenting tools that we can immediately put to use in our lab."

Comments such as the small sampling given here are encouraging, but also indicate that we have a large challenge before us. Please let us know your views on TQM training needs, either by a handwritten note to me or by a PROFS note (FCAIN). Together, we can develop training programs that will do the job for your unit.

In addition, the Georgia Tech Office of Human Resources already offers, and will continue to develop, a variety of training courses for the campus. It is anticipated that many of these courses will aid us in our developmental efforts for use at several personnel levels. A future edition of the GTRI CONNECTOR will address these opportunities. □

"Writing Tips" is the third in a series of articles written by members of the Research Communications staff to help researchers improve their media relations and communications.

Queries & Quotes

"Is PROFS going away?"

"If so, when?"

"And what will take its place?"

These are vital questions to GTRIers. For some answers, read the Dialogue Box.

Dialogue Box

PROFS transition under way

By Melody M. Eidbo, College of Computing

Electronic mail is becoming an increasingly important aspect of communication among the Georgia Tech faculty, staff, administration, and students. The PROFS system, which provides electronic mail service for a significant portion of the Georgia Tech population, is being replaced. A plan is being devised to switch users to a better, more reliable, and more available electronic mail system. Some departments have already made the transition on an experimental basis, and eventually all PROFS users will change over to the new system.

Ron Hutchins, the new Director of Network Services for Information Technology, answers some questions about the PROFS transition below.

Q: Why are we moving away from PROFS?

RH: PROFS is obsolete technically—it depends on a single, large, expensive central computer. It does not interface well with the external world, such as PC's, MacIntoshes, and national networks. For example, transferring word processor files (such as WordPerfect files) cannot be done with PROFS. PROFS is essentially a closed community because of this old technology. PROFS cannot be expanded to accommodate the number of users Tech requires. The features that it provides are not as good as those provided by newer mailers. Also, because it is a central resource, if the machine goes down, then all PROFS users are denied service. PROFS is limited in the number of users that can have access, sometimes causing long waits and many retries to connect to a port. Replacing PROFS will allow us to move forward into our new vision of a coherent, reliable, and more useful e-mail system.

Q: Who is affected by the new e-mail plan?

RH: All PROFS users will make the transition to the new system. Other proprietary e-mail system users are encouraged, but not required, to switch as well. Having only one e-mail system at Tech will allow IT (Information Technology) to provide higher quality support for the campus.

Q: When is PROFS going to go away?

RH: The current plan includes a timetable that will be created to ensure that every department and work group will be scheduled for transition. Each organization will be examined to determine what equipment and software are needed. PROFS will be turned off only after every group has had sufficient time to make the transition.

Q: What will the transition be like?

RH: The transition will include the following:

- IT will examine existing hardware, soft-

ware, and network connections. By studying what is already in the work environment, recommendations can be made for any necessary hardware or software upgrades.

- IT will recommend software packages that will provide the needed services.
- IT will assist with installation of new products.
- Training will be available both for work group support personnel and for end users.

Q: What is the new e-mail system like?

RH: The recommended applications software for e-mail includes public domain (free) packages that together provide comparable or superior services for most PROFS features. One feature that is not currently addressed is calendaring, but this will be studied later.

Q: How much will the new system cost?

RH: It depends on the existing resources in the organization or work group, how you currently connect to the PROFS machine, and the functionality desired. The recommended package will be free, and IT will provide support for the PC, MacIntosh, and Unix workstations and terminals without charge. Other proprietary solutions will work, but installation and support may not be free.

Q: Is IT still going to support MicroSoft Mail?

RH: We're making allowances for existing proprietary mailers to be used in a local environment when there is a gateway to convert to SMTP (the campus-wide standard protocol). However, we feel that other products will soon be available that will provide better features and will operate in the campus environment better.

Q: What will happen to my mail address?

RH: In the short term, the same PROFS address will work. The long-term goal is for Tech to have a consistent, campus-wide addressing scheme that might fit with a larger statewide scheme, now under development. The details of the new scheme are still being worked on.

Q: Who is studying these issues?

RH: The campus-wide Network Working Group (NetWG) has been studying the PROFS transition problem for almost a year. This group is sponsored by Information Technology and includes representatives from many departments and GTRI who are well versed in networks and electronic mail technology. The NetWG has examined the issues and problems carefully and has experimented with and recommended e-mail solutions. Some of the NetWG members have already implemented the new e-mail solution in their departments and have it working well.

Q: How can we get further questions answered?

RH: Now is the time to give us input. You can send questions via e-mail to: profs-questions@gatech.edu.

(To our readers: Do you have a question or suggestion for the Dialogue Box? Send it to GTRI CONNECTOR, RCO/GTRI 0800 or PROFS MSTEGAR. We will route it to the proper person for action. If it is of general interest, it may be selected for publication. Otherwise, if you include your name, you will receive a personal reply.) □

Professional Activities

Program reviews held

GTRI staffers participated in two program reviews in February. **Marvin Cohen** (MAL), **Mike Baden** (MAL), **Guy Morris** (RSAL), **Mike Minardi** (CMDL), **Mark Smith** (CMDL), and **Jerry Heckman** (CMDL) participated in the NCTR (Non-Cooperative Target Recognition) Program Review at Wright Laboratories February 18. Minardi briefed the group on results of current threat assessment, and Smith briefed on development and assessment of candidate "innovative" threat electronic countermeasures (ECM) techniques.

February 18-21, a group from the Countermeasures Development Lab—**Don Lewinski**, **Jack Landgren**, **Jerry Heckman**, **Bob Wohlers**, and **Harry Andrews**—supported an EFRA (ECM Functional Requirements Analysis) Interim Program Review at Dynetics. Lewinski, Wohlers and Landgren gave a two-hour briefing on analytical results for various ECM and ECCM techniques under consideration. Plans were made for GTRI and Dynetics to provide analytical support and evaluation of selected ECM techniques to be employed in upcoming tests against a missile seeker simulator. The hardware tests will be useful in validating the performance of the ECM techniques, as well as the EFRA models.

Concepts Analysis Lab

Ronald Prado received his MSEE from Georgia Tech March 21.

Economic Development Lab

Chuck Catlett recently was elected national vice president of the Association of Government Marketing Assistance Specialists.

The Augusta Regional Office played a major role at the recent Central Savannah River Area Science and Engineering Fair, the largest two-state science fair in the Southeast. More than 150 schools from some 20 counties in Georgia and South Carolina participated. **Paolo Chiappina** coordinated the efforts of 130 judges recruited from area businesses, colleges, and government agencies who evaluated 560 projects.

Charles Estes led a focus-group session for Trade Adjustment Assistance Centers at the National Association of Management and Technical Assistance Centers' (NAMTAC) spring conference in Washington (DC) March 29-31.

The Industrial Extension Service was cited and **David Swanson** quoted in the April 6 issue of *Business Week*.

Electronic Support Measures Lab

Steve Millar graduated from Georgia Tech March 21 with an MSEE.

Kathy Schlag and **Mike Kopp** presented a review of their intrapulse work to the multinational TTCP (The Technical Cooperation Panel) in Ottawa, Canada, March 24-26.

Electro-Optics Lab

The GTRI high-speed, low-noise CCD speckle imaging system is busy with observing runs: March 13-22 at the Lowell Ob-



At the Test and Evaluation Symposium dinner, Al Nelson, Ira Garnto, and Dinal Andreasen (left to right) chat in front of the poster paper on the SADS IV Threat Simulator that was presented by GTRI. An accompanying eight-minute repeating video showed various shots of the movement of portions of the radar. (Photo by Barry Sharp)

servatory 72-inch telescope and May 5-10 at the Mt. Wilson 60-inch telescope. According to **Jim Beletic**, they are observing Mars, asteroids, binary stars, and the moons of Jupiter.

Ted Doll will chair a symposium at the annual convention of the Human Factors Society, to be held in Atlanta October 12-16. The symposium, entitled "Visual Target Acquisition: Bridging the Gap from Vision Research to Applied Models," will include a joint paper by Doll, **David Schmieder**, and **Shane McWhorter**, as well as papers by three other investigators. The papers will examine visual discrimination models derived from basic vision research and evaluate their applicability to applied problems, such as target detection in cluttered backgrounds. The models and data presented in the symposium also should have implications for other areas, such as the evaluation of image quality.

Environmental Science & Technology Lab

March 19, **David Jacobs** testified before the U.S. Senate Subcommittee on Housing regarding the 1992 Lead Hazard Reduction Act, a bill that would extend lead-based paint testing and abatement requirements to all federally assisted housing.

Dan Ortiz recently made a presentation on ergonomics to the National Science Foundation.

Charlene Bayer and **Chris Downing** were featured on "CNN Science Update" March 21 and 22 for their work on a new ventilation system to improve indoor air quality in buildings.

The Society for Technical Communication presented an Award of Excellence to **Nancy Davis**, **Dan Ortiz**, and **Rae Adams** for "A Stitch in Time—The Supervisor's Guide to Ergonomics." **Leigh McElvaney** and **Stephanie Babbitt** won an Achievement Award for "The Sixth Southeastern Safety and Health Conference and Exhibition Exhibitor Prospectus."

The Sixth Southeastern Safety and Health Conference was held April 6-8 at the Hyatt Atlanta Airport. More than 500 persons (including exhibitors) participated.

Management & Project Support Group

Ron Creswell presented a paper entitled "Oracle and Lotus 1-2-3: the Best of Both

Worlds" March 13 at the East Coast Oracle Users Conference in Rockville (MD). He will present the same paper to both the Georgia and Georgia Tech Oracle Users Groups in April. The paper describes the Phase II Project Planner tool being developed within the Resource Management Program (RMP) for use by GTRI project directors.

Modeling & Analysis Lab

Chris Barnes presented a paper entitled "Direct Sum Signal Constellations for Coded Modulation" on March 18 at CISS '92, held at Princeton University.

Radar & Instrumentation Development Lab

Nick Currie and **Tracy Wallace** taught the first week of the Millimeter Wave Systems part of the ARDEC Smart Munitions Course at Picatinny Arsenal February 11-14. **Ted Lane** and **Bob McMillan** taught the second week. The ARDEC Smart Munitions Course is a 15-month course (one week per month) on radar, radiometry, millimeter waves, infrared, and smart munitions.

At the Second International Congress on Recent Developments in Air- and Structure-Borne Sound and Vibration, held March 4-6 at Auburn University, Capt. **Michael Matheus**, adjunct research engineer, presented a paper entitled "Investigation of an Acoustic Denial System."

Threat Systems Development Lab

TSDL personnel presented two papers at Test and Evaluation Symposium VIII at Fort Walton Beach (FL) March 10-12. **Al Nelson** presented a paper, entitled "Using the SADS IV Threat Simulators as an Electronic Countermeasures Test Bed" and coauthored by **Ira Garnto**, during the formal classified session. The other paper, "Instrumentation, Calibration, and Interpretation of Data in the SADS IV Threat Simulator," was presented as a poster paper during the buffet dinner March 10. Coauthors were **Barry Sharp**, **Dinal Andreasen**, **Dave Price**, and **Tom Tapp**. **Kay Lindsey** did all the art work on the poster paper. All but Tapp and Lindsey attended the meeting.

Congratulations to **Vickie Fennell**, who was graduated from Kennesaw State College with an MBA and inducted into the Honor Society of Phi Kappa Phi. □

Perennial course is perennially popular

By Susan Shows, EDL

Georgia Tech's Basic Economic Development Course reached a milestone this month: it has been offered for 25 consecutive years! More than 80 industrial and economic developers from 12 states attended the session, which was held April 5-10 at the Paul Weber Space Science and Technology Building on campus. The course is accredited by the American Economic Development Council (AEDC) and is a prerequisite for admission to AEDC's Economic Development Institute.

Bob Cassell, former head of GTRI's Community Development Branch, instituted Georgia Tech's Basic Course in 1967 and has directed the annual event since that time. Cassell currently is the executive director of the Southern Industrial Development Council.

On Friday, April 10, David Clifton, director of Economic Development and Technology Transfer at GTRI, and other members of the Tech community honored Bob Cassell at a luncheon at the Penta Hotel for his 25 years of outstanding service to the Basic Course. Dr. Clifton presented a plaque to Mr. Cassell recognizing his efforts and achievement in making the Georgia Tech Basic Course a model for other university-based programs for economic developers. □

Focus on Folks



Bob Cassell (left), who founded and has directed the Georgia Tech Basic Economic Development Course for 25 years, received an appreciation plaque from David Clifton at a luncheon in his honor April 10. (Photo by Rae Adams)

Focus on Folks

GTRIers are invited to a Symposium on Environmental Research at the University of Georgia May 8 and 9.

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Personnel News

Aerospace Lab

Mike Foster has graduated and accepted an RE I position. **John Marshall** has terminated.

Electro-Optics Lab

The Speckle Imaging Group has two new students: **Ken Brown** is a physics PhD student who is working on algorithms and data processing software, and **Franck Lecanu** is an EE graduate student who has come from France to do thesis study at Georgia Tech for the next six months.

Management & Project Support Group

Jeffrey Douglas Wise is a new student assistant in the MAPS Baker Building Group. His major is biochemistry.

Office of the Director

Janet Nelson, student assistant, has graduated with a BIE, and **Bill Fannin**, technical writer, has terminated.

Threat Systems Development Lab

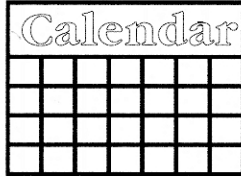
Jay Phelps has transferred to the Advanced Technology Lab.

Tana Parker has resigned her permanent position and become hourly as needed.

Leon Stillman will retire April 30. □



The GTRI Connector is published for Renette Miller, an accountant in the Research Operations Analysis/Modeling Group (ROAM), and all the other employees of GTRI. (Photo by M.A. Stegar)



May events schedule— College of Computing

MAY

- 1 Ralph Grishman, New York University, "Information Extraction in Natural Language Text," Cognitive Science Colloquium, 12-1:30 p.m., CoC Room 201.
- 7 Larry Hodges and Ben Watson, "Fast Algorithms for Rendering Cubic Curves," GVI Brown Bag Series, noon, Skiles Room 108.
- 7 Dr. Alfred C. Spector, President and CEO, Transarc Corporation, "Bases of Distributed Computing," Distinguished Lecture Series, Reception at 3 p.m., Lecture at 3:30 p.m., College of Computing (CoC) Room 17.
- 7 Ernst Dickmanns, Universitat der Bundeswehr Munchen, "High Speed Autonomous Navigation." For more information, contact Prof. Ron Arkin, College of Computing.
- 8 Beth Warren, TERC, Boston, "Appropriating Scientific Discourse," Cognitive Science Colloquium, 12-1:30 p.m., CoC Room 201.
- 14 Chris Hertzog, "Mental Rotation of Visual Images," GVI Brown Bag Series, noon, CoC Room 101.
- 15 Dan Spears, "Wide-Area Network Technology," The Telecommunications System Group, 11 a.m., MiRC Room102.
- 15 Mallory Selfridge, University of Connecticut, "A Computational Model of Learning to Count," Cognitive Science Colloquium, 12-1:30 p.m., CoC Room 201.
- 21 Panel: Jim Foley, Greg Corso, Mike Sinclair, Beth Davis, Larry Hodges, "Virtual Reality: Hip, Hype, or Hope," GVI Brown Bag Series, noon, CoC Room 101.
- 22 Wen-Pai Lu, "Standard for Interoperable Local Area Network Security," The Telecommunications System Group, 11 a.m., MiRC Room102.
- 28 Hans De Graaff, "Context-sensitive Textual Help As An Integral Part of a User Interface Development System," GVI Brown Bag Series, noon, Skiles 108.
- 29 Ray Bareiss, Northwestern University, "ASK Systems," Cognitive Science Colloquium, 12-1:30 p.m., CoC Room 201.

For more information on any of these lectures, contact Molly Croft, College of Computing, at 853-2682. □

Personal Notes

Cradle Roll

Bob Schmitter (ESTL) and his wife, Donna, are parents of a new baby girl, Ryan Marie, born March 22.

Preston Bates (AERO) is the proud father of a baby boy (his first), Adam Joseph.

Bryan and **Lynette Powell** (MATD) are the proud parents of a baby boy, Lloyd Brett, born March 20.

Virginia and **Jim Sowell** (EOL) welcomed a son, Daniel James, March 25.

Sick Bay

Bob Shackelford (OOD) is recovering from major surgery performed on March 31.

In AERO, **George Shrewsbury** is recovering from nose surgery, and **Charlie Crawford** is back at work following hip surgery.

Our Sympathy

... to **James Seals** (EDL), whose father died in early April, and to **Jon Hoffmeister** (TSDL), whose stepmother died April 4.

Achievers

Tom Hoshstrasser's (TSDL) wife, Belinda, recently appeared in the Ballet Rotaru's production of "Swan Lake." □

Research symposium to focus on environment

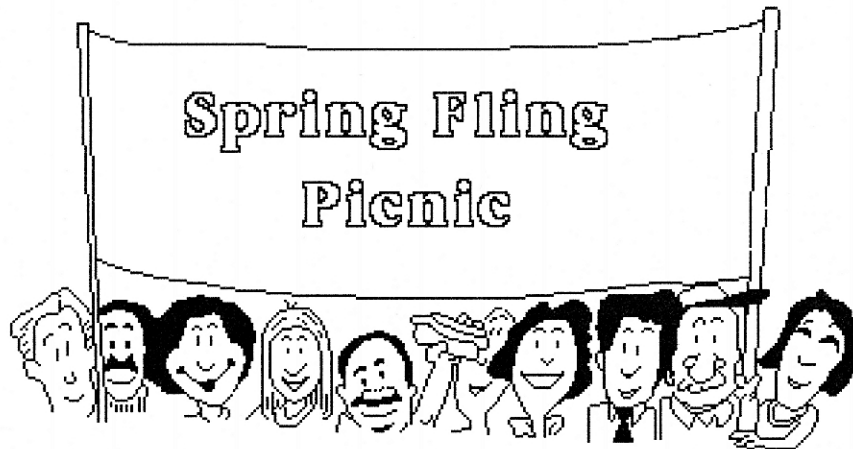
"Designing Tomorrow's Sustainable Environment Today: Georgia's Role" is the theme for the Second Annual University System Symposium on Research, planned for May 8 and 9. Faculty and students from public and private colleges and universities, as well as the general public, are invited to attend the conference, to be held at the University of Georgia's Center for Continuing Education.

The two-day meeting will showcase environmental research being conducted throughout the University System, and a panel of experts and respondents will discuss Georgia's environmental issues. Among the topics to be addressed are:

- Natural Resource Assessment and Management
- Waste Management and Pollution Prevention
- Global and Regional Changes
- Strategic Alliances and Outreach

Speakers for the session include Commissioner of the Georgia Department of Natural Resources Joe Tanner and Governor Zell Miller, along with researchers from around the state.

Registration fees range from \$45 for faculty to \$30 for students. Some money may be available to defray student costs. Fees for all attendees, except students, will increase by \$5 after May 1. For more information on the conference or registration, contact Janice Sand, University of Georgia Institute of Ecology, 404-542-2968. □



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We'll see you Wednesday, May 20, at the Burger Bowl (Hemphill & 8th Sts.), 11 a.m.-2 p.m.! (Rain date Tuesday, June 2)