

# The GTRI Connector

## Did You Know...

The pupil of the eye expands as much as 45 percent when a person looks at something pleasing.

The earth rotates on its axis more slowly in March than in September.

-- from *2210 Fascinating Facts* by David Louis

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## A Year to Remember

By Richard H. Truly, VPDIR

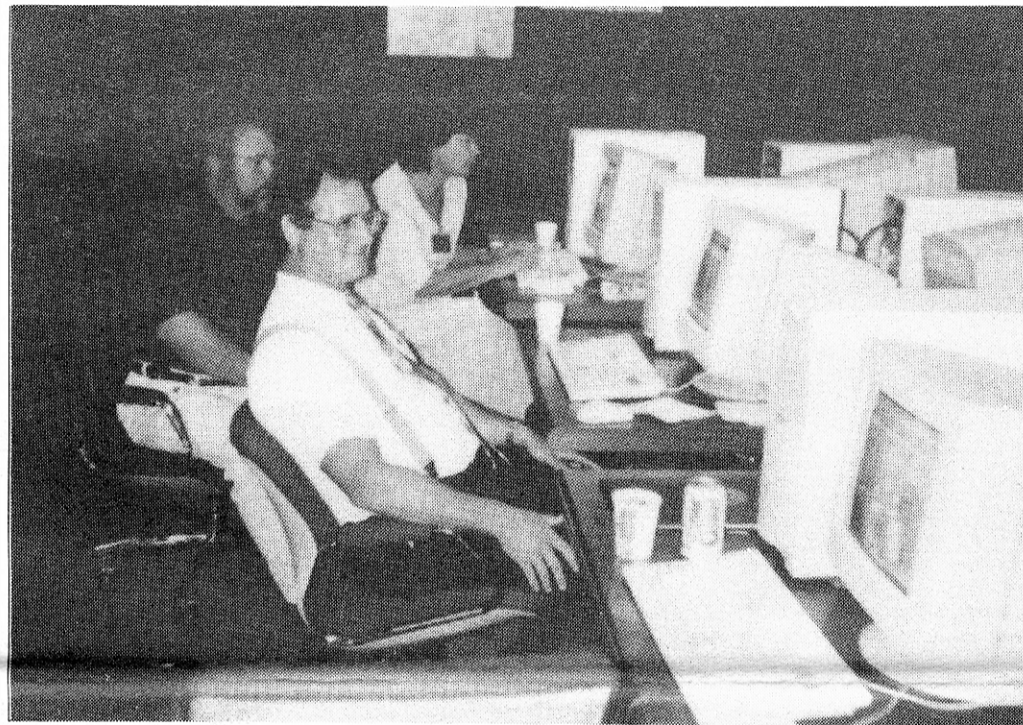
It's usually in late December or early January during short days and chilly, winter breezes when we generally look back at life and accomplishments, both personal and professional. The recent blazing hot, mid-summer days of July may seem like an unusual time to review the progress of a year, but that's just what I've been doing.

GTRI's fiscal year 1995 ended this past June 30, and by any measure, it was a shining year — a year to remember. I'm very proud, and frankly amazed, at the things we, together, accomplished together during these last 12 months.

**Record New Awards:** GTRI recorded our all time best research awards year during FY 95, bringing in \$98.7 million in awards! Working together, we exceeded our previous FY 91 record of \$98.3 million by more than \$360,000. And this was in a year during which the competition has never been stiffer.

**Record Research Backlog:** We also exited FY 95 with the strongest level of research contract backlog in our history: \$19.6 million.

**Delivering Quality to Our Customers:** In several areas we have made tremendous improvements in attention to quality — the most important aspect of our work. A great example of this is on-time deliverables during FY 95. GTRI met our customer obligations with the delivery of more than 3,300 individual items, ranging from monthly reports to software programs to multi-ton sophisticated hardware. Our on-time perfor-



**Carl Baxter (front), Rusty Embry and Diane Price learn to use a new software for tracking work orders. Ten SSD employees were trained on the software in late July. (Photo by Lea McLees)**

mance increased during the year by more than 10% to approximately 85% on-time, with several laboratories achieving an on-time rate of more than 95%. We're getting there!

**Revitalized Internal Research:** Our internal research program gained strength with the continuation of ongoing work and the addition of new projects in computer assisted breast cancer diagnosis, a high resolution digital film master system, distributed fiber optic/integrated optic analytical probes, and finite-difference time-domain analysis of radome effects on antennas. The GTRI Fellows, who oversee our internal research and development, have done excellent work on that project, along with forecasting and assessing technologies, encouraging campus research

collaboration and collecting recommendations from employees to share with me.

**Successes in New Initiatives:** GTRI funded new, promising research initiatives in modeling and simulation, law enforcement, transportation, educational and medical technology. Researchers made strides in numerous other areas: carbon-carbon composites, a software program that predicts ground-induced tracking error for radar systems, "human level" robot processing systems, signal transmission and reflecting in buildings, fog detection and motorist notification of it, simulated traffic control centers, and reengineering corporations.

**New Faces, New Ideas:** We also welcomed some new faces. First and foremost, we joined in welcoming Georgia Tech's tenth President, Wayne Clough. In GTRI,

*Continued on page 2*

## Observed & Noted

**FY 95 was a year to remember. Turn to page 4 for a list of our 10 largest awards and the people and labs who brought them in.**

Want to ride a bike to work during the Olympics? See "Countdown to 1996" on page 3.

■ Sarah Andrews (Phosphor Center) is in-the-know about the Olympics, and you can be, too. *If you missed her June 26 brown bag, turn to page 3 for a summary.*

■ GTRI has hired two new junior faculty research

leaders. *Meet one of them on page 4.*

■ Internal research is an important investment for GTRI. *Read about the four newest projects on page 5.*

■ What's the key to pollution prevention? *See page 5 to find out what*

*some GTRI researchers say.*

■ Want to ride in a dream vehicle? *Climb aboard Georgia Tech's electric bus on page 6.*

■ If you work in property management, you'll want to attend an up-

coming seminar. *Harry Ross tells you about it on page 6.*

■ Your work at GTRI has an economic impact on Georgia. *To learn how — and how much — turn to page 6.*

■ What do Bob Brems and Jean Sands have in common? *They're new employees — meet them on page 7.*

■ Babies, babies, and more babies! *Turn to page 8 to find out which colleagues are welcoming new family members.*

# News & Notes

**Year**

*From page 1*

Gerald Smith began leading our strategy and planning, in addition to assisting Ed Reedy in day-to-day Research Operations. Gerald and Trent Farill remain as interim directors of EOEML and ELSYS, while we conduct national searches for permanent directors of these labs. Senior research faculty leader Myron Cramer joined our other faculty leaders and began spearheading Georgia Tech's investigations in competitive information technologies and information warfare. Our first two junior faculty research leaders, Margaret Loper and Lisa Lust, joined the GTRI team. Margaret specializes in distributed interactive simulations, and Lisa's area of expertise is percolation and semiconductor physics. Many others joined our team in several GTRI units.

**Familiar Faces, New Roles:** Jim Cofer was named head of the Advanced Program Office. He'll coordinate future multilab research areas and marketing efforts. Janice Porter, as leader of our new Administration Office, is taking on new responsibilities handling vital GTRI administrative processes, special activities and programs. Her work will include many duties formally assigned to the other members of the Executive Staff. MAPS began reporting to Research Operations, so its employees can be even more closely aligned with the needs of their lab

customers.

**Active GTRI Advisory Council:** The 12 outstanding individuals of this council held two productive and free-wheeling meetings with us during the year. They familiarized themselves with GTRI and its people during fall and spring visits, and are offering suggestions and constructive criticism based on their expertise with the federal, state and corporate research.

**Improved Work Space and Management:** We continued work toward our long-term goal of upgrading our work environment. The Techway Building became home to the Undersea Research Program Office and the GTRI Warehouse. The O'Keefe Building and some campus and Cobb County labs were renovated. We began a very concentrated effort to improve the looks, safety and efficiency of our vehicle fleet.

**Bold, Effective and Collaborative Campus Activities:** We launched a quality improvement collection in Georgia Tech's library. Through our teaching fellows program and other opportunities, GTRI researchers shared their knowledge with Georgia Tech students in more than 27 courses during FY 94. Well over 300 dedicated graduate and undergraduate student employees gained valuable work experience at GTRI. Many of our full-time employees began, continued or completed advanced degrees, about 70 percent at the master's

degree level and 30 percent at the doctoral level. Our Mentor/Mentee Program fostered the contract development skills of younger GTRI and college researchers.

Of course there were bumps and ruts along the way. The external environment is changing at a rapid clip, and coping with it while maintaining our quality is not easy. But I do believe that the best is yet to come. I am proud of our successes this past year — and I look forward to working together with each of you in the coming year to meet the challenges on our horizon. Together, let's work hard to make GTRI a better place for all, and to create a fiscal year 1996 that's another year to remember, as well.

**It's Almost Picnic Time!**

Be sure to mark your calendars for the GTRI Family Picnic: It's scheduled for 11 a.m. to 4 p.m. Saturday, October 7 at the Cobb County Research Facility. Lunch will be served from noon to 2 p.m. More details will be coming soon.

Picnic committee chairperson is Cheryl Barnett, and DW Senn is co-chair. Committee members are Rebecca Bennett, John Toon, Bob Lang, Ida Taplin, Wanda Fox, Maggi Harrison, Sheron Meyers, Miriam Crenshaw, Elaine Baran, Adrienne Harrington, Carey Floyd, Kim Toatley, Cindy Roberts and Janice Porter.

## SELECTED JUNE 1995 AWARDS

Title	PI/Laboratory	Sponsor	Funded Amount
HH/MH60G Usage Spectrum Evaluation Program	Crawford, C. (AERO)	Air Force	\$1,221,346
Electronic Warfare Techniques Analysis	Lilly, L. (ELSYS)	Air Force	300,000
Combat Identification Tech Base Support	Vander Meer, W. (SEAL)	Army	150,000
High Speed Test Track Maglev Upgrade TCBA	Blankenship, S. (ELSYS)	Army	160,880
IEW Mission Processor Software Independent Verification & Validation	Brooks, J. (ELSYS)	Air Force	1,000,000
Spectra Program	Kotliar, A. (EOEML)	Allied Corporation	50,000
Computer-Assisted Infrared Imaging Systems for Determining Vehicle Occupancy	Gimmestad, G. (EOEML)	Ga. Dept. of Transportation	317,130
Viseo Support for Combat Modeling	Schmieder, D. (EOEML)	Army	150,000
Assurance of Integrity in Hollow Cathode Insert Flight Hardware	Ohlinger, W. (EOEML)	NASA	25,271
SXI Fiber Optic Coupler Coating	Robinson, W. (EOEML)	NASA	24,568
Task Order #1 - Secondary Emission Cathode Research Technology, Science & Policy Transfer Support Service to AEPI	Ohlinger, W. (EOEML)	Meridian Corp.	45,000
Laboratory Studies of Tropospheric Sulfur Chemistry	Davis, N. (EOEML)	Army	24,491
Affordable Multi-Missile Manu. (AM3) Independent Benchmarking	Wine, P. (EOEML)	National Science Foundation	142,000
Flight Mission Simulator/Digital (FMS/D) Development	Smith, J. (HRO)	Army	425,113
Optoelectronics Demonstrations for Army Missile Systems	Frost, M. (HRO)	Army	395,990
Advanced Manuf. Technology for Missile Electronics	Bohlander, R. (ITL)	Army	299,989
Microject Cooling for Missile System Electronics	Bohlander, R. (ITL)	Army	294,912
MATS Ultraviolet Missile Approach Warning System Stimulator Specification	Allen, M. (ITL)	Army	124,765
XM-15S Simulator	Roberts, R. (SDL)	CTA Inc.	69,649
Modification to Laser System Eng. Support	Camp, S. (SDL)	Army	1,985,399
Air-to-Air Electronic Countermeasures Model (AECM) to Enhance Electronic...	Roberts, R. (SDL)	CTA Inc.	107,692
Target Signature Measurements at GTRI Electromagnetic Test Facility	Harkness, L. (SEAL)	MTL Inc.	26,666
Tech. Support of the Millimeter Wave Instru. Radar Sys.	Gostin, L. (SEAL)	ERIM	79,684
Antenna Simulation & Performance Effectiveness Assess.	Moore, L. (SEAL)	Army	74,720
Radar Hardware Development Analysis	Adams, J. (SEAL)	Dynetics Inc.	249,857
Antennas in Structural Composites	Belcher, M. (SEAL)	Army	500,000
Electromagnetic Composite Information Exchange	Weaver, E. (SEAL)	Navy	499,981
	Kemper, P. (STL)	Los Alamos National Lab	300,741

# News & Notes

## Countdown to 1996

**Some GTRI personnel and others may want to commute by bicycle during the Olympic Security Period. Will there be any place to park bikes on campus? Is there any thought of reserving specific lanes, routes or streets for non-motor traffic only? Also, will there be any shower facilities available so those who commute to Tech by bike can clean up?**

Bikes can be used for commuting, but they will not be allowed past security checkpoints. Thus, you will have your choice of placing your bike on the inside or the outside of the security fences during the Olympic Security Period.

If there is enough demand, Georgia Tech will set up one or more covered areas on both sides of the gates. Bikes could be securely kept in these areas.

As of now, there doesn't seem to have been much thinking about having lanes or routes dedicated to non-motor

traffic such as bikes. However, it does seem like an idea worth considering by the city transportation planners.

There will be no shower facilities other than what already exists in GTRI facilities. Bear in mind that the Student Athletic Complex will not be available during the Olympic period.

**Will any part of Home Park be closed off to either traffic or parking during the Olympics?**

It appears that Hemphill Avenue, though it won't be closed, may have an express lane for use by buses and official vehicles.

The Atlanta Committee for the Olympic Games (ACOG) and the Atlanta Police are currently discussing how to handle traffic and parking issues in Home Park, as well as the other neighborhoods around the campus. An ACOG official expressed concern that residents exiting Home Park to the south may have problems with the Olympic express bus lane planned for 10th Street. Therefore, a possibility exists that Home Park streets may be blocked off at 10th Street. At the same time, 14th Street would be

devoted entirely for use by non-Olympic traffic, such as local residents.

Blocking off the 10th Street entrances to Home Park would have the added benefit of making it harder for Olympic visitors to find their way into Home Park and park illegally. At this time it seems safe to assume that non-residents won't be allowed to park in any areas adjacent to campus.

Meanwhile, it seems probable that residents in Home Park and other nearby neighborhoods will receive some kind of identification for their cars. This would differentiate them from non-residents and allow them to park near their homes during the Olympics.

More finalized information should be available from ACOG later this summer.

**Sources:**

- William A. Miller, Director of Olympic Planning for Georgia Tech.
- The Atlanta Committee for the Olympic Games (ACOG).

## Olympic Update: MARTA, Conyers Will Be Busy

Normal daily ridership of MARTA runs about 200,000 people daily. But during the Olympics it's expected to peak at a decidedly snug 500,000 riders per day.

That and many other Olympics facts and trivia greeted listeners as Sarah Andrews offered another lunch-and-learn Olympic Brown Bag update on June 26.

Andrews, who works in GTRI's Phosphor Center, is an Olympics volunteer who's knowledgeable about the upcoming Games. Among the particulars she reported:

- All competitions at the 1996 Games will be for medals. Unlike other Games, no exhibition sports will be held.
- Women's soccer will be played as a medal sport for the first time at the 1996 Atlanta Games.
- 1996 will see mountain biking competition for the first time — in Conyers, along with the equestrian events at the Georgia International Horse Park.
- Can you guess why the 3rd and 12th days of the Olympics can be expected to draw the largest number of visitors to town? It's because those are the days of equestrian (also known as "dressage") competitions — and thus probably are not the best dates for social visits to Conyers.
- There will be several pre-Olympic sports competitions at Olympic venues during 1995, under the name Atlanta Sports '95. If you've a mind to, you can

volunteer for Atlanta Sports '95 events without having to make the full two-week time commitment required of regular Olympic volunteers. Those who would like to find out about opportunities to be either an Atlanta Sports '95 volunteer or an Olympic volunteer can call 404-224-1996.

Sarah Andrews is versed not only on the Olympic present but also its illustrious past. Do you recall, for instance:

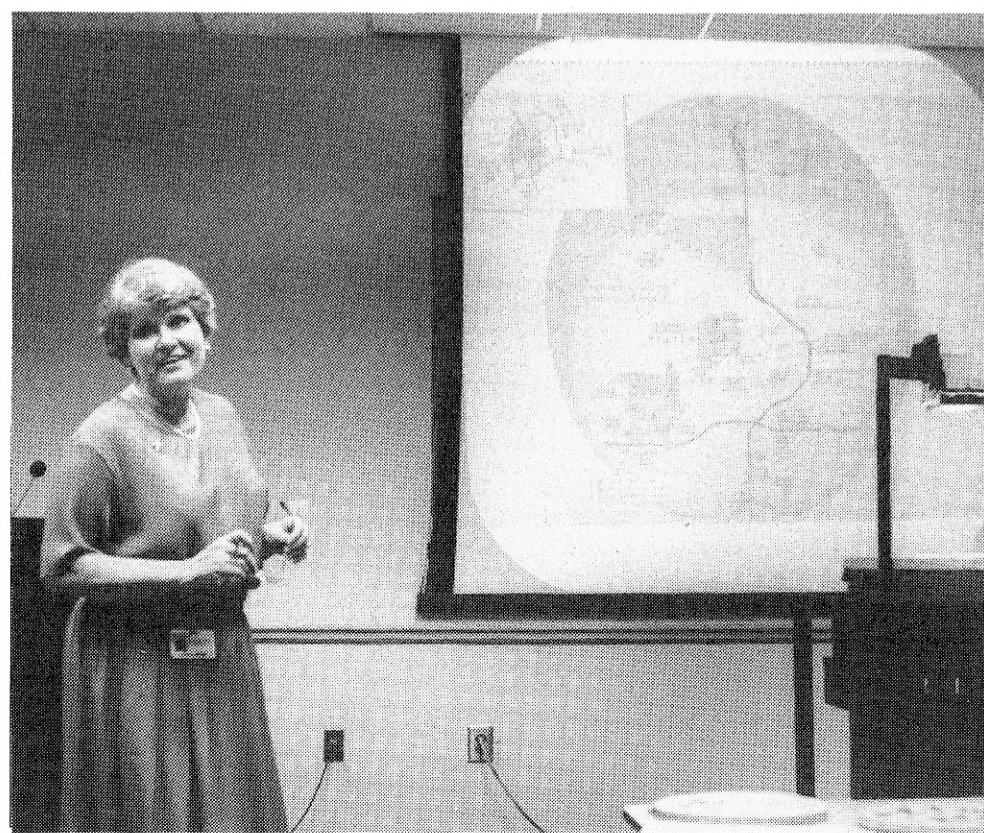
- Which bronze-medal winner in the 1984 Los Angeles Olympics once filled gas tanks for a living at DeKalb-Peachtree Airport?

- Which athlete won five gold medals in the 1924 and 1927 Olympics, and set 67 world records in swimming distances from 50 to 880 yards? (Hint: he went on to become a Hollywood swinger.)

- Which five states had the most Olympic participants on the team that went to the 1992 Barcelona Summer Games?

- What member of the 1972 U.S. Men's Olympic basketball team went on to become a U.S. congressman?

(Answers: Evander Holyfield; Johnny Weissmuller; California, Texas, Florida, New York, Massachusetts; Tom McMillen.)



**Sarah Andrews discusses Olympic events with brown bag attendees. Look for another Olympics Brown Bag to be offered in the fall. (Photo by Rick Robinson)**

**Focus  
on  
Research**

**Top Ten for FY 95**

These labs and employees brought in the 10 largest awards during FY 95. Congratulations!

Lab	Proj. Director	Sponsor	Title	Funded Amount
ELSYS	R. M. Ingle	U. S. Air Force	Integrated Support Systems	\$5,435,334
SDL	S. V. Camp	U. S. Army	XM-15S Simulator	4,186,000
EOEML	C. J. Summers	U. S. DoD	Phosphor Technology	3,000,000
STL	J. G. Meadors	U. S. DoD	Workshops & Documents	2,638,586
ELSYS	T. M. Strike	U. S. Air Force	MH-53J Integrated Electronic Warfare	2,350,000
ITL	B. J. Wilson	U. S. Army	Opossum Magic Analysis	2,000,000
SEAL	G. V. Morris	U. S. Air Force	Radar ECCM Flight Test	2,000,000
SDL	S. V. Camp	U. S. Army	XM-15S Simulator	1,985,399
SEAL	G. V. Morris	U. S. Air Force	Radar ECCM Flight Test	1,875,000
ITL	R. W. Moss	U. S. Air Force	(U) Adaptive Communications	1,700,000
SEAL	G. V. Morris	U. S. Air Force	ECCM Analysis Scope Increase	1,465,000
SEAL	G. V. Morris	U. S. Air Force	ECCM Assessment Analysis	1,330,000
SEAL	G. Caille	U. S. Navy	Conformal Aperature	1,261,000
ELSYS	L. L. Lilly	U. S. Air Force	Electronic Warfare Techniques	1,250,000
AERO	C. C. Crawford Jr.	U. S. Air Force	HH/MH60G Usage Spectrum Evaluation	1,221,346
SDL	E. E. Toph	U. S. Army	AAA/Missile Threat Simulator	1,131,389
SEAL	G. V. Morris	U. S. Air Force	ECCM Flight Test Demo Scope	1,112,000
ELSYS	A. J. Harrington	U. S. Air Force	ALE-47 Processor Support Station	1,100,000
ELSYS	G. F. McDougal	U. S. Air Force	EC Test Results Correlation	1,100,000
STL	D. E. Clark	U. S. Navy	Electromagnetic Environment	1,100,000
EOEML	C. J. Summers	Planar America	High Resolution Flat Panel Display	1,047,500
ELSYS	J. L. Brooks	U. S. Air Force	IEW Mission Processor Software	1,000,000
<b>GTRI Major Awards FYTD Total</b>				<b>41,288,554</b>

Margaret Loper is interested in DIS applications to fields including medicine, education, manufacturing and transportation. (Photo by Rick Robinson)

**ITL Hires GTRI's  
First Junior  
Faculty Leader**

By Rick Robinson, RCT

GTRI has its first junior research faculty leader: Margaret Loper, who joined the Information, Technology and Telecommunications Lab last month.

Loper, who comes to Georgia Tech after a 10-year career with the University of Central Florida and Martin Marietta Corp., specializes in research in distributed interactive simulations (DIS). This technology is widely used for military training and has applications in several other fields.

In describing her decision to join GTRI, Loper said she was "impressed with the broad range of research here. There's a lot of breadth, as well as depth, to what's going on."

Loper, a research scientist II, added that Georgia Tech's doctoral programs made the school attractive to her. She said she plans to pursue a doctorate at the College of Computing in the field of network and communications in distributed simulations.

Under the Junior Research Faculty Leader Program, GTRI hires people whose early research careers show strong levels of accomplishment and promise. Junior research faculty leaders typically have less than 10 years experience and are tasked to develop a nationally recognized program with major impact on GTRI. The junior faculty leader program, outlined in the latest edition of the *GTRI Policies and Procedures Manual*, draws support from a combination of laboratory, sponsor and short-term Research Operations funds.



Loper explained that over the past 10 years DIS technology has developed as a means to network a variety of simulation devices, thus creating a "virtual synthetic environment." The resulting network is used primarily for team training, though other uses include test and evaluation, mission rehearsal and virtual prototyping.

DIS designers develop a "world environment representation" so that distributed simulations participate in the same synthetic environment. The simulations use application protocols to communicate information such as radio communication, electronic warfare emissions and logistics and repair, among many others.

Moreover, DIS technology has applications to non-military needs, such as medicine, education, manufacturing and transportation, Loper said. "I was very attracted to Tech because there is so much work going on in all those areas," Loper said. "I hope to be able to educate people as to how DIS could enhance what they're doing."

For the past five years Loper has worked at the Institute for Simulation and Training at

the University of Central Florida in Orlando, where she has been involved in research in distributed simulation. For five years before that, she was employed by Martin Marietta in Orlando, where she worked on guidance controls and navigation simulations for missile systems.

"We did prototyping and simulation work on missiles, prior to building the real thing," she said.

Loper, who grew up near Clemson, S.C., earned a bachelor of science degree in electrical engineering from Clemson University. She also holds a master of science in computer engineering from the University of Central Florida.

She is married and has two children: son Crawford, 5, and daughter Ingraham, 2. She and her husband Wayne recently bought a house in Roswell.

Loper said she is glad to be in Atlanta after many years in Florida. "We just really like the Atlanta area. It's kind of like coming home."

*In the next issue: Meet Lisa Lust, GTRI's second junior faculty research leader, who arrived in July.*

**Focus  
on  
Research**

**FY 96 Internal Research Projects: Analysis of Radome Effects on Antennas to Breast Cancer Diagnosis**

By **Lea McLees, RCT**

FY 96 brings with it four new internal research projects whose funding was announced in mid-June. The projects were selected from 12 proposals reviewed by the GTRI Fellows Council.

Funding these projects is part of GTRI's strategic plan effort to encourage and support new research efforts in targeted areas benefitting society. Following are brief summaries of this new research.

**Application of Automatic Target Detection Techniques to Computer Assisted Diagnosis of Breast Cancer —**

**Chris Barnes (SEAL):** Breast cancer is expected to kill 460,000 of the 2 million women diagnosed with it during the 1990s. Early detection is the key to treating and surviving the disease. However, identifying the indicators of malignant tumors in mammograms is sometimes difficult. The indicators, tiny microcalcifications, can be as small as 0.1 millimeter, says Barnes — and eye fatigue, limitations and imperfections make detection a challenge for radiologists. Studies show that, in retrospect, about 15 to 20 percent of all breast cancer cases had early indicators that were missed in initial mammogram examinations.

Barnes will investigate the use of direct sum successive approximation (DSSA), a patented technique for discriminating, classifying and identifying sensor data. Because DSSA takes into account subtleties in mammography data not perceivable by the radiologists, Barnes hopes this research could eventually help reduce the number of false negative and false positive breast cancer diagnoses women are given. He is working with data supplied by an Emory University colleague Dr. Debra Monticciolo.

**High Resolution Digital Film Master (HRDFM) System —**

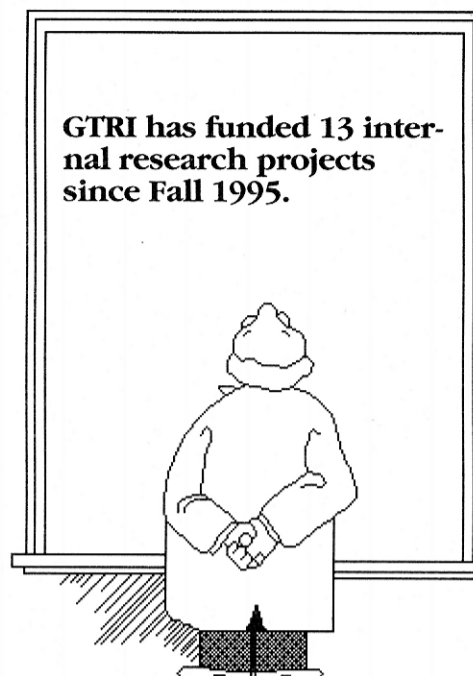
**Lon Pringle, Bruce Glasgow, Thomas McElwain (STL):** Storing color film digitally — on a computer hard-drive rather than as slides, photos, negatives or film on a reel — is not currently independent of the device used to scan the film into the computer. Each scanner records color intensity through red, blue and green filters, and the definition of each of these colors is somewhat different for each scanner. Extra software is required to convert color scan data to a standard, empirical measure of color perception.

The method Pringle, Glasgow, and McElwain are developing measures color data at each pixel, or dot, that makes up the image. Initial results show that color reproduction accuracy of this process is an order of magnitude better than the accuracy of typical scanning systems. The researchers will be defining the appropriate color and spatial resolutions needed for storage, as well as computer system requirements.

**Distributed Fiber Optic/Integrated Optic Analytical Probe with Wavelength-Selective Grating Elements —**

**Nile Hartman, Bob Schwerzel (EOEML):** The distributed fiber optic sensors Nile Hartman and Bob Schwerzel are developing could detect localized disturbances along an optical fiber a kilometer or more long. Depending on the application those disturbances could be anything from the presence of chemical or biological contaminants in water or air to stress in aircraft frames or changes in ignition system discharges in cars.

Thanks to recent research developments, distributed fiber optic sensor systems can be small, lightweight, and low-cost. A distributed system avoids the problems associated with using many discrete fibers transmitting two or more messages simultaneously over a common circuit. The sensors' sensitivity is close to that of interferometric techniques, and rivals optical time domain techniques in ability to detect the locations of disturbances. The researchers will verify the



validity of the basic technology, and develop a prototype system.

**Finite-difference Time-domain (FDTD) Analysis of Radome Effects on Antennas —**

**Jim Maloney, Brian Shirley (STL):** Researchers in STL have developed a general purpose, time-dimensional, finite-difference time-domain (FDTD) electromagnetics solver called MAXTDA — the MAXwell Time-Domain Analyzer. They have adapted it to model the electromagnetic behavior of systems ranging from transient radiation of antennas and scattering of transient signals from localized targets, to transmission through/reflection from random composite material sheets.

For this project, they will use MAXTDA to analyze the interactions between antennas and the radomes that house them. One benefit to using FDTD analysis is the ability to generate movies of the fields being studied.

The researchers will model radome geometry and materials, as well as antennas, and verify their codes. The work should result in a new and validated antenna/radome capability for GTRI, as well as a multimedia presentation that explains the capability.

**Pollution Prevention: People are the Key**

By **Lea McLees, RCT**

Imagine that you work for one of the approximately 100 programs in the United States that provides pollution prevention assistance to small and mid-size companies. Among the contacts you have made are some companies who call you regularly — perhaps more often than they really need to — to solve problems. You also see their representatives at all your seminars — even the seminars the representatives do not particularly need to attend.

Has your pollution prevention program

met its goals?

If the main goal was to have a regular dialogue with clients, the answer is yes, says Carol Foley. If the main goal was to see clients succeed on their own at pollution prevention, then you may need to provide some different solutions — solutions that integrate organizational assistance with technical aid.

"The days of a separate pollution prevention program are coming to an end," Foley says. "Pollution prevention had to be separate early on to raise awareness. By focusing on a particular problem, we discovered that technical assistance programs can become surrogates for multi-departmental decision-making within companies."

Foley, a GTRI employee who also is a visiting fellow at the Army Environmental Policy Institute, bases her conclusions on a study funded by the U.S. Environmental Protection Agency (EPA) and the Georgia

Pollution Prevention Assistance Division.

She, Claudia Huff (EOEML), Leigh McElvaney (EOEML) and Michael Elliott (ARCH) surveyed pollution prevention efforts among 1,529 mid-size firms in Florida, Georgia, Louisiana, North Carolina, Tennessee and Texas, obtaining a 40 percent response rate. Each firm had two to 30 facilities nationwide and was potentially eligible for the U.S. EPA 33/50 program, a voluntary emission reduction program focusing on 17 toxic chemicals.

The researchers' findings support the need for integrating pollution prevention programs with organization management, communication and culture-related assistance. Among their observations:

**• Pollution prevention is not as integrated across the entire facility in mid-sized firms as it is in larger organizations.**

*Continued on page 7*

## Focus on Folks

GTRI researcher Wade Garnto, third from right, is participating in a study involving Georgia Tech's new electric bus, shown in background. He is pictured here with officials from Westinghouse Electric Co., Blue Bird Body Co. and Argenbright, Inc. (Photo by Lea McLees)



## Electric Bus Charges Up Research, Stinger Routes

By Lea McLees, RCT

What is your dream car or truck like? No tune-ups? No pollution? Quiet?

You may not own it yet, but you can ride in it at Georgia Tech.

This dream vehicle is a 32-passenger electric bus that began serving Stinger Route C in early July and eventually will rotate among all the Stinger routes, says Wade Garnto (AERO). The arrival of the bus on campus makes Georgia Tech's transportation system the first in the state to use odorless, noiseless fleet buses.

Not only will the bus transport students and employees around campus — it is also the focus of studies by GTRI researchers and the Southern Coalition for Advanced Transportation.

"Our task will be to integrate the electric bus into the standard Stinger routes, and — to the extent possible — treat the electric bus just as the other buses in the fleet are treated," Garnto said. "The bus will be rotated among the routes and drivers will be assigned randomly from day to day. We think the riders will like the comfort found in the bus. It has great promise in this environment as a low-cost, environmentally friendly, zero emission alternative whose time has come."

The bus was produced cooperatively by Westinghouse Electric Co. and Blue Bird Body Co., the world's largest school bus maker, located in Ft. Valley, Ga. Columbus, Ga.'s GNB Technologies made the 112 12-volt lead-acid batteries that power the vehicle. Georgia Power provides the electricity. The coalition members, including Tech, matched Advanced Research Projects Agency funds to build the state-of-the-art bus.

Researchers will examine operation

and maintenance costs; compare diesel and electric buses from an air quality viewpoint; determine customer and operator expectations of the buses; and educate people about features and advantages of electric buses. They also will survey selected transportation agencies about their vehicle requirements.

The campus vehicle charges up at a specially designed refueling stop. It is plugged into a charger drawing power from electric lines on a nearby power pole. The charger converts the power from alternating current to direct current for recharging the bus batteries.

After two hours of recharging, the bus is ready to run for another 70 miles at 55 miles per hour. Garnto estimates that the bus could run on Stinger Route C for about six hours before recharging, based on speeds and miles covered.

Because it has no gas engine, it does not require tune-ups, oil changes or other similar types of maintenance, and produces no fumes. The fuel costs for electric buses are proving to be eight to 10 cents per mile, compared to 24 to 27 cents for methanol and compressed natural gas and 11 to 14 cents for diesel.

The bus is comfortable, roomy and quiet. It emits a low, humming noise, similar to that produced by a MARTA train, while traveling. The only other noise is the whoosh of the air conditioner and the sounds of riders chatting. Specially treated windows keep the sun from heating up the interior, thus reducing the amount of electricity the bus uses for cooling. Specially designed easy-roll tires increase the distance the bus can travel on a single battery charge. The bus has room for wheelchairs, as well as a wheelchair lift.

In some ways, driving the bus is similar to taking a gas-powered vehicle for a spin. As with a gas-powered vehicle, jump starts are not recommended — they use too much power. However, unlike gas-powered vehicles, the bus motor turns into a generator when brakes are applied, recharging the vehicle's batteries with a technique called regenerative braking.

## GTRI: Powering the State of Georgia

Your work as a GTRI employee has an economic impact on Georgia. Here's how:

- **Returning Georgia's Investment:** In FY 94 the State of Georgia invested \$12 million in GTRI. During that period GTRI attracted an additional \$77 million in sponsored funding. GTRI's total economic impact on new industrial activity during FY 94 was \$189.4 million. GTRI leverages EDI's 18 field office locations and many services to foster, promote and implement programs.

- **Spinning Off New Companies:** At least 26 spin-off companies have been developed in Georgia by current and former GTRI employees. These companies employ more than 4,096 people and generate more than \$635 million in sales annually.

- **Attracting Non-State Dollars:** GTRI participates in national programs of science, technology and preparedness that attract out-of-state research dollars to Georgia. During FY 94 GTRI brought in approximately \$77 million in federal and private industry research funding from outside Georgia.

- **Creating Jobs and Revenues:** GTRI's direct economic impacts, which result from out-of-state dollars alone, were \$36.4 million in household income and 814 jobs. When GTRI's purchases of supplies and services and its employees' personal expenditures are included, GTRI's FY 94 economic impact increases to \$2.5 million in local taxes; \$3.2 million in state taxes; and 2,325 jobs for Georgia.

Thanks to Bill Riall (EDI) for performing this analysis!

## Property Management Authority to Speak

All employees who work in property management units within GTRI and around campus are invited to hear Douglas Goetz of the National Property Management Association (NPMA) speak at 6 p.m. August 29 in CRB Rm. 119.

Goetz is a professor of contract management at the Air Force Institute of Technology's Defense Acquisition University, Wright-Patterson Air Force Base, Ohio. He is known as the "Guru of Government Property," and serves as NPMA's editor and director of professional development.

Goetz's one-hour presentation will address potential changes in Federal Acquisition Regulations Part 45, which details control of government property in possession of federal government contractors. The talk will be followed by a 30-minute question-and-answer session, says Harry Ross (RPT), research property manager and president of the Atlanta-based Shamrock Chapter of the National Society of Property Administration.

Property management representatives from other Georgia universities have been invited to attend, as well, so seating is limited and reservations are required. To obtain a seat at this free presentation, call Ross at 894-3676 or send e-mail to Harry.Ross@gtri.gatech.edu by 5 p.m. August 22.

## GTRI Greetings

Welcome to some of our newest employees!

### Ten Good Things We Know About Robert R. (Bob) Brems Jr.

1. He joined EOEM's Safety, Health and Ergonomics Branch in early April.
2. His specialty is occupational epidemiology, and he is currently working with the Safety and Health Consultation Program.
3. He received a master of public health degree from the University of Michigan in 1990, and a bachelor of arts in biology from Wittenberg University in Ohio in 1988.
4. After an internship at General Motors, in 1991 Bob moved to the Atlanta area to work at Lockheed as an occupational epidemiologist.
5. The GTRI job was a "good move," he says. "It allows me to see both the exposure and the outcome ends" of workplace safety."
6. He grew up in Reading, Pa., but his family moved to Marietta years ago. Now Bob, his wife Mindy and their 18-month-old daughter Emma Lorene also live in Marietta.
7. As a boy, he spent four years overseas

— in South Korea, Yugoslavia and England while his father, a nuclear engineer, was on assignment in Europe.

8. His wife's maiden name was Mindy Knouse, and as a result, Bob says, "we collect a lot of Disney paraphernalia." On their honeymoon, the couple went to Disney World.
9. In his spare time, Bob enjoys participating in the STA Volleyball Recreation League in Marietta.
10. He also spends many spare hours serving on the Cobb County Special Olympics organizing committee. He acts as games director for the county and was recently elected "committee member of the year."

### Ten Good Things We Know About Jean E. Sands

1. She was hired as a Research Engineer I with ITL's Communications and Networking Division May 15.
2. Her field of specialization is the use of lasers and fiber optics in communication.
3. After high school in Appleton, Wis., she spent six years in the Navy working as a cryptological technician.
4. After leaving the Navy, Jean received a bachelor of science degree in physics from the University of Wisconsin at



Robert Brems



Jean Sands

Oshkosh in 1988.

5. In Fall 1988 she started work in the Georgia Tech doctoral program in electrical engineering.
6. In 1990, she married Henry Owen, who is an assistant professor in Tech's ECE department.
7. Jean has pursued her doctoral studies at Georgia Tech Lorraine (GTL) in Metz, France, and has worked for the Naval Reserve in Europe. She finished her master's in EE at GTL in Fall 1993.
8. She was recently promoted to intelligence officer in the Naval Reserve, with the rank of ensign.
9. In June, Jean successfully completed aviation flight physiology at TOP GUN at Miramar Naval Air Base in Calif. After four successful "egressions" (underwater escapes) from the "helo dunker," she hopes she never has to do the real thing.
10. She lives in Smyrna, Ga. In her spare time she likes to quilt, and she is learning scuba diving.

## News & Notes

### Pollution

From Page 5

• **Mid-size firms rely on external sources for identifying pollution prevention options more than large firms do.**

• **Mid-size firms are less likely than large firms to use quality teams, facility assessments, employee recommendations for gathering information on pollution prevention options.**

The researchers also developed detailed case studies of four of the firms surveyed that have successfully prevented significant amounts of pollution over the last four to five years.

One site was committed to Total Quality Management (TQM) concepts, McElvaney said. "They had moved to touch-screen computers dedicated to communicating with employees because the typical computer keyboards intimidated their employees; they had video monitors everywhere broadcasting information such as safety and health tips; and all employees had access to production data at anytime," McElvaney notes.

Another company also successful at pollution prevention was run in a more autocratic style, was not as clean and neat, and did not seem to have formal TQM programs in place. "However, this company had decentralized decision making processes, as did the TQM-oriented company," McElvaney says. "Some of the floor managers had worked there for a long time and their opinions were respected. The decisions

didn't all come from the top-down."

A participatory management style that encourages pollution prevention input from all employees is vital, says Huff. "The way to solve a lot of environmental problems is to begin by talking to the employees on the floor and getting their ideas," she says. "Companies must encourage the employees on the line to feel confident enough to talk to the manager, and of course the manager must respect those ideas and follow through."

In fact, many technical assistance programs are based on collecting input from employees at different levels of the company. This feedback is used to determine whether the solution to a problem lies within the company, or whether a university's engineering assistance is needed, Foley notes. Encouraging a company to develop management and organizational styles welcoming employee pollution prevention suggestions is just as important as actually implementing a pollution prevention program, the researchers say — and will encourage the company to solve some problems on its own.

Other organizational characteristics of mid-size firms successful at pollution prevention include:

- **A significant emotional event.**
- **Focus on product quality.**
- **Respect for the company's environmental manager.**
- **An opportunity for change.**

*In the next issue: Management based approaches.*

## Fellows Want Your Input

One of the duties of the GTRI Fellows Council, formed in 1993, is to provide recommendations to the GTRI director from the research community without passing through the management chain. Continued comments and specific suggestions for improving the research enterprise at GTRI are invited. You may contact any of the Fellows, listed below.

**Krish Ahuja** AERO 528-7054  
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*Georgia Tech*  
RESEARCH INSTITUTE

# Focus on Folks

## Professional Activities

### Electronic Systems Laboratory

**Mike Kelly** presented the opening address, "Important Design Issues for Advanced Traffic Management Systems," at the Transportation Research Board Freeway Operations Committee Meeting in San Antonio on June 5.

A paper about Georgia Tech's winning robots at the 1994 AAAI Robot Competition, "Io, Ganymede, and Callisto: A Multiagent Robot Trash-Collecting Team," was published in the Summer 1995 issue of *AI Magazine*. The authors were Tucker Balch (CoC), Gary Boone (CoC), **Tom Collins**, **Harold Forbes** (ITL), Doug MacKenzie (CoC), and Juan Carlos Santamaria (CoC). **David Huggins** (ITL) also participated in the development of the robots.

"Fabrication of Carbon-Carbon Composites by Forced Flow-Thermal Gradient Chemical Vapor Infiltration" was published in the June 1995 issue of *Journal of Materials Research* by **Sundar Vaid Yaraman** (Chem. Eng.), **Jack Lackey**, **Garth Freeman**, **Pradeep Agrawal** (Chem. Eng.) and **Matthew Langman**.

### Electro-Optics, Environment and Materials Laboratory

**Art Wickman** presented "Granite Shed Workers' Exposures to Silica Dust in Elberton, Ga." to the American Industrial Hygiene Conference and Exhibition in Kansas City on May 23.

**David Jacobi**, **Paul Schlumper** and **Jim Walsh** conducted a one-day environmental, safety and health seminar in Albany, Ga. on June 6. This seminar was held jointly with Darton College, the Albany Regional Office of Georgia Tech and GTRI, through the Georgia Manufacturing Extension.

**Kirk Mahan** and **Paul Schlumper** represented the Georgia Chapter of the American Society of Safety Engineers at the ASSE's national Professional Development Conference in Orlando, Fla., June 19-22.

**Mikhail S. Belen'kii** will be at White Sands Missile Range until mid-September with the Summer Research Program at the Starfire Optical Range.

**Wendy Jones** and **Dan Ortiz** completed a pilot study as part of an Emory-Georgia Tech five-year research project on the health effects of computer use among office workers, funded by CDC and the National Institute for Occupational Safety and Health. The pilot focused on the time of day, day of week and rater effects on goniometric measures (i.e., posture).

**Paul Wine** and **Mike Nicovich** attended the Gordon Research Conference on Atmo-

spheric Chemistry in Newport, R.I., June 18-23. They presented two poster papers. Also, Wine was elected co-chairman of the next Atmospheric Chemistry Gordon Research Conference, which will be held during summer 1997. The other co-chairman is Daniel Jacob of Harvard University.

During early June, **Mike Nicovich** attended the Fourth International Conference on Toxic Combustion Byproducts in Berkeley, Calif. and the Methyl Bromide Coalition Scientific Workshop in Monterey, Calif. At the Berkeley conference, Nicovich presented a paper entitled "Kinetics and Thermochemistry of the Cl + C2Cl4 Association Reaction." The paper was coauthored by **Shouzhi Wang** and **Paul Wine** of Georgia Tech and Mike McKee of Auburn University.

### Sensors & Electromagnetic Applications Laboratory

**Donald Bodnar** attended the International Symposium of the IEEE Antennas and Propagation Society held June 19-23 in Newport Beach, Calif. He chaired the meeting of the Past Presidents Council, presented the slate of new officers for the society during the administrative committee meeting, and participated in two other committee meetings. He was honored at the awards banquet with a plaque of appreciation from the IEEE for his service last year as president of the society.

### Research Property Team

**Harry Ross** attended the July 2 National Property Management Association (NPMA) annual conference in Dallas, Texas. He is president of the Shamrock Chapter of the NPMA, headquartered in Atlanta. While attending the conference, he served as a member of the Education and Information Committee. He assisted in development of education services including preparation of lesson plans for chapter use, a syllabus for all materials, monographs and additional development of new program materials.

## Personal Notes

### Congratulations to Another GTRI Graduate!

**Carmen Daniels** (AIST) recently completed a bachelor's degree in Human Resource Administration from St. Leo College, Fla. Carmen is working in AIST as an Administrative Assistant under the Tech Temp Program.

### Cradle Roll

Charlane and Gintautas **Jazbutis** (ITL) welcomed a daughter, Emily Lynn, born May 13.

**Susan Liebeskind** (ITL) and her husband, Jeff Donnel, welcomed a son, Theodore Marshall, born May 13.

Suzy and **Bruce Harvey** (ITL) welcomed a son, Brian Robert, born May 12.

George and **Carolyn Olive** (ELSYS) welcomed their third child and first daughter, Emily Louise, on April 21.

Virginia and **James Sowell** (EOEML) welcomed their second child, Thomas Robert, born June 16.

### Our Sympathy

...to **Garry Cheshire**, whose father died on June 28.

...to **Evan Chastain**, whose son died July 4.

## Personnel News

### New Hires

AIST welcomes two new employees: **Elizabeth Bell**, Systems Analyst IV; and **Andy Bowers**, a Co-op Student.

ITL welcomes **Margaret Loper**, Research Scientist II; **Kevin Brown**, Graduate Research Assistant; **Mary Lynn Munn**, Student Assistant; **Kristy Payant**, Student Assistant; and **Kedric Combs**, Co-op Student.

Strategy & Planning and Research Support & Finance welcome **Ryan McFarlane**, Co-op Student.

SDL welcomes **Luther Ward**, Tech Temp.

EOEML welcomes **Bernice Hoang-Lan Coomes**, a Shackelford Graduate Research Assistant who will be working with **Dan Ortiz** and **Michael Burrow**; and **Tom Taris**, a Student Temp working for **Vicki Ainslie**.

### Transfers

**Kysha Rowe** (ITL), a Graduate Temp, has transferred to The Phosphor Center of Excellence and the Safety, Health, and Ergonomics Branch.

**Janice Davis** (ITL) has transferred to Civil & Environmental Engineering.

### Moving On

**Eric Ayers** (ITL), **Michael Henderson** (ITL) and **Leonard Rodriguez** (EOEML) recently left GTRI employment.

### Kudos

**Craig Wyvill** has been appointed an FY 96 member of the Governor's Advisory Council on Science and Technology Development.

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