

# The GTRI Connector

## Character traits

- You are only young once, but you can stay immature indefinitely.  
— Unknown
- Beautiful young people are accidents of nature. Beautiful old people are works of art.  
— Marjorie Barstow Greenbie
- Strength is the capacity to break a chocolate bar into four pieces with your bare hands—and then eat only one of the pieces.  
— Judith Viorst

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## Research awards honor 19 employees

By Martha Ann Stegar, RCO

The 10th annual GTRI Research Awards presentation on December 3 honored 19 outstanding employees. The recipients were chosen from among 66 finalists selected by committees of their peers from the many nominations submitted for 1992.

Marvin Cohen, chairman of the Awards Committee, presided and introduced the 66 finalists. Other committee members were Martha Farley, David Flowers, Harry Andrews, Janet Leininger, and Bill Howard (ex officio, nonvoting).

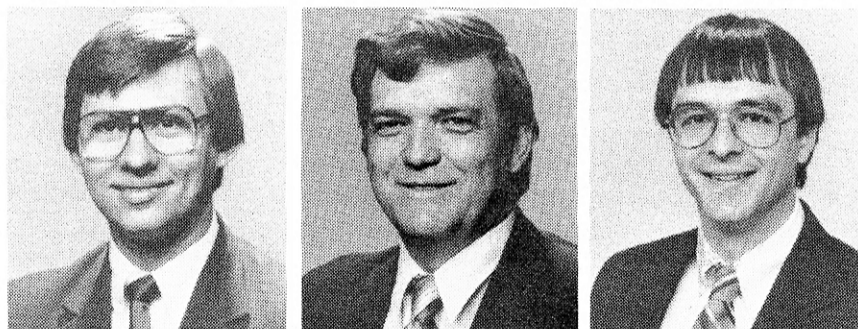
"We are here today to honor 19 special people out of 1,400 GTRI employees for their outstanding leadership, performance and creativity," Dr. Cohen said. "I like to think of this as an inclusive process," he added. "We are including these recipients with the group from previous and future years as those recognized for excellence."

As retiring GTRI Director, Dr. Donald Grace introduced the new director, Admiral Richard Truly. "I believe strongly that Georgia Tech owes Dr. Grace a real salute for his leadership over the years in a trying period, bringing GTRI to its present leadership position," Truly said. "I hope when I leave GTRI and Georgia Tech I can have the same sense of pride Don Grace has." Dr. Grace received a standing ovation.

In his formal remarks, Admiral Truly said: "It gives me special pleasure to speak at an event honoring the best, and I'm glad it's my first opportunity at GTRI. I believe very strongly in quality and in organizations that strive to continuously improve themselves."



Recipients of the 1992 GTRI Research Awards are (L-R): Back row—Danial Mack (ESML), Mark Entrekin (TSDL), Jeffrey Farley (EOPSL), Tom Pratt (CMDL). Second row—Richard Maier (RSAL), Guy Morris (RSAL), Robert Englar (AERO), Donald Clark (EEEL). Third row—Edgar Lindsey (EDL), George McDougal (CAL), Kathryn Lindsey (TSDL), John Robrbaugh (EEEL). Front row—Kevin Massey (AERO), Cathy Dunnaboo (OOD), Susan Guion (EOPSL). (Photo by Billy Banks)



Other Research Award recipients are (L-R): Melvin Belcher (RSAL), John Scoville (RSAL), and Terry Tibbitts (ESML). Not pictured: Michael Valletutti (CSITL).

He added: "Today, the old adage, 'if it ain't broke, don't fix it,' ain't good enough. It takes teams of people to make Georgia Tech, in concert with GTRI, the most rel-

evant university to solve the problems of the next century.

"I believe strongly in ethical behavior,  
**Continued on page 2**

## Observed & Noted

Michael Kelly of the Concepts Analysis Lab is leading a \$4.2-million effort, funded by the Federal Highway Administration, to design an advanced traffic management center to achieve optimum performance from the human operator. *Read*

*about it on pages 2 and 3.*

This month, the internal research spotlight falls on Jim Beletic (EOPSL) and his colleagues, who have designed and built a powerful new camera that uses speckle imaging to create better images of

celestial objects like Mars. *Details are on page 3.*

Car in the shop? You can always ride a bicycle to work! *To find out what's involved, read comments from GTRI's bicycle brigade on page 4.*

The GTRI CONNECTOR loses its editor, but gains another. *To find out who and why, see page 5.*

The Management and Project Support (MAPS) group conducted a client survey last fall to find out how it could better serve its cus-

tomers. *The results are on page 6.*

If you are a Deming TQM devotee, you might like to join the new Georgia Tech Deming Study Group. *See page 6.*

Congratulations to Don Clark and Dave Flowers,

who have been elected to Fellow membership in the IEEE. *Their achievements which earned them this honor are summarized on page 7.*

A Christmas tree and Hawaiian shirts grace the "people page"—*page 8.*

Georgia Tech  
RESEARCH INSTITUTE

# News & Notes

**"Our job is to figure out how to design a Traffic Management Center so the human operator can do the best job.... We plan to introduce all the computer technology we can, such as decision aiding and other technology that the military has introduced in recent years."**  
**— Michael Kelly  
 CAL/GTRI**

## Research Awards From page 1

whether in the research laboratories, the GTRI administrative offices, Georgia Tech, politics, or government. I hope I can contribute to the clarity of purpose that GTRI needs."

Admiral Truly concluded: "I never had a job in my life that dealt in the present. I was always concerned with the future. This is exactly the business you're in, whether in the classroom teaching and influencing students for the future or in the laboratory working on research that someday will create business or technology that can change lives."

Presenting the awards were Bob Shackelford, Jerry Carey, Don Wilmot, Pat O'Hare, and Devon Crowe. They are as follows:

**Outstanding Performance in Research:** *Melvin L. Belcher* (Radar Systems Applications Lab), for advancing the state of the art in high-resolution radar signal processing, including a better understanding of radar hardware-induced errors and their compensation for high-resolution, wideband phased-array radar systems, as well as a generalized approach for waveform selection, predistortion, and post-processing which minimizes distortions and relaxes hardware tolerance requirements; *Robert J. Englar* (Aerospace Lab), for advancing the state of the art in circulation control for aerodynamic surfaces in an expanding experimental research program that employs the Coanda effect to increase lift or to prevent flow separation; *Daniel J. Mack* (Electronic Support Measures Lab), for advancing the state of the art in crystal video receiver technology, beginning with an idea that would theoretically increase the detection range of a crystal video receiver by an order of magnitude while providing adequate dynamic range to process the increased RF energy, and carrying this concept to development of a successful device with broad applications; *Thomas G. Pratt* (Countermeasures Development Lab), for advancing the state of the art in signal processing analysis of multidimensional data by developing a unique method of analyzing extremely complex multidimensional experimental flight test data to determine cause and effect relationships between jamming signal parameters and missile response.

**Outstanding Performance in Program Development:** *Edgar T. Lindsey* (Economic Development Lab), for discovering and developing diverse new markets for research benefiting not only the Brunswick Regional Office and other EDL units, but also another GTRI laboratory; *George F. McDougal* (Concepts Analysis Lab), for his outstanding track record in obtaining broadly based task ordering contractual vehicles for use by all GTRI researchers, particularly in the test and evaluation arena; *Guy V. Morris* (Radar Systems Applications Lab), for cultivating and maintaining a cohesive and highly successful program development thrust in electronic counter-countermeasures research among several GTRI laboratories; *John P. Robrbaugh* (Electromagnetic Environmental Effects Lab), for conceiving and developing numerous innovative technological marketing areas for applying GTRI's electromagnetic interference and environment expertise.

**Outstanding Performance in Management:** *Donald E. Clark* (Electromagnetic Environmental Effects Lab), for outstanding

direction of the Electromagnetic Environmental Generating System program, overcoming several serious technical and contractual obstacles to generate 100-plus deliverables, tracking 19 major sub-budgets and ensuring that all tasks stayed on schedule and on budget; *John T. Scoville* (Radar Systems Applications Lab), for assembling and effectively managing a hardware, software and analytical research team that includes 50 persons from seven laboratories and other GTRI units to perform a set of tasks with stringent security and demanding schedule requirements; *Terry E. Tibbitts* (Electronic Support Measures Lab) for assembling and managing large project teams that have performed technically outstanding research on time and within budget, resulting in a remarkable record of sponsor satisfaction, and for taking particular care to advance the careers of those who report to him by providing them opportunities to develop their capabilities in project work and contract development.

**Outstanding Performance in Research Support:** *Cathy L. Dunnahoo* (Office of the Director), for her personalized support as the student employment coordinator to find appropriate matches between students and laboratories, and for her expertise, attention to detail, patience, flexibility, and pleasant disposition; *Mark R. Entrekim* (Threat Systems Development Lab), for his initiative, ingenuity and contributions as a skilled craftsman and ability to plan and organize mechanical hardware fabrication; *Kathryn F. Lindsey* (Threat Systems Development Lab), for her commitment to quality and innovative support in preparation of presentation and publication material; *Richard A. Maier* (Radar Systems Applications Lab), for his dedication and wide-ranging support in fulfilling contract obligations and outstanding initiative in program development.

**Outstanding Performance as a Student Employee:** *Jeffrey R. Farley* (Electro-Optics and Physical Sciences Lab), for important contributions in support of high-definition TV and semiconductor devices research; *Susan F. Guion* (Radar Systems Applications Lab), for her support of radar research through her software development expertise, including development of interactive graphics software; *Kevin C. Massey* (Aerospace Lab), for important contributions to the study of supersonic jet noise characteristics, and for his initiative, drive and energy that have aided in obtaining several follow-on funding awards; *Michael J. Valletutti* (Computer Science and Information Technology Lab), for his outstanding efforts as a team leader and key technical contributor to military intelligence software development.

Each recipient received a \$500 check, a personalized engraved wall plaque, and a letter of recognition. A photograph of each recipient will be displayed all year at the recipient's work location.

Guests at the awards ceremony and reception included Executive Vice President Mike Thomas, Vice President for Interdisciplinary Programs Gary Poehlein, OCA Director J.W. Dees, and Associate Dean of the Ivan Allen College Fred Tarpley. □

## GTRI looks at human factors in advanced traffic management

By Martha Ann Stegar, RCO

The Concepts Analysis Lab (CAL) has succeeded in diversifying its sponsor base by turning expertise it gained in military research to civilian applications, thereby garnering a \$4.2-million contract with a new sponsor. The lab will be responsible for human factors aspects of the design for an Advanced Traffic Management System (ATMS) for the "smart" highway of the future.

Under a 39-month contract with the Federal Highway Administration (FHWA), Dr. Michael Kelly, head of CAL's Human Factors Branch, is leading a team of researchers that also includes the Electronic Support Measures Lab and the Computer Science and Information Technology Lab in GTRI, as well as Civil Engineering and Psychology.

"Our job is to figure out how to design a Traffic Management Center so the human operator can do the best job," Dr. Kelly says. "We're designing for the 'liveware,' so to speak. Loral was awarded a contract at the same time as ours to look at the computerized aspects—the hardware and software of the ATMS."

The GTRI award is one of three programs that the Federal Highway Administration is sponsoring that involve human factors in various components of Intelligent Vehicle Highway Systems (IVHS). Battelle is leading a team researching Advanced Traveler Information Systems, and Honeywell is working on Automated Highway Systems.

The Advanced Traffic Management System is the most important and challenging of the three tasks, Dr. Kelly feels. "Federal officials expect these systems to become a reality over the next few years," he says. "Some 50 cities are starting to develop some form of the ATMS now, and Atlanta is expected to have one in place for the 1996 Olympics."

### What is an ATMS?

An Advanced Traffic Management System uses sensors and other means to determine conditions on streets and highways and feeds the data into a central Traffic Management Center (TMC) for computer analysis and decision making by human operators. Highway sensors may include loop detectors, which detect the presence of vehicles and their rate of speed, and surveillance cameras in key places. Los Angeles already is using both, Kelly says.

Orlando is using a different approach—probe vehicles. The city has installed sensors in rental vehicles, enabling the TMC to track their locations and how fast they are going. In turn, the vehicles are notified where traffic problems are occurring and how to avoid them. More than 100 vehicles in Orlando have these systems installed. In the future, similar systems are expected to be installed in police, emergency and service vehicles.

"As the various kinds of sensors send information to the TMC, computers will help the operators figure out what it all means," Kelly says. "This is what the military calls data fusion. We plan to introduce all the computer technology we can, such as decision aiding and other technology that the military has introduced in recent years."

The center would be responsible for deciding how to achieve optimum traffic flow and traveler safety in the event of unusual

road conditions. For events such as the Super Bowl, plans can be made months in advance; snowstorms can be predicted hours in advance, but in the case of traffic accidents, rapid decisions must be made in real time. Not only must the center call out emergency vehicles and direct them to the accident, but the operators must decide whether to change the cycling of traffic signals on streets paralleling the freeway when it is closed due to an accident. And a message system may be activated to warn drivers of an obstacle on the road ahead.

#### The GTRI project

The GTRI effort got started in mid-October, and the first two tasks are well under way. "We've been talking to 'visionaries' to get an idea of what an ATMS might be like at the turn of the century," Kelly says. "No one knows what it will look like. We're taking an almost 'sci-fi' view to develop a picture, which may or may not be like the reality a few years hence."

Another task (there are 17) is to look at the state of the art. "We're analyzing similar systems fielded today, for example, military command and control systems, nuclear power plant control rooms, and air traffic control systems," Kelly explains. "We're looking at human factors lessons they learned and the guidelines they used in building their systems. We're also talking to the manufacturers who built key parts of these systems, asking them what they have on the drawing board that might be used in a traffic management system in five years."

The GTRI team will combine data from these tasks to get a more realistic picture of what the TMC will look like. The next step will be a top-down systems analysis to define what the operators will be doing, the kinds of decisions they will have to make, what equipment they will have, and what buttons they will have to push to operate it. From this, they will develop a set of human factors guidelines for design of jobs and equipment.

"We know we'll find problems that no one has tackled before," Kelly says, "so we'll have to do our own empirical research. We will build a simulator of the future Traffic Management Center and perform a series of 10 experiments to resolve some of the unsolved issues."

Kelly says they are working on the simulator design now and probably will start building it in January. "It has to be up and running a year from now," he says.

At the end of three years, GTRI will deliver the simulator to the customer for further testing, together with a detailed textbook on how to design a TMC from the human factors standpoint.

"We'll also give them a top-level description of the next-generation research simulator," Kelly says. "We'll look at lessons learned from our simulator, incorporate technical advances in simulation (better decision aids, for example), and—with a larger budget—combine them to build a higher fidelity center. FHWA already has a research plan for the next-generation simulator."

#### How did we get the award?

FHWA says this is the first contract GTRI has ever had with them. GTRI responded to a Request for Proposal in an open competition. So how did we get the edge?

"FHWA really liked GTRI's breadth of capabilities," Kelly elaborates. "Every task re-

*Continued on page 4*

## Spotlight on Internal Research

*This is the eighth in a series of articles reporting on projects funded by GTRI's Senior Technology Guidance Council (STGC).*

### Better images provided faster Camera development gets help from STGC

By Lea McLees, RCO

STGC funding provided an extra boost for the development of a powerful new camera in the Electro-Optics branch of EOPSL last year—a camera that has produced noteworthy results in its imaging of Mars.

The system, refined and demonstrated with STGC funds, has allowed researchers to retrieve "the best images of Mars taken from a ground-based observatory when the planet is far from the Earth," says research scientist James Beletic.

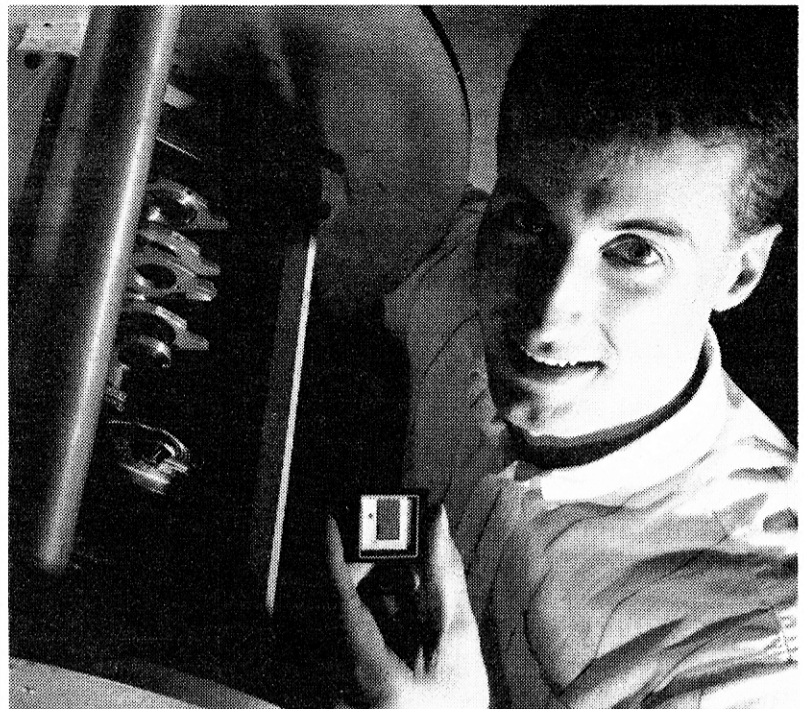
Astronomers traditionally don't even attempt to capture images of Mars during that phase, because turbulence in the atmosphere blurs them so much.

The GTRI camera system that Beletic and his colleagues have developed is not your average 35-millimeter. The entire system weighs about 400 pounds and relies on a special charge-coupled device (CCD) computer chip supplied by the Massachusetts Institute of Technology's Lincoln Laboratory in Lexington, Massachusetts. The flat, half-inch-square chip is essential, because it detects 80% to 90% of available light in the area the camera is focusing on. This chip, a backside illuminated CCD, is 10 times more sensitive to blue light than the more common frontside illuminated CCD chip.

The chip allows the camera to work at high speeds, taking 50 shots per second with little of the interference that can result when photographic signals are processed and amplified. The data buffer/recorder part of the camera system stores four megabytes per second. Five gigabits can be recorded in 20 minutes on just one videotape.

When the researchers line up a series of the camera's photos of Mars taken through a large telescope, each photo is blurred differently because of the Earth's rapidly varying atmospheric turbulence. But by programming a computer to recover an image of the signal that stayed the same in all the photographs—i.e., the planet Mars—researchers can get a more distinct picture of the planet without the turbulence. That process is called speckle imaging.

Refining the camera system with STGC funding allowed the researchers to do work that resulted in one presentation at an international conference in Germany and two presentations to a select group of astronomers at the Aspen Center for Physics. The researchers have established collaborations with the California Institute of Technology's Jet Propulsion Laboratory in Pasadena; Lowell Observatory in Flagstaff, Arizona; Carnegie Institution, also in Pasadena, California; and the Space Telescope Science Institute in Baltimore, Maryland. Three papers have been published, and others are being



**Graduate student Jerry Zadnik displays a CCD chip. To his right is an optics box, which processes light for the CCD camera and is on loan to James Beletic from Harvard University. (Photo by Margaret Barrett)**

written. The researchers take the camera to different observatories a few times a year.

Four funded projects related to camera development are ongoing, including the construction of cameras for the University of Chicago's telescope in New Mexico and the Keck 10-meter telescope in Hawaii, the largest telescope in the world. One of the funded projects uses speckle imaging to attempt to image other planetary systems that are in early stages of formation.

The group also is working with Dr. Raj Roy in the School of Physics, using the GTRI camera to study laser pulse propagation in optical fibers. With the new camera, the researchers were able to measure signals much fainter than those they had seen with the camera previously used.

Four staff members and four graduate students have worked on the camera's development and use. The work contributed to a master's thesis in physics and is part of an upcoming Ph.D. dissertation in electrical engineering.

The camera system can accept almost any CCD chip. It could be used in a variety of other areas that rely on sensitive imaging with high-speed readout and low noise, Beletic says. Areas he is interested in are medical applications and enhancement of the CHARA array, the seven-telescope system that Georgia Tech and Georgia State are collaborating on with funding from the National Science Foundation.

Beletic and his colleagues would like to work with others on campus whose research might benefit from use of the camera. You may call him at 853-0654 or send e-mail to beletic@gtri.gatech.edu for more information.

### Library improves on-line services

The library has moved GTEL (Georgia Tech Electronic Library) to a new computer (RS6000/Unix) to improve on-line information services. The most obvious improvement to GTEL is the new, and more friendly, interface. Additional features will be added over time. The primary improvements are:

- context-sensitive help
- one-step LENDS requests for faculty
- easier-to-read record displays
- gateway to Georgia State's on-line system (OLLI)

Instructions for remote login to GTEL are changed. Come by the library for a copy or call the Reference Desk at 894-4529 to request the instructions by mail. The library also offers frequent one-hour classes on how to use GTEL. □

**A powerful new camera developed in the Electro-Optics Branch has allowed researchers to retrieve the best images of Mars taken from a ground-based observatory when the planet is far from the Earth.**

**Profile  
&  
Insight**

**GTRI and the art of bicycle commuting**

By Martha Ann Stegar, RCO

Have you ever thought about riding your bicycle to work and decided it was just too much trouble? Some of your co-workers are doing it regularly and reaping all sorts of benefits.

Seven people responded to the CONNECTOR's request for comments about bicycle commuting several months ago. Here's what they said:

Three of the seven ride their bicycles to work every day, two ride about three times a week, and two ride occasionally. Most of them live from 1.5 to five miles from Georgia Tech, but Chris Thompson (EOPSL) lives 10 miles away, in Brookhaven. He rides one way down Peachtree three to four mornings a week (a 40-minute ride), and he and his bike take MARTA home.

"I feel that my bike route is safe only in the early morning before 7:15," Chris says. "MARTA doesn't allow bikes on a train before 6:30 p.m.," he adds. "If they would discontinue their time restrictions for bikes, I would ride every day."

Greg Galloway (EOPSL), who comes from the vicinity of Collier Road and DeFours Avenue, feels his bike route is safe, as he takes the less traveled roads by the Atlanta Water Works. But several of the riders wish their route were safer. Keith Vaughn (MAL-campus), who commutes down Peachtree from the Darlington Apartments, says he doesn't have a problem with "most of the fuel-consuming community," except for out-of-state cars and "people in really expensive cars." Bill Joye (MAL) admits to problems with trucks and MARTA buses, and Chris Thompson says MARTA bus drivers are the worst for bicycle courtesy.

**Why ride?**

The bicycle commuters do it for various reasons, but the most popular one seems to be for health and fitness. However, Laurie Tucker (CAL) comments: "I'm not sure that the small amount of exercise in a 1.5-mile trip balances out all the exhaust fumes I'm forced to breathe in during the ride."

Several say they just like to get outside and enjoy the scenery. Greg Galloway

*Bill Joye commutes to work daily on his bicycle. (Photo by M.A. Stegar)*



boasts that, due to traffic congestion, he can actually get to work quicker on a bike—7-10 minutes by bike, as opposed to 12 minutes by car and 15 minutes by bus. He also says his is a one-car family, and he'd rather his wife drove than he, for safety reasons.

Among those citing lower car expenses Keith Vaughn comments: "I have an old car with high mileage, so the less I drive it, the longer it will last." Ecology and the environment also got a couple of votes.

**Parking and safety**

Once the commuters get to work, they have to park their steeds. Most feel that the bicycle racks provided beside the buildings aren't safe enough from vandalism, but Laurie Tucker uses the racks next to CRB. She says, "I'm hoping that if I only leave it out there during 'normal business hours,' it will be safe, since there are a number of people going to and from the building almost constantly."

Others make special arrangements to bring their bikes into their offices or park them in interior storage areas. Greg says: "My office is large enough that a bike doesn't get in the way, and my building is so old, a guy coming down the hall with his bike isn't that out of place." Keith has permission to park his bike in the back bay of CRB. "This is a good arrangement," he says, "since it protects the bike from thieves (bikes are easier to steal than cars) and I don't have to strip all the accessories off the bike."

GTRI Associate Director Pat O'Hare says, "GTRI has no policy regarding bicycles in any building. But we do expect good judgment and protection of all property, including walls, elevators, carpet, etc."

Georgia Tech Police Chief Jack Vickery adds: "Georgia Tech has no rules and regulations regarding bicycle parking. It is up to each department to set its own rules. We do require that the bicycles must not create a safety hazard. For instance, it is a violation of fire regulations to chain a bike in a stairwell."

Vickery says there's not much history of bike vandalism at Tech. Most stolen bikes are reported in the Student Center and housing areas. The bikes that are bothered are not well secured and are stolen at night or in the early morning. Some of the student housing has storage facilities inside, but outdoor bike racks are the only provision for office and academic buildings.

To discourage vandalism, Vickery says, "Bike racks should be placed where they are real visible. Don't hide them in back." He suggests that bicycles be secured to the racks in a couple of places—the frame and the front wheel. The owner should use a strong, Citadel-type bike lock and chain, "not a dime-store chain," he cautions.

He stresses that bicycles in motion are governed by regular traffic laws; they must follow "the rules of the road." He feels the campus needs to be more bike-friendly and recommends that Tech build bicycle paths in the future. Bicycles may be registered at the campus police headquarters as a free service.

**Squeaky clean**

Once the bikes are parked, one problem remains: making oneself presentable for the work day. Math professor Jamie Goode, who used to work at EES/GTRI in the 1950s, has been commuting to Tech daily by bicycle for about 10 years. He goes directly to SAC to shower and change clothes. Bike commuters in Baker and ERB are lucky: they can use showers installed years before SAC was built.

Greg says, "It's a hassle having to take 3-4 showers a day, but my co-workers appreciate it!"

Patricia Ryan (MAL-campus) thinks two improvements would help her become a bicycle commuter: 1) providing a safe-guarded place, preferable indoors, for bicycle storage; and 2) equipping office buildings of the future with showers and lockers.

According to Bill Joye, who conducted an e-mail bicycle commuter survey via Internet last August, companies in California's Silicon Valley encourage alternative modes of commuting, including bicycles, as a means of helping Silicon Valley overcome its regular violations of EPA air quality standards. Three companies even subsidize alternative commuters. Of 20 respondents, nine indicated that their companies provided secured bicycle parking (lockers or inside storage), and several other firms had specific policies allowing in-office parking in accordance with regulations. Eight companies provided locker rooms with showers for bikers and other fitness-minded employees.

All the GTRI respondents say they would like to get together with other GTRI bike riders for some group activities and to compare notes. They would welcome inquiries from others who are interested in bicycle commuting. □



*The GTRI CONNECTOR is published for Wilbert Stewart, Baker Building attendant, and all the other employees of GTRI. (Photo by M.A. Stegar)*

**ATMS**

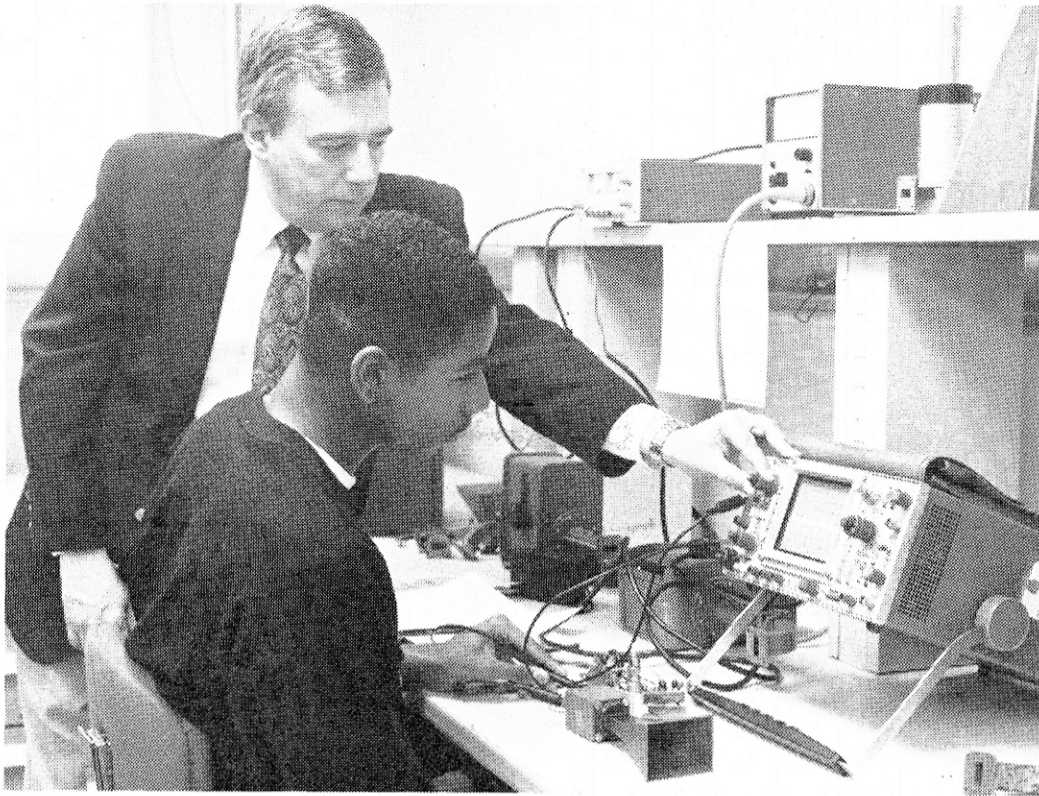
From page 3

quired is one that we've done in the past for different environments and organizations."

Kelly says the only subcontractors GTRI will have are one consultant in C<sup>2</sup> simulators and a company that specializes in training and handbooks. This company will write the first edition of the human factors textbook; GTRI will do the second, which will incorporate recommendations based on lessons learned from the experiments.

CAL researchers are designing cockpit displays for Air Force PAVE LOW helicopters and, to a lesser degree, for the Marine Corps' AH-1W Cobra helicopters. In the past, they developed and built a simulator of a Soviet radar operators' station. "We used it to see what we could do to make their operators perform more poorly," Kelly comments. Prior to coming to GTRI, Kelly performed top-down systems analysis on the Air Force tactical C<sup>2</sup> system and helped design and build a C<sup>2</sup> simulator for Navy research.

He also has had experience in designing human factors handbooks—for airline pilots and (with Dan Ortiz of ESTL) for the apparel manufacturing industry. □



Gene Greneker and Chazaughn Purvis (seated at the oscilloscope) look at the signals being produced by the radar Chazaughn has just built, observing the Doppler shift caused by a simulated target in the room. (Photo by Kay Lindsey)

## High school student builds radar with GTRI help

Gene Greneker (RIDL) played mentor to a 15-year-old high school student December 22, advising Chazaughn Purvis on how to build a radar for the Atlanta School System Science Fair.

Chazaughn, an honor student at Benjamin E. Mays High School, called Gene the day before the lab sessions in the GTRI short course, Principles of Modern Radar, to ask if Georgia Tech could provide him with information on how to build a radar. Gene invited him to attend the lab sessions and observe the eight radar laboratory demonstrations at the Cobb County Research Facility. After participating in the demonstrations, Chazaughn decided that he wanted to build a homodyne radar.

Gene invited Chazaughn to come to the Radar and Instrumentation Laboratory on December 22 to build his radar. Surplus radar parts were provided, and Gene guided him on how to measure radar transmitter power output, frequency of operation, and how to assemble the homodyne radar. Chazaughn won first place in the engineering category in his school science fair and will compete in the citywide fair later this month.

Chazaughn, the son of Cornelious and Carol Purvis, has participated in science fairs since the sixth grade. He is considering Georgia Tech, Florida Institute of Technology, and Illinois Institute of Technology for his college choice. His career goals are related to computer technology, and he hopes to work for one of the cutting-edge computer companies after college. □

## Good-bye from your editor

This is it! After nearly 30 years at EES/GTRI and 12 years as editor of the GTRI employee newspaper, I'm retiring! This is my last issue of The GTRI CONNECTOR.

EES (now GTRI) began publishing an employee newsletter (*Station News*) in 1972, and I was an associate editor from its beginning until 1979. I became responsible for *Station News* as its editor in 1981 and shepherded its expansion into a four-page tabloid, The GTRI CONNECTOR, when EES changed its name in 1984. In July 1990, we redesigned and expanded the CONNECTOR again to its current eight-page format.

I've enjoyed getting to know many of you through the years, as I've learned and written about your activities for the newspaper. I thank you for all the help, tips, information, photos and articles you have given me, and I will continue to be interested in your "doings."

But I am leaving the CONNECTOR in capable hands. Lea McLees will be the new editor. She began media relations work at RCO in June 1991, coming from a position as assistant city editor at *The Times*, a daily newspaper in Gainesville, Georgia.

Lea is a first honor graduate of the University of Georgia with a bachelor's degree in journalism. She interned at *The Boston Globe*. She currently is studying part time at Georgia Tech for a master's degree in environmental policy.

To learn how to get news into the CONNECTOR in the future, please see the sidebar article.

Good-bye! I wish the best to GTRI and to you all!

— Martha Ann Stegar

## How to get news into the CONNECTOR

Some familiar faces at RCO will be taking on new responsibilities for producing The GTRI CONNECTOR at the end of January. Lea McLees will be planning and editing each issue, and Jim Kloepfel and Mark Hodges will be designing the publication each month.

Your submissions and ideas are the life of The CONNECTOR. You may contact Lea at 894-3444, fax to 894-6983, or send e-mail to lea.mclees@gtri.gatech.edu. Submissions also may be brought to Room 223/CRB. The deadline for each month's issue is the first Tuesday of that month. If interviews and/or photography will be needed, please try to let us know two weeks before our final deadline.

Information for the Professional Activities, Personnel News, or Personal Notes columns may be submitted to the associate editors in your area, listed in the lower left corner of the back page of each CONNECTOR. The associate editors' deadline is also the first Tuesday of each month, so please assist them by providing information early.

In the February issue, look for an interview with Dr. Donald Grace, outgoing GTRI director, and a feature on automobile acoustics research conducted on the interstates around Atlanta—in a very unusually equipped car at very unusual hours! We'll also begin a series of stories on GTRI student employees who are doing exceptional work in the labs, and start a calendar of GTRI events.

RCO looks forward to continuing to produce a quality CONNECTOR for you! □

## Calendar of lectures

Here are upcoming lectures at the College of Computing (CoC). Call 853-2682 for more information.

**February 4**—"Terabytes >> Teraflops: Or Why Work on Processors When I/O Is Where the Action Is?" David Patterson, Professor and Chair, Computer Science Division, Department of EECS. CoC Distinguished Lecture Series. Reception at 3:30 p.m., lecture at 4 p.m., Room 17, CoC.

**February 18**—"Expeditions in Virtual Space," Tom Furness, University of Washington. Graphics, Visualization, and Usability (GVU) Distinguished Lecture Series. 12 noon, Room 102, Pettit Building (Microelectronics Research Center).

**March 11**—"The Future of Computer Graphics Research," Jim Kajiya, California Institute of Technology. GVU Distinguished Lecture Series. 12 noon, Room 102, Pettit.

The Center for the Enhancement of Teaching and Learning (CETL) lectures are from 12:05-12:55 p.m., with a reception immediately following. Call 894-4474 for details.

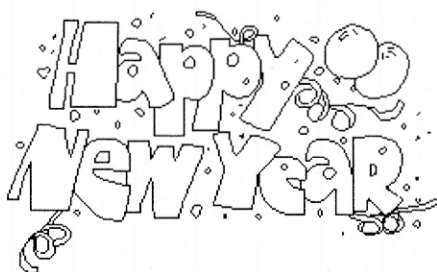
**February 9**—"Cooperative Learning: How Two Tech Professors Turn Theory into Practice," Donna Llewellyn and Gil Neiger. Student Center Theatre.

**March 9**—"The Scholarship of Teaching," MaryEllen Weimer, Pennsylvania State University. Student Center Theatre. Workshop: "Large Classroom Techniques," Alumni/Faculty House Ballroom, 3-5 p.m.

**April 14**—"Women in Technology and Sciences," Joan Rothschild, University of Massachusetts at Lowell. Student Center Theatre. Panel Discussion: "Gender and Pedagogical Issues," Management 228, 3-5 p.m.

## News & Notes

Gene Greneker helps an Atlanta high school student build a radar for a Science Fair project.



Queries  
&  
Quotes

Focus on  
Quality

MAPS conducts  
customer survey

By Carolyn Mahaffey and Charlotte Batson

The MAPS group recently completed a survey of our primary customers (project directors and laboratory directors) in order to learn more about how well we are meeting their needs—how we are perceived, what services need improvement, and what additional services may be needed.

Of the 478 surveys sent out, we were pleased to receive a 40% response and many valuable and thoughtful suggestions. The Pareto chart indicates the areas covered by our users' comments, including those which were "generally positive" or "generally negative."

The largest area of concern has to do with public relations, mostly due to requests that we need to do a better job in identifying exactly what services we provide. A representative comment in this area was, "More folks need to know about MAPS and the good work they do." In response to these concerns, the group plans to issue a brochure in the near future, outlining its services. Some of them include:

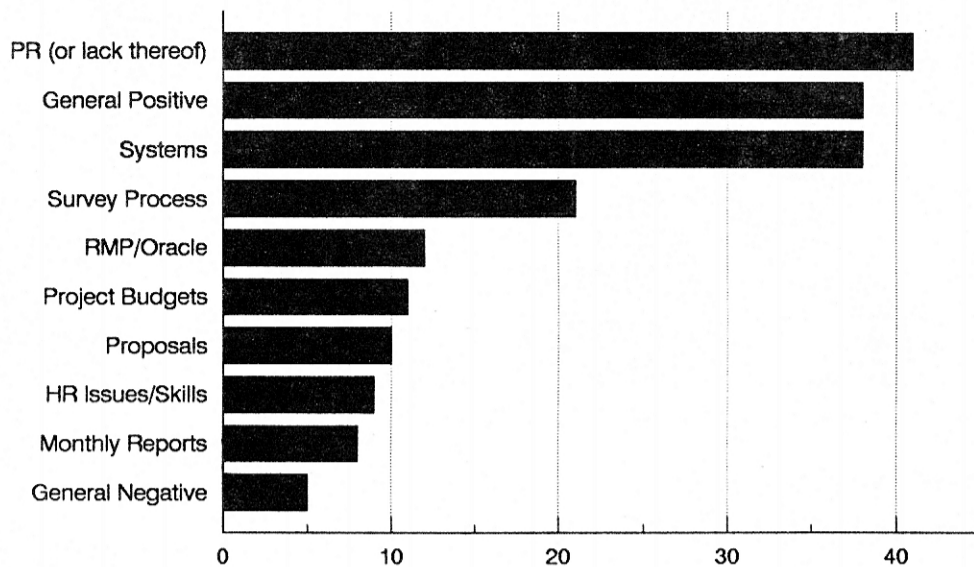
- Preparing proposal budgets
- Calculating project cost-to-complete
- Preparing sponsor-required financial deliverables
- Handling overrun transfers
- Rebudgeting projects
- Preparing management tools and summaries
- Assisting with problems related to overdue deliverables
- Tracking and monitoring the status of project deliverables
- Setting up, amending, and zeroing project subbudgets
- Providing administrative support to projects as needed

The second biggest comment area has to do with systems. One example, "Standardize your forms across labs," is an area we had already begun to address. For several months we have been working on standardizing our forms and processes across labs, and we expect to have completed a draft package later this month for review by GTRI managers. Each of the reports currently prepared for laboratory directors and group directors has been analyzed and condensed into a standard format, with the goal to portray the necessary management information in a uniform way while minimizing any redundancy of effort.

Other systems issues addressed by several respondents included the following comments: "It would be handy to have timely 'greensheet' data on a project spreadsheet, updated monthly, automatically without asking, distributed on a disk or over the network. I suspect there are a lot of people who are still keypunching data from the 'greensheets.' Any ideas on tools for estimating projects?"

*"The (MAPS customer) survey has provided a benchmark for measurement of the success of our continued efforts to serve our research staff in the most efficient and cost-effective way possible."*  
—Carolyn Mahaffey  
MAPS manager

Pareto Chart of Comments Received



"Be more involved with financial planning and management of contracts. Information is available through accounting and projview; financial planning is not. Prepare financial project deliverables for all projects."

These and other questions are being addressed by the RMP project team, which has worked to make all GTRI Accounting transactions and month-end data, as well as OCA PAD information, available through the use of Oracle tables. MAPS staff members, who work closely with the RMP team in the development and use of these tables, are being trained to access these databases directly. It is now possible for MAPS to obtain vital financial and contractual information on a real-time basis for use in project reporting, planning, and estimating.

MAPS and RMP have worked together to develop several standard report formats which satisfy financial deliverable requirements on a large number of GTRI projects. These reports can be produced in the MAPS groups as soon as Accounting closeout has occurred. These capabilities are proving to be a valuable resource to those project directors who are using them.

Some comments indicate the need for MAPS and GTRI systems to be improved in order to address such concerns as duplication of effort ("I have my own budget specialist"), lack of availability ("There is no MAPS in my building"), computer systems ("Info needs to be on-line and Macintosh-compatible"), as well as improvements which could be made to the survey process itself. Others suggested that we need to "instill an 'ownership' concept, where one MAPS person feels intimately connected to the success of a particular lab (or mission), with others in that MAPS group as backup and support."

There were many complimentary comments, such as: "Our MAPS group has been very responsive and effective. We have transferred many of our activities to this group and depend on them for financial and project support." And, "I like to use MAPS for the latest info on proposal rates and for occasional help on rebudgeting projects."

Several constructive suggestions targeted future goals for our group, such as the need to help implement electronic timesheets, the need to become more proficient in helping with personnel coverage projections, and the need to take a more aggressive role in identifying and correcting problems before being told about them. These comments indicate that, while the utilization of MAPS and the

customer satisfaction are good, there is plenty of room for improvement.

The survey has provided a benchmark for measurement of the success of our continued efforts to serve our research staff in the most efficient and cost-effective way possible. We appreciate the enthusiastic response to our survey, and we ask our users to work with us to help make GTRI a better place to work, and the premier research organization in the world! □

Tech Deming Study Group  
invites participants

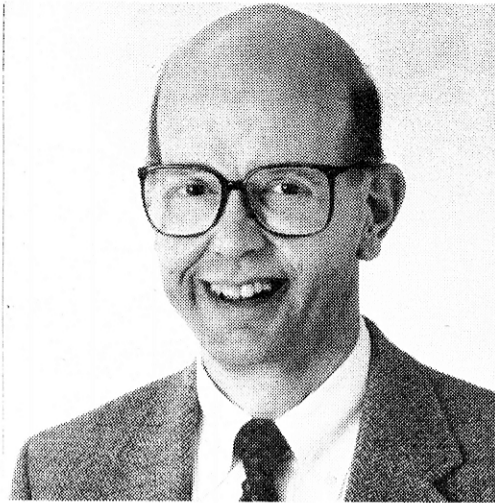
For the past several months, a number of GTRI employees have been participating in a weekly Brown Bag luncheon for the purpose of learning more about Continuous Quality Improvement (CQI) principles and how to apply them to their individual lives and workplaces. The group is composed of persons who have attended one or more "Deming Seminars" on Total Quality Management (TQM).

The group has elected to call itself the Tech Deming Study Group. It is seeking guidance and support from the Atlanta Area Deming Study Group, which meets monthly on the Georgia Tech campus.

The group also has decided that, since GTRI is integrally entwined in Georgia Tech's broad mission of education and research, members would gain significantly by expanding the group to include all Georgia Tech faculty and staff who have attended a Deming Seminar and share a common interest in learning and applying CQI principles.

To promote broader Georgia Tech participation, the group has moved its location to the Student Center. The group now meets from 12 noon to 1 p.m. every Thursday in one of the third-floor Student Center meeting rooms (with the exception of those few weeks in the year when no Student Center meeting room is available). Individuals may bring their own "brown bag" lunch or pick up a lunch from one of the two cafeterias in the Student Center.

For further information, contact Charlotte Batson, 853-4199. □



New IEEE Fellows Donald Clark (left) and David Flowers (right).

## Clark and Flowers named IEEE Fellows

By Lea McLees, RCO

Two GTRI principal research engineers have been elected to the highest rank of the Institute of Electrical and Electronics Engineers (IEEE).

Donald E. Clark of EEEL and David C. Flowers of CMDL were recently named IEEE Fellows by the organization's board of directors, along with two Georgia Tech electrical engineering professors, Joseph A. (AJ) Connelly and A.P. (Sakis) Meliopoulos. The four are among 246 fellows elected this year from a pool of 530 nominees. There are currently 4,757 IEEE Fellows among IEEE's 320,000 total membership.

Flowers' citation letter credits him with making "fundamental contributions to the field of electronic countermeasures." Clark is recognized for "contributions to electromagnetic compatibility in military systems."

"It is quite more of an honor than I anticipated," Clark said of the Fellow award, noting that he has received many congratulations from people around campus and from colleagues elsewhere.

Flowers is particularly appreciative of the award because it is given by engineering peers who understand the technical intricacies of his group's projects.

"This is recognition by similar people in my profession who do technical work," he said. "It is not a management award, it is from people who read the papers we write."

Both Flowers and Clark credit excellent colleagues at GTRI with helping them achieve the successes the Fellow awards were based on. The two join five other IEEE Fellows currently employed at GTRI: Fred Nathanson (RIDL), Josh Nessmith (RSAL), Ed Reedy (OOD), Johnson Wang (MATD), and Jim Wiltse (OOD).

### Don Clark

Clark's work addresses electromagnetic compatibility (EMC) technology, particularly that of complex military systems. Understanding this area becomes more essential as electronics become more dense and operate at lower voltages—such proliferation increases the possibility of interference from communication and radar systems. Clark's most significant contribution to this field has been to make compatibility technology readily available to people who develop and design such systems.

Clark contributed to compatibility criteria for three Navy missile systems, TALOS, TARTAR and TERRIER. His work became the basis of the Navy handbook *Electromagnetic*

*Compatibility Criteria for Surface Missile Systems*. On other programs, he has compiled both management and design information that aids managers and engineers who must address potential vulnerabilities to guided weapons operating in electromagnetic environments. Various aspects of Clark's work are the subjects of the U.S. Army *SEMI Handbook* and *Management and Design Guidance—Electromagnetic Radiation Hardness for Air Launched Ordnance Systems*, another handbook.

Clark also planned, designed and integrated a multimillion-dollar Navy facility for evaluating the intersystem electromagnetic compatibility of military aircraft. The facility is used most often for checking the safety of aircraft operations on carrier decks, but also has been used to test civilian aircraft.

Clark will have worked at GTRI for 17 years as of April 1993. He enjoys his work because it is constantly changing.

"Challenging problems that are different are always coming up," he says. "I enjoy digging out information and trying to solve problems I have not solved before."

### David Flowers

Flowers' work is in the area of radar-related signal processing, particularly in understanding the effects of jamming technologies. His most significant contribution has been to develop and solve equations that "describe the interaction of angle measurement receivers and the class of Dual Coherent Source (DCS) angle jamming techniques," according to his nomination papers. He devised the null ring theory, which took into account DCS research results achieved all over the country. It brought together analysis and design procedures for all jamming techniques relying on two mutually coherent radiators. The theory explained phenomena observed in jamming which had not been fully understood for more than a quarter of a century. Flowers has shared his results in publications and presentations, as U.S. Department of Defense security restrictions permitted. He shared the information with GTRI groups and consulted with government and industry to promote the acceptance and use of the theory, which is now familiar to most groups pursuing DCS research.

He also developed an algebraic equation and solutions that made possible characterization of the momentum envelope of control movement gyroscopes (CMGs) for controlling spacecraft attitude. The equations, when applied to the two principal CMG control approaches, helped researchers initially understand the merits of each and select the attitude control system used on the X-ray observations launched in the 1980s.

Flowers has worked at GTRI for 14 years. He enjoys his work because it helps meet sponsors' needs, contributes to a stronger U.S. defense base—and because it is mathematically oriented.

"I'm a mathematician at heart," he says. □

## DEC Visualization Reference Center now fully operational

By Bill Ribarsky, Manager  
Scientific Visualization Group, OIT

Now that the DEC Visualization Reference Center (VRC) is fully set up, you have a new and deep source of computational power, graphics capability, and software tools in the SciVis Lab. This is an ideal time to take advantage of these facilities, since the user load has just begun to rise.

At your disposal are three high-end graphics workstations (DECstation 5000 model 240 with turbo graphics), a server with 5.4 GB of disk, some peripheral devices including button and dial boxes, and a color laser printer. Also available in the same location are the workstations and facilities of the DEC Multimedia Project and all the computing equipment and peripherals of the SciVis Lab. DEC is committed to working with us to keep the VRC at state-of-the-art, and we can expect future upgrades that include the hot new Alpha workstation.

Among the application packages available in the VRC are AVS, IDL (similar to the Wavefront Data Visualizer), Mathematica, DEC VUIT and FUSE for user interface construction and graphical development, DEC PHIGS, Motif, and Plot3D. In some cases (e.g., Motif and Plot3D), this provides continuity with applications already on the SGI machines in the Lab. In other cases, new applications and functionality (e.g., AVS and PV-WAVE, using Mathematica within a visualization environment) are available through the VRC. During the Winter Quarter, we will be teaching seminars on packages such as AVS—watch for details in this newsletter and in postings on git.announce.

The DEC VRC and the facilities of the SciVis Lab are available, free of charge, to the GTRI staff. Charlie Patterson of the SciVis Group is the DEC VRC manager and is available to answer your questions. With his help and the efforts of other knowledgeable people, we already have extensive projects under way in atmospheric analysis, molecular dynamics visualization, visualization techniques, and multimedia.

So don't vacillate; come by now, get a SciVis account, and start using the many facilities at your disposal. If you would like a SciVis account or more information, please contact Bill Ribarsky (ccsupwr@prism or phone 894-6148). □

**Focus  
on  
Folks**

**Don Clark and Dave Flowers have been elected IEEE Fellows, Clark for his "contributions to electromagnetic compatibility in military systems," and Flowers for his "fundamental contributions to the field of electronic countermeasures."**

## Focus on Folks

### Professional Activities

#### Countermeasures Development Lab

**Tom Pratt** made an invited presentation October 29 to the NAVSEA DECM Subcommittee in Moorestown (NJ) concerning standoff chaff effects on MTI and pulse Doppler radar. He also presented a paper entitled "Standoff Chaff Concept Assessment" at the Radar Electronic Warfare Conference in Adelphi (MD) December 11.

#### Economic Development Lab

On November 6, **Holly Grell-Lawe** gave a presentation on "Standards Information for Exporters to the European Community" at a meeting sponsored by the Society of Manufacturing Engineers concerning ISO 9000 quality standards.

**Dave Swanson** is president of the newly formed American Industrial Extension Alliance. Comprising more than a dozen universities, the group will push for a federally funded industrial extension service.

#### Environmental Science & Technology Lab

In December, **Steve Hays** made a presentation concerning construction safety to the Augusta Chapter of the American Society of Safety Engineers. In January, he spoke to the National Association of Corrosion Engineers on the topic of excavation safety.

**Toni Hurley** became a Diplomate of the American Academy of Industrial Hygienists in December by passing the Certified Industrial Hygienist examination.

#### Microwave & Antenna Technology Development Lab

**Don Bodnar** has been elected vice president of the IEEE Antennas and Propagation Society for a one-year term beginning January 1, 1993. His election was the result of balloting the society's 8,000 international members.

#### Office of the Director

**Janice Porter** passed the Certified Professional Secretaries exam in November.

#### Radar & Instrumentation Development Lab

**Istvan Nogradi** presented an invited paper, "A Quiet and Expendable Signal Source," at the High Voltage Workshop, held at Wright-Patterson AFB in Dayton (OH) October 20-21. He also chaired the Modulator Session and was appointed to serve on the executive committee for future conferences. He was able to secure the next conference for Georgia Tech, and it will be held during the week of March 1-5, 1994, at the Cobb County Research Facility.

Nogradi also presented a paper, "Modified Hardflet Modulator," at the National Radio Science Meeting of URSI, which was held January 5-8 in Boulder (CO). This was Nogradi's third paper at national and international conferences in six months.

#### Radar Systems Applications Lab

**Guy Morris** wrote one of the feature articles in the December issue of the *Journal of Electronic Defense*. It was titled "Trends in Electronic Counter-Countermeasures."

#### Research Communications Office

RCO won three awards in the Council for Advancement and Support of Education (CASE) District III awards competition. The *GTRI Annual Report* won a Special Merit in

the annual reports category. Credit goes to **Mark Hodges** and **Jim Kloeppe**, co-editors; **Martha Ann Stegar**, writer; **John Taylor** (GT Publications), graphic design; and **Gary Meek** (TelePhoto), photography. *Research Horizons* garnered an Award of Excellence in the special magazines category for editor **Mark Hodges** and graphic designer **Adele Llop** (GT Publications). **John Toon** and **Lea McLees** earned an Award of Excellence in the media relations category. □

### Personnel News

#### Aerospace Lab

**Clarke Stevens** has resigned.

#### Countermeasures Development Lab

**Bob Newsom** has transferred to ESTL. **LaKrista Odom**, **John Bond**, and **Joe Jadamec** have terminated.

#### Economic Development Lab

**Karen J. Fite** is a new RA II in the Savannah Regional Office. She previously worked for Eastern Airlines, the University of Georgia's Small Business Development Center, and the Muscular Dystrophy Association.

**Marguerite Osborne** retired December 9, and **Mac Davis** left GTRI in January.

**Kristen Anclien** is a new co-op student in the Macon Regional Office.

#### Electronic Support Measures Lab

**Dave Zurn** has resigned.

#### Microwave & Antenna Technology Development Lab

MATD welcomes SRE **Gary W. Caille** and co-ops **William P. Kirsch** and **Amy N. Cosby**.

#### Research Communications Office

**Martha Ann Stegar** is retiring at the end of January.

#### Threat Systems Development Lab

Terminations include **Mary Ann Adams**, **Scott Higgins**, **Andrew Kroll**, and **Richard Prater**. □

### Personal Notes

#### Wedding Bells

**Eunice Kelsey** (OOD) and **Hamilton Glover** were married January 2.

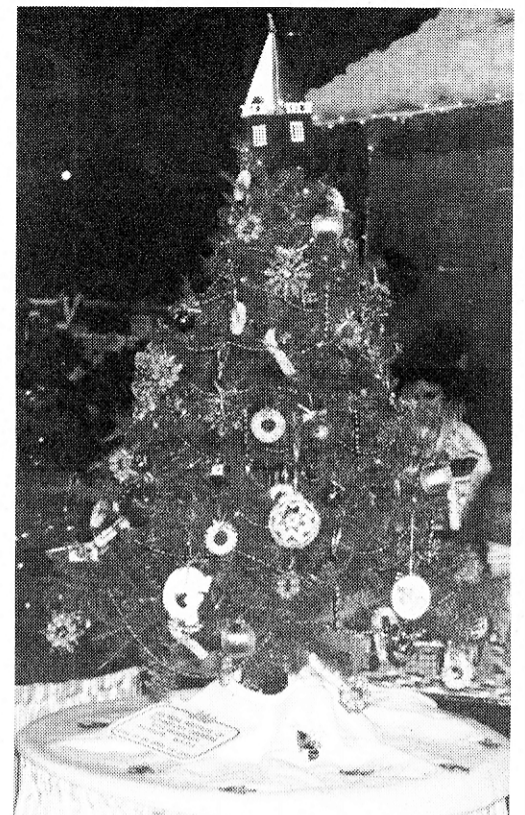
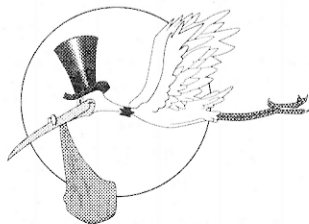
#### Cradle Roll

**Coretta** and **Michael Lee** (TSDL) welcomed a baby boy, **Joseph Alan**, December 18.

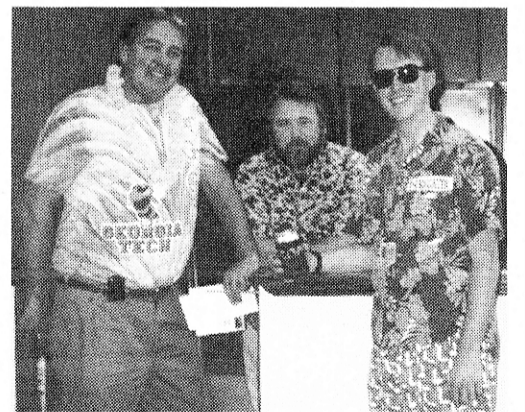
**Brenda** and **Dirk Gentry** (EDL) became proud parents of **Harvey Garhett** December 19.

Congratulations to **Mary Jo** and **Tom Pratt** (CMDL), whose third son, **John Thomas**, was born December 20.

**Kelly Nicole** is the new daughter of Mr. and Mrs. **Don Strausberger** (RIDL), born January 8. □



*A Christmas tree with a Georgia Tech theme, created by the GTRI MAPS Group and the RMP project team, sold almost immediately for \$175 at Egleston Hospital's Festival of Trees last month. The four-foot-tall tabletop tree, named "Going for the White and Gold," was decorated in a Georgia Tech theme. The "crowning" piece was a model of the Tech Tower, crafted to scale by Rick Hoffner of the Baker MAPS group. Rick glued together and notched popsicle sticks to form the "bricks" and topped it with a folded aluminum "roof." Another special item was the white felt tree skirt featuring appliques of "Buzz" and the GT logo. Sewn by Sharon Tabor of MATD, it was "commissioned" by Cobb I MAPS' Carey Floyd and Helen Hunton. Sharon Mattson (Baker MAPS) coordinated the project, made many of the ornaments, and delivered and decorated the tree. Assisting her were Marsha Barton (Cobb II MAPS), Michele Brown (CRB MAPS), Wanda Fox (RMP group), and Mary Redish (ERB MAPS).*



*The Cobb County Research Facility celebrates Theme Day the first Friday of each month. Among participants in the January Hawaiian Day were, L-R, Julian Price (TSDL), Rusty Embry (FMD), and David Camp (MATD). For December, in addition to wearing their Christmas attire, everyone was encouraged to bring canned goods and toys to place under the tree in the Building 1 lobby. Donated items were given to the Cobb County Police Department, which had adopted six needy families for the holidays. (Photo by Cheryl Barnett)*

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