

The GTRI Connector

It's about time!

- If it weren't for the last minute, a lot of things wouldn't get done.
— Michael S. Troyton
- Time flies, but remember you're the navigator.
— Anonymous
- You may delay, but time will not!
— Ben Franklin

Vol. 8 • No. 7

Published Monthly for the Georgia Tech Research Institute Family

May 1992

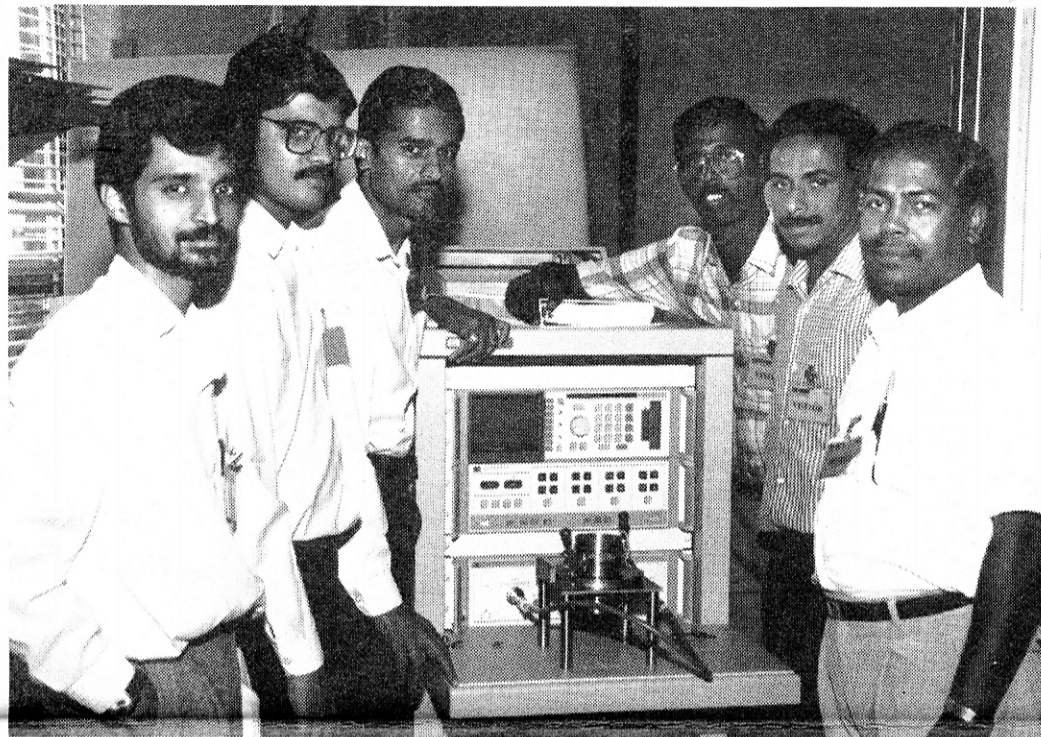
Salaam, Bombay ... and Madras!

By Martha Ann Stegar, RCO

Hugh Denny, director of the Electromagnetic Environmental Effects Laboratory, spent three weeks in March lending his expertise in electromagnetic interference (EMI) and electromagnetic compatibility (EMC) to the Government of India. Now he is hosting three Indian scientists who will get hands-on experience working in his lab for three months.

The exchange is part of a grant program under which the U.N. Development Programme of the United Nations Industrial Development Organization is providing funds for special equipment and training to the SAMEER Centre for Electromagnetics of Madras, India. The program, which started three years ago, provides funds for experts from developed countries to conduct short-term on-site training and consultation with Indian engineers and for selected Indian engineers to spend longer periods working in labs in the U.S. and other countries. Indian electronic equipment designers, manufacturers and users utilize the services of the Centre to help them increase the quality, reliability and operational effectiveness of their products.

"The Centre is set up primarily to assist the commercial/industrial sector in minimizing or controlling EMI," Denny says. "While I was there, I typically spent the mornings giving seminars and lectures on grounding and shielding and on electromagnetic environmental effects design techniques. The



Six Indian engineers working at Georgia Tech on a UNIDO/UNDP exchange program inspect the transfer impedance test fixture in GTRI's electromagnetic environmental effects test lab. From left to right, they are P.H. Rao, Alok Chordia, A.K. Shrivastav, M.K. Konathalapalli, G.T. Karimpumannil, and A.L. Das. Rao, Shrivastav, and Das are working with Ed Joy (EE); the others are hosted by Hugh Denny and John Daher (EEEL). (Photo by Dayton Funk)

afternoons were devoted to visiting different groups or individuals, discussing problems and acting as a resource. I also spent a day running ground resistance tests, took a field trip to a radar site, and visited a construction site for open-air testing."

At the Bombay headquarters of SAMEER (Society for Applied Microwave Electronics Engineering and Research), Denny gave a one-hour lecture on grounding. He also viewed a major project to design and develop a 50-megahertz atmospheric wind shear radar.

"Their scientists and engineers are pretty much on a par with us," Denny says. "They're enthusiastic and perceptive of the problems and realities of EMI/EMC."

Three engineers—Alok Chordia, George Thomas Karimpumannil, and Mohan

Krishnaiah Konathalapalli—arrived at Georgia Tech May 17 for a three-month fellowship. They will be working with John Daher on an internally funded program looking at the metrology of EMI gaskets used for sealing joints of electronic equipment to shield it from electromagnetic interference from other electronic sources. The objective of the research, which is in its fourth year, is to develop improved techniques for characterizing the shielding properties of EMI gaskets.

Another trio of Indian engineers—A.L. Das, A.K. Shrivastav, and P.H. Rao—arrived April 15 for a similar stay. They are working with Ed Joy of the School of Electrical Engineering on near-field planar array techniques.

Continued on page 2

Observed & Noted

Put June 19 on your calendar to attend the second annual Aerial Robotics Competition at Georgia Tech. Details are on page 2.

This month, the Internal Research Spotlight is on continuous coating of ceramic fibers to make them heat-

resistant. Jack Lackey and John Hanigofsky lead this STGC-funded project. See page 3.

Ten GTRI retirees are profiled on pages 4 and 5, and 60 employees receiving 25-year Gold-T's and 10-year certificates are listed on page 5.

ATDC is cranking up the second year of its Faculty Research Commercialization Program, which successfully commercialized two of last year's projects. The deadline for proposals is July 6. See page 5.

The TQM column this month features

a philosophical discussion by Fred Cain. Page 6.

Learn what it takes to act—and look—like a pro when you're interviewed on television. RCO's Lea McLees and TelePhoto's Susan Hawkins present some tips on pages 6 and 7.

Krish Ahuja wins Georgia Tech's Outstanding Interdisciplinary Activities Award, and co-op Jenny Rooke gets an NSF fellowship for graduate study at Yale. Read about these and other Professional Activities on page 7.

Congratulations to 23 GTRI professionals who will be promoted on July 1. See page 8 for their names.

Georgia Tech
RESEARCH INSTITUTE

**News
&
Notes**

The Association for Unmanned Vehicle Systems hopes the lessons learned by contestants in the Aerial Robotics Competition will help students be better engineers—and equip them with skills that will advance knowledge about autonomous aerial vehicles.

EMI/EMC

From page 1

Denny's consultancy came about through a visit to the Tech campus last year by Dr. Kodali of India's Department of Electronics, who was on a study trip under the UNDP grant and wanted to talk to someone about electromagnetic compatibility issues. Last summer, Dr. P.B. Tole, director of SAMEER, visited Georgia Tech and issued an informal invitation to Denny, who sent an application to UNIDO in the fall. He received his official acceptance in early January. □

2nd annual Aerial Robotics Competition coming up June 19

By John Toon, RCO

Blimps, helicopters, a "flying gyroscope," and two "tailsitters" are among the unique air vehicles expected to participate in the second annual Aerial Robotics Competition next month. It will be held June 19 in one end of Georgia Tech's Bobby Dodd Stadium.

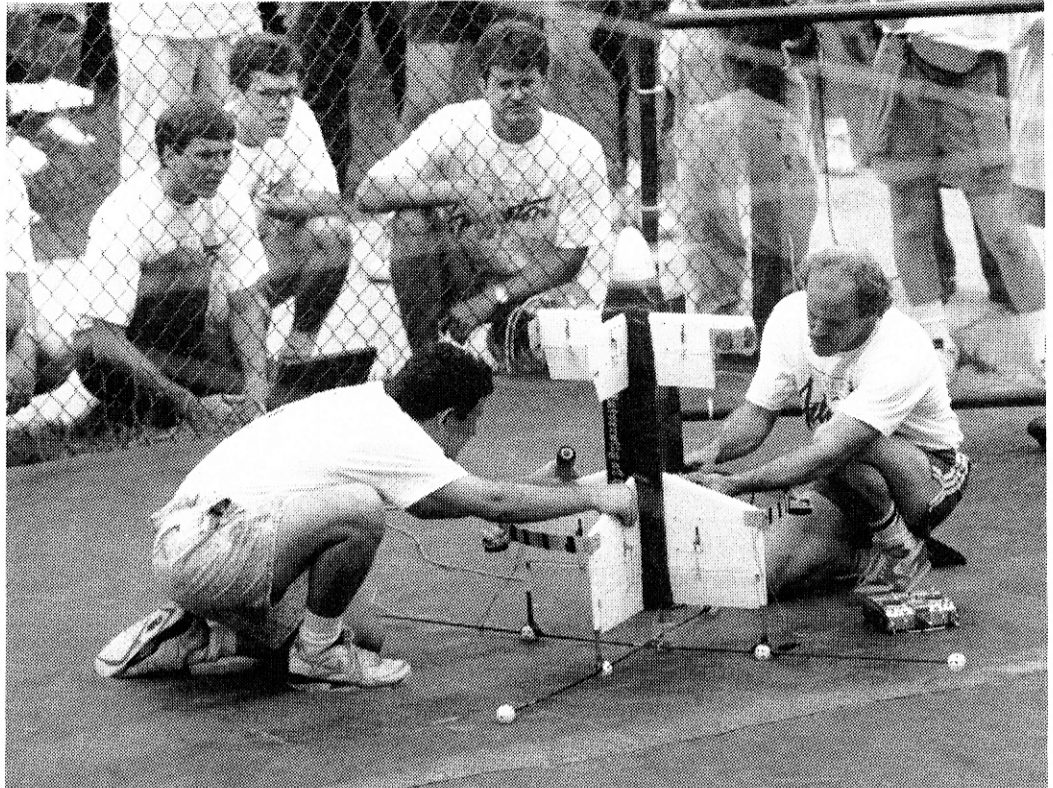
Built by teams of students from 11 different colleges, the autonomous flying machines will attempt a task that has never been done before: to find and retrieve metal disks from a bin and fly them across a barrier to another bin—all without human direction or intervention. "Once the vehicle is started, each robot must travel on its own, using its machine vision to perceive the environment and its own intelligence to find a disk, acquire it, and navigate across the barrier to drop it," explains GTRI's Rob Michelson, who is vice-president of the Association for Unmanned Vehicle Systems (AUVS), the event's sponsor. "It's a real technical challenge."

Teams from California Institute of Technology, Ecole Polytechnique Federale de Lausanne (Switzerland), Georgia Tech, Mississippi State University, U.S. Naval Academy, Purdue University, San Diego State University, Southern College of Technology, University of Dayton, University of Southern California, and University of Texas at Arlington are expected to compete. Many of the college teams have support from industrial and government organizations such as Lockheed Aeronautical Systems Company and the U.S. Army Aerostructures Directorate.

Two teams from Georgia Tech will compete, one fielding a six-foot helicopter and the other entering a ducted-fan aerial vehicle it calls a "flying gyroscope."

"We're trying to build an inherently stable craft that would be easy to control," explains Chris Thompson, a GTRI researcher who is working with the Georgia Tech #2 Team. The "flying gyroscope" is small, just 19 inches in diameter and 24 inches tall.

Returning to the competition for a second year is Georgia Tech Team #1, which will fly a 6 1/2-foot-long helicopter, says Team Captain Mark Gordon. The team has assistance from NASA and from two smaller companies: Dickerson Vision Technologies and Guided Systems Technologies.



Team members from the University of Texas at Arlington ready their "tailsitter" during the first Aerial Robotics Competition held last summer at Georgia Tech. (Photo by Joe Schwartz)

Five teams entered the first Aerial Robotics Competition, held in July 1991 in a Georgia Tech volleyball court. None of the machines completed the task, although one autonomously found the bin containing the disks but crashed as it descended to acquire one. Three of them are competing again this year, and Michelson believes the lessons they learned may give them an edge over competitors.

Because of the technical difficulty of the task, Michelson expects that many of this year's group of machines may also fail—though he hopes at least one will be able to fly off with a disk.

This year, the rules allow larger vehicles to enter, as long as they fit within a 10-foot cube. "As a result, we should expect to see some new lighter-than-air entries such as blimps," explains Michelson, who is a senior research engineer in GTRI's Aerospace Lab.

The vehicles will be allowed six minutes to move as many disks as possible from one bin to the other, and each craft will be allowed three attempts. A three-foot barrier across the middle of the field will test the machines' ability to avoid obstacles.

A detailed scoring system will award points based on the size, weight and speed of each craft—in addition to what part of the task it is able to accomplish. The team that is judged the winner will receive a prize of \$10,000.

Lessons learned

The AUVS hopes the lessons learned will help students be better engineers—and equip them with skills that will advance knowledge about autonomous aerial vehicles. "The main thing the teams learned last year was that when you do a real engineering project, you must integrate all of your systems together," Michelson says. "People always seem to put that off to the end, thinking that since their systems work individually, they will also work correctly together. That's not so."

The teams also learned that the simpler solutions often work better than complex ones, and that many problems can arise between the drawing board and the competition field, he adds. "The higher the level of

complexity, the more there is to go wrong," he notes. "You can do almost anything on paper, but when you are constrained by what parts are available and how much money you have, you quickly learn the virtue of simplicity."

The work is interdisciplinary, requiring skills in mechanical, aerospace, electrical and materials engineering, along with computer science and software development. "This competition forces interaction between specialties in many disciplines, requiring each to understand how his contributions strengthen the whole, and how important trade-offs and compromise can be," Michelson comments. "The Aerial Robotics Competition involves significant engineering challenges identical to those students will encounter after graduation. Some of the teams have been working for over a year to build their entries."

Interest in the competition appears to be much stronger this year, with several universities fielding more than one team—and some teams bringing more than one flying machine. Michelson attributes that to publicity over last year's event and the competitive nature of college engineering students.

Autonomous aerial vehicles would be useful for both the military and commercial sectors. Military agencies already use remotely piloted vehicles to fly behind enemy lines to obtain information about positions and activities without jeopardizing humans.

Commercial uses could include "dull, dirty or dangerous" jobs such as pipeline inspections or timber monitoring. Autonomous vehicles would have the intelligence to respond to changing conditions and still complete the assigned mission. □

Spotlight on Internal Research

This is the second of a series of articles reporting on internal research projects funded by GTRI's Senior Technology Guidance Council (STGC).

Miracle fibers produced through continuous coating process

By Lea McLees, RCO

The thread-like, downy, ceramic fibers that Jack Lackey and John Hanigofsky of the Materials Science and Technology Laboratory work with are widely known for a strength that seems to contradict their fragile appearance. The soft, tiny filaments measure 5 to 15 microns across, about 1/30 the diameter of a human hair—but they are strong enough for use in reinforced metals and other ceramics. A 1/8-inch diameter fiber could support a 4,500-pound car, for example.

Now, Lackey and others are working on an STGC-funded project that is making the fibers even more useful by imparting to them an additional, important characteristic—heat resistance. “Most ceramic fibers lose their strength if heated to 1,200 degrees Celsius,” he says. “Our goal is to make fibers that are high-strength and capable of withstanding higher temperatures than commercial fibers.”

Lackey and his group are creating heat-resistant fibers by coating them with substances such as titanium diboride and silicon carbide. The coatings are applied using a special furnace in the Baker Building. Only two or three research groups in the United States are exploring this type of work, and

just one company is producing similar, but thicker, monofilaments, Lackey reports.

In addition to increasing strength, the uncoated fibers, when combined with a matrix material to form a composite, help ceramics withstand impact. They also enable metals to resist creep—slow deformation at high temperature. Heat-resistant fibers, however, would be even more useful to industry. The fibers could be used in jet engine components and on the wings and nosetips of future high-speed aircraft—parts of a plane that are subject to high temperatures.

“Ceramics are also lightweight compared to metals—and a lightweight engine in an aircraft improves maneuverability and efficiency,” Lackey says.

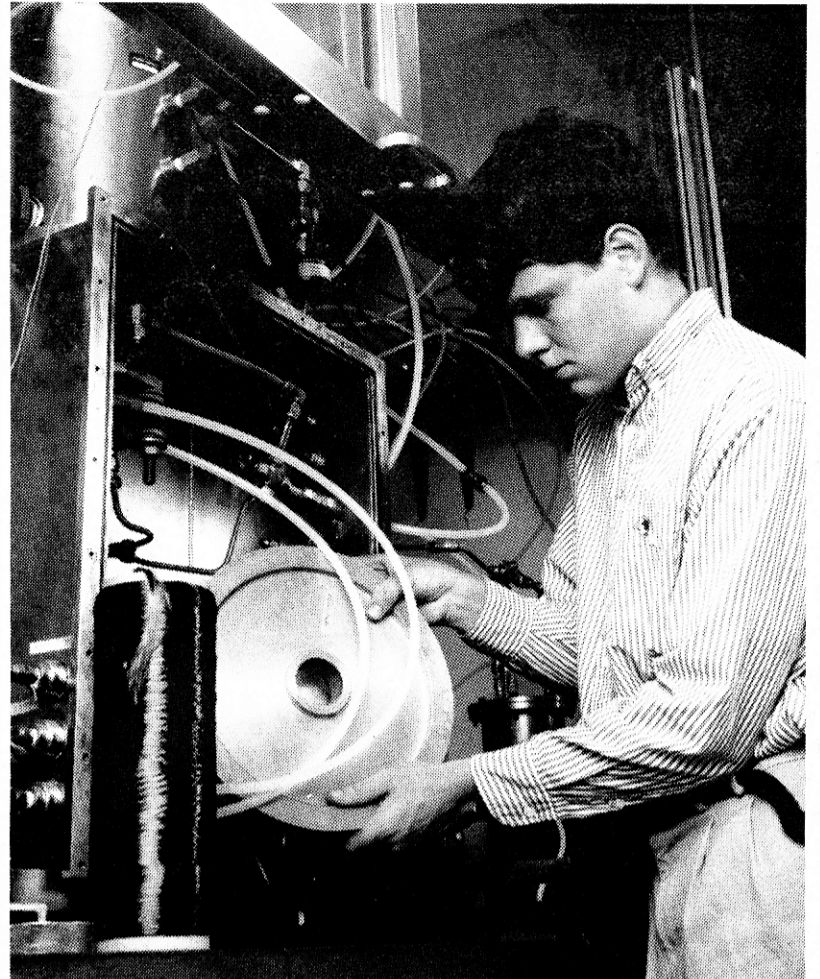
The fibers also might be incorporated into high-temperature filters or heat-exchangers for commercial or industrial processes, such as reclaiming energy produced by glass plants.

The coating process works like this: Tows, or bundles of 3,000 to 12,000 individual ceramic filaments, are wound onto a wheel at one end of the furnace. The tow is unrolled from the first wheel, passed through a furnace heated to 11,200 degrees Celsius, and collected onto a second wheel. Gases are introduced into the furnace as the tow passes through. A chemical reaction occurs, and the coating is deposited on the heated tow.

“The gases are precursors—they are not exactly a vapor form of the coating,” Lackey explains. “There might be two gases that react together to form the coating.”

The total diameter of a new, coated fiber is about 12 microns, says John Hanigofsky, who is a key contributor to the project. Using smaller fibers imparts better mechanical properties, especially to ceramic matrix composites, Lackey adds. More fiber equals more barriers that can stop the spread of a crack through a product.

The researchers are trying to completely coat each single fiber in each bundle—not just the outside of the entire filament bundle. To accomplish that and eliminate clumping of fibers, the fibers are vibrated once per



second as they pass through the furnace. Once the fibers are coated, Garth Freeman examines the fibers with a scanning electron microscope to evaluate the results of each effort.

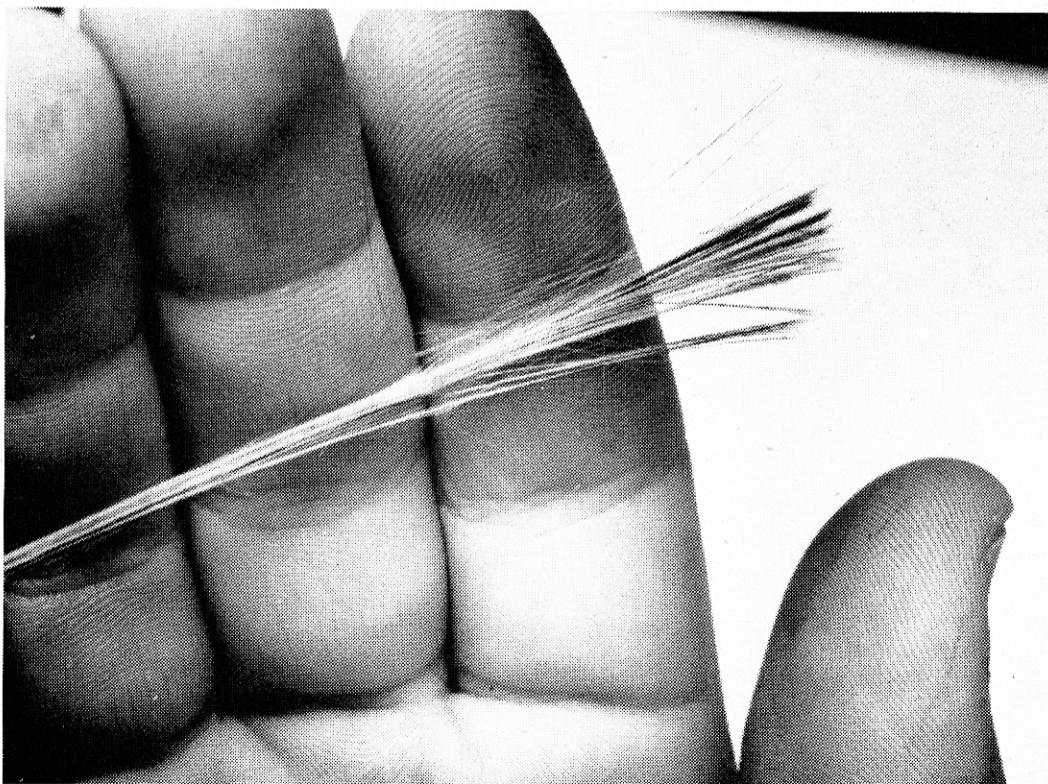
STGC investment in this project is definitely valuable, Lackey says. “This is an important technological area. We know the government is interested in developing better fibers, so this will position us well to get government contracts. But the bottom line is these fibers are needed for aerospace and industrial applications.”

The 19-month project, begun in 1990, has resulted in a contract and other achievements. Lackey's group now is doing continuous fiber coating work for the Materials Directorate of Wright Laboratory Aeronautical Systems Division, U.S. Air Force. The STGC research has spawned nine presentations and two publications thus far, and part of Hanigofsky's Ph.D. dissertation will include the research. In addition, five co-op students have had the opportunity to work with state-of-the-art equipment on the project and have contributed to publications: Bruce Beckloff, Dave Emmerich, Regina Hardin, Randy Kirchain, and Tom Moss. Beckloff spoke about continuous fiber coating in the American Ceramic Society's student speaking contest at its April 12 national meeting.

Continuous coating research holds more potential for the future, as well. Lackey sees possibilities in creating heat-resistant fibers with specific electromagnetic properties—those that might be useful in Stealth aircraft, for example. “We have the option of picking various materials that would be useful for that and other applications,” he says. □

MSIL co-op Jay Lewis prepares to mount a spool of carbon fiber in the supply area of a special furnace that deposits a thin, heat-resistant coating on the fiber. (Photo by Gary Meek)

Don't underestimate delicate-looking, yet strong, ceramic fibers: STGC researchers are making them heat-resistant, too.



A continuous fiber-coating furnace in the Baker Building coats these strong ceramic fibers with substances to make them heat resistant. They are used in reinforcing jet engine components and other products subject to high temperatures. (Photo by Gary Meek)

**Profile
&
Insight**

Ten GTRI retirees are honored in these columns. Their length of service at Georgia Tech ranges from 10 years ("Army" Armitage and Don Esper) to 25 years (George Bearce and Ed Martin). We wish them all a happy and productive retirement!

Eleven retirees honored

Eleven GTRI retirees were among those honored at Georgia Tech's annual retirement dinner May 19, which had a Western roundup theme. Attending the banquet were Donald Esper, Chuck Ryan, Jerry Webb, Jim Wiltse, Pat Winn, and Clyde Wyman. The other retirees are Harland Armitage, George Bearce, Avaneil Brush, Tony Chimera, and Edward Martin.

GTRI's long-term employees have made important contributions to its success, and it is appropriate to take a grateful look back at their careers in these columns. Jerry Webb was profiled in the January CONNECTOR. Sketches on the other 10 retirees are given below.

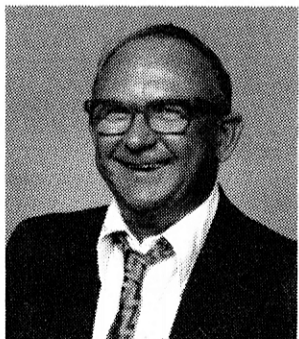
Harland Armitage



An SRE in the Countermeasures Development Lab, "Army" has retired after 10 years as head of GTRI's flight operations. He was responsible for

GTRI's two Airborne Electronics Laboratories, which were involved in many governmental test programs until the planes were sold last summer. He was an engineering test pilot at Lockheed-Georgia Company for 25 years, where he was involved in certification of the C-130, Jetstar, C-141, C-5, and L-1011 aircraft, among others. He had trained pilots in some dozen foreign countries, and had accumulated more than 18,000 flight hours as pilot-in-command.

George Bearce



George worked at GTRI for 25 years, first as a machinist, then as an instrument maker. Most of this time, with the exception of three years in

the Electromagnetics Lab in the early 1980's, he was in the Mechanical Services Department. He excelled in machining miniature electronic components and in grinding ceramics.

Avaneil Brush



Ava isn't retiring until July 31, giving her exactly 14 years at GTRI. She is an electronics technician II in the Threat Systems Development

Lab, where she has worked on many large programs, including the T2 project for the Air Force.

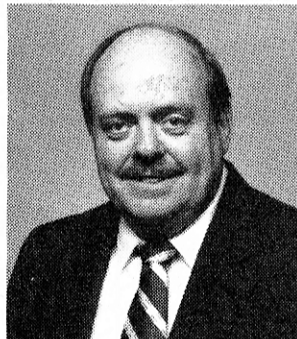
Anthony Chimera



Tony, an SRE and associate director of the Threat Systems Development Lab, came to GTRI in 1978 to head the Countermeasures Branch,

and was chief of the Countermeasures Division from 1979 to 1985, when he became associate director of the Systems and Techniques Lab. He previously spent 24 years at Calspan Corporation, where he rose from electrical engineer to head of the EW and Communications Section and finally to director of Product Applications. He is the author of more than 60 major reports and publications.

Donald Esper



The third Threat Systems Development Lab retiree, Don retired last July after 10 years at GTRI. Jim Cox, who supervised him for most of

those years, said, "Don served very effectively on several large research projects, including the SADS VIII program, the Sierra Research TM Antenna program, and the T2 Radar System program." He was controller for the Sierra project's quality assurance program. On the lighter side, he enhanced the "country club" image of the Cobb County Research Facility by purchasing golf carts for commuting to remote test areas, and the lab's stock and equipment room, under his management, became known as the Espertorium.

Edward Martin

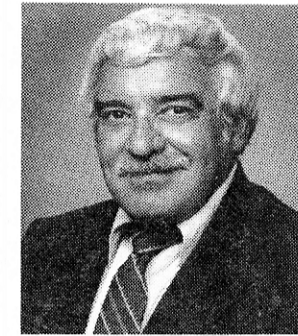


Ed retired last August as an SRE in the Radar and Instrumentation Development Lab, after 25 years of service. He was an engineer at

Texas Instruments from 1959, when he received his BSEE from Georgia Tech, until he came to GTRI in 1966. He served as project director on numerous radar reflectivity mea-

surement programs and was a major contributor to the development of several dual-polarized instrumentation radars operating at microwave and millimeter-wave frequencies incorporating such advanced techniques as polarization agility, frequency agility, and short-pulse coherent detection. He is the author of more than 40 major reports and publications.

Charles Ryan



Chuck retired December 31 as an SRE in the Microwave and Antenna Technology Development Lab, after 20 years of service.

Since his distinguished career was summarized in an article in the February CONNECTOR announcing his election to IEEE Fellow, here are some lighter comments made by his close colleague, Johnson Wang: "To his colleagues, Dr. Charles Ryan is a lot more than a researcher and administrator. He is an avid Harry Truman admirer and follower (but some bucks did find their way past him). He is famous on the campus for his devotion to tennis (and his loud remarks when he loses). He has for years been a Little League baseball coach and leader, and considers many things a game. (Thus he was able to transfer this experience to contract development and research management.) Chuck, we miss you as a prime idea resource and as the most colorful character in GTRI."

James Wiltse



Jim also retired December 31—from OOD, where he was a PRE and an associate director for more than 10 years. He served as GTRI's focal

point for interfacing with the academic schools, including managing GTRI's program for graduate research assistants. Prior to coming to Tech, Jim was at Martin Marietta for 14 years, where he held several top managerial positions, including director of research and technology. He also directed advanced development at Electronic Communications, Inc. (now E-Systems). An internationally known expert on millimeter-wave systems, he is the author of nearly 90 major reports and publications, including two books and three book chapters. Among his many honors, he is a Fellow of the Institute of Electrical and Electronics Engineers, was the IEEE/MTT-S National Lecturer for 1979-1980, and chaired the IEEE National Radar Conference in 1984.

Patricia Winn



Pat worked for GTRI just over 11 years, retiring last January. She joined the Radar and Instrumentation Lab in 1980 as a division secretary, but was

promoted to senior secretary for the lab director, Ed Reedy, in 1985, and followed him to OOD upon GTRI's restructuring in 1990. Here's what her coworker, Neal Alexander, said about her: "Pat Winn will be sorely missed by all those who knew and cherished her forever-positive outlook. Whether her task was to make the 'umpteenth' change to Ed Reedy's travel schedule or to try to make sense of Maggi Harrison's cryptic instructions, Pat always approached the job with boundless enthusiasm and gusto."

Clyde Wyman

Clyde, a research technologist II, joined the School of Geophysical Sciences in 1977 as a member of Prof. Gerry Grams' Atmospheric Optics Group. According to Chris Summers, "Much of Clyde's work involved the design and development of atmospheric optical instruments incorporating lasers and computer systems—often installed on aircraft. The NCAR, NASA and NOAA research aircraft that carried Clyde and his equipment over the years participated in large international atmospheric observational programs flying out of Africa, Alaska, Hawaii, Greenland, Norway and other exotic places. Other instruments built by Clyde have operated at unusual altitudes and from platforms such as balloons and NASA U2 aircraft.

For the past two years, Clyde worked in GTRI's Physical Sciences Lab, also in optical instrumentation, where he distinguished himself by his willingness to work and do whatever was necessary to successfully complete a project." □

60 GTRIers get longevity awards

The Faculty/Staff Honors Luncheon was held Thursday, May 28, in the Student Center Ballroom. Receiving awards for their years of service were the following GTRI personnel:

25-year Gold-T: George A. Bearce (MSD), Robert A. Cassanova (AERO), Nicholas C. Currie (RIDL), Charles A. Duke (EDL), John C. Handley (AERO), Thomas M. Miller, Jr. (CAL), Robert A. Newsom (CMDL), Stephen P. Zehner (RSAL).

10-year certificate: Walter D. Addison II (ESML), E. Howard Atkinson, Jr. (MATD), Thomas O. Autrey (ESML), Robert W. Baggerman (COML), Bryant S. Bostater (RSAL), George J. Bradley III (MAL), Joseph L. Brooks (ESML), Jerry Bryson (RSD), Queen E. Buford (EDL), Royce J. Byrd (MATD), C. Lamar Carney (MATD), Byron L. Coker, Jr. (ESML), Charles Kimbell Cole (ESML), John M. Cotton, Jr. (ATL), James M. Cox, Jr. (TSDL), Wayne Daley (EOL), Cathy L. Dunnahoo (OOD), Anita G. Edwards

(TSDL), Norman D. Ellingson (STL), John L. Estes (TSDL), Jeff Powers Garmon (RSAL), Edward Gilmore (RSD), Johnnie Ann Harbert (ESTL), Joe J. Harrison (OOD), Jeffery A. Jenkins (RIDL), William E. Kenyon, Jr. (COML), Michael T. Kopp (ESML), Darrell R. Lamm (EOL), Michael D. Lowish (ESTL), Melvin C. McGee (OOD), David Paul Meeks (TSDL), Thomas Ansley Moore (MSD), Virginia L. Myers (MSTL), Patrick John O'Hare (OOD), Tana G. Parker (TSDL), William A. Poteat (TSDL), Richard H. Prater (TSDL), Julian R. Price (TSDL), Paul F. Pritchett (HRL), Jacob M. Rhodes III (CSIT), Grover L. Richardson, Jr. (TSDL), John P. Rohrbaugh (EEEL), James Grady Ross (MSD), Diane W. Smith (EOL), Theresa B. Snipes (TSDL), Vincent Sylvester (MAL), Marianne Thompson (OOD), Albert M. Vineyard (TSDL), Luther S. Ward (TSDL), Bert Watkins (RPM), Judith A. Wiesman (CAL), Michael L. Witten (COML). □

ATDC solicits faculty research commercialization proposals

The Faculty Research Commercialization Program that the Advanced Technology Development Center (ATDC) started at Georgia Tech last year with its own money proved so successful that the legislature appropriated \$150,000 this year to apply the pilot program to the six universities belonging to the Georgia Research Alliance.

"We ended with two ideas in 1991 that have resulted in new start-up activities," says ATDC Director Wayne Hodges. ATDC has identified a company interested in licensing the Montage multimedia electronic mail system developed by Bill Putnam and others in the College of Computing, he says. The system provides a fast, inexpensive, easy-to-use and auditable channel for information exchange in almost any media type or format between users of computer workstations. BellSouth funded the original research and part of the product development costs for the system.

The other idea is the 3-D optical digitizer, developed by Mike Sinclair, which rapidly and inexpensively scans three-dimensional objects. The Multimedia Technology Lab has formed a service-related company to market the technology, and a number of companies have shown strong interest in licensing it.

The Faculty Research Commercialization Program provides the financial and business development support necessary to move research technology from the conceptual laboratory stage toward a commercially viable product. Technology-related academic and research faculty at Georgia Tech, the University of Georgia, Georgia State University, the Medical College of Georgia, Emory University, and the Atlanta University Center are invited to submit proposals to ATDC by July 6. Only applied research projects directed at a specific commercial product or technology with a demonstrated market opportunity will be considered.

The proposals will be evaluated by an expert panel with scientific, business and industry representation, which will select three projects for FY93 funding at up to \$50,000 per project. The deliverable will be a "prototype" or "near-prototype" product that could become the basis for establishing a new company, within the membership of ATDC, that markets the product.

ATDC will hold pre-proposal conferences in Atlanta (June 2), Athens (June 3), and Augusta (June 4) to discuss proposal requirements and to answer questions. To receive a copy of the Request for Proposal or to obtain further information, contact Mike Cassidy or Bob Gemmell at ATDC, 894-3575. □



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(Editor's Note: The following article appeared in the November 1991 issue of communication briefings.)

Make your job more secure

To guard your job in today's economic climate, you must make yourself more valuable to your organization.

How to do it:

- **Act as if it's your business.** Think like your employer: A constant flow of well-treated customers brings sales—and profits.
- **Do more** than you have before. Take on new duties, work extra hours—and don't wait to be asked.
- **Determine** what skills your company needs—and acquire them. Attend seminars and classes. Act quickly so you can show that your absence will leave a gap the company can't afford.
- **Seek better,** more efficient ways to do things. *Caution:* Make sure that management will see what you recommend as a long-term saving and not a new expense.
- **Rid your** mind of "I deserve it" thinking. *Examples:* "I get in early often, so I'm entitled to leave a couple of hours early." "I haven't had a day off for a couple of months, so I'll call in sick tomorrow."
- **Show a** little gratitude. Don't bow and scrape, but give your employer what you expect—some positive feedback.
- **Never think** you can't be replaced. Someone with the same experience might be willing to work for less.

Source: John R. Graham, Graham Communications, 40 Oval Road, Quincy, MA 02170. □

ATDC invites researchers with ideas that can be turned into commercial products to submit proposals for funding under its Faculty Research Commercialization Program.

Queries
&
Quotes

Focus on
Quality

Seeds for thought

By Fred L. Cain

What is quality?

Quality is something that the eye of the beholder perceives to be good. There appears to be a threshold in the mind's eye that, once reached, yields a certain sense of satisfaction. Beyond that threshold, a higher and higher degree of satisfaction is sensed as the level of the threshold is exceeded.

If this definition is true, then it implies that quality is something that is not absolute. It can be here today and gone tomorrow, although nothing may have changed. But, one may ask, how can this be? Expectations can change as one observes or experiences a new or improved vision. But whose expectations are implied here? The recipient of that something (perceived quality) is the one who expects; he or she is the one who is often called the customer (sponsor). But who provides that something that the sponsor expects? It's the one usually called the supplier (contractor). So this means that there is some sort of "customer/supplier" relationship associated with quality.

Now if one accepts this thesis of quality so far, then it implies that the notion of customer/supplier relationships is crucial. From this viewpoint, one must define the scope of the system that is pertinent to the relationship envisioned. Then the subsystems of that system must be identified. Once the subsystems are known, then the total system can be optimized, even if it means that some of the subsystems must be de-optimized. Thus, if efforts are continually made to improve the efficiency and effectiveness of the total system, then the customer/supplier relationship will continually improve. This, in turn, will improve quality even more.

Within an organization, who is responsible for quality?

First, one has to agree on what the boundary of the organization is. In our case here at Tech, is the organization the State of Georgia, the University System of Georgia, the Georgia Institute of Technology, the Georgia Tech Research Institute, the GTRI Laboratory, the Branch within a GTRI Lab, or what?

Some say that, in order to have quality, the top person must be responsible for quality. But in our case, who is the top person? The Governor, the Chancellor, the GT President, the GTRI Director, the Lab Director, the Branch Head, or who? If one were to say the Governor is the top leader of the organization and is responsible for quality, then what if he does not accept that responsibility? Does this mean that we at Georgia Tech cannot have quality?

Perhaps, to some extent, the nature of the business of the organization determines who is responsible for quality. For example, at GTRI, research is the nature of our business. A certain degree of quality in research can be achieved even though the Governor may not accept the responsibility for qual-

ity. One could take this concept down to the GTRI Lab level and say that quality in research in the Lab could be achieved even if the top leader of GTRI did not accept his responsibility.

So what are we talking about? It appears that the notion of what quality is is entering into the equation again. If so, are we not talking about the level of quality achieved and its association to the responsibility of the leadership at different levels in the organization? If so, does this premise not imply that quality is not only the responsibility of everyone, but also that the level of quality achieved is proportional (or at least related in some fashion) to the level of leadership that accepts responsibility for quality?

Why is there so much emphasis on quality in today's management systems?

Among the many reasons for this emphasis are the following: First, we live today in a global society, and some global competitors (for example, the Japanese) are eating our lunch because many of their products are perceived to be of higher quality at more competitive prices. Organizations in this country have come to realize that we no longer have a lock on the global market, and if we are to compete, then we must work to continually improve the quality of our goods and services because customers now have more options from which to choose. Many, such as Deming, have come to believe that management has been the problem all along; the reason that it was not obvious before was that management, no matter how bad it was, did not have any stiff competition for its products and, therefore, could sell them because no other choices were available.

Global happenings are affecting our research business at GTRI as well, in areas such as threat systems and technology insertion, to mention a couple. For example, with global peace breaking out, many of our former non-competitors are now moving into our (GTRI's) "bread and butter" areas of research. Consequently, we must strive for even higher quality at lower costs to our customers.

Secondly, management in many organizations has begun to analyze itself from a systems point of view. If a subsystem does not add value to the system, then it often is abolished. (Note that value added by a subsystem does not mean that it must turn a profit within itself.) Thus, if quality, as discussed above, is pursued, then management today realizes that quality not only produces greater bottom-line profits (more contracts for GTRI even though we are in a more competitive marketplace), but the management methodology employed also creates a happier and more productive work force.

Can quality be "managed"?

Quality cannot be managed. If quality is that something in the eye of the beholder, then how can it be managed? What *can* be managed are the "processes" that affect what the beholder thinks. With regard to the customer/supplier relationship, the processes and/or subsystems can be managed so that perceived quality is achieved and/or improved. □

Lights, camera, action:
Preparing for prime time

By Lea McLees, RCO

Fast-paced local television news programs and carefully created science documentaries featured on outlets such as the Discovery Channel and public television make broadcasting look easy.

In reality, being featured on a television program is not necessarily a quick process—but it can be easy, with a little preparation. It can be productive, as well. Participation in broadcast programming provides information to a public that needs it and adds to support and understanding of science.

Following is information that may be useful if you are asked for an interview.

✓ **What makes a television producer seek out a researcher or project?** One of the most important characteristics is relevance to a current event. The Georgia Tech LIDAR that detected ash from Mt. Pinatubo over the Southeast was the subject of a local news story last summer, for example. CNN recently covered analysis of materials Georgia Tech sent up on the LDEF satellite. Unusual research also catches attention—a new development, approach, or discovery—or an interesting research method, such as that used in a popular 1988 Georgia Tech study of the dynamics of falling. It involved volunteers wearing flight suits and safety padding while hooked to elaborate safety mechanisms.

✓ **What aspects of my research would a television producer be interested in?** Good visuals such as a laser, a working robot, bright computer displays, or audible, interesting sounds make compelling footage. However, a crew might prefer just to broadcast an interview with you on your area of expertise.

✓ **What does the production process involve, and how much time does it take?** Recording footage for television programs usually involves two to four people and a good bit of baggage. The crew could include an interviewer, a photographer, and one or more technicians who set up lights and audio. During set-up, the interviewer will discuss the program with you and ask more questions. Once taping starts, some shots may have to be repeated to get the best possible footage. Taping can require from as little as one hour to as many as seven hours, depending on the type of program produced.

✓ **What happens after the interview?** The footage is edited into a story or program which can range in length from 30 seconds to eight minutes or, rarely, into a longer documentary. The process may be fast if it's a short story for a local nightly news program. Or, as in the case of a Georgia Tech aerial robotics competition that became a segment on Scientific American's "Frontiers," editing may take months.

Want some pointers on putting your best face forward on TV? Read "Preparing for Prime Time," the fourth in a series of articles on media relations written by members of the Research Communications Office staff.

You can find out the broadcast date of your segment in advance and videotape it, but remember: The Scientists' Institute for Public Information advises asking the producer if any uses of the tape require permission. If you are featured on CNN, you can request a tape through the reporter who does your story. You will be charged a \$30 licensing fee, which gives you the right to use the tape for educational gatherings such as classes and presentations, but not for the procurement of research funding or for sales. □

TV interviewing tips

Susan Hawkins, television producer for Georgia Tech TelePhoto, offers tips on successful television interviewing:

- **Pay attention to your appearance.** Avoid wearing white. Instead, wear light blue, pastels or darker colors. Also avoid shirt, dress or tie fabrics with thin stripes because the stripes create vibration on tape, making the fabric appear to wiggle. Be sure your hair is combed and your appearance is otherwise professional before the interview.

- **Look at the interviewer.** Focus on that person's eyes when speaking—even when another person, such as a photographer or producer, asks a question. This makes editing easier, makes the final product look professional, and gives you a direct, confident demeanor on tape.

- **Relax and have a conversation.** If you get tongue-tied, don't worry—you can try again. Respond to questions as if you are chatting with the interviewer. If your voice is unusually soft, you might try to project a little more than usual. REMEMBER: Don't say anything you won't want to see on television later.

- **Don't rehearse answers ahead of time.** Prepared responses delivered verbatim sound stilted and unnatural. You will know the crew's particular interest in your work through talking with the producer or interviewer ahead of time. Be confident of your skill in and knowledge of your research area.

- **Keep answers short and concise.** Sound bites, the portions of the program during which you speak, run about 15 to 20 seconds. Use layman's terms, unless you are being interviewed for a product that will be viewed only by experts in your field.

If you have questions about television interviewing, you may call Lea McLees or John Toon in Research Communications at 894-3444. We'll be glad to help you. □

Professional Activities

Aerospace Lab

Congratulations to **Krish Ahuja**, who won the Georgia Tech Outstanding Interdisciplinary Activities Award, a campus-wide honor.

Communications Lab

At the IEEE Tactical Communications Conference held April 28-30 in Ft. Wayne (IN), **Bob Baggerman** presented a paper on "Design Features of Soviet and Eastern European Communications Systems," coauthored by **Bobby Wilson**. **Eric Barnhart** organized and chaired a session on Intelligence Systems.

Computer Science & Information Technology Lab

John Gilmore presented a paper coauthored by **Rick Peterson** and **Khalid Elibiary**, entitled "A Neural Network System for Traffic Management," at the SPIE Neural Network Applications Conference in Orlando April 28-30. Peterson also presented a paper entitled "Toward the Automation of Developing Neural Network Applications," written by **Andy Czuchry**.

Concepts Analysis Lab

Co-op **Jenny Rooke** will graduate from Georgia Tech in June with a BS in physics at the age of 19, and has received a full National Science Foundation fellowship for graduate study in genetics at Yale. Jenny attended public and private schools through sixth grade, then was taught at home for two years by her mother, who has a master's degree in education. After scoring 1040 on her SAT at age 12, she skipped high school altogether and received straight A's as a freshman at Southern Tech. She later enrolled at Georgia Tech, where she has been a co-op for CAL since before she was old enough to get a clearance (16). Jenny's father is an aerospace engineer at Lockheed. Best wishes, Jenny!

Countermeasures Development Lab

David Flowers was nominated for vice chair and program chairman of the Atlanta chapter of the IEEE Aerospace and Electronic Systems Society. He also was a member of the Research Awards Committee that reviewed the annual faculty/support staff nominations for Georgia Tech campus-wide awards.

A paper by **Tom Pratt** and **Mary Ann Ingram** (EE), entitled "Differential Polarization Shift Keying for Single-Mode Coherent Optical Fiber Communications," was presented May 12 at the Workshop on Fiber Optics in Missile Applications at the University of Alabama in Huntsville.

Economic Development Lab

David Swanson made a presentation, "Technical Assistance from Universities," April 29 at a Technology Innovation Information meeting at Oxford University in England.

In early April, **Art Brown**, who is president of the National Association of Management and Technical Assistance Centers, addressed a Congressional subcommittee holding appropriations hearings on federal assistance programs for businesses.

Electromagnetic Environmental Effects Lab

John Rohrbaugh and **Randy Pursley** are participating in Rome Laboratory's Summer Research Program.

Electronic Support Measures Lab

At the SPIE '92 Conference on Aerospace Sensing in Orlando April 21-24, **Kathy Schlag** presented a paper on "Neural Networks Applied to Radar Signal Processing— from Simulation to Hardware," coauthored with **Mike Kopp**, **Roy Thompson**, **Kathy Petty**, **Andy Nunemaker**, and **John Spillane**.

Environmental Science & Technology Lab

The American Society of Safety Engineers has appointed **Steve Hays** Region VIII assistant regional vice president—divisions for 1992-93.

On April 24, **Kirk Mahan** presented a lecture on the fundamentals of OSHA, occupational safety preparation, and current OSHA topics to the LaGrange Employer Committee in LaGrange (GA).

Paul Schlumper recently gave a presentation on the new OSHA blood-borne pathogens standard to the Eames Dental Study Group.

In late April, **David Jacobs** testified before the U.S. House of Representatives Subcommittee on Housing regarding lead-based paint issues. He also was one of several experts nationwide answering questions on training approaches and techniques in *Deleading* magazine.

Microwave & Antenna Technology Development Lab

Glenn Hopkins was the coauthor of an invited paper presented by Prof. **Robert Feeney** (EE) at the recent Microwave Integrated Circuit Workshop in San Diego (CA). The paper's title was "An Empirical Study of a Plated-Through-Hole Interconnect for Multilayer Stripline Circuits."

Congratulations to **Scott McBride**, who has received his MSEE degree.

Modeling & Analysis Lab

Chris Barnes coauthored a paper, "Image Coding with Variable Rate RVQ," that recently was presented at ICASSP '92 in San Francisco.

Radar Systems Applications Lab

The first presentation of the classified Continuing Education course, "Principles of Electronic Counter-Countermeasures," was April 7-9, led by **Guy Morris**, **Linda Harkness**, **Rick Maier**, **Jill Bach**, and **Scott Bostater** of RSAL and **Molly Gary** of RIDL. The special guest lecturer was Todd Kastle of the Air Force.

Threat Systems Development Lab

Richard Ivy will chair a meeting in London dealing with international software engineering standards June 8-12, and will be a U.S. delegate from IEEE. Organizations involved are the International Standards Organization (ISO) and the International Electro-Technical Commission (IEC).

George Ewell presented a paper entitled "Modern Radar Test Options" April 17 at the Old Crows Convention in Las Vegas.

**Focus
on
Folks**

Focus on Folks

Personnel News

Advanced Technology Lab

Georgie Riggs is transferring to STL effective June 1.

Concepts Analysis Lab

Joyce Walsh joined CAL as a clerk III in February.

Countermeasures Development Lab

LaKrista Odom began working as a cop April 3.

Electromagnetic Environmental Effects Lab

Ron Alford and **Bettye Dulaney** resigned in April.

Microwave & Antenna Technology Development Lab

Fred Hybart has resigned.

Office of the Director

Clerk I **Janet Nelson** graduated from Tech with a bachelor's in industrial management in March, married Mike Simpson April 25, and will be moving to California.

Work-study student **Tracy Padgett** has transferred to the campus Police Department. □

1992 Promotions

Congratulations to the following 23 GTRI personnel, who will be promoted, effective July 1, to:

Principal Research Engineer

Nile Hartman PSL
Robert Michelson AERO

Principal Research Scientist

Marvin Cohen MAL
Rosemarie Szostak MSTL

Senior Research Associate

Susan Shows EDL

Senior Research Engineer

Charlotte Jacobs-Blecha CSITL
Elwood Toph TSDL
Philip West CAL

Senior Research Scientist

Michael Cathcart EOL
Dennis Folds CAL
William Kenyon COML
John Trostel RIDL

Senior Research Technologist

Douglas Devine TSDL

Research Associate II

Cathy Bouffier EDL
Jaime Castro EDL
Richard Ray RIDL

Research Engineer II

Scott McBride MATDL
Morgan McRae CSITL
Stephen Moore RIDL
Patricia Ryan MAL

Research Scientist II

Peggy Barrett CSITL
David Jacobi ESTL
Anthony White MATDL

Calendar

College of Computing schedules lectures

June 4: Eileen Kraemer, "The Animation Choreographer," Graphics, Visualization and Usability (GVU) Brown Bag Series, noon, CoC Room 101.

June 5: Don Fisher, University of Massachusetts, "Visual Search and Visual Codes," Cognitive Science Colloquium, 12-1:30 p.m., CoC Room 201.

For more information on these lectures, contact Molly Ford Croft by e-mail at croft@cc.gatech.edu or by telephone at 853-2682. □

Georgia chapter hosts T² annual conference

The Technology Transfer Society will hold its annual conference June 24-26 at the Swissotel in Atlanta. The theme of this 17th annual meeting is "Internationalizing Technology Transfer," and it will feature presentations by experts from Belgium, Canada, Switzerland, Great Britain, Mexico, Finland and Italy, as well as the United States.

According to EDL's David Swanson, head of the Georgia chapter and president-elect of the national group, the conference will address:

- current practices in technology transfer with emphasis on economic and product development applications,
- historical or proven technology development and transfer, and
- emerging models and techniques that preview the future of technology transfer.

A pre-conference seminar will be held June 23 for attendees wishing to learn more about technology transfer. It will cover structures, processes and trends in the field. Authorities from federal labs, academia and industry will lead interactive discussions of tech transfer topics.

Other GTRI staff involved in the conference and local chapter include Charles Estes, Claudia Huff, Carol Aton, Leigh McElvaney, and Vernice Bailey. Jim Walsh of ESTL and Paolo Chiappina of the Augusta Regional Office will deliver papers at the conference.

"This conference should interest researchers throughout Georgia Tech and GTRI," says Swanson. For more information about the conference and the society, contact him at 894-8989. □

Personal Notes

Milestones

Sarah Andrews (CMDL) just completed her tenth year as a seasonal tax preparer for H&R Block. For five of those years, she has been an instructor for public and employee courses and seminars.

Sports News

CSITL's Chicago Whales softball team completed its undefeated season by coming back from a 6-0 deficit to win its last game 7-6. The Whales blew out two opponents 21-1 and 14-2 in winning their division. Led by CSITLers **John Gilmore, Jack Wallace, Rick Peterson, Khalid Elibiary, Keith Johnson,** and **Rich Thompson,** the Whales head into the Intramural playoffs with great momentum.

Wedding Bells

Ralph Herkert (EEEL) and Cathy Steiner were married April 4, and **Lou Haller** (EEEL) and Regina Zima were married April 25.

Charlotte Batson (MAPS) and Tim Cusick were married April 18 in the chapel at Callaway Gardens.

Cradle Roll

Stan and **Gwen Moore** (Research Security) welcomed a second daughter, Lucinda Justine, at 11:11 a.m. May 11.

Patty Parkhill (former EDL-Augusta) is the proud mother of a baby girl, Haylie Dawn, born April 23.

Lynn and **Homer Cochran** (TSDL) welcomed their second daughter, Allison Nicole, May 8.

Sharon Neu became a grandmother March 26. Granddaughter Savannah Renée Fonseca lives with her parents in Vista (CA), where her daddy is a Marine at Camp Pendleton. Her mother is the former Renée Neu.

Proud Parents

Walter Goff, son of Morris and **Maxie Goff** (EDL-Augusta), received his Eagle Scout Award in ceremonies on April 30.

Our Sympathy

...to **Mac Davis** (EDL), whose mother recently died, and to **Paulette Clarke** (MAPS), whose mother died April 30.

...to **Jim Cox** (TSDL), whose brother died May 8, and to **Tom Brown** (MATD), whose mother died May 12. □

The GTRI Connector
Vol. 8 No. 7 May 1992

Published by the Research Communications Office, Centennial Research Building, Georgia Institute of Technology, Atlanta, GA 30332. Georgia Tech is a unit of the University System of Georgia. The deadline for submission of copy is the first Tuesday of each month.

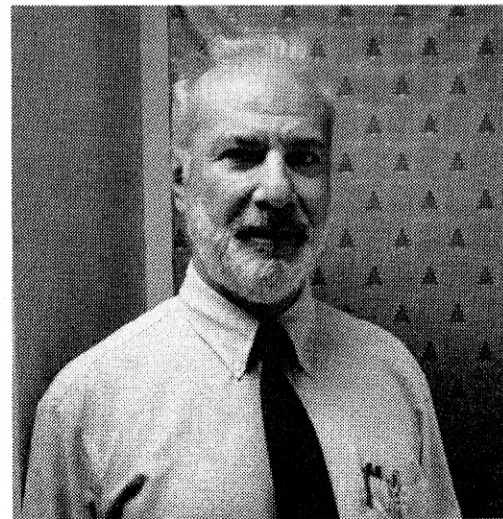
EDITOR & GRAPHICS
Martha Ann Stegar, RCO
894-6988

EDITORIAL REVIEW
Patrick O'Hare, OOD
894-3490

ASSOCIATE EDITORS
Marsha Barton, Cobb II
528-7750
Lincoln Bates, O'Keefe
894-6091
Janice Davis, ERB
894-8229
Carey Floyd, Cobb I
528-7012
Wendy Hanigofsky, CRB
894-7136
Eunice Kelsey, Services
894-6972
Joanna King, Baker
853-0460
Kathie Coogler Prado, CRB
894-7268
Janice Rogers, OOD
894-3401



This publication is printed in part on recycled paper.



The GTRI Connector is published for Yalcin Peker, manager of the MAPS 6 Group in Cobb County, and all the other employees of GTRI.