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Huntsville Lab assists Army with unmanned ground vehicle R&D

By Robert Seitz, HRL

Hertz Rent-a-robot? Robotic lawn mowers? Remotely controlled crop sprayers? The unmanned ground vehicle project which GTRI's Huntsville Research Laboratory (HRL) is servicing someday might lead to just such services and devices. HRL is providing direct technical support to Redstone Arsenal's Unmanned Ground Vehicle (UGV) Joint Project Office (JPO) as it develops the first unmanned ground vehicles for military applications.

Unmanned ground vehicles span a spectrum from wholly teleoperated vehicles which depend upon the driver's reflexes for control to fully autonomous robots. An example of a fully autonomous robot, scheduled for consumer introduction early next year at a price under \$1,000, is the Samsung "ScoutAbout." This is a little R2D2-shaped plastic watchdog that roams about a house, moving every 20 minutes, checking for fire or burglars. It is equipped with heat and motion detectors, and houses a microphone that can detect the sound of breaking glass 150 feet away.

Similar robots for military applications such as reconnaissance and sentry duty are under vigorous development by the Defense Advanced Research Projects Agency (DARPA). However, such robots may require near-human contextual understanding, and barring an unforeseen breakthrough, such a

level of machine intelligence does not appear imminent. It is worth noting that the next generation of cruise missiles and "brilliant" munitions will consist of fully autonomous unmanned aerial vehicles which will be capable of complex behavior.

Teleoperation is somewhat less of a technical challenge. It relies upon remote microphones, TV cameras, and other sensors to give the viewer a "you-are-there" simulation of and control over what is occurring at some distant location. If the simulation can be made sufficiently realistic, the driver will experience a sense of "telepresence," as though he or she were actually at the remote location.

To a certain degree, telepresence is already a routine part of everyday life in the form of TV broadcasts. Teleoperation adds the ability to remotely control what is happening at the other end of the communications channel. It will permit a remote operator to control an unmanned vehicle at distances up to 10 kilometers from that operator. This teleoperations concept is what the UGV JPO is primarily exploring.

The tactical unmanned ground vehicle

For the near term and before attempting to deploy a tactical unmanned ground vehicle (TUGV), the UGV JPO is relying upon the use of a fiber-optic cable payed out behind an unmanned ground vehicle to relay to the remote driver the color stereo video imagery captured by two video cameras on board the vehicle. This system also will contain a radio link for backup in case the fiber-optic cable is severed.

The vehicle itself, called the Surrogate Teleoperated Vehicle (STV), can be operated with or without an onboard driver. It will be a small, six-wheeled, all-terrain vehicle



Huntsville Research Lab staff work on a small prototype of the unmanned ground vehicle. Left to right, they are Bob Seitz, Bruce Mitchell (a co-op student from Auburn), and David Wyatt. (Photo by Dick Stanley)

which can run under either diesel or battery power. In addition to its driving cameras, the vehicle will carry an interchangeable payload sensor package which might consist of a forward-looking infrared imaging camera or of nuclear-chemical-biological environment assessment equipment. Other potential military applications include the breaching (and later the clearing) of mine fields, explosive ordnance handling, and, perhaps eventually, remote control of ground-based weapons.

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Observed & Noted

Good News!

Word has been received that the U.S. Office of Management and Budget will delay implementation of the 26% cap on the administrative portion of overhead charges until July 1, 1992. GTRI Associate Director Jerry Carey reports that Georgia Tech will continue working toward resolution of this issue.

Georgia Tech's influence is still being felt on small industry development in South Korea 13 years after the close of a joint project with a Korean university. Details are on pages 2 & 3.

EDL will continue to transfer NASA technology to Georgia business

and industry under an agreement signed in September. See page 3.

The Profile section highlights the career path of Roy Thompson from Georgia Tech co-op to GTRI engineer. It also describes the experiences of some employees who have gone

back to school. See pages 4 & 5.

GTRI revises its Research Awards guidelines. Read about it on page 5.

To find out how Phil Kennedy plans to raise interim funds for his medical research, turn to page 5.

One day you may be able to fill out and file your time sheet by computer. See page 6.

Bill Cooke made a big splash last month. See page 7.

Ed Lindsey has a new definition for "working under the gun." Read his story on page 8.



News & Notes

"We owe Georgia Tech a great debt for getting us started in providing practical on-site technical assistance to small industries."

**— Yoon-Bae Ouh
Soong Sil
University
Seoul, Korea**

STV

From page 1

The STV is scheduled for field testing at several Army and Marine Corps installations, beginning in January 1992. Given a satisfactory response by the user community, a first-generation tactical UGV (TUGV) will go into full-scale development in 1994 for deployment to tactical troops in 1999.

The first-generation TUGV under this joint service program is likely to include a fiber-optic "tether," which has both advantages and disadvantages. Obviously, there will be some tactical objections to having this cable strewn around the battlefield, but the enemy will have little to no opportunity to gain control of the vehicle. A similar level of security will surely be available with "sans-tether" data links in the future, but such data link does not provide adequate bandwidth for remote driving at this time. The first-generation TUGV probably will have capabilities much like the surrogates now being assembled for demonstration and testing.

Some constraints

Opportunities for teleoperation have been limited in the past by the unavailability of the wide bandwidths required for video communication links over either telephone lines or the radio frequency spectrum. But the advent of Bell Systems' Integrated Services Digital Network and its fiber-optics-based Synchronous Optical Network will provide telephone bandwidths wide enough to permit low-cost video transmissions over ordinary dial-up lines. This capability, coupled with the introduction of revolutionary data compression techniques such as the fractal data compression algorithm developed in the School of Mathematics at Georgia Tech, should help make telepresence and teleoperation household words.

Another constraint on telepresence has been the shortcomings of video hardware. Unfortunately, existing TV sets cannot afford wraparound "omnivision" displays, nor can they approach the 5,000-line resolution of the human eye. Implementation of high-definition television, to which GTRI's High Definition Systems Task Force is contributing, will help to bridge this gap, although full replication of a visual environment may await the commercial introduction of holographic or other three-dimensional display strategies.

Civilian applications

In the civilian sector, most deep-sea diving operations are now performed via teleoperation. Within NASA, teleoperation is a high-priority program for repairs on Space Station Freedom and, coupled with semi-autonomy, for remote operations in space and on other planets. Remote manipulators long have been necessary equipment in nuclear power plants. And the Japanese are reported to have developed teleoperated high-voltage utility line repair equipment.

For the future, if teleoperated equipment can be produced cheaply, there would appear to be a sizable market for teleoperated devices wherever work must be performed in hazardous environments: spray painting of bridges, chimneys and TV towers; handling of hazardous materials; fire-fighting, including forest fires; remote handling of potentially dangerous police missions. Eventually, you might use a teleoperated robot at the supermarket to select and load groceries into your "robo-car," or to permit you to

conduct business in a distant city without ever leaving home.

Telepresence, with its close ties to virtual reality, may render the office-in-the-home a practical reality. Large-screen, high-fidelity video-conferencing may reduce the need for business travel. And eventually, it may permit the rest of us to experience other planets in a way that isn't in our grasp today. □

(Editor's Note: Dr. Seitz is a PRE and head of the Future Technology Branch at the Huntsville Research Lab.)

Georgia Tech influence felt in Korea

By Martha Ann Stegar, RCO

Thirteen years after the end of a cooperative international development project, Georgia Tech's impact is still evident in Korea.

"We owe Georgia Tech a great debt for getting us started in providing practical on-site technical assistance to small industries," says Dr. Yoon-Bae Ouh, Dean of the Graduate School of Small Business at Soong Sil University in Seoul, Korea.

The university, known as Soong Jun University in the 1970's when it was involved in a counterpart agreement with Georgia Tech, already had a small program to consult with industry, but consulting engineers from GTRI's Economic Development Lab (EDL) helped them shape it and make it more effective. Operation of their Integrated Development Center, now called the Small Business Development Institute, was modeled after EDL's industrial extension program.

The Georgia Tech legacy

Now, 13 years after the close of the collaborative project, Soong Sil continues to help small and medium-sized industries (under 300 employees) become established, survive and grow. Their program, the first of its kind in South Korea, is very popular, according to Dr. Ouh, and has made Soong Sil well known all over the country. Its professors consult with all types of industries, both labor- and capital-intensive. Their efforts currently are concentrated principally in the greater Seoul area, but Korea's Small and Medium Industry Promotion Corporation has asked the university to extend its services.

If that were not enough, Soong Sil pioneered the first graduate school of small business in Korea, established in 1983. Now there are others. The school has some 200 graduate students, and offers master's degrees in business administration and public administration as well as an undesignated master of science degree.

Perhaps the widest impact is provided by the popular six-month courses offered in the evenings for small business owners. The Advanced Management Program is for top managers of small businesses and chief executives of related institutions. There also is a Women's Management Program. Traditionally, married women were expected to stay at home and manage the household, but this has been changing in the last several years, Dr. Ouh says.



Dr. Yoon-Bae Ouh, Dean of the Graduate School of Small Business at Soong Sil University in Seoul, Korea. The university received technical assistance from GTRI in the 1970's. (Photo by M.A. Stegar)

Soong Sil has six undergraduate colleges, but the largest is the Engineering College—and Industrial Engineering is the biggest department in the college. The Industrial Engineering Department was founded in 1975 with the curriculum advice and assistance of Georgia Tech and Southern Tech faculty.

Other evidences of Georgia Tech influence are two large, impressive buildings that grace the center of the campus—the library and science hall, which also houses the president's office. "We owe these two buildings to former Tech President Joseph Pettit and Vice President for Research Thomas Stelson," Dr. Ouh says. "They persuaded the U.S. Agency for International Development (AID) to give us funds for their construction."

The program in the '70's

AID was the catalyst that got Georgia Tech and Soong Jun together in the first place. From 1973 to 1978, Georgia Tech conducted an international program in industrial development research, training and linkages under an institutional grant from AID. Tech linked up with six counterpart institutions in developing countries in Africa, Asia and Latin America, each of which received small industry grants from AID. The program was directed by Ross W. Hammond (now retired), who headed the Economic Development Lab and later the Office of International Programs at Tech. Other participants included the School of Industrial and Systems Engineering, College of Management, and Southern Technical Institute.

Activities under this grant program included assistance to counterparts in setting up and conducting programs of management and technical assistance to small and medium-sized industry; developing and promoting appropriate technology; designing and conducting short-term training programs and seminars for economic developers, information specialists, and entrepreneurs; performing research and collecting data on economic development techniques and experience in less-developed countries; and designing formal curricula in small industry development and industrial engineering.

Soong Jun University was an early and active counterpart. The university had been involved in industrial assistance in a small way, but wanted help in expanding and improving its program. Ben James, who at that time headed EDL's field office system, gave them extensive assistance over several years, both by actual consultation and problem-

solving with small industries and by advising the university on how to administer its technical assistance program. Several delegations of Soong Jun professors and small industrialists came to Georgia Tech, in turn, to receive indoctrination into its industrial extension methods and services.

EDL also helped Soong Jun (now Soong Sil) to set up quality control programs and seminars for small-scale industries. Another collaborative effort involved designing appropriate or adaptive technology devices—simplified, low-cost versions of testing devices that ordinarily would have been beyond the financial reach of the university's small industrial clients.

As a result of the initial contacts Tech made during the AID small industry grant program, Georgia Tech staff continue to lend their expertise to the Korean industrial scene. Polymer scientist Jan Gooch (MSTL) currently is negotiating with Goldstar, a leading Korean electronics firm, on a study to improve their magnetic tape, and the Small and Medium Industry Promotion Corp. has asked Georgia Tech to arrange a two-week visit for a team of Korean industrialists to study the U.S. management style next year.

A personal odyssey

I had met Dr. Ouh when we both were involved in the AID grant program in the '70's, so when I went to Seoul, Korea, this September as a Friendship Force ambassador, my first thought was to contact him. This was how I found myself on the Soong Sil University campus seeing and hearing about some of the results of a collaboration with Georgia Tech years ago. It gave me pleasure to witness a thriving, growing institution that generously credited Georgia Tech with contributing to its success, and it was obvious that Tech is held in great esteem.

Dr. Johann Zoh, President of Soong Sil, expressed a desire to renew the university's relationship with Georgia Tech. The Small Business program staff is particularly interested in the incubator program at ATDC, and would like to work with us as go-betweens in setting up linkages between Korean and American firms.

Korea was still an under-developed nation when we started our cooperative project in 1974. Since the end of the Korean War in 1953, the country has worked an economic miracle, wrestling itself up from a poor agricultural area devastated by war to a modern industrial nation. It has a large middle class, well-educated and prosperous, and a bustling, advanced economy. I like to think that Georgia Tech, through Soong Sil University, has had a small part in making that economic miracle possible. □

The Friendship Force

After last year's giant exchanges with Soviet Georgia involving hundreds of U.S. Georgians, including Georgia Tech's Vice President for Planning, Budget and Finance Linda Martinson, is there anyone at Tech who hasn't heard of the Friendship Force?

The Friendship Force was founded 15 years ago by Wayne Smith, an Atlanta Presbyterian minister, with the endorsement of then President Jimmy Carter. The idea was for groups of people from different parts of the world to make exchange visits to further "the cause of friendship, love and peace." Today there are hundreds of local clubs in 37 of the United States and in more than 40



Georgia, NASA reaffirm technology transfer accord

In a ceremony September 27 at the State Capitol in Atlanta, Governor Zell Miller and Thomas J. Lee, director of NASA's Marshall Space Flight Center in Huntsville, Alabama, signed a memorandum of understanding reaffirming the Marshall Center's commitment to transfer NASA-derived technologies to businesses, industries and individuals in Georgia.

Governor Miller selected Dr. David Swanson, director of the Economic Development Laboratory (EDL), as his state's liaison with NASA. Other states with similar agreements are Alabama, Louisiana, Mississippi, Tennessee, and West Virginia.

This is the third year that EDL has partici-

pated in technology transfer with NASA. Under the agreement, EDL helps identify NASA technologies most appropriate to Georgia industries, schedules seminars and workshops for technology transfer, assists NASA in transferring information to industries on request, and helps with resolution of problems facing business and industry.

NASA representatives have visited a number of industries serviced by EDL's industrial extension offices, including both large firms, such as General Electric in Rome and Gulfstream Aerospace in Savannah, and small operations with as few as five employees. Typical technology issues addressed were sound attenuation, enhanced welding technologies, waste disposal, and corrosion control. In addition, NASA technology was transferred to industrial groups through eight seminars and workshops last year. □

other countries on every continent. Over 250 exchanges were scheduled in 1991.

The Atlanta club, one of the largest and most active, schedules about six incoming and outgoing exchanges a year. Just this September and October alone, Atlanta groups have gone to four countries. The trips generally are for two weeks—a home stay with a host family the first week and an optional package tour the second week. Unlike the huge Friendship Force International exchanges, the Atlanta exchanges usually consist of about 20 to 25 people.

Friendship Force travelers are called ambassadors because they have a mission beyond that of the mere tourist: "to be a friend to the people of the world." Consequently, they are interviewed and selected on the basis of their open-mindedness, flexibility and adaptability to other cultures. It's true that the prices for the trips often, but not necessarily, are bargains. For instance, on our trip to Seoul, Delta Air Lines demonstrated its support of the Friendship Force goals by giving us a deeply concessionary rate on our flight tickets. And the first week costs very little because of the home hospitality. But the Force will quickly screen out people just looking for a "cheap trip."

The ultimate reward is an experience far beyond sightseeing; it's the opportunity to live as a part of another culture.

For further information or to join, write the Friendship Force of Atlanta, at P.O. Box 13151, Atlanta, GA 30324-0151, or call the membership chairman, Hal Raffensperger, at 442-3672. The dues are only \$15 a year. □

Editorial assistance offered for promotion papers

The 1991 promotion process at GTRI is under way, and candidates will receive editorial assistance in the preparation of their promotion papers.

Every candidate for promotion to the principal, senior and II levels is receiving a set of general editorial guidelines and instructions for formatting their promotion packages. An editorial committee established by OOD prepared the guidelines.

A member of the committee also is being assigned to review the completed papers of each candidate for editorial style and content. Committee members will contact the candidates whose papers they will review.

These editorial services were offered last year for the first time on a somewhat abbreviated scale. Director Don Grace says that the editorial assistance is being provided so that GTRI candidates will get the best possible chance for promotion. He adds that use of these services will reduce the chances that worthy candidates may be graded down by formatting errors or poor editorial quality.

Editorial reviewers already have been assigned to candidates for principal rank. Candidates for senior and II level promotion will be contacted by a committee member by the last week of October. Candidates who do not hear from a committee member by this time should contact the committee chairman, Mark Hodges, at 894-6987. □

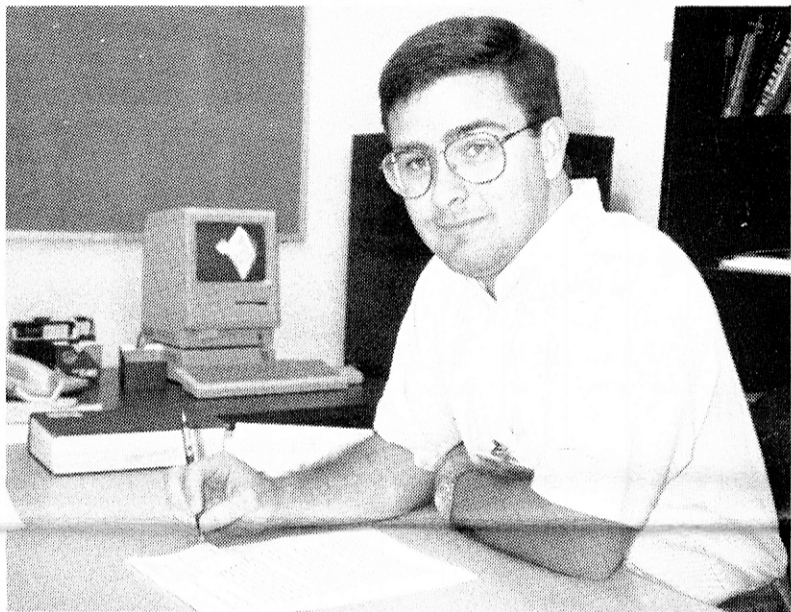
EDL received authorization to continue work on transferring NASA technologies to Georgia business and industry with the September 27 signing of a memorandum of understanding. Shown signing the memo are Thomas J. Lee (left), Director of NASA's Marshall Space Flight Center, and Gov. Zell Miller. Flanking them are (left to right) Ismail Akbay, Director of the Marshall Center's Technology Utilization Office, GTRI Director Donald Grace, and EDL Director David Swanson. David Clifton, GTRI's Director of Economic Development and Technology Transfer, is in the background. (Photo by Dennis Keim, NASA)

**Profile
&
Insight**

**Roy Thompson:
The evolution of a
GTRI engineer**

By Martha Ann Stegar, RCO

“When I interviewed for a co-op job at GTRI, I was impressed by the amount of responsibility they gave to co-ops. I had heard other co-ops working elsewhere talk about some of the unchallenging, boring things they had been given to do, and I didn't want to work where that would be the case. So in January 1988 I began co-oping for Bob Willoughby in the Electronic Support Measures Division (now a lab), and I must say I haven't been disappointed. The dull problems have been few and far between, and all my assignments have been educational.”



Former ESML co-op Roy Thompson is now a full-time RE I in that lab. (Photo by M.A. Stegar)

So says Roy Thompson in explaining how he came to GTRI. In fact, the match was so agreeable on both sides that he stayed for two years, and upon receiving his bachelor of electrical engineering degree from Georgia Tech last June was hired full time as a research engineer I.

The first quarter or so, Roy worked in the Surveillance Technology Branch, where he learned about designing, building and testing digital circuits. Since then, he has worked in the Emitter Identification Branch, where he still resides.

As a co-op, Roy was assigned to a team tasked to collect and analyze intrapulse radar data. He assisted in designing and maintaining a signal processing and analysis system, in collecting radar data on the ground and in the air, and in analyzing data in that system. So apt was he in learning new technical areas and making suggestions for improvements that he earned an accolade from a visiting professor from Wright State University on his quick mind and insight.

As ESML moved into the application of neural networks to intrapulse data processing, Roy joined that research team, headed by Kathy Schlag. In nominating him for a GTRI research award last year, Lab Director Larry Holland cited Roy's assistance in solving the many technical problems that arose in this new area of technology: "In addition to designing the software for data preparation, Roy worked with several of the paradigms, providing valuable insight based on that work."

Not surprisingly, Roy was one of two undergraduate students who received the 1990 GTRI Research Award for Outstanding Performance as an Undergraduate Student.

His outstanding record at Tech (including a 3.9 GPA) also won him a National Science Foundation Grant for Research Experience for Undergraduates, which took him away from GTRI/ESML his senior year. He worked with EE Professor Martin Brooke laying out integrated circuits with EEPROM cells to hold analog voltage instead of the usual digital voltage, for final application in neural networks.

"I'm very interested in implementing neural networks in hardware using analog circuits and systems," Roy says. "Analog neural networks have the potential to be much faster than their digital counterparts." When he starts his master's program, his area of emphasis will be analog circuit design.

He hasn't had time to enroll in graduate school yet, although he will winter quarter. "I'm working with John Bordelon on an Air Force project to flight test equipment designed by other contractors, and I'm having to spend a lot of time at Eglin Air Force Base," he says. He also is writing the software to control the testing instrumentation and data acquisition system.

The opportunity for graduate study is one of the reasons he chose to work at GTRI instead of taking a job at a company upon graduation. "My number one priority is to get a master's degree and, hopefully, a Ph.D., but I didn't want to go full time to school anymore. All the places where I interviewed gave employees the opportunity to study for their master's while working, but GTRI impressed me as stressing its importance more. GTRI seems more understanding and supportive, and allows for more flexibility in attending classes and studying for tests."

A native of Hopewell, Virginia, Roy decided in high school that an engineering career would best meet his interests in computer programming and hardware design. He looked for a school strong in engineering that he could afford, settling on Georgia Tech.

Two EE professors were very influential in shaping his interests, once at Tech. "I took two required analog circuit courses under Drs. Dale Ray and Marshall Leach and got interested in the subject," Roy explains. Of all his teachers, Dr. Leach stands out the most. "I took three classes under him. He was a hard taskmaster, very demanding, but the material sank in. He was very friendly and willing to help."

Roy isn't all work and no play, however. He loves tennis and tries to play at least twice a week. He likes to read—mostly fiction, especially Kurt Vonnegut and Tom Clancy, but he also reads some nonfiction. □

**Going back to school:
sacrifices and rewards**

By Mark Hodges, RCO

For engineer Marilyn Smith, a normal workday rarely includes a leisurely lunch, and it seldom ends at five. That's because she works full time at ASTL while pursuing a doctorate in Tech's School of Aerospace Engineering.

Smith usually studies over lunch at her desk and again for 30 minutes to an hour after the GTRI work day ends. Many nights, she returns to the books after spending a few hours with her family.

"Sometimes, it gets to be difficult," she says. "I spend 10 to 20 hours a week of personal time (working on my dissertation)."

Smith is one of a large number of GTRI classified and research-titled employees who are pursuing college degrees. Though most receive tuition reimbursement from Tech, these programs are designed for individuals who work full time. Not surprisingly, the need to beef up personal organizational skills arises repeatedly in conversations with these employees.

Managing school demands

"You have to get into time management in a big, big way," says Ned Ellington of EDL, who is pursuing a doctorate in operations management at Georgia State. "You get real creative about how you schedule your time. You'd be surprised at how much time you can get."

Ellington divides each day into blocks that he devotes to different responsibilities. He comes in to work at GTRI at 7 a.m. to accommodate the need for school-related work during the day. In the evening, family time is from 6 to 9 p.m., then he studies from 9 to 11 p.m. or midnight. To handle the increased volume of work, Ellington has cut out most of his extracurricular activities and reduced his nightly sleep to six hours.

Public policy student Holly Lawe uses consistency as another strategy for success. The EDL research information specialist tries to spend at least some time on her school work every weeknight.

"Keep up," Lawe urges. "Go into class prepared and plan ahead. When you're working full time and get behind (in a class), it's hard to catch up without taking vacation. And I have had to do that."

For OOD staff assistant Eunice Kelsey, having a clear vision of her objectives has made school work easier to handle. In pursuing her bachelor's degree in sociology at Georgia State, she has found it crucially important to become highly "goal-oriented."

"You have to sit down and assess where you are and where you want to go," she says. "Otherwise, you can't generate the energy (to do the work)."

Outside support essential

Many GTRI employee students have families, and they are able to succeed in school in large part because spouses and children take up the slack at home. "I couldn't do this if I didn't have spousal support," says Lawe. Ellington agrees, adding that his wife has assumed many of his household duties while he returned to school.

The same holds true for the workplace, where colleagues and supervisors can provide the understanding and support that makes going back to school less stressful. Doctoral student John Hanigofsky's dissertation focuses on a materials research field that is the specialty of his supervisor, Jack Lackey. "He's easy to work for and understands what I'm trying to do," Hanigofsky says. "I feel very fortunate, mainly because of Jack Lackey."

Master's student Richard Combes of OOD agrees that graduate work makes heavy demands on full-time employees, but

he cautions that one shouldn't be discouraged by the difficulty of making this adjustment. Over time, he says, familiarity makes the work seem less restricting and demanding.

"People become comfortable with the idea of going to school," Combes says. "The sacrifices become manageable, and that's a growth process in itself."

Stress can be avoided by knowing and respecting one's limits. Information systems specialist Judy Fitzpatrick emphasizes that students should avoid taking on such a heavy load of classes that they stop enjoying the process of education.

One way to avoid burnout, Fitzpatrick adds, is to tailor an educational program so that it fits one's personal interests as closely as possible. She says that this is possible to an extent few students realize at Georgia State, the university where she is working on her bachelor of independent studies degree.

Positive impact on job performance

Most employee students have found positive connections between their school programs and performance on the job at GTRI. The relevance of much of their schoolwork is to be expected, but the applications of some classes have come as a surprise to the students themselves.

For instance, it's not startling to find that Ned Ellington's operations management program has given him new techniques and methodologies for his job of helping Georgia companies improve productivity. However, EOL systems analyst Marvin Bell never imagined that a course in art history would strengthen his ability to compose computer graphics presentations for research sponsors.

"Lots of things I never dreamed would have a relationship to this job are very useful," says Bell, who is beginning a doctoral program in engineering graphics at the School of Civil Engineering.

"Everybody who has used computers has felt frustrated by the lack of progress in reaching their potential," he adds. "Computers are marvelous hammers. You can beat a problem into any shape you want. The whole point of computing is to turn your imagination loose and release you from drudgery."

Marilyn Smith has found the connection between the classroom and her job to be a two-way link. "The knowledge that I gain here (at GTRI) goes into my schoolwork, too," she says.

Some researchers pursuing doctorates have been able to link their dissertations with sponsored contract activity. In this way, they get an extra "leveraging" effect on all the work they do on a research project.

Hanigofsky's dissertation is one of several generated through a DARPA-sponsored project aimed at understanding how thousands of fibers can be coated individually with high-temperature materials in a chemical vapor deposition furnace. "I would hate to think of doing this program any other way," he says.

Hanigofsky's interim lab director at MSTL, Kaycee Logan, has had similar good fortune in using a successful sponsored research project as the springboard for a dissertation. Logan has been a doctoral student in the School of Civil Engineering for two years and expects to complete the program within another year by building on existing

work.

"You could say I've been working on my Ph.D. since 1983 (the year her research in anti-armor materials began)," she says.

Logan never intended to enter a doctoral program, but as her anti-armor materials research has continued, she has seen the need to get a deeper grounding in the fundamentals of mechanics.

"I had become almost an experimentalist, doing things intuitively," she says. "I have always had a good feel for materials. Now I needed a new set of theoretical tools to engineer better impact-resistant materials. It's exciting to associate with the mechanics community. Theory keeps me honest. In preparing for class, reading the text stimulates new ideas."

The beginning of new careers

For Dennis Crain, the bachelor's degree that he earned while working at GTRI has led to an entirely new career. He came to Tech as an electronics technician in the former Computer Related Services Department, then began a program in accounting at Georgia State. The degree took five years to get, but it has allowed him to move into OOD as a budget analyst and assistant director of the Research Operations and Modeling Group.

"I really didn't want to go back to school," he says, "but my future as an electronics technician didn't look good. You really have to be dedicated. It takes a lot of discipline to work 40 hours, go to class, and study on weekends."

For some GTRI staff members, working on an academic degree not only improves their job performance, but it's the culmination of a long-held personal dream.

Nancy Kelley, administrative secretary in the Agricultural Technology Research Program, expects to earn a bachelor's degree in elementary education from Brenau College next June. When she gets her diploma, it will be the end of a process that started 41 years ago.

Kelley says that her methods classes have helped improve her office organizational skills, and she intends to use the degree after retirement to become a supply or substitute teacher in elementary schools.

What has allowed her to persevere for more than four decades of schooling, at several colleges and with a number of family moves?

"You do it by determination," she says. "Or you don't do it." □

GTRI research awards are drastically revised

Nomination deadline is November 1

It's time for the annual GTRI research awards again, and this year there are a host of changes.

★ Individual staff members may nominate candidates directly. Before, only lab directors and research support managers could submit nominations to the awards committee.

★ Instead of one awards review committee, GTRI Director Don Grace has appointed five committees, one for each of the five award categories, to review and evaluate nominations and select outstanding recipients. Each committee has the flexibility to

determine the number of awards to be presented in that category, up to a maximum of four.

★ Each award recipient will receive a monetary prize of \$500 in addition to the customary personalized engraved wall plaque and letter of recognition.

Awards will be presented for outstanding performance in the following categories: Research, Program Development, Management and as a Project Director, Research Support, and as a Student Employee. The last category is subdivided into Graduate and Undergraduate categories.

The guidelines state: "Each award shall be for exceptional performance over some significant period of time during the 36 months immediately preceding the nomination submission date.... With the exception of award categories for students, only permanent (essentially full-time) employees should be considered.... A recipient of any award during the previous three years is ineligible for nomination in any award category this year." In addition, no individual may nominate himself/herself for an award.

Nominations must be contained on a single page and must be received by Bill Howard (OOD/GTRI, 228 CRB) by the close of business on Friday, November 1. For a copy of the guidelines and the format to be used for the nominations, see your lab director or service group manager.

The chairpersons of the five review committees will make up the Executive Awards Committee; they will be responsible for planning and coordinating the awards presentation and reception. Bill Howard serves as the nonvoting ex-officio member of the Executive Awards Committee, representing the GTRI Executive Council.

The awards ceremony will be held on Thursday, December 5, in the Student Center Ballroom, from 3:00 to 5:00 p.m. Snacks and beverages will be provided.

A photograph of each recipient will be placed on display after the reception at the recipient's work location. □

Run for research

Medical researcher Phil Kennedy has come up with an innovative way to fund his neural prosthetics research in these days of tight budgets and financial difficulty—he's asking people to sponsor him when he runs in Atlanta's Thanksgiving Day marathon.

With Georgia Tech's blessing, he hopes to raise at least \$50,000 to enable his research team in the Bioengineering Center to continue its development of a fully implantable system that will monitor the tiny electrical signals from the brains of paralyzed persons. The device would be implanted in the part of the brain that normally controls movement and would send control signals to enable a severely paralyzed person to control a muscle stimulator or to operate a computer or other communication device.

The system consists of a tiny hollow glass cone, 150 microns in diameter, which records the electrical signals via two wires fixed inside it. A piece of sciatic nerve is placed inside the cone to induce neurites (the "telephone lines" in the brain) to grow. In cooperation with the Yerkes Research Center at Emory University, the device has been implanted in the brains of monkeys,

See "Marathon," page 7

News & Notes

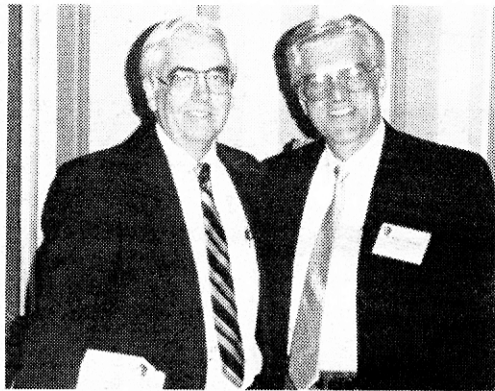
November 1 is the deadline for nominating outstanding GTRI staffers for research awards. This year, anyone may nominate a candidate directly, and the awards include a \$500 cash prize.

Queries & Quotes

Fred Cain (left) and Bill Cummings are shown at the Deming seminar on quality and productivity. Cummings is a TQM consultant for Georgia Tech who is conducting training courses for employees three days a week, operating out of the Business Office.

Congratulations:

- to Rob Michelson, elected executive vice president of the Association for Unmanned Vehicle Systems
- to Art Brown, new president of the National Assn. of Management & Technical Assistance Centers
- to John Nemeth, reappointed to the State Emergency Response Commission
- to Christie Shackelford, recipient of a NASA Fellowship for Global Change Research



Focus on Quality

Electronic time-reporting study under way

GTRI has made good progress on producing improved financial and MIS reports for use by project directors and various unit managers. As we proceed with our entry into the ORACLE environment, other improvements in custom report generation for management and planning will be possible. One major aggravation still remains, however. The speed and accuracy of accounting for personal services charges within GTRI's accounting system is still constrained by antiquated time-reporting procedures.

We need to begin looking at the possibility of time reporting by electronic means so that we can plan for the evolutionary development of this capability as soon as the ORACLE system technology will support it. To that end, I have established a planning group, consisting of the following people, who will begin to meet in the coming weeks:

Chair: Bill Atcheson (director, GTRI Research Accounting Department)

Members: Bob Baggerman (RE II, COM), Julie Blankenship (administrative supervisor, Research Accounting), Tom Brown (PRE, MATD), Randy Case (director, CSIT), Robert Howard (RE II, MATD), and Carolyn Mahaffey (group manager, MAPS).

GTRI is serious about the development of an electronic time-reporting capability, and this group will play a major role in making it happen. The benefits to our organization are rather obvious, and I am excited about the potential on the near horizon.

— Bob Shackelford

GTRI group attends Deming seminar

Forty-five GTRI staff members were among the 500-plus attendees at the Deming TQM seminar September 5-6. They included GTRI lab directors, service group managers, MAPS heads, and some OOD personnel. Also attending was the TQM council from ESML, which is acting as a pilot group for developing TQM lab plans.

World-famed quality guru Dr. Edwards Deming led the seminar, assisted by experts from Ford and General Motors and management consulting firms.

"The seminar provided a management overview of Dr. Deming's principles of quality and productivity that will be highly useful to us," Fred Cain said. "We learned how to apply these principles to specific situations and problems at GTRI." □

Professional Activities

Aerospace Science & Technology Lab

Rob Michelson has been elected to a two-year term as executive vice president of the Association for Unmanned Vehicle Systems, which recently put on the aerial robotics competition at Tech.

A paper by Krish Ahuja and Clarke Stevens, "Recent Advances in Active Noise Control," was published in the July issue of the *ALAA Journal*.

Communications Lab

David Flowers has delivered the draft copy of Chapter 23 for the JTCG/AS *Aircraft Survivability Handbook*, entitled "Terminal Target and Missile Guidance (Countermeasures)." Tom Madden is the coauthor.

Economic Development Lab

Carol Aton attended a Lead Auditor Training Course September 9-13 in Houston (TX).

On September 11, Bob Lann and Jaime Castro made a presentation, "Attracting Retirees—Risks and Benefits for Georgia," at the Governor's Conference on Tourism in Columbus.

Last month, Dave Swanson went to Mexico City to make a presentation, "Impact of Technology on Manufacturing," at the Monterrey Institute for the Study of Technology.

Art Brown is the new president of the National Association of Management and Technical Assistance Centers. He and Charles Estes attended the NAMTAC annual meeting September 20-October 2 in Asheville (NC).

At the annual conference of Trade Adjustment Assistance Centers in Lake Geneva (WI), Charles Estes received a certificate marking 10 years with the TAAC program and Gerry Doubleday earned one for over five years. Other attendees besides Estes were Dave Swanson, Dale Atkins, Susan Shows, Bob Davis, and Maryam Evans.

In September, the Defense Logistics Agency renewed funding for the Georgia Procurement Assistance Center, headed by Chuck Catlett.

Electro-Optics Lab

The Speckle Imaging Group presented two papers at the High Resolution Imaging by Interferometry conference in Garching, Germany, October 14-18: "The Georgia Tech Low Light Level Imaging System," by Jim Beletic, Jerry Zadnik, Connie Tritsch, and Ray Duvarney, and "Low Light Level Imaging Through Aberrations," by Dr. Beletic.

Ted Doll presented a paper entitled "Masking in Three-Dimensional Auditory Displays" at the IEEE 1991 Workshop on Applications of Signal Processing to Audio and Acoustics, held at Mohonk Mountain (NY) October 20-23.

Environmental Science & Technology Lab

John Nemeth has been appointed by Governor Zell Miller to the State Emergency Response Commission, extending his membership as representative of the State Board of Regents.

Materials Science & Technology Lab

Wayne Ohlinger attended the 4th International Vacuum Microelectronics Conference in Nagahama, Japan, August 22-24 and

presented a paper entitled "Beam Deflection Concept for a Vacuum Microelectronic Microwave Amplifier." Coauthors were Norman Hill (Materials Engineering), Robert Feeney (Electrical Engineering), Mike Harris (PSL), Dave Hughes (PSL), and Larry Barnett of Mountain Technologies.

Kathryn Logan gave an invited presentation and attended a workshop on "Smart Materials for Resilient Structures" September 4-5 at Research Triangle Park (NC).

Modeling and Analysis Lab

Jill Butterfield presented a paper on fractals at the 16th International Conference on Infrared and Millimeter Waves held in Lausanne, Switzerland, August 26-30.

MAL may have set a GTRI record for number of publications in a year. Since November 1990, 14 authors have had 22 papers, articles and other publications published, 14 accepted (two of them invited), and have submitted four others. The authors and number of publications each are: Keith Aberegg—2, Martin Alexander/Byron Keel—1, Mike Baden—1, Chris Barnes—8, Jill Butterfield—1, Marvin Cohen—8, Jim Echard—2, Jeff Holder—3, Bill Holm—3, Mark Richards—4, Jagjeet Sidhu—1, Jagjeet Sidhu/Mike Tuley—1, and Brian Stevens—5.

Physical Sciences Lab

A paper by Tony Hynes, "Laser-Induced Fluorescence of Silicon Monoxide in a Glow Discharge and an Atmospheric Pressure Flame," appeared in *Chemical Physics Letters* in June.

Christie Shackelford has received a NASA graduate student Fellowship for Global Change Research to pursue her dissertation research on nitrate radical photochemistry. Her research advisor is Paul Wine.

At the 21st International Symposium on Free Radicals, held August 4-9 at Williams College in Williamstown (MA), Mike Nicovich presented a paper entitled "Kinetics and Thermochemistry of Halogen Atom Reactions with Organosulfur Compounds." Coauthors were Kevin Kreutter, Cor van Dijk, Christie Shackelford, Ed Daykin, and Paul Wine.

Radar & Instrumentation Development Lab

RIDL was well represented at the 16th International Conference on Infrared and Millimeter Waves in Lausanne, Switzerland, August 26-30. Ted Lane chaired a session on antennas, and Bob McMillan chaired a session on MMW radar. Lane gave two papers: "Development of a Multispectral Airborne Instrumentation System (AIS)" and "Dual Frequency Millimeter Wave Radar Imaging Instrumentation System," coauthored by Mike Brinkman and Brian Hudson. Joe Bruder presented a paper entitled "Radar Applications of Gigawatt Sources at Millimeter Wave Frequencies," coauthored by Mel Belcher. Bob McMillan presented a paper on "A 95 GHz Antenna/Scanner for Airborne Operation," coauthored by Ted Lane and Jim Scheer.

Nick Currie and Bob Trebits conducted the first week of the ARDEC Smart Munition Training Course—Basic Radar, Part 1— at Picatinny Arsenal (NJ) August 12-16. Marvin Cohen and Joe Bruder taught Part 2 September 23-27, also at Picatinny Arsenal.

Research Property Management

RPM will host a one-day regional workshop to be conducted by the Society for Property Administrators at Georgia Tech November 4. □

Scientist exchange program with Denmark a success

Dr. William A. Holm, principal research scientist in the Modeling and Analysis Laboratory (MAL), spent seven weeks this summer as a visiting scientist at the Danish Defence Research Establishment (DDRE) in Copenhagen, Denmark. Under a joint grant from DDRE, the Georgia Tech Foundation, GTRI/OOD, and MAL, Dr. Holm conducted research in polarimetric radar technology jointly with his Danish counterparts. DDRE conducts research in radar, electro-optics, signal processing, acoustics, computer science, and operations research. DDRE's primary mission is to advise the Danish military on the acquisition of military equipment, mainly purchased from the United States.

The principal Danish researcher with whom Dr. Holm collaborated was Mr. Ernst Krogager, who recently spent seven months at GTRI as a visiting scientist conducting similar research with Drs. Holm and Holder of MAL. Dr. Holm also participated, along with Mr. Krogager, in a synthetic aperture radar (SAR) data collection exercise conducted on the western side of Denmark in Jutland. The exercise was conducted by the Jet Propulsion Laboratory, Pasadena, California, and supported by DDRE.

"Denmark is a beautiful country," says Dr. Holm, "and the Danes are very friendly and seem to like Americans very much. In fact, to demonstrate their friendship, each year the Danes conduct the largest Fourth of July celebration in the world outside the U.S. in Rebild, which is located in the hills of Jutland. The Danish lifestyle is more relaxed than that of the typical American. And they certainly are less inhibited!"

Due to the success of the two visits thus far, the director of DDRE would like to create a permanent exchange program under which scientists from GTRI and DDRE would be exchanged each summer. He has asked Dr. Holm to pursue this matter further with GTRI management. □

Food Court serves campus needs

The new CRB Food Court has been in operation for a month and is meeting the varied needs of many people on the western edge of the campus. Here are a few examples:

- ✓ Judy Cooper (CRB) is a regular customer of the Food Court. She often takes home food for dinner—says the chef's salad is great for her evening meal.
- ✓ Janie Kite (CRB) and others are planning to use the Food Court for many of their meetings with government sponsors.
- ✓ People are finding it easier to schedule meetings in CRB because the convenience of the Food Court allows meetings to be scheduled close to the lunch hour. Meeting attendees can grab lunch before or after a meeting. This has been invaluable for managers like Carolyn Mahaffey who have staff members in other buildings.
- ✓ Joanna King (Baker) comes over regularly to take lunch back to her busy desk.
- ✓ Deborah Banks (ATDC) had a group lunch meeting and didn't have a car that day,

so she came over to the Food Court and purchased box lunches for her meeting. The food was so well received that one of the visitors came back the next morning for breakfast before an all-day session.

The Food Court, located in the second-floor break room in CRB, is open 7:30 a.m.-1:30 p.m., Monday-Friday. Daily specials are being offered at breakfast and lunch, as well as a Gourmet Coffee Club program. ARA's Campus Dining Services welcomes comments and suggestions. □

Marathon

From page 5

under full anesthesia and full sterility. Electron microscopic study of tissue in the cone along with recordings of movement in the same monkey for 15 months suggest that cortical neurites grow into the tip of the electrode and remain viable, Dr. Kennedy says.

The results will be reported at the Neural Prosthetics meeting of the National Institutes of Health and the Annual Meeting of the Society for Neuroscience in coming months.

Two graduate students—Andy Hopper and Cindy Linker—currently are developing the electronics for a fully implantable system for human prosthetic use. This system requires no batteries or switches and is implanted entirely beneath the skin. An external primary coil and associated electronics can be connected to a wall outlet or a wheelchair battery to send voltage through the skin to the implanted secondary coil, which then sends power to the electronics near the brain. After conversion from AC to DC, the voltage is regulated to power the amplifier and transmitters that route the recorded electrical signals back out through the skin. Prototypes have been implanted in two monkeys and are working successfully.

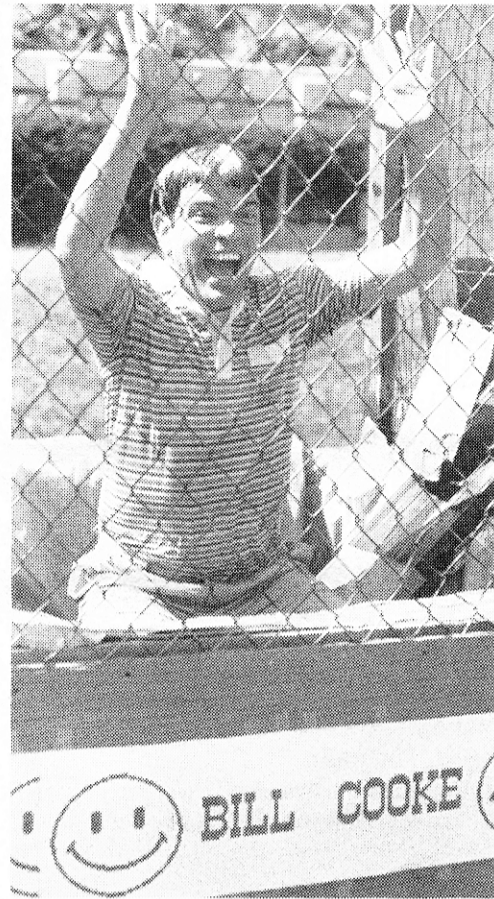
Dr. Kennedy, who has both an M.D. and Ph.D., is a senior research scientist in Tech's Bioengineering Center. His research, formerly conducted in the old Electronics and Computer Systems Lab at GTRI, was transferred to the Center three years ago.

Dr. Kennedy's work has been funded by the American Paralysis Association and the Emory/Georgia Tech Biomedical Technology Research Center, but additional funding is needed. "Contributions for the marathon will keep us going until funds from some of our outstanding proposals come in," he says.

Sponsorship pledges will be channeled through the Georgia Tech Research Corporation (GTRC), which has not-for-profit (501c3) status with the Internal Revenue Service, making contributions tax-deductible. According to GTRC's Ron Bell, GTRC will set up a special account to administer the funds. GTRC also will match the money Kennedy raises up to \$10,000. "We are happy to support the efforts of someone who will go to such extraordinary lengths to promote his research initiative," he says.

President John P. Crecine also endorses this novel idea, commenting: "I approve of this imaginative, ad hoc arrangement. I would like to see more imagination and initiative like this." The Tech Development Office has offered to solicit corporate sponsors.

Dr. Kennedy hopes to attract a large number of individual sponsors as well—people who will pledge a specific amount per mile. For further information, contact Tech's Bioengineering Center, 894-3964. □



Focus on Folks

Left: Bill Cooke feels the shock of the cold water as he lands in the dunk tank at the Cobb County Research Facility picnic. (Photo by Grover Richardson)

Cobb County employees say good-bye to summer with a family picnic

By Maggi Harrison, AERO

On Saturday, September 21, approximately 350 Cobb County employees and their families got together for the day and enjoyed a picnic at the Cobb County Research Facility.

The picnic, held 10 a.m.-4 p.m., opened with a softball game for the adults. A delicious lunch followed, during which several prizes were given out. Sonja Perry, wife of Tom Perry/RIDL, won the top prize, tickets to the Tech-Wake Forest football game.

After lunch, two events were held simultaneously: a tug-of-war contest (during which the contestants broke the rope twice!) and a second softball game played by the children of the employees. The grand finale was the "dunk tank." Lab group directors/lab directors were all REPEATEDLY dunked by a never-ending line of people. Their names should be mentioned as they were all such good sports: Charlie Brown, Jerry Carey, Bob Cassanova, Evan Chastain, Bill Cooke, Trent Farill, Ed Reedy, and Bob Trebits.

Throughout the day there were several ongoing activities: Margo Dixon (wife of Fred Dixon/TSDL) painted various designs on the faces of the children: Braves' tomahawks, cats, flowers, etc; this was a VERY popular activity. Another popular item for the children was the Spacewalk...their screams and shouts of delight could be heard all day, all over the facility! There also were horseshoes, volleyball, and basketball.

Special thanks to the 20-member committee for putting it all together: Tom Autrey/EMSL, Carl Baxter/FMD, Scott Bostater/RSAL, Marsha Braswell/MAPS, Jill Butterfield/MAL, Andy Dugenske/MATD, Scott Gleason/ATL, Maggi Harrison/AERO, Charlotte Irvine/ATL, Karen Moss/RSAL, Bill Nolte/MATD, Tom Perry/RIDL, Grover Richardson/TSDL, Jimmy Ross/FMD, Cathy Sands/TSDL, Rachel Sluss/RIDL, Sherry Travis/AERO, Luther Ward/TSDL, Pat Winn/OOD, Martha Willis/MAL. □

"I approve of this imaginative, ad hoc arrangement. I would like to see more imagination and initiative like this."

— President J.P. Crecine

Focus on Folks



GTRI runner wins race

GTRI's Jim Cooper (TSDL) placed first in a field of 13,000 runners in the Manufacturers Hanover Corporate Challenge September 11 in Atlanta. He also led the Georgia Tech men's team to the first-place victory in the men's division. This is the second year Cooper has won the 3.5-mile race.

Team standings were determined by totaling the times of each team's top five finishers. Georgia Tech's top five male contestants and their times were: Cooper (18:03); George Whitley, MATDL (19:08); Steve Warner, Textile Engineering (20:00); Phil Sparling, Health Sciences (20:08); and Tim Dodd, Civil Engineering (20:30).

Georgia Tech runners also competed in the women's and coed divisions of the Challenge.

Fifty Tech runners competed in the race through Midtown Atlanta, most of them from GTRI. Captain Sherri Odom (MATDL) said that Tech has fielded a team in the event for the past three years. □

Personal Notes

Wedding Bells

Mike Walker (AERO) was married to Pam Luening August 31.

Jo Everette and **Bill Nolte** (MATD) were married August 2. **Howard Atkinson's** (MATD) daughter, Amy, was married to Mike Mullis September 7.

Cradle Roll

Tom Lacy and his wife, Jennifer, became new parents September 8. They have a baby boy, Kyle.

Kim and **John Alford** (ATL) welcomed a daughter, Alois Ann, September 28. **Sam Alford** (TSDL) is the proud grandfather.

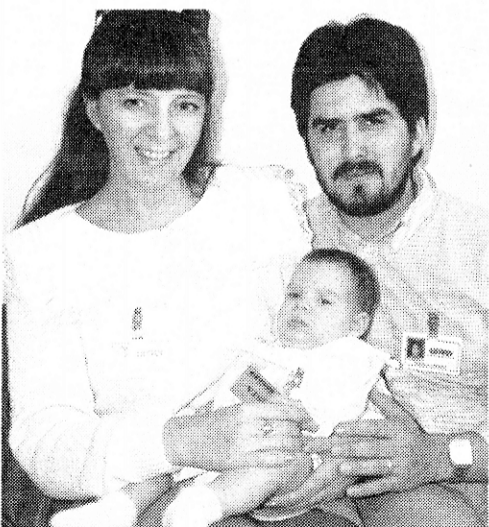
June and **Rick Steenblik** (EEEL) welcomed their first son, Garrett Arend, July 31.

Annette and **Chris Barnes** (MAL) had a baby girl, Lori Anne, August 30.

Our Sympathy

...to **Krish Ahuja** (AERO), whose mother died in July. □

Meet our GTRI family



GTRI baby Elise Michelle Prado (age two months) recently visited CRB with her parents, Katie and Ron, both of CAL. (Photo by M.A. Stegar)



Left: Jim Cooper (TSDL) won the Manufacturers Hanover 3.5-mile race in Atlanta with a time of 18 minutes, 3 seconds, leading the Georgia Tech men's team to victory. Above: The Georgia Tech running team. (Photos by Richard Odom)

Personnel News

Aerospace Science & Technology Lab

Welcome to new employees **Mark Costello**, RE II; **Ricardo Alvarez**, **Tom Lacy**, **Tabitha Barnette**, **Bob Stoker**, and **Bill Kallfelz**, all GRAs; **Sean Kelley** and **Bill Hayden**, both co-ops.

Former GRA **Clarke Stevens** is now a full-time RE I.

Bill Dorris has accepted a position with Lockheed.

Advanced Technology Lab

Georgie Riggs will be on leave of absence until January 2, 1992.

Communications Lab

Bruce Kim has resigned to devote full time to his Ph.D. program.

Concepts Analysis Lab

Michael Sullivan departed October 16 to join Lockheed as a senior engineer.

Economic Development Lab

Jim Clark transferred to ESTL effective October 1. **Ken Buxton** has departed.

Vernice Bailey is now staff assistant for the lab director, succeeding **Yvonne Thomas**, who left in July.

Electromagnetic Environmental Effects Lab

Richard Steenblik has resigned.

Electronic Support Measures Lab

New student employees are co-op **Mike Mayercik**, who is working on a degree in EE at the Southern College of Technology, plus **Mark Rollins** and **Andrew Nunemaker**, two graduate students who are working on their master's degrees in EE at Georgia Tech.

Environmental Science & Technology Lab

Irene Bennett has resigned.

Materials Science & Technology Lab

Tudor Thomas has resigned.

Modeling and Analysis Lab

Christie Belcher terminated September 24 to take up a new career as a mother.

Physical Sciences Lab

Kevin Kreutter received his bachelor's degree in August and has left Georgia Tech to attend graduate school in biochemistry at Duke University.

Shouzhi Wang, visiting RS II in PSL, left Georgia Tech at the end of August to return to his home in Dalian, China.

Radar & Instrumentation Development Lab

Captain **Michael Matheus** has been assigned to GTRI for 10 months by the Air Force Institute of Technology, through the Education with Industry (EWI) program. The EWI coordinator at GTRI is **Evan Chastain**.

Michael is a graduate of the Georgia Tech School of Aerospace Engineering.

SRE **Edward E. Martin** was honored by his friends and co-workers at a retirement luncheon at CCRF August 30.

James L. Kurtz has been appointed acting head of the Systems Branch.

Thomas DiGiacomo is a new GRA, working for **Gene Greneker**. Students who have left include **David Aylesworth**, **James Stephens**, and **Brian Drachman**.

Lucien Bomar has changed to hourly-as-needed, and **Richard Bly** has resigned.

Manuel Ares started October 1 as a PRE hourly as needed, located in New York.

Radar Systems Applications Lab

Jim Byrum has terminated and will be working with TRW in Warner Robins (GA).

EE student **John VanderMeer** has graduated.

Threat Systems Development Lab

Jonna Chisholm, **Anthony Ross**, and **James Session** have terminated. □

Working under the gun

By **Lincoln Bates, EDL**

Ed Lindsey may apply for hazardous duty pay and combat gear. The Brunswick Regional Office director could make a case for it after coming under small arms fire this summer en route to Brunswick from Jesup.

After a meeting at ITT Rayonier, he and NASA's Bob Miner were driving the 40-mile route home, the blacktop slicing through managed timberland of Southern pine. They shared that stretch of road with three cars and a semi. They'd just passed the truck when Ed heard a loud noise.

"It sounded like a blowout, only louder," he recalls. "But the car was under control. My next thought was I'd blown my engine passing the semi. But it was immediately obvious that wasn't it. Then I thought maybe the truck blew one of its tires."

On reaching Brunswick, he got out of his car and walked around to the other side. He noticed a hole in the back panel, a sharp dent nearly one-half inch deep, although the metal was not fully pierced. The paint was sheared off around it in a perfect circle. "I was later told it looked like a deer rifle slug, maybe a .30-.30," says Lindsey, adding that it probably was the work of someone hunting or target shooting back in the timber. Deliberate sniping at a car from closer to the road would have produced deeper penetration. But it was hairy enough. If the bullet had been three inches higher, it would have gone through the window.

Now, how about a flack jacket and helmet?

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