The GTRI Connector

Team Effort Results in Streamlined Cost Reports, Savings

By Lea McLees, RCT

Providing cost reports to sponsors is a lot easier — and more efficient — than it used to be for many GTRI project directors, thanks to a group effort involving AIST, MAPS, GTRI Accounting, OCA and OIT.

These groups have worked together to develop and produce automated, camera-ready, one-page cost reports that now are used as deliverables on more than 200 GTRI projects. The automated reports provide an estimated labor savings of about 1/3 million dollars per year, says Tom Brown (AIST).

"This is one of a number of benefits that are resulting from having online Oracle access to OCA and Accounting data," he said.

Added Carolyn Mahaffey (MAPS): "Our goal is to reduce administrative workloads for our project directors, enabling them to devote their time to research and contract development activities."

Before the automated reports were first offered late last year, most GTRI project directors, other lab employees or administrative support staff members prepared cost reports. The report preparer would re-enter data from the "green sheets," summaries of each project's monthly financial activities, into his or her own computer several days after Accounting closeout was completed and the data became available. Preparing a cost report could take several hours of time per month, and re-keying the data created potential for errors.

With the automated system, however, AIST uses computer technology to make copies of GTRI Accounting and Office of Contract Administration (OCA) financial and contractual data available to MAPS in Oracle tables a few hours after closeout. MAPS employees run a PC-based software application developed by AIST co-op Chris Ingram that retrieves the data and prints out reports as needed by project directors — as many as 50 per hour.
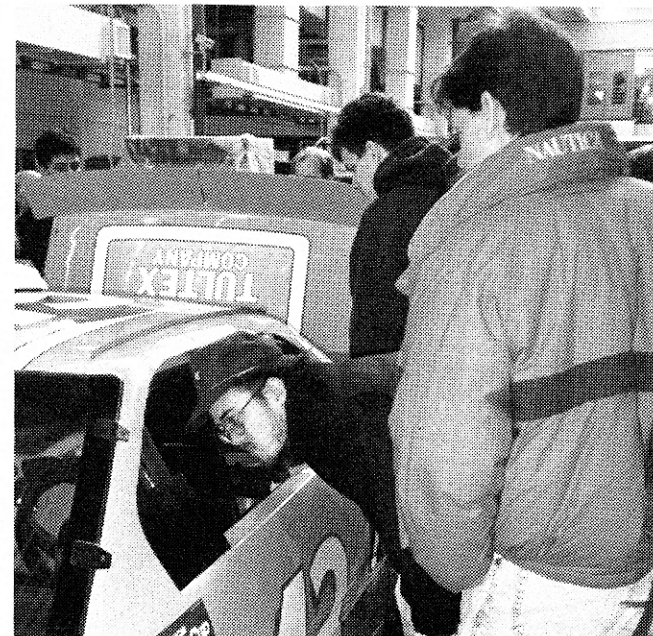
The automated reports can be provided on paper or electronically in any of three formats. The simplest format shows expended and encumbered funds combined; the second breaks out encumbered funds separately; a third adds labor expenditures broken down by employee labor type.

The Science of Speed: GTRI Helps Give Students Close Look at Race Car

By Lea McLees, RCT

About 50 Georgia Tech students recently peered under the hood and leaned inside the cab of what some might consider a work of modern art: the Richard Petty NASCAR race car.

The students kept Pontiac automotive engineers Mark Alfes and Terry Laise busy answering questions and explaining various features of the car during a March 10 exhibit and seminar.

"Vehicle aerodynamics is an empirical science, if not an art," Alfes told the students. "There are no consistent design procedures, and the flow field around the car is very complex. Most aerodynamics research thus far has been done on planes."

The exhibit, preceded by a seminar on "NASCAR Design Principles: Theory Meets Reality," was sponsored by GTRI, GT Motor Sports and the School of Mechanical Engineering. Students gathered in the auditorium of the Manufacturing Research Center to learn from Alfes about the fundamental aerodynamic principles used in designing.

Georgia Tech students view the Richard Petty NASCAR Race car. (Photo by Lea McLees)

Observed & Noted

The instrumentation and calibration specialists keep GTRI's measuring and testing equipment working precisely. *Read about them on page 2.*

■

BEST Georgia Tech is available on GTEL and the Go-pher Server. *Find out what BEST contains and how to access it on page 2.*

■

ATDC has set its open house for April 27. *To find out what is planned, see page 3.*

■

GTRI researchers' findings could be used to help designers of multichip modules minimize electromagnetic interference problems. *Read about their work on page 4.*

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GTRI's recent open house for students was a success. *Read about it on page 4.*

■

Neural network techniques under development at GTRI could help identify patterns in large data sets. *Jim Mahaffey tells how on page 5.*

■

Georgia Tech employees, students and others volunteered their help with a bridge building contest for youngsters.

See who helped out on page 6.

■

News about your coworkers at GTRI fills page 8. *Read about professional, personal, and personnel activities there.*

News & Notes

Meet the Instrumentation and Calibration Specialists

GTRI's instrumentation and calibration specialists keep the sensitive measuring and testing equipment at GTRI working as precisely as is possible. Each piece of equipment is generally calibrated once a year during tests that verify its functions against equipment tested and certified by the National Institute of Standards and Technology (NIST). Some equipment has to be calibrated more often.

You can find the date on which a piece of equipment needs to be brought in for calibration by looking for a small, rectangular white or green sticker on the instrument. The sticker includes the last calibration date; the upcoming calibration date; and the initials of the person who last calibrated the machine. If you don't find such a sticker, or if you have questions about instrumentation and calibration, call 528-7700 and ask for either Tom Moore or Jeff Cook, or call 894-3534 and ask for Bob Cash, all of whom are profiled below. Together they average calibrating at least 40 instruments per month.

Bob Cash

Bob Cash
Came to Georgia Tech 26 years ago this month. His first job was working in the shop at the School of Mechanical Engineering. He also has helped with instrumentation and calibration of equipment in ceramics, chemistry, electrical engineering, microelectronics, the library and in photo labs on campus. His first job at GTRI was in the old Standards Lab working with retiree Walter Ray. He says GTRI's standards lab may have been the first group to repair computer terminals on campus. He works on all types of GTRI equipment. Bob plans to retire July 1.

Jeff Cook
Came to GTRI's Cobb County Research Facility four years ago. He has learned to calibrate 80 percent of the equipment that comes into the lab, and is working toward 100 percent. He likes his work because it is challenging, and because he learns something new every day. He is also particularly proud when he can complete a rush job

Jeff Cook

when a researcher needs it. He reminds everyone to bring equipment in for calibration on the date it is due. Depending on the instrument, calibration can take two to 12 hours. After work he likes to work out, hunt and fish.

Tom Moore
Came to GTRI's Cobb County Research Facility 12 years ago. He maintains and calibrates electronic test equipment used in research at Cobb County. He likes his work because it is always changing, particularly as a result of updates in internal microprocessor equipment. He also enjoys the fact that he gets to work with new equipment first — it has to come to the instrumentation and calibration lab for testing before it can be used in research. Tom suggests that researchers and technicians routinely check the calibration stickers on their equipment before using it to make important measurements. After work he backpacks, particularly on the Appalachian Trail, runs and fishes.

Tom Moore

BEST Georgia Tech Available on GTEL and Gopher Server

Looking for a research collaborator in a particular field? Want to put together a multidisciplinary research effort to respond to a request for proposals? Trying to locate a speaker for a conference? Putting together a capabilities document?

Want to know who knows what at Georgia Tech?

Now the answers are at your fingertips. BEST Georgia Tech, the database of Georgia Tech faculty expertise, is up and running on the Georgia Tech Electronic Library (GTEL) and Gopher. The database contains some 900 faculty expertise records including such information as research expertise, industrial relevance, patents, publications, professional awards and recognitions, linguistic ability and employment history.

"Never before at Georgia Tech has there been such a powerful and immediate means of identifying faculty expertise," says Debbie Bell, assistant to the executive vice

president and coordinator for BEST Georgia Tech. "Access to Georgia Tech's expertise is as close as your personal computer, and since both GTEL and Gopher have full text search capabilities, users don't have to worry about matching keywords exactly," Bell said.

Deborah Salmond of the Economic Development Institute (EDI) can attest to BEST Georgia Tech's power. An information research specialist, she helps find answers to technical questions for manufacturers, chambers of commerce, and EDI's engineers based in regional offices around the state.

"A company might need to know about a plastic or process, for example," she said. "I can use BEST to find who does work in that area and get the answer. Or I can find who at Tech is an expert and link that person with an engineer in the field or a company."

Lynn Boyd, director of Georgia Tech's Corporate Liaison program, uses BEST frequently as she promotes business and industry interest in Georgia Tech researchers' work. Often she uses BEST to locate researchers working on various aspects of a topic—wireless communication, for example—and share the information with a company that plans to visit campus.

"It's an invaluable tool for marketing and tying the campus together," she said. "We need to know what types of research everyone is doing. The fact that we have direct access is really appealing."

On GTEL, BEST Georgia Tech can be found under item one of the main menu, "Georgia Tech Library Catalog and Other Databases." The search process is the same as that used in other Georgia Tech Library databases, and records may be displayed in either short or long format. On Gopher, the database can be found on the main menu. (For information on logging on to GTEL or registering for a weekly GTEL user class, call the Library's Reference Department at 894-4529. For information about accessing Gopher, contact the OIT Helpdesk at 894-7173.)

To add an expertise record to BEST Georgia Tech, contact Bell at 894-6906 or send e-mail to debbie.bell@oars.gatech.edu and she will provide a questionnaire. To update your expertise record, simply print your record from GTEL or Gopher, make any changes you wish on the printed version, and forward the edited record to Bell in the Office of the Executive Vice President, mail code 0325.

SELECTED FEBRUARY 1994 AWARDS

Title	PI/Laboratory	Sponsor	Funded Amount
MH-53J Struct. Mod. Flight Test Support	Crawford, C. (AERO)	Air Force	$1,500,000
Safety Ser. for Ellarbee/Thompson/Trapnell	Mahan, K. (EOEML)	E, T & T	13,000
MIDAS USMC Test Support	Frost, M. (HRO)	Army	95,410
Corps SAM Functional Analysis Support	Dalton, J. (HRO)	Army	239,908
Databases & Autom. ... Missile Systems	Pritchett, P. (HRO)	Army	81,004
Sofware Arch. & Devel. for FAISS	Atha, J. (ITL)	Army	100,000
Accuracy of Traffic Monitoring Equip.	Harvey, B. (ITL)	GA DOT	20,000
Comanche System Engineering Support	Grover, J. (ITL)	RAIL Co.	241,211
Stores Impact on Target Signature Study	Cohen, M. (SEAL)	VEDA Inc.	25,000
Air to Air Countermeasures	Piper, S. (SEAL)	Texas Instruments	63,239
Teris System Eng. & Install. Support	Adams, J. (SEAL)	Army	180,152
Electromag. Environmental Generating Sys.	Clark, D. (SEAL)	Navy	69,000
ECCM Assessment Analysis	Morris, G. (SEAL)	Air Force	1,100,000
Radar Hardware Development Analysis	Belcher, M. (SEAL)	Army	485,000
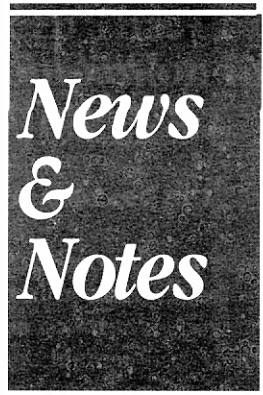
Keep That Computer Companion in Your Office

By Lea McLees, RCT

An ounce of prevention is worth a pound of cure in medicine — and the same goes for keeping computers safe and sound in the office. Following are some computer protection tips from the Georgia Tech Police Department.

• Be sure computers are not left unattended and accessible. It takes just seconds for a thief to grab a laptop model from a desk.

• Lock office doors at the end of the day, or when no one is in your office, if at all possible. Most thieves generally take what is easily and most quickly obtained — locked doors can thwart their plans.

• In some instances additional security is needed. Fewer than five percent of college campus computer thefts involve forced entry, according to computer protection literature. The cost of securing a computer can be substantially lower than the cost of replacing it. If choices must be made among which computers to secure, high priorities might be given to new or particularly valuable computers; those without which an office, lab or department could not function; and computers in areas that are accessible to many people.

• Hidden systems that alarm silently or audibly when a computer is disturbed are available. Some even notify a central headquarters that calls law enforcement officials in your area to the scene of the attempted crime.

• Another option is visible security locks. Not only might a potential thief be deterred by the sight of the locks — such locking systems can withstand thousands of pounds of pressure.

If you need further information on protecting your computer, or literature on specific products, you may call Sgt. Randy Crawford at 894-1285 or 853-9660.

ATDC Open House Scheduled This Month

The Advanced Technology Development Center's (ATDC) fifth annual Spring Open House, scheduled for April 27, allows people around campus to find out about the high tech entrepreneurial firms that are ATDC member companies. These firms are making technological advances in many areas including biochemical detection, medical informatics, integrated vision systems, voice and data communications, "smart" materials and others.

The 1 to 5 p.m. open house will be held at ATDC, 430 10th Street. On the schedule are high tech exhibits and demonstrations, the graduation of two ATDC entrepreneurial companies, and presentations on some of the latest technology developments.

ATDC is the first university affiliated technology development center in the country. The center offers a wide range of business support services to help entrepreneurs start and successfully operate technology businesses.

The open house is free. To attend, RSVP via phone (894-4904) or fax (894-4545) by April 22. For more information, contact Vivian Chandler at 894-4904.

Report   *From page 1*

The system also allows MAPS staff to print the OCA report approval sheet for each report, with most items on it already completed. In the past, each approval sheet was typed individually; with automation, the project director marks only a few boxes before sending it and the cost report to OCA.

The reports are a response to findings in MAPS' 1992 survey of project directors. Respondents most frequently requested help with preparing cost reports.

To develop the reports, MAPS employees collected samples of cost reports from project directors. AIST designed a software application capable of generating reports of varying formats.

GTRI Accounting and the Office of Information Technology   helped by making Accounting and OCA data available via computer to AIST employees. Ingram, a junior computer science major, was responsible for software coding and debugging. He also is training MAPS employees, who produce the reports using Lotus software.

"Eventually we hope to be able to assist project directors with any financial deliverable required by their contract — or better yet, to prepare it for them ready to be briefly reviewed and sent out," Mahaffey said.

As part of that goal, Jim Allison (MAPS) is applying the cost report technology to larger projects that require more complex monthly statements. His first success has been in the AERO lab, working with a NASA project in Krish Ahuja's group.

"The monthly report on this project is at least 19 pages long and used to require two weeks for a research engineer to prepare it each month," Allison said. "Now a MAPS person completes the report in half a day."

Allison is working with other project directors to automate similar complex cost reports.

If you would like MAPS to run automated cost reports for you, please contact your MAPS group.

Race Car   *From page 1*

convert the production-model Pontiac Grand Prix into a race car within NASCAR constraints, and invited the students to view the car in MARC's third floor high bay. Director Richard Truly and AERO lab director Bob Cassanova introduced the speakers and joined the students in examining the car.

NASCAR sets certain parameters that control the shape of a race car, Laise said.

"There are more than 20 dimensions we have to meet, including roof height, ground clearance and the width of the car," he said. "There are no outside mirrors or anything, and we must include an open driver's window."

The engineers develop the best package, within NASCAR's constraints, in the wind tunnel and evaluate their results by testing the cars on tracks such as Atlanta Motor Speedway. Once the engineers are pleased with their design and it is approved by NASCAR officials they send guidelines to each racing team.

Truly thanked STP, General Motors, Pontiac, NASCAR race car driver Richard Petty and Ted Bronson, a former Navy colleague of Truly's who was instrumental in arranging the seminar, for making the event possible.

GTRI Alphabet Soup

Here's a list of official abbreviations of labs, departments and service groups at GTRI:

VPDIR	Vice President & Director
RO	Research Operations
RSF	Research Support & Finance
CS	Chief Scientist
EP	Enterprise Planning

Research Operations (RO)

AERO	Aerospace Sciences Lab
HRO	Huntsville Research Operations
ELSYS	Electronic Systems Lab
ITL	Information, Technology and Telecommunications Lab
EOEML	Electro-optics,Environment and Materials Lab
SEAL	Sensors & Electromagnetic Applications Lab
STL	Signatures Technology Lab
SDL	Systems Development Lab
ACO	Advanced Concepts Office
PDO	Program Development Office

Research Support and Finance (RSF)

AIST	Administrative Information Systems Team
FO	Fiscal Operations Depart.
RA	Research Accounting
ROAMG	Research Operations Analysis & Modeling Group
MAPS	Management and Project Support Group
PST	Personnel Support Team
RCT	Research Communications Team
RSD	Research Security Depart.
SSD	Support Services Depart.
FST	Facilities Services Team
ICT	Instrumentation and Calibration Team
MDT	Mail Distribution Team
MST	Mechanical Services Team
RPT	Research Property Management Team
SST	Supply Services Team

Focus on the Labs

Research Helps Multichip Module Designers Avoid Harm From Electromagnetic Interference

By John Toon, RCT

High-density packaging of mixed analog, digital and microwave devices and a shortage of established design rules could create electromagnetic interference (EMI) concerns for the new generation of multichip modules, unless good EMI design practices are used, GTRI researchers caution.

With support from the Air Force Office of Scientific Research and the Air Force's Rome Laboratory System Technology and Integration Branch, senior research engineer John Rohrbaugh and his SEAL colleagues have analyzed the electromagnetic susceptibility of some increasingly-popular modules. Their findings could be the basis for a new series of test procedures, simulations and design guidelines to help multichip module (MCM) designers minimize EMI problems.

"The military is pushing the use of multichip modules, and if they turn out to be cheaper to manufacture and repair, you will also see them in the commercial world," Rohrbaugh said. "But if you are not careful, you can pack different types of components into a module that might not be compatible. You could then face an expensive rework process."

MCMs are important because they offer potential for reducing the size of electronic equipment by increasing the number of components placed in a specific area. They also may be less expensive to manufacture, easier to repair, and less prone to problems with heat dissipation, Rohrbaugh noted.

Rohrbaugh, research engineer Richard Levin, and graduate student Randy Pursley found a wide range of potential interference problems in both types of MCMs tested. All could be mitigated using good EMI design guidelines.

In a transmit-receive module used in radar and communications equipment, they found that signals applied to an output pin traveled through the package and appeared at all of the input pins. The interfering signals would have disrupted the equipment's operation, and could have simultaneously activated the transmit and receive modes. Similar tests on a second module that included high-speed random access memory also showed EMI susceptibility.

In addition to potential interference generated internally by proximity of mixed devices, high levels of electromagnetic energy encountered in a military environment can also affect MCMs.

"The applications for which these modules are used means they must operate in an environment of high EMI," Rohrbaugh noted. "When you have many of these packages inside a box, you have parallel input-output wires that can serve as antennas for coupling in outside interference."

Rohrbaugh believes the same electromagnetic compatibility standards established for traditional electronic systems can be applied to protect new MCMs.

"We need to treat these packages as systems and think of all of the system problems, including electromagnetic effects," he said. "Usually, you have systemwide specifications for a whole box of components. Now that whole box is included in an MCM, and the designers should be applying systemwide rules to it."

Rohrbaugh, Levin and Pursley showed that standard circuit simulation software could be used to analyze EMI protection for MCMs. The software also could help identify EMI-resistant components. EMI resistance should be designed into the modules because adding protection later can significantly boost costs — and could pose difficult technical problems, Rohrbaugh said.

"If you don't do this and find that you have a vulnerability problem after you start manufacturing them, you'd have to go back in to add electromagnetic hardening," he noted. "You'd almost have to do a complete redesign, and you may not have the space for it. That could be very costly."

To help share the information with MCM designers, Rohrbaugh proposes development of design guidelines. He also would like to complete development of analysis and measurement procedures used to verify EMI resistance in the MCMs.

Ultimately, the work could lead to a continuing education short course, or even a multimedia system that would provide the software and drawing tools in one convenient package.

The research, done at the Air Force's Rome Laboratory System Technology and Integration Branch in Rome, N.Y. , was sponsored by the Air Force Office of Scientific Research and by GTRI. Papers appear in proceedings of the 1993 and 1994 IEEE Dual-Use Technology Conference held at State University of New York (SUNY) in Utica, N.Y.
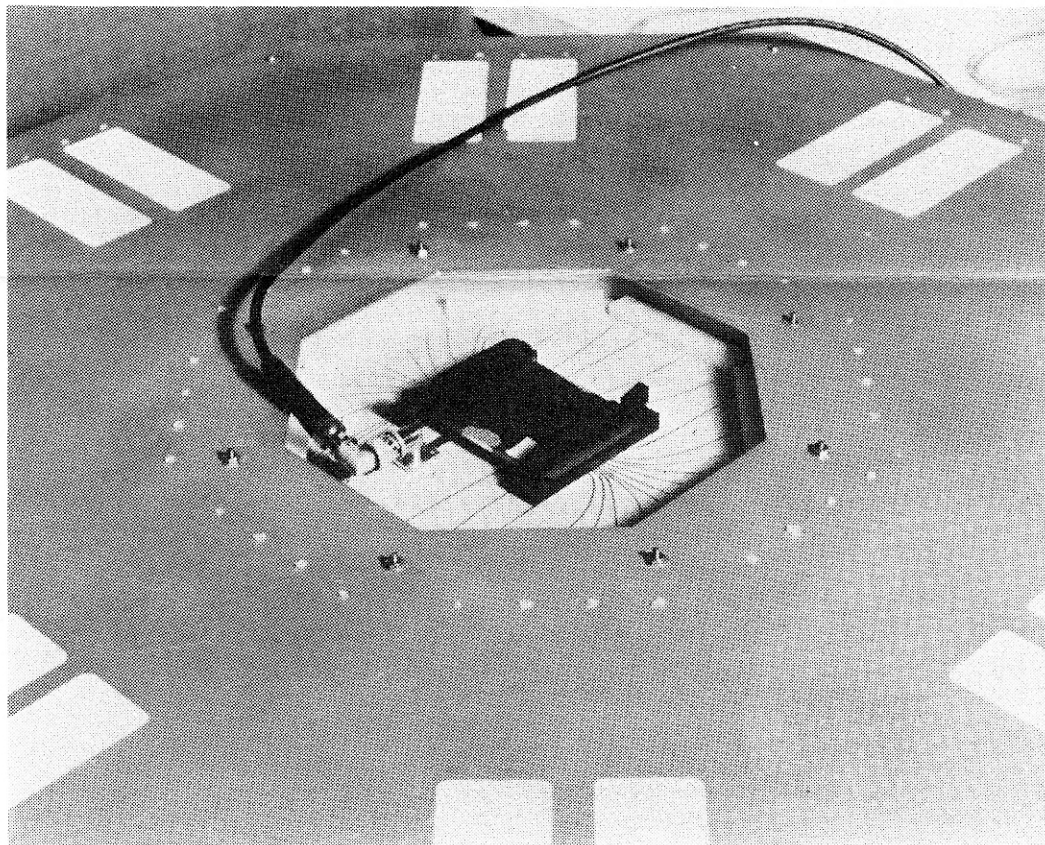
Right, a multichip module is tested for electromagnetic susceptibility in a conducted interference test fixture.

GTRI Student Open House A Success

By Lea McLees, RCT

About 40 Georgia Tech students got a first-hand view of research here during the GTRI Student Open House on February 24.

The students attended demonstrations of Geographic Information Systems and neural net traffic management set up by Nick Faust (EOEML) and John Gilmore (ITL) in the Student Center. They met director Richard Truly and spent the afternoon visiting research projects in the labs.

Dennis Barbour of Georgia Tech's IEEE Student Branch developed the open house idea.

"My original motivation was a personal interest in seeing the facilities and research of GTRI," said Barbour, a co-op with the Department of Defense since 1991. "Secondly, a big part of what we (student organizations) should do is let students know what resources and opportunities are available — and there sure are plenty at Georgia Tech."

On the students' afternoon tour agenda were chemical vapor deposition in Jack Lackey's lab, arranged by student Matt Langaman (EOEML); vision modeling, arranged by Ted Doll (EOEML); neural nets, arranged by Roy Thompson (ELSYS); and millimeter waves, arranged by Ricky Moore (STL).

The tour will help to increase student awareness of GTRI, said chief scientist Devon Crowe, who involved GTRI employees in arranging the tour.

"That can result in increased collaboration with academic research, more interest in doing research at GTRI, and in students possibly becoming GTRI employees after graduation," he said.

The student tour is expected to become an annual event. If you are interested in sharing your research with students on future tours, you may call Gail Tucker or Devon Crowe at 894-3500.

Bridge *From page 6*

Holcombe; Becky Holcombe, Holcombe Graphics; Don Holcombe, Holcombe Builders; Craig Martin, International Safety Instruments; Tracy Mosshart, Georgia State University; Peggy Mulrenin, Georgia-Pacific; Mark Palmquist, AT&T Technologies; Arbie Perry; Hilary Riall; Mona Robertson, Micromation; Steve Robertson, Micromation; Sim Sorrow, Knowledgeware.

Research in the News

By John Toon, RCT

During December 1993, news of Georgia Tech research appeared in 50 publications with a total circulation of more than 8.6 million. Highlights of these news media placements are shown below, with circulation statistics from the publications cited:

● *Scientific American* (600,000) mentioned Georgia Tech communications research in an article on the future of **Wireless Communication**.

● *Research & Development* (108,500) described work in GTRI's Aerospace Laboratory on the **Circulation Control Wing.**

● The **Eye Surgery Simulator**, a joint project of Georgia Tech's Multimedia Technology Lab and the Medical College of Georgia, gained attention in *The Atlanta Journal-Constitution* (482,000), *Multimedia Week, Simulation* (3,000) *and U.S. Tech* (50,000).

● *Popular Science* (1,800,000) published a brief article and computer graphic illustrating **Computer Dynamics Simulation** of molecular activity in materials. The work is being done in the School of Physics.

● Research aimed at improving semiconductor processing through **Neural Network Technology** was described in *Industry Week* (288,000), *Inside R&D*, and *Advanced Coatings and Surface Technology*. The work is being done in the School of Electrical and Computer Engineering.

● Information about the **Georgia Research Line**, the computer bulletin board system operated by Research Communications, has now appeared in a dozen publications with a combined circulation of 382,000. The latest articles were in *Spectroscopy* (30,000) and *AI Magazine* (15,000).

Focus on the Labs

Predicting Aircraft Fires: Neural Networks May Help Analyze Risk, Find Hidden Patterns

By John Toon, RCT

Neural network techniques under development at GTRI could help identify previously-unrecognized patterns and risk factors from records of aircraft accidents, hazardous waste spills, disease epidemics, consumer product sales and other large data sets.

Identifying and understanding such patterns would improve safety, speed the identification of diseases and provide more accurate prediction of consumer demand, the researchers say.

"Neural networks can see weak connections among thousands of different data types, whereas a human being can really only visualize a dozen at most," explained senior research scientist Jim Mahaffey (ITL). "A neural network can see correlations that we never knew existed."

Neural networks also may perform better than traditional statistical techniques in predicting future risks. It was that application — risk analysis — which led Mahaffey and research engineer Darrell W. Acree (SEAL) to explore the neural net approach.

To help make the transport of weapons as safe as possible, GTRI was asked to identify risk factors involved in aircraft crashes. A fire could threaten the weapons, so it would help to know the likelihood that an aircraft would burn if it crashed. The relevant factors are so complex, however, that Mahaffey and Acree decided standard risk prediction techniques would not produce helpful information.

So the researchers decided to try a new approach, constructing a neural network, which — like the human brain — can be trained because it learns from its experiences. Mahaffey and Acree had read of similar efforts using neural networks to predict bank failure, another complex event depending on many variables that are not inherently obvious.

"We were trying to predict the occurrence of very rare events," he explained. "Therefore, to do any sort of prediction, we needed an enormous data set. To see whatever underlying patterns might be there, we had to look to many thousands of incidents."

Fortunately, records for thousands of civilian aircraft accidents exist in the databases of the National Transportation Safety Board (NTSB), which provided the information on magnetic tape. The researchers obtained records of more than 17,000 aircraft crashes. They used most of the data to train their neural network and then analyzed the remaining information to find patterns among the crashes. The researchers gave the neural network all the details associated with each crash.

"Everything seems to have a relationship to whether the plane will burn if it crashes, and some things are more important than others," Mahaffey said. "From that information, we hope to tell what would be the best airplane for transporting a weapon — which would be least likely to burn in a crash."

The neural net made some impractical suggestions. The aircraft least likely to burn in a crash is a glider — which has no engine and therefore carries no fuel. Next on the list of safe air vehicles — and just as impractical — were helium balloons and aircraft flying over water with empty fuel tanks.

The neural network divided the crashes into two main categories: deterministic events that could be predicted based on knowledge of initial conditions, and chaotic events that could not be predicted. Up to 70 percent of the time the system correctly predicted whether a crashing aircraft would burn. Conventional techniques would be correct only 10 percent of the time, Mahaffey said.

"We feel that these results indicate that neural networks may provide reasonable alternatives to statistical methods in probabalistic risk assessments," Mahaffey said. "This turned out to be an enormously complicated problem, and this is only a first attempt."

While 17,000 records may seem like plenty of information, Mahaffey said the variety of aircraft types, weather conditions, pilot characteristics and other factors made it difficult to find enough common data about specific factors. That job could be easier in other data sets where more common information exists.

Mahaffey believes that all events include a mixture of both deterministic and chaotic factors. He sees neural networks as a means for obtaining information about the deterministic factors that could be controlled.

Data analysis was done on a Microway computer, a new model that offers high performance at low cost. Without such a computer, the complex problems generated by the neural network could not have been operated, he added.

For the future, Mahaffey and Acree hope to improve their work in predicting risk and look at other problems in which the neural network might provide insights. The nets might also provide information for consumer products companies interested in better predicting demand.

James Mahaffey poses with a model of a C-130 military transport. He is using neural networks to analyze large data sets.

Students donned safety glasses to watch their bridges being tested. (Photo by Rae Adams)

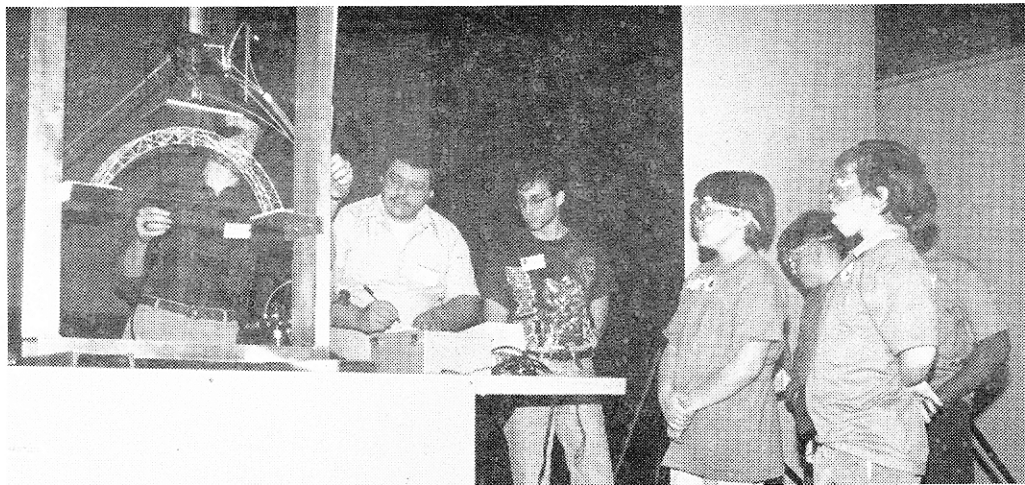## Future Engineers Get Taste of Bridge-Building

By Lea McLees, RCT

A total of 108 students from around metro Atlanta tested their bridge-designing skills February 26, with help from the Society of Manufacturing Engineers' Atlanta Chapter 61; SciTrek, the Science and Technology Museum of Atlanta; and 50 volunteers from Georgia Tech, Southern Tech, and other local employers.

The students, many of them on teams, constructed 63 bridges that were tested to failure. Force was applied to the bridges and the greatest force each bridge could withstand before breaking, the bridge weight, and the span were measured.

The rules for this year's event differed from those of the previous two bridge-breaking events held at SciTrek in that students could use any material to build their bridges. For past events they were restricted to toothpicks and white glue. The rule change gave the students more freedom and allowed them to select materials that are easier to work with than toothpicks and white glue.

Some toothpick bridges were entered, along with several made of balsa wood and others incorporating aluminum, brass, papier-

mache, playing cards, and fishing line. Two bridges met all the specifications and did not break during testing, withstanding 330 pounds of force. One was made of balsa wood and fishing line and the other was made of carbon fiber, Kevlar, and plastic foam. All the bridges had to meet certain dimensional requirements, span 16 5/8 inches, and weigh no more than 121 grams (4.27 ounces).

Volunteers

Georgia Tech: Rae Adams, Ronald Bohlander, Dave Cauffiel, Jim Clark, Wiley Holcombe, Claudia Huff, Nancy Kelley, Jack Leff, Gary McMurray, John Ray, Bill Riall, Robert Stroud, Gary Williams, Craig Wyvill, Chen Zhou.

Southern Tech: Brian Ball, Darrell Barnett, Stan Burton, Dick Harris, Don Horton, Kyle Joiner, Andy Luna, Keith McFarland, Vineet Nagarker.

Others: Al Baird, Baird, Inc.; Ward Broom, Design & Manufacturing Services; Rodger Burgess, Blue Ridge Industrial Sales; Laura Culbreath, Georgia-Pacific; Rabun Culbreath, Morgan Contracting; Rebecca Culbreath; Loretta DeBoth; Ray DeBoth, Rockwell International; Lloyd Gardner, Nordson Corporation; Mary Griffith, Bankhead Enterprises; Natalie Griffith; Geoff Hammett, Scientific Atlanta; Bruce Hefner, International Safety Instruments; Angie

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Editor's Note: The following is the second and final installment of a series on absorbing the mountains of material that flood into your office or lab each day. If you missed the first installment, call 853-9079 or send e-mail to lea.mclees@gtri.gatech.edu.

Here's How... To Conquer those Mountains of Material

By Bobbi DePorter
Learning Forum/Oceanside, Calif.

(Accelerated Learning Techniques, continued)

● Learn how to take notes; it's one of the most important skills you can master. It can mean keeping track of vital tasks and prospects instead of getting lost in a sea of scattered slips of paper.

Keep in mind that note-taking enhances recall. Most of us recall best when we write things down.

When taking notes, avoid the old-fashioned outline form. It has too many drawbacks. Recent research on how the brain stores and recalls information has brought about new note-taking techniques. One of these is mind mapping.

Here's how it works: In the middle of a piece of paper, write the main idea. Then add a branch from the center for each key point — preferably using colors. Write a key word or phrase on each branch, building out to add details. Make important ideas larger. Use random shapes to point out items or ideas.

● Blast off with power reading. Research has shown that using your fin-

ger to keep your eyes moving forward can double your reading speed. It stops you from backtracking, which slows you down.

Here's how: Use your finger to underline each line as you read it. Make your eyes quickly move through the material by moving your finger a little faster than you can read. Resist stopping or backing up.

Other reading techniques:

— Preview a book or article before reading it. Browse through the material as though you were window-shopping before a spending spree. For a book, scan the table of contents and the chapter headings. For an article or a book, scan any boldfaced or italicized print, subheads, graphics and their captions, summaries, and so on.

— Be an active reader. Ask questions as you go along. You'll nudge your mind into a more demanding state.

— Read ideas, not words. Get the big picture by looking at entire phrases, sentences and paragraphs.

— Underline important points with a highlighter and draw pictures in the borders to help you understand key concepts.

— "Mind map" the material.

● Learn memory techniques. Here are a few:

— Make a conscious effort to remember. Take the time to make associations of some kind.

— Make your associations specific and clear. Instead of seeing words, see images that involve distinct action, color and noise.

— Practice using your memory. Use every opportunity to hone your memory skills. As you drive somewhere, for instance, try to remember the names of all the streets or freeway exits by linking them together in a silly

story.

— If you have problems recalling the exact piece of information you need, consciously create a link by remembering something else that's related to it. For example, if you can't remember the sixth president, think of the fifth or the seventh. Many times this will bring back information you're searching for.

— Review your material. This advice seems obvious but many people don't do it. Studies show you'll remember the information a bit longer each time you review.

— Take lots of mini-breaks while studying or reviewing something lengthy. Why: you remember best the information you hear or see first and last in a learning session. So if you take many short breaks, you'll remember more information.

● When you complete a major task, celebrate the feat in some way. This gives you a sense of accomplishment, completion and confidence — and it builds motivation for your next learning goal. Before you begin a major project, decide how you'll celebrate — and include small rewards as you complete individual steps along the way.

Remember: You have the same potential as everyone else. The difference is in how you use your mind.

Bobbie DePorter is the author of **Quantum Learning: Unleashing the Genius in You***, a Dell trade paperback. She is also president of Learning Forum of Oceanside, Calif. This article is adapted with permission from her book, copyright 1992 by Bobbi DePorter. For more information, you may write DePorter at 1725 S. Hill Street, Oceanside, Calif. 92054, or call 1-800-328-5327.*

Events of Interest

Georgia Tech
RESEARCH INSTITUTE

GTRI Greetings!

Welcome to some of our newest employees.

Ten Good Things We Know About Stephanie Hardaway

1. Stephanie is a clerk in ITL. Among her duties are answering phones, sending faxes, typing, and making copies for the lab.

2. Stephanie was a Tech rambler for three years before she began working at ITL.

3. She has worked in offices all over campus including the Bookstore, D.M. Smith, the Tech Post Office, Accounts Payable, and Payroll.

4. She also worked in the Parking Office for a while — but she never annointed any windshields with those dreaded parking tickets.

5. Stephanie likes working at ITL because the people are nice and the communication in the lab is good. She is the youngest employee in the lab and says she is "learning more everyday."

6. The Atlanta native also has a lot of energy and stamina. In addition to working full-time, she attends school full-time at DeKalb College from 5:30 to 10 p.m. Monday through Thursday.

7. Stephanie is a sophomore journalism major who wants to be a female sports announcer for professional basketball games. She will transfer to Georgia State next year to finish her bachelor's degree.

8. On weekends she catches up on her sleep, studies, and tries to make time to watch basketball games and shop.

9. Her favorite basketball team is the Golden State Warriors because one of the team members, Tim Hardaway, has the same name she does.

10. Stephanie's mom is Rosa Hardaway, a person Stephanie says is an unending source of encouragement, love and "you've got lots of potential and you got it from me" reminders!

Stephanie Hardaway

Ten Good Things We Know About James Corbett

1. James began full-time work in ELSYS recently after 13 quarters of co-op experience at GTRI.

2. A research engineer, he writes software for a radar warning receiver. His software interfaces between the receiver and training equipment that helps pilots learn to use the receiver. He also repairs PC's in the lab.

3. James earned a bachelor's degree in electrical engineering from Tech and is currently working on his master's in electrical engineering.

4. The Atlanta native has wanted to be an electrical engineer since fifth grade, when he got an electric project kit as a gift.

5. He credits researcher Bob McMillan with telling him about GTRI and getting him interested in working here.

6. James enjoys working at GTRI because he gets to do a lot of hands-on assignments and because he works with lots of friendly people.

7. He also likes the fact that during his seven years as a co-op and his three months as a full-time employee, he's only had to wear a tie to work six times.

8. When he is not working, in class or studying, James likes to take photographs, especially of the older buildings on the Tech campus. Some of his best of CRB, the Tech Tower and Carnegie Building are on display in his office.

9. James also is a PBS "This Old House" devotee, a Garrison Keillor "Prarie Home Companion" fan, and is active with the singles group at his church in Conyers.

10. James is one of three children and lives in Conyers with his parents.

James Corbett

Focus on Folks

Focus on Folks

Professional Activities

Aerospace Sciences Laboratory

Krish Ahuja and **Kevin Massey** traveled to the Arnold Engineering Development Center in March to receive AEDC's annual Technical Achievement Award. The recognition is based on their work on jet/facility interactions. A photograph of the team will be on permanent display in the AEDC lobby, along with a short description of their award-winning work.

Charles Crawford presented a February 3 seminar at Rand Corporation in Santa Monica, Ca. on the subject of the MI-26 CAPS Halo as viewed by an American. Approximately 20 employees attended and were eager for information on the world's largest operational helicopter with a maximum gross weight of 124,000 lbs. and a cargo box size the same as the C-130. Crawford's technical material was obtained during a visit to the MIL Design Bureau in Moscow the week before Thanksgiving. He also presented a short version at a February 2 dinner meeting of the American Helicopter Society Los Angeles chapter, which was attended by about 40 people.

Marilyn Smith completed requirements for her Ph.D. and graduated March 19.

Electro-optic, Environment and Materials Laboratory

Steve Hays spoke to the National Electrical Contractors Association on February 18 about construction safety. He addressed the Associated General Contractors of America student chapter at Southern Tech on February 24, discussing "Construction Safety: A Forecast for the Future." Hays also spoke at the Associated General Contractors' Construction Safety Conference on February 25 about "Guidelines for a Company Safety Program."

Rae Adams presented "The ABCs of Photography," a talk about Ansel Adams and his development of the zone system, on January 29 at the High Museum of Folk Art and Photography.

Paul Schlumper gave a presentation on OSHA standards at the winter workshop of the Georgia Feed and Grain Association in Savannah on February 25.

Mike Lowish made a presentation on confined space entry procedures to the Associated Builders and Contractors of America, Inc. Seminar held at Southern Tech on February 25. He also was the featured speaker at the American Electronics Association Meeting in Atlanta. He presented an overview of how OSHA impacts high-tech manufacturing companies and how these companies can come into compliance.

Support Services Department

Harry Vann was named a certified facility manager by the International Facility Management Association. He becomes the second certified facilities manager on campus, joining GTRI retiree Tom Jones, who works part-time with the Economic Development Institute (EDI).

Personnel News

Administrative Information Systems Team

Jamie Patrick has terminated.

Graduate co-op **Mike Bridges** has terminated.

Management and Project Support

Gail Woodward has begun work as a Research Associate II.

Electro-Optics, Environment and Materials Laboratory

Elizabeth O'Neil has begun work as a Research Scientist I.

Shane McWhorter has begun work as a Research Associate II.

Electronics specialist **Phillip Bryant** has terminated.

Jeffrey Farley has moved from mechanical technical II to research technician I.

Information Technology and Telecommunications Laboratory

Project coordinator **Arthur Handy** has terminated.

Research scientist I **James Harrell** has terminated.

Systems Development Laboratory

Senior research engineer **Wade Garnto** has transferred to AERO.

Electronics Technician III **James Page** has transferred to ELSYS.

Personal Notes

Welcome Back!

Marsha Barton (MAPS) has returned to work after having surgery and is doing fine. She recently learned that her son, Bryan, earned a four-year baseball scholarship to the University of Toledo, Ohio.

Congratulations!

Teddy Reed (Mailroom) celebrated 19 years as a GTRI employee on March 3.

Ed Gilmore's (RSD) son CDR Edward J. Gilmore recently was named commanding officer of the USS Rueben Janes (FFG-57) home ported in Pearl Harbor. This is a very significant step in a naval career. CDR Gilmore is a graduate of the U.S. Naval Academy. The USS Rueben James has been a key participant in the continuing research and development of anti-submarine tactics and equipment.

After Hours

Terry Hawkins (Mailroom) is taking acting classes in his spare time.

Volunteers

Danny Williams (Mailroom) is doing volunteer work with Cascade Road EYC's Youth Program.

John Toon (RCO) traveled to the San Esteban Valley of Honduras the week of March 13 as part of an 11-person medical mission team. As of their departure the team expected to work on some or all of the following projects: doing fluoride treatments for schoolchildren, installing a solar-electric system in one of the medical clinics (there's no electricity in the valley), building some sanitary facilities for one of the villages, and helping with construction of a cattle barn.

Cradle Roll

Peggy and **Joe Hurst** (SDL) welcomed a son, Cary William, on February 17.

Our Sympathy To...

Harold Knouse (SDL), whose grandfather died on January 7.

Judy Parks (SDL), whose grandmother died February 17.

Charles Brown (RSF), whose father died March 16.

Bob Goodman (SDL), whose mother died March 16. Bob's father, Bob Goodman, Sr., is a retired lab director.

In Next Month's Issue . . .

GTRI employees were active organizers of the 1994 IEEE National Radar Conference in late March. See the May *Connector* for a wrap-up.

●

Wayne Cassaday has been named 1994 Young Radar Engineer of the Year by IEEE/AESS. Read about Wayne in the next *Connector*.

●

GTRI employees are encouraging interest in science, math and engineering among young people. Read in May about how they are doing this.