STL Designs Automated Antenna Testing System

A team in the Systems and Techniques Laboratory (STL) directed by Henry Cotten has successfully completed a two-year project to design an automated antenna testing system for the U.S. Army.

The antenna testing system provides automated data acquisition and analysis of antennas mounted on various vehicles. It was delivered to the Army during a four-week field trip to the U.S. Army Electronic Proving Ground in Fort Huachuca, Arizona, that culminated with acceptance testing on February 27.

The U.S. Army Electronic Proving Ground has operated an analog antenna measurement system to make hemispherical pattern measurements for several years. This facility had become inadequate in terms of frequency coverage, data processing, and measurement speed and accuracy. And only the smallest motion of the test item was under computer command; the elevation location of the probe had to be positioned manually.

The range consists of a large wooden arch (75-foot radius) that is centered over a turntable. This configuration produces hemispherical pattern measurements on various targets, especially those too massive to measure on conventional far-field ranges.

The system in use was an old one that no longer was completely fulfilling the Army’s requirements. Although it performed the necessary functions of data reception, reduction and analysis, the system could do them only in a serial manner, that is, only one process could be performed at a time. The upgrade provides for parallel operations to be performed and allows multiple users to access the system. Several other features, such as a larger hard disk, permit the creation of larger data bases.

The STL project was conducted in phases. The first phase included development of the software to run the system and procurement of the computers that do the data collection and analysis. Phase two involved equipping the range with new instrumentation and automating the elevation axis. STL currently is engaged in a follow-on phase that will utilize the same data acquisition system to operate a different type of range—a large outdoor compact range.

The contract value of phases one and two was $1.8 million. Phase three will total $6.75 million of which $1.8 million has been funded to date.


Solar Research Program Boasts Multiple Achievements

by Martha Ann Stegar, RCO

The Energy and Materials Sciences Laboratory (EMSL) has shifted its solar energy research to solar-unique processes and has come up with several technological breakthroughs along the way.

EMSL engineers are currently using the Georgia Tech solar furnace, which concentrates light to the intensity of 9,000 suns, in their search for processes that can be achieved only with the concentrated flux of sunlight. These processes utilize photon (light) energy as well as thermal energy.

“With this new system, we have already come up with several unique, patentable materials or processes,” reports lab associate director Dan O’Neil, who manages the DOE Solar Thermal Advanced Research Center at Tech. “They include single crystals of ultra-high strength and purity called ‘ceramic whiskers’ and new types of carbon and graphite fibers.”

O’Neil can’t go into detail about these new materials because they are not yet protected by patents.

The ceramic whiskers are made by chemical vapor deposition (CVD). Jack Lackey is decomposing volatile ceramic material in a solar furnace to form the whiskers, which are then used to reinforce composites.

CVD is a new research area for EMSL. Lackey also is using this technique to deposit anticorrosion coatings on metal, to produce extremely fine and pure ceramic powders, and to fill the pores in ceramic preforms. He is experimenting with CVD as a method of laying down new materials required as substrates for the new high-speed microchips.

“We’re also attempting to modify the crystalline structure of existing materials by means of concentrated sunlight,” O’Neil adds. “The first materials we are looking at are carbon-carbon composites, where carbon is used in both the matrix material and the reinforcement. These composites are extremely hard and durable materials used in high-temperature aerospace applications such as missile nose cones, rocket nozzles, and advanced brake systems.”

EMSL scientists are investigating the possibility that new high-temperature forms of carbon called “carbonyres” are produced by solar radiation. Carbynes reportedly have been discovered in meteorites. They are as hard as diamond, with high resistance to fracture, wear and thermal shock, and very light in weight.

Prospects for further breakthroughs can be significantly enhanced by an ultra-high-flux solar furnace which has been designed by Tom Elle to concentrate solar energy to the equivalent of 25,000 suns at a single spot.

See “Solar,” page 3
Hazardous Material Control and Emergency Response Course Trains People to Save Lives

by Carrie Stileleather, EDL


More than 5 million chemicals have been catalogued, with new ones added every day. The fraction of those that are classified as hazardous range from such familiar materials as gasoline and kerosene to exotic ones like methyl isocyanate, the chemical involved in the Bhopal disaster.

Although the Department of Transportation and other federal agencies offer specific guidelines for dealing with incidents involving hazardous materials, such incidents are usually complicated and frightening, and their safe handling may require special training or equipment. Even emergency personnel who are well-trained to handle everyday problems may not know what to do when an unusual disaster strikes. And the consequences of not knowing what to do can be devastating.

According to Georgia Tech’s Hazardous Materials Group Leader, Dr. John C. Nemeth, help is at hand. To help alleviate some of the dangers posed by the ever-increasing use of hazardous chemicals in industry and their transport, EDL’s Environmental, Health, and Safety Division has developed a Hazardous Material Control and Emergency Response course. The five-day course (offered for the first time in September 1986) is designed to train firemen, police, paramedics, environmental scientists, and industrial emergency personnel to properly protect themselves, others, and the environment if an incident involving a hazard should occur.

Course topics feature emergency medical treatment of contaminate victims, hazardous material containment, patching and stabilization of leaks, treatment of hazardous material release, and decontamination. Hands-on training and demonstrations include the decontamination process, tractor-trailer tank stabilization, railroad tanker patching, and hazardous material recovery.

In a simulation exercise, each class organizes its own Emergency Response Unit and responds to a simulated hazard such as a chemical spill. The next course is scheduled for May 18-22 at the Cobb County Research Facility. Says assistant course director Kevin Kampmeyer, “Every day people are being injured or killed and the environment is being contaminated because of incidents involving hazardous materials. The purpose of our course is to train people to safely manage the hazards of today’s world.”

Zeolite Program Clients Attend Technical Meeting

EmS hosted the second annual technical meeting for member companies of Georgia Tech’s Molecular Sieve and Zeolite Research Program on campus March 19-20. A tenth firm joined the program too late to attend the meeting, which is held annually.

The companies, each of which pays $20,000 a year to belong to the program, comprise five American firms—Catalytic, Goodyear Tire & Rubber, Phillips Petroleum, Tenneco and Texaco—and five international firms—Akzo Chemie (Netherlands), Rhone-Poulenc (France), Toray (Japan), Toyko Soda (Japan), and Laporte (England). The program is administered in the Energy and Materials Sciences Laboratory and has been in place about 2½ years.

The first day was a technical meeting with presentations by Georgia Tech researchers and by four of the member companies.

On the second day, each company and Georgia Tech presented their recommendations for research direction for the next three years, and a consensus recommendation was reached.

“We agreed to emphasize synthesis of new molecular sieve crystal structures and compositions with potential applications as catalysts and adsorbents,” said Dr. Tudor Thomas, director of the Molecular Sieve and Zeolite Research Program.

“A significant aspect of the meeting was the participation of our students who work in the program,” said Dr. Rosemarie Szostak, the program’s chief scientist. “Those making technical presentations included graduate students Vinayan Nair and Jefery Brinen, undergraduate student Ritesh Kuswadia, and post-doctoral fellow Dah-Chung Shieh.”

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Solar (from page 1)

EMSL also has found innovative ways to maintain and improve the facilities used in its solar research. Paul Makkie has modified an experimental solar furnace to reorient the mirror field from horizontal to vertical. He and Tom Brown (now in STL) have developed a point-focus camera to realign the mirror field of Georgia Tech's 550-mirror solar thermal facility. The camera scans the field and provides feedback to a control system so that proper corrections can be made. EMSL has proposed to NASA that it be used in space. GTRI's patented molecular monolayer deposition process for improving the anti-fouling characteristics of separatory membranes is being applied to the solar arena in a task headed by Lois Speaker. EMSL is adapting the process as an anti-fouling treatment for holliston mirors made of plastic film. Alumunized polymer mirrors are cheaper than glass. Unlike glass, however, they do not normalize incidents and holds dirt, and won't wash clean. EMSL scientists are designing and developing an anti-sticking chemical layer to treat the surface and to alleviate this problem.

O'Neill foresees a whole new spectrum of solar-unique materials and processes. "The ultimate application of several of these processes may be for manufacturing in space," he says.

RAIL Celebrates Decennial

On March 27, the Radar and Instrumentation Lab celebrated its tenth anniversary. RAIL was officially born March 1, 1977. Lab Director Ed Reedy opened the celebrations with a brief history and some highlights:

- RAIL's early, rapid growth from 115 to 220 employees which resulted in new labs being formed from RAIL, for example, the Computer Sciences and Technology Lab which was later reorganized into ECSL.
- Development of the longest running and most successful short course at Georgia Tech (in dynamics and control and operation). "Principles of Modern Radar."
- Move of the major portion of RAIL from the campus to Cobb County in November 1978.
- Establishment of a field office in Fort Monmouth, New Jersey, in 1983.

- Formation of several spin-off companies: Gulf Applied Research, Pulsetek, and AEI/ESI.
- Nick Currie gave a slide presentation showing RAIL's world-wide activities. RAIL has done research in Canada (Toronto and the Arctic Circle), St. Croix (Virgin Islands), Hawaii, Kwajalein in the South Pacific, France, Germany, Australia, and Japan.
- Bob Trebits showed a humorous film depicting the trials and tribulations of many employees who have taken part in field operation trips over the decade. Employees who were in RAIL at its inception, and who are still working in the Lab, were introduced—along with former RAIL employees now in other GTRI areas or working at other companies.
- Jerry Eaves was the lucky winner of the slogan contest. His entry was "The RAIL Thing!"

Ninth Task Team Appointed

A ninth task team has joined the eight others that recently began examining GTRI's various work and program systems in search of greater cost effectiveness. The new Organizational and Policy Effectiveness Task Group has organized with Jim Scheer (RAIL) as leader. Other members are Jim Gallagher (EML), Larry Holland (SEL), and Herndon Jenkins (ECSL).

PROFESSIONAL ACTIVITIES

ECONOMIC DEVELOPMENT LAB

John Nemeth spoke on the recycling of hazardous waste at the Georgia Department of Community Affairs—Southeastern Recycling Conference on April 3. Claudia Huff made a presentation on stress management to the Atlanta section of the Society of Women Engineers on March 24.

On March 10, Chuck Ross spoke on "Georgia Tech's Energy Integrated Dairy Farm" at the Georgia Cogeneration Society meeting in Atlanta.

GTRI's first "Introduction to Management Vision" workshop was given by Costa Souklos and Chris Thompson April 3 in Atlanta. It drew some 20 participants.

David Cilliton spoke on "Georgia Tech: A Century of Service" at a regional seminar in Orlando April 27-28. The seminar, titled "The Higher Education-Economic Development Connection: Making the Partnership Work," was sponsored by the American Association of State Colleges and Universities of the SII National Association of Management and Technical Assistance Centers.

On February 2-4, David Chatham, educational director in the Maco office, attended the American Society of Engineering Education Annual College/Industry Education Conference in Orlando, where he was especially active in discussions on the "open" site concept for the AMC/ENMTU network.

The March issue of Building Operating Management featured an article on "Weighing Dual-Fuel Options" by Doug Moore.

ELECTROMAGNETICS LAB

Abbas Saadat presented a paper entitled "Photoluminescence Studies of Coupled Quantum Well Structures in the AlGaAs/GaAs System" at the International Society for Optical Engineering Conference on Advances in Semiconductor Structures, held in Bayport (FL) March 25-27.

ELECTRONICS & COMPUTER SYSTEMS LAB


ENERGY & MATERIALS SCIENCES LAB


OFFICE OF THE DIRECTOR

Lanny Feorene was an invited speaker at the Manufacturing Management Conference held March 24 in Atlanta in conjunction with Southern Radar & Instrumentation Conference on March 28-30. STI Director Charles Watt is a member of the advisory committee and chairman of the panel. The meeting will feature presentations on SII developments and related technologies by Georgia Tech researchers, Army Missile Command SII program managers, contractors, and others.

Pat Burns presented a paper entitled "Some Novel Concepts for Antenna and RCS Measurements" at the Fifth International Conference on Antennas and Propagation, held March 30-April 2 at the University of York, United Kingdom.

PERSONAL NEWS

ECOLOGICAL DEVELOPMENT LAB
Delora Gould is a new senior secretary with the Asbestos Group. Patricia Parkhill joined the Augusta Regional Office as an RE I. The following have resigned their administrative secretary positions: Pam Ford, Augusta Regional Office; Melissa Merritt, Gainesville; and Delorise Music, Brunswick. ELECTROMAGNETICS LAB
Huntsville Operations: The staff of the Huntsville Operations welcomes Dr. John F. Stalnaker, SRS, to work in the aerodynamics technical area. He comes to GTRI from Lockheed Missiles and Space Company, where he was a group leader in computational methods, developing fluid and mechanical codes. He is a graduate of West Virginia University and Louisiana State University.
Welton has also Dr. Barry D. Bullard, RE II, who will work in the HAWK technical area. He previously was an associate professor of engineering at the University of Central Florida and a senior radar systems analysis engineer at Martin-Marietta Aerospace. He is a graduate of Southern Technical Institute, Georgia Southern College, and Florida Institute of Technology.

And welcome to Robert H. Carnesi, Jr., RS I, another addition to the aerodynamics area. He is a recent graduate of Tulane University. Other new hires include Jeff Griff-

fin and Jenny Coons as data collection specialists. Promotions this year go to Dana Bailey, senior secretary, and Paula Ferguson, word processing specialist.

Artificial Intelligence Branch: The AI Branch welcomes Stefan Roth, RS I, and Patricia Altman, software license coordinator. Roth will continue developing Georgia Tech’s Generic Expert System Tool (GEST), and will be involved in route planning and image processing contract work. He was a student assistant and GRA in the AI Branch for 2½ years, and received his master’s in ICS from Tech in December 1986.

Altman will coordinate the sale of GEST licenses to the rapidly growing government and industry market. She received an associate degree in computer science from Lake City Community College and is currently pursuing a bachelor’s degree in management from Georgia Tech.

EDC Electronic & Computer Systems LAB
ECSL bids good-bye to Tim Smilovy of CSD and David Hicks of EED.

ELECTRONICS & MATERIALS SCIENCES LAB
EMSLOD welcomes Dr. E. Henry Chua, principal research specialist, OFFICE OF THE DIRECTOR
Carolyn Mahaffey has transferred from ECSL to become a member of OOD’s Research Operations Analysis/Modeling Group.

RADAR & INSTRUMENTATION LAB
RRL’s New Jersey office has dropped the designation “NCTR” and will now be known as the Fort Monmouth Office (FMO). Welcome to co-op William Gunn, a junior majoring in EE, and GR Scott Hrasar, who recently received his BS from Ohio State.

SERVICE GROUPS
Herschel Brown has resigned from the Research Communications Office.

SYSTEMS ENGINEERING LAB
The March Employee of the Month is John Scholz of the Concepts Analysis Division (CAD). He was cited for not only bringing in follow-on work, but also establishing a funding vehicle with a new sponsor with potential cap exceeding $2 million.

Anne Copeland has been appointed associate head of the Mission Analysis Branch of CAD.

Daniel Wehl has joined the Countermeasures Development Division, Prof. Marni Boyce has resigned. SYSTEMS & TECHNIQUES LAB
STL welcomes James P. Jacobson, RE I, and G. D. Blockowicz, student assistant; and two former STL coops, Kenneth A. Oberkoller, electronics specialist, and Glenn D. Hopkins, RE I.

Marvin R. Hill, Jr., was promoted to research technician, not research technician as reported last month.

Personal Notes

EDL: Tim Beck was married to the former Susan Trees on March 21.

EMSL: A speedy recovery to Tom Elle, who had gall bladder surgery on March 29.

ECSL: Congratulations to newlyweds Peggy Cloningier and Paul Glass, also environmental engineers. The couple honeymooned in Hawaii.

RRA: Congratulations to Cece Edweis and Virgil Winslow on their recent marriage. Her new last name is Hedrick.

Congratulations also to Powers Garmon on the birth of a daughter.

Mintz and Ramunno Hang Up Hats

by Pat Mathiasmeier, CRSD

One of the recent courses offered in the CRSD Training Facility is Freelance Plus, a graphics package from Lotus for reports and presentations. Freelance Plus can produce word charts, graphs, forms, signs, newsletters, line drawings, logos, organizational charts, freestyle drawings, and automatic charting from Lotus 1-2-3 or Symphony data. Freelance Plus has a user community interface similar to that of Lotus 1-2-3. It should feel familiar to most 1-2-3 users and is far easier to use than most business graphics packages. Context sensitive help screens provide help on-line.

A symbol library of pre-drawn objects is available. Sixty-four subject libraries contain up to 20 items each, such as maps, text boxes, computer components, office furniture, and international traffic icons. Pre-defined word chart templates can be used to create bullet charts, paragraph-style charts, or many other types of word/text slides. ASCII text files created by word processing software can be imported into Freelance Plus and combined with any of the graphics elements. With the automatic graphing feature, common charts such as pie, bar, line, and scatter/XY can be generated from data. Data can be entered from the keyboard, or imported from Lotus Symphony spreadsheets, or from dBASE files. These charts can be edited to change the size, color, shape, font, or fill pattern. They also can be merged with text symbols, diagrams, drawings, graphs, or maps created in Freelance Plus or furnished in the symbol library. Graphics created in Lotus 1-2-3, Symphony, or Graphwriter also can be imported and edited.

Freelance Plus runs on an IBM PC, XT, or AT with 386K memory. A wide variety of output devices are supported. Freelance Plus drawings can be routed to laser and dot matrix printers, the Polaroid Palette and Matrix cameras, several plotters, and the Videolthank 150 and 160.

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Software Review

by Pat Mathiasmeier, CRSD

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Ann Mintz (left) and Dee Ramunno will retire April 30. (Photo by Margaret Barrett)