

The GTRI Connector

Did You Know...

A person's nose and ears continue to grow throughout his or her life.

The oldest rocks in the world, the so-called St. Peter and St. Paul stones in the Atlantic Ocean, are 4 billion years old.

— from *2210 Fascinating Facts* by David Louis

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Inexpensive, Rugged, Reliable & Compact

Millimeter Wave Rotman Lens Offers Electronically Scanned Antenna

By John Toon, RCT

Researchers in SEAL have designed and built a prototype Rotman Lens that operates at millimeter wave frequencies. Because it has no moving parts, no phase shifters and can be implemented in plastic, the electronically scanned device offers an inexpensive, rugged, reliable and compact alternative to current millimeter wave antenna technologies.

The prototype is believed to be the first Rotman Lens to operate at a frequency as high as 37 GHz. Variations of

the antenna could be used in a range of military and civilian applications, including tank radars, all-weather aircraft landing systems, communications equipment, missile seekers and automobile collision avoidance systems.

"We have taken a first step toward ... a really inexpensive millimeter wave antenna that would be useful in a growing number of applications," says Ekkehart (Otto) Rausch (SEAL). "Radars and communications devices in the millimeter wave region are becoming more widely used. There are many applications where you would like to have an antenna that is very low-cost, simple, rugged and reliable."

The research was supported by the U.S. Army Research Laboratory.

The device got its name from its ability to focus microwave or millimeter wave energy coming from a particular direction by passing the electromagnetic energy through a pair of parallel plates shaped like a lens. Beam-forming or focal ports are located on one side of the plates, fed by a switch array. The array ports are on



Otto Rausch attaches waveguides to prototype Rotman lens. (Photo by Stanley Leary)

the opposite side, each connected to an antenna element. Energy fed into a specific focal port emerges from the antenna elements and produces a beam along a particular direction.

Continued on page 5

Bodnar Named Chief Scientist at Rome Laboratory

By Lea McLees, RCT

A longtime GTRI employee recently was named chief scientist of the U.S. Air Force's Rome Laboratory in Rome, N.Y.

Donald G. Bodnar (SEAL), who began work at Georgia Tech in 1967, will be the principal science and technology



Donald Bodnar

advisor to Rome Lab Commander Col. Ted Bowlds on formulation, planning, managing and integrating the lab's research, exploratory and advanced development programs. He was appointed to the post by the Air Force Materiel

Command headquarters at Wright-Patterson Air Force Base in Dayton, Ohio. Bodnar is one of just four chief scientists for the four U.S. Air Force Laboratories.

This is a very dynamic time for the Department of Defense in general, and for the Air Force in particular, Bodnar says.

"The mission of the Air Force has changed dramatically with the end of the Soviet threat and the emergence of multiple, smaller hot spots around the world," he explained. "The types of intelligence required to handle these situations and the flexibility of air lift and communications is quite different. Rome Lab is rethinking its alignment to these needs, so it's an exciting time to be here."

Continued on Page 8

Observed & Noted

This month we finish meeting members of the Administrative Information Systems Team. Turn to page 2 for an introduction to Elizabeth Bell and Angela DuBose.

New materials are available

from RCT for use with sponsors, potential sponsors and friends of GTRI. Learn what's available on page 3.

GTRI researchers and colleagues around campus are studying the use of

plants to break down explosives. Read more about this fascinating work on page 4.

Remember when Tech parking permits cost 25 cents? James Johnson does -- he's done GTRI research for

45 years -- and counting! Meet James on page 5.

Harry Ross and his colleagues took GTRI's research property system from a metal file box of cards to today's sophisticated

computer system. Find news from Harry's retirement party on page 6.

Five recent graduates are recognized in this issue. Review their ac-

complishments on page 6!

The First Annual Research Scramble Golf Tournament was a success. Savor the victory of Neal Alexander and Karen Moss on page 7.

News & Notes

Meet the Administrative Information Systems Team

This month we will finish meeting members of the Administrative Information Systems Team (AIST), managed by Tom Brown. AIST develops and maintains GTRI's information technology infrastructure. This group is responsible for database and systems support, as well as data architecture and transport.

Elizabeth Bell, Systems Analyst IV, has been with AIST for just over a year.



Elizabeth Bell

Some of her responsibilities include system analysis, data modeling, database design and administration, PL/SQL programming, and web server development and administration. Her goal is to make departmental information available and useful to the GTRI community. Before coming to GTRI, Elizabeth worked as an Oracle database administrator for Race Track Petroleum for six months and spent

10 years before that working for Southern New England Telephone in Connecticut.

A Tech graduate, Elizabeth moved to Atlanta from her native Arkansas to pursue a bachelor's degree in civil engineering. She later went on to earn a master's degree in computer and information science from the University of New Haven in New Haven, Conn. Elizabeth now lives in the Fernbank area with her four-year-old son, David, and their six-month-old puppy, Lucky. She spends most of her free time working around her house and gardening.

Angela DuBose, Systems Analyst III, began her career at Georgia Tech in 1973 working as a secretary in the Student Center Programs Area. After less than a year she transferred to the Engineering Experiment



Angela DuBose

Station (EES), which is now GTRI. She left EES 2 1/2 years later when she moved out-of-state. But she returned to Tech in 1980 when she began working as a secretary in the Office of Contract Administration (OCA). Angela stayed in OCA for nearly 10 years after becoming involved in the original database implementation for OCA data as a telecommunications specialist

and then as a data processor, evolving with their database system as it moved from a Burroughs system to their present M204 system. In 1989 Angela moved to the Research Property Department, where she was responsible for programming and database design and implementation in the Oracle and PC realm. She began her current position in 1994.

Angela assists in database modeling, design and administration and system administration. She handles the "data loads" into the ORACLE realm from the monthly close-out, as well as GTRI's legacy accounting and OCA's systems. She also sets-up e-mail and Oracle accounts and acts as GTRI's liaison to the casbah system administrator involving aliases, lu changes and client/server files.

Angela grew up in the Atlanta area and most of her family still lives nearby. She and her husband, Charles, live in Riverdale with their two daughters, Amanda, 9, and Stephanie, 6. The family members share their home with a cat, Dumpling, and a dog, Shadow. When she's not working, Angela spends time with her family, riding bikes or practicing softball. Her family is also very active in Girl Scouts and church activities.

SELECTED AUGUST 1996 AWARDS

Title	PI/Laboratory	Sponsor	Funded Amount
Analysis of HH/MH-60C SLEP Requirements	Crawford, C. (AERO)	Air Force	\$ 24,500
Investigation of F-15 Unsteady Flows...	Englar, R. (AERO)	Air Force	30,000
Task A1: ASTS Vertical Flight Demonstration	Stancil, C. (AERO)	SAIC	58,537
Recon. Pulse Density Analysis	Mayhew, B. (ELSYS)	SAIC	28,000
High Contrast Azimuth Indicator	Willis, M. (ELSYS)	Air Force	1,000,000
ALQ-161 Waveform Generator SIU	Strike, T. (ELSYS)	Air Force	100,000
System Integration & MWS Engineering Support	Brooks, J. (ELSYS)	Air Force	628,600
Laminated Matrix Composites - A New Class of Materials	Lackey, W. (EOEML)	Air Force	148,802
Processing Struct. & Prop. Interrel. for Laminated Matrix...	Lackey, W. (EOEML)	Nat'l. Science Foundation	175,871
Add On: Dev. of a Market Test Guidebook for Tool Dev.	Tschirhart, R. (EOEML)	U.S. Dept. of Commerce	41,605
Exper. & Theor. Studies of Potential New Atmospheric...	Wine, P. (EOEML)	Nat'l. Science Foundation	110,000
R22 Study in Daytona Beach, Fla.	Bayer, C. (EOEML)	Inter-City Products Corp.	27,613
Updating of EPA Lead Abatement Worker Curriculum	Ainslie, V. (EOEML)	Environ. Protection Agency	47,894
Tunnel Electroluminescent Device:	Wagner, B. (EOEML)	David Sarnoff Res. Ctr.	34,000
Measurement of OH, H2	Eisele, F. (EOEML)	NASA	224,000
FORSCOM G-4 R&D Support	Parker, D. (HRO)	Army	78,140
Air Defense Local Control Terminal Architecture	Dowdy, P. (HRO)	Army	42,847
Evaluation of Missile Sub-Tier Suppliers	Smith, J. (HRO)	Army	20,000
Ray Tracing Analyses	Pickering, L. (ITL)	Air Force	25,653
Eng. Change Proposal & Other Phase 3 Essential Tasks	Pennywitt, K. (ITL)	Logicon Eagle Technology	167,997
Advanced Message Processing Feasibility Study	Coleman, J. (ITL)	Army	49,995
Modeling of ATM Over Satellite Communications	Evans, J. (ITL)	Army	39,946
Navy 6 Requirements Analysis	Roberts, R. (SDL)	Manufacturing Tech. Inc.	65,058
Instrumentation Radar Antenna Procurement	Camp, S. (SDL)	Army	425,068
Waveform Simulator Operation Support	Kerr, R. (SDL)	Lincoln Laboratory	298,865
XM-15S Simulator	Camp, S. (SDL)	Army	123,765
Yellow Sea Internal Wave Acoustic Measurement Program	Caille, G. (SEAL)	Navy	556,735
Continued Development of Unique Math. & Stat. Signal...	Barnes, C. (SEAL)	Navy	64,968
False Image/False Target Investigation	Morris, G. (SEAL)	System Research Laboratory	46,303
SA Scanner Integration	Asbell, O. (SEAL)	Scientific Atlanta Inc.	23,524
Antenna & Transmitter Analysis	Corey, L. (SEAL)	U. S. Government	40,095
Advanced Missile Sensor Studies for Guidepost	Pullen, K. (SEAL)	Sparta Inc.	50,005
Tri-Service Elect. Protect. Assess. Analysis Description...	Morris, G. (SEAL)	Air Force	246,498
Elect. Protect. Assess. Analysis Technique Dev., D0#0010	Morris, G. (SEAL)	Air Force	200,000
RAMS Radar Support	Lane, T. (SEAL)	Johnson Controls	54,910
ECCM Assessment Analysis	Morris, G. (SEAL)	Air Force	45,000
Air Target Algorithm	Cohen, M. (SEAL)	TAU Corp.	50,000
Radar Hardware Development Analysis	Belcher, M. (SEAL)	Army	180,000
Compact, Low-Cost Electronically Scanned MMW Antenna	Rausch, E. (SEAL)	Army	150,000
IV & V Support to the Have Gaze Test Program	Tuley, M. (STL)	SAIC	94,297

GTRI Represented On General Faculty Executive Board, Standing Committees

The following colleagues represent GTRI on committees and the executive board of the General Faculty Assembly.

For more information on the General Faculty Assembly, including minutes of meetings, visit <<www.gatech.edu/hypermail/facinfo/>> on the Web.

Executive Board, 1996-98

Bill Holm (SEAL)
Anita MacDonald (SEAL)

Standing Committees of the General Faculty, 1996-97

Faculty Benefits Committee

Vicki Fennell (MAPS)

Faculty Status and Grievance Committee

Mark Richards (SEAL)

Jean M. Swank (ELSYS)

Statutes Committee

Rich Combes (EOEML)
John C. Adams (EDI)

Academic Services Committee

Ron Bohlander (ITL)

Public Relations Committee

James W. Cofer (APO)

Welfare and Security Committee

Bob Newsom (EOEML)
Robert F. Lang (RSD)
Katherine L. Schlag (ELSYS)

Copyright Committee

(Non-statutory)
Nancy Davis (EOEML)

Software Committee

(Non-statutory)
Kirk Pennywitt (ITL)
Nickolas Faust (EOEML)

GTRI Members of General Faculty Assembly, 1996-98

Mark Wasikowski (AERO)
Chris Downing (EDI)
Sherman Dudley (EDI)

Larry Edens (EDI)
Harris Johnson (EDI)
Jan Youtie (EDI)
Walter D. Addison (ELSYS)
Byron L. Coker (ELSYS)
Thomas R. Collins (ELSYS)
Louis B. Fertig (ELSYS)
Robert D. Kossler (ELSYS)
Linda T. Viney (ELSYS)
Rich Combes (EOEML)
Wayne Daley (EOEML)
Nick Faust (EOEML)
Kirk Mahan (EOEML)
Dara O'Neil (EOEML)
Gisele Welch (EOEML)
James O. Smith (HRO)
Jeffrey Aaron (ITL)
Anita MacDonald (ITL)
Lisa Sills (ITL)
Gail Woodward (MAPS)
Stephen V. Camp (SDL)
James D. Hawes (SDL)
Andre J. Lovas (SDL)
Mike Baden (SEAL)
Susan Dugas (SEAL)
Bill Holm (SEAL)
Lacey Moore (SEAL)
Ben Perry (SEAL)
Vince Sylvester (SEAL)
Ricky Moore (STL)
Lon Pringle (STL)

News & Notes

New Materials Available from RCT

Need GTRI information to share with sponsors, potential sponsors, or friends of GTRI? RCT has updated several of GTRI's main publications for those uses, and is adding some new publications, as well. New items include:

- Two just-produced GTRI **overview videos** — a 16-minute version and a 8-minute version.
- A **one-pocket folder** with an updated description of GTRI inside. Holds a business card and any other materials you want to add.
- A **general brochure about GTRI**, the work we perform and our laboratories.
- The **GTRI Strategic Plan**, printed on high-quality paper.
- Several **one-page fliers** on white paper with gold accents —
 - Food Processing Industry Programs
 - Manufacturing Technology Capabilities

Communications, Navigation and Networking
Safety, Health and Environmental Technology
Electro-Optics Capabilities

- A **brochure with pocket** on Modeling and Simulation at Georgia Tech. Holds a business card.

The following materials are in production:

- **One-page fliers** on —
 - Commercial Acoustics
 - Defense Acoustics
 - Missile Systems
 - Materials Research
- **Brochures** on —
 - Test and Evaluation Research
 - Electronic Protection Research
 - Information Technology Research
- **Brochures** to come later this fiscal year —
 - Radar Research
 - Antennas and Electromagnetics Research

For more information or to obtain these materials, call RCT at 404-894-3444.

Silent Auction to Benefit Scholarship Fund

Mark your calendars: The Georgia Tech Women's Forum's yearly silent auction is scheduled for Nov. 20 in the Student Center Ballroom, with all proceeds going to scholarships for Georgia Tech female students. The forum gives four \$1,000 scholarships, one to a graduate student and three to undergraduates.

All Georgia Tech employees can bid on items displayed at the auction — and they can donate items to be auctioned, as well, says GTRI's Eunice Glover (PST). Glover serves as this year's chairperson and Edwina Avinger (Career Services) is co-chairperson of the forum's fund-raising committee.

"Last year, some wonderful items were donated by the campus community, including football tickets, framed pictures, T-shirts, plants, needle craft, and other hand-crafted items," Glover noted.

If you'd like to donate something for the auction, call Glover at 894-6972 or Avinger at 894-2554. Your item will be picked up from your office.

Web Policies Finalized

Guidelines for World Wide Web use at GTRI were finalized September 6 and are available at the following address:
<<<http://www.gtri.gatech.edu/connector/www/>>>

This document fine tunes for GTRI the general web policy for Georgia Tech. It addresses potential uses, maintenance, content, network resources and more. The general Georgia Tech web policy is available at: <<<http://www.gatech.edu/itis/policy/www/>>>.



**Focus
on
Research**

Researchers test a pilot-scale phytoremediation system. (Photo courtesy Rae Adams)

Aquatic Plants May Defuse Soils Contaminated with TNT

By Mark Hodges, EOEML

At munitions factories, ammunition plants and military bases, the landscape often hides serious environmental hazards. Trinitotoluene (TNT) and other explosives, such as RDX and HMX, have accumulated over the decades in soils and some groundwaters. These pollutants now threaten to contaminate public water supplies or even trigger small explosions at abandoned and operational sites.

The solution to this problem may be helping nature restore itself. Researchers at Georgia Tech, Rice University and Louisiana State University are developing clean-up techniques relying on aquatic vegetation to defuse and detoxify TNT.

This approach, called phytoremediation, could become a useful substitute for incineration, the conventional method of disposing of TNT wastes which requires costly removal procedures. In laboratory studies, researchers are growing different species of aquatic plants and assessing their ability to break down and assimilate these polluting compounds.

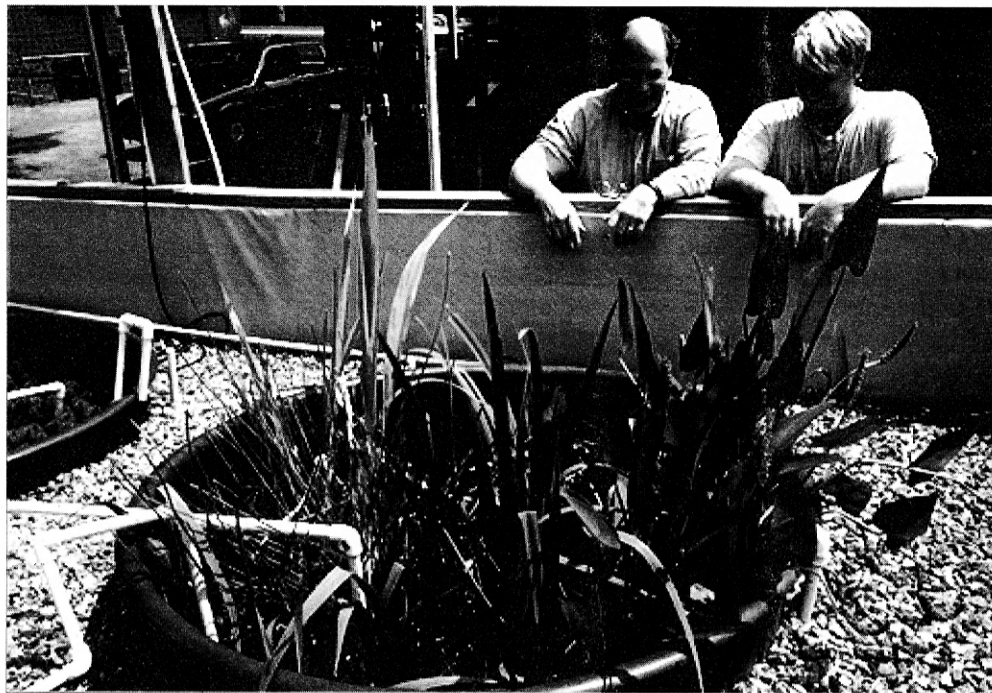
"The plants that seem to do the best job are submerged aquatic plants, which flourish in wetlands and are commonly viewed as nuisance plants in national waterways," says overall project director Michael Saunders (CE) "We think that phytoremediation could provide an effective and economical alternative that is preferable at some sites."

In independent studies, scientists already have found that some aquatic plants are able to assimilate TNT and convert it into less hazardous chemical compounds. The research teams at the three participating universities are building on these results in a multi-year study sponsored by the U.S. Environmental Protection Agency through the South & Southwest Hazardous Substance Research Center.

Louisiana State University faculty researchers are describing how TNT moves from contaminated soils to water and using this knowledge to build models of the process.

Researchers at Georgia Tech and Rice University are conducting basic studies of the way plants transform TNT and the "pathways" the compound follows during breakdown and assimilation.

At Georgia Tech, Saunders and Spyros Pavlostathis have led an effort to assess the TNT-reactivity of a variety of submerged aquatic plants. They have focused on optimal methods of cultivating plants, assessing phytoremediation kinetics and the role of microorganisms and sediments in



breaking down TNT. They also are determining if plants need a period of acclimation or continuous exposure to TNT to attain effective reactivity.

The Georgia Tech researchers have assessed the phytoremediation potential of approximately 20 aquatic plants, both as monocultures and parts of polycultures. They judged the most promising to be opportunistic, structurally simple species, such as *Myriophyllum* spp., *Elodea* spp., and selected algal species.

GTRI researchers have built a pilot-scale phytoremediation system on campus and are using it to test the conclusions of their laboratory studies. In this experimental lagoon, aquatic vegetation is fed with soluble TNT on a continuous basis. The field study began in the summer of 1995 and is still underway. Georgia Tech researchers have supported another field demonstration at a military ammunition plant, with funding from the U.S. Army.

Through these field tests, the researchers are learning some of the problems that must be resolved before a phytoremediation technology is ready for practical use.

Transformation Mechanisms Much-Debated

The mechanisms used by plants to transform and assimilate TNT have produced much scientific uncertainty and debate. According to one theory, a plant enzyme, known as nitroreductase, triggers the initial reduction of the TNT molecule. Georgia Tech and Rice researchers have found evidence that the aquatic plants assimilate TNT and use it for structural growth.

Three key processes appear to take place. TNT nitro groups are reduced to form a series of amino-nitro toluenes. This process takes place within several hours and makes the contaminant non-explosive. The TNT derivatives may be conjugated, a process in which the plant attaches compounds of higher molecular weight, such as glucose, to the contaminant. Conjugation allows detoxification, cellular transport and cellular

storage of TNT. This process acts in concert with plant growth processes and takes weeks to complete in parallel with plant growth processes. The final key process in phytoremediation is assimilation of TNT constituents into plant tissues. The Georgia Tech group found that aquatic plants do not use the TNT amino-nitro toluenes as nutritive sources of nitrogen. Instead, they incorporate these contaminant byproducts into storage, where they are used to produce cell tissue. The assimilation process also takes several weeks to finish. These remediation processes conform to the plant's life cycle, but they take place faster than when TNT is broken down by microbial systems.

Another important finding has been determining where TNT degradation occurs. As Hughes' carbon-14 study showed, transformation does not appear to take place in the soil or water, but instead happens inside the plant and at the plant surface. Some of the resulting amino-nitro toluenes leak into the surrounding water, where they are taken back up into the plant and assimilated.

Sunlight's Impact Studied

Reactivity with vegetation is not the only factor affecting the breakdown of TNT in solution. Dr. Chris Tiller, a Georgia Tech assistant professor of civil and environmental engineering, tested the effect of sunlight on TNT transformation. When exposed to photolysis, TNT-contaminated water turns red or pink when it lacks reactive aquatic plants. The resulting "redwater" contains condensation and polymerization products so difficult to break down that they are considered a remediation dead end. Tiller found that the presence of reactive vegetation in the water triggers such a rapid transformation of TNT that sunlight has little dampening effect. In Tiller's words, "photo doesn't hurt phyto."

Much development work remains, but the prospects look good that plants can effectively defuse this explosive national environmental problem.

Lens

From page 1

the opposite side, each connected to an antenna element. Energy fed into a specific focal port emerges from the antenna elements and produces a beam along a particular direction.

Switching the input from focal port to focal port steers the beam electronically in one direction across a 45-degree arc. The switching could be done with pin diode switches, which are also simple, reliable and inexpensive.

Previous Rotman lens antennas were developed at frequencies of 18 GHz or below, Rausch said. Most were produced in microstrip. But because microstrip is very lossy at high frequencies, it is not suitable for the millimeter wave region. Instead, waveguides and an air dielectric must be used between the parallel plates to reduce losses to 1 to 2 dB.

With modeling assistance from Andrew Peterson (ECE), Rausch designed and fabricated an antenna milled out of solid aluminum. Rausch talked with more than 20 fabrication facilities before locating the New Jersey company that used electrical discharge techniques to carve the necessary shapes at required tolerances of 0.0005 inches.

"Everything about this lens, from the width of the waveguides to the shape of the absorber foam, matters a great deal," he

says. "The surface roughness and even the placement of the screws all have been designed according to strict design principles."

Jay Sexton assisted with design. Mitch Cole laid out the design in AutoCAD and contributed his technical expertise to fabrication. Greg Hampton made the accurate waveguide extensions required for the measurements, and measurements were collected by Mitch Kappa. Kevin Murphy assisted with measurement analysis.

Production antennas could be hot-pressed in plastic and coated with a conductor such as gold. The antenna feed horns and switch array could be made the same way, keeping costs low.

The Rotman lens antenna also offers very low throughput loss and sidelobe emissions. In the prototype Peterson and Rausch developed, sidelobe power can be suppressed by a factor of one-thousand below the energy of the main beam. The power loss through the lens is less than 2 dB.

Most antennas operating at millimeter wave frequencies use mechanical scanning or phase shifters, both of which have disadvantages. Mechanically steered antennas are slow in response and suffer reliability problems from shock and vibration. Phase shifters are costly to fabricate and introduce considerable RF losses. By avoiding those drawbacks, the Rotman lens antenna could open new applications for millimeter wave radar.

To be successful in some applications that Rausch envisions, the antenna's operating frequency must be expanded, and the capability to scan in two dimensions added. Potential applications include:

Autonomous aircraft landing systems: A synthetic vision system based on millimeter wave radar could produce images through fog, allowing aircraft to land even when runways are obscured.

Synthetic vision for ground vehicles: Vibration and harsh operating conditions limit use of conventional antennas for seeing through fog and smoke. A Rotman lens antenna integrated into a tank's structure, could eliminate the need for an external dish and provide necessary reliability and ruggedness, Rausch said.

Automobile collision avoidance systems: Collision avoidance systems built into automobiles could warn drivers of approaching vehicles.

Commercial communications: Rotman lens antennas could be used in short-range, building-to-building wireless communications.

Missile seekers: Its low cost, reliability and compactness could find application in airborne systems such as missile seekers.

A paper on the Rotman lens has been submitted to the 1996 Antenna Applications Symposium. Another abstract on the Rotman lens was submitted to the 1997 National Radar Conference.

James Johnson: 45 Years — and Still Counting! — at GTRI

By Lea McLees, RCT

Georgia Tech parking stickers cost 25 cents when James Johnson joined the State Engineering Experiment Station on October 8, 1951. Georgia Tech had one of only two electron microscopes in the Southeast, and much of what we today know as our campus home was still residential property.

Ten directors, an organizational name change, and innumerable parking fee increases and Tech construction projects later, Johnson still arrives at GTRI each day by 7:30 a.m. to work. In fact, he celebrated 45 years with GTRI at an Oct. 14 reception organized by his EOEML materials science branch colleagues.

"I just enjoy what I'm doing and the people I'm working with, GTRI colleagues and clients alike," says Johnson, a senior research scientist, when asked why he has continued working for so long. "I've been exceptionally lucky in that regard. They are all just really nice people."

Johnson began his GTRI career after completing a bachelor's degree in physics from North Georgia College. He was interviewed for a Research Scientist I position on a Saturday — EES was open half-days on Saturdays then — and met the director, Gerald A. Rosselot, in person right after his interview. At that time, EES employed about 50 people.

"Probably many projects today have larger budgets than all of EES did back then," he said.

Most of his work is analytical in nature, exploring the properties of various materials using electron microscopy, X-ray dif-

fraction and optical microscopy.

"We started out primarily as a kaolin lab — we worked on clay for several years," he said. Since then, kaolin has become one of the most prominent filler materials used — it contributes to the quality of writing paper, kitty litter, paints and more.

"Tech had the only electron microscope in the Southeast, except for Oak Ridge," he recalls. "It was presented by the Rockefeller Foundation in 1948: The RCA-EMU2. And at that time, virtually nobody had heard of a scanning electron microscope!"

Since then, Johnson has studied everything from moon rocks to high-temperature materials. He was involved in four experiments on Skylab, most of which investigated metallurgical questions on improving ball bearings and other casting techniques.

The most exciting work Johnson has done — so far! — has been analysis of the steel used on the space shuttle Challenger after it exploded.

"And Skylab was exciting — it was so early in the game," he said. "It was interesting to go to Huntsville and watch the simulation tanks for the astronauts."

One of Johnson's early sponsors was an astronaut with NASA. She would have been the first female in space, had an illness not grounded her.

He retired after 38 years of full-time work in 1989, but has worked part time since then. Today, Johnson works on all kinds of materials characterization projects including failure analysis, minerals, polymers, thin films, corrosion, electron-

ics, ceramics and more. EOEML materials branch researchers appreciate the expertise Johnson offers.

"He's always very helpful, friendly and approachable," said Jack Lackey. "He knows the equipment in our branch better than anybody else."

"James knows all the answers, or at least, most of them," said Lisa Dettner-Hoskin.

And based on what his wife, Johnnie, says, GTRI will benefit from Johnson's expertise and skill for years to come.

"His grandfather worked until he was 90!" she said.



James Johnson (standing) and his wife, Johnnie, celebrated his 45 years of work at GTRI with materials science branch colleagues recently. (Photo by Lea McLees)

News & Notes

Harry Ross and his wife, sons and daughter-in-law celebrate his retirement. (Photo by Lea McLees)

Leaves GTRI An Excellent Property Management System

Harry Ross Honored at Retirement Party

By Lea McLees, RCT

Whenever you meet Harry Ross in the hall or around campus, one thing is certain: he'll have a great joke to tell.

The same was true at his Sept. 18 retirement reception — he entertained with a story about the Pope chauffeuring his chauffeur, and getting stopped by a policeman in New York. Harry knows so many jokes that none were left over for Evan Chastain, the master of ceremonies, to tell those gathered for the celebration.

"I did a lot of research about which jokes to tell here today, and every time I came up with one, people said 'Harry's already told that one'," Chastain said.

More than 60 people attended the celebration honoring Harry's July retirement. Special guests included Harry's wife, Betty; his son Dan, a compensation analyst in OHR; and his son Mark and daughter-in-law, Susan.

Harry retired from the U.S. Army 17 years ago, after serving for 26 years, including four years teaching ROTC at Tech. In 1979, GTRI recruited him to manage research property. Harry and his group took the research property system from a metal file box of index cards to today's sophisticated computerized system and a GTRI-wide team of property coordinators, says Evan Chastain, director of support services.



"Harry's leaving us with a system that has been held up by the government to other organizations to emulate," Chastain told those gathered at the reception. "He's done a good job of organizing that and hiring good people."

Harry credits his colleagues Sandy Kirchoffer, Bert Watkins, Angela DuBose, Wanda Tombow, Paul Hawley and Mary Henderson and everyone in GTRI with helping make the system succeed.

"Everyone in here has contributed to our success, and I am surely and dearly appreciative of it," he told those gathered at the reception. "My staff worked by my side to make the office what it is."

Harry also was very involved in research property management professional organizations. He is president of the Shamrock Chapter of the National Society of Property Administrators (NPMA). He arranged for Douglas Goetz, a professor at the Ohio State University and editor of NPMA National Property magazine, to

speaking to Georgia Tech employees in October 1995.

But Harry also has made sure his Georgia Tech colleagues had fun. He was president of the Yellow Jacket Bowling League every year but two since 1979. He arranged "Tech Night" at the Braves and negotiated half-price tickets for employees. Harry is known for his culinary skills at the grill, and has cooked for organizations around campus as needed, as well as for volunteer groups in metro Atlanta. He's also known for his great energy: Harry was usually jogging around the Tech campus each morning before most of us were still trying to open our eyes!

Chastain presented a Ramblin' Wreck replica, a plaque and a gift certificate for Sears in honor of his retirement. Now that he has more free time, Harry is teaching research property management classes around the country, and works for GTRI hourly as needed. He'll be doing more fishing, too.

Way to Go, Grads!

Congratulations to our colleagues who recently completed degrees:

Tom McElwain (STL) completed a master's degree in statistics at Georgia Tech. His thesis addressed "L-Estimators Used in CFAR Detection," and his adviser was Marcus C. Struill. A research engineer, Tom applied statistical principles to the design of "smart" algorithms to track low observable targets. He will move to Nashua, N.H. to work as a principal electrical engineer in the Advanced Engineering and Technology Division at Sanders, a Lockheed-Martin company.

Wusheng Tong (EOEML) earned a Ph.D. in physics from Tech while working as a GRA in the Advanced Materials Technology Division. His thesis addressed "Chemical Beam Epitaxial Growth of ZnS: Growth Kinetics and Novel Electroluminescent Structures," and his adviser was Chris Summers (EOEML). Wusheng is working as a research scientist, continuing re-

search development of thin film phosphors for flat panel displays.

Ashesh Parikh (EOEML) completed a Ph.D. in physics from Tech while working as a GRA in the Advanced Materials Technology Division. His dissertation addressed "Thermodynamics and Surface Kinetics of the Growth and Doping of HgCdTe Heterostructures by Metalorganic Molecular Beam Epitaxy," and his adviser was Chris Summers (EOEML). He is now a scientist at Hewlett Packard in Fort Collins, Col.

Jenny White Howard (EOEML) completed a master's degree in physics from Tech. She worked as a GRA with Gary Gimmetad (EOEML), exploring development of a pulsed laser system that will measure atmospheric turbulence. Jenny is now looking for her first full-time job!

Magnus Rognvaldsson (EOEML) earned a master's degree from Tech in industrial and systems engineering. He was a GRA with the Intelligent Machines Branch, and worked with the Robotic Visual Servicing research team under the Agricultural Technology Re-

search Program. Magnus' thesis addressed "Machine Vision Approach for Visual Servo Controlled Robotics." Wayne Daley (EOEML) was one of his thesis advisers. Magnus came to Georgia Tech from Iceland, where he previously worked as a design engineer with Marel Corp., a producer of advanced food processing equipment. He accepted a new position with an American subsidiary of that company, Marel USA, and will be involved in new product development at their Kansas City, Mo. office.

Jeffrey L. Moore (EOEML) earned a master's degree in analytical chemistry from Tech. He has been working in chemical sensor development as a research technician, and will now work as a research scientist.



GTRI Greetings

Welcome to some of our newest employees!

Ten Good Things We Know About David Roberts

1. David was hired as a Research Scientist II in the Computer Science and Information Technology (CSIT) branch of the Information Technology and Telecommunications Lab (ITL) last June. He's not to be confused with the David Roberts in the Electro-Optics, Environment and Materials Lab (EOEML). They're two different people.
2. He supports development of the High Level Architecture (HLA) for the Defense Modeling and Simulation Office (DMSO). David has worked for the last four years in distributed simulation and is chairperson of the Distributed Interactive Simulation (DIS) Testing Special Interest Group at the bi-annual DIS Workshops.
3. A student in the School of Industrial and Systems Engineering (ISyE) here at Tech, David is working toward a Ph.D. with an emphasis on human machine systems.
4. Before coming to GTRI, David lived in the Washington, D.C. area, where he worked at Booz Allen & Hamilton Inc., and then at Science Applications International Corp. (SAIC).
5. David attended Cornell University in Ithaca, N.Y., where he received a bachelor's degree in operations research and industrial engineering.
6. He later earned a master's degree in computer science from Johns Hopkins University in Baltimore, Md.
7. David was a past vice president and membership chair of the D.C. Metro Chapter of the National Society of Black Engineers-Alumni Extension (NSBE-AE).
8. A native Jamaican, David says that he is glad to be back in a warmer climate.
9. David and his wife, Lindia, live in Stone Mountain with their daughter



David Roberts



Anne Leavitt

Corena, 4. They are expecting a son in November.

10. Although his school and work responsibilities keep him very busy, David says he enjoys spending his free time with his family.

Ten Good Things We Know About Anne Leavitt

1. Anne began working in the Signatures Technology Laboratory in May.
2. An office automation specialist, Anne's responsibilities involve translating data from printed into electronic form.
3. Before she started working for GTRI, Anne was a software trainer for Accucomm, an Internet service provider in Irwington, Ga.
4. She is a graduate of Georgia College in Milledgeville, where she earned a bachelor's degree in computer science.
5. One weekend each month Anne works in intelligence for the Air National Guard.
6. Although she has lived all over the United States, Anne thinks of Georgia as her home because she has lived here longest: six years.
7. She now lives in Snellville with two roommates and her cat, Chloe.
8. In her free time, Anne enjoys visiting friends, canoeing and square dancing.
9. One of Anne's hobbies is fish. At the moment she only has two, but she has a large aquarium and hopes to fill it up with fish soon.
10. Another favorite activity is flying. She is working on her private pilot's license.

First Annual Research Scramble Golf Tournament A Success

By Lea McLees, RCT

SEAL's Neal Alexander and Karen Moss took home winning honors at the First Annual Research Scramble Golf Tournament held Oct. 10.

Their net score was 71.2, which allowed them to squeak past Ed Reedy (RO) and retiree Lloyd Lilly to claim victory by .7 of a point.

"Neal and I experienced the ultimate in teamwork — if one of us had a bad shot, the other followed up with a great shot," Karen said. "We all had a great time, and I hope this is beginning a new tradition at GTRI."

"Actually, all our competitors are just lucky we had an off day, or the beating would have been a lot worse than it was," Neal chimed in.

Additional winners included Michele Verone of Therrel-Kizer Roofing, Inc., who took home the award for longest drive; and SDL's Rich Ray and Alan Kovatch, who won closest-to-the-pin awards.

The tournament at the Centennial Golf Club in Acworth began with a conversation between golf enthusiasts Ed Reedy (RO) and Rusty Embry (SSD), recalls Cheryl Lilly (ELSYS), who helped organize the tournament.

"Both of these guys will use any excuse available to play golf," Cheryl said.

No GTRI funds were used, and participants took vacation time to play. All proceeds from the \$55 registration fee went toward door prizes and awards for the players. GTRI employees, their immediate relatives, sponsors and other Georgia Tech employees were invited to play.

"Rusty and Cheryl did an excellent job of organizing and conducting the tournament," Neal said. "We all had a great time because of their hard work."

Additional golfers included Embry; Joe Brooks (FSD); Greg Goolsby (Chem Eng.); Terry Hilderbrand (ITL); Jim Allison (MAPS); Mike Heberger and Dan Sutton of Therrel-Kizer; Gary Williams (MARC); Jack Lackey, Mike Harris, Stan Halpern, John Nemeth and Bob Hendry (EOEML); Jack Hart, Tom Autrey, Bill Rogers, Linda Schuett, Bud Sears, Kim Cole, Neil Lareau and Lou Fertig (ELSYS); Jim Sangston, Jim Scheer, Ken Waters and John Daher (SEAL); Gene Clompton (ME); and Cliff Eckert (AERO).

Companies that sponsored the tournament included Therrel-Kizer Roofing, Inc.; Collaborative Design Group; Scapecare; Georgia Tech Athletic Association, Alumni Association and Bookstore; Wyndham Garden Hotel — downtown and Vinings locations; Atlanta Marriott Northwest; Northwest Atlanta Hilton; Renaissance Atlanta Hotel; Papa John's Pizza; Mrs. Winner's Chicken and Biscuits; and Mildred C. Cole of ReMax-Marietta West Office.

Tentative plans are to rename the event the "semi-annual" research scramble and hold a tournament each spring and fall. To suggest a golf course or improvements on the tournament, contact Cheryl Lilly (404-894-0721; cheryl.lilly@gtri.gatech.edu) or

Continued on page 8

Focus on Folks

A total of 34 GTRI employees and friends spent a day of vacation playing golf together. (Photo by Cheryl Lilly)



Focus on Folks

Professional Activities

Information, Technology and Telecommunications Laboratory

On September 29, **Jay Harrell** presented an invited talk titled "Introduction to Firewalls" at the NCSA's 1996 Firewalls, Web and Internet Security Conference in San Jose, Calif.

Electro-optics, Environment and Materials Laboratory

Dan Ortiz and **Wendy Jones**, in conjunction with Michele Marcus, Fredric Gerr and Susan Cohen of the Rollins School of Public Health at Emory University, recently co-authored a paper on "Measurement Variability in Upper Extremity Posture Among VDT Users," which appeared in Applied Ergonomics.

On September 6, **Steve Hays** and **Kirk Mahan** presented a one-day "Construction Safety Awareness and OSHA Compliance" seminar to 18 representatives from the Ministry of Construction in China. This seminar was presented at Kennesaw State University in conjunction with Project Safe Georgia. The presentation was made through a translator, a new experience for Steve and Kirk! The Chinese delegation took a group photograph with the two speakers and photographs with the speakers and the representatives from each province after the seminar.

Bob Newsom gave a presentation at the Metatechnics '96 Symposium on the Programs at the Plasma Application Research Facility. The symposium is co-sponsored by the University of Bordeaux and Georgia Tech, and the 1996 focus was on "Soil Protection: Prevention and Remediation." Plans are being developed for the 1997 symposium to be held in Atlanta.

Paul Middendorf gave a presentation Sept. 11 at Kennesaw State University on federally funded Safety and Health Consultation Programs to a Chinese delegation interested in construction safety.

Mike Lowish's writing appeared twice in the September 1996 issue of Compliance Magazine. Mike addressed a reader's query on hearing protection in a monthly feature, "Ask the Experts." He also was featured commentator in another monthly department entitled "Federal Regs."

Vicki Ainslie and **Myrtle Turner** presented information on conducting lead-based paint risk assessments in housing for the Georgia Department of Human Resources at the recent Georgia Childhood Lead Poison Prevention Conferences. These were held in Atlanta on Sept. 27 and in Dublin, Ga. on Oct. 1.

Huntsville Research Operations

Dan Parker, was invited to be an advisory group member for the Army Science Board's Logistics and Sustainability Panel.

This assignment entails bi-monthly meetings with the ASB panel in determining processes and procedures for enhancing the logistics function of the Army. The assignment is for one year, renewable in one-year increments.

Personnel News

New Hires

ITL welcomes **Kevin Brown**, Research Scientist I. EOEML welcomes **Fenghua Deng**, Graduate Research Assistant. STL welcomes **Paul Harms**, Research Engineer II. ELSYS welcomes **Odest Jenkins**, Graduate Temporary. SSD welcomes **Gary Nellor**, Machinist.

Moving On

James Hayes, **Christopher Treanor** and **Tao Yang** (EOEML); **Martin Mannion** (SEAL); **Mayuresh Patil** and **Debra Richardson** (AERO); and **James Schwaiger** (HRO) are moving on.

After Hours

Mark Stapleton (ELSYS) and his family were interviewed for a WSB-TV series aired in October on international vs. U.S. adoption. Mark and his wife, Marina, adopted their 18-month-old daughter, Kaylyn, from China.

Personal Notes

Cradle Roll

Deborah and **Mark Clinard** (SEAL) welcomed twins, Margaret Ray and Samuel Reuben, on Sept. 27.

Mary Beth and **John Morris** (ELSYS) welcomed a son, Collin Andrew, on Sept. 20.

Our Sympathy

...to **Carey Floyd** (SDL), whose father, E. G. "Pete" Jones, died Sept. 19.

...to **Mindy Rakestraw** (SDL), whose mother-in-law, Odell Rakestraw, died Sept. 29.

Golf

From page 7

Rusty Embry (770-528-7042; rusty.embry@gtri.gatech.edu).

And look for the return of Karen and Neal.

"Watch out guys! I'll be back next year to defend the title!" Karen said.

"Quite modestly, I expect our margin of victory to be a lot bigger next time," Neal predicted.



Bodnar

From page 1

Bodnar has been assigned to the Rome Lab under the Intergovernmental Personnel Act (IPA) for the last 1 1/2 years, and expects to serve as chief scientist for two years. He will continue as an IPA while serving as chief scientist, and thus remains a GTRI employee.

Rome Laboratory is the lead Air Force laboratory for command, control, communications, computers and intelligence and also pursues programs in surveillance, reconnaissance, photonics, electromagnetics and reliability.

A principal research engineer, Bodnar holds bachelor's and doctoral degrees in electrical engineering from Georgia Tech, and a master's in electrical engineering from Massachusetts Institute of Technology. At GTRI, he has worked as manager of the electromagnetics program office, chief of the advanced technology division, chief scientist of the former Microwave and Antenna Technology Development Laboratory and adjunct faculty member.

Bodnar also consulted for White Sands Missile Range and Sperry Rand's microwave electronics division, and worked at Johns Hopkins Applied Physics Laboratory and the National Radio Astronomy Laboratory.

His research addresses evaluation and design of microwave antennas, with emphases on specially shaped reflector antennas, planar and conformal waveguide slotted arrays, electromechanical scanners and millimeter antennas. He has evaluated multi-layer and anisotropic radomes and radome-covered antennas, and applies numerical and analytical techniques to electromagnetic problems. Bodnar also performed theoretical and experimental studies on advanced microwave and millimeter radiometer detection and tracking systems while at Sperry Rand. He and Jim Cofer (APO) share a 1984 patent on a 360-degree scanning antenna.

Bodnar served as the international president and vice president of the Antennas and Propagation Society of the Institute of Electrical and Electronic Engineers (IEEE), the world's largest professional organization, and also is a Fellow of the IEEE. He has authored or co-authored more than 100 technical papers and reports.

He's also been recognized outside his profession for his achievements. Bodnar is included in several editions of Who's Who in the South and Southwest and American Men and Women of Science.

Bodnar lives in Clinton, N.Y. with his wife, Judy, and daughter Jennifer. Their oldest son, David, lives in Chicago and their youngest son, Don, Jr., attends Penn State University in University Park.

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