



ANNUAL REPORT FOR INSTITUTIONAL PROGRESS 2007

ABOUT GTRI

The Georgia Tech Research Institute (GTRI) is a leading nonprofit applied research institution that provides creative and cutting-edge solutions to the most challenging problems of government and industry. At GTRI more than 1,300 employees perform or support approximately \$130 million in research yearly for more than 400 clients in government and industry.

More than 70 percent of our research personnel hold advanced degrees, and all are committed to an independent, unbiased approach to solving problems. As an integral part of the Georgia Institute of Technology GTRI scientists and engineers regularly partner with academic colleagues who can contribute additional multidisciplinary talent and knowledge for meeting technological and engineering challenges.

CORE VALUES AND PURPOSE

GTRI's core values are integrity, innovation and excellence. GTRI's success is dependent on adhering to these values.

MISSION

Serve the university, the state, the nation and the world by maturing selected technologies and developing innovative engineering solutions to important and challenging problems of society

GTRI STRATEGIC FOCUS AREAS

Technical excellence – strive for excellence in everything we do

1. Define grand challenges i.e., bold and exciting descriptions of technology-based solutions that may take 10 or more years to realize, and that clearly are a giant leap from what is possible in the near term.
2. Sustain core, strategic areas e.g., nurture and ensure leading edge capabilities in focus areas that are long standing areas of GTRI competence with significant market potential or are emerging areas aligned with university strategic initiatives; such areas typically integrate competencies across GTRI and the rest of the university
3. Form strategic alliances e.g., create trusted relationships with customers in key markets. Such customers defer to GTRI for technical advice and guidance. They provide long-term sustained funding commitments; create strategic alliances with our academic colleagues at Georgia Tech and with other leading research centers where appropriate.
4. Create new models for working with industry e.g., explore models whereby GTRI support customer focused R&D for industry based on its core, sustained areas and in ways that support industry and economic growth in Georgia

People – hire the best, equip and support

1. Provide training for leaders and managers e.g., the Training Council takes a systematic view of GTRI training needs including the integration of leadership topics
2. Improve career planning and guidance e.g., PST-led teams work with the Leadership Council and ad hoc teams of classified and non-classified staff to develop canonical career paths and to improve career guidance
3. Improve performance management e.g., link measurement-based objectives in support of this strategy to the current approach to performance management.
4. Ensure competitive salaries e.g., move from the 50th to the 70th percentile with respect to benchmark survey data

Environment – improve how and where we work

1. Enhance Resident Instruction-GTRI collaboration e.g., ensure support functions of the university understand the GTRI strategy and their role in supporting it; foster more joint research and development projects with Resident Instruction and Economic Development and Technology Ventures
2. Improve support processes in all GTRI units e.g., Work Council selects high priority areas for process improvement, Leadership Council commits to implement and support such improvements
3. Provide a professional and supportive work environment e.g., work constantly to improve the culture

Finances – grow, diversify, and invest revenues; improve fiscal discipline

1. Increase revenues e.g., we strive to increase total revenues by 10% per year but also work to determine a 'right size' GTRI and the steady state resources required to support it.
2. Diversify revenues e.g., increase the percentage of total revenues that come from alternate sources defined as the sum of fee, license revenue, course revenue, discretionary state funding, and gifts.
3. Resource a modernization plan e.g., create a modernization budget separate from the annual budget and prioritize improvements to GTRI that will be resourced from this budget
4. Create a GTRI endowment e.g., plan and execute as part of the GT campaign
5. Improve our fiscal discipline i.e., institute fiscal improvements across GTRI as suggested at the GTRI annual off-site meeting, directed by the Leadership Council, prioritized and overseen by the Work and Training Councils, and implemented by appropriate GTRI staff.

FINANCES – BY THE NUMBERS

GTRI ended the 2007 Fiscal Year with total sponsored awards approximately \$18.6M higher than in FY 2006. GTRI is also making progress at developing a modernization budget with which to resource continued infrastructure improvements.

GTRI ORGANIZATIONAL HIGHLIGHTS

GEORGIA TECH OPENS RESEARCH INSTITUTE IN IRELAND: The Georgia Institute of Technology and the Georgia Tech Research Institute (GTRI), the applied research arm of the Georgia Institute of Technology, have expanded Georgia Tech's global reach with the opening of a research institute in Athlone, Ireland. The new institute will focus on four technology areas that mirror Ireland and Georgia Tech's research strengths — digital media, radio frequency identification (RFID), biotechnology and energy. Research and collaborations are expected to be valued at \$24 million.

KEY PERSONNEL HIGHLIGHTS

Tom McDermott Named GTRI Deputy Director and Director of Research

(September 24, 2007) In five years, Tom McDermott has climbed the Georgia Tech Research Institute (GTRI) ladder from senior research engineer to his new position as GTRI Deputy Director and Director of Research. In his new role, which began September 1st, McDermott is supervising all laboratory operations and business development for GTRI's \$131 million research program.

McDermott replaces David Parekh, who left to become director of the United Technologies Research Center and the company's vice president for research.

http://www.gtri.gatech.edu/news/McDermott_Deputy_Director.html

Krish Ahuja Appointed Director of Georgia Tech-Ireland

(September 24, 2007) Dr. Krishan Ahuja, Regents Professor in the School of Aerospace Engineering, has been appointed director and general manager of Georgia Tech-Ireland (GTI). In this role, he will oversee GTI's work with Irish corporations and universities, the Georgia Tech research community and U.S. companies to provide companies on both sides of the Atlantic with industry-focused research and development that bridge the gap between academic discovery and commercial success.

http://www.gtri.gatech.edu/news/Ahuja_Ireland.html

Jim Ellington named GTRI's new director of research security

(September 24, 2007) Securing classified information is a tough job, but one that new Georgia Tech Research Institute (GTRI) director of research security Jim Ellington knows quite well.

Ellington has been protecting classified information for the past 35 years, with experience working for the federal government, state governments and corporations including Honeywell, The Aerospace Corporation,

Rockwell International and Hughes Aircraft Company.
http://www.gtri.gatech.edu/news/Ellington_Research_Security.html

Terry Tibbets Named director for ELSYS lab.

David Parekh Georgia Tech Research Institute Deputy Director Dr. David E. Parekh will be leaving Georgia Tech to take a high-level position with United Technologies Corp. in East Hartford, Conn. Effective September 10, Parekh will become director of the United Technologies Research Center and the company's vice president for research. <http://www.gatech.edu/news-room/release.php?id=1456>

GTRI's **Gary G. Gimmestad** Selected as International Society for Optical Engineering (SPIE) Fellow (May 1, 2007) - SPIE Fellows are members of distinction who have made significant scientific and technical contributions in the multidisciplinary fields of optics, photonics, and imaging. GTRI's Gary G. Gimmestad is recognized for specific achievements in the areas of remote sensing technology including LIDAR systems for atmospheric characterization and air quality monitoring. He has established himself as an international authority through his presentations at technical meetings and by authoring more than 100 publications. http://www.gtri.gatech.edu/news/pdfs/SPIE_Fellow_Press_Release.pdf

ORGANIZATIONAL REALIGNMENT

The departments/units reporting to the GTRI Deputy Director, Director Research are all GTRI research laboratories, the new Program Development unit, Financial Operations, Management and Project Support, GT Ireland (operational support) and the GTRI Chief Scientist. The departments/units reporting to the GTRI Deputy Director, Director Support Operations are Business Services, Personnel Support Team (HR), Information Services (IT), Support Services (Facilities and Maintenance), Machine Services and Research Property. Functions reporting directly to the Vice President GT, Director GTRI are Chief of Staff and Exec. Asst., Communications, Gifts & Fundraising and Research Security (with dual reporting to GT President).

Additional organizational changes of note:

The Director of Research Security, who reports directly to the Vice President GT, Director GTRI also has a reporting relationship to the President of Georgia Tech as well as a close coordination role with the GTRI Director of Research, the GTRI Laboratory Directors, and the GTRI Chief of Staff.

The Program Development is a new unit led by the GTRI Associate Director and includes Federal/State/Industry Programs, National Field Offices, and associated administrative functions.

Financial Operations is a new unit that integrates Rate Management and Budget/Finance.

GTRI RESEARCH ACCOMPLISHMENTS

The Georgia Tech Research Institute conducts funded applied research through seven laboratories, each with a unique technological focus:

- Aerospace, Transportation, and Advanced Systems Laboratory (ATAS)
- Electro-Optical Systems Laboratory (EOSL)
- Electronic Systems Laboratory (ELSYS)
- Huntsville Research Laboratory (HRL)
- Information Technology and Telecommunications Laboratory (ITTL)
- Sensors and Electromagnetic Applications Laboratory (SEAL)
- Signature Technology Laboratory (STL)

Georgia Tech Defense Technology Introduces Learning Assessments for Certificates

(October 23, 2006) — Georgia Tech's defense technology education program is implementing an assessment of learning in its professional short courses to further strengthen its certificates in Antenna Engineering, Electronic Warfare Technology, Infrared & Electro-Optical Technology, Radar Systems, Radar Signal Processing & Techniques, and Modeling & Simulation.

<http://www.gatech.edu/news-room/release.php?id=1167>

[Pavement Marking: Automated System Installs Pavement Markers, Improving Safety For Road Crews and Drivers](#)

(January 10, 2007) - On rainy nights in Georgia and across the nation, drivers greatly benefit from small, reflective markers that make roadway lanes more visible.

There are more than three million of these safety devices, called raised pavement markers (RPMs), in service on Georgia highways. They are installed and then need to be replaced about every two years by road crews who consider the task one of the riskiest they face. Workers typically ride on a seat cantilevered off the side of a trailer just inches from highway traffic.

<http://gtresearchnews.gatech.edu/newsrelease/rpm.htm>

[At GTRI Machines Services, Engineering and Scientific Solutions Move from the Conceptual to the Concrete](#)

(February 2, 2007) - For more than 60 years, Machine Services has been designing, fabricating, assembling and repairing the parts and prototypes needed by GTRI researchers. Unlike industrial fabrication shops that produce large quantities of a particular component, Machine Services' work is highly custom – and varied. Projects run the gamut from medical devices to military vehicles.

http://www.gtri.gatech.edu/news/machine_shop.html

[Bridging into Dentistry: Researchers take Aerospace, Manufacturing, Military and Materials Technologies to the Dental Chair](#)

(Research Horizons Fall 2006) - Researchers at the Georgia Institute of Technology are applying engineering expertise to the dental industry – a field that is often as much art as it is science.

For example, the Georgia Tech Research Institute is working on the next generation of cone-beam imaging, a type of computerized tomography (CT) that enables dentists to take 3D images of patients. These machines take two-dimensional X-rays in one-degree increments around the head to construct a final 3D image. Cone-beam imaging exposes patients to much less radiation than traditional CT machines – and provides far more information than conventional dental X-rays.

<http://gtresearchnews.gatech.edu/reshor/rh-f06/dental-tech.html>

[Swedish Technology Firm Sorman to Collaborate with Georgia Tech in Product Lifecycle Management Technology](#)

(March 2, 2007) - The Georgia Institute of Technology and Sorman Information and Media AB -- a Swedish company that provides technology for managing complex systems -- have signed an agreement to collaborate on research and development, education and training in areas of interest to both organizations. The collaboration is expected to result in the establishment of an Atlanta facility for Sorman, which provides product lifecycle management information systems that help manage complex electronic and mechanical systems in aircraft, motor vehicles, construction machinery and other equipment. The company's software models systems to determine where failures are likely to occur so reliability can be improved.

<http://innovate.gatech.edu/Default.aspx?tabid=32&NewsID=111>

[A Stronger Warning: Researchers Patent Digital Process for Aircraft Radar Warning Receivers](#)

(March 8, 2007) - Researchers at the Georgia Tech Research Institute (GTRI) have patented a discovery that could significantly increase reliability and reduce cost in equipment that helps protect U.S. military aircraft from attack. The patent covers a device called a digital crystal video receiver (DCVR), a vital part of the radar warning receiver (RWR) system that alerts an aircraft crew to enemy ground-radar activity. GTRI researchers Michael J. Willis and Michael L. McGuire, working with Air Force scientist Charlie W. Clark, have patented a way to use digital circuitry to perform many functions formerly allotted to more-problematic analog chips <http://gtresearchnews.gatech.edu/newsrelease/digital-video.htm>

[Chlorine's Casualties and Counsel: Nation's Worst Chlorine Gas Leak Wreaked Havoc, but Research Reveals Lessons Learned](#)

(Research Horizons Fall 2007) - The United States' worst-ever chlorine gas leak killed nine people and injured 250. Eighteen months later – despite efforts to clean and restore the textile mill affected by the leak – 4,000 people lost their jobs, and a longtime, family-owned textile company went out of business.

GTRI scientists and engineers from Georgia Tech's National Electric Energy Testing, Research and Applications Center (NEETRAC) first became involved in cleanup efforts within a few days after the train wreck that caused the leak on Jan. 6, 2005, in the small town of Graniteville, S.C. South Carolina Electric & Gas needed advice, as well as analysis of components from its heavily damaged power substations that served Graniteville and the large, local textile facility owned by Avondale Mills. The 70 to 80 tons of chlorine gas that leaked from the wrecked train corroded equipment in the substations, which eventually had to be rebuilt. <http://gtresearchnews.gatech.edu/reshor/rh-f06/chlorine.html>

[Nano-Manhattan: 3D Solar Cells Boost Efficiency While Reducing Size, Weight and Complexity of Photovoltaic Arrays](#)

(April 11, 2007) - Unique three-dimensional solar cells that capture nearly all of the light that strikes them could boost the efficiency of photovoltaic (PV) systems while reducing their size, weight and mechanical complexity.

The new 3D solar cells capture photons from sunlight using an array of miniature "tower" structures that resemble high-rise buildings in a city street grid. The cells could find near-term applications for powering spacecraft, and by enabling efficiency improvements in photovoltaic coating materials, could also change the way solar cells are designed for a broad range of applications.

<http://gtresearchnews.gatech.edu/newsrelease/3d-solar.htm>

[Georgia Tech and Ben Massell Dental Clinic Join to Bring State-of-the-Art Dental Care to Underserved Populations](#)

(April 24, 2007) - Georgia Tech's Dental Technology Center (DenTeC) and the Ben Massell Dental Clinic are joining forces to bring state-of-the-art dental care to those who can least afford it.

"This is an important alliance that will provide patients and dentists the opportunity to use some of the most innovative technology in the field of dentistry today – and tomorrow," said Gary Miller, CEO of Jewish Family & Career Services, which operates The Ben Massell Dental Clinic. "It also marks a new partnership between our volunteer dentists, who care about bringing quality service to low-income individuals, and the scientists and engineers who are dedicated to inventing and developing the technical innovations that will be used in the future." http://www.gtri.gatech.edu/news/dentec_news.html

[Experts from GTRI's Occupational Safety and Health Program Offer Safety Tips for "Weekend Warriors"](#)

(April 30, 2007) - Georgia Tech provides a broad range of safety and health services to organizations in Georgia and the Southeast through its Region IV OSHA Training Institute Education Center and OSHA 21D Consultation Program. (See Nail Gun Safety News Story on Included CD)

The OSHA 21D Consultation Program provides a free, confidential, on-site consultation service for small companies (fewer than 500 employees) in Georgia that need assistance in occupational safety and health. The OSHA Training Institute Education Center offers safety and health courses in more than 20 topics throughout Region IV, an area covering Florida, Georgia, Alabama, South Carolina, North Carolina, Mississippi, Tennessee, and Kentucky. <http://www.gtri.gatech.edu/news/osha-200704.html>

[Georgia Tech Research Institute Helps Georgia Companies Improve Workplace Safety and Lower Costs](#)

(Research Horizons Winter/Spring 2007) – It's no surprise that a construction site can be hazardous for workers, but how dangerous can a funeral home be?

Plenty, says Daniel Ortiz, manager of Georgia Tech's Safety & Health Consultation Program, which is housed within Georgia Tech Research Institute's (GTRI) Electronic Systems Laboratory (ELSYS). Embalmers are exposed to a number of pathogenic microorganisms and chemicals, Ortiz explains. In fact, preliminary data from a GTRI occupational health study indicates that up to 20 percent of embalmers in Georgia funeral homes may be exposed to formaldehyde levels above regulatory limits.

<http://www.gtresearchnews.gatech.edu/reshor/rh-w07/safety.html>

[Validation & Vision: Long-Term Emissions Monitoring Validates Vehicle Inspection Program and Offers Policy Insights](#)

(June 8, 2007) - The numbers tell the story: 25 Georgia counties, about 420,000 vehicles assessed for emissions each year at more than 60 monitoring sites, data gathered for at least 100 days a year in the field.

Fifteen years of systematic data collection along the roadside, now with a fourth generation of equipment. It's all to see if the \$80 million to \$100 million a year Georgians pay for vehicle emissions inspections and repairs is well spent.

These numbers describe the scope and impact of a long-term research study on vehicle emissions and air quality in 21 metro Atlanta counties, plus four more in Macon and Augusta, Ga. The study, conducted by Georgia Institute of Technology researchers, is meeting the monitoring needs of Georgia's state government and offering significant insights that help direct both research and policy, says Michael Rodgers, associate director of the Georgia Tech Research Institute's (GTRI) Aerospace, Transportation and Advanced Systems Laboratory and group leader of air quality research.

http://www.gtresearchnews.gatech.edu/newsrelease/vehicle_emissions.htm

[Research Center Promotes Accessibility to Wireless Technologies for People with Disabilities](#)

(Research Horizons Winter/Spring 2007) – The wireless world is gradually opening its doors to people with disabilities because of new research, policy and consumer demand.

Significant contributions to the research and policy components of that equation come from work at the Wireless Rehabilitation Engineering Research Center (RERC) co-directed by the Georgia Institute of Technology and Shepherd Center, an Atlanta-based rehabilitation hospital. Now in its second five-year federal grant, the RERC is seeing some fruits of its labor.

Later this year, a wireless captioning system developed at the Georgia Tech Research Institute (GTRI) and licensed by SightLine Media will debut in movie theaters across the nation for beta testing. It will offer new, unobtrusive technology to allow people who are deaf or hard of hearing to enjoy Hollywood's latest films.

<http://www.gtresearchnews.gatech.edu/reshor/rh-w07/lerc.html>

[High School Students Learn Workplace Safety](#)

(July 19, 2007) — As part of an effort to increase job-safety training and awareness among younger Americans, scientists from the Georgia Tech Research Institute (GTRI) have joined with the U.S. Occupational Safety and Health Administration (OSHA) and other groups to introduce health and safety training to Georgia high schools.

The aim: to try to ensure that young workers grasp job-safety basics before they ever reach the workplace. GTRI instructors and others have already taught OSHA job-safety classes to three Georgia high schools, and more schools are scheduled to receive instruction. The effort stems from a 2006 agreement between OSHA, GTRI, Georgia schools and other groups to make safety and health training more available to the state's students. <http://www.gatech.edu/news-room/release.php?id=1432>

[Ga. Tech Sting Racing Team Selected as Finalist](#)

(August 9, 2007) — Georgia Tech's College of Computing today announced that the Sting Racing team competing in the Defense Advanced Research Projects Agency's (DARPA) Urban Challenge has passed its site visit and is one of 36 teams judged technologically capable of competing in the final round. The team's autonomous vehicle, Sting 1, successfully completed all four tests during its capabilities evaluation on June 18, taking it into the next stage in this two-year competition among leading research and technology universities in the United States.

<http://www.gatech.edu/news-room/release.php?id=1447>

[Safe Water: Simpler Method for Analyzing Radium in Water Samples Cuts Testing Time](#)

(August 28, 2007) - A simpler technique for testing public drinking water samples for the presence of the radioactive element radium can dramatically reduce the amount of time required to conduct the sampling required by federal regulations. The U.S. Environmental Protection Agency (EPA) has approved use of the new testing method.

The technique – developed by Bernd Kahn, director of the Georgia Tech Research Institute's (GTRI) Environmental Radiation Center (ERC), and GTRI senior research scientist Robert Rosson – became advantageous when the EPA established new radionuclide drinking water standards in 2000.

<http://gtresearchnews.gatech.edu/newsrelease/radium-testing.htm>

[Ireland's President Visits Georgia Tech](#)

(April 30, 2007) - Ireland's President Mary McAleese visited with Georgia Tech president Wayne Clough, Georgia Tech Research Institute officials and associates from a business with Georgia Tech roots.

Georgia Tech hosted Ireland President Mary McAleese this morning in an effort to strengthen the university ties to Ireland. President Mary McAleese visited with Georgia Tech President Wayne Clough, Georgia Tech Research Institute officials and business associates from a company with roots at Georgia Tech.
<http://www.gatech.edu/news-room/release.php?id=1366>

Tech to Train NASA Leaders for Deep Space Program

(May 10, 2007) — NASA's Johnson Space Center recently selected Georgia Tech College of Management and GTRI to provide leadership training for engineers, scientists, and technologists who will be instrumental in extending the agency's reach deeper into space.
<http://www.gatech.edu/news-room/release.php?id=1376>

GTRI and Arthritis Found. Offer Manufacturers Product Design Training

(September 13, 2007) - The Arthritis Foundation will host a special designer's workshop on Tuesday, September 18, 8:30 a.m. to 4:00 p.m., at the Georgia Institute of Technology Global Learning Center in Atlanta. The workshop will offer manufacturers information on how to design or improve products and packaging for people with physical limitations due to arthritis or other diseases. Representatives from some of the nation's largest corporations have already signed up to attend the seminar conducted by experts in universal design from the Georgia Tech Research Institute (GTRI).
http://www.gtri.gatech.edu/news/Arthritis_Foundation_Training.html

View GTRI's "Funny" Product Usability Videos: (Produced by GT Students for GTRI)

Walnuts: <http://www.youtube.com/watch?v=xhDQueMvngs>

The Mayo Jar: http://www.youtube.com/watch?v=aHHuzl_UNY0

The Binder: <http://www.youtube.com/watch?v=2HhgiwyXzss>

Car Without a Driver: Georgia Tech's Urban Challenge Run Ends at National Qualifying Event

The blue Porsche Cayenne pulls up to a four-way intersection and stops. After it continues through the junction, it approaches a vehicle stopped in its lane. The Cayenne checks to make sure there are no cars approaching in the opposing lane, passes the stopped car and returns to its original lane. This scene may sound normal, but this is no ordinary Porsche Cayenne -- it thinks for itself and requires no driver. This autonomous vehicle was designed by the Georgia Institute of Technology in collaboration with Science Applications International Corporation (SAIC) for the Defense Advanced Research Projects Agency's (DARPA) Urban Challenge.
<http://www.gtresearchnews.gatech.edu/newsrelease/urban-challenge.htm>

Georgia Tech Ireland Teams with IntelliOne on TrafficAid IPTV Project

Georgia Tech Ireland is teaming up with IntelliOne Technologies on an industry-leading research and development project to create an Internet Protocol Television (IPTV) interface for IntelliOne's TrafficAid personal traffic guidance system. IntelliOne Technologies is a premier traffic information company that measures roadway speed by instantly analyzing mobile phone network usage, also announces the creation of IntelliOne Europe, Ltd., with headquarters in Athlone, Ireland.
http://www.gtri.gatech.edu/news/GT_Ireland_IntelliOne.html

New Biosensor Detects Avian Influenza Virus in Minutes, Not Days

Quick identification of avian influenza infection in poultry is critical to controlling outbreaks, but current detection methods can require several days to produce results.

A new biosensor developed at the Georgia Tech Research Institute (GTRI) can detect avian influenza in just minutes. In addition to being a rapid test, the biosensor is economical, field-deployable, sensitive to different viral strains and requires no labels or reagents.

<http://www.gatech.edu/news-room/release.php?id=1522>