

# *Laying a Foundation for Global Leadership*

**ANNUAL REPORT 2010**



**Georgia Institute  
of Technology®**



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## Laying a Foundation for Global Leadership

Building upon the already superior academic infrastructure at Georgia Tech is no simple task, but the Institute's people are noted for meeting daunting challenges with ingenuity and determination. Since September 2009, our community has been engaged in a visioning process that has included robust discussion among, and the valuable contributions of students, faculty, staff, alumni, and other friends. That process has yielded a twenty-five-year Strategic Plan that we've dubbed "Designing the Future." This name succinctly captures exactly what we're doing: thoughtfully and intentionally shaping a path for the Institute that will lead to national and global preeminence among institutions of higher learning.

Our Strategic Plan articulates a vision of Georgia Tech as an international leader. Our leadership in education will be reflected by the way we change what and how we teach, and by how our students learn. Our leadership in research will be reflected by our creation of new knowledge and our identification of new solutions, new directions for our research enterprise, and new ways in which we perceive our world.

In conjunction with the release of our Strategic Plan this fall, we also publicly launched Campaign Georgia Tech and announced a five-year extension of the campaign beyond its originally planned December 2010 conclusion. The campaign is vitally important to the Institute for many reasons, but particularly because it is the vehicle by which the vision expressed in our Strategic Plan will become a reality. When the ten-year campaign concludes in 2015, we will have raised a record \$1.5 billion from alumni, corporations, foundations, and other friends who share our vision for Tech's future and are passionate about ensuring the Institute's long-term success, vitality, and relevance.

While we have much work ahead of us to achieve the goals we've set, all of Georgia Tech's stakeholders should take a large measure of pride in the Institute's invitation last spring to join the prestigious American Association of Universities (AAU). Membership in this group of more than sixty leading public and private research universities in the United States and Canada is based on the high quality of programs in academic research and scholarship as well as undergraduate, graduate, and professional education in a variety of disciplines. This tremendous honor is truly a credit to those who have worked so hard to make Georgia Tech the institution it is today, particularly President Emeritus Wayne Clough and former Provost Jean-Lou Chameau.

The pages of this 2010 Annual Report are filled with examples of bright, dedicated individuals whose work not only helped garner the recognition required to receive an invitation to AAU membership, but is also advancing the goals enumerated in our Strategic Plan. These examples are not only impressive, but more importantly, they contribute immeasurably to what has been the heart of Georgia Tech's mission for 125 years: developing and implementing technological solutions that improve the quality of human life around the globe. We feel sure that you will find these people and their work to be profoundly inspiring—and worthy of enthusiastic support.

Sincerely,

A handwritten signature in black ink, appearing to read "G. P. Peterson", written over a horizontal line.

G. P. "Bud" Peterson, President



# Focusing on Student Success

*Georgia Tech is many things to many people, but the most critical role the Institute plays is providing a technologically focused education of superior quality. Consequently, our students—and their ultimate success—are the core of our mission and our identity. To help ensure that our students excel to their fullest potential, both on campus and later in their careers, we are striving to make their experiences here as relevant and meaningful as possible.*



## Initiatives to Improve the Student Experience

During his fourteen-year tenure, President Emeritus G. Wayne Clough was noted for his exceptional commitment to undergraduate education. Early in his presidency, Clough realized that the rapid growth of the student body would require the creation of a campus community invested in their success. A dramatic expression of that vision—the G. Wayne Clough Undergraduate Learning Commons—is currently under construction in the heart of the Tech campus.

The Clough Commons will provide a unique and comfortable environment outside the traditional classroom where students can take advantage of hands-on, collaborative, and technologically enhanced teaching and learning opportunities. The 230,000-square-foot, \$85 million facility will encompass:

- Modern and innovative science laboratories for foundational biology, chemistry, earth and atmospheric sciences, and physics courses;

- Technologically advanced classrooms ranging from intimate seminar settings to tiered lecture halls seating hundreds;
- A single facility housing undergraduate advising, tutoring, and other student-centered academic services; and
- Sustainable design features that will enable certification as a LEED (Leadership in Energy and Environmental Design) building.

The five-story building, which will feature a central glass atrium, is located on a slope between the Tech Green and the Price Gilbert Library, providing expansive views of green space as well as the Kessler Campanile.

“This building is the result of the support and hard work of so many, from students and faculty to donors and state officials,” said Clough at the building’s April groundbreaking. “The Learning Commons epitomizes Georgia Tech’s commitment to the success and growth of its undergraduate students. I am humbled that the building will carry my name and I accept this honor on behalf of the students of Georgia Tech to whom this building is truly dedicated.”

Just a short walk from the Clough Commons construction site is the Old Civil Engineering Building, whose recent renovation earned LEED Gold status last year. Located near the center of campus on Bobby Dodd Way, the renovated building is now a hub of activity for Ivan Allen College of Liberal Arts students as home to the School of Economics and the School of History, Technology, and Society.

In addition to top-notch facilities, students also benefit from a variety of scholarship programs. One of the most recently created scholarships, the G. Wayne Clough Georgia Tech Promise, offers a debt-free Tech education to academically qualified Georgia residents from low-income families.

The power of the Georgia Tech Promise was clearly illustrated at spring commencement when Duane Carver—the first member of the inaugural freshman class of Tech Promise scholars to enroll in 2007—graduated with a degree in computer engineering. An academically gifted high school student from Brunswick, Georgia, Carver came from a family with few financial resources; his family was even homeless at one point.



*Duane Carver, CmpE 2010*

Thanks to the Tech Promise, Carver was able to enroll at Georgia Tech and complete his degree in three short years.

Tech Promise is designed for students like Carver, academically qualified Georgia residents from low-income families who lack the resources to finance a Georgia Tech education. Since its inception three years ago, the program has benefitted 371 students with annual household incomes averaging in the low \$20,000s. The cumulative grade point average for Tech Promise Scholars of 3.04 is slightly higher than the Tech student body as a whole.

"My Tech Promise scholarship isn't just about my education and my success in life," Carver said. "It's also about what I can do to help other people the same way that I was helped. One day I'll be giving to the Tech Promise



*The G. Wayne Clough Undergraduate Learning Commons will open in fall 2011.*

program to help other students get a Tech degree, but right now I have the chance to help my family make their dreams come true. I think it's really important for somebody like me who has received something as life changing as the Tech Promise to give back and help others to have success in life. That's what the Tech Promise is really about, and I want to thank all the people who have donated to the program. They'll never know what a difference they've made."

While the Tech Promise helps gifted high school students handle the financial obligations of a Georgia Tech education, the Institute's living-learning communities are encouraging students to consider new and challenging ideas as part of a new "Think Big" initiative.

With ten proposed Think Big communities for the fall 2010 and spring 2011 semesters, Georgia Tech's students can sign up for a dorm room as well as try a new approach to living on campus.

## Five Yellow Jacket teams recognized for academic success

Five Georgia Tech athletic teams were recognized in the NCAA's Academic Progress Rate (APR) report for being in the top 10 percent of their sports. These include baseball, golf, men's cross country, women's cross country, and volleyball.

The Yellow Jacket teams were among 841 that were recognized by the NCAA. The APR provides a real-time view of a team's academic success by tracking the progress of each student-athlete during the school year. By measuring eligibility and retention each semester or quarter, the APR provides a clear picture of the academic culture in each sport.

In addition to excelling in the classroom, Tech student-athletes also achieved great things on the playing field last year. The football, golf, softball, and women's tennis teams all won Atlantic Coast Conference championships.

Men's basketball player Derrick Favors was named ACC rookie of the year, football player Derrick Morgan was named ACC defensive player of the year, and volleyball player Monique Mead was named ACC Freshman of the Year.



*Derrick Favors*



*Derrick Morgan*



*Monique Mead*



Think Big brings together students and faculty in a residence hall setting to discuss intriguing ideas and issues. No additional homework or coursework is required. Students can sign up to be a part of any community without prior knowledge or experience in the topic. The majority of the communities are housed in the North Avenue Apartments, providing greater flexibility for students who want to meet new people while still living close to friends.

“Students are expanding their horizons like they would in study abroad, but without all the expenses,” said Think Big Program Coordinator Craig Rawe.

Think Big is largely the result of student feedback expressing a desire for a deeper sense of community. The



Office of Undergraduate Studies and the Department of Housing’s Residence Life program partnered to develop a series of communities that bring like-minded students together to explore intellectual “side streets” apart from their coursework.

“Students were experiencing a negative transition between their freshman and upperclassman years,” said Rawe. “The administration sought to create living-learning communities to complement and expand upon what the Freshman Experience program provides freshman students. Think Big can be a catalyst and contribution to the evolution of the Georgia Tech student experience, both academically and non-academically.”

New initiatives such as Think Big are offered alongside longstanding programs such as OMED (Office of Minority Educational Development), which last year celebrated three decades of



*Underrepresented students receive invaluable assistance from the Office of Minority Educational Development (OMED).*

assisting Tech’s underrepresented students. OMED’s mission is to provide programs and services that aid in the retention, development, and performance of Georgia Tech students who are traditionally underrepresented in academia. Its services and programs, however, are available to all Tech students.

OMED has received significant national recognition for its work with students. In 2004, OMED’s Challenge retention program received one of four Lee Noel and Randi Levitz Retention Excellence Awards, and in 2007 the organization received a Golden Torch Award from the National Society of Black Engineers.

“I think Tech can be the model for academic excellence and inclusion among minority students,” said OMED

Director and Senior Partner S. Gordon Moore Jr. “The argument of ‘equity versus excellence’ doesn’t work here at Georgia Tech. You have to be excellent to even come here.”

## Notable Student Achievements Span Disciplines

Georgia Tech students have a long tradition of excelling in a variety of regional, national, and international competitions as well as receiving high-profile awards and other forms of recognition. A prime example is a robotics team from Georgia Tech-Savannah that received a design award during the Marine Advanced Technology Education Center’s (MATE) 2009 International Student Remotely Operated Vehicle (ROV) Competition.

The Georgia Tech team was among more than twenty collegiate finalists competing in the challenge to design and build ROVs that function as submarine rescue systems.

The MATE competition, a first for Georgia Tech-Savannah, was held at the Massachusetts Maritime Academy. The Savannah team received the “Design Elegance” award and was commended



*InVenture Prize winners were Patrick Whaley (left) and Sarah Vaden (center).*

for its ROV's design aesthetics, simplicity, and functionality.

"We started with a core group of four Georgia Tech-Savannah students six months ago," explained team captain Justin Shapiro, an interdisciplinary robotics PhD candidate. "We realized that this project would allow us to apply what we learned in class, and then push beyond what we learned."

On the Atlanta campus, one of the most anticipated contests among students is the annual InVenture Prize competition, whose goal is to encourage an interest in invention, innovation, and entrepreneurship among Tech students.

First place in the 2010 competition went to Patrick Whaley (mechanical engineering) for his OmegaWear strengthening apparel. Whaley's workout wear incorporates hydrogel weights in the clothing, placing them over major muscle groups to help increase caloric burn and improve muscle endurance. Whaley also won the People's Choice Award, voted on by the viewing audience of Georgia Public Broadcasting. The two prizes carry monetary awards of \$15,000 and \$5,000, respectively.

Sarah Vaden (aerospace engineering) won second place and a \$10,000 prize for her novel drum. Through principles learned in chemistry class, Vaden used compressed gases to change the tone of a drum on the fly, while the drummer was playing. Her idea allows for one drum to produce different sounds.

Both InVenture winners received a free U.S. patent filing from the Georgia Tech Office of Technology Licensing, each valued at approximately \$20,000.

In a competition focused on the efficiency of the healthcare system, a team of College of Computing graduate students—the Georgia Tech Flatliners—took the top three prizes at the NHIN CONNECT Code-a-Thon Challenge.

The Challenge asked student teams to create innovative stylesheets to display patient medical information in a Continuity of Care Document (CCD) to a primary care physician taking calls from patients after office hours. The idea was to develop a CCD visualization tool that facilitates an efficient and effective

## Anthony Schwartz named Co-op Student of the Year



While working as a co-op student in the Medical Division of C.R. Bard Inc., Anthony Schwartz (biomedical engineering) worked closely with the company's engineering staff on two of the division's largest projects: a suburethral sling device for the treatment of female stress urinary incontinence and a surgical implant for anterior and posterior female pelvic floor repair.

Schwartz's responsibilities often required him to work fifty- to sixty-hour weeks, including nights and weekends, contributing to the final product designs, mechanical

testing of the devices, and writing technical documents and protocols.

For his dedication, Schwartz was the first co-op student to receive the Bard "Caught on the Spot Award," given to employees who go above and beyond their normal job duties.

Little did Schwartz realize that his efforts would result in another award that went far beyond the confines of his co-op employer. He was delighted, however, to travel to Palm Springs, California, to receive the 2009 Co-op Student of the Year award from the Cooperative and Experiential Education Division of the American Society of Engineering Education (ASEE).

Schwartz's selection was based on criteria including quantity and quality of co-op work experience, challenges faced and overcome at work, published papers or presentations, employer awards or recognition, community involvement, and overall contributions to cooperative education. Since joining the Co-op Program in the summer of 2006, he has completed five co-op work terms at Bard, a provider of medical products and services in the vascular, urology, and oncology areas located in Covington, Georgia.

"Working at Bard has not only provided me with invaluable experience and insight into the world of biomedical engineering, but has also allowed me to serve as an ambassador of Georgia Tech and build upon its existing reputation of producing quality academics and driven graduates," said Schwartz. "Using my knowledge obtained in the classroom, I've worked in the real world to help cure ailments that tens of millions of women suffer from every year."

In addition to his regular co-op duties at Bard, Schwartz worked as a research assistant in a preclinical study. He is awaiting the upcoming publication of a paper that he co-authored in the *International Urogynecological Journal*.

After graduation, Schwartz plans to apply for admission to medical school in the United States or Australia with the goal of becoming a surgeon.



*Kim Cobb (far left), associate professor in the School of Earth and Atmospheric Sciences, led the winning team in the Carbon Reduction Challenge, who prevented 60,000 pounds of carbon dioxide from entering the atmosphere.*

phone consultation between the on-call doctor and an unfamiliar patient. Not only did the solutions have to interpret and display data error-free, but they also had to facilitate the most efficient use of the physician's time.

The GT Flatliners—consisting of computer science PhD student Klara Benda and master's students Adrian Courreges, Monosij Dutta-Roy, and Hassan Khan—presented three solutions: a problem-based approach (first place), a multi-context approach (second place), and a rapid-access approach (third place).

"If the country is going to make full use of information technology in improving the efficiency and quality of our healthcare system—and getting a handle on the enormous costs it currently demands—it's going to take the effort and ingenuity of everyone in the health IT community and the fresh perspective of new entrants into it like these students," said Professor Mark Braunstein, MD, who taught the health informatics class in which the Flatliner

team was enrolled. "I'm tremendously proud of our students for coming up with such innovative solutions to this problem, and I'm thankful to the people and organizations we've partnered with to bring these solutions into the open source community."

The Code-a-Thon Challenge was sponsored by the National Health Information Network.

Another student group earned a major award from the National Wildlife Federation for its efforts to address the problem of global warming. A video submitted by Students Organizing for Sustainability (SOS) won a National Wildlife Federation competition, "Chill Out: Campus Solutions to Global Warming," which honors U.S. campuses that are advancing creative solutions to address this environmental challenge.

SOS, in a partnership with the Environmental Alliance, received the best video honor for producing a video that showcases recycling, environmental education, bicycle repair and proliferation, and community garden

programs at Georgia Tech. The two organizations received a \$500 grant to continue innovating global warming solutions.

The Chill Out initiative is part of the National Wildlife Federation's Campus Ecology Program, an integral part of the campus greening movement since 1989.

In a separate environmentally focused initiative, a class of Georgia Tech students saved the Institute approximately \$2,500 in energy costs and prevented more than 60,000 pounds of carbon dioxide from entering the atmosphere. They did it as part of the Carbon Reduction Challenge, a competition that Kim Cobb, associate professor in the School of Earth and Atmospheric Sciences, holds to challenge her students to design and implement a strategy to achieve significant reductions in the amount of carbon dioxide used on campus.

This year twenty-five students participated in the challenge, and the winning team lowered the temperature for the boilers for a group of residence



halls, resulting in a savings of more than 5,000 pounds of carbon dioxide in just ten days. The winning team was comprised of students Chelsea Datko, Abby King, Spencer Vore, and Sam Whited.

While various competitions and challenges are excellent vehicles for students to hone a wide variety of skills, innovative programs in the classroom also serve that same purpose. For example, Georgia Tech Honors Program students' examination of Henry David Thoreau's writings took a physical turn last year as School of Literature, Communication, and Culture (LCC) Associate Professor Hugh Crawford's class reconstructed Thoreau's famed cabin.

Using only the instructions recorded by the author in his work, *Walden*, the class and numerous other students raised the cabin's walls and rafters on the lawn in front of the College of Architecture Building. What began as a seminar on the writings of Thoreau became a search for meaning beyond the analysis of words on a page.

"We are searching for a greater

understanding of Thoreau's experience at Walden and of knowledge embodied in practices and processes," said Honors Program student and builder Victor Lesniewski. "There is a case to be made for gaining a perspective on the world—an additional context for meaning—through material practices. It means understanding that there is knowledge and intellect that cannot be represented through a graph, a lecture, or a college classroom. It is a tacit knowledge that can only be achieved through an interaction with the materiality of a tree, a tool, the world."

Students used only tools that would have been available to Thoreau to recreate the cabin. No nail guns, power saws, or pressure-treated two-by-fours—students used felling axes, broadaxes, crosscut saws, adzes, chisels, augers and bores, chalk lines, squares, froes, and mallets. They also relied on Thoreau's sparse instructions to guide them through the building process, which the students ultimately dubbed the Thoreau Housing Collective.

The project has already made an impact across the country. High school students in Cincinnati used a Skype connection to hear a lecture about the project and learn more about Thoreau. Plans call for additional Skype lectures around the country.

## Students Receive Prestigious Academic Honors

Earning high-profile fellowships and other academic honors is not only a boon to the budding careers of the student recipients, but it also highlights Georgia Tech as a fertile incubator of the nation's brightest young minds.

This year, three Tech students—Hunter Causey, Thomas Wall, and Alice Wang—joined twenty-one of their predecessors who have earned Fulbright Scholarships over the past two decades, representing the Institute around the globe. "In the past three years, twelve



*Professor Hugh Crawford (right) leads an Honors Program class in constructing a replica of Henry David Thoreau's famed Walden cabin as part of the Thoreau Housing Collective project.*

Georgia Tech Fulbright winners have served in Japan, two in Germany and Indonesia, and others in Poland, Tunisia, Switzerland, and Mexico,” said Karen Adams, interim director of Georgia Tech’s Fellowship Communication Program. “This coming year, students will travel to the European Union, Cyprus, and Mongolia.”



*Hunter Causey*

Causey has “a special appreciation for contributing to protecting one of the world’s most pristine river systems.” Causey also has a special appreciation for Georgia Tech. His grandfather, who graduated from Tech in 1935, instilled in him a sense of the Institute’s “academic excellence.”



*Alice Wang*

Wang, who recently completed her bachelor’s degree in electrical engineering with minors in economics and law, science, and technology, plans to use her Fulbright in Cyprus implementing computer-assisted conflict resolution. “I look forward to applying the technical engineering knowledge I have learned at Georgia Tech to a real-world international affairs situation,” said Wang.

“I have always been interested in computer applications in international affairs and policy,” she said. “I was looking for a fellowship opportunity to go abroad for a year, and the Fulbright seemed a perfect match.”

Wall, a second-year civil engineering doctoral student, will study the relationship between climate change and transportation infrastructure at two universities in Europe.



*Thomas Wall*

of Amsterdam—in my chosen field of study: potential impacts of climate change on transportation infrastructure,” said Wall. “I am looking forward to the opportunity to exchange thoughts and research ideas with researchers to further our collective understanding of the potential impacts that climate change will have on transportation infrastructure and to develop methodologies to best adapt our current management practices given this context of changing climate.”



*Andrea Barrett*

Another highly coveted academic honor among the nation’s brightest university students is the Hertz Fellowship, a prize awarded last year to recent graduate Andrea Barrett (biomedical engineering). One of four women and eleven men selected from an elite pool of nearly six hundred applicants, Barrett was the only student from the southeastern United States to receive the fellowship last year.

Valued at more than \$250,000, Hertz Fellowships are unique no-strings-attached awards that allow exceptional applied scientists and engineers the freedom to innovate. The awards provide support lasting up to five years of students’ graduate studies.

“Winning the Hertz Fellowship is an amazing honor that I am so thrilled to receive,” said Barrett. “The Hertz Fellows are some of the most distinguished and accomplished scientists in the country, and I look forward to learning all I can from them. Earning this

“I applied for a Fulbright because of the opportunity it afforded to conduct research at ground zero—that is, at two of the leading universities, the University of Oxford and the University

fellowship is a remarkable way to culminate my undergraduate career in biomedical engineering at Georgia Tech, and I know it will change my life tremendously with all it has to offer for my graduate career.”

Barrett’s undergraduate research experiences have spanned multiple disciplines and international boundaries, resulting in two conference publications and contributions to several other manuscripts. She has worked in labs at Georgia Tech, Harvard Medical School, Osaka University in Japan, and the National Cancer Institute. Building on her undergraduate coursework and research experience in various facets of biomedical engineering, Barrett plans to pursue a PhD in bioinformatics and computational biology and eventually a career in academia as a research professor at a leading institution.

Another accomplished undergraduate, senior Will Boyd (physics/computer science), was named to the USA Today Academic All Star Team. Boyd participates in the Honors Program, has done an internship at CERN (European Organization for Nuclear Research) in Switzerland, and was part of the group that won the 2009 InVenture First Prize for their work on an algae-based photobioreactor.



*Will Boyd*



Among his many accomplishments, Boyd founded a company as well as a student organization, conducted undergraduate research around the world, and won a competition for student inventors. "Will becomes a leader because he wants to do things," said Professor Greg Nobles, director of the Georgia Tech Honors Program. "He doesn't do things because he wants to be a leader."



*Mitchel Keller*

In addition to talented undergraduates such as Boyd and Barrett, Tech graduate students are also renowned for garnering prestigious academic fellowships. Doctoral candidate Mitchel Keller, one of Tech's most prominent young scholars, was awarded a Marshall Sherfield Fellowship for the 2010 academic year. Keller is Tech's third fellowship winner, making the Institute the nation's top producer of Marshall Sherfield fellows. He is also the first mathematician to receive the honor.

The Marshall Sherfield Fellowship encourages the academic advancement of intellectually gifted young Americans who have recently received a PhD in science, technology, engineering, or mathematics through the opportunity to work with the United Kingdom's most innovative scientists and engineers. Fellows conduct research over a one-to-two-year period at a college or university in the U.K. Keller plans to study mathematics at the London School of Economics.

"I applied for a Marshall Sherfield Fellowship because of the opportunity to work with a leader in my area of mathematics in the United Kingdom," said Keller. "I plan to conduct research in combinatorics, particularly the combinatorics of partially ordered sets, with Professor G. R. Brightwell. I chose London School of Economics because of Professor Brightwell's reputation in this area of mathematics as well as the overall strength of the math department in discrete mathematics."

Research in partially ordered sets

could offer critical solutions to important issues facing the global community, specifically improving healthcare or encouraging fiscal responsibility in large organizations.

Keller's fellow graduate student, bioengineering doctoral candidate Yash Kolambkar, is one of thirteen postdoctoral researchers to be named among the first Kauffman Postdoctoral Fellows.

In addition to providing a salary and benefits to support the fellows' research over the course of the yearlong fellowship, the Kauffman Foundation has matched each fellow with an academic advisor for mentoring on matters beyond research, and an experienced investor or corporate leader to serve as a business mentor. During the fellowship year, each fellow also will undertake an industry internship suited to his or her research interests and objectives.



*Yash Kolambkar*

Kolambkar is a researcher in the biomedical field with a strong focus on translation of research ideas into commercially viable products. He has earned a technology commercialization certificate from the nationally recognized TI:GER (Technological Innovation: Generating Economic Results) program, based in Georgia Tech's College of Management. In the program, he developed a commercialization plan for his PhD technology, which would restore cartilage in osteoarthritic patients.

In addition to Kolambkar and Keller, a group of thirty-eight graduate students and graduating seniors received National Science Foundation (NSF) Graduate Research Fellowships, more than any other college or university in Georgia.

The fellowships, valued at more than \$100,000 each, include \$30,000 per year for three years for graduate study and \$10,500 annually for three years for tuition. This year's recipients are comprised of twenty-eight graduate students and ten undergraduates (seniors). Areas

of study range from artificial intelligence to science policy. A separate group of thirty-seven current Georgia Tech students received an honorable mention designation from the NSF.

# Honoring Faculty-Staff Contributions

*No matter how talented and accomplished its students are, a great university won't stay great for long without a first-rate faculty to guide and inspire students, and a superior staff to support the wide array of activities pursued by both faculty and students. Georgia Tech is tremendously fortunate to be able to attract and retain the finest faculty and staff members.*



## Faculty Garner High-Profile Awards

One of the most critical drivers of a university's reputation is the quality and productivity of its faculty, and Georgia Tech professors consistently rank among the nation's best on both counts. Of particular note this past year was the impressive array of young faculty members who earned prestigious honors.

Assistant Professors Melissa Kemp (biomedical engineering) and Christine Payne (chemistry and biochemistry) are the first Georgia Tech faculty members—and first in the state of Georgia—to receive the National Institutes of Health (NIH) Director's New Innovator Award. The award provides \$1.5 million in research funding—\$300,000 a year for five years—to each early career investigator honored. New Innovator Awards were presented to fifty individuals in recognition of their potential to produce major impact on broad, important problems in biomedical and behavioral research.

Kemp was recognized for research

that utilizes engineering methods to analyze complex biochemical networks. Specifically, she is studying how oxidative environments influence immune cell function. One of her goals is to develop computational models that can predict responses to drug interventions for inflammatory disease and cancer.

"I am thrilled and honored to receive this award at an early stage of my career," Kemp said. "Young researchers often feel pressure to conduct 'incremental science' in order to acquire funding. The grant provides my lab the financial freedom to explore unconventional ideas as part of our research efforts."



*Melissa Kemp (right) is one of two Tech recipients of the NIH Director's New Innovator Award.*



Payne's honor was in recognition for her research targeting and delivering nanoparticles to living cells and the development of microscopy methods to image dynamic events inside cells. Her research has promising applications in the arena of drug and gene delivery along with displaying potential to further understand the fundamental functions of the cell.

"This award provides a great opportunity to focus on the science of nanoparticle-cell interactions and the development of new fluorescence microscopy methods," Payne said.

While both Kemp and Payne received the award for their individual achievements, the two are also involved in a joint collaboration that combines microscopy, modeling, and biochemical analysis in an effort to understand the intracellular environment.

Another of Tech's talented young faculty members, Assistant Professor Justin Romberg (electrical and computer engineering), received a Presidential Early Career Award for Scientists and Engineers (PECASE), the nation's highest honor for professionals at the outset of their independent scientific research careers.

Romberg was among 100 recipients of the award, established in 1996 to honor the most promising researchers in the nation within their fields. His research focuses on the mathematics of data acquisition. In particular, he is interested in ways in which randomness can actually help in data acquisition, potentially reducing both the cost and the computational complexity of high-resolution sensing systems. This work will influence the design of next-generation analog-to-digital converters, radar imaging platforms, and MRI systems. Romberg is the sixth PECASE winner from the School of Electrical and Computer Engineering.

Romberg's engineering colleague, Assistant Professor Todd McDevitt (biomedical engineering), received the 2010 Young Investigator Award from the Society of Biomaterials (SFB). The Young Investigator Award annually recognizes an individual who has demonstrated outstanding achievements and



*Fumin Zhang (Georgia Tech-Savannah) received the ONR Young Investigator Award.*

leadership in the field of biomaterials research. This marks the fourth time in the last seven years that a Georgia Tech faculty member has received the SFB Young Investigator award.

The McDevitt Laboratory for the Engineering of Stem Cell Technologies is focused on the development and application of engineering principles to translate the potential of stem cells into viable regenerative therapies and in vitro diagnostics. Biomaterials-based approaches are used to engineer the microenvironment of stem cells in order to improve the efficiency and homogeneity of directed stem cell differentiation strategies.

In addition, McDevitt's research focuses on development of novel regenerative molecular therapies from natural biomaterials produced by stem cells. The combination of directed stem cell differentiation and development of stem cell-derived biomaterials is expected to yield fresh insights into stem cell biology, facilitate new regenerative therapies, and create novel cell diagnostic platforms.

Prestigious honors are not limited to engineering faculty on the Atlanta campus. Assistant Professor Fumin Zhang (electrical and computer engineering) at Georgia Tech-Savannah received the 2010 Young Investigator Award from the

Office of Naval Research (ONR). The award recognizes academic scientists and engineers who show exceptional promise for creative study.

Zhang's research proposal, "Generic Environmental Models for Agile Marine Autonomy," identifies the capabilities of unmanned robots and mobile sensor networks to meet the challenge of monitoring large areas in the ocean and atmosphere with limited sensing resources and limited power. Zhang has developed motion planning algorithms and motion control laws for underwater robots to explore and sample ocean fields. His current goal is to establish a lab and a research program for designing underwater robots and sensor networks at Georgia Tech-Savannah.

"I am honored to be recognized among other talented young investigators who received this prestigious award," said Zhang. "This award allows me to further my research and academic career in maritime robotics, ocean sensing, and the science of autonomy. I look forward to pursuing influential intellectual contributions with my colleagues and students."

In addition to young engineering faculty, more seasoned scholars in the field also received their share of honors last year. For example, the American



Vladimir Tsukruk (seated) is one of two Tech professors who received the Humboldt Research Award.

Society of Civil Engineers (ASCE) elected Distinguished Professor Bruce R. Ellingwood (civil and environmental engineering) a distinguished member.

Internationally recognized as an authority on structural load modeling and load combination analysis, structural reliability, and risk analysis of engineered facilities, Ellingwood also is considered a leader in the technical development and implementation of probability-based codified design standards for building structures. He served as administrator of the Secretariat of American National Standard Committee A58 on Minimum Design Loads from 1977 to 1984, directing the development of the general probability-based load criteria for limit states design that have appeared for nearly three decades in successive editions of *Minimum Design Loads for Buildings and Other Structures*. These standards are found in all strength design standards—structural steel, concrete, and wood construction—in the United States.

“I was truly honored to be elected as a distinguished member of ASCE,” Ellingwood said. “I have been a member of ASCE for over thirty-five years and treasure my numerous professional associations and friendships with Society colleagues. My fellow distinguished members are at the top of the profession, and it is a privilege to be considered as worthy to be included in that group.”

Two Tech faculty members—Professor Vladimir Tsukruk (materials science and engineering) and Assistant Professor Brett Wick (mathematics)—received the Humboldt Research Award from the Alexander von Humboldt Foundation.

Tsukruk, co-director of Georgia Tech’s Bio-nano-enabled Inorganic/Organic Nanostructures and Improved Cognition (BIONIC) center, is conducting research at the University of Bayreuth in Germany. His research focuses on the field of fabrication and structural characterization of molecular films.

Wick received the award in recognition of his research in complex function theory. His eighteen-month fellowship, based at the University of Paderborn,

continues through 2012. Wick’s research interests focus on problems in analysis of several complex variables, harmonic analysis and operator theory, and specifically the interaction between these subjects.

In addition to the impressive array of awards garnered by engineering and sciences professors, the computing faculty brings even more cachet to Tech’s reputation. One such rising star is Assistant Professor Andrea Thomaz (interactive computing), who was recognized by *Technology Review* magazine as one of the world’s top innovators under the age of 35. Thomaz focuses her research on social interactions between robots and humans.

“It’s quite hard to enumerate, much less engineer ahead of time, all the tasks and skills people will need robots to do,” said Thomaz. “We’re working on developing robots that can learn new skills from everyday people so that the robots can adapt their behavior to the task at hand.”

This work is called socially guided machine learning, and Thomaz is working on bridging the gap between state-of-the-art learning systems and the kind of teaching an everyday person is able to give the robot.

Thomaz was selected from more than 300 nominees by a panel of expert judges and the editorial staff of *Technology Review*, MIT’s magazine on science and technology.



Andrea Thomaz (left) was named one of the world’s top innovators under age 35.



## Staff Receive Variety of Key Awards, Appointments

A great university cannot function without high-quality staff members, and Georgia Tech's staff strives for excellence in their campus roles as well as their community activities.

Donna Ennis, project director of the Georgia Minority Business Enterprise Center (GMBEC), was named one of Atlanta's Top 100 Black Women of Influence by the Atlanta Business League. Funded by the U.S. Department of Commerce's Minority Business Development Agency and operated by Georgia Tech's Enterprise Innovation Institute, GMBEC helps emerging and existing minority businesses achieve significant growth and sustainability and generate long-term economic impact through the creation of jobs and revenue.

The list of "Atlanta's Top 100 Black Women of Influence" includes black women in the metro Atlanta community who have reached senior-level positions within their professions, are leading entrepreneurs in their industries, or have attained the ability to influence large public bodies politically.

"Donna Ennis was selected as one of Atlanta's Top 100 Black Women of Influence because of her commitment and dedication to growing minority businesses," said Leona Barr-Davenport, Atlanta Business League president and CEO. "Very simply put, she cares and is results oriented. Her work speaks for itself."

Ennis is responsible for the strategic direction, marketing and outreach, and operations of the GMBEC and assists clients with strategic, business, and market planning; marketing research and communications; public and private procurement, finance, and operations; and business process improvement.

"The Georgia Minority Business Enterprise Center plays a vital role in facilitating the growth of both emerging and established minority businesses in



*Lanous Wright was named chair of the Board of Regents Professional Development Consortium.*

Georgia," noted Stephen Fleming, vice provost of the Enterprise Innovation Institute. "Donna Ennis has been the driving force behind the Center's success, and I am pleased to see her hard work and dedication recognized in this way."

Helping Georgia Tech staff advance their careers through continual

training is the professional focus of Lanous Wright, director of training in the Office of Organizational Development. Wright's influence was extended far beyond the Tech campus when he was named chair of the Board of Regents Professional Development Consortium, which allows him to play a critical role in shaping professional

## Georgia Tech among Chronicle of Higher Education 'Great Colleges to Work For'

*The Chronicle of Higher Education* named Georgia Tech to the list of ten universities among its annual "Great Colleges to Work For." For institutions its size, Georgia Tech was cited in ten of twenty-six categories, including job satisfaction, healthy faculty-administration relationships, collaborative governance, teaching environment, physical workspace conditions, work-life balance, confidence in senior leadership, connection to institution and pride, perception of and confidence in fair treatment, and policies, resources, and efficiency.

Results are based on survey responses from nearly 41,000 administrators, faculty, and staff members at more than 300 colleges and universities. As evidence of faculty and staff confidence in fair treatment regarding pay and performance, Georgia Tech was specifically cited for its networking and mentorship programs that support professional development and conflict resolution.

"The survey results simply quantify what we already knew," said President Bud Peterson. "The fact that we have been officially recognized as a great place to work is a testament to the more than 6,000 faculty and staff dedicated to making Georgia Tech one of the nation's leading research institutions."

development throughout the University System.

“The formation of the Professional Development Consortium demonstrates the commitment to training and professional development that exists at the University System office level,” said Wright. “With Georgia Tech being selected as a hub, it also acknowledges the strength of our programming here at Tech.”

Empowering and advocating for women students, faculty, and staff was the decade-long mission of Yvette Upton, founding director of Tech’s Women’s Resource Center (WRC). When Upton took another position at Georgia Tech-Savannah last year, WRC leadership decided to honor her contributions by establishing the Yvette Upton Empowerment Award. Presented annually, the award honors women Tech students whose service, support, and advocacy of gender and equity issues emulates Upton’s example.

## Faculty Support Federal Government Activities

Since taking office in early 2009, the Obama Administration has called upon a number of Tech faculty members to provide expertise and guidance in a variety of endeavors.

To address an area of increasing concern in the digital age, President Barack Obama appointed Howard Schmidt, adjunct faculty member in the Georgia Tech Information Security Center (GTISC) in the College of Computing, as the new White House cybersecurity coordinator.

“Howard is one of the world’s leading authorities on computer security, with some forty years of experience in government, business, and law enforcement,” said John Brennan, assistant to the president for Homeland Security and Counterterrorism. “Howard will have regular access to the president and serve as a key member of his national security staff. He will also work closely



*Howard Schmidt is greeted by President Obama.*

with his economic team to ensure that our cybersecurity efforts keep the nation secure and prosperous.”

At Tech, Schmidt has helped set up the GTISC industry advisory board. He has worked on a research project to evaluate the cybersecurity policies of various U.S. stakeholders and has given lectures on security policies and strategies. Schmidt previously served as chief security

strategist for the US CERT Partners Program and special advisor to the White House for Cyberspace Security under President George W. Bush. He joined the Tech faculty in 2006 to work with GTISC to improve the state of information security by lending his vast knowledge and expertise in this growing technological area.

Schmidt’s distinguished career as an information security advocate includes leadership positions with both public and private sector organizations. He has served on the President’s Critical Infrastructure Protection Board, was an augmented member of the President’s Committee of Advisors on Science and Technology, and held executive positions with the Information Systems Security Association, the Information Technology Information Sharing and Analysis Center, the National Institute of Standards and Technology, and the Information Security Privacy Advisory Board.

Another key Obama Administration appointment is that of Stephen Cross, Tech’s executive vice president for research, to the Defense Science

## Campus departments receive Customer Service Award from University System

Eight campus departments and organizations, comprised of faculty, staff, and students, were awarded a silver level Chancellor’s Customer Service Recognition Award from the University System of Georgia.

Recognized for their service in assisting with Georgia Tech Housing Freshman Move-in, representatives from Housing, Parking and Transportation, Police, Facilities, the Residence Hall Association, the Residential Network, and Greek Affairs received the team Excellence Award of the Year.

Housing Senior Director Michael Black served as coordinator of the operation. The different groups worked with students and families on Freshman Move-in Day to help with simple tasks such as unloading cars and connecting new students’ computers, to institutional assistance with traffic and recycling of discarded moving materials.

“We’re very honored to receive this award from the Board of Regents,” Black said. “It was good recognition for the years of hard work that finally came to fruition.”

Black added that nearly 6,500 students were moved into housing in three days. With volunteers helping, the average car was emptied and had its contents carried into the residence halls in eight minutes or less.





*Catherine Ross has consulted with the White House Office of Urban Affairs.*

Board. Considered leaders and experts in engineering, science, and technology as applied to the defense and military services fields, board members serve on task forces and provide informed opinions and input on scientific, technical, manufacturing, acquisition processes, and related matters to Department of Defense administrators.

The Defense Science Board was established in 1956 as a standing committee that advises top Pentagon officials on the “needs and opportunities presented by a new scientific knowledge for radically new weapons systems.”

Cross, who served on the Defense Science Board Task Force on Defense Software in 2000, holds faculty appointments as a professor in Tech’s School of Industrial and Systems Engineering and as an adjunct professor in the College of Computing. He serves on the research advisory boards of the Health Systems Institute, the Parker H. Petit Institute for Bioengineering and Bioscience, the Strategic Energy Initiative, and the Tennenbaum Institute for Enterprise Transformation. He joined Georgia Tech in 2003 after serving as director and CEO of the Software Engineering

Institute at Carnegie Mellon University, which he joined in 1994. Previously, Cross was program manager at the Defense Advanced Research Projects Agency.

During his career, Cross has provided expert testimony to Congress on several occasions, published more than sixty papers on information technology and technology transition, and presented keynotes at numerous institutional conferences.

The future of broadband communication is another critical area of national interest where the White House has called upon Georgia Tech expertise. Associate Professor Chris Forman (management)

served as an expert panelist as part of a Federal Communications Commission (FCC) workshop in Washington, D.C. The goal of the workshop, part of an FCC initiative to develop a national broadband plan, was to evaluate the potential impact of increased broadband penetration and speed on U.S. productivity growth, economic growth, and employment.

Forman’s research interests include the study of the adoption and returns to IT investment among businesses, with a particular interest in the impact of geography and standards on the value of IT infrastructure investments. Forman also studies innovation in the IT and software industries and electronic commerce.

Catherine Ross, Harry West Professor and director of the Center for Quality Growth and Regional Development

(CQGRD) in the College of Architecture, has consulted with the recently created White House Office of Urban Affairs, whose mission is to coordinate federal agencies that impact urban policies in order to ensure thoughtful and integrated investment in urban areas. The Office is also charged with identifying policies that will best leverage the assets of U.S. metropolitan areas.

Ross has extensive experience in regional planning, infrastructure planning, and development. She is the author of the recently released *Megaregions: Planning for Global Competitiveness*, and she co-authored *The Inner City: Urban Poverty and Economic Development in the Next Century*.

In addition, Ross was invited by the White House to participate in the Clean Energy Forum, where Transportation Secretary Ray LaHood and Housing and Urban Development Secretary Shaun Donovan spoke about why action for a clean energy future is of vital importance.

## Faculty Give Congressional Testimony

In addition to serving on advisory boards and panels and providing consulting services, Georgia Tech faculty also assist the federal government by



*Danny Boston testified before Congress on affordable housing.*

providing expert testimony at congressional hearings.

Danny Boston, an economics professor in the Ivan Allen College of Liberal Arts, testified before Congress last year on the importance of providing quality, affordable housing to low-income families. Much of Boston's testimony was based on his research on the Atlanta Housing Authority.

"My research concludes that environment matters," said Boston. "When low-income housing-assisted families are given access to quality, affordable housing in neighborhoods of greater opportunity, their self-sufficiency increases significantly."

Boston's research concluded that families who relocated from public housing projects moved to much better neighborhoods, and that the employment rates of work-eligible adults increased from 21 percent in 1995 (when most families lived in housing projects) to 53 percent in 2007 (when most families had moved away from housing projects). In addition, violent crime was not significantly correlated with the percentage of families in census tracts who used vouchers; it was highly correlated with the poverty rate.

"To a great extent, the rebirth of in-town neighborhoods in Atlanta has accompanied the mixed-income revitalization of public housing projects," Boston said. "In my opinion, this rebirth would not have occurred in its absence. Secondly, my research in Atlanta has demonstrated conclusively the self-sufficiency of low-income families can improve significantly if we provide them access to quality, affordable housing in neighborhoods where the opportunities for upward mobility are greater."

Also offering congressional testimony this past year were two of Boston's Ivan Allen College colleagues: Professor Sy Goodman (international affairs and computing), and Associate Professor Danny Breznitz (international affairs).

In his testimony before the House Committee on Science and Technology, Goodman expressed strong support for the Cybersecurity Enhancement Act of 2009. The bill, which passed the House



*Michelle LaPlaca (center) gave Senate testimony on traumatic brain injury in veterans.*

of Representatives by a vote of 422 to 5, was designed to improve security in all sectors by building a skilled cybersecurity workforce, speeding the transfer of technologies to market, and promoting awareness of cybersecurity to the public.

"A large fraction of the American people, its businesses, and government institutions have become increasingly dependent on networked information technologies. We are at risk because these infrastructures are riddled with vulnerabilities and cannot fully be trusted," Goodman wrote in a letter to the subcommittee chairman. "From my perspective, and the perspective of educational institutions, the bill is extraordinary in the extent to which it tries to address education and workforce building issues."

Breznitz testified before the House Committee on Science and Technology's Subcommittee on Technology and Innovation at a hearing on the federal government's role in supporting innovation.

One theme of the hearing was the need for a comprehensive federal strategy to create an environment that is conducive to innovation in the U.S. According to the witnesses, a comprehensive innovation strategy would include components such as a tax policy amenable to attracting capital, a more

efficient process to transition research to commercialization, and immigration policies that attract the best and the brightest and keep them in the U.S.

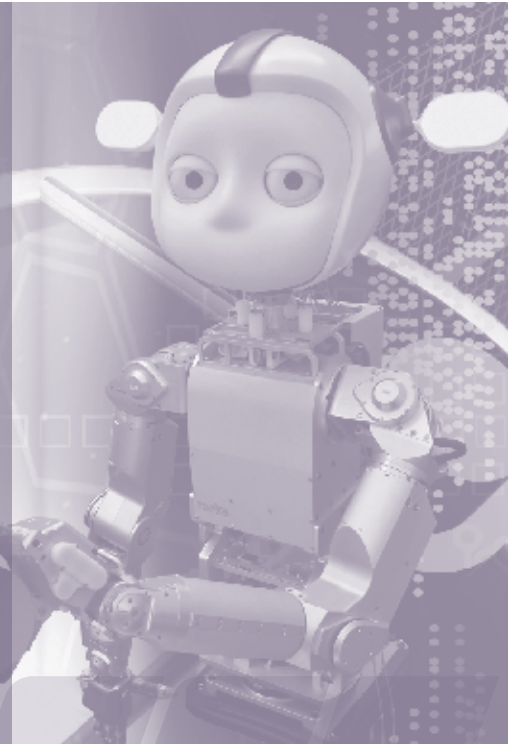
Breznitz discussed three roles that the government has to play in innovation policy: public financing of private innovation, public production of innovation (i.e. financing of industrial research at non-profit institutions), and facilitation of professional, inter-institutional networks. He also suggested that federal-state partnerships could encourage states to compete in the development of different, experimental, and creative policies for innovation and encourage regional collaboration.

Tech's College of Engineering was also represented on Capitol Hill by Assistant Professor Michelle LaPlaca (biomedical engineering). LaPlaca testified before the Senate Committee on Veterans' Affairs about traumatic brain injury (TBI) in veterans and progress being made in treating such injuries. She shared her research experience in diagnosing and treating TBI along with her collaborations with the Department of Veterans' Affairs.



# Achieving Research Results That Matter

*Nowhere is Georgia Tech's commitment to improving the quality of human life more clearly demonstrated than in the Institute's research laboratories. From life-saving diagnostic tests and treatments to robots that can teach science to children to novel ways of furthering environmental sustainability, Georgia Tech's research agenda revolves around a mission to make people's lives better.*



## Advancements in Medical Diagnostics and Treatments

Although it was established only thirteen years ago, the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University is now ranked No. 2 in the nation. The primary force behind this visibility and recognition is the work of faculty members such as Professor Ravi Bellamkonda, who is leading a research team that has developed an improved version of an enzyme that degrades the dense scar tissue that forms when the central nervous system is damaged. By digesting the tissue that blocks re-growth of damaged nerves, the improved enzyme—and new system for delivering it—could facilitate recovery from serious central nervous system injuries.

The enzyme, chondroitinase ABC (chABC), must be supplied to the damaged area for at least two weeks following injury to fully degrade scar tissue. But the enzyme functions poorly at body

temperature and must therefore be repeatedly injected or infused into the body.

In a paper published in the journal *Proceedings of the National Academy of Sciences*, the researchers describe how they eliminated the thermal sensitivity of chABC and

developed a delivery system that allowed the enzyme to be active for weeks without implanted catheters and pumps.

“These results bring us a step closer to repairing spinal cord injuries, which require multiple steps including minimizing the extent of secondary



*Professor Ravi Bellamkonda (right) mentors undergraduates such as Xi Lu.*



*Assistant Professor Maysam Ghovanloo (left) developed a tongue drive system to help patients with severe spinal cord injuries.*

injury, bridging the lesion, overcoming inhibition due to scar, and stimulating nerve growth,” added Bellamkonda, who is also deputy director of research for GTEC, a regenerative medicine center based at Georgia Tech and Emory University.

In a separate initiative, Georgia Tech researchers have developed an assistive technology that enables individuals with high-level spinal cord injuries to maneuver a powered wheelchair or control a mouse cursor using simple tongue movements.

“A recent clinical trial has validated that the tongue drive system is intuitive and quite simple for individuals with high-level spinal cord injuries to use,” said Assistant Professor Maysam Ghovanloo (electrical and computer engineering). “Trial participants were able to easily remember and correctly issue tongue commands to play computer games and drive a powered wheelchair around an obstacle course with very little prior training.”

The clinical trial—conducted at the Shepherd Center, an Atlanta-based catastrophic care hospital—tested the ability of individuals with high-level spinal cord injuries to perform tasks related to

computer access and wheelchair navigation using only their tongue movements.

Ghovanloo chose the tongue to operate the system because unlike hands and feet, which are controlled by the brain through the spinal cord, the tongue is directly connected to the brain by a cranial nerve that generally escapes damage in severe spinal cord injuries or neuromuscular diseases. A future system upgrade will be to move the sensors inside the user’s mouth. This will be an important step for users who are very impaired and cannot reposition the system for best results.

“All of the subjects successfully completed the computer and powered wheelchair navigation tasks with their tongues without difficulty, which demonstrates that the tongue drive system can potentially provide individuals unable to move their arms and hands with effective control over a wide variety of devices they use in their daily lives,” said Ghovanloo.

Another persistent medical problem being addressed by Tech researchers is the development of pressure ulcers in hospital and nursing home patients. A Georgia Tech startup company formed to commercialize a new device that

could help prevent such ulcers has won the first Georgia Tech Edison Prize. The \$15,000 prize will help launch the new company, known as Multispectral Imagers.

Treatment of pressure ulcers costs an estimated \$8 billion each year in the United States alone, but the painful skin injury can be prevented if detected early. The device, a hand-held multispectral imaging system that provides data in real time, could be used by healthcare professionals to detect signs of pressure ulcers before they can be seen with conventional visual screening techniques—especially in patients with darker skin.

“We have developed a novel multispectral imager that can be integrated onto a chip,” said Fengtao Wang, an electrical and computer engineering graduate student. “We can deliver a compact, real-time, and low-cost multispectral imager to detect erythema at an early stage.”

The device would be marketed to clinics, nursing homes, rehabilitation centers, hospitals, and other facilities that treat patients whose mobility problems can result in development of pressure ulcers. In addition to the medical applications, Wang said the device may also have military, agricultural,



manufacturing, and environmental uses.

In addition to Wang, the company team includes Ali Adibi and Fuhan Liu (electrical and computer engineering), and Linghua Kong and Stephen Sprigle (Center for Assistive Technology and Environmental Access, College of Architecture).

The Georgia Tech Edison Prize was established to encourage formation of startup companies based on technology developed at Georgia Tech, and was made possible by a multi-year grant from the Charles A. Edison Fund, named for the inventor's son.

## Promoting Environmental Sustainability

What if a distasteful trip to the curb to take out the trash suddenly became a pleasant—and profitable—stroll?

Juiceless batteries would be good for a few cents. An old keyboard might fetch a couple of bucks. Even that empty box of Pop-Tarts might be worth something.

No need to sort these discards: the trashcan has already done it, inventorying all contents and calculating the worth of the waste. Next month's garbage bill could be accompanied by a check.

"Recycling and consumer waste are still managed with 1950s technology," said Professor Valerie Thomas (industrial and systems engineering). "Of course it can't keep up. The flow of products out of the household needs to be managed with at least as much intelligence as the flow of products into the household. It's sort of obvious."

This is the concept behind "Smart Trash," an approach developed by Thomas that has caught the attention of major corporations and the U.S. Environmental Protection Agency (EPA). Smart Trash systems not only provide sustainable and productive ways for discarding items, but also can redefine the relationship people have with their garbage.

There are a number of manufacturers, retailers, recyclers, and researchers now working to actualize the Smart

Trash idea. Project PURE (Promoting Understanding of RFID and the Environment)—featuring representatives of companies such as Wal-Mart and Hewlett-Packard, as well as recyclers and developers of product codes—is working to refine this concept and push it toward mainstream reality.

"There are advantages on both sides to the consumer and the recycler," said Angie Leith, senior policy analyst at the EPA Office of Solid Waste. Leith recruited Thomas to take part in Project PURE, which is funded by the EPA, after being impressed with her research and the promise of Smart Trash.

"Valerie understands industrial ecology," she said. "If there's always going to be trash, when it gets to end of life, you should be able to do something with it. Let's try to do it in a smart way. It really makes sense."

The second component is a retrofitted recycling truck or recycling center that can sort recyclables. Valuable items could be sent to auction sites where the proceeds could be sent directly back to consumers. Items with hazardous components could be shunted aside for appropriate management. A Wi-Fi connection provides the bridge between the trashcan and the recycling service, relaying information that can anticipate and properly organize the contents.

Recyclable items with significant value—such as consumer electronics—would be forwarded to online auction services where the maximum value could be actualized. Consumer recycling credits could also be issued for something as insignificant as a frozen pizza box or a shampoo bottle. Any money garnered from the waste could be applied to a consumer's monthly



*The Smart Trash technology developed by Professor Valerie Thomas could revolutionize waste disposal.*

Two essential elements are involved in making Smart Trash function.

The first is a Universal Product Code (UPC) or radio frequency identification (RFID) tag that identifies specific merchandise. A scanner equipped within a trash receptacle would be able to immediately record what is being disposed, allowing consumers to track their trash and determine what pieces are potentially valuable.

sanitation bill or sent as a check.

Thomas also advocates using non-recyclable waste to provide energy via combustion. Burning non-recyclable disposables in an environmentally friendly manner could provide power for everything from lights to appliances.

Converting waste to energy is also the focus of another research project at Tech whose results were published in the American Chemical Society's journal



*Assistant Professor Baratunde Cola (center) leads the NanoEngineered Systems and Transport Research Group.*

*Nano Letters.* The study reveals that thermocells based on carbon nanotube electrodes might eventually be used for generating electrical energy from heat discarded by chemical plants, automobiles, and solar cell farms.

The research was a joint collaboration between Assistant Professor Baratunde Cola (mechanical engineering) and an international team of researchers from the U.S., Australia, China, India, and the Philippines.

Cola, director of Georgia Tech's NanoEngineered Systems and Transport Research Group (NEST), described the study as a breakthrough in efficiently harvesting electrical energy from various sources of exhaust or wasted heat.

"Our NEST Lab was fortunate to team with Dr. Ray Baughman's Nano-Tech Institute at the University of Texas at Dallas and Dr. Gordon Wallace's Intelligent Polymer Research Institute in Wollongong, Australia, in the final year of a long collaboration that solved key technical problems," he said. "We brought fresh eyes, as well as our knowledge and experience with heat transfer engineering from the nanoscale to the scale of practical devices to the problem, which provided a key missing link. The team will together work to enable additional breakthroughs that are required for this technology to reach its full commercial potential."

Efficiently harvesting the thermal energy currently wasted in industrial plants or along pipelines could also create local sources of clean energy that in turn could be used to lower costs and shrink an organization's energy footprint.

The new thermocells use nanotube electrodes that provide a threefold increase in energy conversion efficiency over conventional electrodes. They also take advantage of the exceptional electronic, mechanical, thermal, and chemical properties of carbon nanotubes. The nanotubes' giant surface area and unique electronic structure afforded by their small diameter and nearly one-dimensional structure offer high current densities, which enhance the output of electrical power and the efficiency of energy harvesting.

"Georgians have worked with state support, and in partnership with initiatives such as the Strategic Energy Institute at Georgia Tech, to realize significant gains in renewable energy production," said Cola, who received the 2009 Defense Advanced Research Projects Agency Young Faculty Award for his work on solar energy conversion. "But to become a leading energy state, we must increasingly explore new ways to extract and utilize all forms of energy. Harvesting waste heat as electricity is one direction our NEST Lab takes with

international partners to help provide increased renewable energy options for Georgia and the world."

## Novel Applications of Robotics and Computing

Turning children on to science and math with robotics has become routine, at least since the FIRST Robotics Competition began in 1992. But there is very little evidence about whether robots can actually teach students science, or whether they just serve to excite students already interested in science and engineering.

Given the right context and design challenge, can robotics-based activities engage girls as much as boys? Are there differences in the way rural students engage in these types of materials, compared with urban or suburban students?

To help answer these questions, researchers and curriculum developers from Georgia Tech's Center for Education Integrating Science, Mathematics, and Computing (CEISM) and Center for the Enhancement of Teaching and Learning (CETL) have begun a five-year, \$3.5 million National Science Foundation study to discover how effective robotics and engineering design are at teaching eighth grade physical science content, and at increasing students' interest and engagement in science, math, and engineering.

"Robots are good at increasing students' engagement in science and engineering, but there's no solid evidence to tell us what they actually learn from robotics. Do the students learn science and math, or are they just having fun?" said Marion Usselman, senior research scientist and associate director of CEISM.

The program is known as the Science Learning: Integrating Design, Engineering, and Robotics program (SLIDER). The SLIDER team is developing the curriculum and tracking the progress of science and math students who will enter eighth grade in the 2011-12 school





year. By that time, the research team will have good longitudinal data to show how they performed in science and math before the robotics instruction began.

In addition to using computing to educate the next generation of humans, Tech researchers are also helping to develop and refine the next generation of supercomputing. This effort took a significant step forward when the Institute received a five-year, \$12 million Track 2 award from the National Science Foundation's (NSF) Office of Cyberinfrastructure to lead a partnership of academic, industry, and government experts in the development and deployment of an innovative and experimental high-performance computing (HPC) system.

The award provides for the creation

of two heterogeneous HPC systems that will expand the range of research projects that scientists and engineers can tackle, including computational biology, combustion, materials science, and massive visual analytics. The project brings together leading expertise and technology resources from Georgia Tech's College of Computing, Oak Ridge National Laboratory (ORNL), the University of Tennessee, National Institute for Computational Sciences, HP, and NVIDIA.

NSF's Track 2 program is designed to fund the deployment and operation of several leading-edge computing systems operating at or near the petascale. An underlying goal is to advance U.S. computing capability in order to support computational scientists and engineers in the pursuit of scientific discovery.

"Our goal is to develop and deploy a novel, next-generation system for the computational science community that demonstrates unprecedented performance on computational science and data-intensive applications, while also addressing the new challenges of energy efficiency," said Jeffrey Vetter, joint professor of computational science and engineering at Georgia Tech and Oak Ridge National Laboratory. "The user community is very excited about this strategy."

Vetter will lead the five-year project as principal investigator. The project team is comprised of luminaries in the HPC field, including a Gordon Bell Prize winner and previous recipients of the NSF Track 2B award. Co-principal investigators on the project are Jack Dongarra (University of Tennessee and ORNL), Karsten Schwan (Georgia Tech), Richard Fujimoto (Georgia Tech), and Thomas Schulthess (Swiss National Supercomputing Centre and ORNL).

Georgia Tech is also advancing high performance computing through the formation of the Institute for Data and High Performance Computing (IDH), with the goal of advancing and coordinating Tech's research and education activities in this area. HPC continues to grow as a strategically important area for Georgia Tech, both in its application to key areas of science and engineering as well as in the advancement of the technology itself.

A key mission of IDH will be to enhance Georgia Tech's scientific contributions, reputation, and impact, focusing on the exploitation of HPC technology coupled with the development of novel computational methods. The new institute will promote the development of software and tools to enhance multidisciplinary research and enable discovery and innovation. In addition, it will work closely with the Office of Information Technology to ensure effective, faculty-driven governance concerning the acquisition and use of HPC resources on campus.

Regents' Professor Richard Fujimoto (computational science and engineering) is serving as interim director of IDH.



*Professor Richard Fujimoto (left) is interim director of the Institute for Data and High Performance Computing.*

One important objective for Fujimoto will be to focus on developing new innovations in computational methods into useable tools and software to advance research in the application domain. Creating computational artifacts that provide value to application researchers and can be exported beyond the Tech campus provides a critical avenue to maximize the impact of Georgia Tech research innovations.

“Georgia Tech has made substantial infrastructure and personnel investments in high performance computing, and achieved many important successes over the last five years,” said Fujimoto. “I fully anticipate that IDH will enable us to advance beyond prototypes to new levels of accomplishment in the high performance computing area.”

## Cancer Research is Major Priority

Developing novel methods of detecting and treating cancer has been a key component of Georgia Tech’s research agenda for quite some time, and that effort advanced significantly this year.

Georgia Tech’s Integrative Cancer Research Center (ICRC) has joined forces with the Center for Cancer Research and Therapeutic Development (CCRTD) at Clark Atlanta University to establish a Collaborative Cancer Genomics Center (CCGC), which is



*John McDonald of Georgia Tech, Shafiq Khan of Clark Atlanta University, and George Daneker of St. Joseph’s Hospital join forces to personalize cancer treatment.*

housed at Clark Atlanta. The partnership integrates expertise at both universities that will focus on understanding the underlying causes of prostate, ovarian, pancreatic, and lung cancers.

“The molecular, bioinformatic, and clinical expertise necessary to move forward with such a personalized cancer diagnosis and treatment program exists at the collaborating institutions,” said Shafiq Khan, director of Clark Atlanta’s CCRTD. “Establishment of CCGC will complement the existing experimental infrastructure necessary to generate the genomic data required to attain our goals.”

“We are particularly interested in developing algorithms that will allow us to use gene expression and DNA sequence data that we gather from specific patients to generate a customized prognosis and optimal therapeutic treatment program for individual cancer patients,” said John McDonald, chief research scientist at the Ovarian Cancer Institute at Georgia Tech.

Under the collaborative agreement, CCRTD will house and operate the CCGC’s high-throughput next-generation sequencing instruments. The resulting sequence data will be assembled and analyzed at ICRC. Patient samples will be provided by the Ovarian Cancer Institute (OCI) and Saint Joseph’s Hospital’s Translational Research Initiatives in Oncology for the Management of Personalized Healthcare (TRIOMPH) program. Clark Atlanta and Georgia Tech scientists will join clinical experts from OCI and TRIOMPH to interpret and evaluate the resulting data.

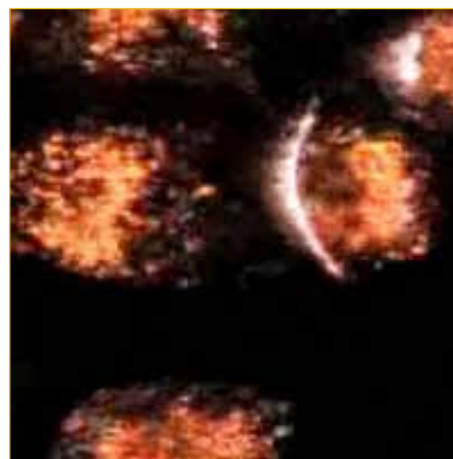
The potential of CCGC is augmented by the rapidly developing science of nanotechnology, which has proven to be fertile ground for Georgia Tech cancer researchers, as various types of nanoparticles are playing key roles in this endeavor.

Taking gold nanoparticles to the cancer cell and hitting them with a laser has been shown to be a promising tool in fighting cancer, but it does have its limitations.

“We’ve developed a system that can kill cancer cells by shining light on gold



*Professor Mostafa El-Sayed*



*Gold nanoparticles used in cancer treatment*

nanoparticles, but what if the cancer is in a place where we can’t shine light on it? To fix that problem, we’ve decorated the gold with a chemical that brings it inside the nucleus of the cancer cell and stops it from dividing,” said Mostafa El-Sayed, Regents’ Professor and director of the Laser Dynamics Laboratory at Georgia Tech.

Once the cell stops dividing, apoptosis sets in and kills the cell. “In cancer, the nucleus divides much faster than that of a normal cell, so if we can stop it from dividing, we can stop the cancer,” said El-Sayed.

Another challenge in fighting cancer is that drugs often hit other non-cancerous cells, causing patients to get sick. But what if researchers could sneak cancer-fighting particles into just the cancer cells? Researchers at Georgia Tech



and the Ovarian Cancer Institute are working on doing just that by developing a method that uses hydrogels—less than 100 nanometers in size—to sneak a particular type of small interfering RNA (siRNA) into cancer cells. Once in the cell, the siRNA turns on the programmed cell death the body uses to kill mutated cells and help traditional chemotherapy do its job.

Many cancers are characterized by an overabundance of epidermal growth factor receptors (EGFR). When the EGFR level in a cell is elevated, it tells the cell to replicate at a rapid rate. It also turns down apoptosis, or programmed cell death.

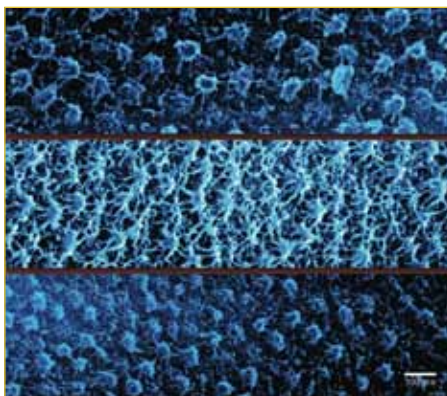
“With our technique we’re inhibiting EGFR’s growth with small interfering RNA,” said Professor John McDonald (biology), chief research scientist at the Ovarian Cancer Institute. “And by inhibiting its growth, we’re increasing the cell’s apoptotic function. If we hit the cell with chemotherapy at the same time, we should be able to kill the cancer cells more effectively.”

“It’s like a Trojan horse,” said Professor Andrew Lyon (chemistry and biochemistry). “We’ve decorated the surface of these hydrogels with a ligand that tricks the cancer cell into taking it up. Once inside, the particles have a slow release profile that leaks out the siRNA over a timescale of days, allowing it to have a therapeutic effect.”

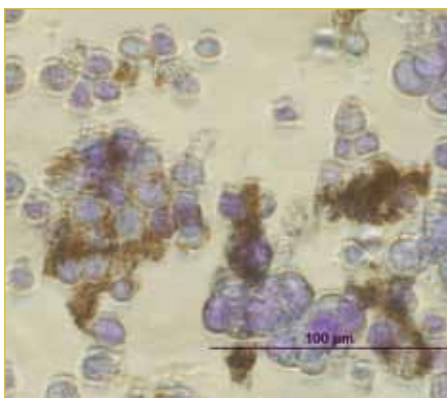
McDonald is also helping to further develop a potential new treatment against cancer that uses magnetic nanoparticles to attach to cancer cells, removing them from the body. The treatment, tested in mice in 2008, has now been tested using samples from human cancer patients.

“We are primarily interested in developing an effective method to reduce the spread of ovarian cancer cells to other organs,” said McDonald.

The idea came to the research team from the work of Ken Scarberry, a former PhD student at Tech and now a postdoctoral fellow in McDonald’s lab. Scarberry originally conceived of the idea as a means of extracting viruses and virally infected cells. At his advisor’s



*Hydrogels reduce ill effects of cancer treatment.*



*Magnetic nanoparticles help remove cancer cells from the body.*

suggestion, Scarberry began looking at how the system could work with cancer cells.

Scarberry and McDonald showed that by giving the cancer cells of mice a fluorescent green tag and staining the magnetic nanoparticles red, they were able to apply a magnet and move the green cancer cells to the abdominal region. Now they have shown that the magnetic technique works with human cancer cells.

“Often, the lethality of cancers is not attributed to the original tumor but to the establishment of distant tumors by cancer cells that exfoliate from the primary tumor,” said Scarberry. “Circulating tumor cells can implant at distant sites and give rise to secondary tumors. Our technique is designed to filter the peritoneal fluid or blood and remove these free-floating cancer cells, which should increase longevity by preventing the continued metastatic spread of the cancer.”

In tests, they showed that their technique worked as well at capturing cancer cells from human patient samples as it did previously in mice. The next step is to test how well the technique can increase survivorship in live animal models. If that goes well, they will then test it with humans.

## Honors for Tech’s Cancer Researchers

Georgia Tech’s groundbreaking work in cancer research has garnered a number of honors for the talented and dedicated scientists involved.

Professor Ravi Bellamkonda (biomedical engineering) is one of six researchers selected by the Georgia Cancer Coalition (GCC) as recipients of the 2010 Cancer Research Awards, made possible through voluntary donations to the Georgia Cancer Research Fund on state income tax forms.

Bellamkonda received a one-year, \$50,000 grant to study how to mark brain tumor margins using a dye visible to the naked eye, so as to provide accurate visual cues to the surgeon during surgery.

Since the 2000 inception of the State Income Tax Checkoff Program, \$2.75 million has been raised for cancer research, which is matched by each researcher’s organization. Sixty-one awards have been made possible by these contributions of Georgia’s citizens.

One of Bellamkonda’s colleagues in biomedical engineering, Assistant Professor Manu Platt, was one of nineteen scholars selected by GCC for its Distinguished Cancer Clinicians and Scientists Program for 2009-10. He will receive \$50,000 each year for five years to support his research efforts. GCC selects scientists engaged in the most promising areas of cancer research. Currently, Georgia Tech has eleven active Distinguished Cancer Scholars.



## GTRI supports Air Force priorities

Georgia Tech has a long history of responding to the needs of the nation's military, particularly the U.S. Air Force.

When the Air Force found that one of its key combat aircraft needed more protection from an enemy missile threat, a multidisciplinary team from the Georgia Tech Research Institute (GTRI) went into action.

The problem was a pressing one. The A-10 attack aircraft, an Air Force workhorse, needed important additions to its electronic warfare (EW) countermeasures systems.

"This was a rush program—they needed it right away," said research engineer Melanie Hill, GTRI's lead engineer on the program. "We made it a priority across many different GTRI groups because of the broad requirements, which included electrical engineering, software development, systems engineering, and mechanical engineering."

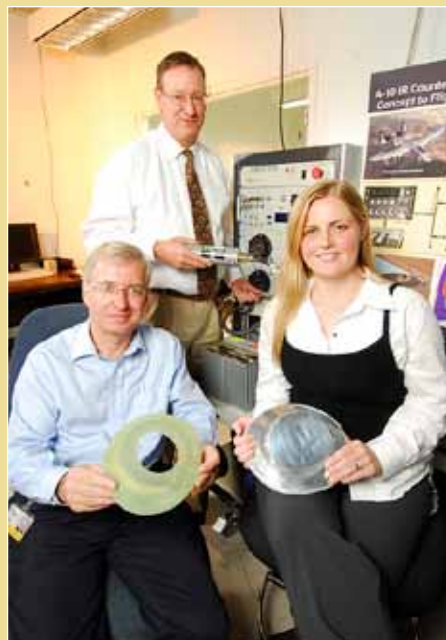
At issue was the ability of the A-10 to detect infrared signals from certain classes of enemy weapons. The A-10, an attack aircraft that often flies at lower altitudes to use its heavy guns and missiles against ground targets, could be vulnerable to those weapons.

The A-10 already carried extensive electronic warfare equipment, including the ALQ-213, a central controller that is the core of the airplane's electronic warfare systems. Essentially, it is the pilot's control center for threat protection.

The GTRI team's first task was to take an existing infrared-detection tool, the AAR-47 missile warning system, and determine whether it could do the job on the A-10. Then the team had to decide exactly how to add the AAR-47 to the A-10, and how to integrate the new missile-warning functions into the ALQ-213 controller.

The effort, called the A-10 Infrared Countermeasures (IRCM) Program, was on a tight schedule from the start, with 200 days to move from concept to flight test. Engineers from across GTRI pulled together to meet the deadline, developing the software that allowed the AAR-47 to communicate with the ALQ-213. A successful flight test kept the program on schedule.

The next task was to take the prototype equipment that had passed the flight test and use it to develop a standardized installation kit that included a complete package of technical drawings. The kit would then be used to perform hundreds of upgrades on U.S. A-10s worldwide. GTRI personnel worked on the original prototype used for flight testing, as well as on development of the upgrade installation kits. The upgrade is now active on the U.S. A-10 fleet worldwide.



*Mike Willis, Charlie Carstensen, and Melanie Hill (left to right) were members of an interdisciplinary GTRI team that completed a recent upgrade of the missile-defense capability of the A-10 aircraft.*



*The A-10 attack aircraft, shown here undergoing maintenance, is an important element of U.S. air-to-ground offensive capability.*



*Principal Research Engineer Jeff Hallman troubleshoots key equipment on the aircraft.*



# Fostering Global Engagement

*As the summer of 2010 marked the twentieth anniversary of the Institute's first international campus—Georgia Tech-Lorraine (GTL) in Metz, France—the visionary wisdom of GTL's creation could not have been more apparent. Today Georgia Tech is a leader in higher education in leveraging international partnerships and relationships that advance our students' education and our faculty members' research and service priorities.*



## Recognition for International Efforts

Georgia Tech's ongoing efforts were recognized this year by the Institute of International Education (IIE), which presented Georgia Tech with the 2010 Andrew Heiskell Award for "Internationalizing the Campus."

IIE Awards are for best practices in the categories of Internationalizing the Campus, Study Abroad, and International Exchange Partnerships. This year, in an effort to showcase initiatives that are working to make the science, technology, engineering, and mathematics fields more global, the "Internationalizing the Campus" category recognized exceptional programs that bring international elements to the study and teaching of engineering.

Over a two-year period, Georgia Tech faculty and administrators developed a broad set of global course requirements that can be tailored to any discipline. This curriculum integration initiative, The International Plan (IP), is in its fifth year and encompasses twenty-five of

Tech's thirty-five undergraduate majors, including eight of the eleven engineering majors. Since the IP's inception, 661 students have participated in the program, 50 percent of whom come from the College of Engineering or the College of Computing.

"The International Plan neither replaces nor supplants other Georgia Tech programs," said Gary Schuster, former provost and executive vice

president for Academic Affairs. "Rather, it is Georgia Tech's signature international program to enhance international study for undergraduates."

The Heiskell Awards were established to promote and honor the most outstanding initiatives in international higher education among the members of the IIE Network, IIE's membership of more than 1,000 institutions.



*Tech's first international campus, Georgia Tech-Lorraine celebrated its twentieth anniversary in 2010.*

## International Partnerships

In addition to internationalizing the curriculum, Georgia Tech is also focused on establishing strategic research and education partnerships with prestigious institutions around the globe. A prime example is an agreement finalized last year with India company Infosys Technologies Ltd. to cooperate on research and education, possibly at a new Georgia Tech facility in India.

The Institute is currently working on launching a small postgraduate research institution in Hyderabad, India, that would have programs in information technology, biotechnology, energy systems, and other fields.

“Since Infosys has a presence both in Atlanta and Hyderabad, there are collaborative opportunities in both locations,” said Gary Schuster, former provost and vice president for Academic Affairs.

In 2007, Georgia Tech signed a memorandum of understanding with the Andhra Pradesh state government to build a campus in Hyderabad on land donated by the government. But the economic downturn has delayed those plans, said Vijay Madisetti, executive director of Georgia Tech’s India Initiative.

For now, Georgia Tech will focus on opening a small research facility in leased space in Hyderabad. “It’s going to be a small but high-quality program,” said Madisetti.

Within a year or two, the Institute hopes to secure government approval to open a graduate program in Hyderabad, initially with only a few dozen students, according to Madisetti.

Establishing a campus in India has become a priority because companies like Infosys are expanding in Atlanta and hiring Georgia Tech graduates. Infosys, which has hired several hundred engineers in its Atlanta office over the last few years, was recently named “Employer of the Year” by Georgia Tech’s Division of Professional Practice. Infosys, which provides a broad range



*After the opening ceremony for the KORUS Research Center for Informerisive Systems, ECE graduate research assistant Ted Wada (left) provided an overview on acoustic signal enhancements for immersive and intelligent collaboration.*

of information technology and consulting services, has more than 100,000 employees worldwide. Late last year, Infosys acquired Atlanta-based technology company McCamish Systems LLC.

“We have strengthened our presence in Atlanta through our recent acquisition of McCamish Systems, and our partnership with Georgia Tech further enhances our business opportunities in the U.S.,” said S. Gopalakrishnan, CEO and managing director of Infosys.

Another historic partnership—between a team of Georgia Tech faculty and the South Korean government, industry, and universities—is aimed at developing a single platform to accommodate a vast array of multimedia functions. This potentially could include watching a favorite TV show and talking about it with one friend on the phone, while at the same time trading messages with others on Twitter and e-mail. The technology might even anticipate favored TV shows and music.

Awarded a \$9 million contract through the KORUS Tech Program, an initiative of the Korean Industrial Technology Foundation, Georgia Tech was chosen from 109 universities to lead the development and design of the next generation of digital convergence devices that will let users establish and participate in digitally connected communities. This award marks the first time that the

Korean government has chosen a U.S. university to lead one of its research and development programs.

Project investigators will develop immersive technologies on a hybrid graphics processing unit (GPU)/central processing unit (CPU) platform, which will be created at the newly established KORUS Research Center for Informerisive Systems (CIS). The Center will be headed by Assistant Professor Jongman Kim (electrical and computer engineering), lead investigator for this project and consortium. Associate Professor Ghassan Al-Regib (electrical and computer engineering), editor-in-chief of the *ICST Journal on Immersive Telecommunications*, leads the multimedia processing and immersive communications portion of the project, where data about home environments, modes of entertainment, and viewing and listening preferences are captured, processed, and interpreted by using motion, temperature, and light sensors; microphones; and multiple cameras that are placed in a user’s home.

Korean officials cited Georgia Tech’s stellar reputation in research, education, and translation of technology into useful products and successful companies as the primary reasons for choosing the Institute for this project.

“The Georgia Tech team’s innovative ideas were backed by technological



rigor and complemented by detailed analysis of state-of-the-art technologies and competing initiatives,” said Sungjin (Bryan) Baik, senior researcher and project manager of the KORUS Tech Program. “Atlanta’s stature in the telecommunications and information media industries was also key in deciding that Georgia Tech was the proper home for this center.”

The majority of CIS operations will be based at Tech’s Atlanta campus and will receive additional support from facilities and personnel at Georgia Tech-Savannah.

Georgia Tech’s activities in Korea and India are augmented by a new collaboration in Europe—with the National University of Ireland, Galway (NUI Galway) and the University of Limerick—to develop a joint translational research institute.

With an increasing emphasis on research providing immediate industrial and economic benefits, Ireland is focused on a “smart economy” and a knowledge-based society. The proposed translational research institute, with the backing of Georgia Tech’s longstanding and extensive track record of industry-focused research and technology development, will play a key leadership role in launching new technology. This will benefit U.S. companies with an interest in Ireland as well as Ireland-based corporations.

The new translational research institute will focus on the core technologies and expertise of the partner institutions. While it will retain the Georgia Tech-Ireland name, it will be constituted as a commercial Irish company. The three partner universities will be connected through a member agreement that defines the relationship between the institutions and the company. Georgia Tech-Ireland will report to the three institutions through a research advisory council that will define the research objectives. The agreement also allows each of the three institutions to formally conduct joint research programs of benefit to the people of Ireland and Georgia. Initial research activities will include development of wireless sensors,

digital media in health systems, medical supply chains, and sustainable energy.

The new partnership will also make it easier for Georgia Tech to conduct many large-scale applied research programs and will provide additional real-world research opportunities for Tech students.

“Georgia Tech is building upon a successful working relationship with both universities that has already produced important research in such areas as use

of radio-frequency identification (RFID) in medical inventory management and energy management for buildings, and in-home care of aging populations,” said Georgia Tech President G. P. “Bud” Peterson. “Georgia Tech remains committed to research efforts in Ireland, and we feel the synergy with our Irish partners will be a pathway to long-term successful operations.”

## Governor Sonny Perdue stresses global focus to Management class



Students in an International Business class in the College of Management heard some words of advice first hand from someone who has a fair amount of experience in that environment.

Georgia Governor Sonny Perdue pre-

sented a lecture to the class and answered questions, touting the future Tech graduates as those who excel both in the international arena and in applying their business acumen.

“You are in a very unique place,” Perdue said. “I find Georgia Tech graduates in places of importance throughout the entire world.”

Perdue spoke on the importance of conducting business globally, saying that his job as governor broadened his perspective into the global business arena. He told the class that the summer of 1996 served as the catalyst for attracting international businesses, both here and abroad. “The Olympics illuminated Georgia and Atlanta to the world, but it also opened Georgians’ eyes to the rest of the world,” he said.

The governor cited the state’s strategic advantages, such as its lower tax rates and the location of the Savannah and Brunswick ports, as reasons for global companies to seek out Georgia as a place to conduct business. “It’s important for Georgia to be economically successful,” he said. “A strong economy boosts [the state’s] education, safety, and overall prosperity and wealth creation.”

When asked what the state does that is unique to attract global businesses, Perdue said that Georgia continues to fund ten international offices while similar offices in other states are closing. Georgia also has a chief of protocol position and an international business liaison.

Chris Young, a Tech alumnus who serves as both the chief of protocol and director of international affairs for the State of Georgia, taught the class where Perdue spoke.

## Critical Assistance on a Global Scale

In keeping with Georgia Tech's long-standing mission of applying technology and science to improve human life around the world, Institute researchers are assessing flooding and damage from the 2008 Myanmar cyclone.

Tropical Cyclone Nargis made landfall in the Asian nation on May 2, 2008, causing the worst natural disaster in the country's recorded history—with a death toll that may have exceeded 138,000. In the summer of 2009, researchers reported in an issue of the journal *Nature Geoscience* on a field survey done three months after the disaster to document the extent of the flooding and resulting damage.

The information—which may be the first reliable measurements of cyclone damage in the area—could lead to development of computer models for predicting how future storms may impact the geologically complex Ayeyarwady River delta. Those models could be the basis for planning, construction, and education that would dramatically reduce future loss of life.

Among the findings of the study: the cyclone created a storm surge as much as 5 meters high—topped by 2-meter storm waves—that together inundated areas as far as 50 kilometers inland. Fatality rates reached 80 percent in the hardest-hit villages, and an estimated 2.5 million people in the area lived in flood-prone homes less than 10 feet above sea level.

"The recorded high water marks serve as benchmarking for numerical models for the complex hydraulic response of the giant Ayeyarwady delta," noted Associate Professor Hermann Fritz (civil and environmental engineering). "Ongoing numerical simulations will allow us to determine flood zones and vulnerabilities for future cyclone scenarios. Based on those, evacuation scenarios and evaluation plans will be derived in collaboration with international partners and the Myanmar government."



*Tech researchers helped assess the damage from a cyclone that struck Myanmar.*

Already, a local non-governmental organization in the nation has developed a cyclone education program to raise awareness among residents, said Fritz, who was the only international scientist leading a team that surveyed 150 kilometers of the country's coastline during a two-week period.

"The aim of our project was to document the extent of the flooding and associated damage in the delta," Fritz explained. "Field surveys in the immediate aftermath of major disasters focus on perishable data, which would otherwise be lost forever—such as infrastructure damage prior to repair and reconstruction."

Fritz hopes the work done by the survey team will ultimately help reduce the human cost of major cyclones.

"In the 21st century with modern communication and all that has been learned about cyclones in the Bay of Bengal, there is no need for 138,000 people to be killed by a storm like this," Fritz said. "With adequate planning, education, and shelters, it should be possible to reduce fatality rates from future cyclones by at least one order of magnitude."

The massive earthquake that struck Haiti on January 12 was also a major focus of Tech faculty, especially Professor Reginald DesRoches (civil and environmental engineering), a native of the Caribbean nation.

Along with a team of experts, DesRoches assessed critical buildings to determine if they were safe to reoccupy. Looking at hospitals, schools, U.N. facilities, government buildings, and buildings occupied by various nations' ambassadors was the main focus of DesRoches' work; he has extensive experience in the area of dealing with structures in the wake of an earthquake.

DesRoches subsequently presented an assessment of the earthquake damage to Congress and the World Bank, and he led a team of earthquake researchers and practitioners to Haiti to document the earthquake's scientific, engineering, and societal effects.

Augmenting the work of DesRoches and other faculty were the efforts of the Caribbean Student Association, which coordinated various relief efforts in response to the devastating earthquake.



# Stimulating Economic Development

*Georgia Tech is fortunate to be located in a state with fourteen Fortune 500 companies, ten of which are in Atlanta. The Institute has long played a key role in fostering the development of technologies that lead to robust economic growth for Georgia and the Southeast. Two years ago, Georgia Tech's annual research expenditures surpassed the \$500 million mark for the first time ever, reaching a total of \$524.9 million. Last year that growth trend continued unabated, with a total of \$561.5 million for Fiscal Year 2009. These increases continue to fuel high-tech economic growth that produces both jobs and investment returns.*



## Expanded ATDC Membership

Georgia Tech's Advanced Technology Development Center (ATDC), one of the nation's largest, longest operating, and best-known university-based technology accelerators, has expanded its mission. ATDC has merged with Georgia Tech's VentureLab and with the Georgia Small Business Innovation Research (SBIR) Assistance Program. By pooling resources, the new ATDC has increased the number of staff available to serve its expanded mission of helping Georgia entrepreneurs launch and build successful technology companies. The change allows ATDC to greatly extend its reach to serve more technology companies along multiple growth paths and at all stages of development.

ATDC, the former Georgia Tech VentureLab, and the SBIR Assistance Program are part of the Enterprise Innovation Institute (EII) at Georgia Tech, which helps Georgia enterprises improve their competitiveness through the application of science, technology, and innovation.

Founded in 1980, ATDC has helped create millions of dollars in tax revenues by graduating more than 120 companies, which together have raised more than a billion dollars in external financing. However, the startup market has changed dramatically over the past few years, according to Stephen Fleming, vice provost and executive

director of EII and interim director of the new ATDC. "Many startup companies do not want or need to pursue venture funding. Some are not even seeking traditional office space," said Fleming. "ATDC's new initiatives directly address the demands of today's startup environment."



*Stephen Fleming leads the Enterprise Innovation Institute.*

While ATDC has opened its membership to all technology entrepreneurs in Georgia—from those at the earliest conception stage to well established, venture-fundable companies—the Center will continue to offer traditional “bricks-and-mortar” incubation space on entrepreneur-friendly terms, both in midtown Atlanta and Savannah. ATDC will be expanding its recent “Seed-Space” offering of small single-office leases in Technology Square for the earliest entrepreneurs and will provide a variety of co-working spaces to promote casual interaction among entrepreneurs. Recognizing the sprawl of the Atlanta metro area, ATDC will offer programs outside the Interstate 285 perimeter where dense clusters of entrepreneurs can benefit from its services. ATDC will also take full advantage of social media to build connections with entrepreneurs across Georgia.

Since 1999, the state-funded ATDC Seed Capital Fund has made equity investments in Georgia startup companies alongside angel investors and traditional venture firms. With this new merger, ATDC will also manage the Georgia Tech Edison Fund, an innovative investment fund established in 2007 that draws its resources from charitable donors who are interested in helping expand the entrepreneurial ecosystem surrounding Georgia Tech.

“ATDC has always been a focal point for entrepreneurship in Georgia,” said Sig Mosley, president of Imlay Investments and a member of ATDC’s board of advisors. “With these moves, ATDC now is aligned to support the specific needs of the new startup environment. The open door policy is a strong, positive shift and reinforces ATDC’s leadership role in the startup community not just within the Atlanta metro area, but throughout the entire state.”

The new ATDC organization continues to assist Georgia Tech faculty members and other research staff in forming new companies, and to provide assistance to any Georgia small business seeking SBIR funding. Once such SBIR grant was awarded to ZOOZ Mobile from the National Science Foundation.



*Professor Gil Weinberg is one of twenty faculty members from across campus working in research and commercialization of innovative music technology.*

The grant of \$150,000 supports the development of an innovative music intelligence engine for a new line of ZOOZ music creativity products.

“The NSF SBIR grant validates the quality of our research and the high prospect of commercialization of our efforts,” said Gil Weinberg, director of the Center for Music Technology in Georgia Tech’s College of Architecture and chief technology officer of ZOOZ Mobile. “We hope that the first phase of support will lead to great results and to the continuation of the NSF SBIR support, which can grow to more than \$1million in funding.”

The SBIR grant will be matched by additional funds from the Georgia Research Alliance and VentureLab, which has supported ZOOZ Mobile in the past.

## Services to Local Governments

Savannah, Georgia—the “Hostess City of the South”—is known for its southern hospitality and charm, but it is also making a bid to be known as environmentally friendly.

Mayor Otis Johnson, as part of his pledge that the city will be a more environmentally sustainable community, launched a new sustainability initiative dubbed Thrive. However, Johnson wanted to focus on leading by example rather than making policies that force citizens to get on board with the program.

“There’s a lot of talk about being green and sustainable,” Johnson said. “If we’re going to lift up being environmentally healthy, we have to walk that walk.”

Rachel Smithson, Thrive coordinator for Savannah, collected data indicating that Savannah city government produces roughly 75,320 tons of equivalent carbon emissions per year and that city government buildings were the number one source of energy consumption, a trend that coincides with national data.



The Thrive Committee decided to focus its initial energy-reduction efforts on buildings, and through its connection with the Georgia Environmental Partnership, requested assistance from Georgia Tech's Enterprise Innovation Institute (EII), which has a local office on the Georgia Tech-Savannah campus.

"We wanted to have an energy audit because we didn't want to randomly start replacing lights and windows; we wanted to make sure that we were going to have the greatest impact on our electricity and energy consumption," Smithson said. "The city was really excited about using Georgia Tech because it isn't trying to sell us a particular product; the staff there gives us a good, third-party, neutral analysis of what we need."

Mike Brown, an EII energy specialist, and two Georgia Tech co-op students conducted energy audits at three government buildings: City Hall, the Thomas Gamble Building, and the Broughton Municipal Building. All three are designated historic buildings, housing the mayor's office and council chambers, human resources, information technology, auditing, utility services, and revenue, among others.

Brown and the students placed data loggers in each of the buildings, measuring temperature, lighting, and energy consumption, even over nights and weekends. They studied each building's energy consumption history and measured the major energy-consuming equipment.

Among the recommendations that the Georgia Tech specialists made were: replacing incandescent lamps with compact fluorescent lamps, improving fluorescent lighting efficiency by replacing T-12 lights with T-8 lights, and managing the building plug-load. They also recommended installing occupancy sensors in restrooms, vending machine controllers to reduce lighting and cooling, a building automation system to automatically control HVAC systems, and variable-air volume fans to reduce air flow when cooling is not needed.

According to Smithson, the biggest challenge now is implementing Georgia Tech's recommendations. As part of the 2009 American Recovery and Reinvestment Act, the city was able to establish a revolving loan with its stimulus funding. Although the city cannot implement all of the recommendations immediately, Smithson says that as soon as one

investment is paid back, another project can begin with the energy savings from the previous project.

Already, the benefits are outweighing the challenges. Georgia Tech's assistance allowed the city to have an energy conservation strategy in place, a requirement of the stimulus funding application that some cities have spent more than \$250,000 to obtain. And although a lot of investments have yet to be made, electricity expenditures have been several hundred thousand dollars below what the city had targeted, something Smithson attributes to changing employee behavior alone.

## Services to Industry

Lee Adams, president of Fabritex Inc., remembers exactly how his family-owned business started. His entrepreneurial father had purchased a trampoline and realized he could make the metal frame as well as anybody else.

"We started in 1989 and since then, we've grown into a 55-employee, 110,000-square-foot facility with an emphasis on tube fabrication and sheet and plate fabrication," Adams said. "We manufacture everything from tubular wire carriers to stem baskets to annealing process materials. Just because we haven't built something before doesn't mean we're not going to quote on it. We try to think outside the box and sell ourselves as a one-stop shop."

It was precisely this innovative mindset that brought both opportunity and challenges to Fabritex, based in Hartwell, Georgia. A few years ago, a customer asked Adams about producing a new product line within a specific timeframe and gradually ramping up production to cut cost. To determine the most efficient way to do so, Adams called on Georgia Tech's Enterprise Innovation Institute (EII).

Tara Barrett, Danny Duggar, and Karen Fite, all EII project managers, led a project in value stream mapping, a technique used to analyze the flow of materials and information required to bring a product or service to a



*The Thomas Gamble Building is among three designated historic buildings where Mike Brown, an energy specialist with the Enterprise Innovation Institute, and two Georgia Tech co-op students conducted energy audits for the City of Savannah.*



*Lee Adams, president of Fabritex, shows E12 project manager Karen Fite how the company implemented lean principles throughout its facility in Hartwell, Georgia.*

consumer. The team developed a value stream map that identified all the value-added and non-value-added steps then in use, assessed the current state to create product flow by eliminating waste, and drew and implemented a map showing what the future state could be.

“Fabritex needed to increase throughput and reduce costs. The results were that they were able to increase their production to a capacity of 500 units per month and meet their customer’s requirements,” noted Fite. “Our goal is to have Fabritex learn the concepts and continue to implement them after we’re gone.”

According to Adams, the process is now streamlined and more efficient. The company has made nearly \$300,000 in capital investments, saved \$100,000, and increased sales by more than \$1 million. The company also created eight jobs and doubled production.

“Georgia Tech was really able to get the creative juices flowing. It gave the guys working on the floor the encouragement to make improvements and make suggestions where normally they wouldn’t have spoken up,” Adams observed. “Now there’s a craftsmanship to what they do; they’re not just here punching a clock.”

The value stream mapping project proved so successful that the company has continued to partner with Georgia Tech. Dan Trier, sales and marketing manager, has already taken several classes offered through the Georgia

Tech Procurement Assistance Center (GTPAC), an organization based at EII that helps Georgia businesses identify, compete for, and win government contracts.

“We’ve had a Corps of Engineers project for more than ten years, but this is an area we would like to explore more,” Trier said. “I’ve attended classes on how to read and speak government procurement language, which is not easy, as well as learning where to find government contracts, how to read them, and how to fill them out.”

In addition to classes, GTPAC provides its clients with coaching, mentoring, and a set of tools to research and identify government contracting opportunities. Services are available at no cost to any Georgia business, large or small, with the interest and potential to perform work—as a prime contractor or a subcontractor—for federal, state, or local government agencies.

## Georgia Tech ranks among top 10 in ‘patent scorecard’

Georgia Tech has joined prestigious research universities in the top 10 of the 2009 Patent Scorecard, which ranks technology innovations generated from patents. With a 36 percent increase in patent activity during the past year, Georgia Tech jumped from 11th to 8th place, with a focus on semiconductors and electronics, according to the report.

“The great news is that Georgia Tech had the third-highest impact score, which measures the extent to which our patents are being built upon,” said Jilda Garton, associate vice provost for research. “We are also proud of the fact that Georgia Tech, which reports as a single entity, compares favorably with university systems such as the California University System.”

According to the Patent Board, the 2009 Universities Patent Scorecard represents universities and university-based laboratories from around the world involved in patenting their research in all disciplines within the United States. The report ranks 124 of the top universities according to the relative strengths of their patent portfolios.



# Making an Impact in Our Community

*Partnering with the local community to improve our neighbors' physical environment and educational opportunities is a commitment Georgia Tech takes very seriously—not only because it's the right thing to do, but also because such efforts make Georgia Tech a stronger institution.*



## Campus/Community Clean-Up Efforts

Georgia Tech's Government and Community Relations office is spearheading a collaboration with the Home Park Community Improvement Association (HPCIA) to clean up properties in the neighborhood that are out of city code compliance, thereby reducing the likelihood of crime in both Home Park and on the adjacent Tech campus.

A Home Park Community Clean Up event held in January included more than eighty volunteers from the Home Park, Midtown, and Georgia Tech communities disposing of seven tons of garbage and unclogging seventeen sewer drains. Atlanta Police also impounded four cars.

"We were delighted to assist Home Park in starting their new 'Fixing Broken Windows' strategy for community improvement," said Community Relations Director Andrea Ashmore. "The work included clearing streets of leaves, removing trash, and cutting back

overgrown shrubbery to make Home Park a safer environment, add curb appeal, and foster community pride."

As part of the annual Tech Beautification Day (TBD), students, staff, and faculty worked to spruce up campus, along with several neighboring communities. More than 700 volunteers participated in approximately fifty projects involving landscaping, painting, and trash disposal. Student volunteers plan, organize, and facilitate TBD every year.

"This whole project is overseen by students," said Institute Horticulturist Donna Chronic. "Campus planting beds have been prepped, and Facilities works with [project supervisors] ahead of time to explain the projects. We have someone on site for help, but TBD students supervise anywhere from eight to thirty students per project site."

Tech's Facilities department procured three tractor trailers of pine straw, which made up the bulk of the projects. Some trees were planted, in keeping with the Institute's Tree Campus USA status, but most of the projects were smaller in scope this year. Some new projects included cleaning up the volleyball



*Volunteers work in the English Avenue neighborhood on an annual Team Buzz community service project.*

courts and a more focused Greek housing clean-up.

According to mechanical engineering major Mike Goodman, vice president of projects for TBD, more than 1,250 spots around campus were identified. "There's always something people can do," Goodman said. This is especially true since TBD organizers went off campus with their efforts. Both the Home Park and

English Avenue neighborhoods were recipients of some Tech-powered sprucing up. “We’re working with the Home Park Community Improvement Association and an English Avenue church group,” Goodman said.

Members of the TBD Executive Committee start planning the mid-April initiative in January. Students help raise funds from sponsors, sign up volunteers, and get the word out. “What always amazes me is [TBD] is almost always crunch-time for students, yet they still are able to coordinate and get this done,” Chronic said.

“It’s hard to fit in the schedule, but it’s worth it,” said Goodman, who has participated in TBD for several years.

## Support for Special Olympics

In the frigid February air, Georgia Tech Police Captain Regina Rogers was one of hundreds taking a dip in Lake Lanier while raising money for Georgia Special Olympics.

As part of the inaugural Polar Plunge fundraiser for Special Olympics, hundreds of volunteers took their icy dip at Lake Lanier Islands Beach and Waterpark. To participate, attendees raised money via pledges, with a minimum of \$50 needed to jump in.



*Captain Regina Rogers takes the plunge for Special Olympics.*

Rogers not only raised nearly \$2,700, but also received the award for the individual raising the most money.

Most of the time, outdoor swimming is accomplished in warmer weather. Not so for the Polar Plunge. “The water temperature was 42 degrees,” Rogers said. “Most people wait until their swimming pools reach 80 degrees before they get in. It was pretty darn cold, but ‘Freezin’ for a Reason’ was a lot of fun.”

Rogers first became involved in raising money for Georgia Special Olympics three years ago, when she says other members of the department were coordinating fundraising efforts. “I participated in the ‘Cops on Donut Shops,’” she said. “This is the first year I’ve been the coordinator for our department, and I just decided to literally jump in feet first with our drive to raise money. I think Special Olympics is one of the most noble causes around, and the athletes are true heroes for being so brave to compete when they face so many challenges every day.”

Will the Georgia Tech Police officer brave the cold waters again? “I plan on doing it again next year,” Rogers said. “And I’m trying to convince some of my fellow officers to participate with me.”

## The Educational Value of Video Games

Walk into almost any household that includes teenage boys and you’ll find one or more video game consoles. Walk into that household past 10:00 p.m. and you’re likely to find one or more teenage boys playing those video games. Walk into the parents’ bedroom, wake them up, and then ask them what they think of their sons’ playing video games, and most likely they’ll tell you it’s a waste of time. But is that necessarily true?

Betsy DiSalvo, doctoral candidate in the College of Computing, has a hunch that she can use their interest in video games to spur an interest in computer science. And since African American males are underrepresented not only in the computer industry, but also in

graduate schools, she and her colleagues have started a game testing group known as Glitch that introduces teen-aged African American boys to the gaming industry as game testers for companies such as Electronic Arts, Game Tap, and Cartoon Network. They’re finding that more than half of the game testers are now interested in furthering their education in computer science.

“Research tells us that African American males graduate from college at a lower rate than African American females,” said DiSalvo. “We also know that these same youth play video games at a higher rate than white males, so we wondered if we could use this interest in video games that they already have to increase their interest in computer science.”

Along with researchers from Tech and Morehouse College, DiSalvo introduced a group of twelve students aged 16-17 to game testing, giving them experience in working in the gaming industry for about twenty hours per week. In addition, the students learned programming skills using Alice, a drag and drop programming language. They also learned how to use Jython to manipulate images in a media computation workshop.

“We found these students’ play practices were very different from those of white youth,” said DiSalvo. “They began playing games at a younger age, they tend to play more often with parents or other family members, they prefer to play competitively with others in the room rather than online, they consider games as an extension of competitive sports, and they tend not to use cheats, hacks, or gaming guides.”

What DiSalvo saw jibes with current research that shows that many young African American males don’t look at games as computation, or something that can be manipulated. Yet many people who go on to have careers in computing say that modifying existing programs, or creating hacks, was how they initially got into the field.

After learning how to game test from Electronic Arts, the students got first-hand experience with computer bugs and helping create games by spending





*Computing doctoral candidate Betsy DiSalvo (left) led a program that provided early computing experience to African American teen boys by having them work as video game testers.*

six weeks testing a preproduction site for GameTap. In all, they logged close to 1,000 bugs and conducted tests for the sites of more than 1,000 games.

They also spent two weeks testing Cartoon Network's Fusion Fall and Good Egg's Elf Island. In addition they spent a week testing Polyghost, an iPhone application for Last Legion Games.

"It is a childhood dream job, playing games all day, but you learn it is a lot more than that," said one of the game testers known as Spock to protect his privacy. "But you know, it has been great here and I really think that computer science is something I am looking forward to."

All in all, DiSalvo is pleased with what the program has been able to teach so far.

"They saw what computer science is on several levels," said DiSalvo. "First, the workshops showed them they could code. Also, being able to be creative by engaging in programming and problem solving motivated a number of students. Others just realized they could work in technology because they were doing game testing work as high school students."

Throughout the year, DiSalvo will continue working with the same group of testers for eight hours per week. They'll be getting real-world job experiences as well as real-world payment from the game companies.

"All of them were very proud of what they contributed to Game Tap and other games," said DiSalvo. "They felt like it was real work that had a real impact on the video games that were produced."

## Students collect donations for Atlanta flood relief

The Georgia Tech Student Government Association, MOVE (Mobilizing Opportunities for Volunteer Experience) Georgia Tech, the President's Council Governing Board, and the American Red Cross collected non-perishable food, clothes, and money to assist victims of Georgia's September 2009 floods.

Donations were collected from students, faculty, staff, and alumni on Skiles Walkway, at the Mock Rock competition, in the Ferst Center for the Arts, and prior to the Ramblin' Reck Parade during the 2009 Homecoming weekend.

Students especially wanted to assist with flood relief when they learned that fellow Yellow Jackets were affected by the disaster. "When we heard Governor [Sonny] Perdue give the estimate for damage at \$500 million, we quickly realized we had an obligation to do our part," said Corey Boone, who was elected Undergraduate Student Government president last spring.

# 2009-2010 Timeline

## July 2009



Stephen Fleming is named vice provost of the Enterprise Innovation Institute, the nation's largest and most comprehensive university-based program of assistance to business and industry.

Since 2005, Fleming had served as Georgia Tech's chief commercialization officer and led the Enterprise Innovation Institute's Commercialization Services Division in creating new companies based on research discoveries.



Georgia Tech is named to *Princeton Review's* sustainability Honor Roll, the only southeastern university

named to this year's list. Out of nearly 700 institutions evaluated on sustainability efforts, Georgia Tech was listed among the top fifteen.

Chester "Chet" Warzynski is named executive director of the Office of Organizational Development. Warzynski had most recently served as director of Organizational Development Services at Cornell University.

Georgia Tech's Strategic Energy Institute announces the four proposals selected for its Creating Energy Options program. Open only to Georgia Tech faculty and researchers, the program focuses on technologies and ideas with the potential to be commercialized or to streamline the processes involved in the implementation of energy options in the "near-term"—three to five years.

## August 2009



In the 2009 edition of *U.S. News & World Report's* rankings of the best colleges for undergraduates, Georgia Tech is

listed at No. 7 among national public universities and No. 35 among all U.S. universities and colleges.

Members of President Bud Peterson's cabinet, college deans, and leaders from the Georgia Tech Foundation, the Alumni



Association, and the Athletic Association hold initial meetings to begin the Institute's strategic planning process.

The Board of Regents of the University System of Georgia announces a new Executive Leadership Institute program for high-potential faculty and staff in senior management positions. Program segments include identifying and developing leadership strengths, self-assessment, 360-degree feedback, mentoring, job shadowing, and exposure to peers and leaders across the system.

In an effort to better extend the Institute's community outreach across various levels, President Bud Peterson merges the Office of Institute Partnerships and the Federal Relations Office with the Office of Government Relations. With the move, outreach with the



local community, as well as with state and national government, is streamlined into a single office led by Executive Director of Government and Community Relations Dene Sheheane.

As directed by the Board of Regents of the University System of Georgia, the Tech administration announces that nearly all employees will be required to take six full-day days during the fiscal year. The action is in response to a historic decline in state revenues caused by the worst recession in seventy years.

## September 2009



Dr. G. P. "Bud" Peterson officially becomes the Institute's eleventh president at a September 3

investiture ceremony held in Alexander Memorial Coliseum.



The Campus Recreation Center opens a new ropes course—the Leadership Challenge

Course—to teach leadership skills and teamwork.



The Harris Corporation makes a \$2 million commitment to the School of Electrical and Computer Engineering to

support a capital campaign for construction of a new ECE headquarters facility and the renovation of the school's Van Leer Building, built in the early 1960s.



Renu Kulkarni, formerly vice president for technology partnerships at the Motorola Corporation, is named director of Georgia Tech's new FutureMedia Initiative, whose goal is to make the

state of Georgia both a leader in developing new media and a model for how to bring new ideas to market.

Georgia Tech is awarded the Governor's Cup for the 2008 State Charitable Contributions Program. The Governor's Cup recognizes Tech for the largest contribution per employee for an organization of its size. Faculty and staff gave nearly \$312,000 for local, state, and national charitable organizations.

## October 2009



Renowned futurist James Canton addresses the Georgia Tech community on global trends that will shape the next twenty years. The address is part of the campus-wide strategic visioning process.

Professor Robert Guldberg (mechanical engineering) is named director of the Parker H. Petit Institute for Bioengineering and Bioscience. Previously the IBB associate director, Guldberg succeeds founding Director Robert Nerem, also a professor of mechanical engineering.

President Bud Peterson joins the advisory board of Noro-Moseley Partners, an Atlanta-based venture capital firm.

Georgia Tech becomes a member of the Center for Sustainable Engineering, created by the National Science Foundation and the U.S. Environmental Protection Agency in



2005 to assist engineering educators in the transition to a new engineering paradigm based upon the concept of sustainability.



The campus observes Dean Dull Day on October 23 to honor the late Dean of Students James Edward Dull, who served on the Tech staff from 1957-1991.

Young feminist scholar and activist Alexis Pauline Gumbs moderates a discussion with feminist icons Beverly Guy-Sheftall and Gloria Steinem about their impact on the history and future of feminism.



The Library and Information Center receives more than \$850,000 from the Institute of Museum and

Library Services to create a repository service for the member institutions of the University System of Georgia (USG). The repository will provide access to scholarly works and research information from member institutions of the USG who are participating in the grant.

## November 2009



The College of Management receives an anonymous commitment of \$25 million, \$20 million of which

is a 1-to-1 challenge grant designed to inspire charitable gifts and commitments from other donors to the College's endowment. The remaining \$5 million will provide funds expendable at the discretion of College Dean Steve Salbu.



H1N1 influenza (also referred to as swine flu) vaccines are made available to students, faculty, and staff at Stamps Health Services.

The Institute holds its inaugural Legislative Day to continue ongoing efforts to build partnerships between government leaders and Georgia Tech.

Sir Harold "Harry" Kroto, recipient of the 1996 Nobel Prize in Chemistry, presents

"Science, Society, and Sustainability" at the Ferst Center for the Arts. Kroto, along with Robert Curl and Richard Smalley, are credited with discovering fullerenes, or buckyballs.



Georgia Tech is awarded a U.S. Air Force Center of Excellence to design nanostructures for energy harvesting and adaptive

materials, and to develop tools to optimize critical cognitive processes of the modern warfighter. The \$10.5 million Center, known as the Bio-nano-enabled Inorganic/Organic Nanostructures and Improved Cognition (BIONIC) center, is led by Vladimir Tsukruk and Kenneth Sandhage, professors in the School of Materials Science and Engineering.

## December 2009

As part of the American Recovery and Reinvestment Act, Georgia Tech receives fourteen awards from the National Institutes of Health for a total of \$3.2 million and forty-two awards from the National Science Foundation for a total of more than \$17.5 million.



Regina Dugan, director of the Defense Advanced Research Projects Agency, addresses the doctoral and master's commencement ceremony, while Vice Admiral Richard Truly, former

NASA shuttle astronaut, and 2009 Distinguished Professor Robert Nerem address two separate undergraduate ceremonies.

Climate scholars in the School of Public Policy join more than 10,000 world leaders, business representatives, environmental activists, academics, and other participants and observers in Copenhagen, Denmark, for the fifteenth annual Conference of Parties meeting, which debates the future of the United Nations Framework Convention on Climate Change.



schools within the College. The new units are the School of Architecture, the School of Construction, the School of City and Regional Planning, the School of Industrial Design, and the School of Music.



Regents' Professor Zhong Lin Wang (materials science and engineering) is one of six foreign scientists selected as academicians to be inducted into the Chinese Academy of Sciences (CAS) for the

year. A CAS academician title is the highest Chinese academic achievement in science and technology and a lifelong honor. Wang is the youngest foreign academician to be inducted and the first from any Georgia educational institution.

## January 2010

Students, faculty, and staff attend a candlelight vigil for victims of the earthquake in Haiti at the Campanile. Donations are collected, and attendees remember those who were lost. The earthquake was the worst to hit the small island nation in more than 200 years.



Gen. David H. Petraeus, commander of the U.S. Central Command, addresses a full house in the Ferst Center on topics ranging from Afghanistan to Yemen.



The Georgia Tech Research Corporation announces an \$11.6 million award from the U.S. Commerce

Department's National Institute of Standards and Technology for construction of the Carbon-Neutral Energy Solutions Laboratory in the North Avenue Research Area. The \$23.3 million, 45,000-square-foot facility will house several energy research efforts.



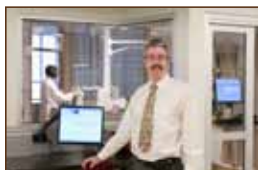
As part of a community update on Georgia Tech's strategic vision process, Woodruff Arts Center

President and CEO Joseph Bankoff presents a "report" on Tech's last twenty-five years—as seen from the year 2035.

*USA Today* selects Georgia Tech as one of four universities for a pilot study of a new electronic format of the newspaper that is an exact replica of the print edition supplemented by interactive content.

The Technology Square Research Building hosts a Congressional Oversight Panel field hearing on the state of commercial real estate lending, the potential effect of commercial real estate problems on the banking system, and the role and impact of the Troubled Asset Relief Program (TARP) in addressing that effect.

## February 2010



Environmental psychologist and Professor of Architecture Craig Zimring and two Georgia Tech alumni—Debajyoti Pati and Anjali Joseph—are included in *Healthcare Design* magazine's list of the twenty-five most influential people in healthcare design.



Jacqueline Jones Royster, a professor of English with interests related to rhetorical studies, women's studies, and literacy, is selected as dean of the Ivan Allen College of Liberal Arts. In addition to holding the dean's chair, Royster serves as a professor in the School of Literature, Communication, and Culture.



Printing and Copying Services (PCS) announces a transition to 100 percent recyclable material in its paper and envelopes. The move represents an extension of Georgia Tech's commitment to sustainable practices, especially significant in an area that represents the highest percentage of institutional recycling.

The Office of Information Technology launches a new visual voicemail service that will allow Georgia Tech faculty and staff to receive e-mail copies of any telephone messages, as well as the ability to listen to and manage their voicemail messages on the Web.



To help the community learn more about personal safety, Georgia Tech holds a Campus Safety Day, providing messages about steps that students can take to stay safe.

## March 2010

Tech alumnus William J. "Bill" Todd, CEO of the Georgia Cancer Coalition, is presented with the 2010 Ivan Allen Jr. Prize for Progress and Service at the Ivan Allen College of Liberal Arts' annual Founders Day event.

*BusinessWeek* ranks the College of Management among the nation's top fifty undergraduate business programs.



The College of Computing announces the establishment of the School of Computational Science and Engineering, which joins the existing School of Computer Science and School of Interactive Computing.



A group of Georgia Tech students sells bowls of chili on Skiles Walkway to raise funds for victims of the Chilean earthquake.

Tom Akins, a Georgia Tech alumnus and director of the Division of Professional Practice for two decades, retires. Under Akins' leadership, the division added undergraduate internships and study-abroad opportunities for students.



Georgia Tech is named for Bourne and his wife.

Henry C. Bourne Jr., who served as acting president of Georgia Tech in 1986-87, dies. Bourne also served as Tech provost and a member of the electrical engineering faculty. The Margaret T. and Henry C. Bourne Jr. Chair in Poetry at

## April 2010



For the first time, Georgia Tech's award-winning Earth Day celebration features an element of the artificial. A garden of tree-like sculptures crafted from recycled materials serves as a backdrop for

the annual green-themed festivities, inspiring passers-by to practice sustainable behaviors.



Zvi Galil is named dean of the College of Computing. A member of the National Academy of Engineering and a fellow of the Association of Computing Machinery and of the American

Academy of Arts and Sciences, Galil served as professor and dean of the School of Engineering and Applied Sciences at Columbia University. In 2007 he was named president of his alma mater, Tel-Aviv University in Israel.

Tech's graduate engineering program maintains its No. 4 position in *U.S. News & World Report's* annual national rankings of graduate programs. Other graduate rankings included Computer Science at No. 10, full-time MBA program at No. 26, and part-time MBA program at No. 24.



The Ferst Center for the Arts is transformed into a television studio where Georgia Tech students

join those from Savannah College of Art & Design, Emory University, Georgia State University, and a handful of high schools gathered for the satellite taping of "The Oprah Winfrey Show." The episode is dedicated to Winfrey's No Phone Zone campaign, which seeks to garner pledges from viewers to refrain from talking on the phone or texting while driving.



Georgia Tech is named one of the country's greenest schools by *The Princeton Review* and the U.S.

Green Building Council. One of fifteen schools to be named to the 2010 Green Honor Roll, Georgia Tech is also one of 286 green schools included in the newly released *The Princeton Review's Guide to 286 Green Colleges*. The Institute was named to the Green Honor Roll in 2008 and 2009.

## May 2010

Stephen Cross becomes Tech's first executive vice president for research. Cross previously served as vice president and director of the Georgia Tech Research Institute.





Cross is replaced at GTRI by Interim Director Tom McDermott, who had served as deputy director and director of research.



U.S. Secretary of Energy Stephen Chu delivers the commencement address for PhD and master's students, while

alumnus Brook Byers and NCR Corp. Chairman and CEO Bill Nuti deliver addresses to undergraduates in two separate ceremonies. Byers is also presented with an honorary doctoral degree for his contributions to the life sciences field.

Georgia Tech's Center for International Business Education and Research (GT CIBER) is awarded a \$1.5 million grant from the U.S. Department of Education, renewing its status as one of thirty-four national resource centers in international business funded by the federal government.



Georgia Tech is selected by the U.S. Department of Energy for one of forty-two university-led research and

development projects aimed at developing the next generation of nuclear technologies. The goal of Tech's portion of the project is to develop the next generation of nuclear reactors that produce more energy with less waste.

The Ramblin' Rockets Club finishes in fifth place out of twenty teams at the NASA University Student Launch Initiative (USLI), which partners students with NASA engineers to design, build, and fly a reusable rocket.



College of Engineering Dean Don P. Giddens is elected to serve as president-elect of the American

Society of Engineering Education (ASEE) in 2010-2011. He will serve as president in 2011-2012.

The Georgia Tech Integrated Food Chain Center (IFC) launches as an international research hub focused on designing,



analyzing, and improving the food chain for cold and perishable products. The IFC's goal is to assure that growers, processors, retailers, and logistics providers can deliver quality perishables via greater efficiency throughout the supply chain.

## June 2010



Georgia Tech-Lorraine in Metz, France, marks its twentieth anniversary. The French campus offers

graduate degrees in engineering and computer science as well as a variety of undergraduate educational experiences.



Governor Sonny Perdue announces the appointment of Georgia Economic Development Commissioner Ken Stewart as a senior advisor for industry strategy at Georgia Tech, beginning

in July. A member of the Georgia Tech Advisory Board, Stewart comes to the Institute after six years in state government, where he also served as director of the Georgia Forestry Commission.



Professor Christine Ries (economics) is appointed to the Special Council on Tax Reform and Fairness for Georgians, a newly created committee charged with rewriting Georgia's tax code.



Executive Vice President for Research Stephen Cross announces that Professor Ravi Bellamkonda

(biomedical engineering) will become associate vice president for research beginning in August. The half-time, three-year appointment will allow Bellamkonda to continue his active research program while taking on Institute-wide duties such as co-chairing an innovation task force.



Colleen Riggie is named director of the Women's Resource Center. Previously the Center's coordinator, Riggie holds a master's degree in college student affairs leadership from Grand Valley State University.



Perennial southern restaurant favorite Waffle House opens a new location on Fifth Street in Technology Square. District Manager Travis Bell—a College of Management alumnus and former Tech football player—oversees both the

Tech and Underground Atlanta locations of the restaurant.



The appointment of Rafael L. Bras as provost and executive vice president for Academic Affairs is announced. A civil engineer and hydrologist, Bras comes to Georgia Tech after serving on the

faculty of the Massachusetts Institute of Technology.

# Enrollment and Degrees

## NEW DEGREES FROM 2000-2010

### Bachelor's

- Applied Languages and Intercultural Studies
- Biochemistry
- Biomedical Engineering
- Chemical & Biomolecular Engineering\*
- Computational Media
- Economics & International Affairs
- Environmental Engineering
- Global Economics & Modern Languages
- International Affairs & Modern Languages
- Materials Science & Engineering\*
- Polymer & Fiber Engineering\*

### Master's

- Bioinformatics
- Biomedical Engineering
- Building Construction & Facility Management
- Business Administration in Management of Technology\*
- Business Administration\*
- Computational Science & Engineering
- Digital Media\*
- Electrical & Computer Engineering
- Global Executive MBA
- History and Sociology of Technology & Science\*
- Industrial Design
- Information Security
- International Logistics
- Medical Physics\*
- Music Technology
- Paper Science & Engineering
- Polymer, Textile & Fiber Engineering\*
- Professional Applied Systems Engineering

- Prosthetics & Orthotics
- Quantitative & Computational Finance
- Supply Chain Engineering

### Doctoral

- Applied Physiology
- Bioinformatics
- Biomedical Engineering
- City and Regional Planning
- Computational Science & Engineering
- Digital Media
- Economics
- Electrical & Computer Engineering
- History and Sociology of Technology & Science\*
- Human-Centered Computing
- International Affairs, Science & Technology
- Music Technology
- Operations Research
- Paper Science & Engineering
- Polymer, Textile & Fiber Engineering\*
- Robotics

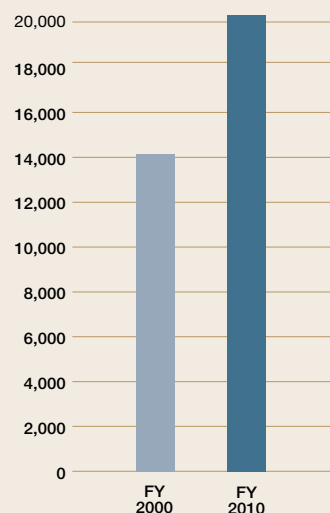
*\*Updated programs*

## Total Headcount Enrollment

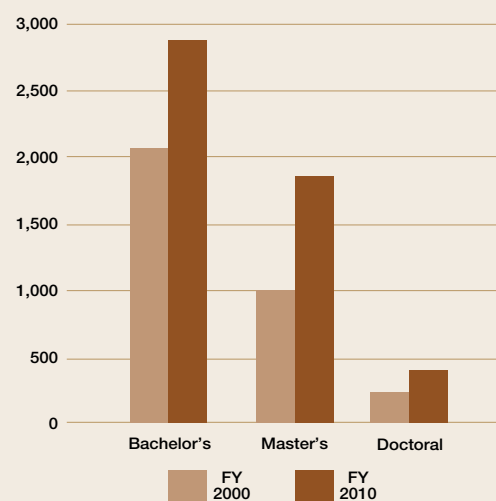
ENROLLMENT	FY 2000	FY 2010	%Change
Undergraduate	10,257	13,515	32%
Graduate	3,818	6,776	77%
Total	14,075	20,291	44%
Full-time Equivalent (FTE) Enrollment	13,428	19,066	42%



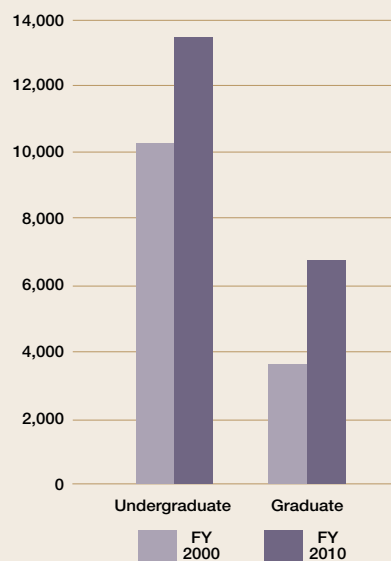
## Comparison of Total Headcount Enrollment FY 2000 & FY 2010



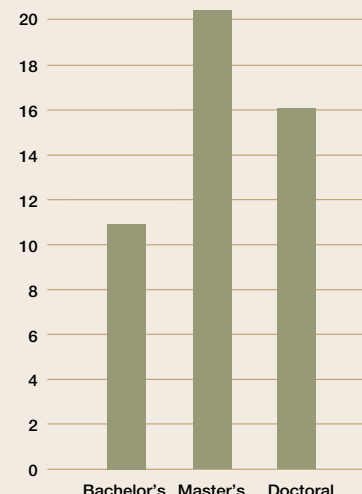
## Comparison of Degrees Awarded by Level FY 2000 & FY 2010



## Comparison of Headcount Enrollment by Level FY 2000 & FY 2010



## New Degree Programs FY 2000-2010

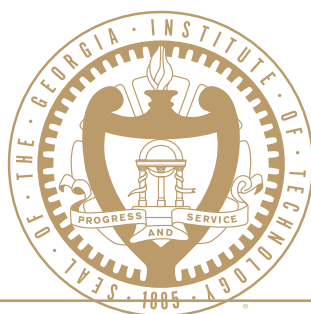






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# ***Financial Report 2010***

**LAYING A FOUNDATION FOR  
GLOBAL LEADERSHIP**



**Georgia Institute  
of Technology®**

# Message from the Executive Vice President for Administration and Finance



This Fiscal Year 2010 annual financial report reflects the continued commitment of the Georgia Institute of Technology administration to provide an annual compilation of the Institute's financial position and performance, thereby documenting the growth and health of the Institute over time for its many benefactors, constituents, friends, and supporters. The data presented demonstrate the commitment and the progress Georgia Tech has made in its quest to become the defining technological university of the twenty-first century, including the campus-wide effort to build an outstanding administrative support and capital asset infrastructure in support of the Institute's core mission.

During FY2010, under the leadership of President G. P. "Bud" Peterson, the Institute undertook a long-term strategic visioning process known as "Designing the Future." Throughout the fiscal year, the many Georgia Tech faculty, students, staff, alumni, and community supporters worked hard to define where the Institute can be in 2035. Throughout the strategic visioning and planning process, participants recognized that significant planning and investments are required in the near term to build for the future while preserving the momentum of today.

Despite being a challenging financial year with significant reductions in state revenue support and a general economic downturn, Georgia Tech saw true progress in achieving our missions of academics, research, service, and economic development. Through continued improvements in the Institute's infrastructure, administrative processes, and business systems, we have worked relentlessly to demonstrate benefits to all departments, students, and employees of the campus. We are also utilizing best practices, enhanced protection of physical and information technology

assets, and continuous process improvement methodologies to enhance the achievement of academic goals and plans. The Institute continued to receive favorable audit reports with no major findings in the numerous federal and state audits conducted this year. The Institute's physical development continues to evolve with new construction, infrastructure, renovations, and landscape improvements focused on strategic plans and sustainable development. These improvements and key investments made this fiscal year help to lay the groundwork for the future that the Institute has envisioned through our planning processes.

As we continue to build momentum for the challenges of today and look to the plans for our future, the Division of Administration and Finance implemented a realignment of our business units in the past fiscal year. With the foundation of a strong team of talented individuals in our division, empowerment and agility are critical success factors for our organization and our ongoing support of the Institute's future vision and growth.

The FY2010 financial report presented here includes the Institute's general purpose unaudited financial statements and accompanying footnotes for the Fiscal Year 2010 ending June 30, 2010. As one of the thirty-five institutions that comprise the University System of Georgia governed by the Board of Regents, the Institute's financial statements are audited annually by the State of Georgia Department of Audits in its annual audit of the University System. These audited financial statements will be available for review at "fin-services@gatech.edu."

The financial report for the Institute incorporates Governmental Accounting Standards Board (GASB) Statements 34, 35, and 39, first required in FY2004, to enhance the understanding of the following three groups of financial statement users: those to whom government is primarily accountable (citizens); those who directly represent citizens (legislative and oversight bodies); and those who lend or participate in the lending process (investors and creditors).

Three basic financial statements are presented: (1) Statement of Net Assets (the balance sheet); (2) Statement of Revenues, Expenses, and Changes in Net Assets (the income statement); and (3) Statement of Cash Flows. It is important to note that GASB treats state appropriations as "non-operating income" rather than "operating income," a presentation requirement that makes it appear that Georgia Tech and other public colleges and universities have an "operating loss" since

state appropriations are not considered as operating income. A full picture of the year's operations can be seen from the "bottom line" of the Statement of Revenues, Expenses, and Changes in Net Assets.

GASB standards also require the discrete reporting of affiliated organizations in the Institute's audited Financial Statements. For this unaudited annual report, affiliate information is included in the notes.

Notes to the financial statements recognize the significant contributions of six separately incorporated cooperative organizations to the annual operation and performance of the Georgia Institute of Technology. These six cooperative organizations provide the means and support to:

- build facilities and purchase equipment,
- receive and invest contributions,
- perform sponsored research and services and license intellectual property,
- facilitate technology transfer and economic development,
- provide programs and facilities for intercollegiate athletics, and
- inform and promote alumni interest in the Institute.

Together the cooperative organizations add significantly to Institute assets and revenues for programs and services, and ultimately enhance the Institute's performance of its mission.

In summary, the Georgia Tech of the future, and of today, is a great university populated by skilled, knowledgeable people who apply best practices at all levels, with disciplined translation of thought into planned action in support of our vision. Employees in Administration and Finance and throughout the academic and other major divisions of the Institute made significant contributions to the performance highlighted in this annual report, and I wish here to acknowledge and praise their efforts to ensure the Institute's success in the past fiscal year. Special thanks go to members of the Administration and Finance Leadership Team listed on the facing page. This team continues to play a vital role in the success of the Institute.

Sincerely,

A handwritten signature in dark ink, appearing to read "Steven G. Swant".

Steven G. Swant  
Executive Vice President  
Administration and Finance



## ADMINISTRATION AND FINANCE

### Steven G. Swant

Executive Vice President for  
Administration and Finance

### Rosalind R. Meyers

Vice President for Campus Services

### Charles G. Rhode

Associate Vice President  
for Facilities

### Joel E. Hercik

Associate Vice President for  
Financial Services

### John K. Mullin

Associate Vice President and  
Associate Vice Provost for  
Information Technology and  
Chief Information Officer

### Patrick J. McKenna

Associate Vice President for  
Legal Affairs and Risk Management

### JulieAnne Williamson

Assistant Vice President  
for Administration and Finance

### Jane-Allen Shope

Executive Secretary to  
the Executive Vice President

## GEORGIA INSTITUTE OF TECHNOLOGY STATEMENT OF NET ASSETS

(dollars in thousands)

	Georgia Tech June 30, 2009 (audited)	Georgia Tech June 30, 2010 (unaudited)	Component Units June 30, 2010 (unaudited)
<b>ASSETS</b>			
<b>Current Assets</b>			
Cash and Cash Equivalents .....	\$70,014	\$120,492	\$92,152
Short-term Investments .....	149	152	
Accounts Receivable, net			
Receivables—Federal Financial Assistance .....	6,735	9,496	
Receivables—State General .....			
Appropriations Allotment .....			
Receivables—Other .....	11,579	21,989	39,546
Leases Receivable .....			17,289
Pledges Receivable .....			4,273
Due from Component Units .....	64,513	55,309	5,674
Due from Primary Government .....			
Inventories .....	360	346	3
Prepaid Items .....	8,359	12,704	6,111
Notes and Mortgages Receivable .....			1,079
Other Assets .....			72,392
<b>Total Current Assets .....</b>	<b>161,709</b>	<b>220,488</b>	<b>238,519</b>
<b>Noncurrent Assets</b>			
Noncurrent Cash .....			27,837
Due from Component Units .....			91,157
Due from Primary Government .....			
Investments (Including Real Estate) .....	51,010	54,935	1,129,309
Notes Receivable, net .....	10,063	10,360	30
Leases Receivable .....			379,703
Pledges Receivable .....			11,792
Other Assets .....			94,293
Capital Assets, net .....	1,522,344	1,538,480	256,257
<b>Total Noncurrent Assets .....</b>	<b>1,583,417</b>	<b>1,603,775</b>	<b>1,990,378</b>
<b>TOTAL ASSETS .....</b>	<b>1,745,126</b>	<b>1,824,263</b>	<b>2,228,897</b>
<b>LIABILITIES</b>			
<b>Current Liabilities</b>			
Accounts Payable .....	23,685	40,508	26,309
Salaries Payable .....	1,428	1,634	
Benefits Payable .....	272	287	
Contracts Payable .....	1,012	715	107
Deposits .....	28,942	24,275	9,438
Deferred Revenue .....	14,812	23,647	50,803
Other Liabilities .....	3,096	4,843	1,140
Deposits Held for Other Organizations .....	10,422	7,687	
Due to Component Units .....			5,678
Due to Primary Government .....			55,310
Current Portion of Long-term Debt .....	18,807	19,230	51,107
Compensated Absences (Current Portion) .....	19,431	21,047	601
<b>Total Current Liabilities .....</b>	<b>121,907</b>	<b>143,873</b>	<b>200,493</b>
<b>Noncurrent Liabilities</b>			
Due to Component Units .....			91,157
Due to Primary Government .....			
Lease Purchase Obligations (Noncurrent) .....	517,630	502,499	95,836
Deferred Revenue (Noncurrent) and Other Noncurrent Liabilities .....	5,231	5,038	742,697
Compensated Absences (Noncurrent) .....	15,905	16,503	
<b>Total Noncurrent Liabilities .....</b>	<b>538,766</b>	<b>524,040</b>	<b>929,690</b>
<b>TOTAL LIABILITIES .....</b>	<b>660,673</b>	<b>667,913</b>	<b>1,130,183</b>
<b>NET ASSETS</b>			
Invested in Capital Assets, net of related debt .....	985,906	1,016,752	(46,748)
Restricted for			
Nonexpendable .....	44,328	47,648	477,378
Expendable .....	29,851	41,782	564,263
Capital Projects .....	5,249	25,693	4,760
Unrestricted .....	19,118	24,476	99,061
<b>TOTAL NET ASSETS .....</b>	<b>1,084,452</b>	<b>1,156,351</b>	<b>1,098,714</b>

# GEORGIA INSTITUTE OF TECHNOLOGY STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET ASSETS

(dollars in thousands)

	Georgia Tech June 30, 2009 (audited)	Georgia Tech June 30, 2010 (unaudited)	Component Units June 30, 2010 (unaudited)
<b>REVENUES</b>			
<b>Operating Revenues</b>			
Student Tuition and Fees (Net of Allowance for Doubtful Accounts)	\$180,037	\$212,266	
Less: Scholarship Allowances	28,322	34,783	
Grants and Contributions			42,448
Endowment Income (Per Spending Plan)			
Federal Appropriations			
Grants and Contracts			
Federal	318,214	366,526	
State	12,999	9,931	
Other	186,615	188,291	
Sales and Services	15,584	23,543	38,709
Rents and Royalties	1,066	854	60,436
Auxiliary Enterprises			
Residence Halls	52,301	56,058	
Bookstore	1,936	2,030	
Food Services	18,185	5,276	
Parking/Transportation	13,173	13,650	
Health Services	6,219	7,191	
Intercollegiate Athletics			
Other Organizations	7,252	2,279	
Other Operating Revenues	8,995	15,035	465,961
<b>Total Operating Revenues</b>	<b>794,254</b>	<b>868,147</b>	<b>607,554</b>

## EXPENSES

### Operating Expenses

Salaries			
Faculty	261,660	266,168	
Staff	286,541	297,967	5,965
Benefits	110,167	114,144	1,192
Other Personal Services	688	684	26
Travel	15,746	16,495	4,677
Scholarships and Fellowships	12,353	14,769	7,748
Utilities	39,051	30,481	1,450
Supplies and Other Services	228,131	249,541	33,529
Depreciation	69,585	75,333	11,129
Other Operating Expenses			5,960
Payments to or on Behalf of Georgia Institute of Technology			568,033
<b>Total Operating Expenses</b>	<b>1,023,922</b>	<b>1,065,582</b>	<b>639,709</b>
<b>Operating Income (Loss)</b>	<b>(229,668)</b>	<b>(197,435)</b>	<b>(32,155)</b>

### NONOPERATING REVENUES (EXPENSES)

State Appropriations	254,938	207,557	
Grants and Contracts			
Federal	9,012	47,764	
State			
Other			
Gifts	18,322	2,975	
Investment Income (Endowments, Auxiliary, and Other)	13,064	12,163	130,062
Interest Expense (Capital Assets)	(27,719)	(28,336)	(40,908)
Other Nonoperating Revenues	(16,517)	1,434	(8,130)
Net Nonoperating Revenues	251,100	243,557	81,024
Income Before Other Revenues, Expenses, Gains, or Loss	21,432	46,122	48,869
Capital Grants and Gifts			
Federal			
State	56,791	12,180	
Other	1,266	6,289	
Additions to Permanent Endowments			56,360
<b>Total Other Revenues</b>	<b>58,057</b>	<b>18,469</b>	<b>56,360</b>
<b>Increase in Net Assets</b>	<b>79,489</b>	<b>64,591</b>	<b>105,229</b>

### TOTAL NET ASSETS

Net Assets – Beginning of Year, as Originally Reported	1,037,017	1,084,452	993,485
Prior Year Adjustments	(32,054)	7,308	–
Net Assets – Beginning of Year, Restated	1,004,963	1,091,760	993,485
Net Assets – End of Year	1,084,452	1,156,351	1,098,714



# GEORGIA INSTITUTE OF TECHNOLOGY STATEMENT OF CASH FLOWS

(dollars in thousands)

Georgia Tech  
June 30, 2009  
(audited)

Georgia Tech  
June 30, 2010  
(unaudited)

## CASH FLOWS FROM OPERATING ACTIVITIES

Tuition and Fees .....	\$152,775	\$181,124
Grants and Contracts (Exchange) .....	511,185	565,424
Sales and Services of Educational Departments .....	15,329	23,154
Payments to Suppliers .....	(375,980)	(402,716)
Payments to Employees .....	(545,900)	(561,715)
Payments for Scholarships and Fellowships .....	(12,353)	(14,768)
Loans Issued to Students and Employees .....	(3,342)	(1,041)
Collection of Loans to Students and Employees .....	2,675	745
Auxiliary Enterprise Charges:		
Residence Halls .....	52,111	56,290
Bookstore .....	1,941	2,044
Food Services .....	18,171	5,268
Parking/Transportation .....	13,221	13,705
Health Services .....	6,217	7,188
Intercollegiate Athletics .....		
Other Organizations .....	7,146	2,009
Other Receipts (Payments) .....	23,799	16,614
<b>Net Cash Provided (Used) by Operating Activities .....</b>	<b>(133,005)</b>	<b>(106,675)</b>

## CASH FLOWS FROM NONCAPITAL FINANCING ACTIVITIES

State Appropriations .....	257,218	244,391
Agency Funds Transactions .....	(3,251)	(2,735)
Gifts and Grants Received for Other Than Capital Purposes .....	25,054	13,905
Other Nonoperating Receipts (Used) .....	(886)	2,920
<b>Net Cash Flows Provided by Noncapital Financing Activities .....</b>	<b>278,135</b>	<b>258,481</b>

## CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES

Capital Grants and Gifts Received .....	8,507	11,931
Proceeds from Sale of Capital Assets .....		
Purchases of Capital Assets .....	(115,973)	(75,193)
Principal Paid on Capital Debt and Leases .....	(17,542)	(18,807)
Interest Paid on Capital Debt and Leases .....	(27,709)	(27,495)
<b>Net Cash Used by Capital and Related Financing Activities .....</b>	<b>(152,717)</b>	<b>(109,564)</b>

## CASH FLOWS FROM INVESTING ACTIVITIES

Proceeds from Sales and Maturities of Investments .....	5,000	
Interest on Investments .....	21,907	8,280
Purchase of Investments .....	(1,327)	(44)
<b>Net Cash Provided (Used) by Investing Activities .....</b>	<b>25,580</b>	<b>8,236</b>
<b>Net Increase/Decrease in Cash .....</b>	<b>17,993</b>	<b>50,478</b>
Cash and Cash Equivalents – Beginning of Year .....	52,021	70,014
Cash and Cash Equivalents – End of Year .....	70,014	120,492

## RECONCILIATION OF OPERATING LOSS TO NET CASH PROVIDED (USED) BY OPERATING ACTIVITIES

Operating Income (Loss) .....	(229,668)	(197,435)
Adjustments to Reconcile Net Income (Loss) to Net Cash		
Provided (Used) by Operating Activities		
Depreciation .....	69,585	75,333
Change in Assets and Liabilities		
Receivables, net .....	8,268	(3,967)
Inventories .....	(38)	14
Other Assets .....	5,062	(4,758)
Accounts Payable .....	4,178	16,824
Deferred Revenue .....	(627)	8,641
Other Liabilities .....	8,182	(3,541)
Compensated Absences .....	2,053	2,214
<b>Net Cash Provided (Used) by Operating Activities .....</b>	<b>(133,005)</b>	<b>(106,675)</b>

# GEORGIA INSTITUTE OF TECHNOLOGY NOTES TO THE FINANCIAL STATEMENTS

June 30, 2010

## SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The financial statements presented in this report are modified statements issued under reporting guidelines established by the Governmental Accounting Standards Board (GASB). The statements focus on the financial condition, results of operations, and cash flows of the Institute as a whole, with resources classified for accounting and reporting purposes into four net asset categories: invested in capital assets, net of related debt; restricted-nonexpendable; restricted-expendable; and unrestricted. The basis of accounting is full accrual, including capitalization and depreciation of equipment and fixed assets.

The unaudited financial statements are prepared using the economic resources measurement focus and the accrual basis of accounting. Under the accrual basis, revenues are recognized when earned, and expenses are recorded when an obligation has been incurred. All significant intra-Institute transactions have been eliminated. Audited financial statements with accompanying footnote disclosures have not been completed at this time. Copies of the audited financial report will be available upon request.

The financial operations and position of six Institute cooperative organizations are considered component units of the Institute and are included by discrete presentation in the Institute financial statements. Although these organizations operate exclusively to provide the Institute with supplemental resources and support, they are separately incorporated and managed by their own boards. An annual post audit of each organization's financial statements is

conducted by independent certified public accountants. These organizations are described below:

**Georgia Tech Foundation Inc.** is incorporated as a nonprofit corporation under the laws of the state of Georgia to promote in various ways the cause of higher education in the state of Georgia, to raise and receive funds for the support and enhancement of the Georgia Institute of Technology, and to aid the Institute in its development as a leading educational institution.

**Georgia Tech Facilities Inc.** is incorporated as a nonprofit corporation under the laws of the state of Georgia. The purpose of Facilities Inc. is to construct buildings and other facilities as may be appropriate to meet the needs and goals of the Georgia Institute of Technology. Facilities Inc. serves as a financing and contracting entity for construction projects on the campus of Georgia Tech, but does not manage buildings after completion.

**Georgia Tech Alumni Association Inc.** is a nonprofit organization formed to assist the Georgia Institute of Technology in alumni relations and to promote education. The Association is dedicated to the interests and welfare of Georgia Tech. Among its many other programs and activities, the Association acts as a fund-raising arm of the Georgia Tech Foundation through solicitation of contributions from alumni and friends of the Institute on behalf of the Foundation.

**Georgia Tech Research Corporation (GTRC)** is a Georgia nonprofit corporation organized and operated exclusively

for scientific, literary, and educational purposes. GTRC serves as the contracting agency for all sponsored research activities at Georgia Tech. Additionally, GTRC assists Georgia Tech in obtaining quality research space, enters into long-term leases for specialized research equipment and facilities, and conducts other research support programs for Georgia Tech and its affiliated research programs. It also owns all intellectual property created at Georgia Tech and manages patents, copyrights, and licenses. All funds received by GTRC are used to support various Georgia Tech research programs as approved by the Board of Trustees of GTRC.

**Georgia Tech Athletic Association Inc.** is a nonprofit organization created for the express purpose of aiding the educational programs of the Institute by providing physical training, recreation, and intercollegiate athletic facilities; carrying out its athletic programs; and soliciting gifts, donations, and grants for the purpose of supporting and enhancing the Institute's varsity athletic programs.

**Georgia Advanced Technology Ventures Inc. (GATV)** is a Georgia nonprofit organization formed to support the Georgia Institute of Technology's technology transfer and economic development mission. GATV provides capital and operating support for technology transfer and economic development activities, including the Advanced Technology Development Center (ATDC) incubator facilities and services to ATDC-affiliated companies.

## GEORGIA INSTITUTE OF TECHNOLOGY COOPERATIVE ORGANIZATIONS

Summary financial data from the financial statements of each cooperative organization is as follows: Year ended June 30, 2010 (dollars in thousands) (unaudited)

	GEORGIA TECH FOUNDATION	GEORGIA TECH FACILITIES	GEORGIA TECH ALUMNI ASSOCIATION	GEORGIA TECH RESEARCH CORPORATION	GEORGIA TECH ATHLETIC ASSOCIATION	GEORGIA ADVANCED TECHNOLOGY VENTURES
<b>Total Assets</b>	1,438,429	310,475	1,144	145,263	208,776	124,810
<b>Total Liabilities</b>	438,376	323,873	740	108,084	138,336	120,774
<b>Unrestricted Net Assets</b>	59,359	(23,964)	131	37,179	(10,051)	336
<b>Restricted Net Assets</b>	940,694	10,566	273	—	80,491	3,700
<b>Net Assets</b>	1,000,053	(13,398)	404	37,179	70,440	4,036
<b>Total Net Assets and Liabilities</b>	1,438,429	310,475	1,144	145,263	208,776	124,810
<b>Revenues</b>	226,334	13,446	6,390	473,261	59,394	15,172
<b>Expenditures</b>	117,457	16,196	6,148	472,503	55,627	20,837
<b>Net Increase (Decrease)</b>	108,877	(2,750)	242	758	3,767	(5,665)
<b>Net Assets: July 1, 2009</b>	891,176	(10,648)	162	36,421	66,673	9,701
<b>Net Assets: June 30, 2010</b>	1,000,053	(13,398)	404	37,179	70,440	4,036

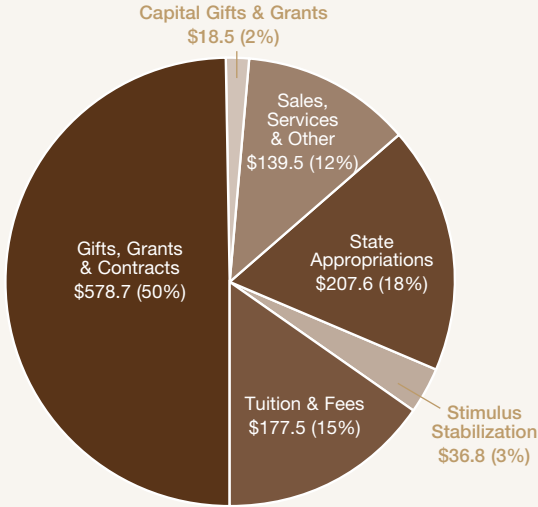


# GEORGIA INSTITUTE OF TECHNOLOGY

June 30, 2010

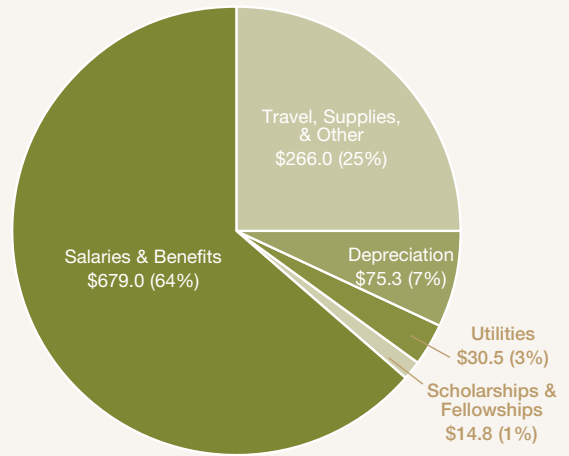
## REVENUE

FY 2010 (Total: \$1,158.6 Million)



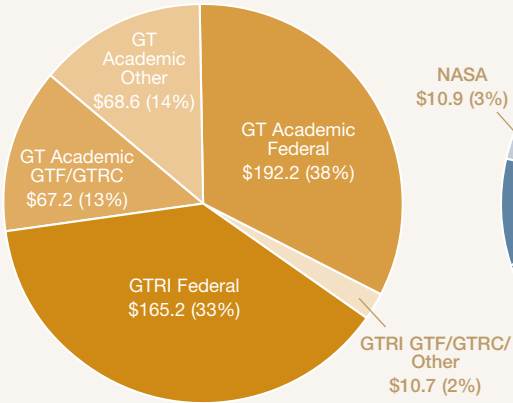
## OPERATING EXPENSES

By major class  
FY 2010 (Total: \$1,065.6 Million)



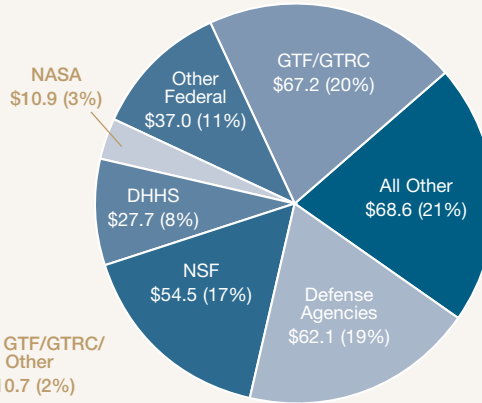
## SPONSORED EXPENDITURES

By major unit and source  
FY 2010 (Total: \$503.9 Million)



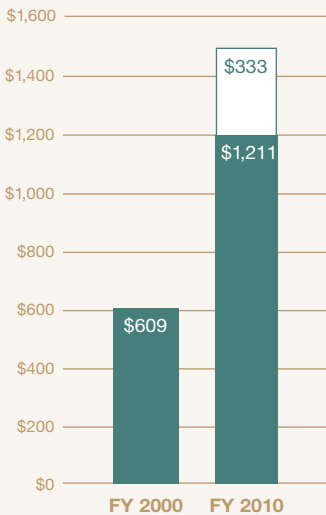
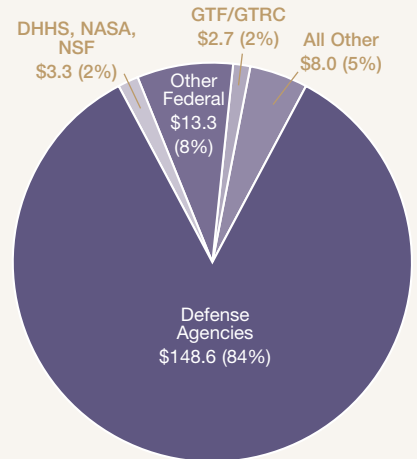
## ACADEMIC SPONSORED EXPENDITURES

By major source  
FY 2010 (Total: \$328.0 Million)



## GEORGIA TECH RESEARCH INSTITUTE (GTRI) SPONSORED EXPENDITURES

By major source  
FY 2010 (Total: \$175.9 Million)

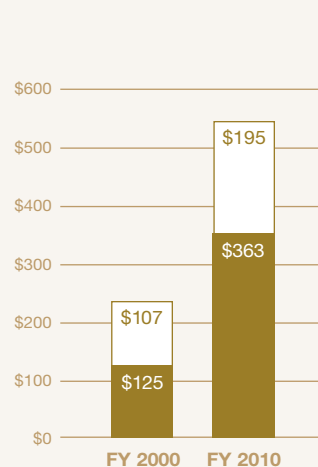


## PHYSICAL PLANT ASSETS TEN-YEAR COMPARISON BOOK VALUE OF LAND, BUILDINGS, AND IMPROVEMENTS

(dollars in millions)

FY 2010 (Total: \$1,544 Million)

Land, Buildings, and Improvements (Depreciation)  
Book Value of Land, Buildings, and Improvements



## NEW SPONSORED AWARDS

(dollars in millions)

FY 2000 (Total: \$232 Million)

FY 2010 (Total: \$558 Million)

Georgia Tech Research Institute (GTRI)  
Resident Instruction

