

# Success by Design



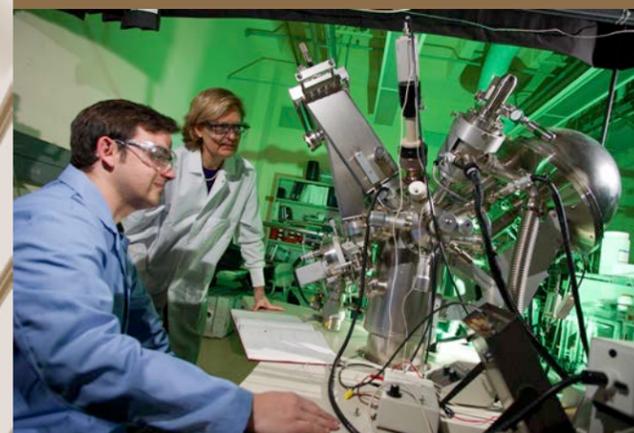
**Annual Report 2013**



**Georgia Institute  
of Technology**

# Table of Contents

<b>Student Achievement and Support</b> .....	<b>2</b>
<b>Faculty/Staff Honors and Accolades</b> .....	<b>8</b>
<b>Maximizing the Impact of Research</b> .....	<b>12</b>
<b>A Vital Partner in Economic Development</b> .....	<b>18</b>
<b>A Growing Global Footprint</b> .....	<b>22</b>
<b>The Impact of Philanthropy</b> .....	<b>26</b>
<b>Community Engagement</b> .....	<b>28</b>



## Success by Design

The biggest challenge with strategic planning is that the destination changes during the journey. Designing for long-range success requires both vision and flexibility, a delicate balance that the Georgia Tech community maintained beautifully three years ago during the creation of “Designing the Future,” our 25-year strategic plan.

As we mark the third anniversary of the strategic plan’s dissemination, I believe it’s important to pause and take stock not only of the progress we’ve made in fulfilling the goals we articulated in 2010, but also of how well we’ve adjusted to rapidly changing circumstances.

Being among the most highly respected learning institutions in the world is the first of our overarching strategic goals. We took a giant step toward this in 2010 when we accepted an invitation to join the American Association of Universities (AAU). The prestigious AAU plays a major role in the nation’s research enterprise, as well as in training the next generation of scientists, engineers, and scholars.

While AAU membership had been an institutional aspiration for some time, the rise of massive open online courses, or MOOCs, was a development we did not anticipate in 2010. Thanks to the flexibility of our strategic plan, however, we were able to move thoughtfully and nimbly to inaugurate an array of MOOC offerings that have attracted hundreds of thousands of learners from around the globe. This is the kind of deliberate yet bold action that will assure Georgia Tech’s position as one of the most highly respected learning institutions in the world.

In our strategic focus on innovation and entrepreneurship, we have initiated or expanded a number of collaborations and strategic partnerships with organizations such as Emory University and Children’s Healthcare of Atlanta, as well as business and industry. We are also playing a leading role in creating an “Innovation Zone” in Midtown Atlanta that has attracted such companies as Panasonic, Penguin Computing, and AT&T Mobility. Celebrating its 10th anniversary this fall, Technology Square is a high-energy hub that is creating an exciting environment for innovation to flourish.

Another initiative aimed at fostering innovation is the Engineered Biosystems Building, or EBB, currently under construction on 10th Street as the latest addition to our Biotechnology Complex. EBB will bring together scientists and engineers in chemical biology, cell and development bioengineering, and systems biology. What makes this facility unique is that its spatial organization and structure have been planned according to the concept of “research neighborhoods,” as opposed to traditional academic disciplines. Because of EBB’s core facilities with specialized, shared scientific equipment designed to serve all three research neighborhoods, interesting and often unexpected discoveries and advances are bound to happen there.

These are only a few examples of the tremendous progress we are making in fulfilling our shared vision of what the Institute can and should be in the 21st century. I hope you’ll enjoy reading in the pages of this annual report about the numerous ways in which we are designing and achieving a future of success and preeminence for Georgia Tech.

Sincerely,

G.P. “Bud” Peterson, President

# Student Achievement and Support

The role of students — during their time at Tech and in their careers that follow — is integral to the Institute’s strategic plan. Two of the five overarching goals of the strategic plan directly address the role of students:

- Ensure that innovation, entrepreneurship, and public service are fundamental characteristics of our graduates.
- Expand our global footprint and influence to ensure that we are graduating good global citizens.

## Rhodes, Marshall, and Goldwater scholars

Innovation, entrepreneurship, and public service are easily observed in this year’s recipients of highly prestigious scholarships, including Rhodes Scholar and recent computer science graduate **Joy Buolamwini**.

From her high school bedroom in Memphis, Tenn., Buolamwini realized she could change the world with technology as she created a website for the Ethiopian Embassy in the Ivory Coast. This was one of the first times, but certainly not the last, that her computing skills would have a global effect.

Born in Canada to African parents and having lived in Ghana, Spain, Memphis, and Atlanta, Buolamwini truly considers herself a global citizen. She is currently living in the United Kingdom studying global governance and diplomacy and African studies at the University of Oxford as a 2013 Rhodes Scholar, an honor bestowed on just 32 U.S. students a year. In addition to being a Rhodes Scholar, Buolamwini is also a 2013 Fulbright Scholar and will use her grant to improve access to education in Zambia. Her experience developing Web and mobile applications for Atlanta’s Teach for America schools will inform her efforts with the Zambian Institute for Sustainable Development to create a program that gives students a foundation in information technology, mobile software development, and entrepreneurship.

As a Tech student, Buolamwini was a Stamps Scholar, interned at Yahoo, worked at the Carter Center, founded multiple startup companies, and earned numerous competitive scholarships. Her first innovative venture at Tech was with the Institute’s In Venture Prize competition, where she was the youngest finalist in 2009. “The most valuable thing was the confidence I gained and realizing I could put something out in the world and make it become a reality,” she said. “Everything became an opportunity after that.”

“She has an integrity to herself that is really unusual,” said Merrick Furst, distinguished professor of computer science and founder of Flashpoint, the Georgia Tech startup incubator from which one of Buolamwini’s companies graduated. “It’s not that Joy does one thing well, it’s that her talent is a well, coupled with a remarkable, boundless, and generative energy.”

Continuing the theme of good global citizenship is recent civil engineering master’s graduate **Jacob Tzegaegbe**, who was named a Marshall Scholar. The award is bestowed annually upon intellectually distinguished students from the United States pursuing post-secondary education in England. In fall 2013, Tzegaegbe began using his scholarship to pursue a doctorate in civil engineering at University College London.

“My doctorate will likely focus on evaluating best practices in context-sensitive design for major transportation infrastructure projects in developing countries,” said Tzegaegbe, who also earned a bachelor’s degree in civil engineering at Tech. “My hope is to work with professors in the Bartlett School of Planning to learn more about how to plan infrastructure in developing countries.”

Born to a Nigerian father and Israeli mother, Tzegaegbe is the first in his family to attend college. His athletic abilities, community activism, and intellectual prowess earned him a reputation as a model student. Named Mr. Georgia Tech at the 2011 Homecoming game, Tzegaegbe received a National Science Foundation Graduate Research Fellowship and was a finalist for the Rhodes Scholarship.

“We are proud, but we cannot be surprised by this honor,” said his mentor, Reginald DesRoches, the Karen and John Huff Chair of the School of Civil and Environmental Engineering. “Even among the very brightest students who come to Georgia Tech, Jacob is a stand-out. He is academically focused and driven, and is quite aware of the larger implications of his work.”



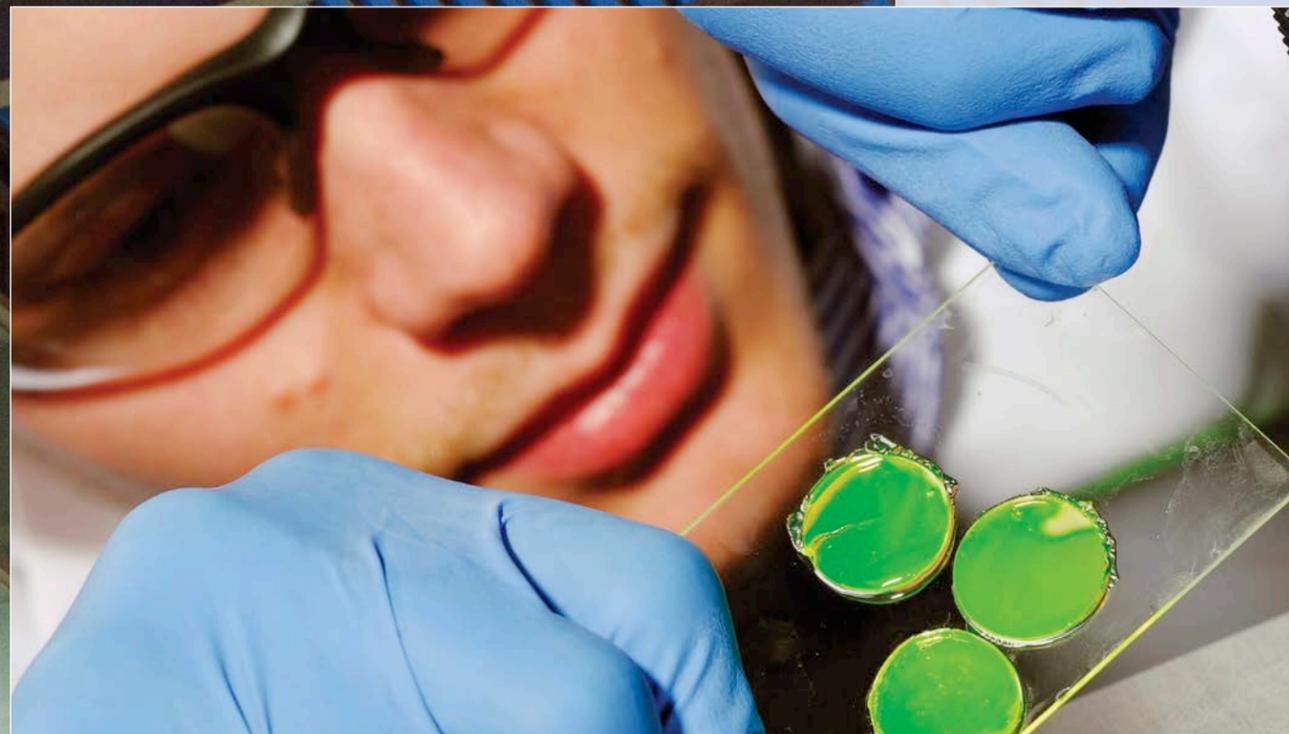
Joy Buolamwini



Jacob Tzegaegbe



Gautam Goel



## G. Wayne Clough Tech Promise Scholarship

[www.finaid.gatech.edu/promise](http://www.finaid.gatech.edu/promise)

- **Debt-free education** for qualified in-state students
- Family income of less than \$33,300
- Funded by generous alumni and other donors



Mallory Soldner



Andrew Harris



Jose Bernardo

“In my time at Georgia Tech, I have developed a deep appreciation for the impact that infrastructure can have on improving the quality of life of citizens,” said Tzegaegbe. “The Marshall Scholarship will allow me to further my understanding of how to develop cities that can sustainably transport people and goods while providing a foundation for economic development.”

This year’s only Georgia Tech recipient of the Goldwater Scholarship was **Gautam Goel**, a double major in applied mathematics and computer science who plans to pursue a doctorate in mathematics. His academic interests include probabilistic models of mathematical physics and the theory of algorithms.

Goel, a sophomore when he received the Goldwater Scholarship, conducts undergraduate research with faculty members Yuri Bakhtin in the School of Mathematics and Loren Williams in the School of Chemistry and Biochemistry. With Williams, he’s developing efficient algorithms to align the

structures of molecules in three-dimensional space. These algorithms produce much faster results for scientists than the ones previously used and allow them to compare structures that couldn’t be compared before.

In one of his projects with Bakhtin, Goel is exploring a mathematical model of human decision-making.

“Mathematics is, among other things, the perfect tool to understand a variety of real-world phenomena,” said Goel. “I hope to apply my mathematical perspective to problems originating in computer science, physics, economics, and biology. The most exciting thing that can happen is the development of rigorous theories with both a rich mathematical structure and useful application in fields other than mathematics.”

**“The Marshall Scholarship will allow me to further my understanding of how to develop cities that can sustainably transport people and goods while providing a foundation for economic development.”**

— *Jacob Tzegaegbe*

### Prominent Student Awards

Georgia Tech students continued their tradition of garnering high-profile student awards last year.

**Mallory Soldner**, a Ph.D. student in the Stewart School of Industrial and Systems Engineering, was selected as the Institute of Industrial Engineers representative for the 2013 New Faces of Engineering, a program that honors promising young engineers who are contributing greatly to society, thus promoting the image of engineering globally. Soldner was profiled in a special section of *USA Today* during National Engineers Week in February.

Since 2009, Soldner has served as a research assistant for the Georgia Tech Center for Health and Humanitarian Logistics (HHL), which led her to become involved in collaboration efforts with the United Nations World Food Programme as a research affiliate in 2010. She spent summer 2012 in Rome, Italy, where she led the development of business requirements and the design of dashboards for the World Food Programme’s Supply Chain Key Performance Indicator project.

Electrical engineering undergraduate **Andrew Harris** was named Intern Student of the Year by the Cooperative Education and Internship Association. Harris is also pursuing a minor in meteorology to fulfill

his lifelong interest in atmospheric chaos — or weather.

Harris worked as an avionics intern at Space Exploration Technologies (SpaceX) in 2012. He was responsible for lithium-ion battery testing, including those batteries used in the Dragon spacecraft and Falcon 9 rockets, contributing to a successful mission to the International Space Station. He also worked as a systems engineering intern at Microsoft, where his responsibilities included optical performance characterization, system-level power analysis, and prototype testing.

Colleagues at both companies identified Harris’ strong work ethic, critical thinking skills, and ambition to continuously learn in the workplace as catalysts for success in a full-time career. After graduating in spring 2014, he plans to pursue a career in the consumer electronics or aerospace industries with the option of pursuing a graduate degree simultaneously.

Recent aerospace engineering Ph.D. graduate **Jose Bernardo** was named Outstanding Student of the Year by the Federal Aviation Administration (FAA) Center of Excellence. As a Tech doctoral student, Bernardo conducted research for the FAA/College of Engineering Partnership for Air Transportation Noise and Emissions Reduction under the direction of faculty members Dimitri Mavris and Michelle Kirby.

At the age of 5, Bernardo moved with his

family from Lima, Peru, to the U.S., and he became a U.S. citizen in 2002. He completed a bachelor’s degree in mechanical engineering in 2008, capping his undergraduate studies by flying a microgravity experiment on NASA’s microgravity research vehicle. Bernardo completed a master’s degree in aerospace engineering in 2009.

In addition to his academic and research capabilities, Bernardo has demonstrated significant leadership by organizing and directing graduate research assistants, overseeing laboratory space, and contributing to the completion of various College of Engineering research initiatives.

### Unique Support Programs

A key element of support for the strategic plan is ensuring that the Institute offers students an array of substantial programs that foster entrepreneurship, innovation, and creativity.

For the past five years, the InVenture Prize competition has led the way in this endeavor. This year’s InVenture Prize winner, Chewbots, is a line of fully automated robotic dog toys that make owning a dog easier and more exciting and interactive. Chewbots inventor **Christopher Taylor**, a mechanical engineering major, created the dog toys, which won him up to \$20,000 provided by Google and

a spot in Georgia Tech’s startup accelerator program, Flashpoint.

“It was all just kind of a big blur,” said Taylor. “I was completely shocked. I don’t really have the words to describe it.”

Taylor plans to manufacture the dog toys and is using his prize money to make a second prototype to test his product for durability.

The invention that took second place in the InVenture Prize event — AnemoCheck — was also the winner of the 2013 Ideas to SERVE competition sponsored by the Scheller College of Business. **Erika Tyburski**, a biomedical engineering major, created AnemoCheck to improve the accuracy and affordability of testing for anemia around the world.

“I have mild anemia, so it made perfect sense for me to work on solving this problem,” explained Tyburski. “Thirty percent of the world will experience anemia at some point this year, and most of the time anemia is completely curable if diagnosed in time.”

Current diagnostic tests for anemia are often inaccurate, said Tyburski, who began working on the AnemoCheck technology through a senior industrial design project. “But with just one drop of blood, AnemoCheck can provide clear, reliable results for less than 25 cents per test. It is safe, simple, and accurate anemia screening.”

Open to all Georgia Tech students and



## Co-op Program

[www.coop.gatech.edu](http://www.coop.gatech.edu)

- Founded in 1912
- Combines academics with work experience
- Alternate class and work semesters
- Competitive career advantage





(Left) The Georgia Tech Center for Music Technology hosted the third annual Margaret Guthman New Musical Instrument Competition. (Upper) Daniel Hooper, a computational media alumnus, is an accomplished video game designer whose puzzle game, Percepto, was selected as Apple's Game of the Week in dozens of countries worldwide. (Bottom) Qualcomm Inc. has joined forces with Georgia Tech to establish the Qualcomm Augmented Reality Game Studio, a research and design center aimed at pioneering new advancements in mobile gaming and interactive media. Blair MacIntyre, professor in interactive computing, talks with two of his students.

# Banner Year for Tech Athletics

A momentous year for Georgia Tech athletics was capped by the naming of Mike Bobinski of Xavier University as the Institute's new director of athletics. Bobinski came to Tech after 12 years as director of athletics at Xavier University in Cincinnati, where he also had leadership experience in development.

"We are very pleased to welcome Mike Bobinski to Georgia Tech," said President Bud Peterson. "Mike's proven record of success and his diverse background in sports, finance, and development, as well as his unwavering commitment to student-athletes, make him the ideal person to lead our athletic program."

In 2012, the National Association of Collegiate Directors of Athletics named Bobinski the Under Armour Division I Northeast Athletic Director of the Year. During his tenure, nine Xavier teams earned 40 team or individual spots in NCAA championship competition. That includes men's basketball, which has reached at least the NCAA Tournament Sweet 16 in four of the last five years.

A native of Yaphank on Long Island, N.Y., Bobinski holds a bachelor of

business administration degree from Notre Dame University, where he played baseball.

Bobinski arrived at Tech not long after the football team made its second consecutive trip to the Hyundai Sun Bowl, where the Yellow Jackets defeated the University of Southern California 21-7.

"I'm really proud of our football team," said coach Paul Johnson. "I thought that they showed up and played with a lot of heart and a lot of determination, and I know Southern California has some really good football players. It was a hard-fought game."

The Yellow Jackets rushed for 294 yards on 63 carries while stopping a seven-bowl losing streak. Southern California had been ranked No. 1 at the beginning of the season.

Back on campus, the entire student body welcomed the November opening of the McCamish Pavilion basketball arena and the January opening of the Ken Byers Tennis Complex. These state-of-the-art projects, both of which replaced aging, outdated facilities, were made possible by the generous

philanthropy of Georgia Tech alumni Hank McCamish and Ken Byers.

The 2012 Summer Olympic Games in London included the participation of six current or former Yellow Jackets. Tech-affiliated athletes competed in basketball, swimming, and track and field, representing the United States and three other countries. A seventh Yellow Jacket competed in the Paralympic Games. They included:

- **Chaunté Lowe**, Women's High Jump, United States
- **Angelo Taylor**, Men's 400m Hurdles, United States
- **Alade Aminu**, Men's Basketball, Nigeria
- **Andrew Chetcuti**, Men's 100m Freestyle, Malta
- **Gal Nevo**, Men's 200m Butterfly, 200m Individual Medley, and 400m Individual Medley, Israel
- **Cassie Mitchell**, Paralympic Track and Field, United States (research faculty member, biomedical engineering)

recent alumni, Ideas to SERVE involves innovative business concepts that could help improve society or preserve the environment.

Georgia Tech's vision of innovation is not limited to science and technology. The complex challenges of the 21st century call for innovative problem solving by original thinkers and visionary leaders. To answer this need, the Institute cultivates the creative and analytical qualities of its students through a robust support for the arts in a program called Arts@Tech. Georgia Tech offers a variety of courses and degrees at all levels of study for students who want to blend the boundaries between art and technology.

The College of Architecture brings together designers, musicians, planners, and builders in a stimulating environment that encourages students to expand their imaginations and creativity. Students acquire a well-rounded knowledge base that combines liberal arts, fine arts, architectural and industrial design, and technology.

Another exciting option for undergraduate students is the Bachelor of Science in Computational Media, a joint offering of the College of Computing and the School of Literature, Media, and Communication within the Ivan Allen College of Liberal Arts. This degree prepares students for careers in the design and development of video games,

animation, special effects, and user interfaces.

Researchers at Tech are making great strides in many creative fields, including music technology, robotics, animation, augmented and virtual reality, architecture, information visualization, new media, gaming, graphics, and wearable computing. The

goal is to continually increase the number and range of research opportunities, grants, and exciting new graduate programs at the art/technology interface.

Arts@Tech is helping students push the boundaries of what it means to "innovate."



## Student Body Profile

- **Women: 35.9%** of 2012 freshman class
- **43%** of undergraduates participate in research
- **Freshman retention rate: 95%**
- **Six-year graduation rate: 82%**



# Faculty/Staff Honors and Accolades

Faculty and staff are the backbone of Georgia Tech's academic and administrative infrastructure. Without superior personnel, there is simply no way to have a superior university. The efforts of faculty and staff are directly responsible for the Institute's success in pursuing all five goals set forth by the strategic plan. The visibility and prestige that accompany employee achievements advance the Institute's progress toward reaching our strategic goals.

## Prestigious Awards

**Baratunde Cola**, assistant professor of mechanical engineering, received the American Association for the Advancement of Science (AAAS) Early Career Award for Public Engagement with Science.

Cola was recognized for his commitment to an exceptional research career while sharing his passion for science by engaging in creative outreach with teachers and students in underrepresented communities.

"Baratunde Cola has an impressive scientific record for one so early in his career, while at the same time engaging in substantial public outreach," said Tiffany Lohwater, director of public engagement at AAAS. "We commend his collaborative work with K-12 teachers to create broadly dispersed education materials in the fields of nanotechnology and energy conservation, from hands-on engineering competitions to nanotechnology-inspired art displays."

Cola and his colleague **Meghan Duffy**, assistant professor of biology, were among this year's 96 recipients nationwide of the Presidential Early Career Award for Scientists and Engineers (PECASE). Announced by the White House, the awards are the highest honor bestowed by the U.S. government on science and engineering professionals in the early stages of their independent research careers.

"My interests and accomplishments are shaped by the ethos of my family, friends,

and all of those who have supported and encouraged me," said Cola, who is also director of Georgia Tech's NanoEngineered Systems and Transport Lab (NEST). "I am thrilled to have an opportunity to represent them on this national stage. I feel honored to be considered in this group and to be able to share our discoveries of new ways to improve the conversion of waste heat to electricity with a wider audience."

"Receiving this award is a tremendous honor," said Duffy. "One thing I love about my research is that it combines a lot of different approaches. For example, we go out in the field and get muddy, but then also come back to the lab and use advanced molecular techniques to study parasites. And the goal of all of that is to answer questions that I think are really important, such as what allows disease outbreaks to occur?"

**Steve Potter**, associate professor of biomedical engineering, received the 2013 Teaching Excellence Award of the Board of Regents of the University System of Georgia.

"I tell my students exactly what they need to do to succeed in my class, meaning that I lay out — in great detail — what it takes to get an A," he said. "And then I do my best to raise their excitement and motivation to a level that makes all that work seem like fun."

For example, for his introductory neuroscience course, Potter asks students to select a specific topic in the neuroscience field and become an expert on it by reading research papers and interviewing engineers and scientists working in the field.

"Dr. Potter is an excellent teacher and his introductory course was my favorite at Tech,"

said Devon King, a fourth-year biomedical engineering major. "It is a challenging course, but in the 'I get to do this' way instead of the 'I have to do this' way. I always looked forward to going to his class, and I think other students did too."

**Alan Wagner**, a research scientist at the Georgia Tech Research Institute (GTRI), received the Air Force Young Investigator Award for his work in social robotics.

Combining psychology and high-end robotics research, Wagner works to create robots that will interact with a wide variety of people in as many different social situations as possible. Wagner's work draws heavily on theory from social psychology and aims to develop the computational underpinnings that will not only allow a robot to act "socially" in the presence of humans, but will also allow the robot to reason about a

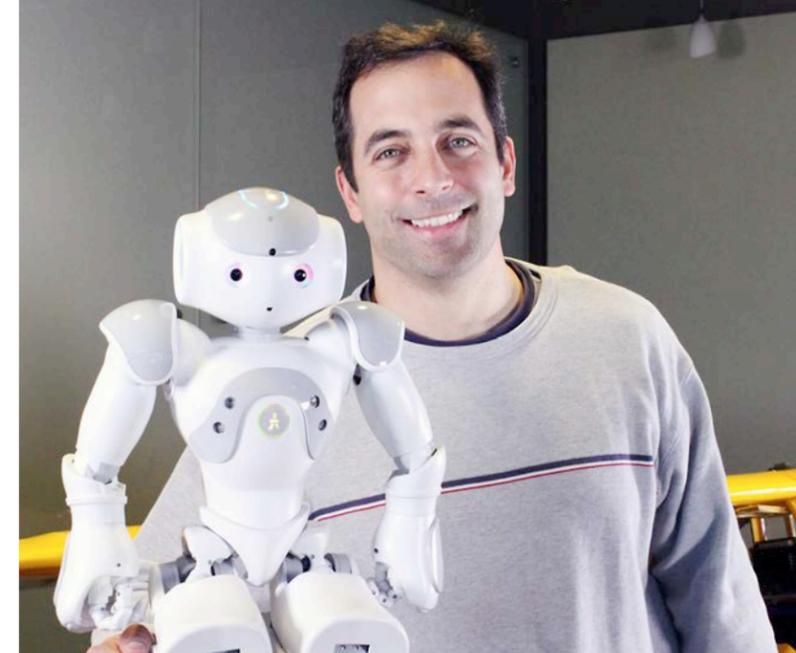
person's own social behavior.

"These are very competitive awards, reserved for those earlier career researchers that the Air Force deems as demonstrating exceptional ability and promise," said Georgia Tech Vice President and GTRI Director Bob McGrath.

In previous work, Wagner developed, implemented, and tested algorithms that allowed a robot to model and deceive an interactive partner.

**Andrea Thomaz**, assistant professor of interactive computing, was named by Popular Science as one of the 2012 "Brilliant 10," an award given to 10 scientists under 40 whose innovations will change the world.

As director of the College of Computing's Socially Intelligent Machines research lab, Thomaz focuses her research on all aspects of human-robot interaction, specifically on



(Left) Steve Potter (right) received the 2013 Teaching Excellence Award of the Board of Regents of the University System of Georgia. (Right) GTRI's Alan Wagner received the Air Force Young Investigator Award for his work in social robotics. (Bottom) Andrea Thomaz (center) was named by Popular Science as one of the 2012 "Brilliant 10."

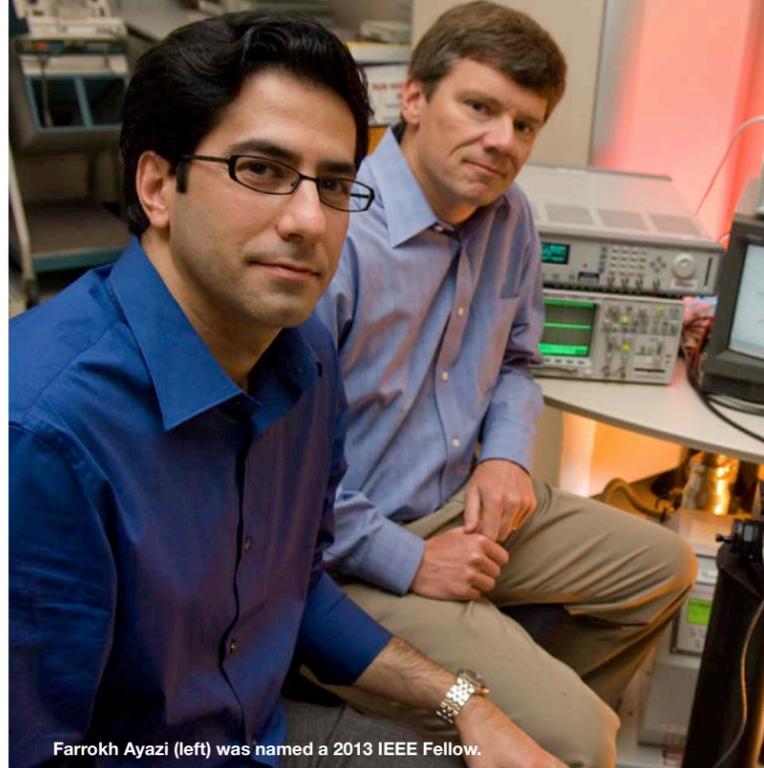


Baratunde Cola (right) received a prestigious PECASE award.





Tim Lieuwen (center) was appointed to the National Petroleum Council.



Farrokh Ayazi (left) was named a 2013 IEEE Fellow.



Jonathan Colton



Thomas Boston



Lauren McDow



Marta Garcia

was appointed to the National Petroleum Council (NPC) by the secretary of the U.S. Department of Energy to advise on matters related to oil and natural gas. Lieuwen also leads Georgia Tech's Carbon Neutral Energy Solutions laboratory.

The NPC includes members with interests and expertise in the oil and gas industries as well as representatives from academic, research, Native American, and financial fields. The NPC conducts studies based on specific requests from the energy secretary and renders reports to the government as a public service after they are transmitted to the secretary.

**Farrokh Ayazi**, a professor of electrical and computer engineering, was appointed a 2013 IEEE Fellow. Ayazi was recognized for his contributions to micro-electro-mechanical resonators and resonant gyroscopes.

The IEEE grade of Fellow is conferred by the IEEE board of directors upon those with an outstanding record of accomplishments in any of the IEEE fields of interest. It is the highest grade of membership and is recognized by the technical community as a prestigious honor and an important career achievement.

A Tech faculty member since 2000, Ayazi leads the Integrated MEMS Laboratory and is the director of the Georgia Tech Center for MEMS and Microsystems Technologies.

**Jonathan Colton**, professor of both mechanical engineering and industrial design, was named one of 13 Jefferson Science Fellows for 2013-14. Colton is a

**“I am looking forward to this exciting opportunity to work with the U.S. State Department and USAID on their important missions around the world. This is a wonderful chance for Georgia Tech and me to contribute to the service of our nation.”**

**— Jonathan Cotton, a 2013-14 Jefferson Science Fellow**

member of the 10th class of fellows selected as an initiative of the Office of Science and Technology Advisor to the U.S. Secretary of State. The Jefferson Science Fellows program is designed to further build capacity for science, technology, and engineering expertise within the U.S. Department of State and the U.S. Agency for International Development (USAID).

“I am looking forward to this exciting

opportunity to work with the U.S. State Department and USAID on their important missions around the world,” said Colton. “This is a wonderful chance for Georgia Tech and me to contribute to the service of our nation.”

Economics Professor **Thomas “Danny” Boston** testified before the U.S. Senate’s Small Business and Entrepreneurship Committee in Washington, D.C. Boston joined leaders from around the nation, including Atlanta Mayor Kasim Reed, for a roundtable on “Closing the Wealth Gap through the African-American Entrepreneurial System.” It was the second consecutive year he was invited to testify before the committee.

Boston spoke about the need for continued support of the 8(a) Business Development Program, an initiative for businesses owned and controlled by socially and economically disadvantaged individuals. Boston said that businesses participating in the program annually produce 124,000 jobs and \$5.5 billion in revenue.

## Staff Achievements

Providing a vital complement to the efforts of academic and research faculty is the work of Georgia Tech’s professional staff, whose 6,000+ members utilize a vast array of expertise to advance the Institute and its mission.

**Lauren McDow**, career advisor in the Scheller College of Business, received the individual Chancellor’s Customer Service Excellence Award of the Year from the University System of Georgia.

An alumna of the Scheller College, McDow is responsible for career programs that assist undergraduate business students, including teaching a career development class and overseeing other initiatives to help students succeed in their job and internship searches. Additionally, she is responsible for building and maintaining relationships with companies interested in hiring business students for internships and full-time opportunities.

The University System also honored Associate Registrar **Zachary Hayes** with the GeorgiaBEST MVP award. Appointed associate registrar in early 2012, Hayes had previously served as associate registrar for technology since 2007.

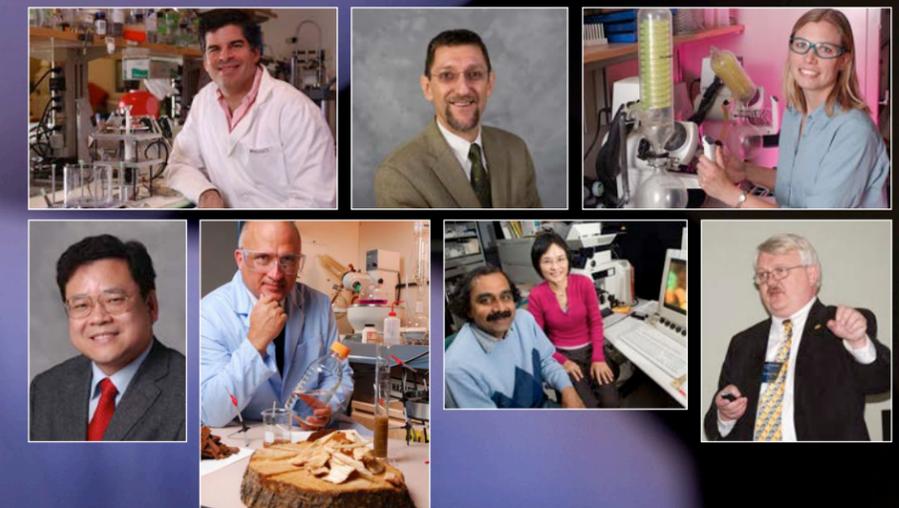
Associate Vice President for Development **Marta Garcia** received the insignia of Knight in the National Order of Merit, a French order of state founded in 1963 by President Charles de Gaulle. Individuals are received into the order for distinguished civil or military achievements.

# Seven Georgia Tech Faculty Named AAAS Fellows

The American Association for the Advancement of Science (AAAS) named seven Georgia Tech faculty members as 2012 Fellows. AAAS grants Fellow status to recognize scientifically or socially distinguished efforts to advance science or its applications. The 2012 AAAS Fellows are:

- **Andrés Garcia**, mechanical engineering, for distinguished contributions to the field of biomaterials and regenerative medicine, particularly for the engineering of materials for therapeutic and cell delivery and tissue repair.
- **Paul Goldbart**, physics, for distinguished contributions to theoretical condensed-matter physics, especially in the areas of nanosuperconductivity and mesoscopic physics, liquid crystals, quantum entanglement, and vulcanization.
- **Julia Kubanek**, biology, for distinguished contributions to chemical ecology, particularly for advances in aquatic ecology, marine natural products, drug discovery, and chemical signaling.
- **Shuming Nie**, biomedical engineering, for distinguished contributions to single-molecule surface-enhanced Raman scattering (SERS) as well as the development of semiconductor quantum dots for molecular and cellular imaging.
- **Arthur Ragauskas**, chemistry and biochemistry, for distinguished fundamental contributions to the field of green chemistry and biorefining of biomass to biofuels and bio-based chemicals and materials.
- **Mohan Srinivasarao**, materials science and engineering, for fundamental studies in the optical and physical properties of liquid crystals, insect wing iridescence, biomimetic synthesis of periodic structures through breath figures, and for public educational efforts in color science.
- **Eberhard Voit**, biomedical engineering, for distinguished research and the development of innovative teaching tools in the fields of computational systems biology and metabolic pathway analysis.

AAAS, the world’s largest general scientific society, publishes the journal *Science*, which has the largest paid circulation of any peer-reviewed general science journal in the world.



Pictured in order of appearance.

# Maximizing the Impact of Research

Georgia Tech's research enterprise has always emphasized translating the results of our groundbreaking innovations into solutions that improve and save human lives. That focus has become even sharper with the development of a research strategy that accentuates creating transformative opportunities, strengthening collaboration, and maximizing economic and societal impact.

As articulated by Executive Vice President for Research Stephen E. Cross, the three primary objectives of Georgia Tech's research strategy are:

- To pursue transformative research that is game-changing and leading edge, which will require identifying new ways for faculty, students, and postdoctoral fellows to explore and solve exciting problems by working together across traditional academic disciplines.
- To strengthen collaborative partnerships with industry, government, and nonprofits, making sure that we better understand the needs of our partners so that we can do an even better job of developing solutions that will have a meaningful impact.
- To maximize the economic and societal impact of our research, because accelerating the maturation and transition of our research results into real-world use is important and fundamentally related to the first two objectives.

The linchpin of this new strategy is the designation of 12 core research areas that correspond with newly formed Interdisciplinary Research Institutes (IRIs). The 12 core areas are:

- Big Data
- Bioengineering and Bioscience
- Electronics and Nanotechnology
- Energy and Sustainable Infrastructure
- Manufacturing, Trade, and Logistics
- Materials
- National Security
- Paper Science and Technology
- People and Technology
- Public Service, Leadership, and Policy
- Robotics
- Systems

"Establishing the core research areas has created a more intuitive means of identifying our thought leadership in key research areas, and makes it easier to find out more about research at Tech," said Cross. "However, this list is not cast in concrete and can change when it makes sense to describe it differently. But the list makes it easier for the outside community to understand and to navigate our research enterprise."

## Leadership in Energy Research

A prime example of the type of transformative opportunity envisioned in the research strategy is a package of three grants totaling more than \$9 million awarded to Tech researchers by the U.S. Department of Energy's Advanced Research Projects Agency — Energy (ARPA-E) to develop energy technology solutions.

The three awards are for projects involving solar fuel generation, power generation from vortices of solar heated air, and energy storage.

"Georgia Tech is one of the leading recipients of ARPA-E awards in the nation, and these new awards demonstrate our continued prominence across the entire energy space in developing transformative energy solutions," said Tim Lieuwen, director of Georgia Tech's Strategic Energy Institute.

The three awards have been distributed as follows:

(Left page) Tech's four newest LEED-certified buildings — the Clough Commons; the Carbon Neutral Energy Solutions Laboratory building; the Joseph Brown Whitehead Building; and Fitten, Freeman, and Montag residence halls — join the ranks of six other campus structures that are certified at various levels: Scheller College of Business (silver), Klaus Advanced Computing Building (gold), Old Civil Engineering Building (gold), Zelnak Center (gold), Women's Softball Complex (gold), and North Avenue Apartments (gold).



Ari Glezer



Asegun Henry

• Mechanical Engineering Professor **Ari Glezer** will receive \$3.7 million to develop a method to capture energy from "dust devils," wind vortices that harvest the thin layer of hot air along the ground created by the sun. If successful, Georgia Tech's approach could cost 25 percent less than conventional wind and 60 percent less than traditional solar power.

• Mechanical Engineering Assistant Professor **Asegun Henry** will receive \$3.6 million to develop a high-efficiency solar reactor to produce solar fuel. Using liquid metal, the reactor transports heat away from the sunlight-collection point to a chemical reaction zone, minimizing the loss of solar heat. This system could enable cost-effective solar fuels that would be used for transportation and continuous electric power generation.

• Regents Professor of Materials Science and Engineering **Meilin Liu** will receive \$2.1 million to develop a supercapacitor using graphene — a two-dimensional sheet of carbon atoms — that could store energy at 10 times greater density than current technologies. Supercapacitors store energy in a manner similar to a battery, yet can charge and discharge much more rapidly. The Georgia Tech team will improve the internal structure of graphene sheets to store more energy at lower cost.

Georgia Tech's three ARPA-E grants were among 66 cutting-edge research projects announced in fall 2012 by Energy Secretary Steven Chu as part of the department's "OPEN 2012" program. ARPA-E seeks out transformational, breakthrough technologies that show fundamental technical promise but are too early for private-sector investment.

"With ARPA-E and all of the Department of Energy's research and development efforts, we are determined to attract the best and



Meilin Liu

brightest minds at our country's top universities, labs, and businesses to help solve the energy challenges of this generation," Chu said.

Playing a significant role in addressing such energy challenges is Georgia Tech's Carbon Neutral Energy Solutions (CNES) laboratory, which opened in September 2012. The CNES building is the first on campus with a net-zero energy consumption goal from onsite energy production. Additionally, the 42,000-square-foot building consumes only 29 million BTUs per year — roughly half the energy of a small-sized office.

"The CNES facility is intended to set a new standard for sustainable design for laboratory buildings of its type," said Howard Wertheimer, director of Capital Planning and Space Management. "The building will achieve this goal by optimizing passive energy technologies, reducing electricity loads, thoughtful day-lighting strategies, water conservation



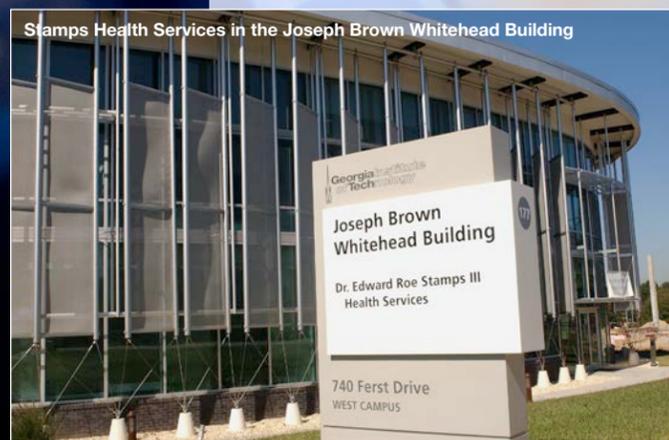
G. Wayne Clough Undergraduate Learning Commons



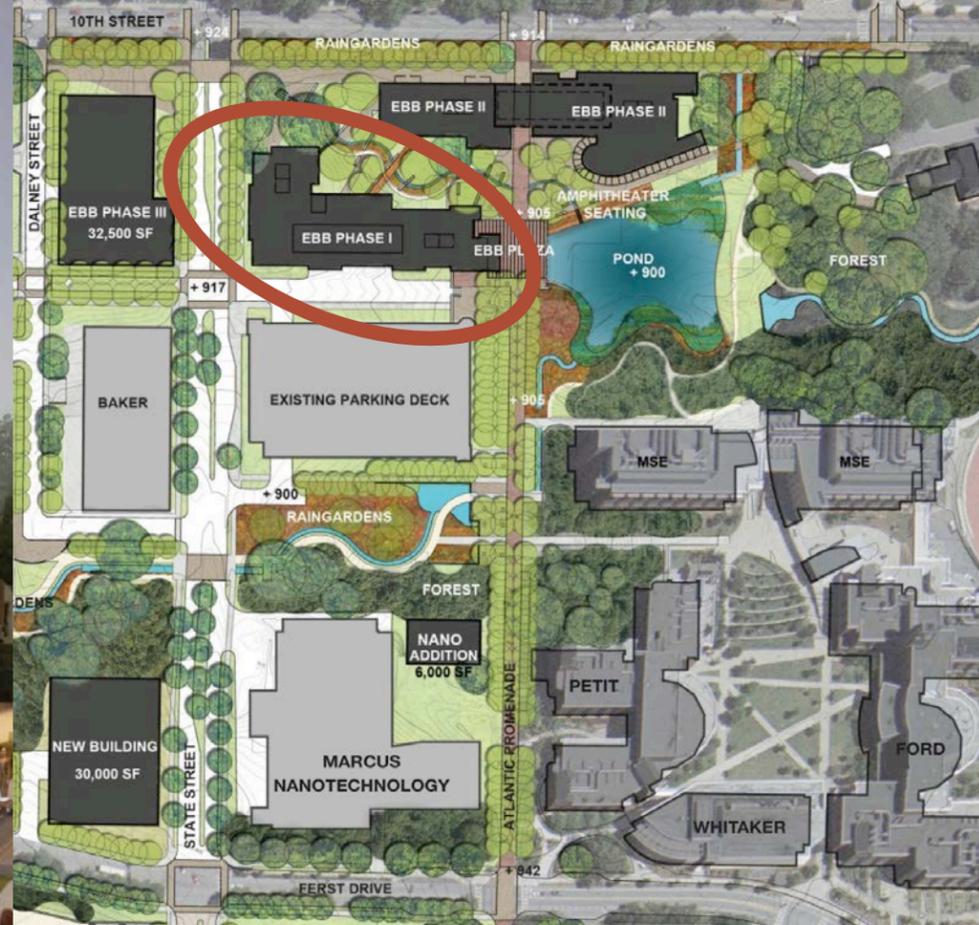
Carbon Neutral Energy Solutions Laboratory building



On the roof of the G. Wayne Clough Undergraduate Learning Commons



Stamps Health Services in the Joseph Brown Whitehead Building



Commission (SEC) filings, or even on an organization's own website.

"There are lots of open sources of information that will increase the chances of eliciting a response in spear phishing," Howard said. "We are looking at a way to warn users based on this information. We'd like to see email systems smart enough to let users know that information contained in a suspect message is from an open source and suggest they be cautious."

Other techniques to counter the attacks may come from having access to all the traffic entering a corporate network.

To increase their chance of success, criminals attempting to access a corporate network often target more than one person in an organization. Network security tools could use information about similar spear phishing attempts to warn other members of an organization. And by having access to all email, security systems could learn what's "normal" for each individual — and recognize unusual email that may be suspicious.

These and other strategies will be part of Phalanx, a new product being developed by GTRI researchers to protect corporate networks from spear phishing. It will be part of Titan, a dynamic framework for malicious software analysis that GTRI launched last spring.

Among the challenges ahead are developing natural language algorithms that can quickly separate potential spear phishing attacks from harmless emails. That could be done by searching for language indicating a request such as "open this attachment" or "verify your password."

GTRI researchers have been gaining experience with corporate networks based on security evaluations they've done, and work with GTRI's own network — which receives millions of emails each day. Fortunately, they say, it's not just the bad guys who are learning more.



and harvesting, and maximizing the use of renewable energy, including a 290-kilowatt photovoltaic array."

Anchored by Georgia Tech's Strategic Energy Institute, CNES houses a variety of energy research programs. Last December, CNES was awarded Platinum-level LEED (Leadership in Energy and Environmental Design) Certification, the first Georgia Tech facility to receive this level of LEED certification.

## Taking Biological Sciences to the Next Level

Ground was broken last March for the Engineered Biosystems Building (EBB), which will transform Georgia Tech's approach to biological research.

Located at 10th and State Streets, the 220,000-square-foot, \$113-million facility will consist of technologically advanced biological laboratories and research space. Occupants of the building will include faculty and students from the colleges of Sciences, Engineering, and Computing whose research focuses on molecules, cells, organisms, and populations as a composite of dynamically interacting systems and pathways, which together control the manifestation of disease and determine the state of health.

When completed in 2015, EBB will provide state-of-the-art laboratory facilities that support genomics, proteomics, metabolomics, bioinformatics, and nanomedicine in an interdisciplinary environment designed to accelerate discovery beyond the boundaries of current knowledge. The building will have space for research and laboratory instruction for approximately 85 faculty members, 425 graduate students, and several hundred undergraduates. The facility will not only allow for enhanced partnerships with researchers at institutions such as Emory University Hospital and Children's Healthcare of Atlanta, but it will also allow for significant economic impacts through new research awards and commercialization of technologies developed there.

"This facility has the potential to take Georgia Tech's science and engineering programs to the next level," said University System of Georgia Chancellor Hank Huckaby at the groundbreaking. "It will enhance Tech's commercialization efforts, stimulate job growth in Georgia, and generate new start-up companies."

"Talent is flocking to Georgia Tech," said Robert Guldberg, director of the Parker H. Petit Institute for Bioengineering and Bioscience. "Integrated life sciences technology is a strategic area of importance for Atlanta and the state, and this building will help ensure that Georgia Tech is at the forefront of this scientific revolution."

## GTRI Helps Combat Spear Phishing

Information security experts at the Georgia Tech Research Institute (GTRI) say the most challenging threat facing corporate computer networks today is "spear phishing."

Generic emails asking employees to open malicious attachments, provide confidential information, or follow links to infected websites have been around for a long time. What's new today is that the authors of these emails are now targeting their attacks using specific knowledge about employees and the organizations they work for. The inside knowledge used in these spear phishing attacks gains the trust of recipients.

"Spear phishing is the most popular way to get into a corporate network these days," said Andrew Howard, a GTRI research scientist who heads up the organization's malware unit. "Because the malware authors now have some information about the people they are sending these to, they are more likely to get a response. When they know something about you, they can dramatically increase their odds."

The success of spear phishing attacks depends on finding the weakest link in a corporate network. That weakest link can be just one person who falls for an authentic-looking email.

"Organizations can spend millions and

millions of dollars to protect their networks, but all it takes is one carefully crafted email to let someone into it," Howard said. "It's very difficult to put technical controls into place to prevent humans from making a mistake. To keep these attacks out, email users have to do the right thing every single time."

Howard and other GTRI researchers are now working to help email recipients by taking advantage of the same public information the malware authors use to con their victims. Much of that information comes from social media sites that both companies and malware authors find helpful. Other information may be found in Securities and Exchange



Chris Smoak and Ryan Spanier, cyber-security researchers with GTRI, monitor analytics of incoming email and potential spear phishing attacks that may be contained within it.



Ground was broken on March 8 for the Engineered Biosystems Building (EBB). Artist renderings of the EBB commons area.



Pamela Bhatti is leading efforts to develop a new type of interface that could dramatically improve the sound quality of cochlear implants.

## The Next Generation of Cochlear Implants

The cochlear implant is widely considered the most successful neural prosthetic on the market. The implant, which helps deaf individuals perceive sound, translates auditory information into electrical signals that go directly to the brain, bypassing cells that don't serve this function as they should because they are damaged.

Despite their prevalence since being introduced in the early 1980s, cochlear implants have a long way to go before their performance is comparable to that of the intact

human ear. Led by Pamela Bhatti, assistant professor of electrical and computer engineering, a team of researchers at Georgia Tech has developed a new type of interface between the device and the brain that could dramatically improve the sound quality of the next generation of implants.

A normal ear processes sound the way a Rube Goldberg machine flips a light switch — via a perfectly timed chain reaction involving a number of pieces and parts. First, sound travels down the canal of the outer ear, striking the eardrum and causing it to vibrate. The vibration of the eardrum causes small bones in the middle ear to vibrate, which in turn creates movement in the fluid

of the inner ear, or cochlea. This causes movement in tiny structures called hair cells, which translate the movement into electrical signals that travel to the brain via the auditory nerve.

Dysfunctional hair cells are the most common culprit in a type of hearing loss called sensorineural deafness, named for the resulting breakdown in communication between the ear and the brain. Sometimes the hair cells don't function properly from birth, but severe trauma or a bad infection can also cause irreparable damage to these delicate structures.

Contemporary cochlear implants consist of an external component that attaches via a magnetic disk to an internal component, implanted under the skin behind the ear. The external component detects sounds and selectively amplifies speech. The internal component converts this information into electrical impulses, which are sent to a bundle of thin wire electrodes threaded through the cochlea.

As an electrical engineer, Bhatti sees the current electrode configuration as a significant barrier to clear sound transmission in the existing device.

“In an intact ear, the hair cells are plentiful and are in close contact with the nerves that transmit sound information to the brain,” Bhatti said. “The challenge with the implant is getting efficient coupling between the electrodes and the nerves. While we'd like to be able to increase the number of electrodes, the space issue is a major challenge from an engineering perspective.”

With funding from the National Science Foundation, Bhatti and her team have developed a new, thin-film electrode array that is up to three times more sensitive than traditional wire electrodes, without adding bulk. Unlike wire electrodes, the new array is also flexible, meaning it can get closer to the inner wall of the cochlea. The researchers believe this will create better coupling between the array and the nervous system, leading to a crisper signal.

Before the device is approved for use in humans, it will need to undergo rigorous testing to ensure that it is both safe and effective; however, Bhatti is already thinking about what's next. She envisions that one day the electrodes won't need to be attached to an array at all. Instead, they will be anchored directly to the cochlea with a biocompatible material that will allow them to more seamlessly integrate with the brain.

“We are always designing with the end user in mind,” Bhatti said. “The human component is the most important one to consider when we translate science into practice.”

# Georgia Tech Playing Significant Role in the BRAIN Initiative

Two Georgia Tech researchers traveled to the White House last April to attend President Barack Obama's announcement of a major new commitment to fund research to map the activity of the human brain. The goal of this grand challenge project is to develop new technologies that reveal in real time how brain cells and neural circuits interact to process information. The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative will be launched with \$100 million in the president's FY 2014 budget.

Robert E. Guldberg, executive director of the Parker H. Petit Institute for Bioengineering and Bioscience and mechanical engineering professor, and Craig Forest, assistant professor of mechanical engineering, were present for Obama's announcement.

“To hear the president's announcement was exciting,” Guldberg said.

“Neuroengineering is a major strength at Georgia Tech, and along with our statewide partners, we are well poised to make significant contributions to this new initiative.”

The project is modeled after scientific grand challenges such as the Human Genome Project, which mapped the human genome. Francis Collins, director of the National Institutes of Health (NIH), called the potential advancements from this research the next “greatest scientific frontier.”

Unlocking the human brain has the potential to impact dozens of conditions, including Parkinson's disease, eye diseases, mental health, and traumatic brain injury, to name just a few. The NIH committed \$40 million from its budget for the project, and other government agencies — including the National Science Foundation and the Defense Advanced Research Projects Agency — also made commitments.

Additional funds will come from foundations and other nonprofits.

“BRAIN represents a massive challenge across an interdisciplinary spectrum, for example, neuroengineering tool development, neuroscientific interpretation of the deluge of data to arise, and computing challenges in storage and processing,” said Forest, who is currently conducting research in this area. “The magnitude of this undertaking is analogous to the Apollo Space Program or Manhattan Project in its breadth, depth, technical complexity, and the need for large teams focused on ‘big science.’”

Forest recently collaborated with MIT to develop a way to automate the process of finding and recording information from individual neurons in the living brain. He was featured on CNN last spring for this work.



Georgia Tech's Robert Guldberg (right photo) and Craig Forest attended President Barack Obama's White House announcement of the BRAIN Initiative, a grand challenge to map the activity of the human brain.

# A Vital Partner in Economic Development

Serving as an economic engine for the city of Atlanta, the state of Georgia, and the Southeast region is much more than a laudable goal that Georgia Tech has set for itself; it's truly a part of the Institute's DNA. This tradition has also been formalized in our strategic plan, which exhorts us to "ensure that innovation, entrepreneurship, and public service are fundamental characteristics of our graduates."

## Midtown Innovation Zone

A key strategy for achieving Georgia Tech's goal of serving as an economic engine is the leading role the Institute has taken in creating an Innovation Zone in Midtown Atlanta. What was a blighted location just 10 years ago is now fast becoming the center of the entrepreneurial community in the Southeast. The mixed-use area is a testament to what is possible through a partnership between higher education, the state, and business and industry.

"At Tech we are committed to helping not only our students, faculty, and staff be innovative, but also people from all across the state," said President G.P. "Bud" Peterson. "Georgia Tech is taking a leading role in creating an Innovation Zone in Midtown because we want to help people transform their intellectual property in order to drive innovation, attract and create new business, and transition ideas from the concept stage to the marketplace."

Last February *USA Today* published a feature on Atlanta's aspirations to be the new Silicon South. It cited that the National Venture Capital Association ranked Atlanta as the No. 12 city in the nation for tech startups in 2012.

Georgia Tech's Institute for People and Technology (IPaT) is playing a major role in

the Midtown innovation district through its partnership with the Midtown Alliance. IPaT recently initiated this pivotal partnership to spur the growth of Midtown as an innovation district that capitalizes on technical inventions, entrepreneurial activity, and community engagement. This unique partnership combines Midtown's desirable setting with Georgia Tech's considerable intellectual capital, research labs, and incubators to develop leading-edge technology approaches to enhance the urban environment. The partnership will work with local thought leaders on strategies to further strengthen Midtown's technology infrastructure, create commercial real estate opportunities for entrepreneurs, and highlight the sizeable array of innovation assets, activities, and success stories that are happening now.

The first phase of the partnership will include the creation of a live-work-play "laboratory" for exploring the potential of media technologies and creating a climate for continual innovation. A vital component of the living laboratory will be the development of an open platform for experimental mobile applications designed to enrich the Midtown experience for those who work, live, and visit there. Ideas to be explored include augmented reality tours of the district, apps to help users find parking and real-time public transportation options, and ways to gather community feedback for upcoming projects and initiatives. Applications will be tested and improved with public feedback; new participants and industry partners will be encouraged to use the open platform to develop applications that can be piloted in Midtown.

"Through this unique partnership with Georgia Tech, we will explore how to harness an array of new technology and tools to further enhance the user experience and buttress our city's innovation assets," said Dennis Lockhart, chairman of the Midtown Alliance. "Midtown Alliance has been focused on making Midtown a more livable, walkable, and vibrant district for a long time, through physical improvements, urban design, and a range of programs to improve the physical environment."

"This partnership is a natural extension of our research in media, health, and community-focused technologies that directly impact quality of life," said IPaT Executive Director Beth Mynatt, who will lead the laboratory activities. "The partnership will bring together the best of Georgia Tech's inventive power and the innovation culture of Midtown Atlanta."

## Panasonic Facility

Also contributing to Midtown's vast innovation portfolio is a new research and development center opened by Panasonic Automotive Systems of American Company last November. The Tech Square facility augments the company's existing headquarters in the Atlanta suburb of Peachtree City.

In its initial efforts to develop a new R&D facility, "Panasonic realized they were going to have to open a new location and predicted they'd wind up with their new innovation center somewhere like San Francisco or Manhattan, or maybe a college town like Ann Arbor," said Stephen Fleming, vice president of Georgia Tech's Enterprise Innovation Institute (EI<sup>2</sup>). "Thanks to some alert work by the Metro Atlanta Chamber of Commerce, the Georgia Department of Economic Development, and EI<sup>2</sup>, the Panasonic executives were shown the activity in Midtown: the high-density live-work-play environment that's so attractive to the creative class, the commitment to sustainable development surrounded by the walkable and bikable BeltLine, the buzz of entrepreneurial startups, and the presence of established companies like Turner and Google. The Centergy Building in Tech Square turned out to be the perfect place."

Panasonic performs a great deal of design verification testing in the Midtown facility, and the proximity of Georgia Tech co-op students provides a vast pool of talent to handle this important work.

## Moving Technology to the Marketplace

Georgia Tech is a globally renowned leader when it comes to converting breakthrough scientific research into marketable products that make life better. A great example of this is Clearside Biomedical Inc., an Atlanta-based ophthalmic pharmaceutical company launched from research at Emory University and Georgia Tech.

This past year, Clearside Biomedical received \$7.9 million in funding to continue drug and technology development for treatment of ocular diseases. The new funding is in addition to a \$4 million venture capital investment received by Clearside Biomedical in early 2012 that served as the foundation for the startup company.

Santen Pharmaceuticals Co. in Osaka, Japan, is funding Clearside's technology development and has also entered into a research collaboration agreement for

posterior ocular diseases. Santen, along with new investor Mountain Group Capital and its affiliates, joins current investors Hatteras Venture Partners in Durham, N.C., the Georgia Research Alliance Venture Fund, and the University of North Carolina's Kenan Flagler Business School Private Equity Fund.

Clearside Biomedical is developing micro-injection technology that uses hollow microneedles to precisely deliver drugs to a targeted area at the back of the eye. If the technique proves successful in clinical trials and wins regulatory approval, it could provide an improved method for treating diseases including age-related macular degeneration and glaucoma, as well as other ocular conditions related to diabetes.

The technology was developed in a collaboration between the research groups of Henry Edelhauser, professor of ophthalmology at Emory University School of Medicine, and Regents Professor Mark Prausnitz of Georgia Tech's School of Chemical and Biomolecular Engineering. The National Institutes of Health sponsored research leading to development of the technology.

In contrast to standard treatments, this microneedle technology provides a more targeted approach for treating retinal diseases that confines the drug to the site of disease and reduces side effects from exposing other parts of the eye.

To spur the creation of more companies like Clearside Biomedical, Georgia Tech and the City of Atlanta have partnered to form Start Up Atlanta.

In August 2012, Georgia Tech President G.P. "Bud" Peterson welcomed city and business leaders to campus to launch the initiative, which is designed to create new businesses and jobs. Overseen by Invest Atlanta, the city's development authority, Start Up Atlanta is geared toward entrepreneurship. The initiative's website visually maps out valuable resources — including incubators, accelerators, and service producers — and connections to create and support a network of entrepreneurs working to launch or build a business in the city.

"Georgia Tech, the City of Atlanta, the State of Georgia, and the U.S. Department of Commerce all share the same goals of expanding the entrepreneurial ecosystem," said Peterson at the launch event. "We are continuing to initiate and foster programs designed to strengthen these efforts."

Attendees included Atlanta Mayor Kasim Reed, Invest Atlanta President and CEO Brian McGowan, U.S. Patent and Trademark Office Director David Kappos, and a number



Clearside Biomedical, Inc.



KUKA Chair of Robotics Henrik Christensen shared with the Congressional Robotics Caucus the vast potential of robotics to transform the U.S. economy and society.

when he presented “A Roadmap for U.S. Robotics: From Internet to Robotics — 2013 Edition.”

The report, which outlines the progress of robots in multiple industries over the past five years and identifies goals for the coming decade, highlights robotics as a key economic enabler with the potential to transform U.S. society.

“Robots have the potential to bring manufacturing jobs back to the U.S., to improve our quality of life, and to make sure our first responders and warfighters stay safe,” said Christensen, who is also the coordinator of Robotics Virtual Organization, sponsor of the report. “We need to address the technical and educational needs so we can continue

of local entrepreneurs.

Georgia Tech’s Advanced Technology Development Center (ATDC) plays a pivotal role in technology commercialization efforts, helping Georgia entrepreneurs launch and build technology companies. ATDC is the oldest and largest technology accelerator of its kind in the U.S. and is widely regarded as one of the best. A unit of EP, ATDC has helped launch more than 140 companies that, together, have created thousands of jobs and attracted more than \$1 billion in investment.

In spring 2013 Georgia Tech announced plans to strengthen resources in ATDC to help meet the growing demand for support to Georgia technology entrepreneurs and startup companies.

## Robots to Spur Economy, Improve Quality of Life

Robots are being used more widely than expected in a variety of sectors, and the trend is likely to continue with robotics becoming as ubiquitous as computer technology over the next 15 years.

That is the message Henrik Christensen, Georgia Tech’s KUKA Chair of Robotics in the College of Computing, brought to the Congressional Robotics Caucus last March

to be leaders in developing and using robotic technology.”

A group of more than 160 experts from universities, industry, and government came together for five workshops over the past year to fully evaluate the use of robotics across various applications and create a roadmap to the future. Christensen presented that report to lawmakers as a guide on how to allocate resources to maximize progress.

Most notably, the group found that using robots in manufacturing could help generate production systems that are economically competitive compared to outsourcing to countries with lower wages.

Companies such as Apple, Lenovo, Samsung, and Foxconn already have begun to “reshore” manufacturing by using robotics in production systems. The sale of robotics in manufacturing grew by 44 percent in 2011 as robots have become cheaper and safer.

Christensen noted that automation in manufacturing will not lead to job losses for U.S. workers, but will create new high-value jobs.

“Some jobs will be eliminated, but they are the ‘dirty, dull, and dangerous’ jobs,” he said. “Those jobs will be replaced with skilled labor positions. That’s why one of the goals in the roadmap is to educate the workforce.”

In addition to manufacturing, robots are helping businesses such as Amazon improve logistics and reduce delivery costs, a savings that could be passed on to the consumer. In

agriculture, robots are being used to precisely deliver pesticides onto crops, reducing unnecessary exposure of chemicals on produce. The report recommends continued progress in both areas.

With advances in human-like manipulation, robots are increasingly assisting individuals with disabilities with tasks such as preparing meals. They are also being used in 40 percent more medical procedures than they were a few years ago and in a greater number of surgical areas such as cardiothoracic, gynecology, urology, orthopedics, and neurology — reducing complications by as much as 80 percent.

Robots have proven their value in removing first-responders and soldiers from immediate danger. More than 25,000 robotic systems have been deployed in Iraq and Afghanistan for ground and aerial missions. More than 50 percent of pilots in the U.S. Air Force operate remotely piloted systems.

“Robotics is one of a few technologies capable of building new companies, creating new jobs, and addressing a number of issues of national importance,” said Christensen. “We hope this report will help foster the discussion on how we can build partnerships and allocate resources to move the robotics industry forward.”

## Georgia Tech’s Economic Impact

(Fiscal Year 2012)

- **\$2.6 billion**
- **More than 20,000 jobs**
- **Georgia Tech’s economic impact was the largest among all University System of Georgia institutions.**

# GTMI Brings Revitalized Manufacturing Emphasis

As part of its industry-friendly research strategy, Georgia Tech has announced the launch of an interdisciplinary research institute to promote a technologically advanced and globally competitive manufacturing base in the United States.

The Georgia Tech Manufacturing Institute (GTMI) creates a campus-wide community of investigators and thought leaders capable of using innovation in manufacturing to create more high-value jobs in the U.S., ensure the nation’s global competitiveness, and advance economic and environmental sustainability.



Wang, Georgia Tech’s chief manufacturing officer and executive director of GTMI. “It’s critical to the economic viability and competitiveness of our nation to efficiently move leading-edge research from the lab to the real world.”

Since Georgia Tech was founded in 1888, manufacturing has been ingrained in the curriculum. Also for the past 20 years, the Georgia Tech Manufacturing Research Center has been focusing on developing next-generation technologies.

“Manufacturing is important to the development of a variety of products, from medical devices to alternative energy solutions to cars, on the large and nano scale,” said Ben

Wang. “We aspire to be known globally as the collaborative hub for manufacturing technologies and as the recognized leader in crossing the ‘valley of death,’” Wang said. “By that, we mean to transform the research results by faculty and students into competitive products and services to be made in the U.S. Our success is defined by how fast we can translate these discoveries and innovations into products for our stakeholders, accelerating our readiness and providing translational leadership.”

GTMI will focus on the complete innovation value chain — from raw and recycled resources to prototypes and finished products. It will develop materials, systems, processes, educational offerings, and policies that impact manufacturers’ performance in the marketplace.

“GTMI is industry-focused and customer-centric, amplifying Georgia Tech’s reputation globally as the world’s leader in innovation-driven manufacturing,” Wang said.

Under this stepped-up initiative, the Manufacturing Research Center has been renamed the Georgia Tech Manufacturing Institute and has expanded to engage researchers from all of Georgia Tech’s colleges, the Enterprise Innovation Institute (EI<sup>2</sup>), and the Georgia Tech Research Institute. The researchers have joined forces with industry and government experts to help define and solve some of the greatest challenges facing the manufacturing industry today, such as the importance of translational research.

With roughly 400,000 square feet of space and state-of-the-art core facilities for manufacturing research, GTMI will target specific industry needs in manufacturing by forming “collaboratories” — co-located pilot plants or prototype shops where Georgia Tech scientists and engineers work side-by-side with their counterparts from industry, government, and other universities.

Education is also a priority of the new manufacturing research institute. With top-quality researchers, facilities, and technological equipment, GTMI aims to educate and train the workforce of the future to investigate, collaborate, and compete successfully through both its on-site programs and via collaborative, manufacturing-based instructional programs in technical colleges. In addition to providing real-world research opportunities to undergraduate and graduate students, GTMI offers a manufacturing certificate program, manufacturing scholarships, and student assistantships. It also conducts science, technology, engineering, and mathematics (STEM) outreach activities.

The launch of GTMI complements Georgia Tech’s presence in the national discussion on manufacturing. Georgia Tech President G.P. “Bud” Peterson is a member of the White House’s Advanced Manufacturing Partnership steering committee and is a member of the Secretary of Commerce’s National Advisory Council on Innovation and Entrepreneurship.

# A Growing Global Footprint

Georgia Tech's rise to prominence on the global stage has been rapid and breathtaking. From China to Saudi Arabia, from France to Panama, educators, researchers, and business leaders from across the globe are seeking Georgia Tech's counsel, expertise, and partnership. This deep level of engagement with international players is also helping us to fulfill one of the primary goals of our strategic plan: to expand our global footprint and influence to ensure that we are graduating good global citizens.

## World Economic Forum

Georgia Tech leaders continue to be invited to participate in the annual World Economic Forum, an independent international organization committed to improving the state of the world by engaging business, political, academic, and other leaders of society to shape global, regional, and industry agendas.

President G.P. "Bud" Peterson was one of a select number of university presidents attending the January 2013 event in Davos, Switzerland. During the Forum, Peterson and several other thought leaders from around the world discussed the topic, "The Disruptive University: How Are New Models of Collaboration with Universities Spurring Innovation?" Peterson and the group considered what prompts research universities to collaborate with one another, business, and industry, as well as what universities can do to encourage innovation and spur the economy. They also examined how universities are "reinventing" themselves to be responsive to society's needs and to address today's biggest challenges.

Peterson also served as a "rapporteur" for the session "From Data Deluge to Data Dividend" and posted a blog on the World Economic Forum website providing insights on the discussion.

Also at the Forum, cybersecurity expert and Computer Science Professor Mustaque



more than 3,500 corporate and government organizations participate in GTPE programs, and students enrolled in these programs represent half of the world's countries.

Now, those barriers are disintegrating even further.

Ahamad participated in a panel moderated by Reuters focused on cyber risk. Ahamad spoke about a joint initiative between the Georgia Tech Information Security Center and the Georgia Tech Research Institute (GTRI) to develop facts-based, real-time security threat monitoring for industry partners. Ahamad's presence at Davos was also related to Georgia Tech's efforts with the World Economic Forum to create a global cyber risk barometer.

Renu Kulkarni, founder and executive director of FutureMedia@GT and strategic partners officer at the Institute for People and Technology and GTRI, spoke about the Digital Media Governance project and facilitated a workshop to consider the future role of intellectual property in this domain. Kulkarni also participated in "The Next 1 Billion Seconds" session that explored opportunities and challenges to the consumption, governance, and impact of technology in an increasingly connected world.

Georgia Tech has taken a leadership role in the creation and dissemination of MOOCs, or Massive Open Online Courses. Coordinating the effort is the Institute's Center for 21st Century Universities. In its first year of offering MOOCs, Georgia Tech enrolled more than 200,000 students, who have access to some of the best professors, course material, and opportunities for online interaction around the globe in their quest for continuous learning.

"Georgia Tech's vision is to define the technological research university of the 21st century. We will explore technologies and

instructional approaches that will improve our role as a leading provider of the best and most effective education in the state of Georgia, the nation, and the world," said Rafael Bras, provost and executive vice president for academic affairs.

Deepening this commitment even further is the College of Computing, which has launched the first professional Online Master of Science in Computer Science (OMS-CS) degree that can be earned completely through the massive online format. The degree is being provided in collaboration with online education leader Udacity Inc. and AT&T.

All OMS-CS course content is being delivered via the MOOC format, with enhanced support services for students enrolled in the program. Those students also will pay a fraction of the cost of traditional on-campus master's programs; total tuition for the program is initially expected to be less than \$7,000. A pilot program, partly supported by a generous gift from AT&T, will begin in the 2013-14 academic year. Initial enrollment will be limited to a few hundred students per course recruited from AT&T and Georgia Tech corporate affiliates. Enrollment is expected to expand gradually over the next three years.

The Institute has been involved in online education for more than 30 years. Providing a completely online master's degree is the next step in expanding Georgia Tech's online offerings beyond the Institute's national leadership role in developing and offering MOOCs.

"We are thrilled to be able to join with



## Offering Coursework on a Global Scale

While the power of a high-quality education is tremendous, the impact of gifted faculty members has traditionally been limited by the size of the classroom or lab in which they teach.

For a number of years, Georgia Tech Professional Education (GTPE) has worked tirelessly to expand the reach of the Institute's educational offerings. And the numbers are significant: 17,000 individuals representing



Electrical and Computer Engineering Professor Magnus Egerstedt taught robotics to 40,000 students in a single course.

Udacity and AT&T in taking this bold next step,” Bras said. “We are proud of the visionary role of Dean Zvi Galil in the creation of this degree offering from our nationally renowned College of Computing.”

“We are excited to team with Georgia Tech, whose College of Computing offers computer science degrees of the very highest caliber,” said Udacity founder Sebastian Thrun. “AT&T is a champion for innovation in education, and we are grateful for its vision in supporting this endeavor. Udacity has been at the forefront of innovation in online pedagogy. We hope our work with Georgia Tech and AT&T will induce transformational change in higher education.”

The OMS-CS could help address the nation’s growing shortage of qualified workers in STEM (science, technology, engineering, and mathematics) fields — one of the primary reasons AT&T decided to lend its financial support. The company also supports vastly expanding the accessibility and lowering the cost of quality education.

“Because of this collaboration, anyone with a broadband connection will have access to some of the finest computer science instruction in the world,” said Randall Stephenson, AT&T chairman and CEO. “We believe that high-quality and 100 percent online degrees can be on par with degrees received in traditional on-campus settings, and that this program could be a blueprint for helping the United States address the shortage of people with STEM degrees, as well as exponentially expand access to computer science education for students around the world.”

“MOOCs have quickly become one of the most significant catalysts of innovation in higher education,” said U.S. Secretary of



A grand opening for Atlanta’s At&T Foundry was held in August 2013.

Education Arne Duncan. “As parents know all too well, America urgently needs new ideas about how to make higher education accessible and affordable. This new collaboration between Georgia Tech, AT&T, and Udacity, and the application of the MOOC concept to advanced degree programs, will further the national debate — pushing from conversations about technology to new models of instruction and new linkages between higher education and employers.”

While courses related to the OMS-CS are available free of charge on the Udacity site, only those students granted admission to Georgia Tech will receive credit. Degree-seeking students will pay tuition based either on individual courses or the entire degree program. Georgia Tech and Udacity also will develop a separate credential for those students who successfully complete courses but do not qualify for full

graduate standing.

“The OMS-CS will set a new agenda for higher education — real, rigorous, and marketable graduate education in computer science will now be available to tens, even hundreds of thousands of additional students around the world,” said Zvi Galil, John P. Imlay Jr. Chair and dean of the College of Computing. “Computing is the catalytic field of the 21st century. Now we could potentially double the number of trained computing professionals worldwide in as little as a decade.”

Augmenting AT&T’s vital support of Georgia Tech’s MOOC programming is an AT&T Foundry facility, which represents an investment of \$3 million. Located in the Centergy Building in Tech Square, the Foundry is leading the way in developing the next generation of lifestyle applications and services. The Foundry is the result of collaboration

among AT&T, Cisco, Georgia Tech, and state and local business and political leadership.

The 10-person Foundry team tests and develops products involving AT&T’s recently launched home security and automation service, Digital Life. The team also creates new apps and services related to the “connected car,” mobility, emerging devices, and AT&T U-verse. Host sponsor Cisco collaborates with AT&T on projects and helps identify key third-party developers, startups, investors, inventors, and other entrepreneurs to bring into the facility.

## Dramatic Increase in Students Pursuing International Experience

Perhaps no other barometer is more vital in gauging the success of Georgia Tech’s efforts with global education than the number of students who study and/or work abroad.

In the 2011-12 academic year, 1,478 students studied abroad. This represents an increase of nearly 100 percent over the 746 students who studied abroad 10 years earlier and a 51 percent increase from just five years earlier.

Georgia Tech offers more than 80 exchange programs and 30 group faculty-led study abroad programs. In 2012-13, Tech students were studying on six continents in nearly 20 different nations.

The numbers for students participating in the International Internship/Co-op Program are also impressive. In 2006-07, shortly after the program began, there were 47 international interns and co-op students. By 2012-13, that number had nearly tripled to 137. In total, more than 41 percent of Georgia Tech students have an international experience by the time they graduate.

“The perception of international experience has changed drastically over the past 10 years,” said Amy Bass Henry, executive director of Georgia Tech’s Office of International Education. “What was once regarded as a really nice luxury is now increasingly viewed as a must-have for students who want to both distinguish themselves in the job search process and to compete effectively in a global marketplace. I expect our study abroad numbers to continue increasing in the years to come.”

# Tech Community Engages Globally for Spring Break Service Projects

This is not your parents’ spring break!

While the sandy, sunny beaches of Florida still draw many thousands of college students for spring break each year, a growing number of students are using this time in service of others. And more and more of these projects are taking place outside the United States.

This past year, students represented Georgia Tech in locations across the Western Hemisphere, performing activities such as testing water quality, constructing houses, and building relationships with residents in remote communities. In addition to working on projects in several southeastern states as well as New Jersey, Maryland, and West Virginia, Tech students ventured as far as Central America and the Caribbean in their efforts to improve the lives of people in need.



**Northern Mexico:** The Campus Christian Fellowship led a group of students in helping to build a house with the organization Casas por Cristo, which has built thousands of houses in Mexico. The team helped transform an empty lot into a safe and secure home complete with cement foundation, electricity, windows, and doors.

**Nicaragua:** The campus Catholic Center and the School of Civil and Environmental Engineering joined forces to offer CEE 4803, Environmental Technology in the Developing World. In this for-credit course, students apply environmental technology to solve issues in underdeveloped regions worldwide. This past year, the group focused on water modeling of chlorine in a water distribution system, improving an aquaponics system, and measuring air and water quality. In the same community, students from the Catholic Center partnered with Amigos for Christ to drill a well and dig water lines to help get clean water to homes, all while building relationships with residents.



**Bahamas:** Wesley Foundation members traveled with peers from the University of West Georgia to build homes in impoverished communities. They worked with Bahamas Methodist Habitat in this area that faced devastation from Hurricane Sandy and dramatic economic downturns in its two largest industries: tourism and international banking.



# The Impact of Philanthropy

Georgia Tech's strategic plan articulates an array of ambitious, relevant, and worthy goals, and private philanthropy is the means by which those aspirations will be realized.

Campaign Georgia Tech — the Institute's \$1.5 billion comprehensive fundraising effort — closed out its ninth fiscal year in June with a total of nearly \$1.25 billion in gifts and commitments from alumni, corporations, foundations, faculty, staff, students, parents, and friends. This total reflects a gain in excess of \$100 million during fiscal year 2013.

Following are some examples of significant gifts and commitments to the Campaign during the fiscal year that made this progress possible:

## Student Scholarships



**Mike Hammond**, a 1973 management alumnus, made an estate provision establishing the need-based Henry Michael Hammond Scholarship Endowment in the Scheller College of Business. "Whatever success I've enjoyed is due in large part to my Georgia Tech education," Hammond said. "Tech helped develop my work ethic and problem-solving abilities. I also made lifelong friends there, and I cherish my experiences to this day. I'm very happy to be able to give something back to my school."

**Aaron's Inc.**, one of the nation's leading rental and rent-to-own companies, made a commitment establishing the Aaron's Scholarship Endowment Fund. Income from the company's generous philanthropy provides scholarship support to undergraduate students with demonstrated financial need who qualify for the G. Wayne Clough Georgia Tech Promise scholarship program. "It is humbling for our company to be in a position to do something that will make such a tremendous impact on our state and on the lives of Georgia Tech students, now and in the future," said Georgia Tech alumnus Ronald W. Allen, chairman, president, and CEO of Aaron's.

## Faculty Chairs



**J. Louis Fouts**, a 1990 industrial engineering alumnus, made a gift establishing the Fouts Family Chair aimed at enhancing the Stewart School of Industrial Engineering's ability to attract and retain eminent teacher-scholars. Despite its longtime No. 1 national ranking, the Stewart School has been grappling with the challenges of improving its student-faculty ratio. "I knew that I wasn't in a position to understand the School's most pressing need as this point, or how that need might change over time," Fouts said. "So I wanted to make a gift that allowed the flexibility to attract and/or retain faculty at various levels now and in the future."

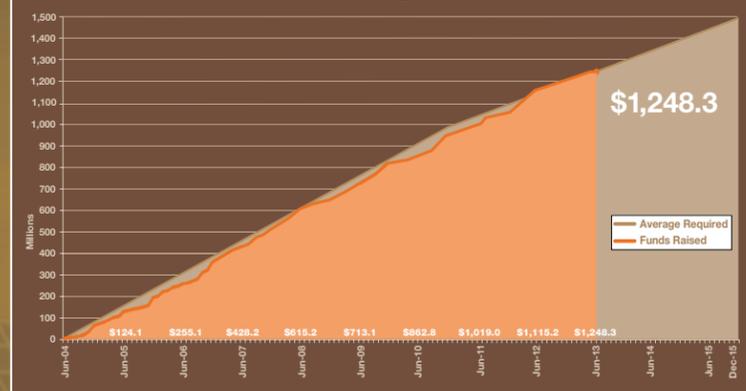
## Academic Facilities



**Ken Entrekín**, a 1973 electrical engineering alumnus, and his wife Sue made an estate commitment that will one day provide vital support for the School of Electrical and Computer Engineering (ECE). "ECE today appears to be very strong, with strong leadership coming from (former chair) Gary May in the past several years and currently from Steve McLaughlin," said Entrekín. "I believe ECE is preparing today's students well for their careers, but ECE has a strong disadvantage with their facility. The Van Leer building appears exactly as it did when I was in school 40 years ago!" The Entrekíns envision their commitment providing crucial long-term support for a broad range of ECE needs, including not only facilities but also scholarships and faculty support.

Thanks to passionate and devoted donors such as Ken and Sue Entrekín, Lou Fouts, Mike Hammond, and Aaron's Inc., Georgia Tech is poised to design a future of global preeminence.

## Campaign Georgia Tech Funds Raised v. Required July 1, 2004 through June 30, 2013



## Global Philanthropy

Support for Campaign Georgia Tech stretches far beyond the shores of the United States.

Latin American alumni and donors are setting a powerful example of support for Georgia Tech and students who want to attend the Institute. The Costa Rica Student Endowment Fund seeks to raise a minimum of \$1 million for the permanent support of Tech students from Costa Rica. A commitment of \$250,000 over five years is being sought to establish the Varela Family Scholarship, which will provide a full one-year Tech scholarship for an undergraduate public school student from Panama. The Reconstruyendo el Puente (Rebuilding the Bridge) fund has the long-term goal of providing a modern, technological education to aspiring engineers, managers, and scientists from Cuba once that nation's protracted period of isolation and economic hardship comes to an end. During FY 2014, the Office of Development will formalize its commitment to long-term development and advancement efforts through the establishment of a full-time position focused on South and Central America.

To better serve the needs of donors in Asia, the Office of Development is establishing a representative office for Georgia Tech's development and advancement efforts in China. Shelton Chan, an Industrial Logistics alumnus, is assisting the Office of Development in establishing the China office. Chan will also be relying on the support and expertise of an Alumni Development Council comprised of 16 leadership alumni who are successful, promising leaders in the Chinese business community and also loyal Georgia Tech alumni.

Augmenting these efforts is a concurrent initiative in Europe, where Managing Director Leopold Demiddeleer is focusing on building relationships with industry and academic partners in research and increasing the Institute's visibility and prominence in Europe. Given the presence of Georgia Tech-Lorraine (GTL), France will continue to be a philanthropic priority. Efforts also continue in building a scholarship endowment supporting both American students studying in France and GTL students studying in Atlanta.



**Campaign Georgia Tech**  
Our time. Our legacy.

# Community Engagement

The three pillars of Georgia Tech's mission are education, research, and service, and we continually strive to ensure that our efforts in support of the third pillar are vital and meaningful.

## Supporting Our Local Neighborhoods

A new strategic initiative focused on supporting communities on the west side of campus is bringing new life to Georgia Tech's engagement with some of our closest neighbors.

The Georgia Tech Westside Task Force — comprising individuals across campus — and the Westside Communities Alliance — which includes external partners in addition to Institute personnel — are providing opportunities for Tech leaders, faculty, and students to join forces with residents of the Home Park, Vine City, Centennial Park, and English Avenue neighborhoods in two partnerships.

Ivan Allen College of Liberal Arts Dean Jacqueline Royster and recently retired College of Architecture Dean Alan Balfour brought together members of the Tech family with an interest in Westside communities to form the Georgia Tech Westside Task Force. The

group's goal is to connect efforts across the Institute, so that by partnering and sharing resources, the groups can accomplish more.

The Westside Communities Alliance also seeks to build or strengthen partnerships with external organizations such as businesses, nonprofits, neighborhood associations, public schools, police and fire departments, other universities, and residents. Its mission is to share Tech's expertise and culture of service with its neighbors.

"The Westside initiatives are important steps in Georgia Tech's strategic initiatives, linking our research, knowledge generation, and education to community action," said Royster. "We are bringing coherence and energy to the Institute's engagement with these neighborhoods. The problems here are different, so the processes won't look the same and the solutions won't be the same, but we expect the impact to be comparable."

## Students Help Residents Near Closed Army Base Envision Property's Future

A team of students from the College of Architecture's City and Regional Planning Program took home the 2012 American Planning Association Student Project Award for a proposal to redevelop Atlanta's Fort McPherson in a way that benefits the neighborhoods that surround it.

The 488-acre U.S. Army base in southwest Atlanta was included in a 2005 Pentagon base closure plan. Working under the direction of Professor of the Practice Michael Dobbins, the team's approach was from the perspective of the neighboring communities — mostly low- to moderate-income communities of



The Small Town Engineering program aims to inspire young students in rural areas to pursue engineering careers.

color — and how future development can complement surrounding community characteristics rather than considering redevelopment of the base in isolation.

The resulting proposal, "Action Plan for the Fort McPherson Community," is the product of thorough analyses and public participation from more than 75 citizens and elected officials from neighboring communities. It was completed with support from Georgia Stand-Up and the Ford Foundation.

"Our students are very pleased with this recognition," said Dobbins. "It confirms the principle that in planning work, as much attention should be given to the impacts of a project on surrounding neighborhoods as on the project itself, with the goal of assuring that community benefits outweigh community costs. Further, affirming the support we

received from the Ford Foundation, it shows that working on behalf of communities that lack ready access to technical support from our profession is a worthy and respected endeavor."

Recognized specifically for its contribution of planning to contemporary issues, the action plan made recommendations for ensuring that redevelopment plans provided community benefits in seven core areas:

- Economic Development and Jobs
- Education and Culture
- Environment and Health
- Housing
- Land Use and Zoning
- Public Safety
- Transportation

## 'Small Town Engineering' Focused on Rural Communities

In 2007, Caitlin Henegar left her small hometown of Trenton, Ga., to come to the big city and earn a Georgia Tech mechanical engineering degree. Although she's still in Atlanta working on her Ph.D. in bioengineering, she hasn't forgotten northwest Georgia. In fact, she's hoping to inspire young students in Trenton and other rural communities to follow in her footsteps.

That's why Henegar founded Small Town Engineering (STE), an outreach program that targets middle and high school students in smaller communities in Georgia and



Westside kids playing



# John Lewis Receives Ivan Allen Jr. Prize for Social Courage



Last spring the Ivan Allen College of Liberal Arts honored civil rights icon Congressman John Lewis with its Ivan Allen Jr. Prize for Social Courage. The award is given annually to individuals who have, by asserting moral principle, positively affected public discourse at the risk of their careers, livelihoods and, sometimes, even their lives.

“Congressman Lewis made his mind up to accomplish many things throughout his lifetime, and his accomplishments will transcend generations,” said President G.P. “Bud” Peterson. “He has dedicated his life to protecting human rights, securing civil liberties, and building what he calls ‘The Beloved Community’ in America. His unflinching civil rights leadership and ongoing advocacy for social change throughout his career have elevated the cause of human rights around the world.”

Lewis became known around the world at the age of 25 following the “Bloody Sunday” beatings of peaceful protesters in Selma, Ala., in March 1965. Lewis called on President Lyndon Johnson for federal intervention, turning public opinion against those trying to maintain the old social order of the South. President Johnson would soon present to Congress what would become the Voting Rights Act.

“I always did what I could do to help other people,” said Lewis, who received congratulatory messages at the award ceremony from former presidents Bill Clinton and Jimmy Carter. “I wanted to make a difference in order to meet the pressing need of people left out or left behind. I was inspired to find a way to a ‘new way.’ And this inspires me today, as I continue to keep pushing on.”

Lewis’ impact on civil rights for African-Americans included advocating desegregation laws and voters’ rights. A founding member and president of the Student Nonviolent Coordinating Committee (SNCC), Lewis planned and led many of their activities. His personal courage was first evident when he led student sit-ins that resulted in the public accommodation of African-Americans at Nashville restaurants. He was one of the original 13 Freedom Riders who challenged legally sanctioned segregation on interstate buses. Despite repeated attacks on his dignity, physical beatings, and arrests, Lewis remained staunchly committed to nonviolent work for social change.

The Ivan Allen Jr. Prize for Social Courage is named after Allen, a former mayor of Atlanta and a Georgia Tech graduate. In 1963, Allen testified before Congress in support of what would become the Civil Rights Act of 1964, risking both his place in society and political future. The prize is supported in perpetuity through a commitment from the Wilbur and Hilda Glenn Family Foundation.

Alabama. She and STE partner Kevin Bandy, a former Georgia Tech student, work together to create engineering-inspired and hands-on lesson plans for teachers, visit schools, and speak with students about how math, science, and engineering can be fun and interesting fields to explore. They work with teachers to ensure that students continue to have an interest in engineering in the future.

Henegar says students in small towns are often at a disadvantage when it comes to engineering.

“Not only are they not targeted by other outreach groups, but they also miss out on more hands-on learning opportunities,” she said. “Another reason is due to the size of these towns. Since they are small, the mentality of the community is often very similar. Students are not exposed to a wide variety of ideas and ways of thinking that might otherwise be found in a large city.”

Since the initiative began in August 2011, STE has made four school visits (three in Alabama and one in Georgia). Future plans include integrating with the Science, Technology, Engineering, and Mathematics (STEM) Education Coalition to create a rotation system that will increase the number of school visits and lesson plans. The response from both teachers and students affected by STE has been decidedly positive.

“When we go to the schools, the kids get so excited about the hands-on activities,” said Henegar. “We’re not only teaching them about math and science, but also showing them what opportunities exist outside of their environment. We want to encourage students to attend and complete college in the math, science, and engineering fields.”

During the classroom visits, STE has had 95 percent student engagement for hands-on activities that range from building products to looking at microfluidic bacteria. One challenge that the young students often deal with is having the confidence to pursue a college degree.

“The mentality of the teachers and parents needs to be one of encouragement to help build the students’ confidence,” said Henegar. She tries to tie in her Ph.D. research with the lesson plans to show the students how engineering includes small-scale and large-scale concepts.

“I really enjoy working with the kids and getting them excited about math and science like I was as a grade school student,” she added. “I’m happy to show younger students the importance of furthering their education for a great career and opening their minds to the world beyond their small town.”

# Alfredo Trujillo Succeeds John Carter as Georgia Tech Foundation President

Last spring the Georgia Tech Foundation board of trustees named Alfredo Trujillo, a 1981 aerospace engineering alumnus, as president and chief operating officer of the Foundation, the not-for-profit corporation that manages \$1.73 billion in philanthropic assets given to Georgia Tech by alumni, corporations, foundations, faculty, staff, students, parents, and friends of the Institute. The appointment was effective July 1.

A successful private investor for the past six years, Trujillo retired in 2007 as CEO of Recall Corp., an Atlanta-based global information management company with \$650 million in revenues, operations in 23 countries, and more than 4,600 employees. He had previously served as president of Recall-Americas and general manager of Sydney, Australia-based Recall Australasia.

Prior to Recall Corp., Trujillo served as president of Atlantic Waste Disposal in Waverly, Va.; general manager of CyanoKEM in Mahwah, N.J.; and project engineer on the Trident III program with Lockheed Missiles and Space Co. in Sunnyvale, Calif.

Past chair of the Georgia Tech Alumni Association, Trujillo currently serves on the Georgia Tech Foundation’s Finance and Stewardship committees, and as a member of the Georgia Tech Advisory Board. Recently, he served on the search committee for Georgia Tech’s new athletics director, Mike Bobinski. He has given to Roll Call for more than 30 consecutive years.

In the Atlanta community, Trujillo is a member of the Marist High School board. He is a non-executive director of Haverty’s Corp., serving on the firm’s Audit and Executive Compensation committees. A native of Cuba, he serves as a volunteer GED course instructor for immigrants.

In addition to his Georgia Tech degree, Trujillo holds a master’s degree in mechanical engineering and an MBA from Stanford University. He and his wife, Melba, have two daughters, Amanda and Jacqueline, a computer science undergraduate student at Georgia Tech.

Trujillo succeeded John B. Carter Jr., a 1970 industrial engineering alumnus who retired after 14 years as president and chief operating officer of GTF. Prior to assuming leadership of GTF, Carter served as vice president and executive director of the Georgia Tech Alumni Association for 16 years.

“John Carter leaves Georgia Tech with a truly amazing legacy,” said President G.P. “Bud” Peterson. “His passion for Georgia Tech shines through in everything he does. John has spent three decades building strong, enduring relationships with alumni and friends of the Institute that have helped advance Georgia Tech’s standing nationally and globally — and that work will continue to bear fruit for decades to come. I am especially grateful to John for his leadership during the recent economic downturn. The Georgia Tech Foundation and the Institute are in excellent financial shape today, thanks in large part to John, our volunteer leadership, and the Foundation staff. On behalf of Georgia Tech, I thank him for his many years of excellent service and wish him all the best in his well-deserved retirement.”



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