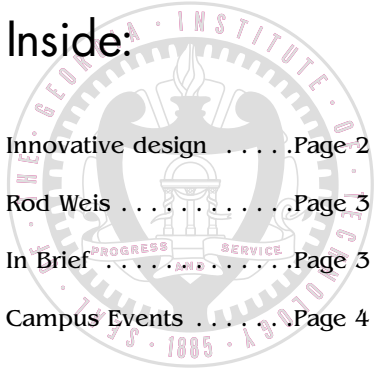


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# THE WHISTLE

FACULTY/STAFF NEWSPAPER

VOLUME 27, NUMBER 25 • AUGUST 12, 2002

THE GEORGIA INSTITUTE OF TECHNOLOGY

## Biomedical engineers team with cardiologists to improve treatments for pediatric heart patients

Larry Bowie  
Institute Communications  
and Public Affairs

Although the normal heart has two ventricles – lower chambers of the heart that are used for pumping blood through the body – some babies are born with just one lower chamber. Considered one of the most complex congenital heart defects, single-ventricle often leads to congestive heart failure if not repaired.

Patients with this defect often undergo multiple surgeries to reconfigure the pulmonary and systemic systems in operations called “Fontan repairs.” Staged over several years, these surgeries are an option used for treating the single-ventricle defect.

In an effort to develop optimal surgical designs based on the child’s anatomy, a team of biomedical engineers, pediatric cardiologists and surgeons led by Georgia Tech have begun developing improved technologies to assist surgeons in the planning of Fontan surgery.

“Optimization of the Fontan procedure is a clinical problem,” said Ajit Yoganathan, Regents’ Professor in the Wallace H. Coulter Department of Biomedical

Engineering at Georgia Tech and Emory University. “Our goal is to improve the efficiency of this procedure.”

The team, led by Yoganathan, consists of several members from three other institutions. Together they have collaborated in the development of improved imaging technologies for use in the pediatric group.

Shiva Sharma, pediatric cardiologist at Children’s Healthcare of Atlanta, explains that surgery for complex congenital heart disease is currently based on the surgeon’s experience. “For the first time, computer technology is being used to assist surgeons in correcting single-ventricle defects in the most efficient way. Furthermore, this will enable customization of the Fontan repair to suit a patient’s unique anatomy and physiology. This is a paradigm shift.”

The team is funded by a \$5.1 million award from the National Heart, Lung and Blood Institute (NHLBI), part of the National Institutes of Health (NIH). Various aspects of the research will be divided among the four institutions based on each institution’s specialties and expertise.

*Surgery continued, page 2*

## Campus outreach efforts serve local community, strengthen ties with neighbors

Michael Hagearty  
Institute Communications  
and Public Affairs

For decades, the fence that surrounds the main campus could have been a symbol of the relationship Georgia Tech had with its neighbors: tense, guarded and suspicious. That perception is fading, however, due in part to a concerted effort to partner with and generate goodwill in the communities bordering Tech.

Speaking at the State of the Institute address last fall, President Wayne Clough noted seven “critical areas” of focus that would serve to define the technological university of the 21st century. Specifically, he noted the importance of expanded local, regional and global outreach, and expressed his desire to mend a fractured relationship.

“Georgia Tech has not always been concerned about being a good neighbor,” he said. “But in our defense, we were not always surrounded by elements that made us inclined to be neighborly. Today, all that is changing for the better.”

Tech’s neighbors — the communities of Home Park, Centennial Place, Herndon Homes, English Avenue and

Midtown — all have their concerns about the progress Georgia Tech is making in terms of growth and development. To address these individual needs, Clough tapped Andrea Ashmore, director of Institute Partnerships, to act as Tech’s outreach ambassador.

“These communities are different, and they have different needs,” Ashmore said. “What we do is to assess their needs and see how their needs dovetail with the resources Tech has at its disposal.”

She does this by directing Tech’s outreach efforts, both on and off campus.

As the Institute expands, the reasoning goes, identifying opportunities for cooperation with its neighbors has a mutual benefit. With hundreds of employees living in the surrounding areas, Tech’s extensive mentoring and tutorial programs with local schools, for example, give students an educational advantage unique to other city schools.

Julius Lee, the executive director of Centennial Place YMCA, said, “The impact has been tremendous.” In running an after-school program for

*Outreach continued, page 3*

## Summer commencement adds 922 to alumni rolls

David Terraso  
Institute Communications  
and Public Affairs

Hundreds of friends and families turned out to cheer as approximately 922 students walked across the stage and became Georgia Tech alumni during summer commencement exercises at the Alexander Memorial Coliseum.

Jay David Bolter, professor in the School of Literature Communication and Culture in the Ivan Allen College and winner of this year’s Distinguished Professor Award,

delivered the address. Bolter advised the students to relish their role as designers of the future and look beyond the nuts and bolts of technology into its implications for society.

The ceremony underwent a few changes this summer. Banners represented each of the six colleges, which hadn’t been seen since the College of Computing’s inaugural year in 1990 added some color to the event. Additionally, the proceedings were broadcast on the coliseum’s Jumbotron to give everyone present a clear view of the action.



President Wayne Clough recently met with several community leaders to discuss neighborhood affairs and get feedback on some of Tech’s outreach initiatives. Pictured are, from left, Linda Harper, director of Planning and Development for Antioch Urban Ministries; Tim State, president of the Home Park Community Improvement Association; Andrea Ashmore, director of Institute Partnerships; and Julius Lee, executive director of the Centennial Place YMCA.

“QUOTE—  
UNQUOTE”

“A complete microneedle device could be the size of a Band-Aid, cost well under a dollar, require no batteries and cause no pain.”

—Mark Prausnitz, associate professor of chemical engineering, on his research team's work developing a transdermal method for delivering drugs or vaccines.

(New York Times)

“They realized that relying on Ph.D. programs just wasn't going to be enough. (For a professional bioinformaticist), it seemed like a master's program would make a lot more sense.”

—Jung Choi, an associate professor in the School of Biology and faculty coordinator of Tech's Bioinformatics Master's Program, on the industry's demand for graduates with an interdisciplinary education that combines the science and computer fields.

(Genome Technology)

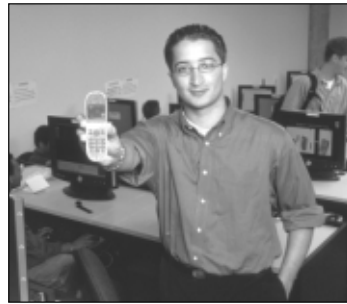
## Innovative design wins Tech students award in national competition

Larry Bowie  
Institute Communications  
and Public Affairs

At any given time, an estimated 3 percent of drivers on roadways in the United States — about 500,000 drivers — are talking on hand-held cell phones, according to a survey last year by the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA).

It was statistics like this that caught the attention of Georgia Tech students Anish Buch and Neil Saunders while enrolled in a senior-level design course called Interactive Computer Graphics and Computer-Aided Design in the School of Mechanical Engineering. The course requires students to pair up and design a new product of their choice. The result: a prototype of a small cell phone that flips open at the press of a button, making it easier and safer to use when driving, the two say.

“This design, in general, is a lot more durable and smaller than most flip-phones available out there,” said Buch, 21, a senior in mechanical engineering. “However, what is really innovative about it is that it allows for single-handed operation, which increases comfort and ease of



Anish Buch demonstrates his prototype.

operation as well as safety while performing tasks, such as driving, that require undivided attention.”

### Designing a New Concept

Buch and Saunders followed design guidelines specified in a contest they learned was being sponsored by PTC and Motorola. They figured they'd design the phone for class as well as enter it in the competition. Before they began designing the phone, the students researched the flip-phone products that are already on the market. They found most of the products to be cumbersome when it came to operation.

So they designed a phone that worked the way they wanted it to work. The phone is divided into two halves and joined by a hinge. Magnets on each half keep it closed.

The notable flip-feature of the design uses a hinge-and-trigger system to spring open the phone. By pressing a trigger button in the area where the user grips the phone, two solenoids on the bottom face rise, pushing the upper half just enough for the springs to overcome the magnetic force and bring the phone to the open position.

“The key features of the design — the hinge and trigger — need not be restricted to cell phones,” Buch said. However, since cell phones are the most popular and widespread cellular communications devices, Neil and I thought it seemed like the more appropriate design. Also, the flip-feature is more typical to cell phones than any other device.”

Robert Fulton, a professor of mechanical engineering at Georgia Tech, was a strong source of support for the team during the process. Fulton teaches the course in which the students were enrolled.

“They had a basic idea and started modeling from there,” Fulton said. “Companies look for innovative changes in their products and students often have the best ideas for improving their products.”

The team entered the phone into the PTC/Motorola design competition, taking home an award for “Benefits the Design has for Motorola.”

Surgery, cont'd from page 1

### A Multi-institutional Approach

Central to the study is understanding the single-ventricle defect, and its anatomy and physiology, in order to improve surgical configurations and planning. The investigators are hoping their research will yield important information and better options to assist surgeons in determining the optimal surgical treatment for these young heart patients.

“The main focus of this research is to give surgeons a tool with which to predict not only the outcome of a Fontan procedure, but also the best possible configuration,” Yoganathan said. “In order to optimize the design of the Fontan procedure, we know that the repair should maximize the flow of blood. This is crucial in a heart that has only a single ventricle as the pumping chamber for all blood.”

In the United States, two out of every 1,000 babies are born with single-ventricle defects. Surgical operation procedures vary depending on factors such as age, symptom status or condition of the lung blood vessels. The most popular procedure used to correct the problem is called the total cavopulmonary connection (TCPC) — the method on which the research team will focus.

### The Fontan Procedure

The Fontan Procedure involves an anatomical reconfiguration that diverts the blood flow coming to the right side of the heart directly to the lungs, so that the heart no longer has to pump blood to the lungs.

The operation seeks to separate the heart into two circulations and allow oxygen-poor blood (blue) to go to the lungs and oxygen-rich blood (red) to go to the body. By substantially reducing the mixing of blue and red blood, the body receives a normal or near-normal oxygen supply. It also reduces the risk of a stroke or other complications and decreases the workload on the single ventricle.

To separate the deoxygenated blood and oxygenated blood, doctors create a baffle, or wall, in the right atrium to prevent the deoxygenated blood from returning to the heart. The right atrium is then attached to the pulmonary artery, so that all of the returning deoxygenated blood flows straight to the lungs. Since this causes an increase in pressure in the systemic veins returning blue blood from the body, a small hole is created in the wall, acting as a pressure relief valve while the child becomes used to its new circulation.

### After the Procedure

Initially, the child will be on a ventilator and may need support from IV medicines and a temporary pacemaker. Once the breathing tube is out, the main goals for the child's recovery are to return to normal physical activity.

“The ultimate goal of our



Shiva Sharma, a pediatric cardiologist at Sibley Heart Center at Children's Healthcare of Atlanta, and Ajit Yoganathan, Regents' Professor in the Department of Biomedical Engineering.

research is to improve this long-term functional outcome of all our patients,” Sharma said. “This prospective, multi-institutional study will need to be done, and we propose to show the surgical optimization done with this technology translates into improved functional outcome.”

For more information...

Cardiovascular Fluid Mechanics Lab  
www.bme.gatech.edu/groups/cfmg/cfmg.htm

Sibley Heart Center  
www.choa.org/cardiology/

Georgia Tech

THE WHISTLE

Editor: Michael Hagearty

Published by Institute Communications and Public Affairs.

Publication is weekly throughout the academic year and biweekly throughout the summer.

The Whistle can be accessed electronically through the Georgia Tech web page, or directly at www.whistle.gatech.edu.

E-mail Whistle submissions to michael.hagearty@icpa.gatech.edu, or fax to Michael at 404-894-7214 at least 10 days prior to desired publication date. For more information, call 404-894-8324.

Cost/\$675 Copies/5,200

Institute Communications and Public Affairs  
Wardlaw Center  
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Atlanta, Georgia 30332-0181

Georgia Tech is a unit of the University System of Georgia.

## Weis resigns as director of Parking

Michael Hagearty  
Institute Communications  
and Public Affairs

Rod Weis, director of Parking and Transportation, has announced his resignation from Tech, effective Aug. 16, leaving in favor of a similar position at another university. Weis will assume the title of director of Parking, Traffic and Transportation Services at Texas A&M later this month. The opportunity for greater advancement and his family's desire to live in a smaller town both contributed to his decision.

It was only a few years ago that the line for parking registration was more than nine hours long. When Weis took over as director of Parking and Transportation nearly three years ago, he said that was the most tangible example of that office's disorganization.

"There were just no processes in place to manage the system," Weis said. As late as 1998, the office was still a paper-based organization.

"I think everyone is surprised at how far and how fast (improvements) have come," Weis said.

In three years, the office has worked to update and streamline its systems. Though some computer solutions were already in the works, Weis reviewed every procedure and protocol by which the office operated. Parking also

collaborated with the Office of Information Technology to develop a web-based registration system in order to avoid the long lines and lost paperwork that had become its hallmark.

Then there's enforcement. With approximately 10,000 spaces spread out over campus, parking had become a game of cat and mouse, with students racking up massive amounts in fines during a four-year career.



Rod Weis

"There was one student who had accumulated \$2,100 in parking fines," chuckled Weis. The software systems now in place, he said, eliminate that problem. As a result, 85 percent of citations are resolved within six months, compared with 26 percent three years ago. In fact, more stringent enforcement actually caused violation revenue to go down over the past year.

Weis's biggest accomplishment, he said, was creating "a

very structured, consumer service-oriented organization." He pointed out that he and his assistant directors personally respond to the lion's share of the queries submitted through the parking website.

Parking will continue to provide useful services to the campus. Beginning this fall, faculty, staff and students who receive permit violations will be notified by an automatic e-mail, in addition to the familiar yellow envelopes. Permit holders will also be able to view and resolve citations through the Parking website using a credit card.

About his experience at Tech, Weis said, "I have had the pleasure to have worked with and met some of the most outstanding people, which made the decision that much more difficult. There are friends here I will have for the rest of my life."

In the interim, Alan Corry, assistant director of Parking and Transportation, will serve as acting director. In the coming weeks, a national search will commence to locate a successor. With a proven system in place, Weis believes the job will draw a lot of interest, but advises that candidates have two qualities in particular: patience and a good sense of humor.

For more information...

Parking and Transportation  
[www.parking.gatech.edu](http://www.parking.gatech.edu)

## IN BRIEF:

### Two engineering chairs open

Searches are still under way for successors to fill the department chair positions in biomedical engineering and civil and environmental engineering. In the meantime, Professor Roberto Leon is continuing to serve as interim chair of the School of Civil and Environmental Engineering. Serving as interim chair for the



Roberto Leon

Mike Thomas

Wallace H. Coulter Department of Biomedical Engineering is Michael Thomas, the former provost of Georgia Tech who is now the executive director of Internet Policy, Application and Research as well as the executive director of the Logistics Institute.

### An entrepreneurial success story

Radatec, an Atlanta start-up company commercializing technology developed at Georgia Tech, has been awarded a \$600,000 Small Business Innovation Research Program (SBIR) contract from NASA.

Supported by NASA's Dryden Flight Test Center at Edwards Air Force Base, the contract will fund further development of Radatec's proprietary radar sensor technology for monitoring complex heavy machinery such as gas turbines. The system can warn of impending problems before they become dangerous.

Radatec was incorporated in November 2001 by research faculty Jon Geisheimer and Scott Billington to commercialize technology developed at Georgia Tech's Manufacturing Research Center (MARC) and the Georgia Tech Research Institute's Sensors and Electromagnetic Applications Laboratory. The technology will be licensed from Georgia Tech's Office of Technology Licensing.

For additional information about the company and the new sensing technology, visit [www.radatec.com](http://www.radatec.com).

### Book of the month

John Doane, a member of the research faculty in the Georgia Tech Research Institute (GTRI), has recently published a work of fiction. "Apogee" has been described as a "fast-paced action novel" that, set in the future, incorporates his other hobby: aviation. Doane earned both his bachelor's and master's degrees in mechanical engineering at Tech. "Apogee" is now available in the Tech bookstore.



### Retirement planning

A Fidelity Investments retirement counselor will be on campus to discuss retirement planning on Aug. 20, with a second visit scheduled for Sept. 4. To schedule an appointment to discuss account consolidation or portfolio management, call 1-800-642-7131. For customer service issues, such as making changes to an existing account, enrollment or requesting forms, visit [www.fidelity.com](http://www.fidelity.com) or contact customer service at 1-800-343-0860.

## Clough to participate in national economic forum

President Wayne Clough is among the invited attendees at this week's national economic forum, scheduled for Aug. 13 at Baylor University in Waco, Texas. President George W. Bush is assembling Vice President Dick Cheney, members of the

Cabinet and leaders from business, labor and academia to address new ideas for economic growth to go with the president's agenda for economic recovery.

Clough will serve on the Technology and Innovation panel, one of eight panels set

up for the day. The panel will be co-chaired by Energy Secretary Spencer Abraham and Floyd Kvamme, the president's science advisor. Kvamme is also co-chair of the President's Council of Advisors on Science and Technology.

Outreach, cont'd from page 1

150 children from neighboring Centennial Place Elementary School, Lee said counselors and volunteers from Tech make a difference. "We believe that their assistance has improved the test scores of the students and contributed to the success of this particular elementary school." Lee also pointed out that they receive Tech staff support at the management level, helping to expand the services the YMCA can offer.

Though education is a priority, Ashmore said, her office's efforts are also directed toward professional training and

employment. Working with the Office of Human Resources and Antioch Baptist Church, local residents sign up for classes in computer training and life skills. Graduates are then encouraged to go for jobs at Tech, giving them step-by-step advice on how to apply.

Ashmore said such partnerships are "helping to soften the perception that some folks have had about Georgia Tech (in the past)."

Maximizing resources also involves coordinating campus efforts. To keep abreast of outreach activities among campus units, Ashmore initiated the Neighborhood Outreach Consortium (NOC), which meets

twice a year to discuss the progress and problems associated with being good neighbors. The sum total of this work, said Clough, is vital to enhancing Tech's standing in the community.

"Our neighborhood outreach initiatives are a tangible expression of our intent to create a positive environment for ourselves and our neighbors," he said.

For more information...

Community Outreach  
Partnership Program  
[www.copp.gatech.edu](http://www.copp.gatech.edu)