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THE WHISTLE

FACULTY/STAFF NEWSPAPER

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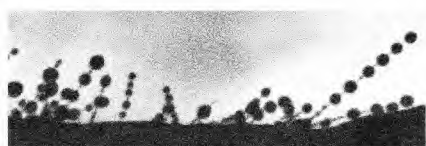
THE GEORGIA INSTITUTE OF TECHNOLOGY

Scientists unlock secrets behind nanotube formation

David Terraso
Institute Communications
and Public Affairs

There is widespread speculation in science and industry that nanotubes are at the center of the next technological breakthrough. Several methods for making nanotubes exist, but until recently little was known about how these techniques physically produce the hollow fibers.

A multinational team of scientists has discovered that multi-walled carbon nanotubes made by the pure carbon arcs method are in fact carbon crystals that form inside drops of glass-coated liquid carbon. The research appears in the Feb. 11, 2005 issue of the journal *Science*.



Nanotubes coated with glassy drops of carbon poke through the surface of a column housing nanotubes.

One way to make nanotubes involves using a carbon arc to heat graphite to about 5,000 degrees Celsius. An electrical current is passed through the graphite in a chamber filled with helium gas. The result is a sooty deposit on one of the electrodes that contains columns filled with nanotubes.

Nanotubes continued, page 2

Police Department reports sharp decrease in campus crime

Michael Hagearty
Institute Communications
and Public Affairs

Police Chief Teresa Crocker said the Georgia Tech Police Department was having some success driving away those "who prey on our campus," despite an urban environment that sees some of the highest criminal activity in the city. Thanks to a community effort, she said, the Department has reported a 30 percent drop in campus crime over the past 12 months.

Communication has been the key. The Department has placed more emphasis in this area, creating a crime prevention unit and dedicating one officer to act as the liaison between the Department and the

campus community. The result has been a more community-oriented policing effort, with crime alerts and public safety committees. The messages may sometimes seem repetitive, Crocker said, but "on a college campus, turnover is constant, so we have to be persistent in our communication efforts to keep folks aware of the dangers."

Other efforts include partnerships with a number of key departments. Deputy Chief of Police Anthony Purcell cited the Office of Parking and Transportation as one example of this kind of cooperation. Employees working around campus serve as the eyes and ears by alerting police dispatch of suspicious activity.

Crime continued, page 2

Clinical trials move heart sensors one step closer to commercialization

T.J. Becker
Research News

CardioMEMS, a member of Georgia Tech's Advanced Technology Development Center (ATDC), is pioneering a new breed of testing devices to monitor heart patients. Combining wireless communications technology with microelectromechanical systems (MEMS) fabrication, CardioMEMS' products provide doctors with more information, while making testing less invasive for patients.

In June, the U.S. Food and Drug Administration (FDA) approved CardioMEMS' investigational device exemption, which enabled the company to begin clinical trials for its EndoSensor.

The EndoSensor measures blood pressure in people who have an abdominal aortic aneurysm, a weakening in the lower aorta. This condition ranks as the 13th leading cause of death in the United States. If the aneurysm ruptures, a person can bleed to death within minutes.

Doctors can treat the aneurysm with a stent graft, a slender fabric tube placed inside the bulging artery to brace it and relieve pressure by

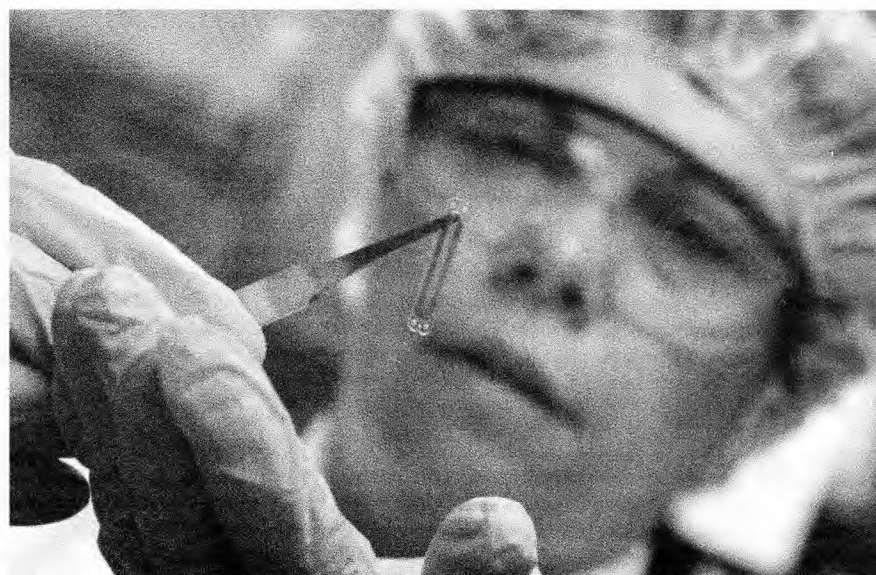
creating a channel for blood flow. Still, the stent can fail, resulting in leakage of blood into the aneurysm, which can cause the aneurysm to burst. For this reason, lifetime monitoring is required.

Safer, easier testing

Up to now, doctors have relied on CT scans for testing, but CT scans have limitations. "One problem is that CT scans only show the size of the aneurysm," explains David Stern, CardioMEMS' chief executive. "Yet pressure, which is what our device monitors, is the most important measurement."

CardioMEMS' biocompatible sensor, which is implanted along with the stent, monitors the stent more effectively than CT scans. It's also cheaper and more convenient: the physician waves an electronic wand in front of the patient's chest to activate the EndoSensor, which takes pressure measurements and relays the information to an external receiver and monitor.

CardioMEMS conducted its first implants at the Cleveland Clinic in July. By the end of December, approximately 100 patients in four countries had received sensors.



Deborah McGee of CardioMEMS examines an EndoSensor in the company's clean room facility in the ATDC Biosciences Center located in the Environmental Science and Technology Building. The sensor is implanted to measure pressure in an aneurysm being treated by a stent graft.

CardioMEMS will submit resulting trial data to the FDA early this year, and hopes to receive permission to start selling the EndoSensor by mid-2005.

"Our trials show the EndoSensor is safe and producing good data,"

reports Stern. "Doctors are enthusiastic because the sensor is very easy to use even though it's complex technology."

CardioMEMS continued, page 3

FOCUS UNQUOTE

"The challenge is to create a seamless interface between the digital information, each individual user and the physical environment. We aren't quite there yet, but we're on our way."

—Blair MacIntyre, assistant professor in the College of Computing, on his laboratory's project, developing an "Augmented Reality" tour that enables visitors to see and hear historical accounts delivered by ghostly images of the deceased in Atlanta's Oakland cemetery.

(Technology Review)

"The link shows how fragile this environment is. All this is tied up and it's a very delicate balance. Every time you change something, it has consequences."

—Nicholas Meskhidze, a postdoctoral fellow in the School of Earth and Atmospheric Sciences, on his report showing a link between ocean fertility and air pollution over land.

(Wired News)

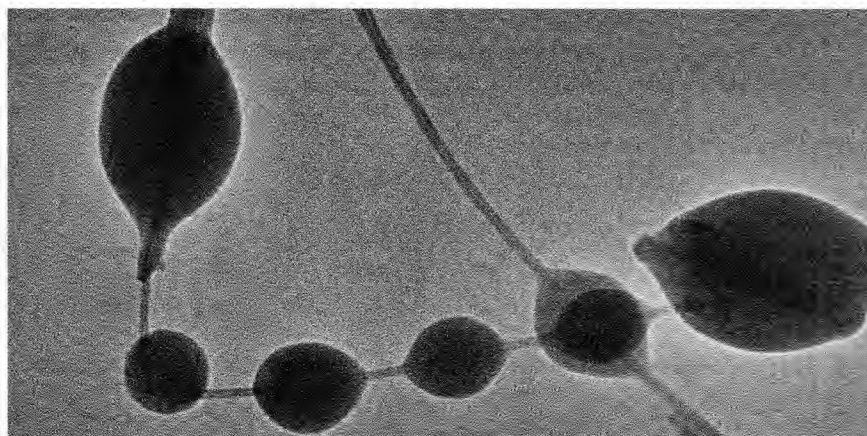
Nanotubes, cont'd from page 1

"We were doing research on the electrical transport properties of carbon nanotubes when we noticed that the nanotubes had these little beads that looked like liquid drops on them," said lead author Walt de Heer, a professor in the School of Physics.

Much like archeologists studying artifacts to decipher what happened in centuries past, the research team began with the photos of the liquid-like beads coating the nanotube fibers and worked their way back to try to find out how they got there.

"Just by looking at them we realized that this has something to do with liquid," said de Heer. "So we asked the question, 'if the beads were once liquid carbon and the nanotubes they are attached to are also carbon, why didn't the liquid carbon dissolve the nanotube?' The answer is that the liquid must have been a glass at a lower temperature than the nanotube."

The research team observed the beads had the disordered molecular grouping that is characteristic of glass while the nanotubes they surrounded had an orderly, crystalline pattern. This led them to conclude that the carbon arc must have melted the graphite into drops of liquid carbon, which had cooled at a much faster rate on the outside, giving it a glassy



Glassy drops of carbon coat the fibers that house nanotubes after their synthesis with a carbon arc. It was images like this that sparked the research team's interest.

appearance.

Since the nanotubes in the interior had a crystalline structure, the team reasoned that the liquid carbon on the inside of the drops had cooled so slowly it became a supercooled liquid, which is a liquid below the temperature that normally turns it into a solid. As the temperature of any supercooled liquid drops to a certain critical temperature, it begins to crystallize, which researchers reasoned resulted in the orderly molecular structure of the nanotubes.

As the nanotubes continue to crystallize they lengthen, poking through the glass layer and causing the glass to bead on the tubes much like water beads on pine needles. This final

portrait of the beads on nanotube fibers is the photo that began the research team's initial questions.

"Before we began this work, we had spent a lot of time investigating these fibers, because they had special significance for our work. Most people don't look at the fibers. They open them up to get the nanotubes inside, but the balls are on the surface," said de Heer. "It took us having to see them several times — actually they were quite annoying — but then we realized that they may have some significance by themselves. We hope our results will open up the whole question of nanotube formation again."



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

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

Crime, cont'd from page 1

He also pointed to an increased willingness for campus departments to solicit vulnerability assessments, and to make improvements by adding card readers at building access points.

Communicating with external law enforcement has helped, too. Crocker said that the partnerships formed with organizations such as the Atlanta Police Department have helped to keep everyone informed of criminal activity.

"Crime doesn't go away, it just moves somewhere else," she said. "We encourage our officers to share information with members of the APD and Midtown Blue so we can all can work together."

Another factor, they said, was Zeus and Tiger, Tech's K-9 unit and the only two full-patrol dogs in Fulton County. Because of their specialized training, a number of police departments have requested their assistance under a mutual aid agreement the Department has with other agencies.

The primary role of the K-9 unit is crime suppression, and the principal benefit its presence on campus has is deterrence. Most crime on campus is a matter of access and opportunity, and police dogs add a psychological component that can have a profound effect on criminal activity. They've been so effective that the Department would like to add two more.

Crocker also said the Department is working toward national accreditation. For most of the past year, they have worked to develop a comprehensive operational policy in line with national standards. If successful, it would place the Department in elite company: only 600 law enforcement organizations in the country have met the criterion. The goal is to receive accreditation before the end of the year.

Part 1 crimes	2003	2004	Change
Murder	0	0	0
Rape	1	2	100%
Robbery	9	3	-66.7%
Aggravated Assault	2	1	-50%
Burglary	76	77	1.3%
Motor Vehicle Theft	90	44	-51.1%
Larceny-Theft	919	644	-29.9%
Total	1097	771	-29.7%

Larceny-theft	2003	2004	Change
Shoplifting	2	6	200%
From Motor Vehicle	278	217	-21.9%
Motor Vehicle Parts	184	53	-71.2%
Bicycle	116	63	-45.7%
From building	250	197	-21.2%
Coin-operated machines	5	3	-40%
Other	84	105	25%
Total	919	644	-29.9%

Campus best practices challenge winners named

Elizabeth Campell
Institute Communications
and Public Affairs

At the Student Center last week, nearly two-dozen staff members presented an impressive variety of administrative efficiencies, entered in one of four categories during the first annual Georgia Tech Best Practices Challenge, sponsored by the Office of Organizational Development.

In the people strategies category — relating to hiring, development, retention and motivation of people including faculty, administrative, research and student staff — the School of Mechanical Engineering's "Utilization of Cooperative Education Students in Support Service Areas" received the Best of the Best Award. The School found that hiring co-op students is more efficient than using part-time students, saves money in performing lower-level support tasks and benefits students, who are in a real work environment and gaining hands-on experience.

The School of Psychology's "Network-based Time Document Solution" won the prize in the research, finance and Institute operations category, which relates to the daily management of research development, academics, facilities and administrative responsibilities. Administrators found that the system reduces the interruptions and traffic flow to the financial office by enabling the individual to complete and print time documents at their convenience.

In the academic and student services category, the Best of the Best Award went to the Office of Success Programs for its "The Transfer Assistance Center." Offered as part of FASET Orientation for transfer students, the Center's goal is to provide immediate resolution to the challenges facing transfer students during registration, in a one-stop-shop environment.



Amy Stalzer from the Office of Success Programs presented in the people strategies category.

The Best of the Best Award in the information technology category went to the School of Mathematics for its "Automated and Unattended Installation of Computers." When a new computer or laptop arrives or needs serious repair, support staff can boot the system off a special CD, and begin to automatically install or reinstall the operating system and most applications, saving time and ensuring that all the systems behave similarly.

John McCullough, manager of technical services for the School of Mechanical Engineering, listened to several of the presentations that day, and intends to apply some of the knowledge gained in his own department.

"Barbara Roper and Linda Cabot did an excellent job of presenting 'OIT's Professional Development Program,'" he said. "I plan to use parts of their model for developing our own career development program. I also liked (QTRI Personnel Support Director) Jim Beisner's presentation on employee retention strategies, especially the part about new employee orientation."

2005 Best Practices Challenge award winners

People Strategies

John McCullough, Mechanical Engineering
"Utilization of Cooperative Education Students in Support Service Areas"

Barbara Roper, Information Technology
"OIT Professional Development Program"

Research, Finance and Institute Operations

Nicholas Kelling, School of Psychology
"Network Based Time Document Solution"

Rosalind Meyers, Auxiliary Services
"Annual Customer Satisfaction Survey"

Academic and Student Services

Merideth Ray, Office of Success Programs
"The Transfer Assistance Center (TAC)"

Wayne Whiteman, Mechanical Engineering
"Automation of the Financial Support System and the Recruitment/Admissions Process for Graduate Students"

Information Technology

Lew Lefton, Mathematics
"Automated and Unattended Installation of Computers"

More information about the Best Practices Competition, including the presentations from this year's entries, is available at www.training.gatech.edu/BP/index.html.

CardioMEMS, cont'd from page 1

CardioMEMS was co-founded by Jay Yadav, a cardiologist and director at the Cleveland Clinic Foundation, and Mark Allen, a professor in the School of Electrical and Computer Engineering and director of the School's MEMS research group.

Yadav was interested in Allen's use of MEMS technology for microsensors that could measure pressure in turbine engines. Although Allen had designed the sensors specifically for military drone aircraft, he and Yadav believed that they could adapt the technology to monitor heart and blood pressure in humans.

MEMS technology uses micro-machining fabrication, which was originally developed for the integrated circuit industry to build electrical and

mechanical structures at the micron scale (one-millionth of a meter).

Admitted to ATDC in 2001, CardioMEMS has grown to 30 employees. "ATDC has given us access to a range of personnel and facilities that have been instrumental to our success," Stern says, noting that one-third of the company's employees are either Georgia Tech graduates or students working part-time.

For more information...

CardioMEMS

www.cardiomems.com

Center for MEMS and Microsystems Technologies

www.cmmt.gatech.edu

IN BRIEF:

Emeritus ECE chair honored at reception

More than 300 faculty, staff, administrators, students and alumni paid tribute last month to Roger Webb, chair of the School of Electrical and Computer Engineering, at a reception honoring his 41 years of service to Georgia Tech.

Webb came to Tech in 1959 to pursue his doctorate, and became an assistant professor in 1963, the Institute's 20th faculty member in electrical engineering.

In 1978, Webb became the School's associate director, served as acting director in 1989, and assumed the School chair in 1990. That period has been one of intense growth and expansion in ECE, including the founding of 15 centers and consortia such as the Packaging Research Center and the University Center of Excellence for Photovoltaic Research and Education.

Professor and Associate Chair Emeritus Alvin Connelly, who served as the reception's emcee, said "The growth in ECE during Roger's tenure speaks for itself — faculty hired, degrees awarded, research funding, new buildings, awards, national rankings, alumni outreach, and so on. Certainly, Roger Webb did not achieve all of this by himself. However, he did enable and empower folks to pursue and achieve lofty goals."

Though officially retired, Webb will continue as the School's interim chair on a part-time basis until a successor is named. He has already started a new task in the Office of the Provost, where he is working on issues of strategic importance with Provost Jean-Lou Chameau.

Aquatic competition changes hours of operation at CRC

Georgia Tech's Campus Recreation Center is the host for the ACC Swimming and Diving Championships. The following changes will be in effect between Feb. 23-25.

- Aquatic Center (competition pool and diving well) as well as the adjoining locker rooms will be closed.

- Crawford Pool hours will be 6 - 9 a.m. and then 11:30 a.m. - 7:30 p.m.

Attendance for the athletic competition is free. For more information, visit

www.crc.gatech.edu.

Tax forms and instruction books available

Visitors to the Library and Information Center can pick up tax forms on 2 East — the Special Formats and Maps area. Instruction booklets for the 1040NR-EZ are also available, as well as the standard 1040 booklets and forms.

Football schedule amended

The Atlantic Coast Conference, in conjunction with Georgia Tech, has announced a change in the Yellow Jackets' 2005 football schedule. The change is the result of a scheduling issue at the conference level.

Tech will now host Connecticut on Sept. 17 at Bobby Dodd Stadium, followed by a road game at Virginia Tech on Sept. 24.

The Georgia Tech Alumni Association has announced that the Clemson game on Oct. 29 will be the annual Homecoming celebration, while the Connecticut game will be held during Family Weekend.

For a complete schedule, visit www.ramblinwreck.com.

C A M P U S E V E N T S

Arts & Culture

Mar. 3

The School of Literature, Communication and Culture's Poetry at Tech series continues as Professor Thomas Lux introduces C.K. Williams and Adam Zagajewski, at 7 p.m. in the LeCraw Auditorium. For more information, visit www.iac.gatech.edu/poetry.html.

Mar. 9

The Ferst Center for the Arts welcomes the Mozart Festival Opera for an 8 p.m. performance of "The Marriage of Figaro." For tickets, call 894-9600.

Brown Bags/Conferences/Lectures

Feb. 24

The Gvu Center hosts a brown bag with Genevieve Bell, a senior researcher within Intel Corporation's Intel Research, on "Does Jesus Do SMS? Religion, Technology and Ubiquitous Computing," at noon in room 132, TSRB. For more, visit www.gvu.gatech.edu/events.

Feb. 24

The School of Mechanical Engineering's Woodruff Colloquia Series welcomes UCLA Emeritus Professor James Smathers on "B.S. in Nuclear Engineering: Is It a Good Preparatory Degree for Graduate Training in Medical Physics?" at 11 a.m. in the MARC auditorium.

Feb. 25

The Institute of Paper Science and Technology's Distinguished Lecture Series welcomes George

Weyerhaeuser, senior vice president of technology for the Weyerhaeuser Company, on "Technology Deployment in the Forest Products Industry," at 11 a.m. in IPST's Kress Auditorium. The lecture will also be Web cast. For more information, visit www.cpbis.gatech.edu/dls2005.

Feb. 25

A Science and Technology Studies (STS) Seminar features School of Public Policy Associate Professor Michael Hoffmann on "Model-based Reasoning: A Tool for Overcoming Epistemological Problems of Conflict Management," at 4 p.m. in room 002 of the Wesley New Media Center.

Feb. 28

The School of Biology welcomes Emmanuel Tannenbaum, postdoctoral fellow Department of Chemistry and Chemical Biology at Harvard University, "Evolutionary Dynamics of DNA Genomes: Extension of the Quasispecies Model to Living Systems," at 11 a.m. in room L1205, ES&T Building.

Feb. 26

The College of Architecture hosts a symposium on "Architecture and Memory." For more information, visit www.coa.gatech.edu/symposium.

Mar. 1

The School of Mechanical Engineering's Woodruff Colloquia Series welcomes Northwestern University Professor Ted Belytschko on "Computational Studies of Nanofracture and Nanomechanics," at 11 a.m. in the MARC Auditorium.

Mar. 2

In cooperation with the Georgia Electronic Design Center, the Center for Research on Embedded Systems and Technology welcomes Ivo Bolsens, chief technology officer for Xilinx, on "A New Era in FPGA Design," at 11 a.m. in the TSRB Auditorium. For more information, e-mail mooney@ece.gatech.edu.

Faculty/Staff Development

Feb. 23

The Office of Sponsored Programs offers a class in "NSF FastLane Proposal Preparation and Project Reporting." Call 894-6944 to reserve a seat.

Mar. 3

The Office of Information Technology gives an overview of Georgia Tech's information security efforts for the layman in both business process and technical terms at 9 a.m. in room 242, Rich Building. To register, visit www.trainsweb.gatech.edu/mastcal.asp.

Miscellaneous

Mar. 9

The Office of Human Resources hosts a pre-retirement meeting on Social Security and Georgia Tech benefits, from 1:30 - 4:30 p.m. in room 117, Student Services Building. For more information, visit www.ohr.gatech.edu. To register, visit www.trainsweb.gatech.edu/mastcal.asp.

Mar. 21-25

Spring break.

C L A S S I F I E D S

AUTOMOBILES

1967 Triumph TR4A. Owned for 27 years by Tech professors. Keep it in the family. Runs and looks great, \$7,500. Call 894-2719 or e-mail andrew@math.gatech.edu.

1988 Volvo 240 GL wagon. White w/ tan leather interior. 210K miles. Runs well, body and engine in great shape. \$1,800 OBO. Call 404-806-6096.

1992 Honda Civic hatchback, rebuilt engine and transmission and more. 5-speed. Good gas mileage. Good work car. \$2,000. Call 404-323-4371.

1999 Ford Taurus SE. Great condition w/maintenance records, leather, ABS, dual front air bags, remote key entry pad, alloy wheels, power seats, 97,700 miles, \$3,900. Call 404-579-6676.

2000 Audi A4 Turbo 1.8T sedan. Manual, 50K miles, excellent condition. Metallic silver exterior, black leather interior. Regular maintenance. Power windows/locks, ABS, CD. \$16,500. Call 404-931-9922.

2003 Black GMC Sonoma. Two-passenger, like new, 20K miles, with warranty. \$9,500 OBO. Moved and must sell. Call Bob at 678-478-2142.

FURNITURE

4-piece white dresser set: 9-drawer dresser, 3-drawer dresser, 2-drawer night stand and 30"x40" mirror, \$150. Dark walnut dining table and 6 chairs, asking \$150 OBO. Call Diana at 404-667-6290.

Girl's white wicker bedroom set. Excellent condition: 2 dressers, desk, chair, twin headboard, shelf. Paid \$750. Sell for \$300. Call 894-3325.

REAL ESTATE/ROOMMATES

3BR/2BA new house for rent at 1895 West Kimberly Road in Fulton County. \$1,250/month negotiable, Section 8 welcome. Call 404-484-4662.

3BR/2.5 BA townhome w/garage in East Lake. 12 minutes to GT. New appliances. Ideal roommate plan. Spacious bedrooms, gourmet kitchen, gas fireplace & hardwood floors; swim community. \$1,300/month. Call 404-325-1909.

3BR/2.5BA house located in Durham, NC near neighboring universities and RTP. Large fenced-in yard in very peaceful neighborhood. Spacious screened-in deck. Priced around \$134,900 for sale or \$1,200/month. Call Marc 404-964-9928.

Immaculate 2BR/2BA condo, 1.5 miles from Tech. Furnished/unfurnished. \$1,250/month. Call 404-873-5158 or e-mail markballam@aol.com.

Completely updated 3BR/1BA brick ranch on quiet street in West End. Renovated. Attached carport/portico and front yard with picket fence. Quick commute to Midtown. \$169,900. Call 404-502-8393.

3BR/2BA house for sale in Smyrna/Vinings. 20 minutes to Tech. Spacious brick ranch. Hardwood under carpet. 3-year-old Trane HVAC system. \$179,000. E-mail sandra.bullock@oit.gatech.edu or call 770-843-4758.

SPORTS/FITNESS/RECREATION

Exerhealth aerobic rider, \$75. Call 404-467-4917.

Air hockey table by Harvard. Just over a year old and in great condition. Measures 67" x 32.5" with electronic scorer, \$50. Photos by request. Call 770-928-7344 or e-mail rita.brown@edi.gatech.edu.

MISCELLANEOUS

Storm door, white aluminum w/brass handle and dead bolt. Left hinge. Full glass w/screen. Paid \$249, sell for \$125. Photos available. Call 678-232-3475 or e-mail david.gifford@gttri.gatech.edu.

Lithonia resident looking for someone to carpool with. Work hours can be anytime between 7 a.m. and 5 p.m. Willing to share costs. Call 894-1942.

1999 Starcraft Stardust pop-up camper. Used fewer than 10 times. Sleeps eight. Excellent Condition. \$4,000. Call 770-528-7069 or e-mail al.vineyard@gttri.gatech.edu.

Two \$20 Virgin Mobile 'Top-Up' cards, for Virgin mobile phone minutes. \$30 OBO. Call 894-5544 or e-mail pat.barton@dev.gatech.edu.

Four 20-inch Helo rims and Nitto 255/50/R20 tires. Asking \$1,200. Call 678-525-3191 or e-mail pcfreak@gmail.com.

Gently used Bedside CoSleeper. Cream-colored. \$75. E-mail joanie.chembars@coa.gatech.edu.

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