Students offer designs for veteran memorial

An architecture undergraduate presents her plan for the Duluth Living Memorial Project, dedicated to the veterans — living and dead — of Duluth, Georgia. At the invitation of Mayor Shirley Lasseter, students in a senior design seminar on architecture and memorials spent part of the semester generating potential designs for consideration.

Each of the student projects from the design studio will be on display at the City of Duluth’s new public safety building — an opportunity for its citizens to help determine the project’s future direction. The site of the memorial will be the new Town Green and Festival Center, located in the historic center of the city.

Pioneering programs earn faculty member AAAS mentor award

Jennifer Greene ECE School Chair Electrical and Computer Engineering

Gary May, professor and chair of the School of Electrical and Computer Engineering (ECE), has received the 2006 Mentor Award from the American Association for the Advancement of Science (AAAS). The award was presented at the organization’s annual meeting, held earlier this month in San Francisco. The Mentor Award is given to an individual for extraordinary leadership that increases the involvement of underrepresented groups in the science and engineering fields. Honorees must have mentored significant numbers of underrepresented students through completion of their doctorates or helped to increase the diversity of doctoral students in a department or institution.

Gary May has been recognized for his work in helping to increase the number of underrepresented minorities in science and engineering.

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For more information... Steps to protect your identity www.protect.gatech.edu

Tech joins new NSF center to study societal implications of nanotech

John Toon Research News

Recent research into the environmental fate of carbon nanotubes has underscored what until now has been a little-discussed aspect of nanotechnology — its potential societal implications.

To evaluate those implications and inform the resulting public policy debate, researchers at Georgia Tech have joined with colleagues at six other U.S. institutions to form the Center for Nanotechnology in Society. Headquartered at Arizona State University, the new center has so far received more than $6 million in funding from the National Science Foundation.

"Many experts think that nanotechnology is a fundamental and general technology that could have very widespread implications throughout society," noted a professor in Tech’s School of Public Policy and a key contributor to the center. "Nanotechnology has the capability to not only radically change products and processes, but also to lead to both desirable and undesirable societal outcomes. We had better pay attention not only to research on the applications, but also to the potential social implications.

Beyond the potential environmental impact of nanotechnology, policy-makers will have to consider health-related issues, as well as the legal, ethical, economic, employment and competitiveness issues involved. To do that, they’ll need an understanding of how and where nanotechnology may be developing.

Center continued, page 2

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Visual cues help give brain 'a running start'

David Terraso
Institute Communications and Public Affairs

A Georgia Tech researcher has discovered that for tasks involving spatial processing, preparing for the task and performing it are not two separate brain processes, but one — at least when there are a small number of actions to choose from. The research appears online in the journal Brain Research.

In a brain imaging study using functional magnetic resonance imaging (fMRI), Eric Schumacher, an assistant professor in the School of Psychology, along with colleagues from the University of Pittsburgh and the University of California at Berkeley, monitored the activity in brain regions in subjects while they responded to visual stimuli.

The researchers theorized that when they gave the subjects a cue that they were about to perform a hard task, only the superior parietal cortex (known for its involvement in spatial attention) and the prefrontal cortex (known for planning movements) would activate. But after the stimulus was presented, the prefrontal cortex would activate. But they were wrong.

"We found that all of these regions began to activate when the subjects prepared to do the task, even the prefrontal, which is the region that makes the decision on what to do," said Schumacher. "Activating the decision-making region even before the stimulus is presented seems to allow for a quicker response; it allows the brain to get a running start."

Subjects were loaded into an MRI scanner and then shown a disk on a screen prompting them to press a button. They had two different tasks to perform: one labeled easy, and the other difficult. During the easy task, subjects were asked to push a button using the fingers of their right hand if the disk appeared on the left of the screen, and their right hand if the disk appeared on the right. The hard task was manually incompatible, so that if the disk appeared on the left, they were to push the buttons using their right hand and vice-versa. Sometimes a visual cue prompted them that they were about to perform the hard or the easy task, sometimes it did not.

When the tasks were cued, all three regions of the brain increased their activity. When there was no cue, there was less activity.

"So what does this mean in the real world?" Schumacher asked.

"One analogous situation might be when you’re driving and coming up on an intersection where there is a state green light. You may get ready for the light to change to yellow and then red. The research suggests that this preparation for the upcoming change and appropriate response involves the same brain regions that are involved in actually pressing the brake once the light turns red or yellow," said Schumacher.

For more information...

Cognitive Neuroscience at Tech Research Laboratory
www.psychology.gatech.edu/control
New technology helps satellites blast off with less fuel

Engine lets satellites take more hardware into orbit

Megan McRainey
Institute Communications and Public Affairs

Georgia Tech researchers have developed a new prototype engine that allows satellites to take off with less fuel, opening the door for deep space missions, lower launch costs and more payload in orbit.

The efficient satellite engine uses up to 40 percent less fuel by running on solar power while in space and by fine-tuning exhaust velocity.

Satellites using the Georgia Tech engine to blast off can carry more payload thanks to the mass freed up by the smaller amount of fuel needed for the trip into orbit. Or, if engineers wanted to use the reduced fuel load another way, the satellite could be launched more cheaply by using a smaller launch vehicle.

The fuel-efficiency improvements could also give satellites expanded capabilities, such as more maneuverability once in orbit or the ability to serve as a refueling or towing vehicle.

The project, led by Aerospace Engineering Assistant Professor Mitchel Walker, was funded by a grant from the U.S. Air Force. The project team made significant experimental modifications to one of five donated satellite engines from an aircraft engine manufacturer to create the final prototype.

The key to the engine improvements, Walker said, is the ability to optimize the use of available power, very similar to the transmission in a car. A traditional chemical rocket engine (attached to a satellite ready for launch) runs at maximum exhaust velocity until it reaches orbit — the equivalent of a car in first gear.

The new Georgia Tech engine allows ground control units to adjust the engine’s operating gear based on the immediate propulsive need of the satellite. The engine operates in first gear to maximize acceleration during orbit transfers and then shifts to fifth gear once in the desired orbit. This allows the engine to burn at full capacity only during key moments and conserve fuel.

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An illustration of how the enhanced engine thruster technology works. The new electric and magnetic field design helps better control the exhaust particles, which in turn leads to improved fuel economy.

“You can really tailor the exhaust velocity to what you need from the ground,” Walker said.

The Georgia Tech engine operates with an efficient ion propulsion system. Xenon (a noble gas) atoms are injected into the discharge chamber. The atoms are then ionized — stripping electrons from their outer shell — to form xenon ions. The light electrons are constrained by the magnetic field while the heavy ions are accelerated out into space by an electric field, propelling the satellite to high speeds.

Tech’s significant improvement to existing xenon propulsion systems is a new electric and magnetic field design that helps better control the exhaust particles, Walker said. Ground control units can then exercise this control remotely to conserve fuel.

The satellite engine is almost ready for military applications, but may be several years away from commercial use.

For more information...

High-Power Electric Propulsion Laboratory
www.ae.gatech.edu/people/mwalker/HPEPL.html

IN BRIEF:

Request for proposals
The Georgia Tech Honors Program seeks proposals for Honors Program Special Topics Courses to be offered in the upcoming Fall semester. While there is no set of specific requirements for the courses, the goal is to engage and challenge the students to explore questions rather than to expect answers from the instructor(s). To promote this spirit of active engagement and inquiry, enrollment in the Honors Program Special Topics Courses will be limited to 20 students.

Faculty members interested in teaching such a course to Honors Program students in the Fall 2007 semester are urged to send a brief description of the proposed topic in Microsoft Word format by e-mail to the Honors Program (nicole.levard@carnegie.gatech.edu) by March 2. It is requested that prospective faculty have tentative approval to teach the course from the school chair.

The Honors Program Advisory Committee selects several proposals to be developed as Special Topics Courses. Faculty members teaching Honors Program courses will be offered stipends for professional support.

For questions about the Honors Program, visit www.honorsprogram.gatech.edu.

Volunteers needed for study
The Center for Assistive Technology and Environmental Access (CATEA) is seeking volunteers for a computer workstation research study to collect information for use in the development of a new workstation to help computer users with chronic low back pain.

During the session, researchers will adjust the workstation to body size, and volunteers will be asked to do typical computer-related tasks.

The research session lasts approximately three hours and will be recorded on videotape for later analysis. Volunteers will be compensated, and sessions are being scheduled through March 9.

Researchers are seeking volunteers between the ages of 18 and 65, who average at least 10 hours of computer use per week, weigh less than 250 pounds and have touch typing skills. Preference will be given to volunteers who have chronic, recurring episodes of low-back pain or discomfort.

For more information, call Charlie Drummond at 894-4960 or e-mail fociustudies@coa.gatech.edu.

Seeking instructors for GT1000
The Office of Success Programs is seeking volunteer instructors to teach sections of GT1000 Freshman Seminar for Fall 2007. The seminar helps freshmen adjust to college life, learn about their major and related careers, and introduces them to campus resources. Sections are small, with 24-30 students, and are assisted by upperclassmen team leaders. Research has shown that students who take GT1000 do better academically (higher GPA) than those who do not, and are more likely to persist to graduation than those who don’t take the course.

Instructors can be from any department (discipline or service) at Georgia Tech, provided they hold a master’s degree, have been employed at Georgia Tech for at least one year and obtain their supervisor’s support. For more information, visit www.gt1000.gatech.edu or contact Amy Stalzer, interim director of Success Programs, at 894-1970.