THE WHISTLE

Searching for the unknown: making the case for space travel

Jane Sanders
Research News

When the Space Shuttle Columbia disintegrated 40 miles above the Earth on Feb. 1, the debate heated up again.

With so much turmoil and so many needs on Earth, is the NASA space program worth the risk and the money? Is exploring and conducting research in space vital?

Researchers at Georgia Tech — which has a 45-year history of pioneering contributions to the space program — say yes. They make a passionate case for humanity's unquenchable thirst for exploration and knowledge.

"It is man's nature to explore, and it always has been," says Professor Paul Neitzel of the School of Mechanical Engineering. "Anytime in human history, when significant things were accomplished, man was exploring.... Now we are exploring this last frontier of space, the deep ocean and Antarctica. All of these are dangerous and costly places to explore. But I don't think mankind is willing to sit back and say, 'We know everything we need to know.' People will always want to know what's out there."

Researchers also cite far-reaching technologies that have resulted from NASA missions. Others note the research opportunities that are only afforded by conditions outside Earth's atmosphere. These researchers exude excitement over their own scientific findings, and they are hopeful about the future of space studies. But even among supporters of a strong space program, opinions vary about the direction that future research should take. Amidst the debate, researchers realize they must justify their work to the taxpayers who foot the bill.

NASA's $15 billion annual budget is relatively small in comparison to other federal programs, notes Professor Paul Steffes of the School of Electrical and Computer Engineering. With a population of about 300 million Americans, the investment in NASA is $50 a year per citizen.

"The question is," he says, "'Are we providing Americans with not just knowledge, but knowledge that is of use or inspiration for that cost?' My answer is yes, but we have to continue to work hard to maintain that level of importance to the taxpayer and the scientific community."

Why explore the heavens?
"There is an element of human curiosity that has to be satisfied," says retired U.S. Air Force Gen. George Harrison, now research director of the Georgia Tech Research Institute (GTRI). "Why did Columbus set sail to the West? He wanted to prove his theory.... In 1957, the space program was initially formed to map the Earth.... Then we wanted to

Popular Library West Commons boosts traffic

Faculty/staff open house planned Sept 9-10

Sean Selman
Institute Communications and Public Affairs

The number of visitors to the Georgia Tech Library and Information Center is up by about 56 percent, largely due to the success and popularity of the Library West Commons (LWC).

Associate Director for Public Services Crit Stuart said that, during the past 12 months, 830,000 people visited the library. About 95 percent were Georgia Tech students.

"This is a staggering increase over the previous year," Stuart said. "We attribute almost all of it to the drawing power of the LWC and to having the west building open 24 hours a day, five days a week."

"We've had a terrifically successful first year of operation
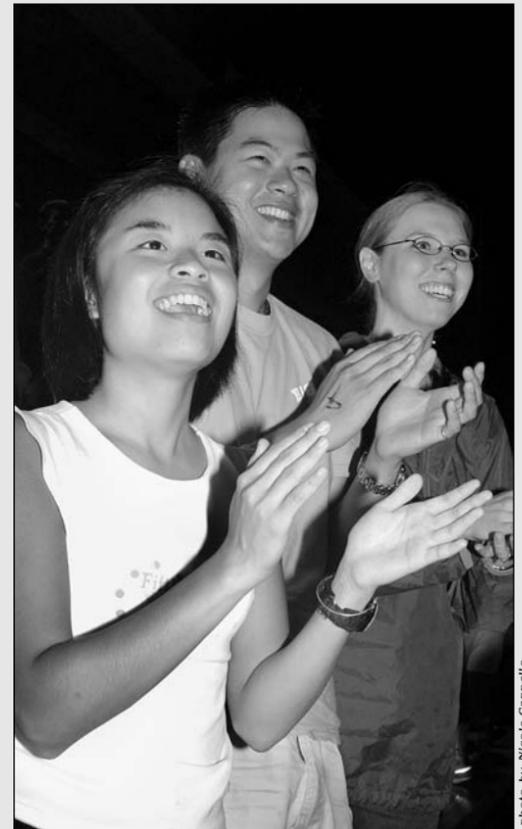
A late afternoon shower didn't dampen the spirits of nearly 1,500 Georgia Tech students and boosters, who turned out last Thursday night to watch the nationally televised season opener against Brigham Young University on the big-screen BuzzVision at Bobby Dodd Stadium.

Despite leading at halftime, the Jackets' defense was worn down in the second half, spending nearly 40 minutes on the field in a 24-13 loss.

Tech will take the field this Saturday afternoon for its home opener in the expanded, 55,000-seat stadium — against Auburn University. The game is sold out.

photo by Nicole Cappello

Tech names campus director of Homeland Security

Michael Hagearty
Institute Communications and Public Affairs

In an era when security planning and rapid response can mean the difference between life and death, Georgia Tech is taking steps toward creating a central security command center, bringing a measure of uniformity to a campus with disparate needs.

Working with the Georgia Tech Police Department, Bob Lang is taking charge of emergency preparedness on campus. Last month, Police Chief Teresa Crocker named Lang as Tech's new director of homeland security.

"Bob will be responsible for implementing programs and projects in emergency planning, training, response and recovery," Crocker said. "His mission is to prepare the campus to respond and recover from any type of emergency or disaster."

Lang will be a focal point, both directing the Institute's support to federal, state and local law enforcement, and acting as a liason between academic units and governmental requests. His position also gives him certain tasking authority over departments for operational support as some of his policies and projects begin to take shape.

"After 9/11, President Clough and I talked about the need for a position like this at Georgia Tech," he said. "We realized the need to coordinate the security activities that were becoming very visible in our daily regimens at Tech, along with taking a hard look at the possibilities and ramifications of a major incident on

learn more about what was in space."

The human desire to explore is probably the strongest motivation behind support of the U.S. space program's future, says Associate Professor John Olds of the School of Aerospace Engineering.

"Humans are natural explorers. We always want to find out what lies around the next unexplored corner of the universe," Olds observes. "The findings often have a direct impact on some of the most important questions we ask ourselves, 'Where did we come from, and where are we going?'"

How should we get there?
With consensus that a continued presence in space is worthwhile, researchers at Georgia Tech have varying perspectives on whether humans or human-made machines should explore and conduct missions in space. The issue is particularly debated with regard to Mars.

Robert Loewy, chair of the School of Aerospace Engineering, says, "There has always been a group, particularly in the science community, that has argued that good space science can be done less expensively if you do it unmanned. I personally believe that humans will never be content to live the space experience vicariously. There will always be a drive to have people be there and experience what can and must be done in space."

Thom Davis, a senior research scientist at GTRI, agrees that humans are superior to machines for many space missions. Yet, the researchers also cite the advantages of uninhabited aerial vehicles (UAVs). They can extend the capabilities of the space program, while lowering the costs and risks to humans.

"The cost of sending humans to Mars would require an investment of about $250 per taxpayer per year," Steffes says. "I'm not sure the American taxpayer would buy that, given that we have so many other needs."

Cost, rather than technological capability, may be the deciding factor on how NASA explores space.

Inherent hazards
Only humans can provide the public with an emotional attachment to space research and the ability to deal with the unforeseen, Harrison says. He acknowledges the risks and costs, but urges perspective.

"After 41 years in space, we have lost a relatively small number of people and spacecraft," Harrison notes. "The cost in human lives has made us more careful, but it has not stopped us. You have to consider the hazards inherent in other activities when you look at the cost of the space program. There's no comparison, for example, when you look at the space program versus the costs of the first 20 years of aviation."

What will the future hold?
Peering into a crystal ball and making predictions is not a comfortable activity for most researchers.

"Yogi Berra said, 'It's tough to make predictions, especially about the future,'" Loewy quips. "It seems that whenever you predict the short run, you overestimate, and for the long run, you underestimate."

Nevertheless, researchers like to imagine humanity's future in space. From supersonic transport to space travel to extraterrestrial life, the greatest achievements may lie ahead.

In 20 years, Loewy predicts humans will have devised a supersonic transport that will fly more quietly and efficiently than the current Concorde aircraft.

"I don't know whether we'll have a colony on the moon," Loewy adds. "Maybe that's one of the things that gets underestimated.... Maybe we will go to Mars, but definitely we'll have UAVs on Mars traversing its surface and exploring its atmosphere."

As for humans extending their permanent presence beyond Earth, researchers vary in their opinions on how and when, but not if, it will happen. Aerospace Engineering Professor Narayanan Komerath and his students envision a lively space-based economy where most trading and transactions occur between entities
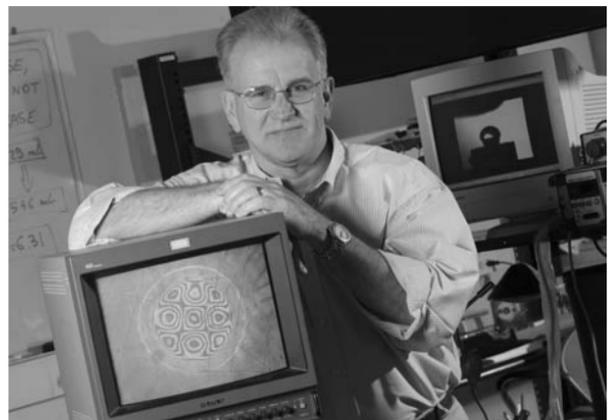
It is man's nature to explore, and it always has been," says Professor Paul Neitzel of the School of Mechanical Engineering. He has conducted research for NASA for nearly 20 years.

photo by Gary Meek

away from Earth.

"We want to communicate to people that space holds a future with careers and business opportunities," he says. "It's not just for test pilots, astronauts, government employees and even tourists."

Contemplating the future of humans in space produces excitement and hope in researchers, just as it has powered NASA's dreams for decades.

"This is what aerospace engineering is about," Komerath says. "You dream something and then figure out what might stop you from it — and how to get around that." ❑

| For more information... |
| **Research Horizons** |
| gtresearchnews.gatech.edu/reshor/ rh-ss03/default.htm |

with the LWC," Dean Richard Meyer said. "What we hope to do now is popularize the area among the faculty, so that class assignments and tutoring opportunities are further explored."

To introduce faculty and staff to the LWC, an open house will be held 2-5 p.m. Sept. 9 and 10.

"Visitors will get an in-depth look at the capabilities of the Multimedia Center and Productivity Area, meet expert staff and user assistants, and learn more about our information and instruction services," Librarian Cathy Carpenter said.

"In the past year, enterprising faculty have placed teaching assistants in consultation cubicles for just-in-time student tutoring," she said. "Staff in the Multimedia Center also collaborate with faculty to provide technological assistance for student projects that would otherwise be difficult to support. The open house is intended to increase awareness of the LWC and its potential for positively affecting student success." ❑

| For more information... |
| **Library West Commons** |
| www.lwc.gatech.edu |

photo by Nicole Cappello

Tech's student newspaper, The Technique, referred to the LWC as "among the best renovations in recent memory."

Recent graduate scores DHS fellowship

Elizabeth Campell
Institute Communications
and Public Affairs

Recent Georgia Tech graduate Blair Dowling, who is as passionate about mathematics as she is about Ultimate Frisbee, will soon become part of a much different team. The U.S. Department of Homeland Security (DHS) has selected her to receive one of 100 fellowships in the new Homeland Security Scholars and Fellows Program.

More than 2,500 students nationwide applied for the 100 openings available to undergraduate and graduate students studying a variety of disciplines related to the scientific and technological innovations that can be applied to the DHS mission.

In May, Dowling graduated with degrees in applied mathematics and computer science and a minor in economics. She'll use the three-year graduate fellowship, which includes a stipend and full tuition, to pursue her doctoral degree in mathematics at Princeton University. As part of the fellowship, she will be required to complete an internship with DHS the summer after her first year.

Dowling, who graduated from Tech with a perfect 4.0 grade point average, was also a finalist for the Rhodes Scholarship, and winner of the Phi Kappa Phi Scholarship Cup, awarded each year to the graduating senior with the best scholastic record in the class.

"I fell in love with math at a very early age," said Dowling, who plans on a career as a professor of mathematics. "Initially my only goal was to make a contribution to theoretical mathematics – a beautiful result on a pedestal. Over the last four years, my goal has expanded to include the innovation of new applications of mathematics to societal problems – such as the HIV project I'm working on now. I'm looking forward to learning the foundations of mathematics at Princeton, and hope to be able to then teach them to the next generation."

As an undergraduate, she pursued several research projects. She worked on a joint Georgia Tech-Emory University research project with Dana Randall, associate professor in the College of Computing and adjunct in the School of Mathematics, and Guido Silvestri, assistant professor of medicine at the Emory Vaccine Research Center and Yerkes National Primate Research Center. The project's goal is to develop a mathematical model of HIV infection in vivo, allowing biologists to visualize the progression of the disease.

"Blair completely embodies the type of student that made me want to become an academic," said Randall. "She demonstrated such extreme professionalism and scientific integrity in our HIV modeling research project that it is hard to believe that she was still an undergraduate. Her enthusiasm and dedication elevated this joint Georgia Tech-Emory project to a level far beyond our original expectations, and we were incredibly fortunate to have her work with us."

Despite her heavy academic load, Dowling found time for extracurricular activities as well. She played on the Georgia Tech Women's Ultimate Frisbee team and additionally served as captain of an intramural ultimate team all four years. ❑

photo by Nicole Cappello

At the Student Honors Luncheon this past spring, Dowling was awarded the Phi Kappa Phi Scholarship Cup as the graduating senior with the best scholastic record in her class.

For more information...
Homeland Security Scholars and Fellows Program
www.orau.gov/dhsed

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any of the Tech properties."

Lang, who has worked at the Georgia Tech Research Institute (GTRI) as the director of research security for the past 15 years, has already begun to conduct a risk assessment of the campus.

That information, he said, is a key element of his top priority: constructing a comprehensive emergency plan for the campus. Developed with input from each of the building managers on campus, this "Incident Command System" will outline a response to a variety of scenarios, and suggest the best safety plan to enact should a crisis emerge.

Given the considerable task of securing a 400-acre campus, Lang believes the best way to ease concerns and reduce uncertainty is in "consolidating security efforts to have one plan for all groups."

Though the thought of increasing security levels may seem incongruous in a university setting, Lang said that a uniform planning and response system will not only help protect the campus community, but also give outside emergency responders a sense of what to expect in dealing with hazards.

As far as visible changes, Lang said the campus should expect to see more facilities requiring card reader access and greater video surveillance. He is also developing a system of signage — small flat-screen monitors at key locations across campus — that would provide information regarding potential threats and actions to take as a result.

The system, he says, would also incorporate a color-coded threat assessment similar to the one used by the federal Department of Homeland Security. The difference here, he says, is that if the threat level changes, specific information can be beamed quickly to each of the flat-panel displays.

"Bob and I have agreed that GT Homeland Security will be viewed as one of the top 10 Homeland Security departments in the country in the next few years," Crocker said. "We have a lot to do." ❑

photo by Nicole Cappello

Robert Lang, Tech's new director of Homeland Security

For more information...
Homeland Security
www.police.gatech.edu/homeland.htm

IN BRIEF:

Containing an outbreak

With the proliferation of recent worms and viruses operating on the Georgia Tech campus network, the Office of Information Technology (OIT) is reminding faculty and staff about the things that can be done to limit the damage.

In an e-mail sent out to campus recently, OIT underlined the importance of these preventative safeguards, noting, "Successful worm and virus outbreaks impair networks by blocking access or increasing the time it takes to transfer data across a network connection. It is imperative that everyone on campus take appropriate actions to secure their systems from current and future outbreaks."

For its part, OIT mentioned several things it had done to secure campus systems, which included blocking several ports within the Microsoft operating system being exploited by the bugs.

OIT also issued several recommendations for the individual to take, both in response to the most recent attack and to prevent future outbreaks:
• If your system is currently infected, you must make sure it gets disinfected.
• Immediately update your computer's security software.
• Download and configure anti-virus (VirusScan) and personal firewall (ZoneAlarm) software from the OIT software distribution web page (**www.oit.gatech.edu/software**).
• Do not open any e-mail attachments from senders you do not recognize.
• Some viruses and worms send infected messages that appear to come from familiar e-mail addresses; therefore, care should be taken before opening attachments that are not expected. More information and guidelines can be found at **www.security.gatech.edu**.

Further, OIT suggests that any computers that are running Windows and have not installed the current patches go to the Microsoft Web site and download the latest security patches.

If additional help is needed, call OIT's customer support at 894-7173.

Complete rankings — 2003 U.S. News and World Report

Overall Universities: 37th
Public Universities: 9th
DuPree College of Management: 36th
College of Engineering: 5th

Specialty rankings – business
• Production/Operations Management: 13th
• Management Information Systems: 22nd
• Quantitative Analysis/Methods: 7th

Specialty rankings – engineering
• Aerospace: 2nd
• Biomedical: 7th
• Chemical: 12th
• Civil: 4th
• Computer: 6th
• Electrical: 7th
• Environmental: 7th
• Industrial/Manufacturing: 1st
• Materials: 9th
• Mechanical: 6th