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 Feiticez 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 1597, the space program was initially formed to map the Earth.... Then we wanted to map the Earth miles above the Earth on Feb. 1."

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Tech names campus director of Homeland Security

Michael Hagerty
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 centralized 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.

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Space, cont’d from page 1

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. Personally, I 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 perspicacity.

“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, especi-

ally about the future,’” Loewy quips. “It seems that whenever you predict the short run, you overesti-

mate, 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 quickly 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 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.”

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.

Open House, cont’d from page 1

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 2:30 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...

Research Horizons

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Tech’s student newspaper, The Whistle, referred to the LWC as “among the best renovations in recent memory.”
Recent graduate scores DHS fellowship

Elizabeth Campell
Institute Communications and Public Affairs

R ecent Georgia Tech grad-
uate Blair Dowling, who
is as passionate about
mathematics as she is about
Ultimate Frisbee, will soon
expect to see more facilities
become part of a much differ-
ent 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 under-
graduate and graduate students
studying a variety of disciplines
related to the scientific and
technological innovations that
can be applied to the DHS mis-
sion.

In May, Dowling graduated
with degrees in applied mathe-
matics and computer science
and a minor in economics.
She’ll use the three-year gradu-
ate fellowship, which includes a
stipend and full tuition, to
pursue her doctoral degree in
mathematics at Princeton
University. As part of the fellow-
ship, 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
depth average, also attended
Phi Kappa Phi Scholarship
Cup as the graduating sen-
ior with the best scholastic
record in her class.

that she was still an undergrad-
uate, “Her enthusiasm and dedi-
cation elevated this 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 pro-
gression of the disease.”

“Blair completely embodies
the type of student that made
me want to become an academ-
ic,” said Randall. “She demon-
strated such extreme profes-
sionalism and scientific integrity
in our HIV modeling research
project that it is hard to believe
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 pro-
fessor of mathematics. “Initially
my only goal was to make a contribu-
tion 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
totality 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 pro-
jects. She worked on a joint
Georgia Tech-Emory University
research project with Dana
Randall, associate professor in
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