# Georgia Tech advances potential commercial space flight system

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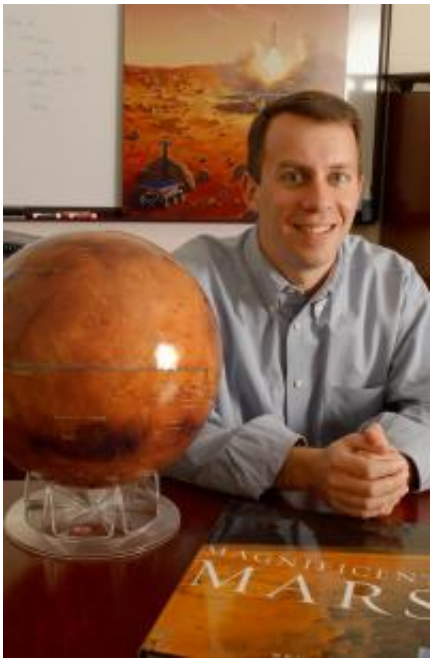

Dr. Robert Braun, the David and Andrew Lewis Associate Professor in Space Technology in Georgia Tech's Guggenheim School of Aerospace Engineering.

(Phys.org) -- Last spring private industry successfully sent a spacecraft carrying cargo to the International Space Station. Now the race is on to see which company will be the first to make commercial human spaceflight a reality.

Sierra Nevada Corporation (SNC) is one of three companies that will

receive hundreds of millions of dollars to further develop its commercial human spacecraft system, NASA announced earlier this month.

SNC has turned to Georgia Tech for expertise on how to ensure the smoothest possible re-entry for its spacecraft, the Dream Chaser, which is reminiscent of NASA's space shuttle.

Robert Braun, Georgia Tech professor of space technology, and his research team – Research Engineer Jenny Kelly and engineering graduate students Zach Putnam and Mike Grant – are working with SNC on the design of an advanced guidance algorithm that will make the most of the Dream Chaser's superior aerodynamic performance during re-entry and landing.

Of the three companies selected by NASA to develop spaceships to taxi astronauts to and from the International Space Station, Sierra Nevada Corporation is the only one with a winged vehicle. It is designed to launch vertically and land on a runway, similar to the Space Shuttle. Boeing and SpaceX are developing capsules that would land in a body of water.

Because the Dream Chaser is similar to the Space Shuttle, it could land using the same guidance algorithm the shuttle used. However, that algorithm, like the shuttle, is based on technology that is more than 40 years old; it does not take advantage of the onboard computing available for today's space systems.

"The shuttle was built in the 1970s, and its designers didn't have the onboard computing capabilities we have today," Braun said. "The Dream Chaser can capitalize on an advanced entry guidance algorithm matched to its aerodynamic and onboard computing capability."

Braun and his team took the Dream Chaser's aerodynamic configuration,

control surfaces and mass properties into account when developing the algorithm. To date, the algorithm runs a computer simulation that allows SNC engineers to tweak aspects of the spacecraft design based on scenarios such as variable atmospheric conditions to perfect the landing process.

The result is an algorithm that "allows the vehicle to fly how it was meant to fly," Putnam said.

Georgia Tech engineers delivered an early prototype of the software to the SNC team this month for detailed evaluation and testing.

Zachary Krevor, a Georgia Tech graduate who is SNC's principal systems engineer with the flight dynamic and performance group, was eager to see the results.

"This is important for us because we feel the algorithm could have performance benefits for our vehicle and make it robust to atmospheric disturbances while ensuring we have a 'low g' re-entry," he said. "Capsules do not have the 'low g' re-entry that is so important for both astronauts and sensitive science payloads."

For the students, the project provides real-world experience in the nascent commercial space industry.

"To be able to participate in the new era of commercial flight is very exciting," Grant said. "It has been a great learning experience to see how commercial space companies work and a real thrill to contribute in a meaningful way to the potential flight of this new space flight system."

Sierra Nevada Corporation's Dream Chaser received an award of $212.5 million from NASA's Commercial Crew Integrated Capability Program on August 3 that will allow the company to complete development of the

system and transport crews to space as early as 2016. An approach and landing test for the Dream Chaser is scheduled for later this year.

Provided by Georgia Institute of Technology