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Cedarville Students Aim for the Sky at NASA Competition

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CEDARVILLE, OHIO -- Students from the Cedarville University School of Engineering and Computer Science have designed automobiles, planes and boats for competitions. At the 2022 NASA Student Launch in April 2022, they will add rockets to the list.

Chad Sanderson of North Huntingdon, Pennsylvania, a senior mechanical engineering student, first learned of the NASA competition last year. He was looking for ideas for his senior design project, required for senior engineering students, when a high school friend who is attending Carnegie Mellon University told him that his university was competing. Sanderson recruited classmates at Cedarville to join him in the competition, and they began researching the NASA competition and rocket building.

"We can go there and represent Cedarville, represent Christ and represent our faith to a lot of the other student teams there," said Dr. Thomas Ward, an associate professor of mechanical engineering and the faculty advisor for the senior mechanical engineering students. "Although we hope to perform well at the competition, the witness is more important than winning."

In addition to Sanderson, who is leading the team and designing the motor mount, Cedarville's team also consists of seniors **Jacob Titus of Medford, New Jersey**, who is leading work on the aerobrake system; **Peter Duttweiler of Montgomery, Texas,** and **Nehemiah Branson of Kingston, Ohio,** who are working on the rocket payload; **Dawson Tso of Dublin, New Hampshire**, who is leading work on rocket recovery and safety; **Forrest Putnam of Glenwood, Washington**, who is leading work on the nose cone and simulations; and **Grant Dupler of Amanda, Ohio**, who will be leading construction of the body and fin. The team also includes two juniors, with **Grace Fearday of Kettering, Ohio,** working on rocket avionics and **Stuart Nowery of Lebanon, Ohio**, testing and modeling the rocket. Sophomore **Josh Lukawski of Wantage, New Jersey**, will also work on rocket modeling. Finally, the team includes two freshmen, with **Daniel Hogsed of Dayton, Ohio**, leading work on the sub-scale rocket and **Joseph Copeland of Hamilton, Ohio**, working on rocket construction.

Ward is joined by professor of electrical engineering Dr. Tim Tuinstra, who is the faculty advisor for the senior computer engineering students.

The team chose the name "Forerunner" for their rocket. The name recognizes both their first-year status and hopes for future teams.

"We not only want to try to do our best to win the competition this year, but we also want to prepare future teams to excel," Sanderson said.

The Forerunner will be constructed out of fiberglass, which has a high strength-to-weight ratio, and have an approximate length of 8-10 feet, a width of 5½ inches and weight of 35 lbs. It will be equipped with an altimeter and potentially include cameras on the nose cone, while the payload will contain sensors and a computer to keep track of the rocket as it flies.

They estimate they will reach Mach 0.6 speed, which is about 450 mph, and 5,500 feet of altitude.

The team is aiming to hit three main criteria. First, they want the rocket to launch and land safely. Next, they hope the rocket is as close as possible to their estimated altitude. Finally, they hope the rocket's payload lands in the area they designate.

Between now and the competition, the team has much to do to prepare. During the fall semester, team members plan to build a subscale rocket, research rocket stability and test their payload. They also want to work on the Forerunner's design so they can start building it as early as possible in the spring semester.

As they're working on the rocket, team members will also submit a series of reports to NASA. They have already submitted one report, the initial proposal, and they have three more to write. According to Putnam, each proposal is around 250 pages.

Additionally, to fulfill competition requirements, the team needs to participate in STEM engagement activities with high school students.

"The goal of this project is to get more people interested in rocketry and areas of STEM," Tso said. "I view it as an excellent way to get people engaged in the science and application of rockets in tangible ways."

Ahead of the competition, the team members will need to test the Forerunner. For this, they'll be working with a local rocketry club called the Wright Stuff Rocketeers. The coach from this club has a certification from the National Association of Rocketry (NAR), required by the competition rules, allowing the team to test launch rockets at this high impulse class.

Finally, in April, at least the team's seniors, and hopefully more, will arrive at the 2022 NASA Student Launch in Huntsville, Alabama. Over the course of four days, they'll have one opportunity to launch the Forerunner, while also presenting on their rocket.

Located in southwest Ohio, Cedarville University is an accredited, Christ-centered, Baptist institution with an enrollment of 4,715 undergraduate, graduate and online students in more than 150 areas of study. Founded in 1887, Cedarville is one of the largest private universities in Ohio, recognized nationally for its authentic Christian community, rigorous academic programs, including the Bachelor of Science in Mechanical Engineering program, strong graduation and retention rates, accredited professional and health science offerings and high student engagement ranking. For more information about the University, visit cedarville.edu.

Written by Bryson Durst.