



# The NASA Human Exploration Rover Challenge



Student competitors from Buckhorn High School in New Market, Alabama, took home the high school division's first place award in the 2018 NASA Human Exploration Rover Challenge. (NASA/MSFC/Emmett Given)

The NASA **Human Exploration Rover Challenge**, one of the agency's flagship **Artemis Student Challenges**, has transitioned to a virtual event for its 2020 season – part of NASA's COVID-19 response, in keeping with recommendations by the U.S. Centers for Disease Control. NASA's top priority is to safeguard student teams, its own workforce and all those supporting the annual student engineering event, which was set to be held April 17-18 at the U.S. Space & Rocket Center in Huntsville, Alabama.

NASA will welcome teams back to Huntsville in 2021 to help celebrate the 50th anniversary of the Lunar Roving Vehicle's first operations on the surface of the Moon.

The popular competition, entering its 26th year in 2020, challenges student innovators around the world to build, test and drive lightweight, human-powered "rovers" of their own design and perform mission tasks along the way – similar to the **Apollo**-era lunar roving vehicles first developed to traverse areas of the Moon.

The competition is organized by NASA's **Marshall Space Flight Center** in Huntsville. It celebrates a



half-century of engineering history – and NASA's **Artemis**-era pursuit of bold new discovery missions to the Moon, Mars and beyond. The event integrates the nation's ambitious plans for solar system exploration with practical engineering skills, innovative design and real-time decision-making that complement students' classroom STEM curricula – science, technology, engineering and mathematics courses.

More than 100 high school, college and university teams from across the country and around the world registered for the 2020 event. Recognizing the hard work many of them have already completed, NASA and its partners will present numerous awards during a virtual ceremony to reward top achievements among participating teams.

## The Challenge

Scheduled around the traditional U.S. school year, the challenge typically begins during the fall term, when NASA releases the competition year's guidebook, and teams begin soliciting sponsors and design and build their rovers and task materials. Each team may include up to six students and a faculty advisor. High school students square off in one division; college and university teams compete in another.

Each vehicle must be powered by one male driver and one female driver across a winding, half-mile-long course of rock, gravel, sand and other materials simulating planetary surface formations. Top prizes during regular competition are awarded to the three teams in each division that complete the course with the highest point totals.

Teams must approach the challenge like mission planners and explorers. A complete list of competition rules and requirements is available online:

<https://www.nasa.gov/roverchallenge/guidebook>

NASAfacts

## Prizes and Awards

Top competition prizes normally are awarded to the three teams in the high school division and three in the college division that post the most points, factoring in pre-excursion inspection results, successful navigation of obstacles and completion of tasks, minus any assessed penalties.

The Rover Challenge will conduct a virtual awards ceremony for those teams which have completed key aspects of the challenge. Teams will be able to join the ceremony online as a group or from individual locations. NASA will provide participants with event details as soon as possible.

Teams who submitted their project reports for award consideration by March 6 will be eligible for the following awards:

- The **Technology Challenge Award** includes a trophy for a single winning team, either in the high school or college/university division, which best addresses the challenges associated with innovative wheel design and fabrication. Teams must take into account safety, surface adaptability, durability and strength, traction, flotation, overall performance and other factors.
- The **Drivetrain Award** includes a trophy for a single winning team which best addresses the challenge to create an innovative drivetrain, the system that transfers the drivers' input energy to the wheels.
- The **Systems Safety Award** is a trophy, presented by the Tennessee Valley Chapter of the International Systems Safety Society, for the team in each division judged to best exemplify system safety practices – the application of engineering and management principles, criteria and techniques that optimize safety.
- The AIAA Best Report Award is presented by the Greater Huntsville Section of the American Institute of Aeronautics and Astronautics to the team in each division for the best overall report detailing its rover-building experience. Winning reports include detailed logs of the rover construction schedule, processes, budget, technical challenges and resolutions, plus biographical material about all team members and their advisor.
- The **AIAA Telemetry/Electronics Award** includes a trophy for the team in each division which develops the most innovative and useful real-time telemetry systems for operation during their course runs.
- The **Neil Armstrong Best Design Award** is awarded by the AIAA's Greater Huntsville Section to the team in each division whose rover is deemed best designed to meet competition

performance requirements. A prize also is awarded to the team whose rover design represents the best technical approach to engineering a terrain navigation solution. The award is named for Apollo 11 astronaut Neil Armstrong, who became the first human being to set foot on the Moon during that historic 1969 mission.

- The STEM Engagement Award is presented by NASA to one team in each division for inspiring others in its community and local schools to pursue the study of engineering design and other STEM topics. Teams may conduct a variety of classroom or public activities at their education events.
- The **Task Challenge Award** is presented by NASA to one team in each division for the best technically designed tools which could be used by lunar and Martian rovers to retrieve samples while on their respective surfaces – helping to improve 3D manufacturing technology for future space missions.

\* Awards listed in bold text require a virtual presentation for eligibility. Video teleconferences will be scheduled with each team to conduct their presentations.

## More about the Rover Challenge

The NASA Human Exploration Rover Challenge builds on the legacy of the NASA Great Moonbuggy Race. Six college teams participated in the first competition in 1994, commemorating the 25th anniversary of the Apollo 11 lunar landing. Expanded in 1996 to include high school teams, the competition evolved in 2014 into its current form. Since its inception, more than 13,000 students have participated.

Organized by Marshall's Office of STEM Engagement and sponsored by NASA's Human Exploration and Operations Mission Directorate and Office of STEM Engagement in Washington, the Rover Challenge seeks to inspire future ranks of scientists, technicians, engineers and mathematicians – the Artemis Generation explorers who will carry on the nation's mission of discovery in the decades to come. The U.S. Space & Rocket Center, Marshall's official visitor center and event partner, hosts the competition each year.

To learn more about the Rover Challenge, visit:

<http://www.nasa.gov/roverchallenge>

For more information about NASA's Artemis Student Challenges, visit:

<https://www.nasa.gov/stem/artemis.html>

For information about other NASA education programs, visit:

[www.nasa.gov/education](http://www.nasa.gov/education)

National Aeronautics and Space Administration

George C. Marshall Space Flight Center

Huntsville, AL 35812

[www.nasa.gov/marshall](http://www.nasa.gov/marshall)

[www.nasa.gov](http://www.nasa.gov)

NASA Facts