

THE BIG SKY



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MSU student robot to dig 'moon dirt' in NASA contest

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MSU News Service

A Montana State University robot that sometimes had a spooky mind of its own is at the Kennedy Space Center to see if it can dig more moon dirt than any other student-built robot.

In a May 27-28 competition sponsored by NASA, an MSU engineering student will remotely steer the 120-pound robot through a giant sandbox so it avoids craters and rocks then removes as much simulated moon dirt as possible in 15 minutes.

The simulated dirt — officially called “regolith” — is different from the sand on a Florida beach or the outdoor

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volleyball court where the MSU students tested their robot in a May snowstorm. Since erosion doesn't occur on the moon like it does on Earth, the top layer will be like powdery glass that's extremely loose and super fine. The soil beneath will be small, sharp, jagged particles that can clump together. It's almost as hard as concrete.

If MSU wins NASA's first Lunar Regolith Excavator Student Competition, it will receive \$5,000 and the opportunity to return to the Kennedy

Space Center to watch a launch.

If MSU's robot, “Montana MULE,” doesn't dig the most dirt and the MSU team doesn't dazzle with its spirit, robot design, video and project presentations — other contest categories — the students said they will still have gained valuable experience from the project

John Ritter observes “Montana MULE” to see what needs to be done before the robot competes in a national contest at the Kennedy Space Center. Six MSU students and a faculty adviser will be in Florida for the NASA competition.

that spanned two semesters. Representing three departments and five majors in the College of Engineering, the team of eight students said the project taught them how to communicate their ideas across specialties — a skill they'll need when they become practicing engineers. They also worked together to design and build a robot that MSU faculty said is much more complex than senior capstone projects in past generations.

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MSU PHOTO BY KELLY GORHAM

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The robot that stands about five feet tall is mostly recycled aluminum, rolls on four wheels and incorporates several systems instead of just one. The students run it by using wireless technology and the controls for an X Box 360 computer game. The wireless technology talks to the robot's electronics system. The electronics system turns a motor on and off. The motor turns a chain that moves small buckets below the level of the wheels. The buckets — moving as though they were the seats on a Ferris wheel — dig the soil, take it along for the ride and dump it into the robot's hopper.

NASA said the purpose of the regolith competition is to retain students in science, technology, engineering and math. The contest may also result in innovative ideas and solutions that could be applied to actual NASA excavations.

NASA gave students some general guidelines for their robot. Besides

weight, height, power and communication constraints, Montana MULE couldn't do anything that astronauts couldn't do on the moon. Since suction doesn't exist on the moon, MSU couldn't invent a robot that contains a powerful vacuum cleaner.

To meet those stipulations, the MSU students met last fall to design the robot.

"We had complete free-rein," said student Craig Harne, of Cutbank. "We had free-rein to do whatever the heck we wanted. It's pretty rare that you get to do that."

"That's why it looks the way it does," added student Steve Pemble, of Billings.

In early tests, the robot started moving on its own during outreach presentations. Faculty adviser Brock LaMeres said it was an intimidating occurrence that sometimes required four team members to take it down and regain control. Later in the year, the stu-

dents displayed their robot without incident at the spring engineering design fair. In early May, they demonstrated the robot to engineering alumni who returned to campus for graduation. Just before shipping the robot to Florida, they tested it in the volleyball courts near the Roskie and Hedges residence halls.

"I was very impressed with how it turned out," LaMeres said. "The sophistication of the mechanical design was very impressive. I couldn't have envisioned something that complex and sophisticated and operational." He added that the robot is one of the largest interdisciplinary projects in the College of Engineering and maybe in the entire university.

Six students and LaMeres will be in Florida for the regolith contest. LaMeres learned about the competition last year while attending a NASA workshop. He brought

back the idea to MSU and obtained NASA funds for materials.

The students said they won't know exactly when they'll compete, but it will be sometime May 27 or 28. They'll have 30 minutes notice, then they'll have 10 minutes to move their robot to the sand, 15 minutes to compete and five minutes to remove their robot from the sand. They only have one chance to perform. Approximately 22 robots will participate, with two competing every hour.

No one knows how they'll do. It's possible Montana MULE will display its old independent spirit. Some robots in the competition may not even start.

But the students said the experience has been a great opportunity, and they'll see what happens.

"I'm not as nervous as I was," said student Ben Hogenson, of Billings. "I think we will have a pretty good chance."