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HEART OF MONTANA

Eleven students show that big talent comes from the state's smallest towns
The robot was having a hard time. Designed to dig in the dirt on the moon, it was bogging down in a sandy volleyball pit at Montana State University.

Computer science senior Justin Krohn of Kent, Wash., gunned the accelerator on the Xbox controller that operated the robot. Its lightweight wheels seemed to gain traction for an instant before the 150-pound robot went dead.

"Power cut out again," Krohn said.

Instantly, several sets of hands were prying at the robot's innards, bypassing circuits and trying to get power restored.

In just a few weeks, the bot—dubbed Montana Mule 2.0—would be defending MSU's moon-dirt-digging title at the Kennedy Space Center. Time to get all the systems working together was running out.

A few yards away, on the edge of the pit, was the team's adviser, Brock LaMeres, professor in the Department of Electrical and Computer Engineering.

LaMeres stood with his hands in his pockets, toeing the edge of the sand and offering quiet suggestions. Mostly, he let the students solve the problem themselves, but one look at his face said that—had it not been a good learning experience—he would have had his hands inside the robot right along with them.

"It was always hard for me to learn as a student when someone was just writing equations on the board for an hour," LaMeres said, sitting behind the big, immaculate desk in his Cobleigh Hall office.

A teacher needs to provide context, he said, something to help students see how the lessons fit into the world outside of college.

That is one of the reasons LaMeres has been so supportive of student research in general and, specifically, the two Montana Mule projects.

The first Mule competed in NASA's 2010 Lunabotics Mining Competition at Kennedy Space Center. Designed by six MSU engineering students as their senior design project, the Mule beat 22 other teams by digging more than 45 pounds of simulated moon dust. No other team even met NASA's minimum requirements.

More than winning, though, the trip to Florida let the students meet with scientists working on some of the same things they are studying at MSU.

"It really helps them see that there is a career track with advanced degrees," LaMeres said. "To hear a NASA scientist..."
break down a mission to the moon to the tiny component they're designing, it really gets them excited.

The students aren't the only ones getting excited, though, said Jennifer Hane, one of LaMeres' graduate students.

"He's like Emeril Lagasse in a classroom," she said, comparing LaMeres to the energetic TV chef. His enthusiasm, she said, comes out in front of the class with yelling, cheers and emphatic whiteboard slapping.

In addition to making students excited about the science—LaMeres' courses focus on digital systems and microprocessors—he helps them find career paths. Hane, who grew up in Fort Shaw, Wash., said she wouldn't have even considered graduate school if it weren't for LaMeres' encouragement.

Now, she is working with LaMeres on a project to design radiation-resistant computers for spacecraft, a project funded by LaMeres' three-year, $750,000 Competitive Research (EPSCoR) Experimental program for Stimulating Science in Undergraduates.

"It was really nice to see a student who is really getting excited and making an impact," Maher said.

His passion for engineering and teaching rubs off not only on the student but on a lot of "jaded old faculty members" too, Maher said.

"He is really in love with being a professor," he said. "I think all of us in academia do it because we like it, but when I see the glimmer in his eye or see his eyebrows go up when he talks about something his students are working on in the lab, you can just see that this is more than just a job."

It is still work, though.

"Teaching is a full-time job, and then some, and research is a full-time job, and then some," he said.

But in spite of the workload, he still finds in teaching the same heart-pumping excitement he felt the first time he walked in front of a classroom.

"I fell in love with teaching and decided I wanted to make it a part of my life," he said. "It's really a rush."

It's a love he was recognized for in January 2011 with a President's Excellence in Teaching award. LaMeres said he was honored to win the award, considering that he was still an untenured, junior faculty member. "I was in the presence of some good company," he said. "As an instructor, you often don't get a lot of feedback on how you're doing. But it is very rewarding to be told you're doing something right."

Their power problems solved, the Mule 2.0 team went back to work digging in the volleyball pit, one Xbox controller moving the bot, another controlling the digging buckets.

Motors whimpered and sand flew. Within a minute, the machine had dug as much as it could reach—then the power cut out again.

The students were annoyed, but LaMeres said, after stepping away from the competition for half a day, the MSU team decided to fix the Mule 2.0 and do a demo dig after competition ended. So, as all the teams began to pack up, the repaired Mule went into the arena and dug 27 kilograms (59 pounds) of regolith.

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"It wasn't official, but they felt really good about showing that their design was sound enough to improve upon last year if they hadn't had a mechanical failure," LaMeres said. "The team really showed some heart."