



# WWU Leaves no Stone Unturned in Robotics Competitions

BY MARY C. DILLON

To say the 38 students representing West Virginia University in NASA's summer robotics competitions left no stone unturned would be an understatement.

The robotics team, which included students from a variety of disciplines in the Benjamin M. Statler College of Engineering and Mineral Resources along with cadets from WWU's United States Air Force ROTC, Detachment, 915, traveled first to the Kennedy Space Center for the Lunabotic Mining Competition, held May 21-26. The following week, they were off to the Revolutionary Aerospace Systems Concepts Academic Linkage Exploration RoboOps or Mars Rover Competition, held at the Johnson Space Center, in Houston, Tex.

The lunabotics event featured 58 international teams of students, which were challenged to design and build a remote controlled or autonomous excavator called a lunabot, to determine which could collect the most simulated lunar soil within 10 minutes. The complexities of the challenge include the abrasive characteristics of the simulant, the weight and size limitations of the lunabot, and the ability to control the lunabot from a remote control center.

"The competition required two runs," said Powsiri Klinkhachorn, professor of computer science and electrical engineering in the Lane Department, who served as the team's advisor. "On our first run, we collected 100.8 kilos of regolith, the most of any team in all runs."

The team noticed, however, that the rear wheel was stalling and suspected an electrical failure. "We made improvements to the electrical system prior to the second run, but the rear right and front left wheels failed, due to a gearbox/axle failure,"

said Klinkhachorn. "This disabled the lunabot, preventing us from completing the second run."

The team didn't leave the competition empty-handed. WWU finished third in the Joe Kosmo Award for Excellence or grand prize competition, which goes to the team with the most points from all categories; finished second in the slide presentation and demonstration award category; and 10th in the on-site mining award competition.

From there it was on to Texas, where WWU joined seven other U.S. schools at the Rock Yard at NASA's Johnson Space Center. The competing teams each received a \$10,000 stipend to partially offset the cost of rover hardware and transportation costs to attend the event. WWU was in excellent company, joining teams from Cal Tech, University of Maryland, University of Pennsylvania, University of Texas, SUNY Buffalo, University of Utah, and Worcester Polytechnic Institute.

The rover, which featured carbon-fiber composite construction, six-wheel independent drive, four-wheel steering, and rocker-bogie suspension, was controlled remotely during the competition by students on WWU's campus in Morgantown, W.Va.

"The rover looked great during practice, able to climb 'Mt. Kosmo,' a challenging rock-strewn hill used to prove rovers' capabilities, and collect specimen rocks," said Ben Knabenshue, student team leader. However, the competition run did not go as well. "Unfortunately, one of the motor controllers' communications microchips failed shortly after starting the competition run, disabling the two front wheels."

Despite the disabled wheels, the WWU rover was able to collect a single sample at the beginning of the run.

"This challenge gave our team experience that cannot be taught," said Lt. Col. Jeremy Anfinson, commander, Detachment 915. "They faced challenges that can be expected in the real world, including teamwork dynamics, leadership challenges, scheduling pressures, and limited budgets."

"The team should be proud of its accomplishments," said former astronaut and WWU alumnus Captain Jon McBride, who was in attendance at the lunabotics competition. "No university on this planet did as well, collectively, as WWU did in the competitions."

WWU's team was sponsored by the NASA West Virginia Space Grant Consortium, the Benjamin M. Statler College of Engineering and Mineral Resources, the Lane Department of Computer Science and Electrical Engineering, the Department of Mechanical and Aerospace Engineering, and the U.S. Air Force ROTC. ●



Team effort — WWU engineering students, from left to right, Tim Godisart of Waynesburg, Pa., Ben Carrero of Philadelphia, Pa., Brenton Wilburn of Charleston, W.Va., and Jen Wilburn of Charleston, W.Va., work with Professor Powsiri Klinkhachorn on a robot used at the Revolutionary Aerospace Systems Concepts Academic Linkage Exploration RoboOps or Mars Rover Competition recently at the Johnson Space Center in Houston.