

The teams run the gamut, from underwater robotics to Formula SAE. Yet, like diverse siblings, they have a common origin—

Assistant Professor of Mechanical Engineering Ashley Bernal is faculty advisor for Make It Happen. Launched last fall, the program

“We’re training students who will change the world,” Balz says. “More than ever, they’ll think about using their engineering for good and to help people.” Helping solve real-world, humanitarian needs, he feels, “makes us better communicators, better team workers, better citizens.” (Read more about the [Make It Happen pilot project](#)

\_\_\_\_\_ , benefitting a Moldovan youngster with disabilities.)

Balz a \_\_\_\_\_ which helped them land internships. This summer, Balz is designing and testing components for SpaceX. “They were so excited about the MakerLab that I think that’s why we got hired. It demonstrates your passion for engineering when you create a project that you design rather than just an assignment.”

MakerLab, Make It Happen, and the Branam Innovation Center allow students to complement their classroom lessons with hands-on application and problem solving. As Bernal notes, “A lot of our students want to have a positive impact on

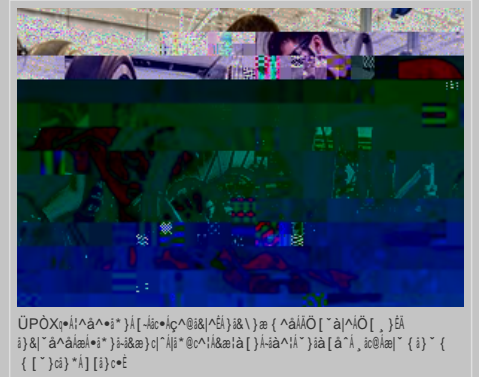
the world. Sometimes it doesn't take a lot of money to make a difference. They can benefit society—not just a for-profit venture.”

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### Efficient Vehicles Team Aims for 2,500 MPG

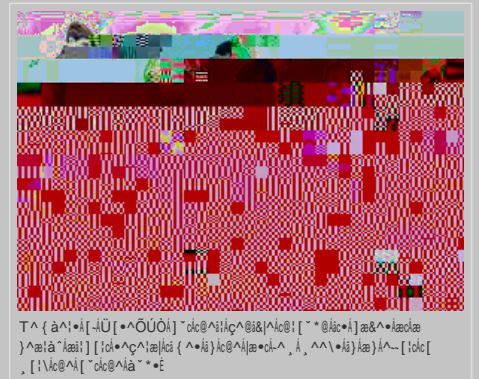
Their sleek racer sustained some damage in transit to Motor City, but the [Rose-Hulman Efficient Vehicles Team](#) repaired it with supplies and tools they'd brought with them and proceeded to compete April 22-24 in the [Shell Eco-marathon Americas](#). The RHEV squad is in elite company—the winning vehicle, from Quebec's Université Laval, logged 2585 mpg.

Rose-Hulman is one of only four colleges or universities to have competed in all 10 Shell Eco-marathons. This year's event drew a record 124 teams from seven countries: Brazil, Canada, Ecuador, Guatemala, Mexico, Puerto Rico and the United States. The RHEV entry resembles a recumbent bicycle on a carbon fiber chassis, with a small, ethanol-powered motor in the rear and a molded, aerodynamic body.



One of the lessons learned this year, says Sean Moseley, team advisor, is time management. “This year, the team simply did not do enough testing and shakedown. The problems they had at competition were solvable had they occurred a month before competition.” Designing and building a vehicle from scratch, he notes, “can be an exercise in project management, team dynamics, testing and refining, and systems integration. Having a good design on paper isn't enough—it has to be realized by everyone on the team.”

The design/build/compete cycle provides a wealth of real-life experience for the student engineers. The RHEV team has been led for the past two years by Jacob Rigelman, whom Moseley calls “the glue that kept the team together.” RHEV plans to be ready when the Shell Eco-marathon Americas returns to Detroit from April 28-30, 2017.





competition. More prep time, he notes, might have allowed the team to prevent the drive chain from coming off a sprocket during the endurance competition at Michigan.

The team's [Facebook page](#) allows alumni and friends to keep track of the team's progress. Several alumni turned out for the competition in May, including one who served as a judge.

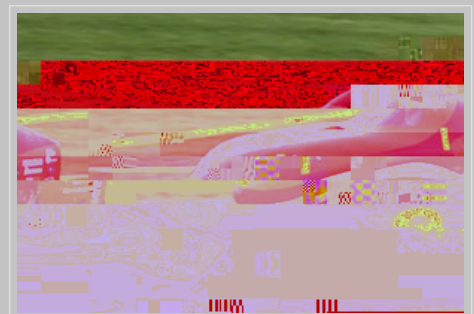
Kawano notes the encouragement such participation can give to students who put in long hours.

"If you're ever in the area during competition,

we encourage you to come out and see what the team has done."

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Yvonne Lumetta doesn't soft-pedal the challenges facing the Rose-Hulman Human-Powered Vehicle Challenge (HPVC) team May 13-15 at Athens, Ohio. "It was rainy at the start, and then it was windy. It was a good stress test for the bikes and for us." The students rose to the challenge, capturing second place overall and topping the field in design and men's sprint. The team also excelled at women's sprint (second) and innovation (third). "We had a blast," says Lumetta, a computer engineering/computer science major.



This year's human-powered vehicle incorporated several innovations, including an active aerodynamic wing to counteract crosswind instability.

The team also did well at the HPVC West event April 22-24, placing sixth overall out of about 30 entrants. Both HPVC competitions are sponsored by the American Society of Mechanical Engineers. Teams design and build a human-powered vehicle from the ground up using sound engineering practices, then race it in sprint and endurance events. Mason Lott, an avid cyclist who plans to participate all four years at Rose-Hulman, notes that not all HPVC competition takes place on the track. The documentation supporting the team's design work spans more than 30 pages, plus another 20 or so pages of appendices.

This year's vehicle sported several innovations, including an active aerodynamic wing to counteract crosswind instability. It's designed to sense wind speed and direction, adjusting automatically to keep the vehicle stable. "We could have used it in the [HPVC East] competition," he says. However, the motor failed days before the event and the wing was removed.

Also new for this year's vehicle was a motorized, adjustable seat designed to accommodate drivers who range in height from 5' 5" to 6' 5". Re-engineering of the vehicle's front sub-frame, which holds the wheel, tiller, drive train and other parts, solved a torquing problem by mounting it on four points rather than two.

Driving the human-powered vehicle isn't reserved for the most athletic students, says Lott. "Riding is a reward. If you help build it, you should get to ride it. We'll sometimes take turns riding it in the parking lot until three or four in the morning."

The team's greatest achievement, according to advisor John McSweeney, is that "learn a wide range of skills, many of which can't be taught in a traditional course: teamwork, budget management, fundraising, big-picture design decision making, the importance of advertising, public relations, and maintaining relationships with alumni and sponsors."

McSweeney, an assistant professor of mathematics, cites the importance of companies that sponsor the teams and the Branam Innovation Center. The Rose-Hulman HPVC team's [Facebook page](#) cites "Bruce Mueller and Rich and Gail Dovalovsky for donating their time and support to the team throughout the entire course of the year and especially in getting the bike to and from our competitions." The Dovalovskys' son, Jeff, participated on the HPV team while a student.

"We absolutely love our alumni," says Lott. "Four or five came to the East Coast competition to cheer us on and help us out. They're always willing to help, which is awesome." The team is already percolating ideas for next year's competition. "We do a lot of emailing and texting each other over the summer," Lott explains. "When we get together in September, we say 'Let's prototype this' or 'Let's try that.'"

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