



Photo by student Nathan Montgomery

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Alumnus Conru Funds Machines for Art-Meets-Robotics Project

Rose-Hulman students are getting the chance to combine art and robotics, thanks to the generosity of alumnus and entrepreneur Andrew Conru. The 1990 mechanical engineering graduate recently approached the school with an idea for making “something unexpectedly beautiful with robots.”

To that end, Conru donated \$50,000 to fund the purchase of two industrial robots for an art project which will give student design teams hands-on programming experience. The ABB SMART Education Package and Robai Cyton Gamma are slated to arrive on campus in March. Student design team members Charles Baechler, Eric Guilford and Sean Kling will tackle the robotic art project.

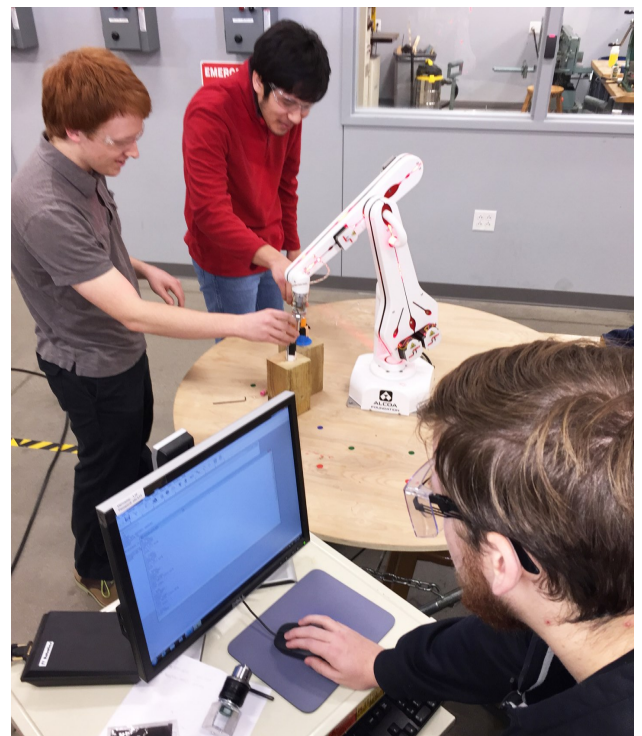
Using a webcam, the team will capture an image of a subject. They will then employ C++ Open CV code for image processing and computer vision programming to direct the robot to recreate the photograph as an oil painting. Beyond brush strokes, the robot will be programmed to choose and mix colors and clean and change tools as needed.

Dr. David Fisher, Rose-Hulman professor and alumnus (ME '00), is overseeing the capstone design group. He says that there is growing student interest in industrial robotics, and that learning to integrate robotics with programmable logic controllers (PLCs) is a very valuable, real-world skill. He would like to use this donation to not only “make something unexpectedly beautiful,” but also to increase the school’s ability to offer great hands-on content in industrial robotics.

“There’s talk of trying to do more with industrial robotics. We could potentially create new course material as soon as 2016,” said Fisher.

The two new robots will be installed in the Branam Innovation Center. Following the two-year robotic art project, the machines will be moved to the Energy Lab in the lower level of Moench Hall. “We’re repurposing the Energy Lab for a number of things, and one of those things is robotics,” Fisher explained. There, they will be available for future student projects.

Rose-Hulman began offering a multidisciplinary minor in Robotics in 2009, with three students participating in the program. It has since grown to 28 students in the class of 2014. To learn more, visit the [Robotics at Rose-Hulman](#) web page.



Rose-Hulman students will have more opportunities for hands-on projects with widely-used industrial robotics systems thanks to a generous donation by alumnus Andrew Conru.

Transitions

McCormack Brings Insight, Experience to Rose-Hulman Seniors



One of the newest additions to the ME department, Dr. Jay McCormack has a passion for helping students plant the seeds for continued professional growth as they transition into their future.

The Carnegie Mellon University graduate joined Rose-Hulman at the beginning of the 2013-14 academic year. His academic credentials are bolstered by industry experience. After completing graduate work focused on Computational Design, McCormack co-founded a company that made computer-aided design tools for circuit board design automation.

McCormack came to Rose-Hulman from the University of Idaho in Moscow, where he spent six years teaching senior design involving interdisciplinary projects with industry sponsorships. During his time there, he collaborated on a research project with Rose-Hulman's Dr. Patsy Brackin. It was this connection that ultimately led him to Terre Haute.

Now, McCormack is guiding Rose-Hulman's burgeoning mechanical engineers through the senior design process, encouraging the students to employ reflection, self-assessment, and continuing professional development as they move forward.

He hopes to attract more industry clients for the new yearlong senior design sequence that incorporates design, build, and test projects in order to give students a taste of authentic challenges and opportunities they will face in the coming years.

"That's more valuable than any lecture that I can give them—a real project with an industry client. I can't top that," he said.

To propose a senior design topic, contact [Jay McCormack](#).

Mirth Helps Capstone Design Students Finish Strong



For Rose-Hulman seniors, a capstone design project is the final stretch in a four-year academic endurance race. Dr. John Mirth, one of the newest ME faculty members, is no stranger to the finish line. A longtime engineering educator and distance runner who was once invited to try out for the Olympic team, Mirth is now coming alongside students to help them make the most of their senior design project.

A graduate of Ohio University in Athens, Ohio, Mirth most recently spent 16 years teaching at the University of Wisconsin Platteville.

"I'd been at Wisconsin for a while and needed something different, and I saw Rose-Hulman as being sort of a step up in the engineering education field," he said.

Since joining Rose-Hulman in the fall quarter of 2013, he has shepherded students through senior design projects for industry heavy hitters such as Caterpillar, as well as such on-campus clients as the RoseGPE racing team.

Mirth, who finished 31 out of nearly 17,000 runners in the 2004 Boston Marathon, noted that the students and faculty at Rose-Hulman create a unique atmosphere for learning and professional growth.

"Not only is there an energy but there are a lot of people to collaborate with," he said. "It's an environment that provides opportunity. There seems to be the sense that there are a lot of things you can do. I'm getting involved in stuff that I don't think I could have gotten involved in elsewhere."

Global Experiences

Bernal, Others Take Lessons from Kenya to the Classroom

A 2012 trip to Kenya was an eye-opening experience for Rose-Hulman alumna and faculty member Dr. Ashley Bernal (ME '06). She, along with faculty members Dr. Mike Kukral, Dr. Charles Joenathan and Dr. Richard Onyancha, a native of Kenya, traveled to the African nation to explore collaborative opportunities with some of the country's universities.

While in Kenya, the group gave teaching talks on various topics, and visited local high schools to encourage students to pursue STEM education. They also witnessed firsthand the struggles of daily life which some Kenyans face.

"We saw some young girls fetching water from a lake to use for drinking water," Bernal recalls.

It would be the inspiration for the first collaborative project between Rose-Hulman and Egerton University in Kenya. Inspired by the need they had seen, Bernal and the other faculty members developed a multidisciplinary summer class. The initial class included a student from Egerton serving as a client for a Rose-Hulman student project team.



Students display plastic lumber manufactured from materials recycled using solar power.

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The team was given the task of researching, designing, building and testing a device utilizing solar energy which would be beneficial to the rural people of Kenya.

Students brainstormed a variety of ideas, including ways to reduce malaria and a solar-powered light for homework, before finally settling on a simple water purification system with which they hoped to reduce bacteria through a combination of filtering and solar heat.

Over the summer of 2014, another team of students put their efforts to a different task.

"We give them a region and a problem. This year we just said, disaster relief, Haiti, go!" Bernal explains.

The team decided to create a means for converting trash to useful building materials. They designed a solar collector to heat plastic refuse, which was then molded into lumber that could be used to build homes. Taking the hands-on project from start to finish gave the team a comprehensive experience.

"They learn a lot of communication skills. They have to actually build a product. They have a proposal they have to write as well. It's as close as you can get, I feel, to the real world," Bernal said.

On Campus

Cunningham Uses Grant to Integrate Metacognition Into Course

“The simplest definition is thinking about your own thinking. But it’s a bit more involved than just that,” explained Dr. Patrick Cunningham. The Rose-Hulman associate professor of mechanical engineering spent last year on sabbatical at Virginia Polytechnic Institute (Virginia Tech) where he enhanced his knowledge of metacognition, returning to Rose-Hulman to integrate metacognitive practices into existing courses.

Cunningham recently received a grant to teach metacognition integrated into ES 205, Analysis and Design of Engineering Systems.

“Metacognition includes knowledge about yourself, what you know and how you process certain tasks, but it also has to do with implementing those tasks,” Cunningham continued.

Metacognitive regulation, the process of planning, monitoring, controlling and evaluating knowledge and learning, can help students develop strategies to address particular tasks. It is bigger, he said, than a single subject, but rather is a tool to help students better engage and leverage their knowledge.

He first hopes to teach the students how to accurately assess and monitor what they already know. “The reality is that we tend to overestimate our ability on things that we are less familiar with,” he said. After he teaches them how to assess, his goal is to encourage them to take ownership of their learning—helping students to realize that they are the primary determinants in their own education.

“To get students to practice metacognition is really helping them to be reflective,” Cunningham added.

“Ultimately, it’s getting to that self-awareness and managing your own learning, becoming engaged with the material at a deeper level, and improving learning across the board. It’s not just here in the classroom now, it’s for the rest of your life.”



Dr. Cunningham encourages students to use metacognition to manage and improve learning.

Student Teams Gain Experience, Gear Up For Annual Competitions



Rose-Hulman’s student teams get hands-on experience while they prepare for this year’s contests. For more information, see contacts below.

RHEV

Rose High Efficiency Vehicle has finished first and second in the SAE supermileage competition, second in the US Shell Eco-Marathon, and 15th place in the European Eco-Marathon.

Contact: [Sean Moseley](#)

Team Rose Motorsports

Students apply engineering skills through hands on automotive repair, design and fabrication. The team participates in sanctioned automotive performance competitions in the area.

Contact: [Mike Fulk](#)

HPV

Human-Powered Vehicle has consistently placed among the top ASME competitors, ranking as Overall Champion in both East and West Coast Finals.

Contact: [Mike Moorhead](#)

RoseGPE

Rose Grand Prix Engineering students build and race a Formula SAE open-wheel race car against college teams from around the country.

Contact: [Daniel Kawano](#)

Design/Build/Fly

This multidisciplinary team creates unmanned, electric-powered, radio-controlled aircraft to meet a specified mission profile, while gaining real-world aircraft design experience.

Contact: [Calvin Lui](#)