

Spring 2015

Volume 2015 - Issue 2 - Spring, 2015

Echoes Staff

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ROSE-HULMAN INSTITUTE OF TECHNOLOGY

Echoes

SPRING 2015

Vol. 2015, No. 2

A photograph of a middle-aged man with glasses and a light blue button-down shirt, smiling broadly. He is standing in front of a roller coaster track with red and blue tracks, set against a background of green trees. The roller coaster track is a prominent feature, curving and looping around him.

THRILL SEEKER

Mark Rose Gives Roller Coaster Fans the Ride of Their Life

See pages 3-6



WELCOME BACK, ROSIE!

Athletics has a new Rosie logo.

Rosie has been an important symbol for the Fightin' Engineers for nearly a century. She has been brought back on a newly unveiled design that depicts the pachyderm with a determined glint in her eye. Also, the trunk points upward, signifying good luck.

WE HOPE YOU COME BACK, TOO.

HOMECOMING 2015 – SEPTEMBER 18-20

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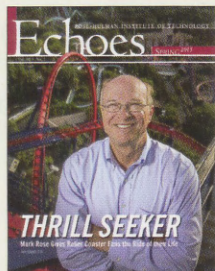
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ON THE COVER

Mark Rose (CE, 1972), vice president of design and engineering for Busch Gardens Tampa Bay, stands atop one of the peaks for SheiKra, a steel dive roller coaster with a 90-degree-drop feature and many twists and turns. It is one of the many thrilling rides that Rose has brought to the popular Florida amusement park during his 33-year career. (Photo courtesy of Busch Gardens Tampa Bay)



Faculty,
Students Have
High-Tech Edge

Pages 8-10



Seniors Expand
Horizons, Look
Toward Futures

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Google's Ray
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PUBLICATION CREDITS

Vice President for Enrollment Management and Strategic Communications: James A. Goecker

Interim Vice President for Institutional Advancement: Doug Smith
Alumni Association President: Tracey (Neal) Lockhart, Class of 2002

Office of Alumni Affairs: James A. Bertoli, Executive Director; Emma Campbell, Administrative Assistant; Lauren L. Jackson, Associate Director; and Lauren A. Meadows (BE, 2014), Graduate Assistant

Office of Communications and Marketing: Mary Wade Atteberry, Associate Vice President for Communications and Marketing; Bryan Cantwell, Photographer; Hyung-Jung Chang, Graphic Designer; Arthur Foulkes, Writer; Dara Gard, Web Manager; Dale Long, Executive Editor and Director of Media Relations; Stacey Muncie, Writer; Traci Nelson-Albertson, Creative Director; Alia Shuck, Project Manager; Julie Tuttle Davis, Senior Director of Interactive Marketing; Steve Voltmer, Web Manager; Majel Wells, Office Coordinator

Office of Institutional Advancement: Chris Aimone, Director of Planned Giving; Dawn Allee, Database Specialist; Tammy Coons, Director of Donor Relations and Executive Assistant to the Board of Trustees; Mindy DiCenso, Administrative Assistant in Development; Felisa Javier-Holt, Manager of Prospect Research and Tracking; Jennifer Kenzor, Annual Fund Coordinator; Danielle Merkel, Executive Director of Advancement Services; Alan Morrison, Special Projects Gift Officer; Amber Parkey, Manager of Gift Accounting; Mark Reitan, Executive Director of Development; and Brandon Zollner, Director of Corporate Relations

Executive Editor: Dale Long
Contact E-mail: Dale.Long@rose-hulman.edu

Contributing Writers: Herb Bailey, Arthur Foulkes, Dale Long, Stacey Muncie, and Alia Shuck

Photographers: Public Relations/Busch Gardens Tampa, Bryan Cantwell, Jon Clark, James Garber, Nick Garcia, Michael Graham/The Gravity Group, Dale Long, Terry Miller/Moore Photography, Chris Minnick/Minnick Editorial Photography, Nathan Montgomery, D. Todd Moore, David Sampell, Shawn Spence/Spence Photography

Class Note/Alumni News Contact:
Send alumni news and address updates to alumniaffairs@rose-hulman.edu

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Success Blossoms Everywhere For Rose-Hulman, Our Alumni



By Jim Conwell, President



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starting salaries among the nation's colleges and universities. For 20-year return-on-investment, we ranked No. 13 overall, ahead of many of the nation's Ivy League schools, along with being first in the state of Indiana. *(See other campus accolades earned this spring at right.)*

And, of course, for the 16th consecutive year, Rose-Hulman was ranked by *U.S. News and World Report* as being No. 1 among the nation's undergraduate engineering institutions. However, even more impressive is this statistic: the placement rate for the Class of 2015—graduates entering careers, beginning military service, or planning to attend graduate school—was once again well over 90 percent by commencement.

Those are some of the obvious reasons I am proud of this diverse, dynamic family we call Rose-Hulman Institute of Technology. Yet there are many other justifications for taking pride in what is taking place on our beautiful campus, and anywhere else our students, alumni, faculty, and staff extend their reach. This year we joined a worldwide effort, headed by the National Academy of Engineering, to bring science, math, and engineering expertise to some of the most perplexing problems facing our world—grand challenges that include hunger, inadequate health care, and environmental concerns.

Every academic year Rose-Hulman students generate a long list of team and individual awards and honors. This year has been no exception. Our human-powered vehicle team, for instance, recently earned first place in the American Society of Mechanical Engineers' 2015 west coast regional in San Jose, California, while a team of four students was one of only two U.S. teams to make the final cut in a global innovation challenge sponsored by Valeo, a French auto parts supplier. They will be participating in that challenge throughout this summer. The list of such achievements, as always, goes on and on. *(See more success stories about our students, including several Class of 2015 profiles, throughout this issue.)*

Meanwhile, our student athletes once again showed they can combine dedication to their sports with stellar classroom performances. On-the-field success helped the Athletic Department earn the Heartland Collegiate Athletic Conference's Commissioners Cup, marking all-around athletic excellence, for the second consecutive athletic year. Our men's teams led all-conference schools for the fourth straight year. Also, we retained

SPRING ACCOLADES FOR ROSE-HULMAN

Named a Top Value-Added College

The Brookings Institution has ranked the institute among the country's highest value-added higher education institutions, comparing predicted earnings versus actual earnings. Rose-Hulman graduates average 44 percent value added, with mid-career earnings at \$114,100 compared to a predicted average salary of \$73,628. *(See story on Page 20)*

Campus Technology Gets High Marks

The Niche College Rankings listed Rose-Hulman No. 16 (out of 1,000 U.S. colleges) for offering the best technology, based on student surveys. The institute got high marks for having students who are high achievers in STEM fields, and having classrooms and labs that are state-of-the-art. *(See story about campus technology on Page 8-11)*

Institute among 'Colleges That Pay You Back'

Career placement, financial aid, and cost variables are reasons Rose-Hulman has been designated a best overall bargain in The Princeton Review's new book and online resource, *Colleges That Pay You Back*. The institute ranked No. 5 for having the best career placement. *Find out more at www.rose-hulman.edu/Payback*

the No. 1 ranking among Division III colleges and universities for the number of consecutive years (29) producing at least one Academic All-American.

In short, the 2014-15 academic year was another outstanding period in our history. As spring brings fresh color across the face of our campus, we know that Rose-Hulman will continue to radiate intellectual growth, creativity, and innovation for the benefit of our students, community, and world. ■



Mark Rose's Roller Coaster Designs Push Limits of Science, Have Busch Gardens' Park Guests Screaming with Delight

Story by Dale Long

As vice president of design and engineering for Busch Gardens Tampa Bay, Mark Rose has never desired to build the fastest, tallest, or longest roller coaster. Rather, the Rose-Hulman alumnus is most concerned with giving riders an exhilarating experience that has them coming back for more.

His latest thrilling adventure, the Falcon's Fury, is doing just that. North America's tallest freestanding drop tower provides a spellbinding ride that over the course of nearly one minute takes 32 riders 335 feet into the air before rotating all seats 90 degrees

downward to have everyone staring in a face-down position. An instant later, there's a descent that returns to the ground within six seconds, reaching speeds up to 60 mph during the fall—giving people a sense of skydiving while living up to its bird of prey namesake.

If that weren't enough, there's SheiKra, a dive coaster sending riders on a breathtaking three-minute, half-mile journey through a simultaneous loop and roll, a vertical drop into an underground tunnel, and a splashdown finale. Or, how about

Cheetah Hunt, a unique triple-launch coaster that begins by putting people inches away from the world's fastest land animals before strapping in for a ride racing along the ground and offering twists and turns through a rocky gorge.

"The experience is the key to creating a great ride," says the 1972 civil engineering graduate. "There should be moments when you're scared out of your mind and times when you're screaming at the top of your lungs. Then, at the end, you can't wait to do it all over again."

Rose has been creating those experiences for 33 years in overseeing the conception, development, construction, and renovation of nearly every attraction across the 300-acre family adventure park, a popular Florida destination which features rides and a 12,000-animal zoo.

"I love everything about my job. There's nothing more satisfying than making others happy," he says.

And, as Rose explains, there are several aspects of science and engineering behind creating those unforgettable experiences. The mathematics



"The experience is the key to creating a great ride. There should be moments when you're scared out of your mind and times when you're screaming at the top of your lungs. Then, at the end, you can't wait to do it all over again."

—Mark Rose, *Civil Engineering, 1972*
 Vice President for Design and Engineering
 Busch Gardens Tampa Bay



GETTING PERSONAL

MARK D. ROSE

Vice President of Design and Engineering
 Busch Gardens Tampa Bay
 1982-Present

ACADEMIC BACKGROUND

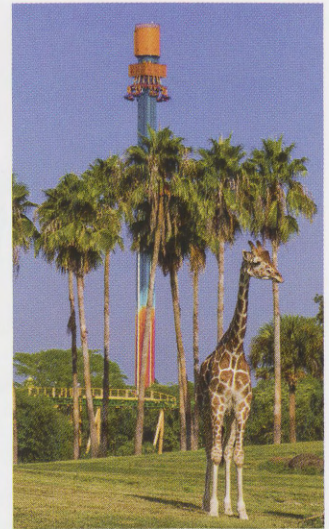
- Rose-Hulman Institute of Technology
 - Bachelor of Science Degree, Civil Engineering, 1972
- University of South Florida
 - Master of Business Administration, 1985

CAREER ACHIEVEMENTS

- City Engineer, Connersville, Indiana, 1972-78
 - Compiled City's First Infrastructure Planning Document
- Director of Public Works, Alexandria, Louisiana, 1978-82
 - Supervised Habitat Design for City Zoo

FAMILY

- Wife, Fifi, and three children
- Father, Willis, was a 1947 Rose-Hulman Alumnus (1987 Honor Alumni Award Winner)



LANDMARK ATTRACTION: Located in the heart of Busch Gardens Tampa Bay theme park, Falcon's Fury is North America's tallest freestanding tower at 335 feet. This one-of-a-kind attraction, opened last fall, gives riders a unique perspective of the park and surrounding Tampa before plunging straight down, at speed approaching 60 mph, in less than six seconds. (Photos courtesy of Busch Gardens)

behind new rides and the forces on the body are calculated by computers, and simulations help duplicate the riding experience before millions are invested on a new attraction. Calculations consider the number of guests on each ride, the number of riding experiences within each day, the space requirements for each ride, and the structural foundation required for the more than one million pounds of steel and thousands of bolts holding a ride together. Extensive testing had to prove that the Falcon Fury could withstand possible hurricane-force conditions.

Then, always desiring to enhance the guest's park experience, Rose and his team of engineers have incorporated several innovative concepts that are helping to revolutionize an industry that is constantly pushing the limits. For instance, they worked with manufacturers to transform zoo displays worldwide by creating specially designed, crystal clear, 2-inch laminated glass (similar to jewelry store showcases) to bring people closer to viewing gorillas and chimpanzees in the animal kingdom's naturalistic rainforest habitat.

"While computer modeling and simulations have taken over many aspects of the roller coaster industry, I still like to employ old-time methods of paper, scale models, and scratching in the dirt," Rose admits.

The dive coaster SheiKra was envisioned to replicate riding a barrel over Niagara Falls, and the idea for Cheetah Hunt came

after Rose watched the sixth episode of Star Wars, where on the planet of the Ewoks, they steal two speeders and go racing through the forest, zooming under fallen trees, and remaining as close to the ground as possible.

These experiences can take three to seven years from original concept to full-scale design, testing, and construction before opening day. That's when Rose can be found riding, with members of his family, in the front car for the very first journey of each new ride since 1982, when he joined Busch Gardens as a project manager. Then, Rose has been in the last car whenever a ride was retired.

After all, he truly appreciates the roller coaster experience. Desiring to keep his park on top in the competitive industry, Rose once took his family on a 17-day vacation to ride every coaster in 17 theme parks. Another adventure had the family visiting 10 parks in 10 days throughout California.

Engineering has a rich history in the Rose family. His father, Willis, was a 1947 Rose-Hulman mechanical engineering alumnus. But the son didn't want to design cars or build bridges, and amusement parks had held a fascination since his first childhood trip. At 22, Mark Rose was hired as city engineer for his hometown of Connorsville, Indiana, and he spent five years building parks and playgrounds, along with other community projects. He then was recruited to be public works director in



THE SECRETS TO DESIGNING A GREAT ROLLER COASTER

Mark Rose offers his guiding principles to designing a thrilling roller coaster:

- It has to look intimidating and a little scary before you even get on the ride.
- It has to be a pleasant riding experience that people want to repeat. Guests can't be too beat up or jostled around—the transitions have to be perfect.
- Every feature in the ride has to look like it's supposed to be right there, not an added attraction. "That's a tough geometry problem," he says.
- Obey the "Grandma Rose Rule," having a place for grandma to sit and watch so she can feel integrated into the excitement of her grandchildren going on the ride.

Alexandria, Louisiana, which had a zoo. Later, he noticed a newspaper advertisement for a project manager position at Busch Gardens Tampa Bay and thought it would be his ideal job.

It has been. Now, Rose oversees an operation with nearly 185 employees covering all aspects of engineering, park maintenance, and landscaping. He is one of the first to arrive at the park each morning, and the last one to leave each evening.

"It's an interesting industry. Fifty percent of my job is looking into the future; 50 percent is building that future," he says. "It's our job to bring family and friends together, and help people escape the stresses of everyday life." ■

Dale Long is executive editor of Echoes and director of media relations.

GETTING HER DREAM JOB

Recent Graduate Realizes Goal of Designing Roller Coasters

Story by Stacey Muncie

Crystal Hurtle has always savored the thrill of riding roller coasters. Growing up in the Cincinnati suburb of Hebron, Kentucky, Hurtle enjoyed yearly trips to the nearby Kings Island amusement park. A sixth-grade math and science field trip to Kings Island motivated the recent alumna (February, 2015) to parlay her love of roller coasters into a career in engineering.

But the journey would have as many twists and turns as any amusement park ride, testing the tenacity of the future mechanical engineer as she sought to gain a foothold in the competitive roller coaster job market.

"I went back and asked my science teacher, 'What do I have to do to build roller coasters?'"

At her teacher's suggestion, she geared her pre-college studies toward a future in engineering, taking all of the higher-level math and science classes available.

During her junior year of high school, Hurtle was surprised to discover her neighbor's brother worked as a roller coaster design engineer. Not only that, but the company he worked for was located nearby. She would later learn there were actually two roller coaster manufacturers based in the Cincinnati area.



READY FOR RIDE OF HER LIFE: Crystal Hurtle (ME, 2015) is now a roller coaster designer for the Gravity Group after having a co-op work experience helping the company construct the Hades 360 wooden roller coaster at the Mt. Olympus Theme Park in the Wisconsin Dells, Wisconsin. Added in 2013, it is the largest roller coaster in the park.

Hurtle used this newfound knowledge to begin making connections in the industry. Her mission started with an interview of her neighbor's brother, seeking information for a school paper about the physics of roller coasters. She wisely used the opportunity to glean insider insights and advice about her chosen career field.

He suggested that she make further connections by attending an industry trade show for the International Association of Amusement Parks and Attractions. He emphasized that in the small world of roller coaster makers, persistence was the key to securing one of the rare job opportunities.

"There was one other thing he said to me: 'There will be people who say you can't do it and people who say you're going to make it. You have to choose who to listen to,'" she adds.

Eager to realize her dream, Hurtle embraced the counsel. She attended her first amusement park trade show in 2012, making arrangements with her accommodating Rose-Hulman professors during the fall academic quarter, and returned in 2013.

A co-op work experience developed in 2012 with the Gravity Group, one of the two Cincinnati roller coaster manufacturers. This provided opportunities to do equipment testing at southern Indiana's Holiday World amusement park and Mt. Olympus theme park in the Wisconsin Dells.

"I got to go ride what I had worked on. That was really fulfilling," she says.

Now, Hurtle has embarked on another thrilling ride. She earned a full-time position with the Gravity Group, starting after completing her degree requirements at the end of the winter quarter earlier this year.

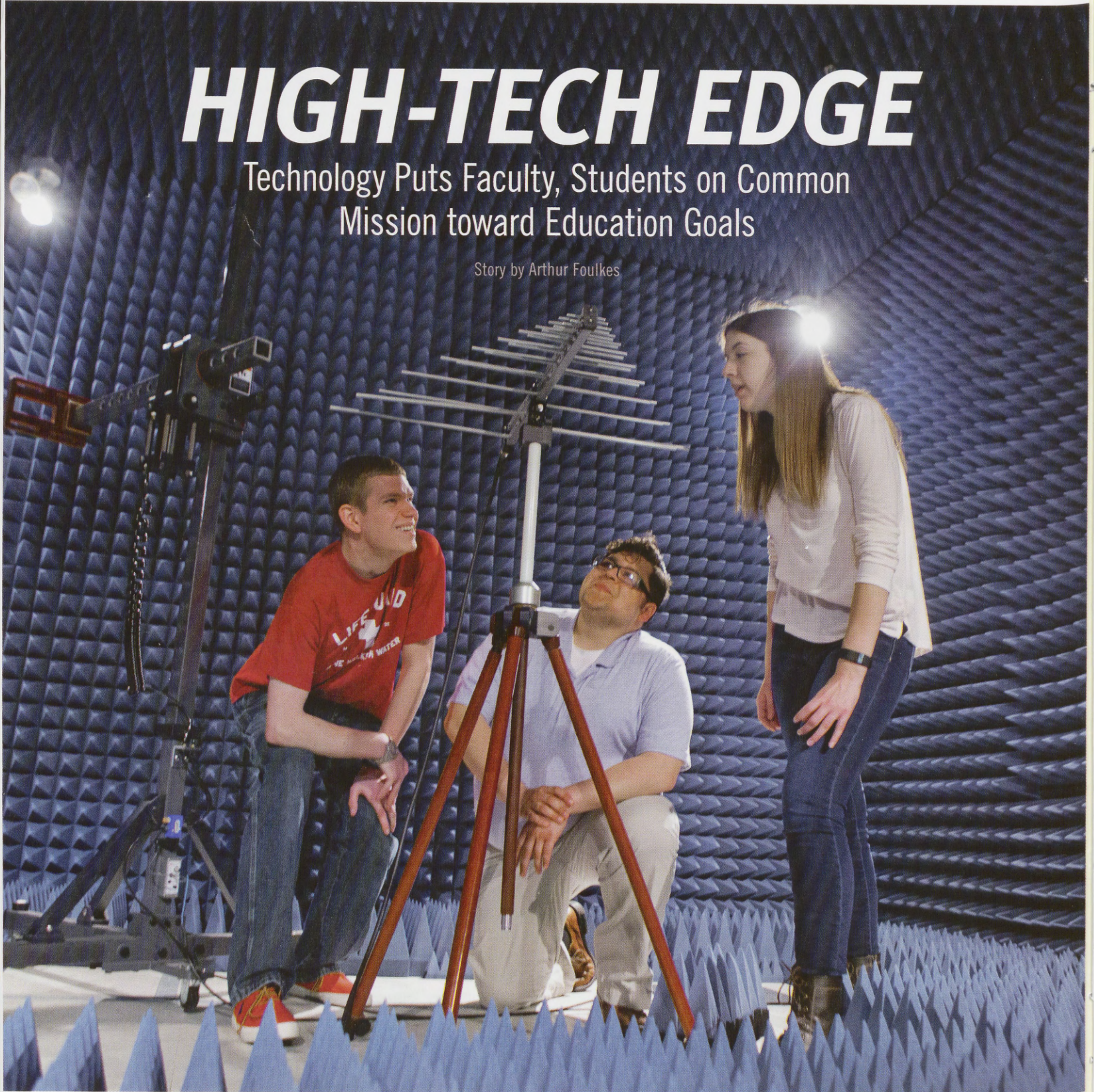
The company has installed rides at amusement parks around the globe, and Hurtle anticipates that future assignments as a roller coaster designer will include international travel to assist overseeing the construction of new thrill rides. ■

Stacey Muncie is a writer for the Office of Communications and Marketing.

HIGH-TECH EDGE

Technology Puts Faculty, Students on Common Mission toward Education Goals

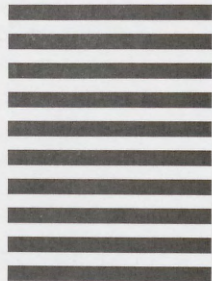
Story by Arthur Foulkes



STATE-OF-THE-ART LAB: Students examine an antenna set up to conduct an experiment in the anechoic chamber that's part of the Electromagnetics and High-Speed Design Laboratory in Myers Hall. The lab was brought to campus by Electrical and Computer Engineering Professor Ed Wheeler, PhD, a 1982 alumnus who translates the benefits of his research activities back to the classroom. (Photo by Shawn Spence)



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David Fisher's faculty office isn't large, but it includes all the needs for a miniature television studio.

In order to shoot a quick video, Fisher swiftly attaches his smart phone to an adjustable arm clamped to a bookshelf, and he stands in front of a big green screen taped to the opposite wall. He then speaks into a microphone that's similar to those used during the golden age of radio.

In this setting, the associate professor of mechanical engineering and Class of 2000 mechanical engineering alumnus has shot more than 400 lecture videos for a variety of mechanical engineering courses. His students watch the videos, most fewer than 10 minutes in length, on YouTube in the evenings, allowing him to use class time for projects, student questions, and individual mentoring.

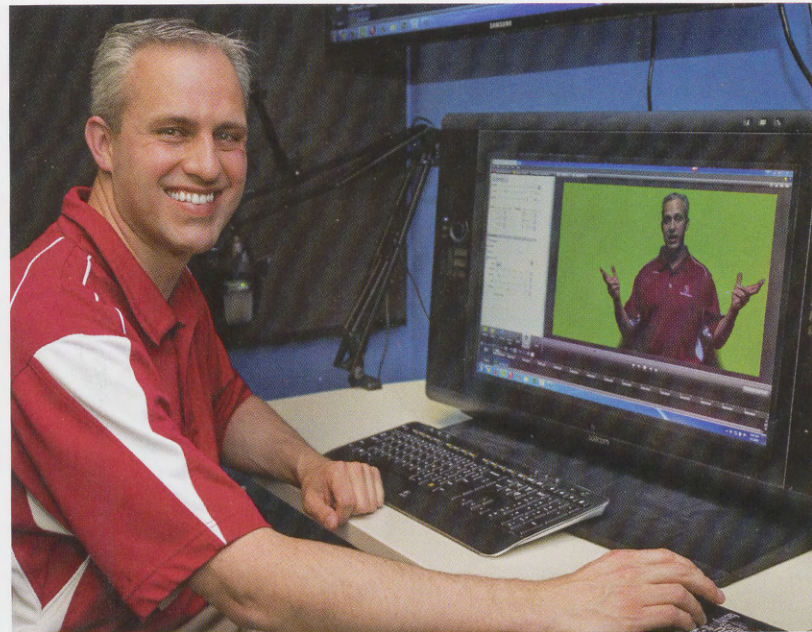
"This fits well with how people learn," says Fisher, PhD, of this approach to the "flipped" classroom, a new concept that's inverting traditional teaching methods.

It is clear that Fisher favors this concept that utilizes technology to deliver instruction online outside of class while moving homework into the classroom setting. Daily lectures were part of only two of his nine courses during the recent spring academic quarter.

Fisher is a campus pioneer when it comes to using technology to enhance the learning experience, says Phillip Cornwell, PhD, vice president for academic affairs. But other professors are getting equally involved in using technology to enhance the learning experience—a big reason why the institute ranked No. 16 in the 2015 Niche College Rankings for employing the best technology.

In 1995, Rose-Hulman became one of the first U.S. colleges to require incoming freshmen to have an institute-provided laptop computer, and has remained ahead of the curve, with a computer network that features more than 7,000 wired Ethernet ports.

Technology is part of nearly every classroom and laboratory on campus. Five technology-enhanced classrooms were installed



CAMPUS TECHNOLOGY PIONEER: Associate Professor of Mechanical Engineering David Fisher, PhD, a 2000 alumnus, uses technology to enhance the learning experience through the use of "flipped" classroom experiences. (Photo by Bryan Cantwell)

in John T. Myers Hall in 2012, featuring computer-interfaced, high-end multimedia equipment supporting an interactive learning environment. Myers Hall is also home to the expanded laboratory for Micro-Nano Device and Systems (MiNDS), which has state-of-the-art equipment that allows multi-disciplinary teams of faculty and students to complete a variety of micro- and nano-technology-related projects.

"We have professors doing all kinds of different things," cites Alan Ward, manager of the Office of Emerging Digital Technologies. Some "flip" their classrooms, some record video

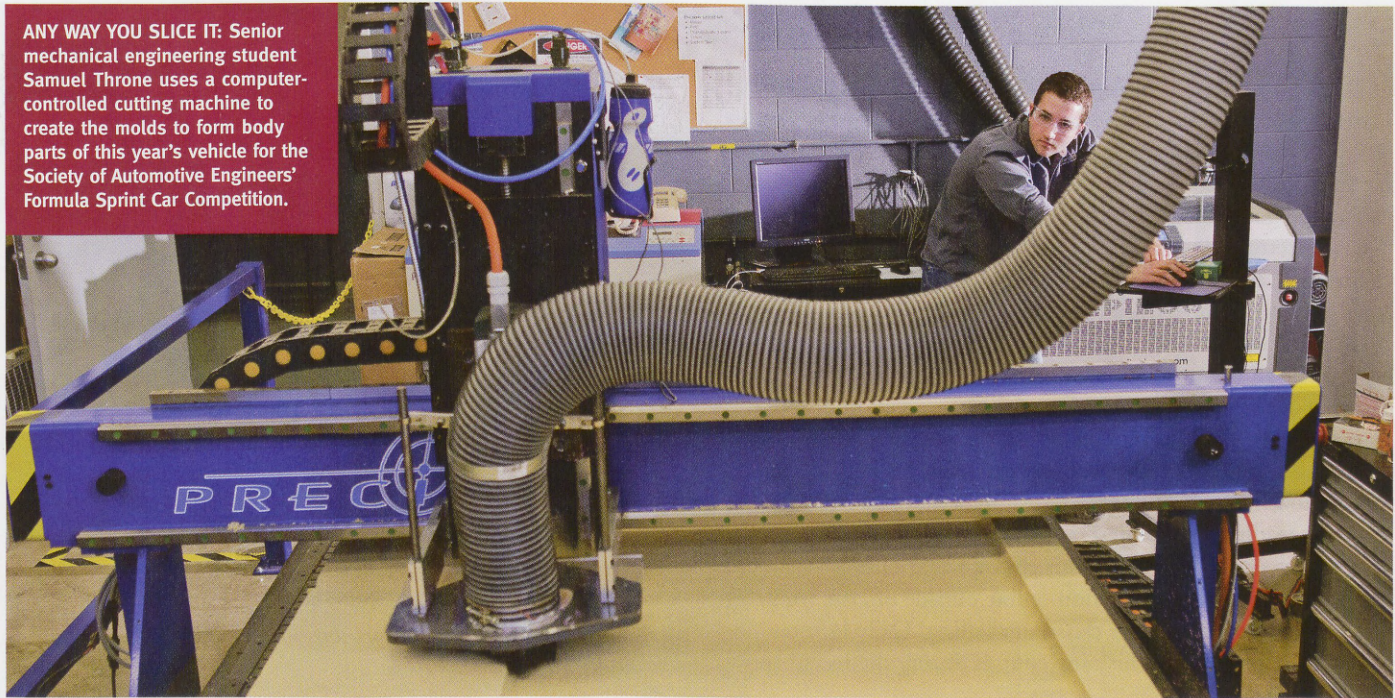


CAMPUS TECHNOLOGY GETS HIGH MARKS IN SURVEY

The fact that technology is featured in a variety of ways throughout campus hasn't gone unnoticed. The Niche College Rankings listed Rose-Hulman 16th out of 1,000 U.S. colleges for employing the best technology, based on student surveys. The institute got high marks for having students who "are high achievers in STEM fields, classrooms and labs are state-of-the-art, and the students report that the administration, facilities, and courses incorporate new technologies effectively." ■

GETTING POINT ACROSS: Ryder Winck, PhD, assistant professor of mechanical engineering, utilizes classroom technology while presenting a lecture during the winter academic quarter. Nearly every classroom features some form of technology to enhance the educational experience for students and faculty. (Photo by Shawn Spence)

ANY WAY YOU SLICE IT: Senior mechanical engineering student Samuel Throne uses a computer-controlled cutting machine to create the molds to form body parts of this year's vehicle for the Society of Automotive Engineers' Formula Sprint Car Competition.



lectures, and others have students utilizing robots, 3-D printing, or sophisticated laboratory equipment.

Professors create instructional videos using laptops, or using an Aquos smart board in a recording studio. Professors can mark up their slides and videos in real-time, like a television weather forecaster or a football announcer analyzing a play. Moodle, an online learning management system, allows professors to post lectures, online quizzes, notes, and classroom assignments for students to access at any time. Additionally, professors create online lessons and discussions forums to enhance the educational experience.

A Rose-Hulman student completing the Niche college survey noted that the institute has few computer labs on campus because students have no need of them. The student states, "My school is one of the best as far as wireless and printing, but we do not have that many computer labs because each person already has a personal laptop."

Rose-Hulman invests in new technologies each year to ensure it is providing the best-possible materials for teachers and students, says Rick Stamper, PhD, dean of faculty and a professor of mechanical engineering and engineering management. However, the institute does not invest in technology for its own sake, he adds. The goal is to purchase only that which improves the interaction between students and professors—tools that can vary from chalk and a

blackboard to sophisticated laboratory equipment.

"We try to give professors a wide variety of the tools they can use," says Stamper, a 1985 mechanical engineering alumnus.

Kay C Dee, PhD, associate dean of learning and technology and a professor of biology and biomedical engineering, adds, "We are also working on standardizing the technologies in the classrooms." As a result, professors and students can utilize technology to easily work together, regardless of the classroom situation.

Rose-Hulman has also invested heavily in a strong support system to assist all members of the campus community. The Office of Instruction Technology provides training tools for faculty to use new equipment and technology. The institute also has an excellent support staff standing by to help if a student experiences problems with a laptop computer.

And, Wayne Dennison, vice president for information technology and chief information officer, notes that, unlike many universities, faculty, staff, and students all share the same technology platforms. This makes it easier to deal

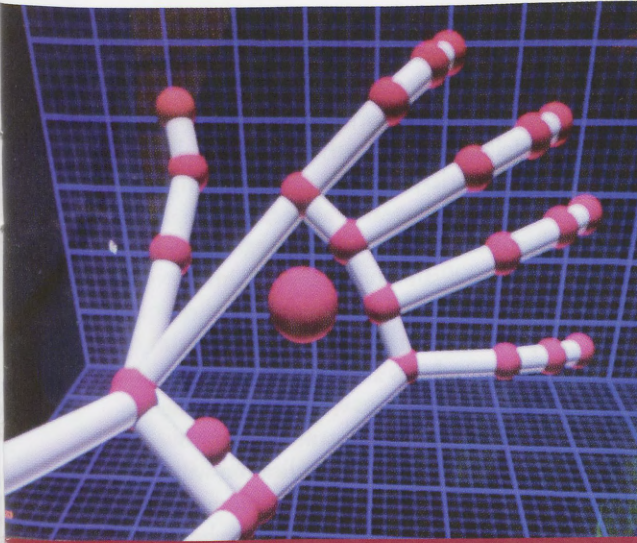
with potential problems, he says.

"That's rare in higher education," remarks Dennison. ■

Arthur Foulkes is a writer for the Office of Communications and Marketing.



TESTING LANDING TOOL: Two freshmen get ready to test an important link to an airliner landing gear designed and fabricated as part of Statics and Mechanics of Materials class.



OFF TO THE RACES: Infrared sensors take the place of an accelerator pedal for a student project that's a new attraction at the Terre Haute Children's Museum. The system controls the toy car's speed around the oval track. A closed fist makes the car move at a slow pace, and the speed steadily increases with each finger extended over the infrared scanner on the exhibit's console. Five fingers create a simulated top speed of 200 mph.



USING TECHNOLOGY TO MAKE A DIFFERENCE

Design Projects Highlighting Hand Technology Challenge Seniors to Help Others, Solve Global Problems

Stories by Arthur Foulkes/Photos by Shawn Spence

It's hard to tell what children like better—the skeleton-like image of their hands waving around on a small television screen or a miniature race car zooming around the Indianapolis-style race track.

Either way, youths enthralled with the new race track exhibit at the Terre Haute Children's Museum have Rose-Hulman students to thank for their fun times. Infrared sensors take the place of an accelerator pedal, controlling the toy car's speed around the oval track. Another feature includes fuel gauge and tire wear displays, warning the driver when it's time to make a pit stop to continue circling the track, just like a real racer. Refueling and new treads are provided by pressing a button.

"I like watching kids have fun with it," says senior mechanical engineering student Stuart West while watching children use the exhibit after its spring unveiling.

Every year, Rose-Hulman seniors put their knowledge and creativity to work on a variety of special projects for clients around the community, country, and world. These projects cover everything from engineering new specialized software to designing new public parks.

"Senior-year capstone projects allow students to connect with the community and improve peoples' lives," says Biomedical Engineering Professor Renee Rogge, PhD, who helps coordinate

SENIOR TECHNOLOGY PROJECTS



CHARTING A NEW COURSE: Allison Crump (left), Brandon Naylor (middle), and Ben Griffith (top) developed a prototype telepresence robot that could provide live video while traveling around campus.

the department's senior design course. "A lot of students come here wanting to make a difference. In senior design, you get to see them start that journey."

Helping persons suffering from severe brain injuries, biomedical engineering students have created a specially designed all-terrain manual wheelchair to provide greater accessibility for Drew Christy, a former Rose-Hulman student who experienced a traumatic brain injury in a February 2008 automobile accident. The wheelchair also will encourage the patient's improved posture (to improve feeding), and an iPad application will allow the patient to better communicate with others through touch-pad technology.

"This project is a game-changer for our family, and will allow us to easily move Drew to get up close to watch outdoor athletic activities, which he loves so much," says Drew's mother, Debbi. "We can't wait to use the wheelchair. Drew's improving mobility has been a direct result from this and other projects completed during the past four years. We're very grateful for the students' great ideas."



HELPING HAND: Kenji Kunugi puts the finishing touches on a project that a student team designed for General Electric to provide a mechanism for a person holding a full clothes basket to easily open a front-load washing machine.



HELPING HANDS: Biomedical engineering students constructed an all-terrain wheelchair (above) for former Rose-Hulman student Drew Christy. This continues a relationship between the institute and his family.

This year's civil engineering projects asked student teams to create an access road and fish passage channel for a Native American reservation in eastern Washington, design new shelters for Indiana state parks, and convert a former drive-in theater in Indianapolis into a multi-use green community. Other projects featured designing a 1,000-pupil parochial school in India, seeking to improve the sewage and rainwater management system for Peru, Indiana, and drawing up the plans to establish a possible pedestrian trail pathway to the Wabash River in downtown Terre Haute.



CONTINUOUS IMPROVEMENT: A biomedical engineering student team further modified an equine therapy device for the Hope Haven Horse Farm to help children with special needs.

Also this year, computer science students were busy providing computer programs to solve an assortment of perplexing problems. For example, clients asked students to create an application to improve reading comprehension for people with autism, help start-up companies showcase their products without traditional marketing, and create an algorithm to schedule and pre-register students for Rose-Hulman classes. Other senior-year computer science projects have expanded the artifacts and antiquities registry for the Smithsonian Institution, and utilized polynomial regression to predict the next "hot" new products in high-end technology and computer programming. ■

Arthur Foulkes is a writer for the Office of Communications and Marketing.

ALUMNUS INSPIRES STUDENTS' AWARD-WINNING ROBOTIC ART PROJECT

Alumnus Andrew Conru wants to create something "unexpectedly beautiful" using a robot.

So, making a robot create something "unexpected" and artistic is an aspirational project for Conru, a 1990 economics and mechanical engineering graduate who has become a successful Internet entrepreneur. "It's more fun to get a robot to do something unexpected than something predictable," he says.

Striving to make this dream come true, Conru has sponsored a special-interest project at Rose-Hulman popularly known as the "robot artist." Mechanical engineering seniors Charles Baechler and Sean Kling joined senior computer science major Eric Guilford in taking important first steps to get the project off the ground this academic year, creating software that allows a robotic arm to reproduce a cartoon character by using a pen and paper.

As proof of their success, the student team took the \$5,000 first-place prize in an international robot drawing competition sponsored by ABB, a Swedish automation firm.



ARTISTIC ROBOT: Eric Guilford (top, left) and Charles Baechler were members of a student team creating a software system that allows a robot arm to paint pictures. Sean Kling was another member of the design team, while Mechanical Engineering Professor David Fisher (ME, 2000) was faculty mentor.

"I was very impressed," says David Fisher (ME, 2000), PhD, associate professor of mechanical engineering and the project's faculty mentor.

Instructing a robot to draw a specific image is one thing; getting it to create something "unexpectedly beautiful" could be another matter. Conru believes getting to that level will require creativity in software design in addition to skillful mechanical prowess.

In the future, the goal is to have a robot use paints and a canvas, like a real artist. The robot will mix colors, correct errors, and make decisions about the best way to produce the desired image.

"There's something intrinsically beautiful about putting paint on a canvass," Conru says.

That may happen next year as another group of students, possibly with more computer science majors, accepts the project's technological challenges.

"The software is the big, creative side in this project," Conru admits.

Mixing art and engineering is nothing new, but for Conru it's something vital to an excellent engineering education. His "robot artist" project pushes past traditional engineering boundaries into the world of art.

"The students have the license to be as creative as they want to be," he says. ■

Several members of the Class of 2015 made key contributions through academic, research, internship, global study, and community service experiences. Stories by Stacey Muncie and Dale Long

Thomas Foulkes Provides Student Voice for Education

A variety of research opportunities enhanced Thomas Foulkes' classroom academic experiences on campus, and provided valuable insight to possibly transform the undergraduate engineering education.

The electrical engineering major was among a select group of 40 students participating in an American Society for Engineering Education's (ASEE) Transforming Undergraduate Education in Engineering workshop this spring in Washington, D.C.

Rose-Hulman's Independent Project/Research Opportunities Program provided Foulkes and other students the opportunity to engage in application-based research, and develop their technical intuition and entrepreneurial spirit. Foulkes also worked on projects in

asteroid photometry and magneto-optic phenomena in pulsed magnetic fields. These experiences helped him gain a 2015-2016 Tau Beta Pi graduate fellowship to attend graduate school at the University of Illinois Urbana-Champaign, where he will study power electronics and applied electromagnetics.

At Rose-Hulman, Foulkes earned numerous academic honors, made 16 technical presentations at regional and national science conferences, and had summer internships with Delphi Safety and Electronics and the U.S. Patent and Trademark Office.



Thomas Foulkes

"Rose-Hulman has provided me with the skillset to tackle real-world problems. The unique campus culture fosters a place for engineers to create innovative ideas and to share what they're learning," he says. ■

LeKisha Bradley Expands Her Global Perspectives

LeKisha Bradley knew she was in for the adventure of a lifetime when her airplane touched down on German soil in 2012. One of 75 American students participating in that year's Congress-Bundestag Youth Exchange for Young Professionals, the mechanical engineering major sought a better understanding of another culture.

"But I ended up learning more about myself," she says.

Bradley spent the first two months in an intensive German language program. She learned the language quickly, by necessity, she says. Later, the year-long program, arranged through Rose-Hulman's Office of Global Programs, had her utilizing her engineering skills while

working with the research and development team at Bosch's headquarters in Reutlingen, Germany.

Now, Bradley is planning to build on her global experiences, along with a minor in entrepreneurship, by attending graduate school at the University of Sheffield in England. She will pursue a master's degree in management, with a concentration in international business.

Ultimately, Bradley feels that the global studies experience opened more career



LeKisha Bradley

options, and enhanced her ability to bring value to teams, working with people in diverse cultures. ■

Robotics Drives Allison Crump's Engineering Passion

Allison Crump's passion for robotics was ignited in middle school and blossomed on campus, complimenting her mechanical engineering degree with a minor in robotics. She also helped organize student teams that participated in regional and national robotics competitions, and lent her robotics expertise to several projects at Rose-Hulman Ventures.

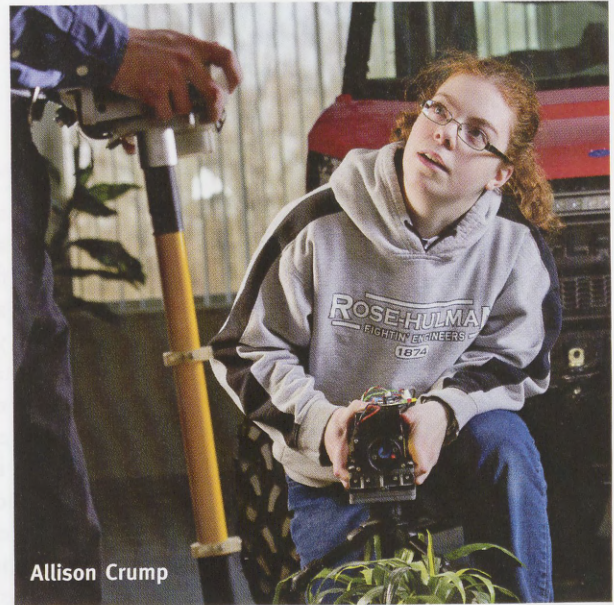
In particular, the Minnesota native helped develop the data collection system for a new agricultural tool that's allowing Precision Planting to confirm spacing of seed planting technologies. This is a critical component to improving crop yields for farmers.

"[Precision Planting] wanted to quantify how well their corn planters

worked," Crump explains. She added computer vision technology to the device.

Now, Crump is ready to use her problem-solving skills as an engineer for Intelligrated, an automated materials handling company with a production facility in the Chicago area.

"I enjoy designing, building, and testing complex systems that combine mechanical systems, electrical components, and software. Robotics allows me to work with all of those. Robotics is a large field, full of challenges," says



Allison Crump

Crump, who received the Cummins Engine Company Award as this year's top graduating mechanical engineering senior. ■

Ian Fong's Entrepreneurial Spirit Gives Back to Others

Ian Fong won't have long to celebrate completing his mechanical engineering degree this spring. The Fremont, California native will be spending three weeks in Nice, France this June exploring his entrepreneurial interests as a member of a Rose-Hulman student/faculty team participating in the European Innovation Academy program.

This will be his second global educational experience, after spending a year studying abroad in Sweden.

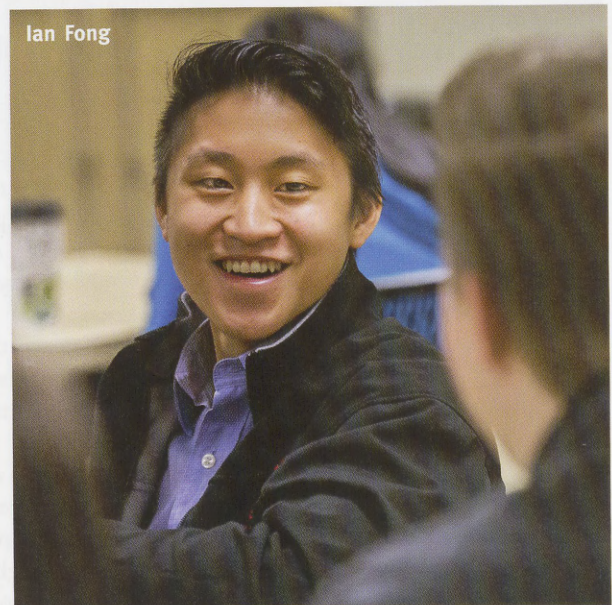
These opportunities, Fong says, have motivated him to help others in need throughout the world.

Fong's love of photography helped bring smiles to those less fortunate. He helped the Pi Kappa Alpha fraternity partner with the international Help

Portrait organization to take individual and family group photographs at a Terre Haute homeless shelter—free of charge. These images became priceless gifts for this year's holiday season.

"You look at what you have and what you are able to do to help people who don't have the same opportunities. I felt like it gave them confidence, value, and importance," he says.

Fong also helped organize Pi Kappa Alpha's Fire Truck Pull charity event, supporting Indiana Special Olympics,



Ian Fong

along with being involved in the Student Government Association and Student Alumni Association. ■

Nick Buchta a Winner in Class, on Gridiron

Nick Buchta sought perfection in the classroom and football field as only the fourth student-athlete to be a three-time Academic All-American in the same sport.

The North Barrington, Illinois native had a near perfect 4.0 grade point average as a mechanical engineering major. He earned the Sigma Nu fraternity's Greek of the Year Award, based on outstanding campus and community service.

On the gridiron, the left tackle helped anchor an offensive line that ranked fifth nationally in passing offense (345.8 yards per game) and 10th in total offense (497.0 yards per game) during the 2014 season.

"I came here to take on a rigorous challenge and see what I could do in

engineering," he says. "Being able to deal with stressful situations on the football field and overcoming adversity has been very valuable, along with having an engineering mindset."

Buchta used those skills to complete internships with Whirlpool and the Wynright Corporation, and is now preparing to begin his post-graduate career with ExxonMobil in Texas.

"I'm better prepared to have a job in engineering. I will soon be contributing



Nick Buchta

to another winning team, and, once again, I will be ready for that challenge," he says. ■

Elizabeth Melton Launches Astronomical Aspirations

For Elizabeth Melton, the only thing better than astronomy and astrophysics is sharing her enthusiasm for them with others. As president of the institute's Astronomical Society, she was able to spark curiosity among local youths in astronomy through visits to the campus' Oakley Observatory.

In similar fashion, the winter physics and mathematics double-major graduate, with a minor in astronomy, was inspired the first time her parents took her to an observatory.

"I met a few people that night running the observatory who were astronomers and astrophysicists, and I decided that I wanted to explore the universe through a telescope just like them," she says.

Melton's astronomical exploration

will continue as a student seeking a doctorate degree at Pennsylvania State University's prestigious Department of Astronomy and Astrophysics. She is ready for the challenge after completing an internship last summer at Massachusetts Institute of Technology. She helped design, test, and build an electromagnetic shield to protect components of a Micro-X high resolution X-ray spectrometer that's currently under development.

Melton was named this year's most outstanding physics graduate.



Elizabeth Melton

This summer, Melton will travel to Rose-Hulman's Oakley Southern Sky Observatory in Australia as part of a team installing and calibrating a new telescope. ■

READ MORE STUDENT PROFILES AT WWW.ROSE-HULMAN.EDU

Danielle DeFelice Overcomes Obstacles to Succeed

When Danielle DeFelice accepts her diploma in electrical engineering, the walk across the stage will give no hint of the arduous journey she has completed, nor the exciting journey that's about to begin.

DeFelice, a first generation Cuban-American, worked evenings and weekends in high school. During this time, she, her single mother, and young siblings were homeless for nearly 18 months. She says her mother instilled a belief that education would be her ticket out of poverty.

She arrived at Rose-Hulman in 2012 after graduating as valedictorian at a small community college. Here, she tackled a full course load, while working as a waitress to help pay her way. She credits the encouragement from professors Carlotta

Berry and Tina Hudson as being crucial to her success. Experiences from internships at Rose-Hulman Ventures helped DeFelice secure a job with Edgile, a cybersecurity firm. She will also begin work on a master's degree in computer information systems and database development.

Once her career is established, DeFelice plans to use her experiences and resources to make a difference for the homeless. "I feel like what you've gone through really defines who you are," she says. "I want to help

provide others with all of the things that I know would have helped my family succeed." ■



Danielle DeFelice

Rose-Hulman, Athletics Have Been All in the Schulthies Family

When Austin and Blake Schulthies graduate from Rose-Hulman this spring, they will follow in the footsteps of older brother, P.J., a 2012 alumnus. And, their younger brother, Lucas, is waiting to continue the legacy as part of the Class of 2017.

The brothers don't just have engineering in common. They have also been outstanding track and field athletes for the Fightin' Engineers, winning numerous events and awards in the Heartland Collegiate Athletic Conference. Blake also capped his collegiate career by qualifying for the NCAA Division III Outdoor Track and Field National Championships, becoming the first Rose-Hulman

qualifier in the decathlon since Tony Allen-Cooksey (CE, '78) took home fifth-place honors in 1978.

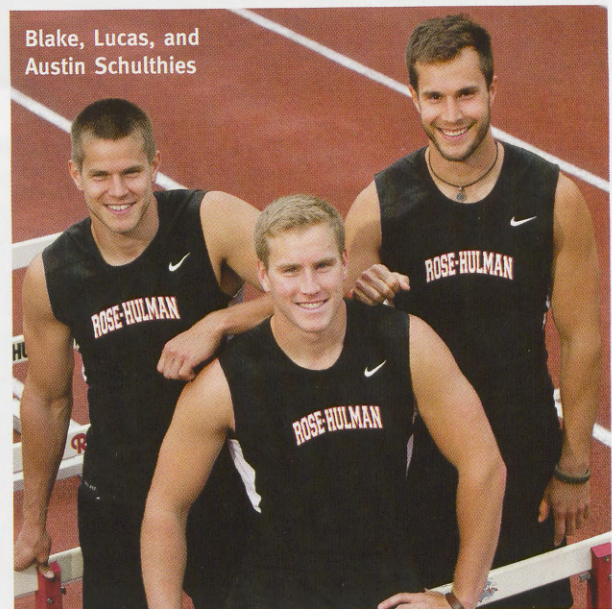
And, it continues a family tradition started by their parents, Phil and Tammy, who met as athletes at nearby Indiana State University.

Though competitive, the siblings are far from rivals. In fact, you might say that their motto is "all for one; one for all."

"Growing up, they were never bored, because they had each other," recalls Tammy.

The Dubois, Indiana natives agree that

going to the same college, participating in the same sports, and being members of the same fraternity suit them just fine. They call it "bringing a piece of home to Terre Haute." ■



Blake, Lucas, and Austin Schulthies



MAKING AN IMPACT: Several of the students and faculty in the inaugural 2011-12 Home for Environmentally Responsible Engineering (HERE) program gather near Rose-Hulman's Recycling Center. The group includes (clockwise from front) senior Katelyn Stenger, senior Matt Hayes, senior Daniel Wang, senior A.J. Carr, English Professor Richard House, Mechanical Engineering Professor Patricia Brackin, and senior Braxton Carter. (Photo by Shawn Spence)

HERE, HERE!

Students Leaving Sustainable Mark on Campus through Projects, Coursework & Organizations

Story by Arthur Foulkes

Students with an interest in environmentally conscious engineering are changing the face of campus and paving the way for a more sustainable world.

Seeds for the institute's Home for Environmentally Responsible Engineering (HERE) program were sown in the 2011-12 school year, and have been followed annually by approximately 40 first-year students. They live in the same residence hall and are enrolled in the same freshman-year classes, and have helped form environmentally conscious organizations, such as the new chapter of Engineers for a Sustainable World (ESW), a national, not-for-profit organization based mostly on college campuses.

Each HERE freshman group organizes a project designed to improve sustainability at Rose-Hulman. One project's recommendations to change hallway lighting fixtures on the first floor of Olin Hall have provided substantial electricity usage savings, says Mike Taylor, senior director of facilities operations.

"Without the HERE group pushing for that, it wouldn't have happened," says Taylor, adding that the project was so successful that it was applied to the second-floor lighting as well.

Elsewhere in Olin Hall, HERE students were commissioned to improve the lighting system in the Department of Chemical Engineering's High-Bay Laboratory. This project has reduced

power usage, while improving overall lighting in this large educational space, according to Taylor.

One of three HERE projects partially funded by a grant from Proctor & Gamble had students constructing a greenhouse, appropriately located near the campus' recycling center. Students have also designed a system that directs rainwater collected from the roof of the recycling center into an underground storage tank for use to water plants in the greenhouse.

Then, this spring, HERE students helped the new ESW chapter in creating a sustainable green space that is designed to solve a groundwater issue on campus.

"The students are using their education to help Rose-Hulman," cites Taylor. "The HERE and ESW programs help students to think and work at the hands-on level. They learn from their projects and, at the same time, we learn from our students."

These projects allow HERE students to see the real-world impact of their ideas on people and places. That's a key part of the philosophy behind sustainable engineering, which attempts to take long-term cultural, political, economic, and environmental impacts of any project into account. That's important because "theory

and practice don't always go together," says Joy Atzinger, a sophomore civil engineering major who helped a HERE group design the rainwater collection system for the campus greenhouse.

Several members of the original 2011-12 HERE group said they valued the year-long experience as a way to meet like-minded students, while broadening their thinking. They also forged lasting friendships with other HERE students through taking the same classes, sharing residence life experiences, and participating in volunteer activities together. These events included removing honeysuckle from area parks, placing recycling bins around campus, and conducting energy audits of local buildings and homes.

"You go to class with the same people you live with," says Daniel Wang, a mechanical engineering major from the inaugural HERE group. "I thought that was really cool."

One of HERE's biggest benefits is helping students learn how to keep an open mind about how people impact the world around them, and "thinking outside the box," says A.J. Carr, a senior mechanical engineering student. "Sustainability is a mindset, not just a field," she says.

Two graduating seniors will be the first students earning the institute's new Certificate in Sustainability Studies, an interdisciplinary program that enhances students' understanding of the environmental, social, and economic dimensions of sustainability. Students develop communication, professional, and design skills that will allow them to contribute to sustainability on local, national, and global levels.

Rose-Hulman's HERE program was launched by several faculty and staff members who advocate sustainable development and engineering, and have incorporated sustainability into engineering and science courses. Members of this group are Patricia Brackin and Richard Layton, professors of mechanical engineering; English professors Corey Taylor, Mark Minster, and Richard House; Rebecca DeVasher, associate professor of chemistry and biochemistry; Jennifer Mueller Price, assistant professor of civil engineering; Erik Hayes, associate dean of student affairs; and Michael DeVasher, assistant vice president for enrollment management. ■

Arthur Foulkes is a writer for the Office of Communications and Marketing.

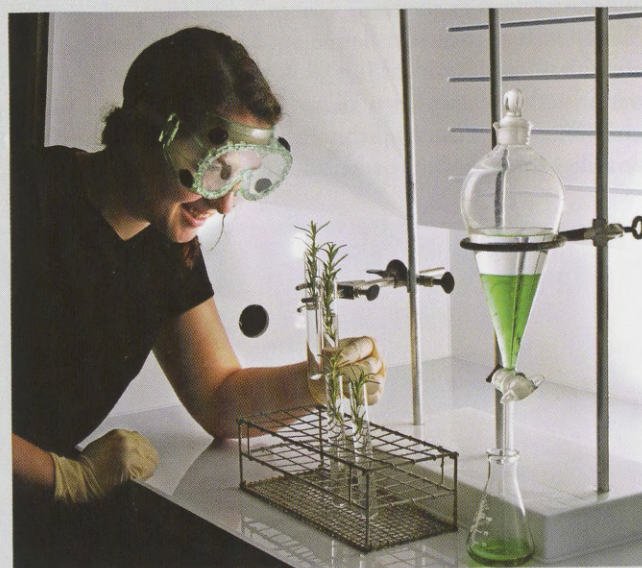
SUSTAINABILITY TOPICS ADDED TO CURRICULUM

The institute's new Certificate in Sustainability Studies, an interdisciplinary program open to students of all majors, enhances students' understanding of the environmental, social, and economic dimensions of sustainability. Students develop communication, professional, and design skills that will allow them to contribute to sustainability on local, national, and global levels. Core sustainability courses feature the following subjects:

- Introduction to Sustainability
- Introduction to Environmental Science
- Environmental Economics

Elective sustainability-related courses available include:

- Literature and the Environment
- Sustainable Civil Engineering Design
- Green Chemistry
- Religion and Ecology
- Water Resources Engineering
- Energy and the Environment
- Sustainable Energy Systems
- Renewable Energy ■



GREEN CHEMISTRY: The Department of Chemistry and Biochemistry has added several courses on sustainable topics, including an elective in the expanding area of green chemistry. (Photo by James Garber)

A VALUE-ADDED COLLEGE

Brookings Institution Gives Rose-Hulman Top Marks

Rose-Hulman ranks among the country's highest value-added higher education institutions, according to a study released this spring by the Brookings Metropolitan Policy Program. Its report, "Beyond College Rankings: A Value-Added Approach to Assessing Two and Four-Year Schools," assesses how well colleges affect student post-graduation economic success.

Value added was calculated by comparing predicted earnings versus actual earnings. Rose-Hulman graduates average 44

"The report is about more than high salaries; it's about opportunities. We nurture innovation and an entrepreneurial mindset, give students a solid academic foundation from which to grow, and infuse ethics and sustainability throughout the curriculum."

—Jim Conwell, Rose-Hulman President

But the report also notes that unobservable "x-factors" such as teaching quality and student ambition may also contribute to the future success of graduates.

"The report is about more than high salaries; it's about opportunities," says President Jim Conwell. "We nurture innovation and an entrepreneurial mindset, give students a solid academic foundation from which to grow, and infuse ethics and sustainability throughout the curriculum."

percent value added, with mid-career earnings at \$114,100 compared to a predicted average salary of \$73,628.

According to the report, some of the value added can be attributed to Rose-Hulman's focus in the areas of science, technology, engineering, and mathematics (STEM). Other considerations include graduation and retention rates and financial aid.

IN GOOD COMPANY

The Top 10 Four-Year Institutions, According to the Brookings Institution's Value-Added Scores

California Institute of Technology	49%
Colgate University	46%
Massachusetts Institute of Technology	45%
Rose-Hulman Institute of Technology	44%
Carleton College	43%
Washington and Lee University	42%
SUNY Maritime College	42%
Clarkson University	42%
Manhattan College	42%
Stanford University	41%

SALARY VALUE-ADDED

Source: *Beyond College Rankings: A Value-Added Approach to Assessing Two and Four-Year Schools*, Brookings Institution, 2015

Conwell notes that Rose-Hulman graduates are able to grasp the big picture and understand its relevance to even the smallest task. They are equipped to work in an interdisciplinary setting, utilizing teamwork and collaboration to develop solutions. These are the factors that make the institute's alumni distinctive and highly employable, ensuring them economic success.

"This is an affirmation of our mission statement, which is to provide our students with the world's best undergraduate science, engineering, and mathematics education in an environment of individual attention and support," Conwell adds. ■

View the report at <http://www.brookings.edu/research/reports/2015/04/29-beyond-college-rankings-rothwell-kulkarni>

TAKE NOTE

DEE, LETFULLIN HONORED FOR CONTRIBUTIONS

Kay C Dee, PhD, associate dean of learning and technology/professor of biomedical engineering, and associate professor of physics and optical engineering Renat Letfullin, PhD, have been recognized for their contributions

in their career fields. Dee was inducted into the American Institute for Medical and Biological Engineering's College of Fellows, a group comprising the nation's top two percent of medical and biological engineers. She was honored for her contributions in research related to engineering education and tissue biomaterials. Letfullin was elected a fellow of SPIE, the international society for optic and photonics, for his achievements and contributions in optics, photonics, and nanobiotechnology.



Dee



Letfullin

STUDENTS DESIGNING PARTS FOR CARS OF FUTURE

For the second consecutive year, a student team has been chosen to develop prototype parts to help create smarter, more intuitive cars in the future through the Valeo Innovation Challenge. From more than 1,300 initial project proposals, 20 teams were selected for this important project development stage, with Rose-Hulman

representing one of just two teams coming from U.S. colleges and universities. With \$5,000 in funding from Valeo, the students will have until July 17 to develop a working prototype of an "active suspension" for the wheel base of "the car of 2030." Six finalist teams will be announced on September 1, and those teams will present their prototypes later that month to a jury at the Frankfurt Motor Show in Germany.



ACCEPTING CHALLENGE: Colin Strate, Scott Johnston, Katelyn Stenger, and Christopher Wood have started work on creating an 'active suspension.'

COMMENCEMENT 2015

Alumni Berzsenyi, Harrison Among New Trustees

Three leaders in their career fields, each having a deep understanding and appreciation for development of successful business strategies, have been appointed to the Board of Trustees, beginning this spring.

Agnes Berzsenyi (MSME, 1995) is the vice president and general manager of global product management for GE Healthcare's services division. In this role, she is responsible for driving investment decisions for the business, optimizing the global portfolio of service offerings, and driving regional growth. Berzsenyi started her career with GE in 1995 as part of the technical leadership program at GE Aviation, and she continued to take global leadership roles, with increasing responsibilities, across different GE businesses in the United States and Europe.

Jeff Harrison (EE, 1989) will become president and chief executive officer of Citizens Energy Group on July 1. The public charitable trust provides utility services to about 800,000 residential, commercial, and industrial customers in the Indianapolis area. After 13 years at Indianapolis Power & Light Co., Harrison joined Citizens Energy in 2003. He has been senior vice president of engineering and sustainability since January 2013, and previously was senior vice president of capital programs and engineering, vice president of manufacturing, and director of market development.

Janet Cooper serves as an independent director of three public companies, The Toro Company, Lennox International, and Resonant Inc., and one private engineering company, MWH Global. She was senior vice president and treasurer for Denver-based Qwest Communications, and vice president of finance and controller for its predecessor, U.S. West Communications. She also was chief financial officer and senior vice president of administration for McDATA Corporation, vice president of treasury and tax for The Quaker Oats Company, and project engineer for General Motors. Cooper's son, David, is a 2014 computer engineering graduate of Rose-Hulman. ■



Berzsenyi



Harrison



Cooper

Mussallem Addressing Class of 2015; Two Trustees Getting Honorary Degrees

The institute's 137th commencement will be a special occasion for alumnus Michael Mussallem, who will address the Class of 2015, and for trustees Thomas Dinkel and Carl Cook, who will receive honorary doctorate of engineering degrees.

Mussallem (CHE, 1974) is chairman and chief executive officer of Edwards Lifesciences. He has helped lead the California-based company to become a global leader in the science of heart valves and hemodynamic monitoring.

Dinkel (ME, 1972) is president and owner of several Terre Haute corporations, including Sycamore Engineering, a Terre Haute-based commercial and industrial construction company specializing in mechanical and electrical systems. He serves as treasurer of the institute's Board of Trustees, and has received awards for his leadership and impact in the community.

Cook succeeded his late father, biosciences and medical devices pioneer Bill Cook, in 2011 to lead the Cook Group, a company recognized worldwide for its development of minimally invasive medical device technology that has improved lives. He has been a Rose-Hulman trustee since 2009, and his \$500,000 donation helped establish the William Alfred Cook Laboratory for Bioscience Research. ■



Mussallem



Dinkel



Cook

ATHLETICS RETAINS COMMISSIONER'S CUP

For the second consecutive year, the Athletic Department earned the 2014-15 Heartland Collegiate Athletic Conference Commissioner's Cup for its all-around athletic performance during the current academic year. In addition, the institute captured the league's Men's All-Sports Trophy for the seventh time in eight years due to consistent performances in the nine men's sports sponsored by the college. Men's teams captured HCAC championships in cross country, soccer, tennis, and track and field. The swimming team also scored maximum points.

DUREE, MELLOR READY TO HEAD DEPARTMENTS

Two academic departments will have new leadership on July 1. Associate professor **Galen Duree**, PhD, will take over as head of the Department of Physics and Optical Engineering, replacing Charles Joenathan, PhD. Meanwhile, professor **J.P. Mellor**, PhD, becomes head of the Department of Computer Science and Software Engineering, replacing Cary Laxer. Duree has earned the Dean's Outstanding Teacher Award and serves as director of the Center for Applied Optics Studies. Mellor has specialized in the role of vision in human/computer interaction and computer graphics. Laxer and Joenathan will return to full-time teaching positions this fall.



Duree



Mellor

GIBSON RETIRING AFTER 43 YEARS ON ME FACULTY

Mechanical engineering professor J. Darrell Gibson, PhD, is retiring at the end of this academic year after concluding 43 years with the institute—one of the longest tenures on the current faculty. He lent expertise in industrial and environmental noise control, vibration, and mechanical design to students, and coordinated the department's senior capstone design project course for several years. He and his wife, Peijun Sun (MSME, '94), have given back to Rose-Hulman as members of the Chauncey Rose Society.



Gibson

POPULAR SPEAKER: Students, faculty, staff, and alumni packed into the Hatfield Hall Theater to hear Ray Kurzweil present the Oscar C. Schmidt Lecture on The Web Within Us: When Minds and Machines Become One.



Google's Ray Kurzweil Provides Insight into How Technology Will Enhance the Future

Story by Dale Long/Photos by Shawn Spence

“Human intelligence that has not been enhanced by machine intelligence will be hard to find in a quarter century.” With that insightful statement, world-renowned technology innovator Ray Kurzweil provided students, faculty, staff members, and alumni an intriguing glimpse into the future during the institute’s Oscar C. Schmidt Lecture on campus earlier this spring.

As director of engineering at Google, Kurzweil’s ideas catalyzed developments in artificial intelligence (AI), such as a machine’s understanding of natural language. His innovations have featured the first commercially marketed large vocabulary for speech recognition, and the first text-to-speech synthesizer for the visually impaired.

So, it wasn’t surprising that Kurzweil’s presentation, *The Web Within Us: When Minds and Machines Become One*, brought a standing-room-only crowd to the Hatfield Hall Theater.

Kurzweil’s Google team is developing machine intelligence and natural language understanding, enriching the very nature of what it means to be human. As the species breaks the shackles of its genetic legacy, he believes it will achieve inconceivable heights of intelligence, material progress, and longevity.

Computation, communication, biological technologies (DNA sequencing), brain scanning, knowledge of the human brain, and human knowledge, in general, are all accelerating at an even faster pace. Price-performance, capacity, and bandwidth are doubling every year.

“These rates are now doubling every decade. So, the 21st century will see

“Ever since we picked up a stick to reach a higher branch, we have used our tools to extend our reach, both physically and mentally... [Technology that] used to fit in a building now fits in your pocket. And, what now fits in your pocket will fit inside a blood cell in 25 years, and will be far more powerful.”

—Ray Kurzweil, Director of Engineering, Google

20,000 years of progress at today’s rate,” he cites. “Ever since we picked up a stick to reach a higher branch, we have used our tools to extend our reach, both physically and mentally... [Technology that] used to fit in a building now fits in your pocket. And, what now fits in your pocket will fit inside a blood cell in 25 years, and will be far more powerful.”

In this way, Kurzweil asserts, we will merge with the intelligent technology we are creating. Intelligent nanobots in our blood stream will keep our biological bodies healthy at the cellular and molecular level. They will go into our brains noninvasively through the capillaries and interact with our biological neurons, directly extending our intelligence.

This is not as futuristic as it may sound. Today, several Parkinson’s patients have a pea-sized computer in their bodies with a connection directly into their brains that allows them to download new software from outside the patient. There are already blood cell-sized devices that can cure type I diabetes in animals or detect and destroy cancer cells in the bloodstream. These technologies will be a billion times more powerful in 25 years because their price-performance and capacity is doubling in less than a year, according to Kurzweil.

“The intelligence we will create from the reverse-engineering of the brain will have access to its own source code, and will be able to rapidly improve itself in an accelerating iterative design cycle,” he says. “Although there is some plasticity in the biological human brain, it has a relatively fixed architecture that we are not able to significantly modify. The non-biological extensions that we will build to our brains will not have these limitations.”

While answering questions from Rose-Hulman students, Kurzweil remarked

that “while the social and philosophical ramifications of these changes will be profound, and the threats they pose considerable, we will ultimately merge with our machines, live indefinitely, and be a billion times more intelligent.”

And, all of this will happen within the lifetime of current and future Rose-Hulman students. Kurzweil estimates it will be done within the next three to four decades.

Kurzweil has a 30-year track record of accurate predictions about technology,



EXCHANGING IDEAS: Students had several opportunities to meet Ray Kurzweil throughout his recent campus presentation.

many of which he has shared through five national best-selling books, including *The Singularity is Near*, *Transcend*, *Fantastic Voyage: Live Long Enough to Live Forever*, *The Age of Spiritual Machines*, and *How to Create a Mind*.

Called “the restless genius” by *The Wall Street Journal* and “the ultimate thinking machine” by *Forbes* magazine, Kurzweil was selected as one of the top entrepreneurs by *Inc.* magazine, which described him as the “rightful heir to Thomas Edison.” PBS selected him as one of the “sixteen revolutionaries who made

America.” He was the principal inventor of the first CCD flat-bed scanner,

Among Kurzweil’s many honors, he received the 2015 Technical Grammy Award for his achievements in music technology, earned the National Medal of Technology, was inducted into the National Inventors Hall of Fame, and has been recognized by three United States presidents.

The Oscar C. Schmidt Lecture brings national leaders to discuss issues important to the campus community.

The lecture was established 50 years ago through the generosity of the Cincinnati Butcher’s Supply Company in memory of the late Oscar C. Schmidt, a pioneering manufacturer of machinery for the packing industry. His son, Milton, is a 1974 Rose-Hulman mechanical engineering alumnus. ■

Dale Long is executive editor of Echoes and director of media relations.

WHAT'S NEXT

Alumni Provide Insight on our Changing World



Yogi Berra is credited with saying, "It's tough to make predictions, especially about the future." However, a panel of select alumni, leaders in their fields, provided *Echoes* with a list of those areas in technology providing great promise for the future. ■



CURRENT ALTERNATIVE ENERGY PRODUCTION & STORAGE BECOMES MAINSTREAM

The last 10 years have seen significant expansion of alternative energy, from electric cars to wind turbines to solar power. The next 20 years will see it move into the mainstream across the world. It will no longer be considered alternative energy, but rather primary energy, with a corresponding decline in reliance on fossil fuels. Eventually, the entire world will be powered by the sun and wind.



PERSONALIZED HEALTH CARE

Patients will be in far more control of their own health care. Personal devices such as smart phones will be enhanced to become real-time continuous health monitoring devices. Data from these devices will be correlated across large cross-sections of humans. Big-data collection of medical information, combined with sophisticated analytics, will provide better and cost-effective predictive assessments for individuals and paths to greater health.




INDUSTRY 4.0 (AND EVERYTHING THAT ENCOMPASSES IT)

The "Smart Factory" of the future will bring the fourth industrial revolution, with the prevalence of cyber-physical systems, the Internet of Things, and Internet of Services. This network of embedded devices will allow companies to learn more about how their products are used by consumers. Coupling with self-learning devices, expanding opportunities include efficiency improvements, greater product reliability, cost optimization, customization, and the ability to transact information from devices remotely. The robotics revolution will further enhance human decision-making.



MORE INTELLIGENT & CONNECTED MODES OF TRANSPORTATION

With the advent of high-speed trains across Europe and China, including the engineering capability to do so, there exists the capability and motivation for connecting the majority of the world's population. (Envision a route from China to North America.) This will drastically change the world's mobility habits, especially with the integration into "smart cities" around the world.



ECONOMICAL PERSONALIZED EDUCATION AVAILABLE WORLDWIDE

Methods for interactive, dynamic, and individualized education will bring greater access to world-class education. Personalized coursework will be dynamic and self-adjusting, geared to each student's learning modes and desired outcomes. The fundamental student-teacher relationship will be commonly extended beyond the four walls of a traditional classroom.



ENHANCED MOBILITY FOR PHYSICALLY CHALLENGED INDIVIDUALS

The use of exoskeleton devices and sophisticated software will greatly enhance mobility of otherwise low-mobility individuals, such as paraplegics and quadriplegics. These devices will also be useful for individuals recovering from surgery or injury.




ADVANCES IN MATERIAL SCIENCE

Innovations in materials will improve our ability to build products and sensors that are smaller, stronger, and have higher functionality. Nanomaterials and the resulting capabilities stemming from those advancements are the biggest opportunities in this space.



DATA STORAGE, PROCESSING, & VISUALIZATION

Emotion and experience sway our decisions, but data validate them. This is true in everything people do, not just business. Most data that is produced isn't actually useful, so processing and creating tangible visuals that tell compelling stories in short time frames will drive better decisions in so many areas.



A SUSTAINABLE WORLD

Advancing technologies will bring efficient ways to produce and distribute clean water throughout the world. Meanwhile, vertical farms and forests built in the heart of cities will reduce carbon dioxide and produce more oxygen.

ALUMNI PREDICT WHAT'S AHEAD FOR US



MICHAEL HATFIELD

**Electrical Engineering/Math Economics, 1984
President/Co-Founder, Cyan Optics**

Hatfield is a veteran leader of several successful communications systems start-ups, including Calix, a leading provider of high-speed access systems for communications service providers, and Cerent, a leading provider of high-speed fiber-optics systems. He has also served in management roles at DSC Communications and Ameritech.



FRED CARTWRIGHT

**Mechanical Engineering, 1980
Executive Director, Clemson University's International Center for Automotive Research**

Prior to joining CU-ICAR, Cartwright spent more than 32 years at General Motors, including assignments in manufacturing, engineering, planning, and corporate development. Most recently, he served as director of corporate development at GM's headquarters in Detroit, developing and negotiating partnerships in areas of new technology and products.



CHAD CONWAY

**Mechanical Engineering, 2012
Project Engineer, Tesla**

An internship with Tesla Motors led to a job, and to Conway being actively involved in several innovative projects with the company. He is helping develop stationary energy storage systems which have the potential for substantial cost savings for companies while making better use of the nation's electric energy production system.



NICK BIRCH

**Mechanical Engineering, 2014
Co-Founder and Director of Operations, Eleven Fifty**

Birch took the entrepreneurship and leadership skills he developed on campus to help veteran inventor and strategist Scott Jones start Eleven Fifty's full-spectrum approach of real-world education. The Carmel, Indiana, company provides an app development boot camp for beginning and advanced computer programming students. ■

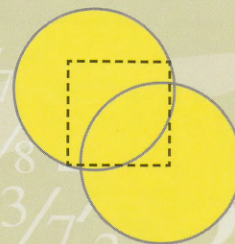
Bailey Challenge

By Professor Emeritus Herb Bailey, PhD

HAVING FIVE FINGERS on each hand, we celebrate events every 'x' number of years, where 'x' is divisible by five. In my case, I was born 90 years ago, graduated from Rose Polytechnic Institute 70 years ago and started the Bailey Challenge 25 years ago. I have recently compiled most of the past challenges and would be glad to email you a copy if you promise not to solve all of them.

SPRING PROBLEM 1

A square with the side length 1 is to be covered by two circles of the same radius. That is, each point of the square is under at least one of the circles. (See graphic) Find the smallest possible circle radius.



SPRING PROBLEM 2

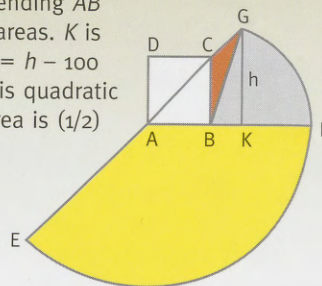
Sally uses her motorboat to travel upstream from positions A to B in five hours. Her return trip downstream from B to A requires only three hours. Assuming constant stream velocity, how long would it take for a log to float from B to A?

SPRING BONUS PROBLEM

Alice and Bill each have a positive integer painted on their foreheads. They are told that the two integers are consecutive. They can see the number on the other person's forehead, but not their own. They alternate (as many times as needed) in tracking down their number, starting each round with the question: Do you know your number? They can only answer 'yes' or 'no' to the question. Assume that Alice is the first to pose the question, and that Alice's number is two, while Bill has a three. Explain how they can determine the number on their own foreheads.

SOLUTION TO WINTER BONUS: The summer challenge problem had a goat tethered by a 150-foot-long rope to the corner of a barn with 100-foot sides. This provided the goat 109,995 square feet to roam. The tether was increased to 250 feet in length for the winter challenge.

Distances are in feet and angles in degrees. Let A, B, C, and D identify the points of the barn corner. We first calculate half the grazing area, that below the line through the points A and C. This line intersects the circle with center A and radius 250 at E and also intersects the circle with center B and radius 150 at point G. The line extending AB intersects both circles at F. Half of the grazing area is the sum of the yellow, gray, and red areas. K is the point on AF such that GK is perpendicular to AF and has length h. Since $BK = AK - AB = h - 100$ and $BG = 150$, then from the right triangle GKB, we have $h^2 + (h - 100)^2 = 150^2$. Solving this quadratic gives $h = 143.54$ and thus $\sin(\angle GBK) = h/BG = .9569$. Hence angle $\angle GBK = 73.126$. The red area is $(1/2)(CB)(BK) = 2,177$ square feet. The yellow area is $(\pi)(250^2)(135/360) = 73,631$ square feet. The gray area is $(\pi)(150^2)(73.126/360) = 14,358$ square feet. Thus, my answer is then twice this sum or 180,332 square feet. Paul Kimmerle (CE, 1991) points out that any farmer knows the correct answer is really $180,332 - 109,995 = 70,377$ square feet since the 109,995 square feet area from the summer challenge has not had sufficient time to recover from the summer grazing period.



Send your solutions to Herb.Bailey@rose-hulman.edu or to Herb Bailey, Department of Mathematics, Rose-Hulman Institute of Technology, 5500 Wabash Avenue, Terre Haute, IN 47803. Alumni should include their class year.

Congratulations to the following solvers of the problems posed in the winter issue:

ALUMNI: T. Jones, 1949; C. Hirschfield, 1954; B. Hall, 1955; A. Sutton, 1956; H. Brown, 1957; D. Bailey, 1959; R. Ireland, 1961; J. Ray, 1961; J. Tindall, 1961; N. Hannum, 1962; R. King, 1965; A. McLaughlin, 1967; R. Dutton, 1969; K. Metz, 1969; R. Jirousek, 1970; S. Jordan, 1970; T. Nelson, 1972; R. Engelman, 1973; M. Bailey, 1976; B. Hunt, 1976; P. VandeMotte, 1977; D. Foltz, 1978; T. Greer, 1978; R. Joyner, 1980; J. Koechling, 1980; S. Nolan, 1981; R. Roll, 1981; M. Taylor, 1982; K. Yerkes, 1982; J. Marum, 1983; R. Priem, 1983; K. Shafer, 1983; M. Saltgaver, 1984; S. Blonigen, 1986; M. Lancaster, 1987; J. Harris, 1991; P. Kimmerle, 1991; C. Schlimm, 1991; J. Zamora, 1991; J. Atkins, 1994; B. Benedict, 1995; K. Bartlow, 1998; M. Pilcher, 1998; J. Mathison, 1999; B. Hirsh, 2004; J. Lange, 2005; S. Shambaugh, 2005; K. Harbison, 2008; and D. Schluneker, 2008.

FRIENDS: T. Cutaia, L. Kulbago, S. Lam, J. Ley, J. Marks, L. Metcalfe, M. Rosene, and D. Voltmer.

Executive Coach Marshall Goldsmith Examines Qualities Of Effective Leaders

Story by Arthur Foulkes/Photo by Jon Clark

If you want to be a better leader or person, Marshall Goldsmith is your man.

The 1970 alumnus, recognized as one of the world's most influential leadership thinkers, knows the skills required to effectively lead an organization, after studying and coaching top, global business executives for nearly four decades. In doing so, he has learned how people best interact with each other in any area of life, from friends and family to the professional board room.

Along the way, Goldsmith acknowledges, he has learned more from his clients than they have from him.

So, Goldsmith had no problem quickly identifying for Echoes the five qualities common to nearly all strong leaders:

- They **focus on others**, not on themselves.
- They **have integrity** and are great role models.
- They **focus on the customer**.
- They are **centered on their organization's mission**.
- They **thoroughly understand their business**.

As the world continues to change, and technology brings us all closer together, Goldsmith also identifies five qualities necessary for tomorrow's leaders:

- They will think **globally**.
- They will appreciate **cultural differences**.
- They will be **technologically savvy**.
- They will **build alliances** with other businesses, organizations, and governments.
- They will **share leadership** with others and listen carefully their advice.

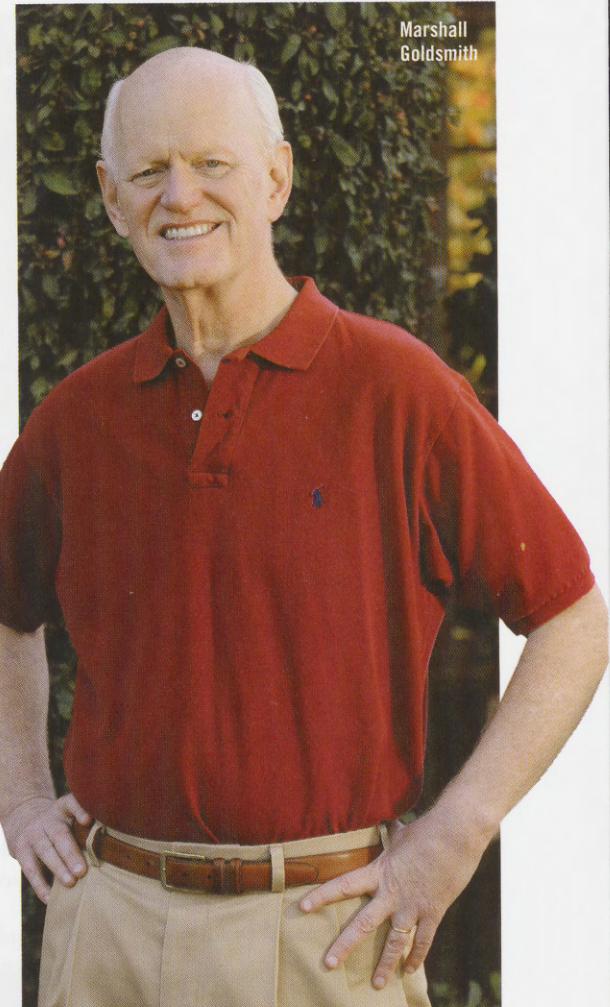
Goldsmith, who graduated from Rose-Hulman in just three years (with a bachelor's degree in mathematical economics), warns that technical knowledge and top grades don't always translate into good leadership. His advice to current Rose-Hulman students: Develop your "people skills" and **learn to sell ideas and yourself**.

One key to having good people skills is to **get your ego out of the way**, Goldsmith emphasizes. "Let others have the spotlight," he says. He quotes a top client, former Ford Motor Company Chief Executive Officer Alan Mulally: "Leadership is not about me; leadership is about them."

The author/editor of more than 30 books, including the best-sellers *What Got You Here Won't Get You There* and *MOJO: How to Get It, How to Keep It*, Goldsmith continues to travel the world serving his clients and learning the subtle truths behind quality relationships and good leadership. He was a pioneer of the 360-degree feedback technique.

"My expertise is leading people," Goldsmith says. "I've been at this for 37 years. I love my job, and I have no plans to retire." ■

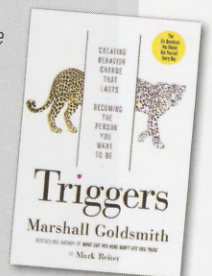
Arthur Foulkes is a writer for the Office of Communications and Marketing.



NEW BOOK EXAMINES BEHAVIORAL 'TRIGGERS'

In the new book, *Triggers: Creating Behavior that Lasts – Becoming the Person You Want to Be* (Random House), Marshall Goldsmith and co-author Mark Reiter discuss how "triggering" moments in our daily lives affect our behavior—from the smell of bacon in the kitchen to a snide comment made by a colleague.

Goldsmith outlines how we can overcome the trigger points in our lives, and enact meaningful and lasting change to become more of the person we wish to be. The book is filled with revealing stories from some of the most successful chief executives and power brokers in the business world.



CLASS NOTES

1955



James E. Tatooles (ME) authored *Heart Beats*, a collection of life-changing stories featuring his brother,

cardiac surgeon Constantine J. “Dino” Tatooles. Jim resides in Florida after retiring from a career building housing, commercial, and industrial developments throughout the Chicago area.

1968



Dennis Fritz (CHE) has been elected a fellow of the Connecting Electronics Industries, formerly the

Institute of Printed Circuits (IPC). He is a member of the IPC Hall of Fame for his career contributions.

1971

Joseph R. Rodriguez (AERO) has been named vice president of operations for SnackHealthy, and will be in charge of all production and logistics matters. He has worked in operations and finance with several public food companies, including the successful launch of Kettle Classic potato chips, Just Popped popcorn, and G.O.T. Fries retail food products.

1976



Jim Gidcumb (CE) has been named vice president and wealth management advisor at Merrill Lynch

in St. Louis. His financial advisory practice includes clients in 16 states, including several Rose-Hulman alumni. Gidcumb is vice president of the institute’s Alumni Association.

1980

Michael Tucker (ME) has been promoted to chief patent counsel at BorgWarner in Auburn Hills, Michigan.

1981



Swearingen



Shaffner

John S. Swearingen (CHE) and **George P. Shaffner** (ME) have been appointed to new senior vice president roles in a series of key management changes announced by Marathon Petroleum Corp. (MPC) Swearingen is

vice president and chief operating officer of MPC’s pipeline and logistics subsidiary. He replaces Shaffner, who is now in charge of health,

environment, safety, and security. Both will remain at MPC’s headquarters in Findlay, Ohio.

1982

Kevin L. Brinkman (ME) has been appointed codes and safety director for National Elevator Industry, a national trade association. He has more than 30 years of experience in the building transportation industry, and his firm, Kevin L. Brinkman & Associates, provides independent consulting services. He was previously vice president of engineering and quality for ThyssenKrupp Access Manufacturing.

1986

Lee Beckham (EE) has released the inspirational book, *Embracing God as Father: Christian Identity in the Family of God*. He has served as a ruling elder at Alexandria Presbyterian Church in Virginia for 14 years.



LAUNCHING ENTREPRENEURSHIP: Yaw Aning (CE, 2007), right, provided insight into entrepreneurship while giving a group of Rose-Hulman students a tour of Launch Fishers, a central Indiana enterprise developed to encourage business enterprises. Aning has successfully launched several companies. (Photo by D. Todd Moore)



HONORED ALUMNI: Members of the Class of 1995 receiving the Alumni Association's 2015 Career Achievement Awards were (from left) Agnes Berzsenyi (MSME), Michael Meneghini (BSCE), Tim Sublette (BSCS), and Brian Desharnais (MSCE). (Photo by Terry Miller)

1989

Michael Leavitt (CE) has earned certification as a fire instructor for the State of Indiana.

1990

Kevin Fesler (ME) is executive director of Air Force programs at Aerojet Rocketdyne after retiring from 24 years of active military service.

1992



Todd Greener (EE) is now senior vice president of supply chain operations for Advance Auto Parts, based in

Raleigh, North Carolina. He spent over 20 years at General Electric, most recently serving as general manager of appliance distribution operations within the GE Appliances division.

1994



Kenneth J. Reid (EE) will receive the American Society for Engineering Education's William Elgin

Wickenden Award this summer at the organization's annual conference. He recently became assistant department head for undergraduate engineering education programs at Virginia Tech.

1999

Rahul Iyer (ME) became a certified quality engineer through the American Society of Quality. He is a program quality engineer for Nammo Talley, and resides in Mesa, Arizona.

2001



Juliana Van Winkle (ME) was one of 130 women across America receiving the 2015 STEP Ahead Award from

The Manufacturing Institute. The award honors women for industry leadership and success in their respective companies. Van Winkle is quality systems and supplier quality engineering manager for Modine Manufacturing in Racine, Wisconsin.

2003

Sid Stamm (CS) has accepted a full-time position in the Department of Computer Science and Software Engineering at Rose-Hulman after being a visiting professor this academic year. He has also been principal security and privacy engineer at Mozilla.

2006

Matthew Wittstein (BE) will become tenure-track assistant professor of biomechanics at Elon University, beginning in August.

2008

Amanda Isom (CHEM) was awarded a doctorate degree in neuroscience last year from the University of Cincinnati.

2009

CJ Picklesimer (CPE) and the electronics design firm he founded, SCALAR Electronics, have launched the small prototyping tool, Lumiotto.

2010

Alex Freeman (ME) spoke as a delegate of ConocoPhillips at the 2015 Permian Artificial Lift & Production Congress. He has been the company's local artificial lift expert since 2013. ■

CLASS NOTES

Marriages

2007



Michael Alto (ME) and wife, Jade, were married on January 26, 2015, on

Marco Island. He is an account engineer with Bastian Solutions in Indianapolis.



Matt Pepelea (ME) and Natalya Romanova were married on July 11, 2014, in

Cancun, Mexico. Matt is staff engineer for Edwards Life Sciences.

2010



Kyle A. Rhodes (SE) and Maggie Redman were married on April 4, 2015, in the

White Chapel at Rose-Hulman. He will become associate director of residence life on July 1. The couple resides on campus.

2012

Christopher Haase (ME) married Jillian Wagner on March 7, 2015, in Huntingburg, Indiana. He is an engineer for Jasper Rubber, and the couple resides in Jasper, Indiana.

Andrew P. Harris (MA/PH, 2012; MSEM, 2013) and Maisey E. Tucker were married on March 14, 2015, in Indianapolis. He is a software engineer at Interactive Intelligence in Indianapolis.

2014



Tracy A. Older (ME) married Keegan Dunn on November 22, 2014, in

Beaver Creek, Colorado. The couple resides in Fort Madison, Iowa. She works in tech services for Climax Molybdenum, a

division of Freeport-McMoRan Copper and Gold.



Maisey E. Tucker (MA/CS) and Andrew P. Harris were married on March 14, 2015, in

Indianapolis. She is a software engineer at Interactive Intelligence in Indianapolis. ■

Rosebuds

1995

Jeffrey Markwardt (PH) and wife, Andrea, welcomed a son, Steve George, on August 30, 2014.

1999



Kendra (Itskin) Basler (ME) and husband, John, welcomed their third child, Eliana Grace, on March 9, 2015. The family resides near Chicago.

2000

John Basler (CHE) and wife, Kendra, welcomed a daughter, Eliana Grace, on March 9, 2015.

2004



Jessica Farmer Albert (CHE) and **Matthew Albert** (CE/MA) welcomed their second child, Lincoln

Lewis, on June 8, 2014. The family resides in Houston.

Steve J. Skillen (ME) and his wife, Jennifer, welcomed their first child, Benjamin Lee, on January 13, 2015. The family resides in Schaumburg, Illinois.

2006



Patrick Ludwig (CE) and wife, Jessica, welcomed their

second daughter, Cecily Catherine, on November 14, 2014. He works as a project manager for Adams Robinson, Inc. The family resides in Dayton, Ohio.

2007

David McIlwaine (CE) and wife, Ashley, welcomed their first child, Evelyn Grace, on May 8, 2014. The family resides in Carmel, Indiana.

2008



Samantha (Sheets) Anderson (BE) and **Curtis T. Anderson** (CE) welcomed their

first son, Ethan Curtis, on October 29, 2014. Samantha works at Ethicon, Inc., while Tyler works at Procter & Gamble. The family resides in Cincinnati, Ohio.

2009

Amy (Briola) Baker (OE) and her husband, Jeff, welcomed a daughter, Grace Agatha, on October 1, 2014. The family resides in Pittsburgh.

2011



Mindy Grupe (CE) and her husband, James, welcomed their first child, Quinn Angela,

on April 5, 2015. The family lives in Long Beach, California. Mindy is a civil engineer and water control manager for the U.S. Army Corps of Engineers' Los Angeles district. ■

Obituaries

1941

William (Bill) R. Ringo (ME), 95, died on January 24, 2015, in Centerville, Ohio. He spent 42 years with the Delco Products Division of General Motors, and then worked for Reliable Electric.

1943

Gordon MacBeth (CHE), 91, died on December 10, 2014, in McMinnville, Oregon. He was a co-founder of Memorex, developing the company's first magnetic coating, and then moved on to develop silicon wafer processing systems with II Industries, Eaton, and SVG.

1948

James (Jim) Hurt (ME/CE), 91, died on March 24, 2015, in Santa Maria, California. He worked on NASA's Space Shuttle launch complex at Vandenberg Air Force Base.

1949

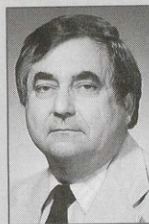
Ralph Lester Trimble (EE), 90, died on March 1, 2015, in Findlay, Ohio. He retired from Marathon Oil.

1950

Frank M. Mardjetko (ME) died on November 17, 2013, in Tarpon Springs, Florida.

Charles Strickland (EE), 92, died on February 20, 2015, in Indianapolis. He retired after 33 years with Indianapolis Power and Light.

1954



Jim Schwartz (ME), 81, died on March 10, 2015, in Naples, Florida. After retiring as a lieutenant colonel in the U.S. Army, he returned to Rose-Hulman to serve as alumni director for 14 years (1976-90). He received the Alumni Association's Honor Alumnus Award in 1988.

1955

George S. Ross (ME), 82, died on January 30, 2015, in Schererville, Indiana. He retired from Dango & Diententhal.

1958

Lyman A. (Tony) Whalen (ME), 79, died on November 9, 2014, in Bremerton, Washington. He was a reliability and systems safety manager for General Electric.

1961

Donald E. Barnett (ME), 77, died on January 22, 2015, in Olney, Illinois. He retired after working at Cross Country Freight Lines.

1965

William Everson (EE), 71, died on February 25, 2015, in Elmhurst, Illinois. He spent 31 years at Commonwealth Edison in Chicago, retiring as a member of the executive management team.

1966

Stephen J. Rozgony, Jr. (CE), 71, died on December 16, 2014, in Evansville, Indiana.

He retired as a software development engineer with Toyota Motor Manufacturing.

1967

Terrell B. Stagner (ME), 69, died on January 10, 2015, in Fort Myers, Florida. He worked for Eli Lilly and Company for 29 years.

1970

David E. Amolsch (ME), 66, died on August 5, 2014, in Milford, Michigan. He formerly lived in Downers Grove, Illinois.

1971

Joseph E. Spearing (EE), 73, died on March 13, 2015, in Indianapolis. He worked for Toshiba, EIL, and Spearing & Associates.

1973

Douglas W. Meyer (EE), 63, died on March 25, 2015, in West Chester, Ohio. He worked for Northrop Grumman's Xetron division. Survivors include sons **Christopher Meyer** (CHE, 2004) and **Jonathan Meyer** (EE, 2006), and daughter **Jennifer Meyer** (CHE, 2002).

1982

Rodger A. Zook (PH), 54, died on December 12, 2014, in Springfield, Illinois. He was a case worker for the State of Illinois before becoming an information technology trainer.

Friends



Hugh J. Baker, III, 70, died on February 14, 2015, in Indianapolis. He served as regional advancement

director for Rose-Hulman's Office of Institutional Advancement, and helped form the institute's Indianapolis Board of Associates, a non-alumni group of central Indiana business, government, and education leaders.

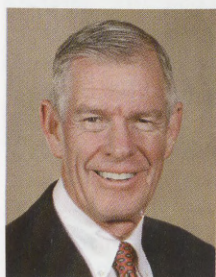


John T. Myers, 87, died on January 27, 2015, in Covington, Indiana. He represented western

Indiana's 7th district in the U.S. House of Representatives for 30 years (1966-96). He helped obtain federal funds for Rose-Hulman's Center for Technology Research with Industry, named in his honor. His many contributions to the institute were recognized when Myers received an honorary doctorate in 1996. ■

WE WANT YOUR NEWS | Share news and photographs at alumniaffairs@rose-hulman.edu.

Doug Smith Named Interim Advancement Leader



Experienced higher education fundraising expert Doug Smith is serving as Interim Vice President for Institutional Advancement while the institute searches for a permanent replacement for Rickey McCurry, who left earlier this spring to become vice president for development and alumni affairs at the University of Tennessee.

In his new role, Smith oversees all fundraising and alumni relations activities for the institute, and is part of President Jim Conwell's administrative cabinet.

Before coming to Rose-Hulman, Smith served as vice president for university advancement at the University of North Texas at Dallas (UNTD), and Bowling Green State University (Ohio). ■

Alumni Association Ready to Honor Distinguished Young Alumni Winners

Four alumni from the last 10 years will be recognized by the Alumni Association during homecoming for their notable achievements in career achievement, continued education, community service, and/or commitment to Rose-Hulman. This year's honorees will be:

MICHAEL HAUGHNEY (ME, 2007)—As configurations manager for Caterpillar's D6T Track Type Tractor, Michael is responsible for interfacing with all of the system teams during a new product introduction program. He has been a corporate sponsor of four Rose-Hulman senior capstone design project teams, and leads Caterpillar's Career Fair Team for the institute.

CHARLIE KEY (CPE, 2007)—Overseeing operations for the Modulus business he helped start with other Rose-Hulman alumni, Charlie helps decide the unit's vision and product direction following its acquisition by Progress Software. He has been a guest speaker at Rose-Hulman's Startup conference, and has sponsored senior-year student design projects.

STEVEN SCHMITZ (ME, 2007)—In his career, Steven has held three major roles in SpaceX, the latest being manager of avionics mechanical integration. He manages the design, analysis, and integration of secondary structure supporting avionics across the SpaceX family of vehicles. He has worked to recruit Rose-Hulman students to join the SpaceX team.

DEREK TROBAUGH (AB, 2006)—Derek is a postdoctoral associate at the University of Pittsburgh's Center for Vaccine Research. His research focuses on how mosquito-borne viruses interact with the immune system, in an effort to develop vaccines for viruses for which no licensed vaccines currently exist. Derek received the Young Investigator Award from the American Society of Tropical Medicine and Hygiene in 2013. ■

ALUMNI CALENDAR



HOMECOMING 2015 SEPTEMBER 18-20

SEPTEMBER 18

Alumni Golf Outing – Hulman Links/Terre Haute Country Club, 8:15 a.m.

Heritage Society Luncheon – Hulman Student Union, Noon

All Alumni Reception, Hatfield Hall, 5-7:30 p.m.

Pep Rally/Bonfire, Sports and Recreation Center, 8:30 p.m.

G.O.L.D. Party (Hosted by Class of 2010), Copper Bar, After Bonfire

SEPTEMBER 19

5K Fun Run/Walk – Sports and Recreation Center, 8 a.m.

Alumni Awards Breakfast – Hulman Student Union, 8:30 a.m.

Alumni Association Annual Business Meeting – Hulman Student Union, 10:30 a.m.

Academic Department Open Houses – Academic Buildings, 11 a.m.-1 p.m.

Tent City – Cook Stadium Parking Lot, Noon

Football Game – vs. Hanover College, 2 p.m.

Rose-Hulman Ventures Open House – South Campus, 4-6 p.m.

50-Plus Golden Gala Events – Hulman Student Union

- Reception, 6 p.m.; Dinner, 6:30 p.m.

Class Reunions, starting at 6 p.m.

SEPTEMBER 20

RoseWood Couples Brunch – St. Mary-of-the-Woods, 10:45 a.m. to 1:15 p.m.

SPECIAL ALUMNI EVENTS

Class of 1965 50-Year Commencement Reception/Dinner, Campus | **May 29**

Class of 1965 Medallion/Commemorative Degree Ceremony | **May 30**

Rose-Hulman Commencement | **May 30**

Indy Eleven Soccer Game, Indianapolis | **June 13**

Holiday World Rose-Hulman Day | **June 14**

Summer Scholarship Golf Scramble, Prairie View Golf Course | **June 25**

Season of Service-Dallas | **June 27**

Indianapolis Indians Baseball Game, Victory Field | **July 4**

Season of Service-Denver | **July 11**

Rose on the Road-Washington, D.C. | **July 16**

Urban Bourbon Trail Event, Louisville, Kentucky | **July 25-26**

Chauncey Day | **September 10**

Fall Career Fair, Campus | **September 16**

Early Bird Alumni Reception, Campus | **September 17**

Check latest events at rosetem.rose-hulman.edu/events

LAST CALL FOR GOLF SCRAMBLE

The annual Alumni Golf Scramble is June 25 at Prairie View Golf Course in Carmel, Indiana. This event raises valuable scholarship funds to support Wabash Valley and Indianapolis-area students. (Since 2007, more than \$200,000 has been awarded to students through this outing.) Golfers can register at rosetem.rose-hulman.edu/Scramble2015.



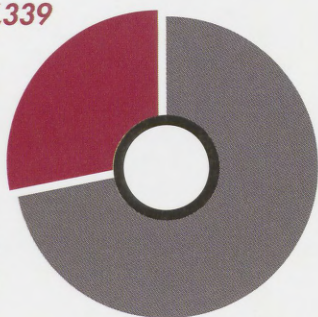
Keep Rose-Hulman in the Lead

A generous alumnus from the Class of 1952 has thrown down the gauntlet to alumni from the 1990's and from the classes of 1950-55. Until June 30, your donations will be matched* dollar-for-dollar, up to \$200,000.

Help Put Your Class in the Winner's Circle

1990's Alumni Current Giving

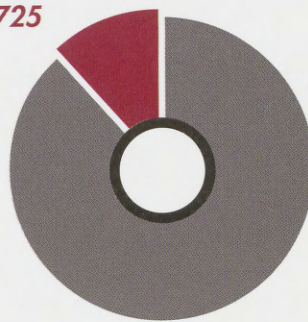
\$77,339



\$200,000
Goal

1950-1955 Alumni Current Giving

\$25,725



\$200,000
Goal

*Matching for '90's alumni donations of \$25 or more, 1950-55 alumni donations of \$100 or more.

Additional participation challenges will allow your giving to go even farther.

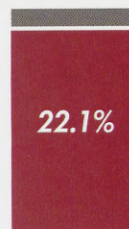
- Each class from the 1990s that reaches 35% participation will earn an additional \$5,000 for Rose-Hulman.
- If alumni from 1950-55 make 10 planned gifts, Rose-Hulman will receive an additional \$50,000.

Young Alumni Participation Challenge

Generous alumni from the Class of 1957 have a special challenge for graduates from 2005-2014. Rose-Hulman will gain an additional \$15,000 gift if young alumni giving reaches 30%.

Current Giving Participation

30% Goal



22.1%

Make your donation and see up-to-date giving totals at www.rose-hulman.edu/give.

Echoes

ROSE-HULMAN
INSTITUTE OF TECHNOLOGY

5500 Wabash Avenue
Terre Haute, IN 47803

Address Service Requested



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PARTING SHOT

Planting An Attitude Of Gratitude

Sophomore Emily Buzard of Geneseo, Illinois, and freshman Ruochong Song from China admire the 4,000 miniature flags in the campus' "Forever Rose" Garden, part of the institute's first Attitude of Gratitude Week. Each flag represented a donor who made a gift to support Rose-Hulman during the 2013-14 fiscal year. (Photo by Shawn Spence)

