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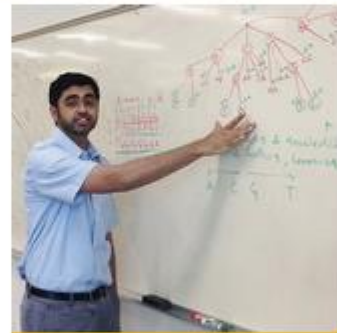
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Student finalist
in international
innovation challenge



CEAS stocks pantry
with 500 pounds
of food



Breakthrough
algorithm key for
precision medicine



Shields receives grant
to study solutions to
freshwater pollution



Hats off to
Bryan
Birchmeier



ALUMNI
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Steel bridge, concrete canoe teams head to regional competition



After months of hard work and fabrication, WMU's steel bridge and concrete canoe teams head to East Lansing, Mich., April 7-9, where they will vie against other schools for the best design. WMU engineering students participate each year in the American Society of Civil Engineers (ASCE) North Central Regional Competition and this year hope to advance to the national competition.

Universities from Michigan and Ohio will attend the conference, with some nine concrete canoe teams and at least seven steel bridge teams.

The steel bridge team designs, fabricates and constructs a scale-model bridge based on criteria established by the American Society of Civil Engineers and the American Institute of Steel Construction. The competition involves building a 1:10 scale bridge that is evaluated on lightness, stiffness, construction speed, economy, efficiency and display. WMU's 20.5 foot-long steel bridge must have a 1.5-foot clearance, be able to hold 2,500 pounds and be assembled quickly from pieces no longer than 3 feet.

Tom Palumbo, steel bridge team captain and a 5th year senior from Hudsonville, Mich., said after months of designing, cutting and welding, the team is ready to show off its final product. "Our program has come a long way over the last few years," he said. "I'm excited for conference because we have a fantastic team this year and we'll be bringing a very competitive bridge."

WMU's entry in this year's concrete canoe competition is named "Italian Stallion," and was produced using a "female" mold rather than the typical "male" mold. Troweling of the concrete occurred on the inside of the Styrofoam mold, rather than the outside. The canoe will be judged in categories such as hull design and aesthetics as well as its performance in a number of different races.

The concrete canoe team recently concluded paddling practice and hope this year's model will perform well in the water. "We've designed and built it – now we're ready to take it and race it," said Bryan McDowell, team captain and a senior from St. Clair, Mich.

The competitions also involve a display and presentation of the concrete canoe, as well as a separate technical paper written by one of Western's ASCE members.

The teams will compete and be judged by industry professionals. Look for competition results in the next issue of InSPIRE.

Engineers invent 3D hybrid metal printer

Make it in metal. Maybe soon, anyone can. That's the hope of a group of WMU engineering graduates and their professor, who have applied for a provisional patent on a new 3D metal printing device and process.

Work on the device began in 2014 as part of a senior design project with then students Jake Ives, Jim McQueen, Dan Ziemer and Matt Ziemer – and associate professor Pavel Ikononov of WMU's engineering design, manufacturing and management systems department.

While 3D metal printers that create metal objects are available, the price tag for the machines can be upwards of \$500,000.

“We saw a need for an affordable metal rapid prototype machine,” said Ikononov. “Most complex metal parts require multiple secondary operations after their initial production, which add time and cost to the manufacturer.”

He said in addition to affordability, the team wanted to ensure the resulting machine could hold close tolerances and had a large build area.

The team built their machine from scratch, combining CNC machining and welding – both well-established technologies in the industry. Its original 3-axis design has since been modified to a 5-axis design for increased capabilities. “Jenny,” as the machine is called, can hold a tolerance of 0.001 of an inch and is capable of functioning as a 5-axis CNC or a CNC controlled welder. The process of building parts is similar to the most common 3D printing methods. The creating of a metal part is achieved using an additive (welding) and subtractive (CNC) machining process. A welder that is attached to the printer is guided by the CNC controller to place metal precisely on a predefined path on each layer. Next the CNC machining tool removes the steel material to create a precise shape. Then the welding and machining processes are repeated multiple times until the part is produced.

“Our goal was to build an accessible and affordable 3D metal printer that nearly anyone can operate with ease,” said Jim McQueen, now a quality engineer with Oliver-Tolas Healthcare Packaging in Grand Rapids.

“We envision many applications for this 3D metal printer – from a homeowner working in the garage to small job shops to virtually any industry,” he said. “Right now, making functional metal prototypes using 3D printers can be cost-prohibitive. Our device and process make it simple and inexpensive to make complex, fully assembled metal parts.”



The students received an undergraduate research award which was used to purchase all the major components. Some smaller items were donated or used from inventory – and the machine came in \$4.93 under the \$4,000 budget, of which more than \$2,000 was the cost of the welder itself.

“We believe this is a patentable design for a machine that will greatly impact manufacturing and prototyping as we know it,” Ikononov said.

Area students compete in 2016 Science Olympiad tournament at WMU

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Teams competed in challenges such as Wright Stuff, a flight endurance contest powered by rubber-band engines; Mission Possible, developing a Rube Goldberg device and energy transfers to complete a task; and Scrambler, which involves building and racing a model car while transporting an egg on its hood.

"Science Olympiad is a program with a mission to inspire the next generation of engineers and scientists," said Scot Conant, of WMU's College of Engineering and Applied Sciences and regional tournament director. "It was an exciting day for these talented students participating in rigorous hands-on competitions."

About 150 WMU students, faculty and staff volunteers helped with the event.



Student finalist in international innovation challenge

What features will the car of 2030 have? What will it look like? How will it perform?

WMU mechanical engineering student Nicolas Theoret, a senior from Montreal, Canada, answered those questions and submitted an essay describing his idea, along with additional supporting material, to bring his idea to life.

It was part of Magna's Student Innovation Challenge, which involves identifying and exploring opportunities to radically improve personal mobility and transportation. Magna International, one of the world's largest automotive suppliers, challenges college students to imagine what their lives may be like 15 years from now and to develop an idea for a new feature or capability for a car in the year 2030.



Theoret's essay earned him an invitation to attend the prestigious Consumer Electronics Show in Las Vegas earlier this year. He was one of nine finalists from the U.S., Canada and Mexico invited as Magna's guests to compete in the three-day innovation challenge.

He was teamed up with two students from other schools for three grueling days of work to come up with a business plan for their design of an interactive windshield interface. The design then was presented to a panel of judges.

Theoret's team took second place.

"The entire experience was truly inspiring. There is no better place than the Consumer's Electronics Show to witness the forefront of technological advancement," Theoret said. "It was exciting to present ideas to help shape the car of the future." He encourages more WMU students to apply for the 2017 student competition. He said he enjoyed the chance to network with industry leaders, hear from Magna's R & D team, and experience the largest consumer electronics show in the world.

For more about the Magna Student Innovation Challenge, visit www.magna.com/studentinnovationchallenge.

College of Engineering and Applied Sciences stocks pantry with 500 pounds of food

The College of Engineering and Applied Sciences Food Drive Challenge was a big success, with nearly 500 pounds of food donated. Faculty, staff and students were extremely generous in donating non-perishable food items to help support WMU's food pantry – the Invisible Need Project.

As in the past, departments within the college competed with each other to bring in the most donations. Advising took first place with 259 items of food collected. The winners of the November food drive were Industrial and Entrepreneurial Engineering and Engineering Management and Engineering Design, Manufacturing and Management Systems, with 192 items of food collected.

The recent food drive also included an additional challenge to the Haworth College of Business to see who could bring in more donations. With 497 pounds of food collected, the College of Engineering and Applied Sciences had a hefty lead over the 257 pounds of food collected by the business college.

In recent years, campus communities across the nation have discovered that there are large populations of students who go hungry. WMU's campus food bank is a critical resource for students in need.

Thank you to everyone who contributed. The next food drive will be in October. For more information on the Invisible Need project, visit mywmu.com/invisible_need.



Researcher's breakthrough algorithm key to precision medicine

The work of WMU computer science professor and researcher Dr. Fahad Saeed recently was highlighted by the National Science Foundation and recognized as a breakthrough in the world of mass spectrometry-based protein research. The article, “Surfing for algorithms,” showcased Saeed’s research on how to reduce the deluge of data produced by mass spectrometers analyzing proteins.

The article appeared in the online publication [sciencenode.org](https://www.sciencenode.org), which is funded by the National Science Foundation and CERN, the European Organization for Nuclear Research.

Saeed, who also is director of the College of Engineering and Applied Sciences Parallel Computing and Data Science (PCDS) lab, found a way to speed up large-scale protein analysis by 100 times. He and his Ph.D. student Muaaz Awan did so by dismissing conventional assumptions that all data in the mass spectrometry-based protein research is relevant. Instead, they searched for ways to identify only the relevant data.



“We wanted to find a way to sift through all the ‘noise’ in these huge data sets in protein analysis,” Saeed said. Called MS-REDUCE, Saeed’s algorithm reduces the irrelevant data points in the large data streams, accomplishing in an hour what typically takes three days. “We hope this sets the stage for personal and precise medicine, making analysis of proteins and identifying related health issues faster and more affordable,” he said.

Dean Houssam Toutanji, of WMU’s College of Engineering and Applied Sciences, said Saeed and his team have made impressive and important contributions to large-scale protein studies that lay the foundation for more personalized medicine in the future.

“Since joining our college in January 2014, Dr. Saeed has received five funded grants totaling more than \$230,000,” Toutanji said. “He is an asset to our faculty and our students and has accomplished a great deal in a short time.”

Shields receives grant to study solutions to freshwater pollution



Chemical engineering graduate student Shaun Shields recently was awarded a Graduate Student Research Grant for his work on freshwater pollution. Shields -- working under the guidance of Dr. Andro Mondala, assistant professor of chemical engineering -- is researching solutions to particulates in erosion and runoff sediments that contribute to pollution in lakes, rivers and streams.

The goal of his research is to develop, scale-up and implement a system that extracts the phosphorus bound onto the runoff sediments that can cause toxic algal blooms and other damage resulting from excessive nutrients.

Implementing this system on an industrial scale would allow the recovery of nutrients from the runoff sediment to be re-used in agriculture.

“This system will reduce dependence on rapidly depleting mined fertilizer sources and could help ensure a sustainable food supply for the growing world population,” Shields said.

Hats off to Bryan Birchmeier

Computer engineering student Bryan Birchmeier, a senior from Saline, Mich., recently received this year's WMU Student Employee of the Year Award.

Birchmeier was one of more than 130 student employees nominated and was recognized at a reception at the Bernhard Center. He also moves on to a national competition later this year. The Student Employee of the Year Award is presented by WMU's Career and Employment Services, which hosts a Student Employee Appreciation Week every February. The week is dedicated to all student employees and is a time to recognize all the hard work and contributions that student employees make to the university.

Birchmeier works about 25 hours a week for WMU's Office of Development and Alumni Relations where he does information technology support, working on computers, tablets, phones and the like.

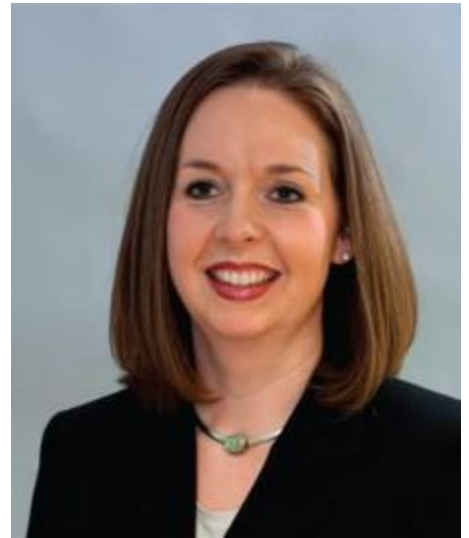
"Bryan is a great example of a Bronco," said Jim Thomas, vice president for Development & Alumni Relations. "For the past two years he has been an amazing problem solver and all-around IT go-to guy."

WMU employs approximately 3,500 students during the fall and spring semesters. Campus student employment allows students to build skills, explore career options, and make meaningful contributions to the university and community.



Alumni Spotlight: Jennifer Lentner

Meet Jennifer Lentner, senior director of marketing communications with Stryker and WMU volunteer extraordinaire. Lentner is a 1996 graduate of the College of Engineering and Applied Sciences, with a B.S. in mechanical engineering. An active supporter and volunteer of Western, Lentner has served as a board member of the WMU Alumni Association since 2011 and is currently its president. In 2014 she received the Alumni Excellence Academy Award, given to those who “have embraced the expectations of our graduates to change the world.” Her volunteer work also includes serving as a board member of Greater Kalamazoo Girls on the Run and participating in the Women in Engineering Mentorship Network at WMU.



What’s your career path been like? What has been most surprising about your time at Stryker?

My career path has been somewhat “non-traditional.” I began at Stryker as an intern in manufacturing, and had the opportunity to take a full time role when I graduated. After several years in manufacturing and R&D, I had the opportunity to move into IT as a project manager. This was a great way for me remain in a role that had a technical aspect to it, but was not an engineering role. That was a great experience – I got to interact with a lot of different areas of the business, including sales and marketing. In that role I did a lot of sales force and marketing support, and after three years I had the opportunity to move to marketing communications. I’ve been on that side of our business ever since, and have had responsibility for marketing communications, medical education, tradeshow, employee communications and meeting planning in various combinations over the years. I also had the opportunity to manage our customer service and distribution functions for a period of time.

The most surprising thing about my time at Stryker is the path I’ve taken. I would never have anticipated that I would end up in Marketing Communications when I started, but it has been a great destination for me! I get asked all the time whether I would have studied marketing or communications if I knew that is where I would end up. My answer to that is no. Having an engineering degree and working as an engineer not only gave me a great foundation of problem solving and asking questions, it allowed me to see areas of the business that I would not have seen otherwise. Those experiences have a significant impact on how I approach my job today.

What are you passionate about in your work?

I am passionate about connecting employees to our mission of making healthcare better, and helping them understand that each person contributes to that mission, whether they are designing the next great medical device, building it, or shipping it out the door to the customer. It’s great to have purpose in your work, and if I can help someone experience that, it’s a good day.

How did your experience at WMU’s College of Engineering and Applied Sciences shape your success?

Of course my time at WMU and at CEAS gave me a great technical foundation. There are lots of places that you can learn the fundamentals of calculus, material science, machine design etc. though. What made the difference for me were the people that challenged and helped and encouraged me, and I’m really grateful for that. I have distinct memories of two professors that pushed me out of my comfort zone, and didn’t allow me to be a wallflower, or let myself off the hook by accepting “I don’t know” as the answer to a question. They made a difference for me, and that is a common thread I hear when I talk to other alumni as well. The interactions

with faculty and staff that really took an interest in me made a big difference in the level of confidence I had going into the professional world.

What's your favorite Bronco moment?

Well, I have lots of them, but a recent one was getting to participate in the alumni center opening as the president of the Alumni Association. That was a lot of fun – definitely a proud Bronco moment.

You have been a very active supporter and volunteer at WMU since you graduated. What makes a good alumni volunteer?

A good volunteer is anyone that feels strongly about the experience they had at WMU and is willing to pay that experience forward with their time, talent or treasure, in whatever amount they have to give. There are so many ways to give back, and everyone has something to contribute. You can mentor a student, welcome prospective students as an alumni ambassador, volunteer to speak in a class. If someone is interested in volunteering, I encourage them to find an area they feel strongly about and ask how they can help.

What's the most incredible thing that's happened to you since graduating?

On the personal side, my great family. My husband is a fellow CEAS alumni, and we have a 2-year-old that makes us laugh every day. Professionally, it was finding a company that does something that I am passionate about, and getting to work with great people. I came to Stryker because I wanted to work for a company that helps people, and do it with people I love working with, and I've been very fortunate to find that.

What is something people don't know about you?

Well, as someone who works in communications, a lot of people don't know I'm an engineer, even though I certainly don't keep it a secret! Beyond that, a lot of people probably don't know that I've been an auto-racing fan since I was a small child. My dad worked in the auto racing industry, and I've been going to work and racing events with him since before I went to school.

Lentner can be reached at jennifer.lentner@stryker.com.