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***Welcome to Ahoya! Engineers*** – Marquette University’s College of Engineering e-Newsletter for alumnae, alumni, students and their families, faculty, staff, and MU friends. We want you to know what’s happening in *your* College of Engineering. This newsletter will be published periodically to share our accomplishments, milestones, and activities.

***Please Note:*** If this e-Newsletter was forwarded to you by fellow alumni and you want to receive future editions *directly*, signing up is fast and easy. Click this link [Subscribe](#), provide your name and e-mail address, and submit your subscription.

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***Greening The Environment.*** On behalf of Wisconsin Governor Jim Doyle, Department of Commerce Secretary Mary Burke presented a \$39,000 grant to ***Dr. Dan Zitomer***, Associate Professor in the Department of Civil and Environmental Engineering, which will increase methane production in anaerobic digesters.

“Wisconsin has a great opportunity to be a leading state in biofuels development, and I’m pleased that we could assist Marquette University in this important research and development project,” stated Gov. Doyle.

The project will develop new preservation methods for microorganisms that will increase

methane production when used with anaerobic digesters. Raw materials for methane production include dairy manure and meat and poultry wastes. Grant funds come from the Department of Agriculture, Trade and Consumer Protection's Agricultural Development and Diversification (ADD) grant program.

"Our research will continue to impact two important topics facing the environment – renewable energy and waste management," stated Dr. Zitomer, as he accepted the check. "Since our work involves the conversion of industrial and agricultural waste to renewable energy, our findings will benefit the state. We are extremely grateful to Gov. Doyle for his support. "

Marquette's *Water Quality Center*, of which Dr. Zitomer is Director, is a leader in anaerobic biotechnology for waste treatment and renewable energy production, organizing an annual international short course on anaerobic treatment of high-strength industrial waste, performing more than \$1 million in research for government and industry, and educating future engineers and scientists to design and operate anaerobic facilities. For information on the Center's research activities, visit <http://www.marquette.edu/wqc>.

The ADD grant program, housed in the Department of Agriculture, Trade and Consumer Protection (DATCP), was created in 1989 to stimulate Wisconsin's farm economy. Based on post-grant surveys, the program has generated more than \$100 million in economic returns, including annual sales increases, annual cost reduction, and additional economic returns. Economic activity resulting from the success of grant projects includes more than 600 new jobs; more than \$30 million in new capital investment; and more than 400 new products developed.

Congratulations, Dan, on receiving this support for your research that will improve our environment!

Lead photo: Dr. Zitomer and Secretary Burke displaying the check from the State of Wisconsin



***Is Engineering For Me?*** Do you have a junior or senior high school student who thinks he or she might be interested in engineering but doesn't know what it's all about? Well, we have a special day planned just for them!

From ***8 a.m. to noon on Saturday, September 8<sup>th</sup>***, your College will offer workshops in five different engineering areas and also a special "Engineering for Young Women" session in which participants can learn what engineers do and experience a lecture followed by a hands-on laboratory experience. During this time, separate informational activities will also be offered for parents. For registration information, [click here](#) - or contact our Enrollment Management Office at 414/288-6720 or [engineering@mu.edu](mailto:engineering@mu.edu). The \$20 registration fee also includes lunch. Register early, as space is limited!

THEN, from ***noon to 2 p.m.***, we'll open our doors to the public for our annual ***Engineering Fall Open House***. Tour our laboratories and view the exhibits, meet our students and faculty one-on-one, hear about Co-op/internship opportunities and learn about our student organizations and

activities. ALL are invited – grade-schoolers, mid-schoolers, high-schoolers and their parents, alumni and friends. WE'LL all be there, so we'd like to see YOU there!



***Come Out, Support Your School, And Show Off Those Wheels!*** We need you and your cars and bikes for the First Annual Marquette Engineering Car and Bike Show!

The event is scheduled for September 8, 2007 from 12-3:30, registration begins at 11. The event will be hosted in Lot P on the corner of 16<sup>th</sup> and Wisconsin Ave, across from the engineering building. There will be awards for Best in Show (car and bike), Best Classic Car, Best Tuner Car, American Muscle, and Best Bike.

If you are interested in participating please contact Dan Wojno at [Dan.Wojno@mu.edu](mailto:Dan.Wojno@mu.edu) for details. In your e-mail please include your name, affiliation to the university, and what you would like to bring to the show!



***Engage, Explore, Explain, Elaborate, and Evaluate (E<sup>5</sup>)***. Your College's Engineering Education Outreach Programs and Academies grew by leaps and bounds this year with the number of programs increasing from three to eleven sessions and student participation more than doubled from last year. A new course, "*T.O.Y.s (Teach Our Youth Strategies) and Polymers*," was taught by Jamie Malwitz, a National Science Foundation Einstein Fellow. Focused on teaching the 6 to 10 year old participants basic physics and chemistry principals using toys, they learned to think and work as scientists do, but with more gadgets and games with which to play!

We are particularly proud of the successful "*Engineering for Young Women*" program. The participants engaged in hands-on projects throughout the week, which introduced them to different fields of engineering. These sessions were led by ***Erin Richardson***, Instructor of our Freshman Engineering courses, and two of our female engineering undergraduate students. Participant reviews were very complimentary and expressed their appreciation for the opportunity to learn about engineering with other girls.



“Engineering for Young Women” participants concentrating on a project

In “*Engineering for Young Minds*,” participants 6 to 9 years of age worked on rocket balloons, electrical circuits, robots, k’nex, and balloon powered cars. “*Robotics Engineering with NXT*” was also a huge success with great demand. Participants worked on designing, building and programming robots and were challenged with competitive projects that brought out their creative best.

“*Robotics for Educators*,” which also had record enrollment, concentrated on teaching Robotics Engineering to K-12 teachers, including curriculum development and strategies for implementation at their individual schools.

Thanks to **Dr. Jon Jensen**, Associate Dean for Enrollment Management and his assistant **Lori Stempski** for planning and coordinating these programs to promote STEM (Science, Technology, Engineering and Mathematics) education and careers to Milwaukee-area youth.

Your College’s mission is to “**BUILD THE WORKFORCE FOR THE 21<sup>ST</sup> CENTURY**” and it is programs like these that get our young participants interested in and thinking about careers in technology. In fact, we had some visitors from the community stop by to observe our outreach activities, one of which was Mr. Michael Cudahy, co-founder of the former Marquette Electronics and long-time promoter of STEM education (see picture below). We look forward to another year of excitement and growth in these programs!



From left: Michael Cudahy, Jim Peck, OPUS Dean Stan Jaskolski and Dr. Jon Jensen visiting the “Robotics Engineering” Summer Academy



***Making Bridges Safer.*** *Dr. Chris Foley*, Associate Professor, and *Dr. Baolin Wan*, Assistant Professor, in the Department of Civil and Environmental Engineering, are working with Marquette graduate and undergraduate students to find ways to extend the life of highway bridges. Longer bridge life = less road construction and maintenance and increased safety = fewer driving delays and more efficient use of our tax dollars = a positive difference in everyday life.

Anyone who spends a winter at Marquette is familiar with use of de-icing chemicals to remove and keep snow and ice off of the roadway. Over time, these chemicals and water work their way into the small cracks and natural voids in the concrete that makes up the bridge deck (driving surface). This contributes to corrosion of the steel reinforcing bars in the deck leading to concrete spalling and costly bridge maintenance operations. In the worst case scenario, it can lead to an unsafe bridge.

Drs. Foley and Wan and the Marquette team are collaborating with the University of Wisconsin, state, and county government on a project funded through the Federal Highway Administration’s Innovative Bridge Research and Deployment Program. The project’s objective is to look for innovative ways to reduce construction costs and increase the useful life of bridges, thereby reducing lifecycle costs and traffic disruptions.

This research project presents two major challenges; exploring innovative bridge building materials and methods to determine how they perform under actual use and developing the tests and test equipment used to collect the data necessary to make those determinations. Field work, laboratory work, and analytical modeling are some of the tools being used in this project.

Two Wisconsin bridges, the bridge on U.S. Highway 151 in Waupun that crosses State Highway 26 and the bridge on U.S. Highway 151 in Fond du Lac that crosses De Neveu Creek, are the field sites for this project. Both bridges were constructed using Fiber-Reinforced Polymer (FRP) reinforcement to replace traditional epoxy-coated steel reinforcement and FRP stay-in-place (SIP) formwork. In simpler terms FRP is plastic reinforced with glass or carbon fibers and that means it won't corrode. Corrosion is a serious problem with traditional steel reinforcement. The FRP-SIP formwork is reinforced plastic that replaces the traditional wooden formwork used for constructing concrete bridge decks. In a traditional bridge deck construction process, wooden forms are built, the concrete is placed, and the forms are removed. In the FRP-SIP formwork system, FRP forms are manufactured, concrete is placed, and the forms permanently remain in the bridge deck serving double-duty as bridge deck reinforcement after the concrete reaches its intended strength.

The other major challenge of this project is to determine how these innovative building materials and methods perform under actual use. Graduate students from the Marquette team developed a portable strain sensor that can be bolted onto the bridge to collect the necessary data during testing and then be removed. Data acquisition software was also written to acquire and store the data. The strain sensor itself is an innovative and very economical solution to the problem of data collection in the field. Traditionally strain sensors are built into the bridge structure itself. Sensor replacement is impossible. Another method mounts sensors on the outside surfaces of the bridge components. In this case, the sensors are permanently exposed to the environment and are subject to degradation and unreliable measurements and sensor failure can result. The MU strain biscuit device is portable. It is bolted to the bridge in exactly the same place each time data is collected, therefore providing consistently accurate data over time.

The field load test consists of calibrated trucks driving onto the bridge and stopping at measured intervals and targeted locations on the bridge. With the trucks in place, the data collection system measures strain, material stretching and compressing, and deflection, vertical movement, of the bridge deck under loading. These bridges will be monitored for 4 years, including a series of two field load tests separated by a two-year interval, to see if the strain and deflection measurements change over time. Any changes in these quantities will be further investigated to determine their likely cause. This project may help to change the face of bridge construction forever.

The next time road construction interrupts your travels, remember that a team of Marquette faculty and students are hard at work making your life a bit better.

*Editor's note:* The above article, which was written prior to the Minnesota I-35W bridge collapse, demonstrates the great importance of the current research being performed by Drs. Foley and Wan and their Marquette team. Dr. Foley was interviewed by numerous media sources in the aftermath of the Minnesota tragedy.



Dr. Foley, lower left, and DOT employee  
On bridge (left to right): Michael Stern (Engineering undergraduate student),  
Nick Hornyak (Engineering graduate student), Dr. Wan,  
and Junshan Liu (Engineering graduate students)



***Recent Grad Awarded Second Place in International Contest.*** In our newsletter last May, we reported that one of our students who entered his embedded design application was a top ten finalist in the *Black Widow \$10,000 Design Challenge*, sponsored by Freescale Semiconductor. Selected from a field of 775 participants, ***Rakesh Reddy***, a May 2007 Electrical Engineering graduate, was invited to submit a prototype of his “Electronic Etch-a-Sketch” for final judging for the most “killer application.”

Rakesh’s prototype, which enables sketches to be saved, retrieved and recreated electronically on a tablet controlled by an S08 MCU, took second place with a \$5000 award.

Rakesh, your College is very proud of your achievements in this contest and we wish you much success in your engineering career!



***Fall Semester Is Just Around The Corner!*** Can you believe it? In just *two* weeks classes will begin for fall semester! Where *has* the summer gone? Well, students and faculty,

enjoy the last few weeks of your “summer” before classes begin and take some well-deserved time off to relax and enjoy. Have a safe trip to campus, students. See you on August 27<sup>th</sup>!



***Help Us Spread The News!*** We realize that we are missing *many* e-mail addresses for alumni and friends who should receive this e-newsletter, so we’re asking for your help. If you received this e-newsletter directly from Marquette, it means we already have your e-mail address on our list serve. However, ***we would really appreciate it if you would forward this newsletter to your fellow-alumni friends and other friends of the College and tell them they can subscribe to the list serve to receive future editions of this e-newsletter.***

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