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wisconsin engineer
NOVEMBER 2010 VOLUME 115, NUMBER 1

The Wisconsin Institutes for Discovery p. 11

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wisconsin engineer

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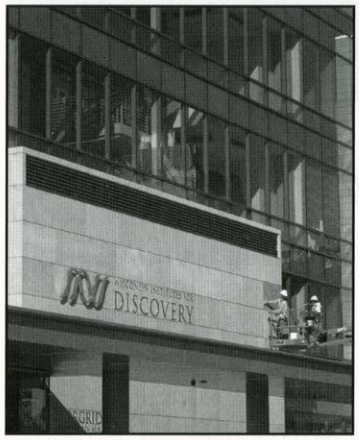
General



Cover photo by:
Brian Mogen

Commentary

Letter from the editors

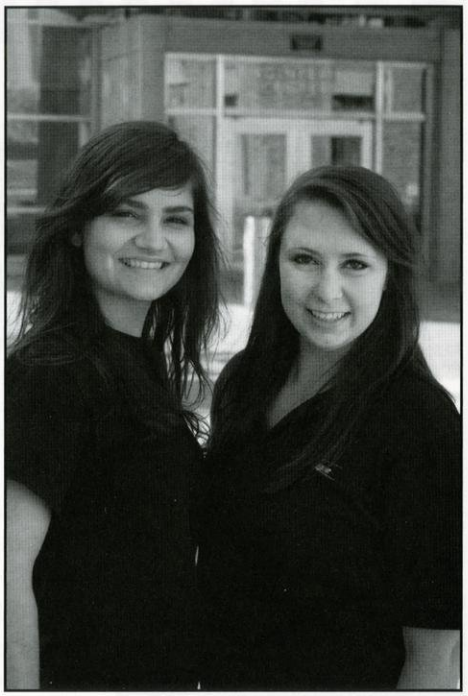
The midterm election campaigns earlier this fall relied heavily on the slogan of "change." It was the central idea of the democratic campaign during the 2008 presidential election and since then the buzzword continues to resurface. This November in Wisconsin, the word seems to hold an especially significant value for our campus.

The high-speed rail, the Solar Energy Lab (SEL) and the Wisconsin Institutes for Discovery (WID) and are just three ways in which the state is trying to move forward. However, there is much debate among politicians as to whether a high-speed rail would offer economic and environmental benefits to our state. Because of the controversy, we have not seen progress from the $810 million allotted for the project (see p 15 and 16). At least Wisconsin will always have tractors (see p 4).

In the true fashion of Wisconsin's "forward" motto, SEL at UW-Madison pioneered solar energy research by becoming the first lab devoted to the topic in the United States. Thanks to the work done here at UW-Madison, the realistic scope of the use of solar energy is being realized and the findings are not necessarily what the popular media may portray (see p 16).

A big change that hits a lot closer to home is the grand opening of the Wisconsin Institutes for Discovery (WID) on December 2. The institutes, that compose far more than just another research lab at UW-Madison, are about to make engineering campus feel a lot less secluded (see p 11). The one of a kind research facility has high hopes for attracting a new demographic of visitors to campus from children on class field trips to world-renowned scientists. And, who knows, maybe a liberal arts student or two will cross Charter Street to stop by and check it out.

The unique public-private partnership of WID was designed to maximize the benefits of collaboration. We believe this issue's content echoes the importance of diversity and teamwork. With the grand opening of a facility developed in the name of collaboration, we maintain hope for the forward movement of Wisconsin. WE



Veronica Nebdy Pierson

COLLEGE OF ENGINEERING
UNIVERSITY OF WISCONSIN-MADISON

THE UNIVERSITY of WISCONSIN MADISON

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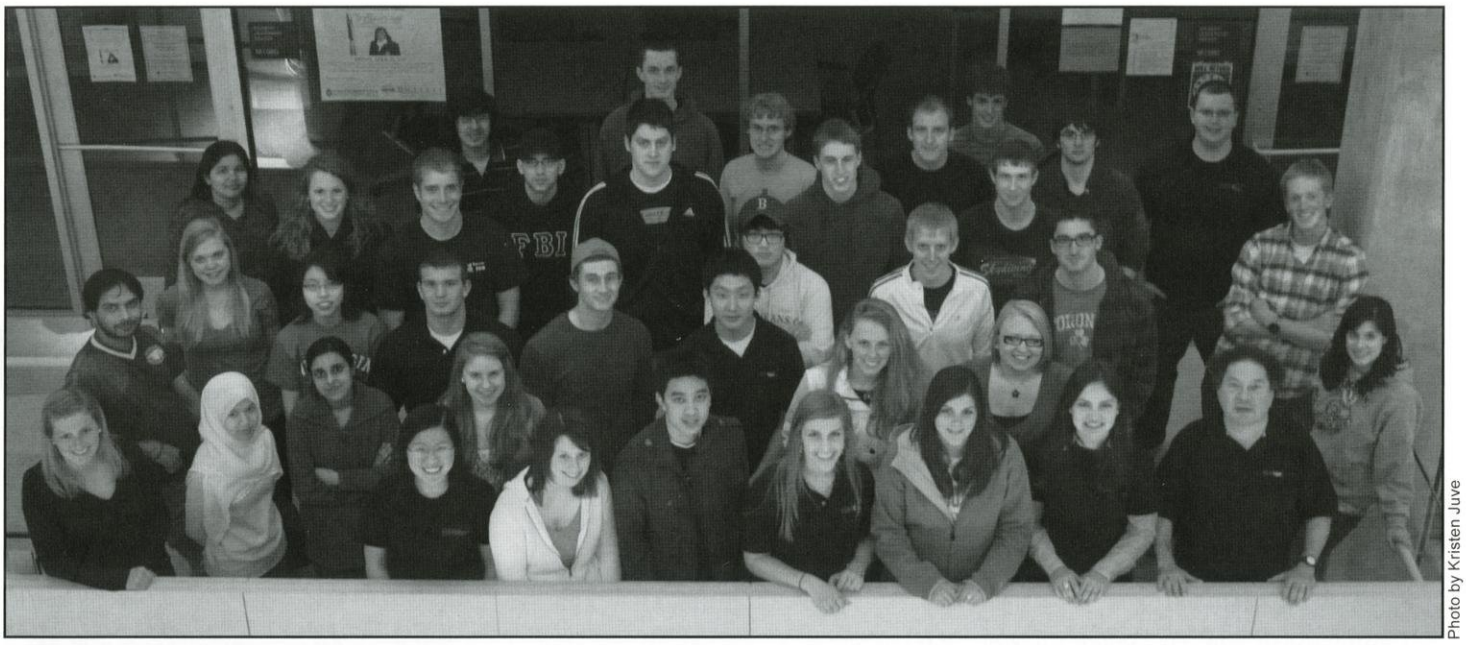

Photo by Kristen Juve

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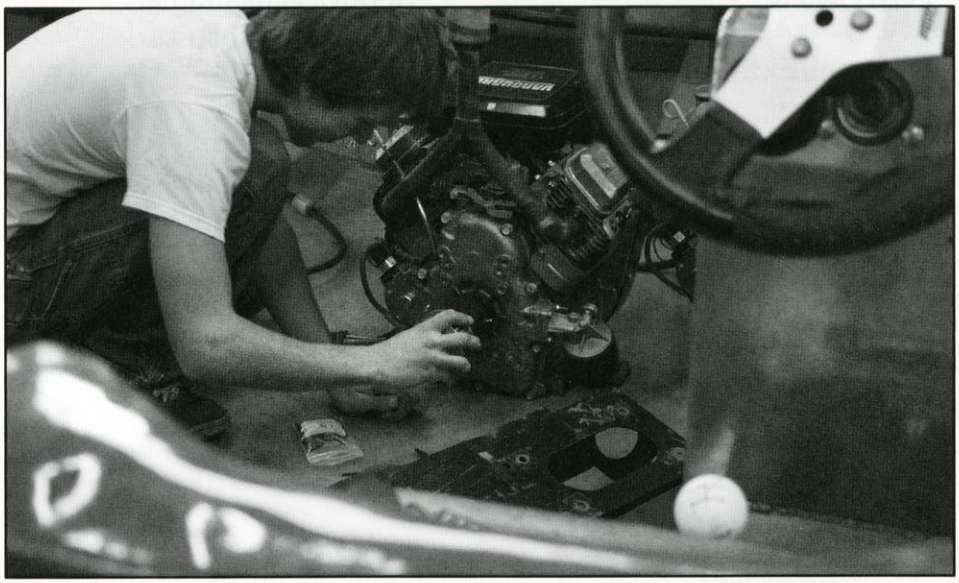
BADGER PULLING TEAM

There is something about being a student at UW-Madison that brings out an innate passion for Midwestern farming. Whether it is an appreciation for Babcock ice cream, a strange enjoyment of the earthy livestock smell by the lakeshore dorms or a lifelong goal to milk a cow, many people take an interest in Madison's agricultural roots. The Badger Pulling Team has taken this affection to the next level, though, and works every year to design a tractor that competes in the annual American Society of Agricultural and Biological Engineers International Quarter Scale Tractor Competition.

University Pulling Teams around the country are given a chance to gain real world experience with the concepts they are learning in their engineering classes, while also making contacts with professional engineers and enhancing their teamwork skills. The competition is comprised of four parts: a written design report, team presentations, static design judging and the performance of the tractor. The students are given a set of tires and an engine, but it is their responsibility to design everything else including the frame, drive train, hitch, clutch and weight brakes. The tractor is about the size and shape of a typical lawn and garden tractor. Additionally, it must be less than 850 pounds and be able to pull a progressive resistance sled.

The Badger Pulling Team is comprised of two smaller teams, the A-team, which designs and creates a new tractor each year, and the X-team, which improves on the previous year's design. In addition to designing the tractor, it is also the students' responsibility to find local and national companies that will sponsor the team.

We interviewed Chris Hargot, the X-team leader for the 2009–2010 season and this year's A-team leader.



Team Members

Steve Anderson
Kjell Bakke
Dave Bartling
Tim Blahnik
Steve Burbach
Alex Earhart
Chris Hargot
Jack Hinze
Christopher Jakins
Jesse Kanehl
Nick Kingsbury
Carl Magnusson
Brandon Nigon
Justin Orrick
Evan Price
Bryan Rowntree
Lauren Runge
Jake Standal
Kyle Wilke
Jake Zimmerman
Tom Zwald
Bryan Zweifel
Kevin Zwieg

Advisors

Harold Bohne
Dr. David Bohnhoff
Bradley Brooks
Larry Gruenberger
Dr. Kevin Shinners

WE: Who makes up the Badger Pulling Team?

Hargot: This year the team has 17 members, who are undergraduates in Biological Systems Engineering, Mechanical Engineering, Dairy Science and Horticulture. We also have several advisors, including Dr. Kevin Shinners and Dr. David Bohnhoff, design advisors; Bradley Brooks, the team faculty advisor; Harold Bohne, an instrumentation specialist and Larry Gruenberger, our contact with Briggs and Stratton.

WE: What goes on at your meetings?

Hargot: The teams meet every Thursday from 6 to 9 p.m. to modify their pulling sled, prepare the trailer for competition and work on finding sponsors for their tractor. The best part about the Badger Pulling Team is the camaraderie among the team members, and even among the different teams at the competition. Through spending long hours at the shop, building parts and assembling tractors, we become almost like a family.

WE: How did the team do in the 2010 competition this past June?

Hargot: We placed 8th overall in the A-team competition and 6th overall in the X-team portion. We are always a very visible team; our tractors are usually very innovative and we try to have a lot of fun.

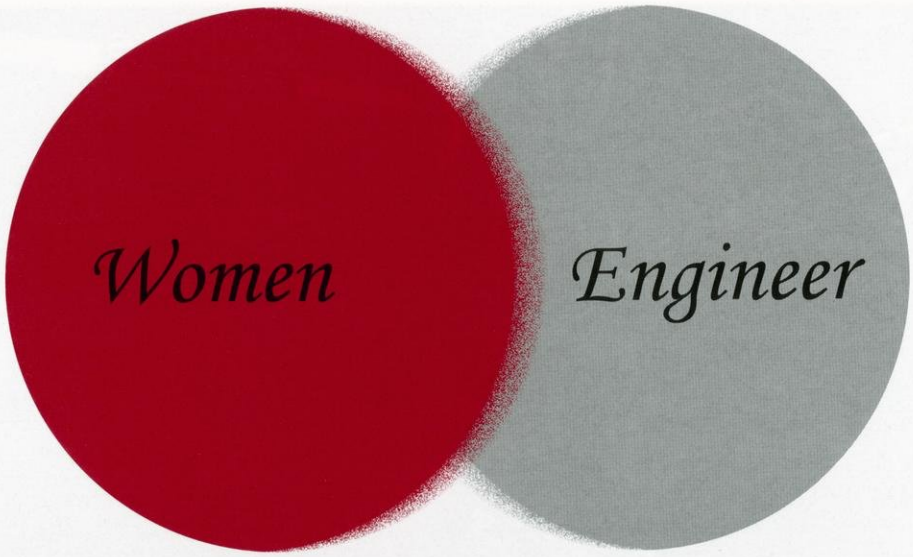
WE: Are there any new rules for this year's competition?

Hargot: This year's competition will take place in Peoria, Illinois in June 2011. There have been some major configuration changes to the tractors. The rules now allow front wheel assist and the engines are limited to either one 31 horsepower Briggs and Stratton or two 16 horsepower Briggs and Stratton engines. There are also going to be two different angles of pull on the sled.

WE: What is the most challenging part of the competition?

Hargot: Getting there; every year we put in many long hours to get both tractors in competition shape. The competition has very stringent rules and regulations, so there is an incredible amount of work necessary to comply. The technical inspection portion of the competition can be a very long, drawn out process if the team and tractors are not prepared. We have a very seasoned team, so the competition usually goes very smoothly. WE

Article by: Kate Slattery
Design by: Kate Slattery
Photography by: Adam Dircz



Time to break barriers

Three years ago, when I was an undergraduate in India, I remember staying late after my Kinematics of Machinery class to sort out my notes. A security guard passed the classroom, peeked inside and threw me a smile and a question. "I noticed the session for the past week. Have all the other girls in the class been absent?" I smiled ruefully and replied, "No, this is a mechanical engineering class, and I am the only girl who took this, along with 62 guys."

Gender diversity in engineering is still a much-discussed, yet little-resolved issue around the world. In the United States, women make up only 20 percent of undergraduates in engineering. Worse, only 11 percent of practicing engineers are females. What could be the reason for such alarmingly low proportions?

The answer is simple. As reports worldwide indicate, schoolgirls think that engineering is challenging and consists mostly of math and science. Surprisingly, the reason for the spread of this myth is the engineering community itself. What should we be doing, as responsible engineers, to see that engineering doesn't remain a mystical dream, but becomes an enjoyable reality to many aspiring young women?

The answers come from women who have already taken that step into engineering. Professor and chair of the industrial and systems engineering department at UW-Madison, Patricia Brennan, has three things to share with young girls. She says, "First, it's not either-or. You can have science and sports, math and music. You need to think about the set of things that make you happy. Next, thinking about what society needs and how you can uniquely respond to that is the best career guide. Science and engineering give so many more tools than you can imagine. Lastly, worry about making friends, but if you and they are not on the same page [on career-choices], it's okay."

Professor Brennan's research involves creating and evaluating technologies for home care that people could use to take care of themselves. Her research spans areas such as human computer interaction, layout design, workflow modeling and nursing. She has recently been chosen a theme leader in the Wisconsin Institutes for Discovery, and will be developing a virtual reality chamber that will recreate almost any household environment in the world. This will help designers create tools that could fit into people's everyday lives and understand the behavior of people in those households.

"There remains a framing of engineering that is more congruent with our sociological

The Society of Women Engineers (SWE) Boeing Tech team works on a portable heating device for the national Boeing Team Tech Competition, for which they won second place.

SWE members Noah Hibbard, Laura Zeitler, Elise Larson, Piotr Starosta and Erin Karweik pose with their portable heating system for the Boeing Team Tech National Design Competition. SWE supports women in engineering, and is open to both males and females.

concepts of male–reductionist and non-emotional. If we were to engage more women in engineering, I think we would have a switch, a reframing of the valuing of solutions. Diversifying the engineering workforce with women and people of different economic and cultural backgrounds would bring a better sense of judgment in solutions," Brennan says.

"Engineering has often been a difficult career choice for women – but that may be largely due to the fear of the unknown."
-Jasmine Vadgaama

What should a woman expect when she rises to a position of power in an engineering career? "That she can't go into the men's room with the boys," Brennan says. "If you are walking down the hall with three colleagues and they turn into the men's room, then you are stuck. It is a matter for recognition, that some of the informal communication pathways which are essential for any organization's running are gendered."

A group of eight undergraduate females from the Society of Women Engineers (SWE) at UW-Madison met with the magazine to share their experiences of transcending the gender barriers of engineering. When posed with the question of why girls don't step into engineering so often, the group came up with two possible reasons. First, most women want a career that they could flex at a later point in life to accommodate a family and children. Second, societal expectations edge men on to jobs with higher pay and status, while women are pushed towards degrees that don't take as much effort and time.

Do females feel out-numbered or left out by the lack of other women? "I guess I don't feel left out by any means," Kimberly Miller, a UW-Madison senior in chemical engineering, says. "There are definitely less women than men, but [the numbers are] improving and there are equal opportunities for both genders."

Kim is currently the president of the Society of Women Engineers (SWE) at UW-Madison. SWE works to promote women in science and engineering fields. One of its goals is to introduce engineering to younger girls by making them more informed and ready for any career choice they may decide on in the future. SWE also works to create a better environment on campus by having upperclassmen mentor underclassmen. "We work a lot with companies, and have corporate sponsors provide professional development in all fields. They [companies] look for female engineers and we work together to get ourselves ready for the workplace," Miller says.

Jasmine Vadgaama, an electrical test engineer with Danfoss Drives in Illinois says, "Engineering has often been a difficult career choice for women – but that may be largely due to the fear of the unknown." Vadgaama has been designing and implementing automated test equipment for Danfoss since early 2008. She loves what she does and stresses that she has no regrets about her choice to pursue a career in engineering. "It is extremely fulfilling to see something that you designed working like it should," she says. "Getting my hands dirty was challenging at first, but that is by far the best way to learn something new."

What is it like to be classified under the moniker 'woman engineer' in today's world? "Awesome and loaded with opportunities," Ms. Vadgaama says. "From personal experience, over the past few years, the industry has been extremely receptive to women in engineering and there has been no better time to make an impact in this area." She adds, "It is definitely very challenging but probably not as much as it was five years ago. Times are changing, and a lot of women have chosen careers in engineering. There is a higher acceptance level for women engineers in the work environment."

What is it like to be classified under the moniker 'woman engineer' in today's world? "Awesome and loaded with opportunities,"
-Jasmine Vadgaama

Whether it is cleaning up the world's lakes and rivers, making the world plastic free, mapping the ocean floors or designing artificial retinas for the blind, it is all in a day's work for engineers. Apart from the constant intellectual challenge, science and engineering provides a strong arena for creativity and intuitive reasoning. Women have the unique ability to bring an emotional tone to that creativity and when combined with technical skills that makes for an impeccable combination, one that ought to be more prevalent in a differential equations or analytical chemistry classroom. WE

Article by: Vindhya Venkatraman
Design by: Linc Han
Photography by: Sean Metcalf

CENTER FOR Quick Response Manufacturing

MAXIMIZING EFFICIENCY AND PRODUCTIVITY

Fast-paced and competitive—it demands flexibility, variability and responsiveness. These phrases could come from a "help wanted" ad for an Emergency Medical Technician, right? Actually, these terms describe the market of custom-engineered product manufacturing worldwide. Fortunately for firms in Wisconsin, they get a little help from their friends at the Quick Response Manufacturing Center.

Many manufacturing companies struggle to make custom-engineered products on short notice. The reason: traditional production methods are generally inefficient for emerging market needs for custom designed, one-of–a kind products with highly variable demands.

After working with QRM, Ingersoll Rand was able to cut the administrative and office work per project from 20 days to just one.

The Center for Quick Response Manufacturing (QRM), established here at UW-Madison in 1993, studies the theory and implements the principles of quick response manufacturing. The QRM Center works with companies that create specially engineered, customized and often one-of-a-kind products. This mutually beneficial partnership brings together companies, students, and faculty to research and solve problems in manufacturing and implement solutions in a real industry setting. Traditional production methods are generally inefficient for low-volume, high variability orders; the QRM Center works to fulfill the need for new principles and methods of production.

The current director, professor of industrial and systems engineering Ananth Krishnamurthy, has been associated with the QRM Center since his days as a UW-Madison student in 1996. He taught and conducted research on manufacturing and supply chain issues at Rensselaer Polytechnic Institute in Troy, New York until returning to Madison and taking over as director of the center in 2008. "My research focuses on manufacturing and supply chain issues which revolve around the notion of responsiveness and customization, so the QRM Center provides an excellent platform to develop and test new ideas," says Krishnamurthy.

Companies that use quick response manufacturing techniques are as diverse as the products they create. From airplane-sized mining equipment at P&H Mining in Milwaukee to conference booklets at Madison Printer Omnipress, QRM principles apply equally across industries. Additionally, QRM knows no geographical boundaries. The Center has worked with corporations right here in Madison, throughout Wisconsin, and nationwide from Stryker Orthopaedics in New Jersey to Oregon-based Bright Wood Corporations. Small companies reap the same benefits as the massive corporations. Many small to medium-size companies in Wisconsin supply to bigger businesses, making them the "heart and soul of American manufacturing," Krishnamurthy says.

"Today we are competing in a market that requires not just cost competence but also lead time reduction. And our factories have been geared towards that," he says. "So in a sense we are trying to win a NASCAR race using Henry Ford's Model T. The car doesn't have the horsepower to compete in NASCAR; the organizations are not set up to compete in that market." The key, he says, is twofold; the structure of the organization and the policies by which it operates.

Lead time refers to the duration from the customer coming to a company with a need and the delivery of the finished product. Reduction of lead-time is a key emphasis of QRM strategy. Touch-time, the time spent actually working on a product, is typically only five percent of lead-time. For the remainder, the product is waiting for machines, people, information, material or other resources. While automation can reduce touch-time, it may require new equipment costs.

QRM emphasizes restructuring the organization and redesigning operating principles that could have a far greater effect on lead time without significant costs. Less lead time gives companies a competitive edge in a fast-paced market. Reducing lead time even created new markets for QRM member company Ingersoll Rand. After working with QRM, Ingersoll was able to cut the administrative and office work per project from 20 days to just one. They were then able to offer customized products while matching their competitor's prices and quality, a win-win for both the business and customers.

Restructuring a corporation also includes management of its workforce. Rather than specialized workers doing individual tasks, QRM

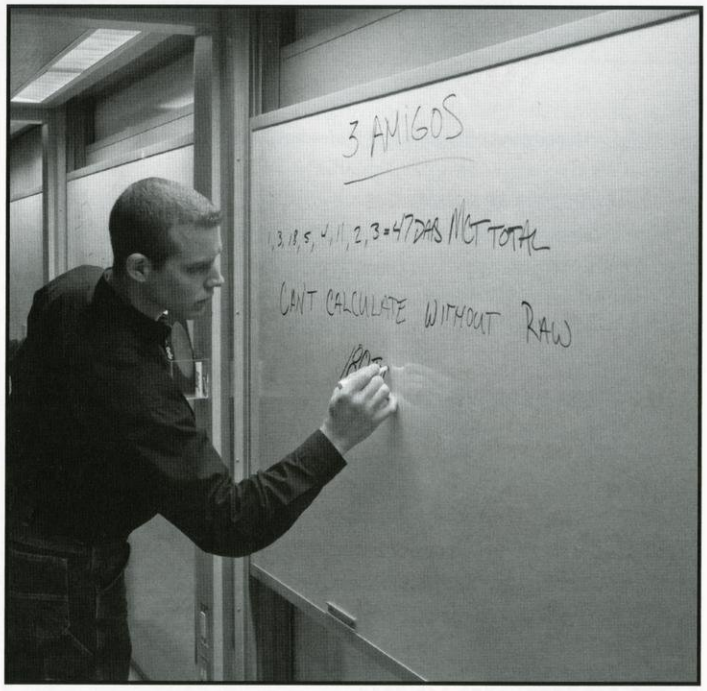
Professor Ananth Krishnamurthy, director of the Quick Response Manufacturing Center, speaks at a recent QRM event on campus.

organizes teams of workers that work together in production cells. Each team, composed of skilled workers cross-trained for a variety of tasks, is self-managed, giving workers a sense of ownership and pride in what they do.

QRM has also helped companies reverse the trend of outsourcing by evaluating the true costs of shipping production overseas. Sending jobs overseas saves labor costs but also creates coordination issues. Overseas shipping lengthens lead times, increases non-value-added time, late penalties and loss of business due to delays. When responsiveness is important for your business, outsourcing may not be the best option at all. QRM gives local manufacturers a huge advantage.

The students and faculty of the Quick Response Manufacturing Center might consider themselves the "Emergency Medical Technicians" of custom-engineered manufacturing, just without the medical school. They save the "life" of companies in the form of their time and costs. They enable rapid response to customer needs and take care of business under constraints of time, budget and infrastructure. This is the challenge dear to the hearts of industrial engineering students everywhere. We

Article by: Lori Bierman
Design by: Akhilesh Dakinedi
Photography by: Travis Zehran



Employees from companies including P&H Mining, Milwaukee Gear and National Oilwell Varco participate in events hosted by the QRM Center.

Editorial: More than just a resume filler

Flash back to a little over two years ago. I was beginning my first semester of college in one of the country's most well-known college towns. On move-in day, I anxiously stepped out of my parents' car and into my own dorm room radiating confidence and filled with high expectations. In high school, I was one of those people seemingly involved in everything. From marching band to National Honor Society to the golf team, I was the jack-of-all trades. I was involved in both the community and school. I came to college fully expecting to stay involved—at least that is what I had promised in the personal statement that got me into college in the first place.

It only took a few months and the first round of midterms before I realized my GPA wasn't the only thing that would drop off significantly in that first year of college. I quickly became dedicated to the social scene and ignored all of those email lists I had exuberantly signed up for at the Student Org Fair (sorry Cheese Club, but I'll stick to cheese when coupled with a bag of Franzia on a Thursday night). I had my excuses for not getting involved in anything. This was, after all, my first year of college and I needed at least two semesters to get used to this whole studying thing.

Now fast forward to the present and things couldn't be more different. Sure my GPA is slowly rebounding to pre-freshman levels and I am no longer subscribed to the Cheese Club mailing list, but I am also a full-fledged member and participant in various organizations around campus. My involvement ranges from my commitment to this magazine to a student non-profit volunteer and leadership group. I could rattle off the reasons why I joined and how much I have grown through my involvement, but that would be too obvious. The funny thing is that during freshman year I assumed I didn't have any time for things that didn't involve studying or socializing. Now I can't imagine how I would fill my free time if I weren't dedicating it to clubs and community involvement.

That brings me to those two golden words that can set a resume apart and so much more. The "community" part extends far beyond the confines of Engineering Hall or Bascom Hill. Being involved in the city of Madison itself speaks volumes to a potential employer, graduate schools and perhaps most importantly it is something Grandma can brag about to the ladies of her knitting club (even senior citizens get involved!). Whether that "community involvement" means volunteering at a local school, cleaning up a park on a lazy Sunday or getting involved in a political campaign, finding something you are passionate about is imperative. There is something for everyone and if there isn't a club that piques your interest, start it yourself!

If you are that freshman who has yet to get involved, here is your chance. You might try your hand at building a tractor for the Badger Pulling Team (p 4) or look into a certain engineering magazine that is always looking for innovative minds. If you are graduating soon but are feeling the need to bolster your resume at the last minute, look into some professional groups for a chance to polish your skills. As a freshman, it is never too early to get involved in the community and as a soon-to-be graduate, it is never too late to join that club you initially rebuffed. In fact, Cheese Club just might be welcoming its newest member at their upcoming meeting. WE

Editorial by: Lauren Kern

WISCONSIN INSTITUTES FOR DISCOVERY

Explore Engage Discover

Introduction by Kelsey Coleman

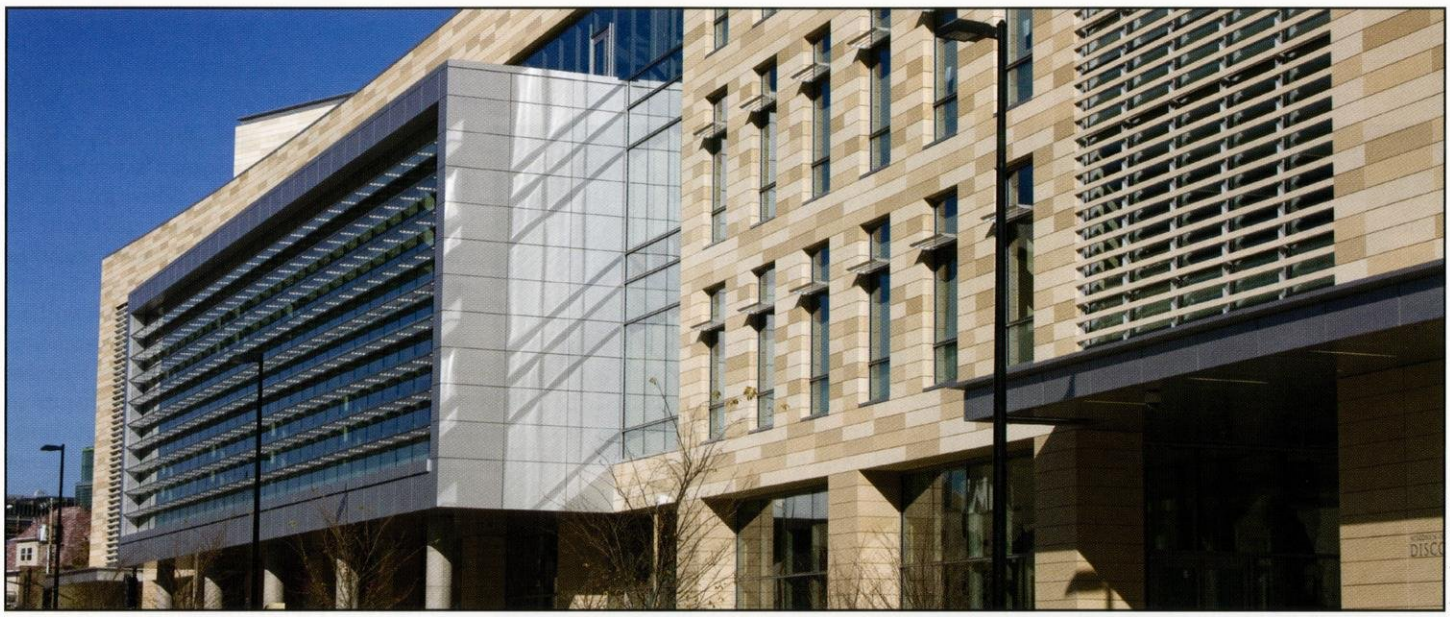


Photo by Brian Mogen

According to the Administration of Aging, by 2030 there will be roughly 72.1 million older people living in the United States, which is more than twice the number reported in 2000. Currently, one of every eight people is older than 65. As the older population increases, the emphasis placed on improving healthcare and lengthening life spans also increases. The American public is not naïve, they know scientists are capable of making improvements and that technology is improving at an unbelievable rate. The public reads headlines in the newspaper about scientists using mice to find a successful cure for type I diabetes and a vaccine to prevent breast cancer, and they are excited about it. They want to see these results in humans, and this desire is what pushed forward the Wisconsin Institutes for Discovery. The $375 million building will house dozens of researchers all working toward improving human health. It will also feature a large public area that allows people to learn about the concepts studied in the research labs, assuring them that work is being done toward curing diseases in more than just mice. The Wisconsin Institutes for Discovery is composed of two organizations, the Morgridge Institute for Research and the Wisconsin Institute for Discovery. The hope is that the unique partnership between the privately owned Morgridge Institute for Research and the publicly run Wisconsin Institute for Discovery will allow for an unrivaled kind of collaboration, featuring a larger, more diverse group of researchers.

The Morgridge Institute for Research is largely funded by John and Tasha Morgridge, both UW-Madison alumni and the founders of the Morgridge Center. The Morgridge family believes the collaborative research will lead to discoveries that will benefit the students, the University, the state, and ultimately, the world. The Morgridge Institute for Research will house five research categories in the new building: regenerative biology, which includes stem cell research; virology, the study of viruses; medical devices; and pharmaceutical informatics, the use of information technology to speed drug development. All of the research areas will be directed by an accomplished UW–Madison professor, who has had the opportunity to select his or her own research team from the top talent around the world.

The Wisconsin Institute for Discovery is run by UW- Madison, and is organized under the UW-Madison Graduate School. The Wisconsin Institute for Discovery will also have five research themes, all of which will incorporate at least two of the three "thrust" areas of biotechnology, nanotechnology and information technologies. The five research themes were determined by an extensive competition, and after three years the five winning proposals were selected. These themes are epigenetics—the study of how genes are activated or inactivated—tissue engineering scaffold research, health technology design in the living environment laboratory—developing personal care diagnostic and therapeutic technology—and optimization in biology and medicine. The Wisconsin Institutes of Discovery team leaders were allowed to select a team of three new members from outside of UW-Madison.

We spoke with professors who represent three of the five research themes that will make up the Wisconsin Institute for Discovery to learn about their specific studies, how they will affect the greater population and what the researchers think of their new home. WE

Patricia Brennan: Healthcare in 3D

by Andrew Golden

In the basement of the Wisconsin Institutes for Discovery, visitors will find the "Cave" – a state of the art virtual reality room that researchers will use for medical research. As part of the Living Environments Laboratory (LEL) research theme headed by professor of industrial and systems engineering Patricia Brennan, this futuristic room will help researchers to catch up with the recent, dramatic shift in the focus of healthcare from doctors to patients.

"They will have to move beyond the 'gee-whiz' factor of this new technology to get good science out of their studies."
-Professor Brennan

The Cave itself will be a fully imersive virtual reality room with three-dimensional renderings of different household spaces such as kitchens, bathrooms and more. Through extensive research in the Cave, as well as in other buildings around campus including the Biotron Laboratory and the new nursing school, Brennan hopes her research team will help better understand home healthcare.

"Right now a physician tells a patient to go home and do X – put your feet up, take this medication – and they don't know what the home experience is like," Professor Brennan says. "So I hope this will increase physicians' abilities to understand the home experience and in turn help them be better able to interact with patients when they give them instructions."

The Cave, and the LEL as a whole, represents the kind of collaboration the Wisconsin Institutes for Discovery promises. The LEL research team includes a biomedical engineer, a computer scientist, nursing staff, an individual from the school of human ecology who studies the "techno-fabrics" that enable virtual reality, a library scientist specializing in consumer information, and a social scientist focused on family dynamics.

Brennan says the research team hopes to work with many different patients – from those with cataracts and impaired vision, to HIV and post-op heart surgery patients. The research will not be limited to only the ill, but also the healthy, and from the young to the elderly.

Visitors to the Wisconsin institutes for Discovery will also be welcome to use the Cave. Brennan expects to open the room to the public about once a month, where guests can try their hand at making virtual reality baby formula.

The research team does face its fair share challenges, though. Brennan says they will have to move beyond the "gee-whiz" factor of this new technology to get good science out of their studies. They also have to get the enormously complex Cave built in the first place – no small task – and ensure it will actually be similar to real-life environments. After that, the ultimate test: to see whether the research will lead to improvements in home design and technologies.

Nevertheless, Brennan is optimistic about the Living Environments Laboratory and the results it will bring.

"I think that part of what we're going to is to bring new thinking about health to the state of Wisconsin," she says. "But I also think the virtual reality lab will just be cool." WE

Photo by Sean Metcalf

John Yin: Unzipping the genes

By Christopher Aberger

A person's genetic makeup: it determines the physical attributes of an individual, but can also determine what diseases one is predisposed to throughout their lifetime. An interdisciplinary systems biology team led by professor of chemical and biological engineering, John Yin, researches viral interactions in order to gain a better understanding of how an individual's genotype makes one more probable to contract certain diseases. In addition, Yin's team researches how to prevent or slow viral spreading through the human body. As one of the five research teams chosen to move into the new Wisconsin Institutes for Discovery building, Yin looks forward to having other engineers, biologists, chemists, computer scientists and all other members of his systems biology research team located in one building.

"Traditionally people have just been concerned with molecules, but we are concerned with the interactions of these molecular organisms."
-Professor Yin

Yin describes systems biology as a "different perspective on moving forward." He says, "Traditionally people have just been concerned with molecules, but we are concerned with the interactions of these molecular organisms." Yin likens systems biology to a vehicle. "If you take apart every component of a car and lay them out, you have thousands of separate pieces with no clue as to how they work together. This makes it impossible to predict something such as gas mileage." By focusing on the interactions of molecules rather than just the molecules themselves,

Photo by Alyssa George

Yin and his team hope to make new discoveries that would not be possible without their unique perspective.

That's great, but how does systems biology help in curing specific diseases? Any good engineer should know the answer lies in models. By building models based on mathematical equations, Yin and his team predict how viruses interact and spread amongst cells in the human body. Using models of viral interaction, the team tests certain antibiotics' ability to kill or minimize the spread of a virus.

Certain types of cancer, acquired immunodeficiency syndrome (AIDS), influenza, hepatitis and in fact all infectious diseases have the ability to be better understood through Yin's research, but one of the largest obstacles facing Yin's team are "cultural challenges." These "cultural challenges" result directly from the interdisciplinary breadth of research members. "Biologists don't build models, engineers do. Engineers search for equations to characterize what is occurring," Yin says. Noting each player, scientist and engineer as equally important, Yin believes synergy must be the end result.

Yin currently conducts research in Engineering Hall, but looks forward to the move to the new Wisconsin institute for Discovery building. "The design of the building makes it hard for me to leave my office and not bump into a colleague. The building is designed to promote interactions between colleagues of multiple disciplines, lending to the opportunity for more progressive and intelligent research," Yin says. After making the transition to the new Wisconsin Institute for Discovery building, Yin and his team hope to research in a smarter and more effective manner. WE

Michael Ferris: The art of optimization

by Christina Wallhausser

Imagine a cancer patient about to receive radiation therapy. Each anxious breath he takes causes the slightest movements within the body and could potentially offset the radiation's target. The technology and precision required for radiation therapy is extremely complicated, but what if some of its challenges could be conquered with the same innovations used to optimize the route of a FedEx truck? This unfamiliar research area of radiation therapy is one of the discoveries hoping to emerge from the Wisconsin Institutes for Discovery.

Michael Ferris is the lead researcher for one of the research themes, Optimization in Biology and Medicine, in the Wisconsin Institutes for Discovery. He is a professor of computer sciences and industrial and systems engineering at UW-Madison. His primary research thus far has been in optimization with applications ranging from video games to radiotherapy.

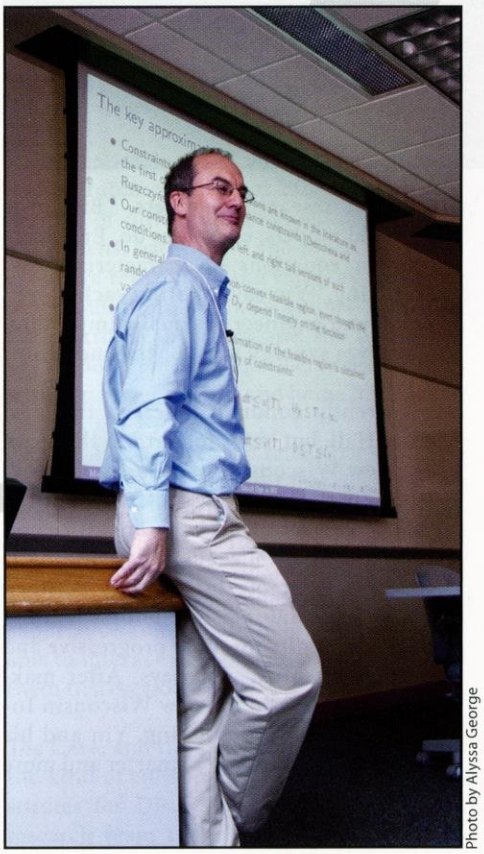


Photo by Alyssa George

"The use of optimization in radiation therapy is relatively new but it has been going on for the past 15 to 20 years." Within the research topic, Ferris and his team are "trying to hire an expert in uncertainty" in order to differentiate their research. "We are trying to establish the link [from] biological models and multiple instances of data collection ... to a physical system which is uncertain in nature," Ferris says. "All of that uncertainty says, what are we trying to play? Can we predict it with any certainty?" These questions are the reason Ferris and his team are looking for an uncertainty expert in order to stay ahead. "We are interested [in] optimization techniques, and we're trying to stay one or two steps ahead of where the practical implementation of these models are in order [to] do research that is of interest of to the community, but also relevant to the community in ten years' time."

With research that is constantly pushing the envelope, Ferris has already received some objection to his unique application of optimization. He also already knows that a lot of the ideas and conversations occurring over the potential research options do not always turn into successful research. "A 50 percent hit rate of the conversations we have actually turning into research would be good," he says. This suggests that "half of the conversations will turn out not relevant, [create] a problem or resistance, or won't prove worth." This might seem a bit discouraging, but "if everything that [the team] went into was a sure fire success then [they] wouldn't be doing risky enough research." And risky research is often times what leads to amazing discoveries.

One of the incredible things about Ferris's research and the Wisconsin Institutes for Discovery as a whole is that it combines a variety of groups, intellects and topics. Optimization research clearly has a broad spectrum of applications. Radiation therapy to Ferris is just a different system to which he can apply his optimization knowledge, but he is not an expert in radiation therapy. Ferris needs a variety of people on his team in order to understand every complex topic within his research, and he knows how valuable this collaboration is. "The impact of what [the team] can do can be magnified by having people with different expertise and also people who have the mixture of technical skills and problem solving expertise," he says.

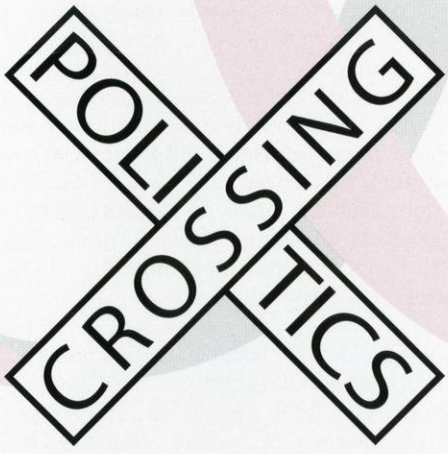
"The impact of what [the team] can do can be magnified by having people with different expertise and also people who have the mixture of technical skills and problem solving expertise."
-Professor Ferris

"The whole Institute is about from discovery to delivery. It's not just about doing the mathematics to get the theorem to tell you the method works well. It's actually about seeing how we can utilize the mathematics within this domain."

Ferris is very excited about moving into the new building, and he believes it will enhance his efforts.

"Good space is when it facilitates good work," he says. "This building is fancy, but if it were just a fancy space then it wouldn't be a success. It should enable the researchers to perform research the community expects." WE

Political crossings of the Wisconsin high-speed rail



As this magazine goes to print, the future of the high-speed rail in the state of Wisconsin remains uncertain.

President Barack Obama

In an effort to reduce American dependence on foreign oil, President Obama unveiled a plan for a national high-speed rail network. According to a CNN news report, the plan is funded in part by the 2009 American Recovery and Reinvestment Act and also by a five year, $5 billion investment allotted for in the nation's 2010 budget.

Governor Jim Doyle

The Wisconsin Department of Transportation submitted an application for federal funding to construct a Milwaukee to Madison segment of the "Midwest Regional Rail Corridor." The president's administration approved the state for the full $810 million it requested and in November 2010, Governor Jim Doyle signed an agreement with the federal government solidifying the state's commitment to spending the grant in its entirety on the high-speed rail project.

Less than a week after this agreement was signed, the Governor sent out a memo to the contracting companies involved, requesting that they suspend work on the project. This action was in light of the election of Scott Walker on November 2, as Wisconsin Governor. According to his website and campaign, Walker strongly opposed the project. Doyle's administration wanted to take a few days to analyze the impact of stopping the project, which Governor-elect Walker has vowed to do.

Governor-Elect Scott Walker

According to a statement Walker issued on his website on Thursday, November 4, he hopes to "work with members of congress on redirecting this money to fixing [Wisconsin's] crumbling roads and bridges." An unexpected response to this statement came from the Governor-elect of New York, Democrat Andrew Cuomo. According to the *New York Post,* Cuomo wrote to the federal government requesting more money for high-speed rail projects in his state if the Governor-elect of Wisconsin does not want the funding.

Full speed ahead?

With $810 million set aside for a Madison-Milwaukee high speed rail route, the details of a drawn-out idea have yet to accelerate.

The year is 1936. You've just come down from Milwaukee to see the "King of Swing" himself, Benny Goodman, performing with Fletcher Henderson's band at the Congress Hotel in Downtown Chicago. In what might have been the first racially integrated jazz ensemble ever to play in front of a paying audience, the music was a representation of the times. Innovative and graceful, the jazz notes were metaphorically describing the igniting development of the High Speed Rail. Last night, it took you just 75 minutes to get from Milwaukee's Everett Street Station to Chicago's Union Station in time for the show. That is an average speed over 74 mph, hitting rates of over 100 mph along the way. In a time where your Uncle's prized Cadillac, which could barely push 60 mph, and the twin-propeller, 14-seat Douglas DC-2 airplane were impressive technologies, this High Speed Rail is gaining the attention of people all over the world. It is a special day when the beauty of the jazz evokes the same emotions as the elegance of the transportation.

Fast forward. The year is 2010. The United States, one of the most developed countries on the planet, has a shockingly low percentage of inter-city rail passengers at 0.3 percent. According to the International Monetary Fund, there are 38 "developed countries" and the United States finds itself at the bottom of this group in inter-city rail passengers. How did the stylish jazz of the 1930s inter-city rail system end up where it is now?

There seems to be many factors which led to the decline of the development of the inter-urban rail network in the United States. The most important was the effect of the regulating body known as the Interstate Commerce Commission (ICC). Established by Grover Cleveland in 1887, the ICC's watch on the railroads was to ensure safe and socially just rail practices. By the early 1940s, however, the ICC was implementing harsh, and somewhat unrealistic, safety requirements for the high speed rails of that time. For example, cab signaling, which is a safety mechanism that allows trains to communicate with each other, was targeted by the ICC to meet more stringent regulations.

Because things like cab signaling and automatic stops were ahead of their time, the rapid development of high speed rail was brought to a halt, as it quickly became uneconomical. The highest regulated, yet least subsidized transportation industry was feeling the heat from the exploding automobile and aviation industries. While the federal government was practically throwing money at big auto, trains were left unable to compete. For the next several decades there would be practically no development of high speed rail in this country. After both Lyndon Johnson's and Jimmy Carter's call for a high speed rail, the issue fell into a political black hole with Reagan and Bush fiercely ignoring the issue, Clinton being fiscally indifferent, and another Bush to reinforce the non-starter.

It's doomed. After about 60 years of much political banter, and relatively no high speed rail lines to show for it, why should anyone expect this industry to just pick up all of a sudden? Well, for one, President Obama has set aside $8 billion for high speed rail projects. That is the largest investment in the American infrastructure since the creation of the Interstate Highway System in 1956. Or maybe another reason we should expect to see it is because of the millions of jobs it will create here in the United States which has recently hit record unemployment and poverty rates. Then there

is the environmental friendliness, relative to our gas-guzzling automobiles. There is also the ability for the United States to compete with other nations.

According to Obama in a press release from the White House this past January, such an "investment is how we can break ground across the country, putting people to work building high-speed rail lines, because there's no reason why Europe or China should have the fastest trains when we can build them right here in America."

Remember that $8 billion dollars we talked about? The Wisconsin Department of Transportation (WDOT) sent in an application to the federal government for the proposed Madison—Milwaukee route, and received the full $810 million dollar funding that it requested. This was the only request in the entire country which was met in full.

According to faculty associate of engineering professional development, David Peterson, "one of the reasons the Madison-Milwaukee route was fully funded was because a lot of planning work and environmental studies had been done already." Peterson says that "the state funded that [research] back in 1996 when Tommy Thompson was governor; since then, Wisconsin has been doing a lot of preliminary studies and work in this passenger service."

So now that funding has been approved, how is it going to be spent? Keep in mind that $810 million dollars is a small budget for the construction of an 85 mile long high speed rail line. Instead of building an entirely new set of tracks, old tracks will be upgraded for high speed travel. Numerous crossovers will be built as high speed trains need dedicated tracks with no road crossings. "Some of the tracks [in Madison] are only capable of sustaining speeds of up to 10 mph," says Peterson. "We need to upgrade that track so that high speed trains can run at 79 mph. The goal is to improve their speed to 110 mph by 2016."

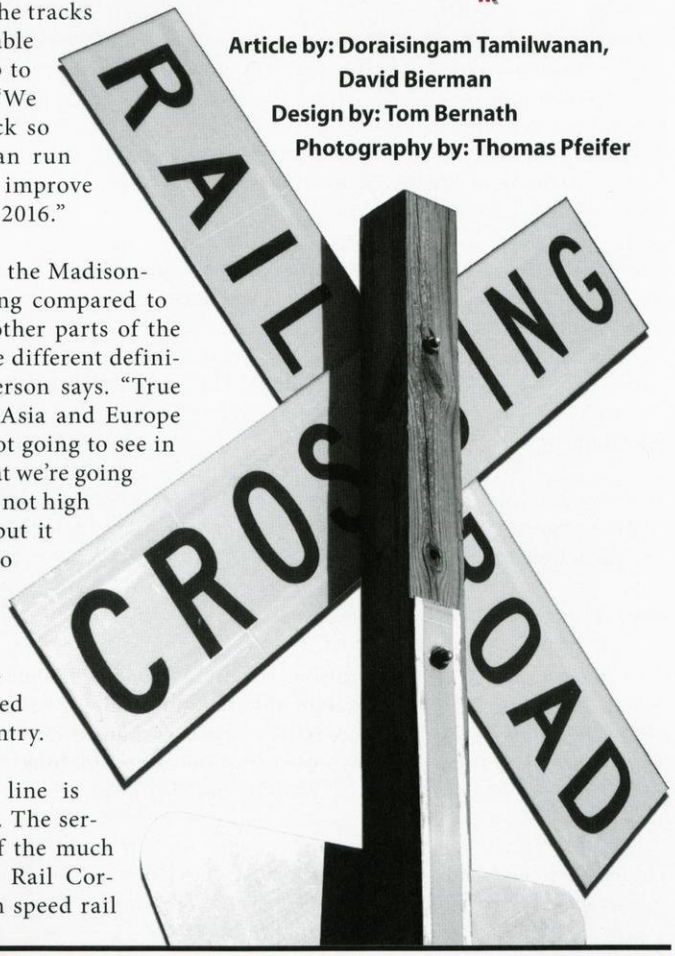
The speed of the trains on the Madison-Milwaukee route is nothing compared to the high speed trains in other parts of the world, however. "There are different definitions of high speed," Peterson says. "True high speed as defined in Asia and Europe is 220 mph, which we're not going to see in the US any time soon. What we're going to see here in Wisconsin is not high speed by true definition but it is much faster compared to what passenger service [trains] we have in the U.S. now." Still, there is no denying the implications of what a high speed rail could bring to this country.

The Madison-Milwaukee line is only the tip of the iceberg. The service is slated to be part of the much larger "Midwest Regional Rail Corridor" which involves high speed rail lines serving nine states and covering a distance of 3,000 miles. The regional rail corridor was designed so that almost all destinations will be less than a three hour train ride to Chicago.

All these details may be fascinating, but it ultimately begs the question: what's in it for us? For starters, Milwaukee will only be an hour's train ride away. The cost of tickets for a one-way trip between Milwaukee and Madison will range between 22 and 33 dollars, which is only a few dollars more than current intercity bus and train rates. Students who live in Brookfield, Oconomowoc and Watertown will have the added bonus of access to fast inter-city transportation near their homes. "One of the key things in having a high speed rail and having people use it is that it serves the population centers," Peterson says. This important aspect was well accounted for by the WDOT, with approximately 76 percent of Wisconsin's population living within 30 miles of proposed Midwest Rail Corridor stations.

Though the Madison–Milwaukee high speed rail was a rather polarized issue in the recent election, it is important to look beyond the politics and attempt to understand where the high speed rail fits into the development of our country. WE

Article by: Doraisingam Tamilwanan, David Bierman
Design by: Tom Bernath
Photography by: Thomas Pfeifer



Solar thermal energy

The next big breakthrough?

The Mojave Desert: 25,000 square miles of temperature extremes ranging from 0 to 130 degrees Fahrenheit throughout the year. It contains Death Valley, the hottest place in North America. It is about as inhospitable a place as you can find in the United States, but it also is home to the largest concentrated solar thermal power plant in the world, the Solar Energy Generating Systems, and its 936,384 mirrors are quite content.

There is a lot of talk today about renewable energies and the benefits involved. Chief among these benefits is less greenhouse gas, less dependence on foreign oil and more job creation. In addition to wind power, one of the most highly touted renewable energies is solar power. According to a 2006 report by the Global Energy Network Institute, covering just 9 percent of the Mojave Desert in solar panels would supply all the power the United States needs.

However, the United States Congress failed again this year to pass legislation requiring that a portion of all heat and electricity be obtained from renewable energy, in particular, from solar energy.

Why is this? Why hasn't solar energy been able to provide the amount of clean electricity we all expected?

The truth is, the cultivation of solar energy has had many setbacks. One major concern is the high costs of set-up and constant maintenance for solar panels. This, especially in a time of decreasing fossil fuel prices, hinders its advancement and progress.

Secondly, solar energy needs to be stored because sunlight is not constantly produced due to storms, clouds and nighttime darkness. This usually means an additional storage structure, and therefore additional cost.

Photo by Sandia National Laboratory (grayscaled)

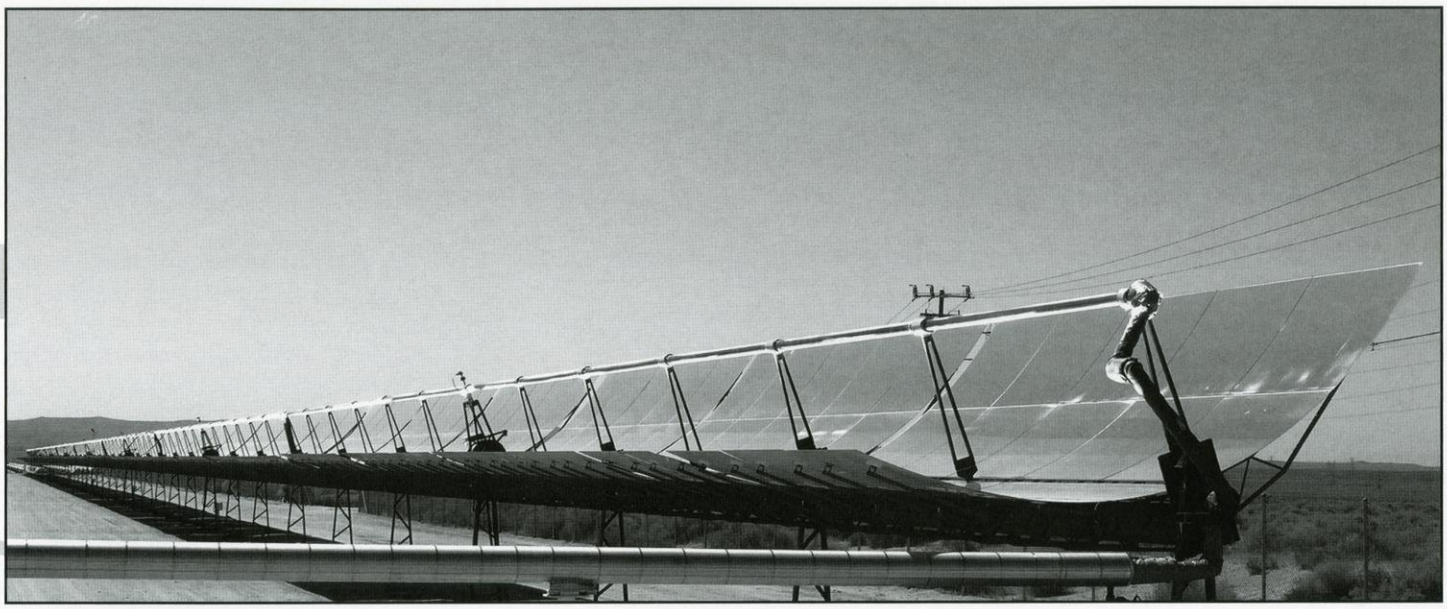


Photo from kjkolb through wikimedai commons (mirrored and grayscaled)

Another obstacle is the fact that the sun is a diffused source and produces only low amounts of energy: the amount of sunlight that reaches the earth is approximately 300 watts per square meter. Due to this, large areas with a considerable amount of solar panels are necessary to centralize the collection of solar energy in order to produce a useful amount of heat or electricity. Areas with plenty of sunlight, mainly around the southwest United States, are most suitable for solar power harvesting. However, water is essential to cool overheating panels, and the regions with adequate sunlight often lack large amounts of water.

"We look at solar not because we want to but because we have to."
-Professor Sanford Klein

Even though the results of solar energy harnessing have mostly been disappointing, our battle to improve renewable energy must continue.

UW-Madison houses the oldest Solar Energy Lab (SEL) in the United States, led by director Professor Sanford A. Klein. "We need to start looking at these things because our conventional sources of energy are dwindling. Even if they weren't, the environmental consequences of using them are dire. We look at solar not because we want to but because we have to," Klein says.

Although solar energy will never be the number one source for electricity, it has too many advantages to abandon or disregard as a clean energy provider. Klein explains that the future for solar energy seems to be in thermal solar panels rather than the commonly used photovoltaic panels.

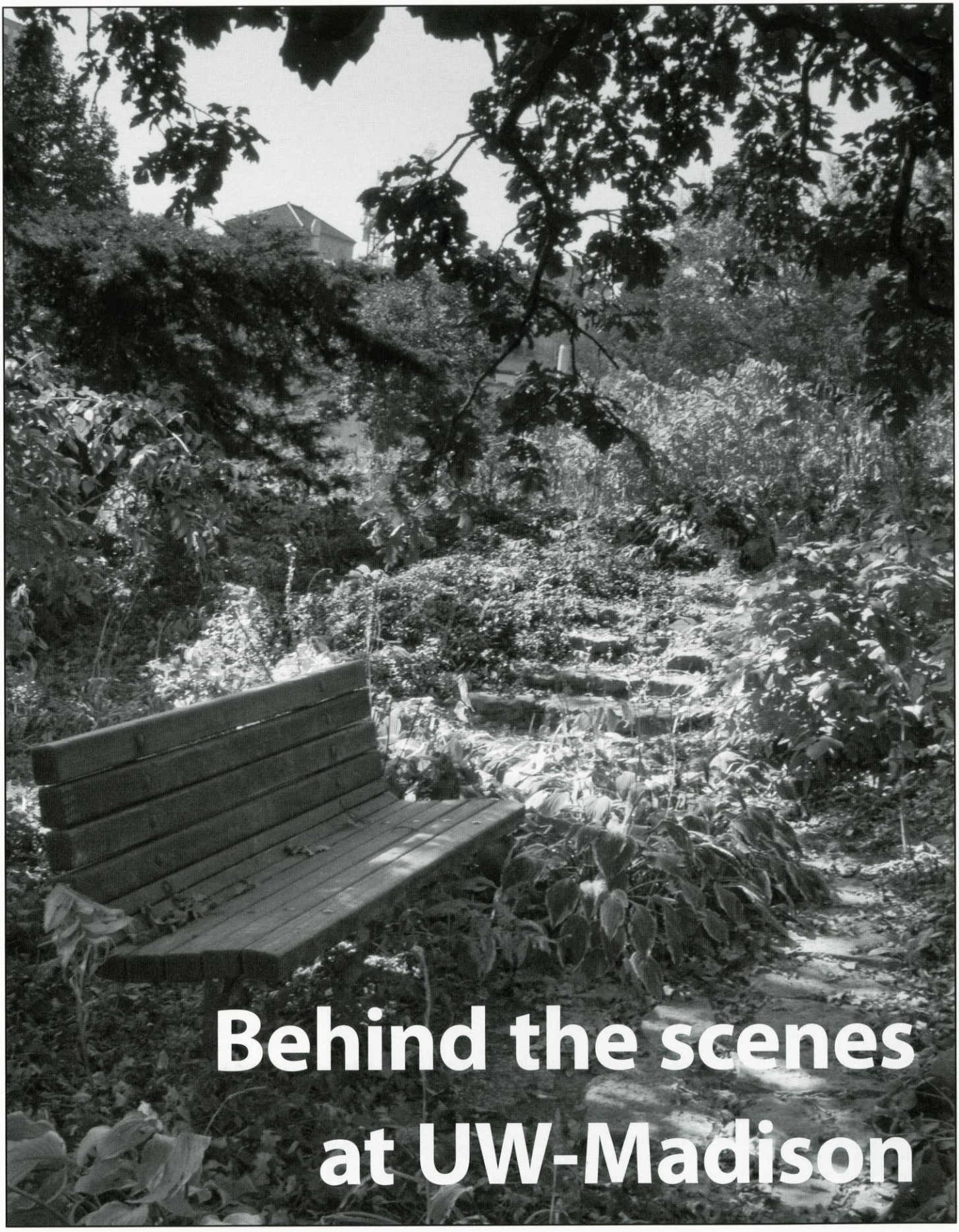
Most people don't know that there are two main types of solar power creation: photovoltaic and thermal. Photovoltaic panels are what most people immediately think of when they hear solar energy. They're the flat, bluish panels that convert the sunlight directly into electricity through the ejection of electrons. They're found many places because they can be made quite small and unobtrusive. However, these panels can reach a maximum efficiency of only about 24.2 percent and thus require a large quantity of light to make a useable amount of power. Additionally, they are incapable of storing the energy produced and need to be cooled during the accumulation of sunlight.

Thermal energy, on the other hand, works indirectly with the sunlight. Have you ever left your car sitting in the parking lot on a hot summer's day and came back to an oven? This is an example of thermal heating, and many homes use this same method to heat tanks of water. However, more efficient methods exist for electricity production. These alternative systems are all based on the same principle: an array of mirrors reflects the sun's energy, concentrating it on a heat transfer fluid, which is simply a medium through which to transfer the energy. It should be noted that focusing the radiation causes a loss in energy. The heat transfer fluid boils and produces steam, and this steam turns a turbine. This concept is called concentrated solar thermal power, or CST. There are four main types of CST in use today: the parabolic trough, Fresnel reflectors, power tower, and dish designs. Solar power is the most readily available of all energy on earth; the problem lies in capturing it. Although the most recent trend has been to invest in photovoltaic arrays, the largest and most promising solar power stations currently operating are CST (specifically parabolic troughs). And this technology is gaining steam. In Europe, for instance, the solar thermal industry grew over 60 percent just in 2008.

The United States has the opportunity to expand its thermal solar power as well. There is abundant, underutilized land in the West that could be covered in solar thermal arrays like the Solar Energy Generating Systems, possibly powering large parts of our infrastructure.

Klein, although enthusiastic, admits some hesitation about rushing into the technology. Like many new technologies, the mystery is one of the most appealing parts. WE

Article by: Alexandra Beletic and Joseph Powell
Design by: Evan Owens



Behind the scenes at UW-Madison

Ever heard of FPM? You may think this abbreviation doesn't apply to you, but the acronym FPM (Facilities Planning and Management) has impacted your life in distinct ways. Between cleaning up after football games and Halloween to keeping the sidewalks free of goose droppings, the staff's presence on campus is undeniable. FPM's different departments, such as waste and recycling, transportation and grounds management, keep our campus running smoothly.

Meet our grounds management crew. They get to work by 7 a.m., mow in the rain and shovel snow without complaining. On a daily basis they work to provide a beautiful landscape for the campus. With 29 full-time staff working on crews such as lawn maintenance, tree and shrub maintenance, construction and gardening, the grounds crew truly puts UW-Madison's atmosphere in full bloom. In addition to their regular duties, the grounds crew helps with special events. In the past they've helped with fencing for Freakfest on State Street, and they prepared Library Mall for President Obama's visit this past September.

Taking care of the grounds is no easy task. "Quite honestly, we don't have enough staffing to keep the grounds the way we'd like to keep it," says Gene Turk, the grounds management supervisor. But don't feel bad if you've never given a second thought to the grounds. "I think the fact that people don't notice things is a good thing," Turk says.

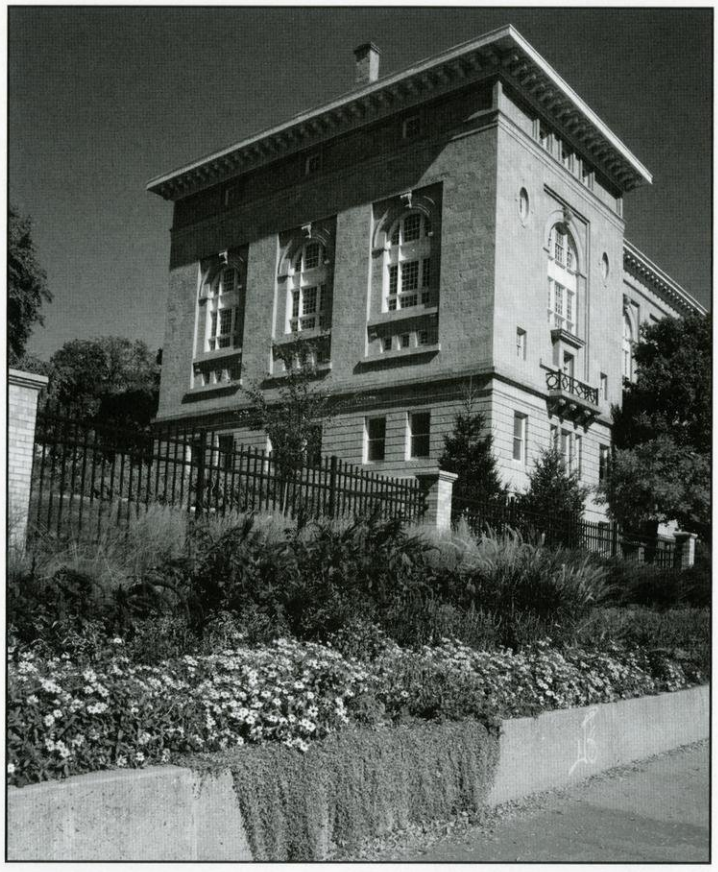
Every day most students pass by the towering oak tree just behind Van Hise on Linden Drive unaware of the time and effort that has gone into maintaining it. Not Turk. Turk started as a grounds crew worker 42 years ago, and he admits his favorite getaway on campus is the oak tree. A while back, he noticed the area overrun and neglected, but after cleaning out the brush and filling in some grading he has transformed the spot into a "peaceful, out of the way place."

What's the grounds crew's toughest job? The answer is snow removal—especially when students are walking around between classes. "I liken it to kicking an anthill," Turk says. Actually, a few years ago a number of engineering students tried to help them out by attempting to create a sidewalk snowplow which could remove packed snow. The grounds crew never heard again from the engineers, who likely abandoned the project.

Of course, when you're working on a college campus throughout the year, unusual events are bound to take place. Turk can testify to that. Once, while finishing plowing snow in the Memorial Union lot, a student surprised him by grabbing onto the top of his truck cab and sticking himself to the windshield. The student then proceeded to hang on to the moving truck for a few minutes before jumping off into the street.

The newest project that the grounds management can add to their growing list is the recently renovated patio area between Barnard Hall and Chadborne Hall's Rheta's Dining Room. The space was overtaken by a thicket of gnarly barberry bushes until Gary Schakelman, a grounds management worker with a natural knack for improvements, chopped them down. To his surprise, University Housing then designated the patio as a picnic area, where they would place two grills and a circular table with benches. The barberry roots were completely removed and the correct grade for the patio was established. Then things all "started to come together." Soon after, the grounds crew noticed that people were cutting through the patio. Schakelman, with landscape architecture knowledge dating back to the 1960s, decided that a path should be added. According to Schakelman, "form follows function," which most engineers can attest to. So if you find yourself in the area, grab a sandwich from Rheta's, sit back on a bench and take in the view.

Our grounds crew gets their hands dirty—literally—to create the campus atmosphere we've all come to enjoy. Next time you run across a UW-Madison worker drive up in a truck with FPM painted on the side, stop and say thanks. As Turk, who has served the campus for 42 years, says, "A little bit of thanks once in a while makes us feel good. We really appreciate that." We



The UW-Madison grounds crew works year round to maintain the scenic areas on campus.

Article by: Rachel Feil
Photography by: Sara Karraker

Professor Plesha
Teaching by the book

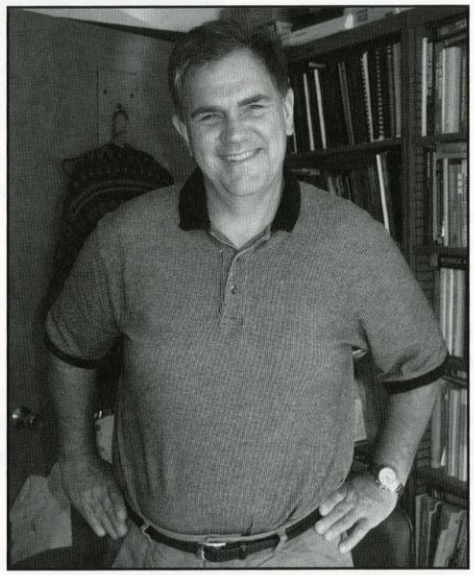
If you're an engineering student at UW-Madison, there's a good chance you've heard the name Michael Plesha. A professor of engineering physics for the past 26 years, Plesha has certainly made himself known on campus between his research, textbooks and non-academic campus affairs.

Engineering statics, taken by two thirds of engineering students, is one of the most fundamental engineering courses, focusing on the "principles of mechanics, force systems, equilibrium, structures, distributed forces, moments of inertia of areas and friction," according to the online student center course description. Heard your peers complain about this course? Think the class is already difficult enough? Be grateful you don't have an ancient, confusing, boring, black and white textbook on top of the challenges the course already offers. You can thank Plesha, who is the author of "Engineering Mechanics: Statics" and "Engineering Mechanics: Dynamics," the modern, interactive textbook currently used in statics and dynamics courses at UW-Madison.

Although they may be his most famous books on campus, the "Engineering Mechanics" books were not the first with which Plesha was involved. Early in his career, he was invited by Robert Cook, professor of engineering physics, to coauthor a finite element textbook along with Professor David Malkus.

"Of all the things I had done in my career, my contribution to the finite element book was the thing I was most proud of," Plesha says. "A large collection of ideas gathered in one spot, unified from start to finish. It's one of the big things that motivated me to work on a statics book."

Although the finite element book gave Plesha his first taste of writing textbooks, it wasn't the only factor that pushed him towards writing his own text.



"Of all the things I had done in my career, my contribution to the finite element book was the thing I was most proud of." - Professor Michael Plesha

"When I started teaching statics, the books that were largely available were the same ones that I'd learned from when I was a student. I thought we could do better than that."

Plesha started writing the statics book with Penn State professors Gary Gray and Francesco Costanzo nine years ago. "There were three people working on two books. That's closing in on about 30 man years of effort," Plesha says. "We don't work on this full time because we have teaching, research and other responsibilities. But every spare moment, nights and weekends is spent writing. It's a huge amount of effort, but it's very rewarding to have a large collection of ideas gathered in one spot." The most recent edition has been in press for about a year.

Plesha has received much positive feedback on his books. An Engineering Beyond Boundaries article says of Plesha's new book: "Wide margins, neatly formatted text and myriad figures evoke the idea of engaging understandable information. Together, design and content fill an important role: helping students master statics."

"I like how it is easy to read and understand," statics student Stephanie Garcia Orozco says. "The examples are very detailed and easy to follow." Senior mechanical engineering student Dustin Spencer has a similar opinion. Although it's been a few years since he used it in class, Spencer distinctly remembers the book.

"Plesha's textbook is the most helpful book I ever had in college," he says. Spencer also encourages students to not sell the textbook back after the class is done, for it may come in handy in courses to follow.

So why is statics such an important course for engineering students?

"It's truly the fundamental course that people will use in the majors that are required to take it, and for good reason. [It will also be used] in their professional practice," Plesha says. "If you struggle in statics, you will struggle

in the courses that follow. It's important to get off to a good start in the fundamentals."

Plesha's number one piece of advice for students taking the course? Practice extra problems. "Statics is a course where the math is elementary," he says. "The challenge is taking real life problems and boiling them down to something that is mathematically manageable. That's as much an art as it is a science, and it just takes practice to cultivate that skill and ability."

Plesha hasn't limited his UW-Madison involvement to the College of Engineering campus. In fact, he spends a great deal of time working with the athletic department and serving on a number of different committees that advise the department. He is a co-chair for the Finance, Facilities & Operations Committee, chair of the University Ridge Committee, a member of the Equity, Diversity, and Student Diversion Committee and a member of the Personnel Committee for Men's Hockey. Plesha has served for six years on these committees and will serve for two more before his term is complete.

Back at the College of Engineering, Plesha is involved in many important research projects. Recently, he has been investigating the development of finite elements for nanotechnology. His research has also included the study of the behavioral particulate media, which include, "sand, powders and other particulate materials like concrete, some types of ceramics and energetic materials like rocket fuel."

Some of the most interesting research Plesha has performed in his career was the use of fractal geometry to develop models for contact and friction. "It was the most interesting because it required me to learn the most new things. It was a small project, but one that I really enjoyed."

Plesha also encourages students to get involved with research. "We are a research university, and there are wonderful opportunities for students to be involved with that," he says. "If a student wants to become involved with research, with all the opportunities available, there ought to be a chance to do that."

Wondering if research is something you should fit into your undergrad years here at Madison? Plesha says, "For someone who wants to go on to graduate school, to have that research experience gives them an edge or an advantage. A student who wants to get a bachelor's degree and hit the job market, maybe a co-op or internship might be a higher priority. I think that those are both great opportunities."

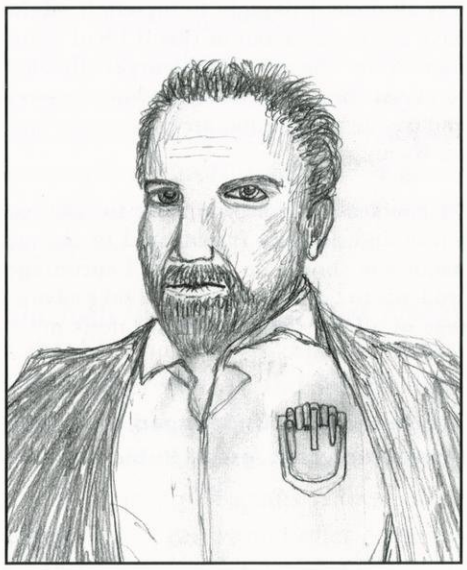
Overall, Plesha encourages students to experience as many things as possible during their undergraduate careers. "When I was younger there weren't as many opportunities—or maybe those opportunities just weren't as popular. I kind of went through my education at breakneck speed. When I was all done, I thought to myself, 'I might have gotten more out of this if I had spent more time,'" he says. Plesha urges students to assess their own undergraduate careers and decide what things are most important for them.

"If you see a course you want to take, go ahead and do that. If you need to change major you should do that too. I encourage students to take their time and take advantage of all the opportunities. Life is not a race. Have fun!" WE

Article by: Ellyn Underwood
Photography by: Jessica Rubio

Just one more

The finest in eclectic humor



A week in the life of
The most interesting engineer

Monday

~ Meet w/ Biddy Martin to discuss dance moves
~ Read websters dictionary

Tuesday

~ Lift weights w/ John Clay
~ Purchase 24 Harry Potter midnight showing tickets

Wednesday

~ Finish thesis on magnetic self-organization
~ Learn Russian

Thursday

~ Attend stretching practice with cheerleading team

Friday

~ Star in Old Spice commercial
~ Race the rowing team (I swim, they row)

Saturday

~ Finish 2 kegs

Sunday

~ Rebuild gears on bike

CAMPUS UNDER CONSTRUCTION

Students on campus are no strangers to dodging construction cones or altering routes due to closed sidewalks and roads. Each semester new construction projects begin while others are fulfilled. Recently, campus has seen a surge of new and exciting projects that are altering the campus landscape in addition to class routes. One project noteworthy to many engineering students is the new South Campus Union. This building offers many exciting features from a rock climbing wall to a wide variety of dining options. On the other side of campus, the recently completed Education Building offers new amenities while preserving the historical characteristics of the building. Another project, the Wisconsin Energy Institute is a newer one that will provide a place for renewable energy research to be conducted. Here are some quick facts about these projects on campus:

Education Building

- Original building was built in 1900
- Project aimed to restore historical elements of the building and the reconfigure the building the serve the school's mission
- Project began in January 2009 and doors reopened on August 13, 2010
- The project incorporated a variety of green technologies with the hope of achieving Leadership in Energy and Environmental Design (LEED) gold certification

Union South

- Will open on April 15, 2011
- 276,664 square feet, $94.8 million project
- The topping-out ceremony occurred on June 11, 2010
- Design committee chose to pursue Leadership in Energy and Environment Design (LEED) certification and set silver level certification as the goal, but currently the project is at gold certification

Wisconsin Energy Institute

- This building will help to develop novel technologies to meet the pressing need to create renewable energy in a sustainable manner
- The building will also have space available to promote renewable technologies
- Will be located at the site of the old University Health building on University Avenue
- It will provide opportunities for work on the long term future of energy research
- Construction hoping to begin Fall 2010 with completion in Fall 2012

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