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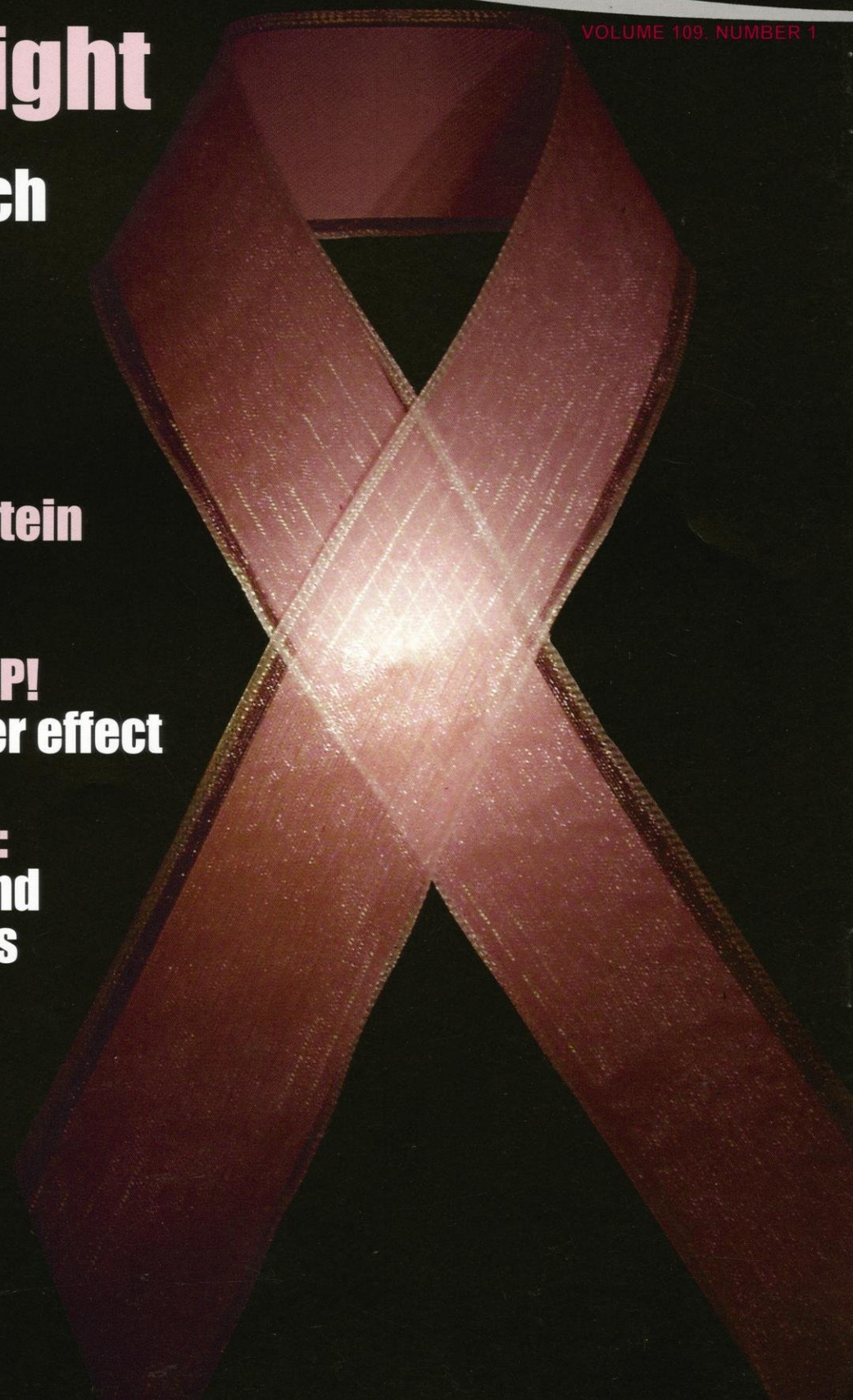
Shining light on breast cancer research



Also inside:

Bringing Frankenstein to life

The science of HELP! Innocent bystander effect

Racing to success: Concrete Canoe and Future Truck teams

University of Wisconsin

Engineering
great magazines,
stadiums,
and touchdown drives.

wisconsin engineer

Published by the Students of the University of Wisconsin-Madison VOLUME 109, NUMBER 1 NOVEMBER. 2004

COVER STORY

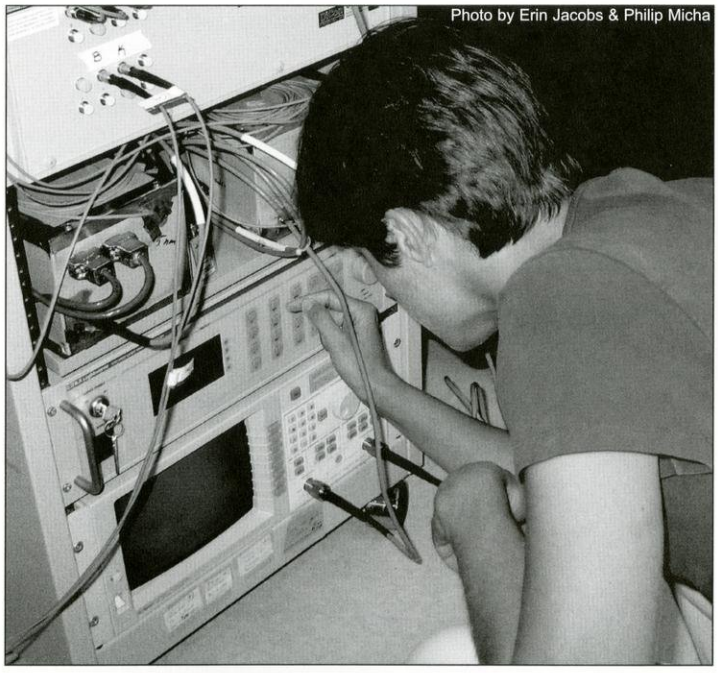


Photo by Erin Jacobs & Philip Micha

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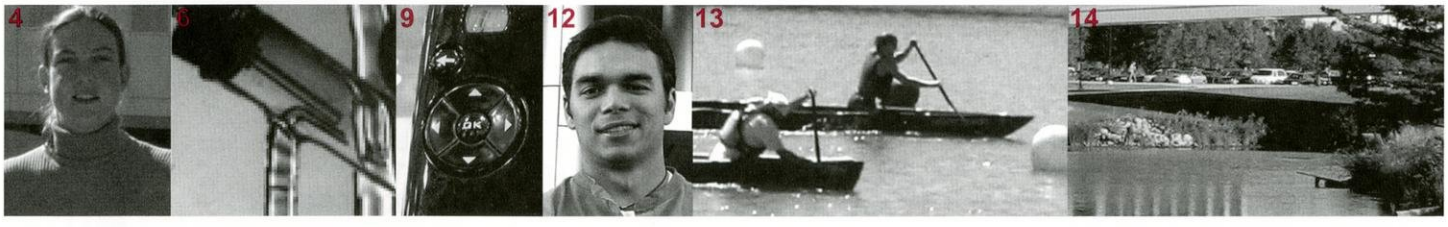

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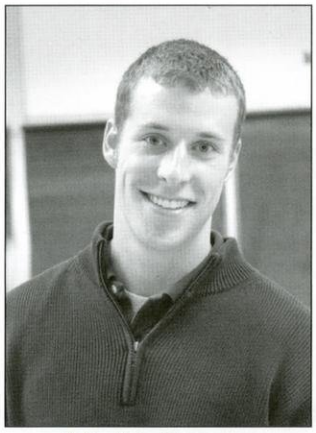
JUST ONE MORE



Martin Grasse, Writing Editor

Cooperation makes the world go 'round

by Martin Grasse

It is easy to visit the library and read the biographies of great innovators of the past. From Newton to da Vinci, Galileo to Bacon, Copernicus to Edison, these historical figures were geniuses of their time. Books are full of their tireless efforts that ultimately revolutionized science and led to new technologies. History also tells us that many of these scientists fought against hardships and political constraints to pursue their work. Because of this, these great minds were often forced to work in isolation without the benefit of a collaborative team.

The world has changed.

Today, with few exceptions, nearly every society around the world embraces innovation and technological advance as a worthy goal and nearly every government funds scientific research in one form or another. Because of this, innovators are not forced to work in solitude, but are able to cooperate with each other in pursuit of a common goal.

In the corporate world, almost every major engineering project involves a team. Each member of the team brings his or her own unique experiences and knowledge to the table, and thus both the design process and the final design are enhanced. With recent advances in telecommunications, engineers and scientists around the globe can share ideas and information in real-time, making collaboration an even more integral part of the design process. In short, innovation today thrives on collaboration.

Here at UW-Madison, the university is beginning to act on the realization that there is a need for engineers who can work successfully in teams. Some of the engineering departments are even inserting team-based design courses into traditional engineering curriculum. The biomedical engineering department, for instance, is leading the way by requiring team design courses every semester from sophomore year until graduation. In some other departments, mechanical engineering for example, students are not required to take a team-based design course until their senior year, leaving them without vital experience that employers are looking for in applicants. The rest of the College of Engineering should take the hint.

The knowledge that students gain taking courses such as calculus, chemistry and physics is valuable, but only a small piece of the education an engineer should receive. If you were to ask a professional engineer, for example, to solve a complex differential equation problem, he would most likely not remember how. On the other hand, communication and teamwork skills gained from working for four months on a team toward a common goal stay with a student throughout his professional career. If the university wants to continue to train engineers that are among the best in the world, it needs to recognize the need for more team-based courses, and implement them into all engineering curricula at all levels.

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Photo by Carl Calhoun

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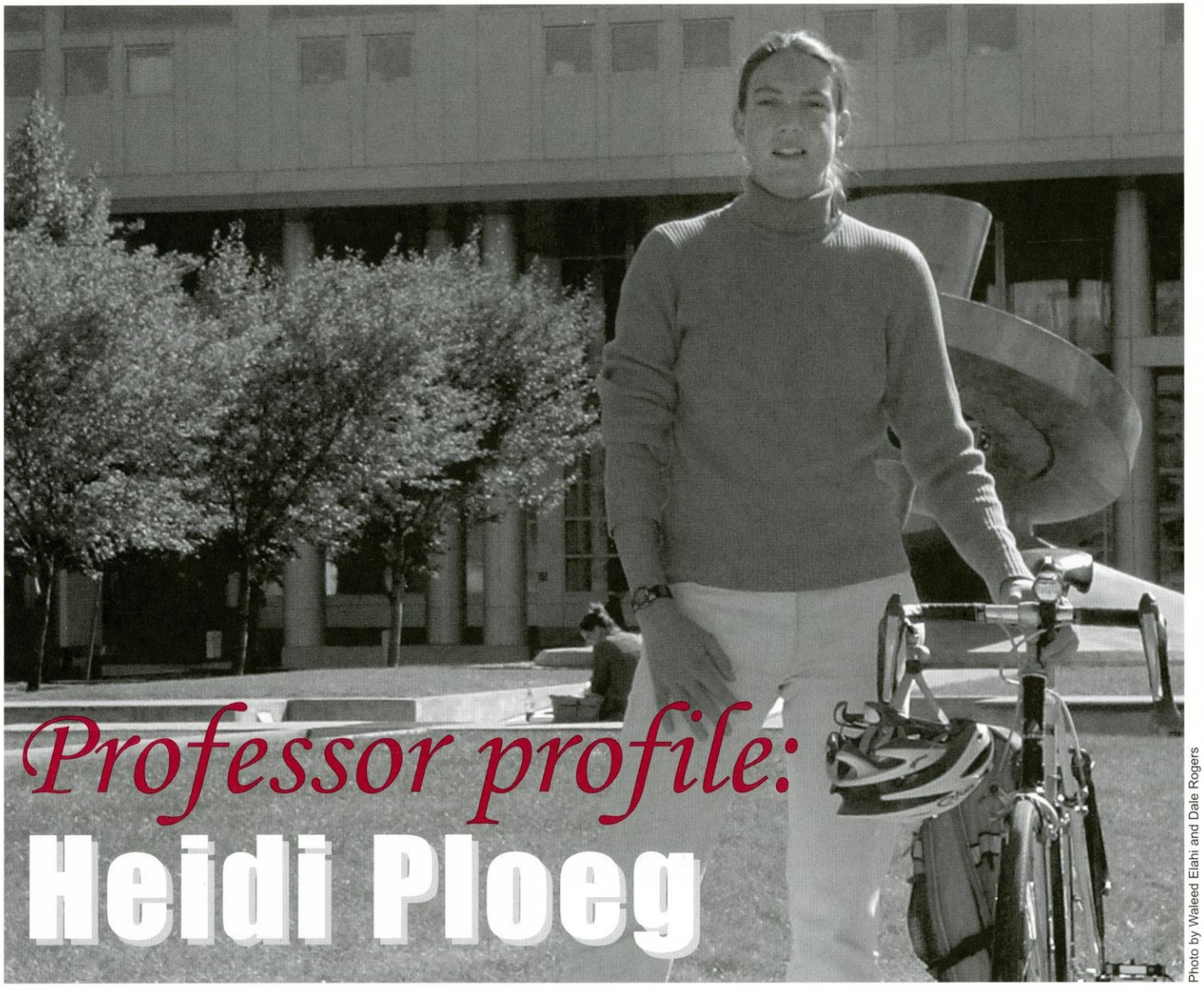


Professor profile: Heidi Ploeg

Photo by Waleed Elahi and Dale Rogers

By Carly Mulliken

Assistant professor Heidi Ploeg credits fate for influencing most of the important decisions she has made in her personal and professional life.

Born and raised in Ottawa, Ontario, Ploeg completed her B.S., M.S. and Ph.D. in mechanical engineering at Queen's University. Ploeg's first brush with fate was a lost job opportunity with a Canadian mountain bike company. They told her she "didn't have mountain bike racing experience." The rejection turned her onto one of her many passions- amateur road bike racing.

Ask Ploeg's students what her obsessions are and they will invariably answer, cycling. Ploeg not only competes in amateur road cycling races, she also bikes seven miles to work each day.

"It's good to get off the addiction of cars and driving to work and parking," she says.

Born and raised in Ottawa, Ontario, Ploeg completed her B.S., M.S. and Ph.D in mechanical engineering at Queen's University

At work she uses her bike to physically represent what she is teaching her students. It isn't surprising to walk by her classroom and see her on top of her bike showing students how to "find forces and stresses in the bicycle and its components."

Before Ploeg came to Madison she lived in Switzerland for ten years. She worked at Centerpulse Orthopedics, a company specializing in bone and joint biomechanics. Ploeg attributes her concentration in biomechanics to fate because her university advisor specialized in the same subject. Her advisor became a mentor and helped her decide to focus in biomechanics.

"It is because of him that I got my position in Switzerland and really became a specialist in that field," Ploeg says.

During her time at Centerpulse Orthopedics, Ploeg was a senior member of the research department. She says the most rewarding project with the company was reconstructing a hip for a retired veterinarian. What made this case so special was that the team personally worked with the patient, a rarity in biomechanics.

While in Switzerland, Ploeg also worked with many student interns and realized that she might like to go back to the university as a professor.

Ploeg not only competes in amateur road cycling races, she also bikes seven miles to work each day

After ten years in Switzerland, Ploeg was ready to speak English again and decided to follow her partner to Middleton, Wisconsin.

Ploeg had started her job search very broadly when fate stepped in again. An initial search of the university's engineering program did not produce any hopeful positions, so she continued to look elsewhere.

After a thorough search of North America, she found an opening in her field at UW-Madison. Ploeg immediately handed in her resume in person, which was a great surprise considering the university had been searching all over the world for such a perfect applicant. This is just another example of what she calls "coincidence and really good fate."

Ploeg became a faculty member in 2003. She now spends her time teaching and working as head researcher in the Bone and Joint Biomechanics Lab.

Ploeg hopes to be a tenured professor at UW-Madison in five years.

Another one of her goals is to develop a reputation in the U.S. research community to add to her list of accomplishments in Europe and Canada. In the near future, she would also like to help out with the new human powered vehicles team in the mechanical engineering department. She feels that working with the team could be an ultimate experience in joining her two loves- cycling and engineering. It will be interesting to see where fate takes Heidi Ploeg next.

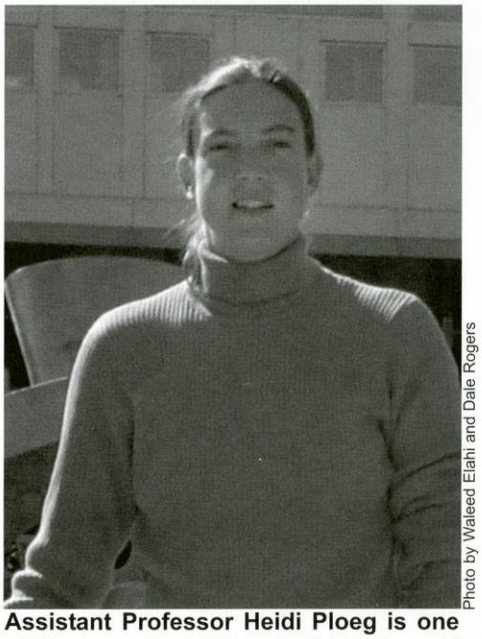


Photo by Waleed Elahi and Dale Rogers

Assistant Professor Heidi Ploeg is one of the newest additions to the College of Engineering.

Author Bio: This is Carly Mulliken's first article for *Wisconsin Engineer*. She is a junior pursuing a degree in english and a technical communications certificate.

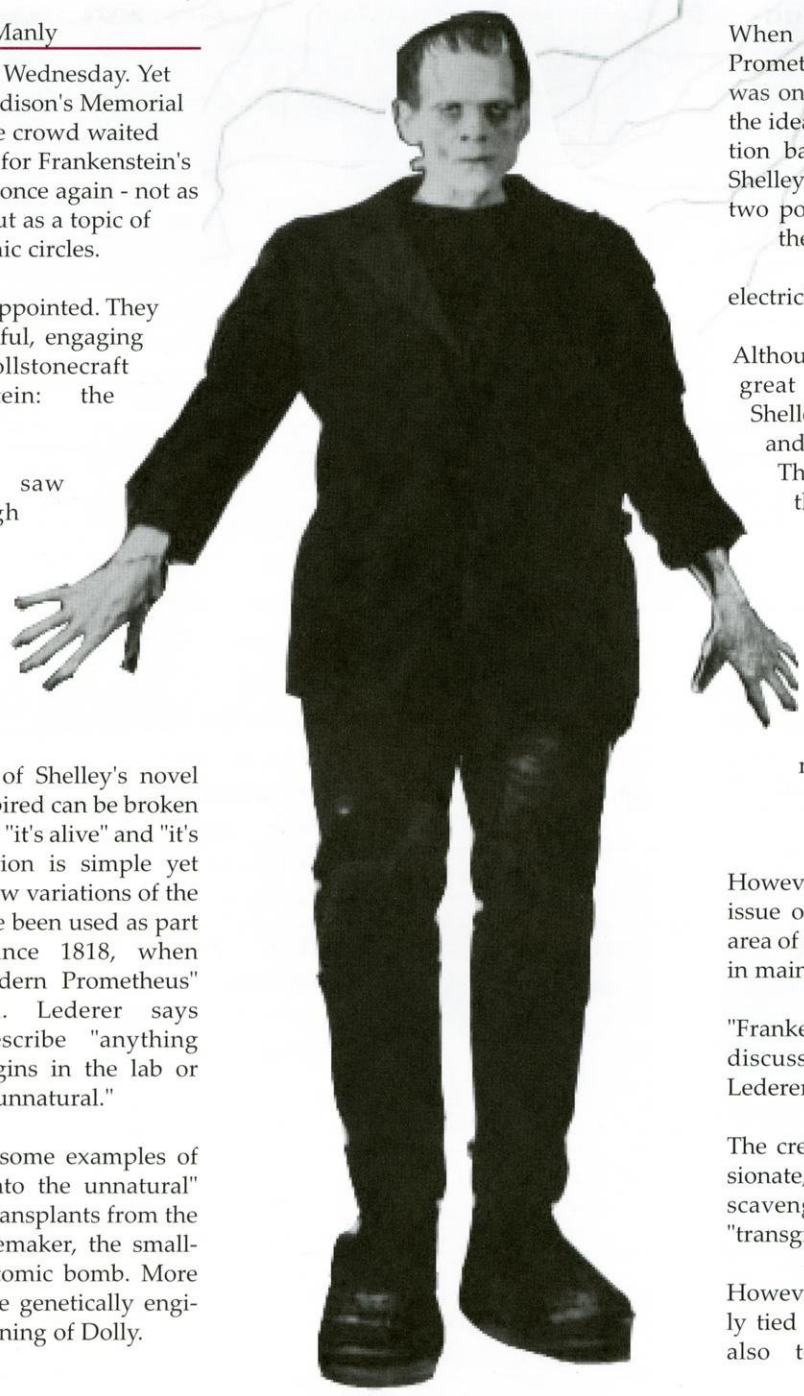
Bringing Frankenstein to life

By LaShunda Prescott-Manly

It was a dark, dreary Wednesday. Yet room 126 at UW-Madison's Memorial Library was full. The crowd waited with eager anticipation for Frankenstein's monster to come to life once again - not as the sinister character, but as a topic of great interest in academic circles.

The crowd was not disappointed. They were treated to a colorful, engaging look at Mary Wollstonecraft Shelley's "Frankenstein: the Modern Prometheus."

The audience saw Frankenstein through the eyes of Dr. Susan Lederer, the curator of the original "Frankenstein: Penetrating the Secrets of Nature" exhibit.



Lederer says the core of Shelley's novel and the myth it has inspired can be broken down in to two phrases: "it's alive" and "it's escaped." This distinction is simple yet accurate considering how variations of the word Frankenstein have been used as part of the vernacular since 1818, when "Frankenstein: the Modern Prometheus" was first published. Lederer says Frankenstein can describe "anything unnatural with its origins in the lab or transgressions into the unnatural."

According to Lederer, some examples of such "transgressions into the unnatural" include human organ transplants from the recently dead, the pacemaker, the smallpox vaccine and the atomic bomb. More recent examples include genetically engineered food and the cloning of Dolly.

When "Frankenstein: the Modern Prometheus" was first published, Shelley was only 20 years old. She first conceived the idea in 1816 as part of a story competition based on supernatural experiences. Shelley's work was largely influenced by two popular scientific topics of her time: the debate over the origins of life and galvanism (the release, through electricity, of mysterious life forces).

Although it was not originally hailed as a great literary work, the imagery in Shelley's novel was adapted on stage and film over the next two centuries. The 1931 film adaptation implanted the association between Frankenstein's monster and out-of-control science in the public's mind.

Before the 1970s, Shelley and Frankenstein were of little interest to scholars. Early academic interest came from feminist theorists, who were intrigued by her youth, lineage and personal escapades.

However, as the biosciences advance, the issue of ethics in science is becoming an area of great interest in academia as well as in mainstream society.

"Frankenstein provides versatility in the discussion of biomedical advances," Lederer says.

The creation of a nameless, hideous, passionate, highly intelligent monster from scavenged body parts is the ultimate "transgression into the unnatural."

However, the story's relevance is not merely tied to the creation of the monster but also to its murderous deeds after

Frankenstein disregards it. Thus, Shelley provides an ominous example of what happens when the creator does not take responsibility for his creation.

The traveling "Frankenstein: Penetrating the Secrets of Nature" exhibition, was brought to Madison through the efforts of Yvonne Schofer, a humanities-English bibliographer at Memorial Library, and Robin Rider, curator of Special Collections in Memorial Library and senior lecturer in the history of science department. The traveling display is based on an exhibition

Lectures and exhibits highlight the scientific implications of Mary Shelley's "Frankenstein: the Modern Prometheus"

produced by the National Library of Medicine in 1997 and has been displayed in libraries across the country since October 2002. The traveling exhibition will end its tour in December 2005 after visiting 80 libraries.

Schofer and Rider both thought it was important to bring this exhibit to UW-Madison because of its relevance to current teaching and research across multiple disciplines.

Photo by Adam Dahlen

Susan Lederer speaks in the Memorial Library on the history of Frankenstein.

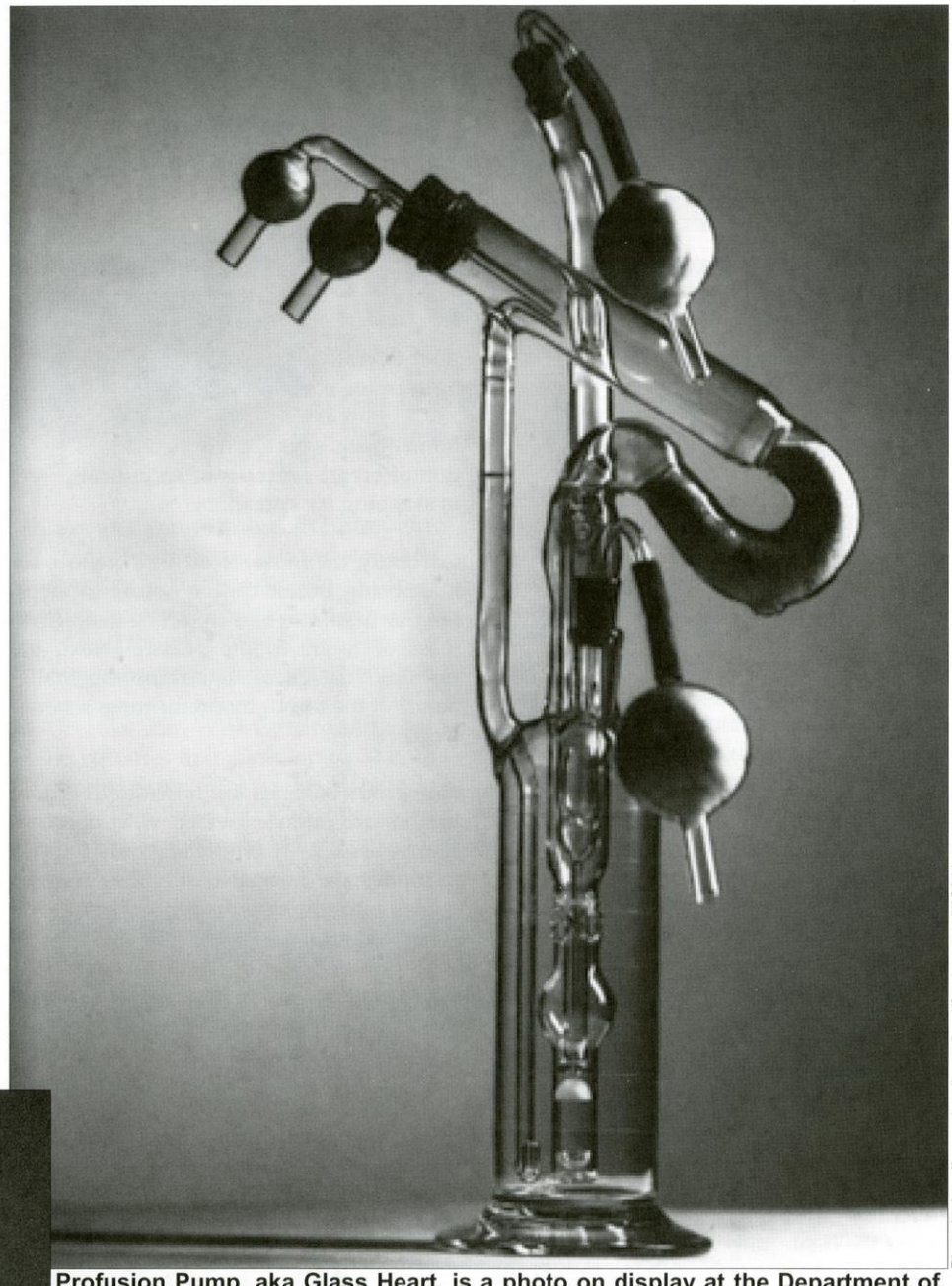


Photo by http://www.nlm.nih.gov/hmd/frankenstein/IIIC31.jpg

Profusion Pump, aka Glass Heart, is a photo on display at the Department of Special Collections in the Memorial Library.

"[Shelley] explored the boundary between the living and dead but offered no easy solutions to the enduring challenges of using knowledge with wisdom," Schofer says.

The exhibit also provided them with the opportunity to showcase campus library resources.

Lederer's lecture was one of the many "Frankenstein" events brought to Madison this fall. Other events included lectures by distinguished scholars, a daylong symposium featuring papers by UW-Madison faculty and graduate students and a showing of a rare print of the German version of the book, "Der Golem." Schofer and Rider hope the exhibits encouraged viewers to re examine the novel.

"We will never be rid of Frankenstein's monster whenever we talk about science and scientists," Lederer says.

Author Bio: LaShunda is a university special student in the TCC program. She is finally taking all the fun classes that she did not get to take as an undergraduate student in EECS.

Shining light on breast cancer research

By Michelle Desnoyer and Dan Witter

Humans harnessed the power of light thousands of years ago. With the dawn of the 21st century, scientists have found more complex and rewarding approaches to benefit from light's energy. UW-Madison biomedical engineering assistant professor Nimmi Ramanujam's work uses fiber optic technology to improve breast cancer screening.

Fiber optics is a technology that uses fibers, usually made of glass or plastic, to transmit light. Light travels through fibers with a diameter the size of a human hair to relay a signal.

In her research, Ramanujam uses light to relay information from a sight of interest in human tissue to an optical detector and computer for analysis. Ramanujam performs optical spectroscopy by shining light of different wavelengths into the tissue using fiber optics. She then collects the light that is reemitted from the tissue through the same or adjacent fibers to see how the light has changed. Once the returned light is analyzed, researchers can determine the major chemical characteristics of the tissue and use this information to determine if the tissue is likely to be cancerous.

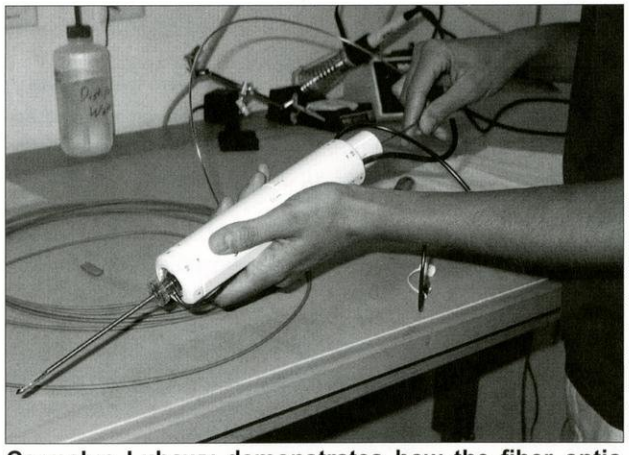


Photo by Erin Jacobs & Philip Micha

Carmalyn Lubawy demonstrates how the fiber optic probe fits into the biopsy needle.

"Our overall goal is to try to improve early detection of breast cancer," Ramanujam says. Early detection of breast cancer is often critical to stopping it's spread.

Currently, the most effective procedure for diagnosing breast cancer occurs in steps. First, a mammogram detects a suspicious mass of tissue in the breast. Next, the physician needs to determine the malignancy of the tumor by preforming several biopsies.

Numerous biopsies are necessary because tumors are often entwined with non-cancerous tissues. If physicians only happen to biopsy the normal tissue, they may be misled into thinking the tumor is non-cancerous.

One problem with the needle biopsy is that it carries a misdiagnosis rate of seven percent. When patients undergo biopsies, their physicians may not find the cancerous tissue right away. The patient is then told to come back in six months for another biopsy. In this case, the patient may have been without treatment for six months.

If the physician suspects cancer but the results of the biopsies and mammogram are inconclusive, the woman may opt to have a mastectomy-a procedure in which the entire breast is removed. In 80 percent of these cases, the suspicious masses are not cancerous, causing the woman to go through unnecessary physical and emotional trauma.

In the end, the accuracy of the needle biopsy depends to some extent on the skill of the physician. However, this is not so for Ramanujam's new fiber optic sensor technology.

"We can just insert a little sensor into the needle. [The needle then acts] like a third eye," Ramanujam says. The sensor can then guide the needle.

Another advantage of this technology is that the fiber optic could eventually be threaded through a needle about as small as the one used for drawing blood, which is much smaller than a biopsy needle.

Since the new device locates tissue in the body that is most likely to be cancerous, a physician may guide a needle directly to that site and take one or two biopsies, as opposed to ten or more.

Using known chemical properties of cancerous tissue, a physician can then compare the data of the sample in question to known chemical properties of cancerous tissue. This makes the procedure less expensive, and less physically painful and emotionally destructive.

Since August, four patients diagnosed with breast cancer have voulentarily undergone fiber optic testing. So far the procedures have "gone well."

It is promising that people are volunteering for the study because it means they understand the process and believe it's safe, Ramanujam says. "It won't help them now but it will help patients in the future," she says. WE

Author Bios: Michelle Desnoyer is a senior double majoring in english and political science. Dan Witter is a fourth year civil engineering undergraduate who is working with the UW Engineering Expo and the UW Construction Club in addition to the *Wisconsin Engineer*.

Portable Media Centers hit the market

By Ed Kim

Devices such as portable MP3 players, cell phones and digital cameras led us to a digital life where we can talk, listen to music and take pictures on the go. In this "digital life," portability has become a big issue.

Many students check out heavyweight laptops at the library to watch DVDs. What would it be like if there were something the size of a Game Boy that could play both videos and music? Creative and iRiver have been working on integrating all these digital needs into one product.

The two companies gave birth to a new generation of gadgets known as the Portable Media Center (PMC). In August and September, iRiver and Creative announced their new products, the Creative Zen Portable Media Center and the iRiver PMP-120.

Creative Zen weighs 0.8 pounds and measures 3.2 x 5.7 x 1.1 inches, whereas iRiver PMP-120 weighs 0.6 pounds and measures 3.3 x 5.6 x 1.2 inches. These featherweight champions are perfect for portable usage.

Loaded with a 20.0 Gigabyte hard drive, these versatile gizmos allow storage of up to 9,000 songs, about 80 hours of video or thousands of digital photos.

An LCD screen with a resolution of 320 x 240 pixels allows users to enjoy crisp and brilliant images. The iRiver has a 3.5" display, whereas the Creative Zen has a 3.8" display.

The only setback is that only one person can enjoy the graphics at a time. However, the built-in speakers allow users to share their music with others.

Both devices connect to a PC through a USB port, allowing for fast transfer rates. Creative Zen features a Windows Mobile operating system, which makes managing files easy. However, iRiver uses its own program to manage digital entertainment.

The Creative Zen uses rechargeable lithium-ion batteries that allow up to 22 hours of audio playback or seven hours of video playback. The iRiver has a slightly shorter battery life, playing up to 16 hours of audio or five hours of video.

Instead of listening to music on your way to class, you can now watch a video on the Creative Zen Portable Media Center (above) and the iRiver PMP-120 (right).

Though it has a shorter battery life, the iRiver device has several advantages over Creative Zen. First, iRiver PMP-120 users can record music directly from any audio source. Second, the iRiver includes an integrated FM tuner. The iRiver also has an integrated voice recorder, which could be used to record lectures while sleeping in class, and a two-position kickstand.

Being portable and lightweight isn't the only reason why people are buying these new products, according to Best Buy employee Jeff Oshiro.

"It's new, it's cool [and] not many people know about it," he says.

Oshiro believes this device will be most popular with business people and others who are on the go. They are also ideal for airplane flights and road trips.

With so many people on the go and already carrying their music collections on MP3 players, it was only a matter of time before they wante d their movie collections with them as well. WE

Author Bio: Edward J Kim is a senior in electrical engineering. This is his first article with *Wisconsin Engineer*.

The science of HELP!

By Sonny Suciawan

On March 13, 1964 Kitty Genovese was walking to her apartment in Queens, New York when Winston Moseley assaulted her. Moseley repeatedly stabbed Genovese in the back. As Genovese screamed for help, lights went on and windows opened around the neighborhood. The screams awoke Robert Mozer, who went to his window and saw the struggle. He shouted, "Let that girl alone!" Moseley ceased his attack and left the scene.

Lights went off and all was quiet again.

Moseley returned twice. His first time back, he continued the assault; lights went on and windows opened again. Moseley fled the scene. A few minutes later, Moseley came back to "finish what he had started." Screams filled the neighborhood again as Moseley continued assaulting Genovese. Lights went on and windows opened, but this time, Moseley continued without any interference. He then sexually assaulted Genovese and stabbed her to death. The whole attack took about half an hour.

After the attack, neighbor Karl Ross called the ambulance. Within two minutes of notification, the authorities were on the crime scene. They discovered 17 stab wounds on Genovese's body.

In total, there were 38 witnesses who saw what happened, from the beginning of the attack to the brutal end. Yet, it took almost 40 minutes for someone to notify the proper authorities, and no one offered physical help.

"Why was it that 38 people who were known to have noticed and observed this rape/murder did nothing? Why didn't anybody do anything? It raised the question of what society had become. Had they become so apathetic that they were willing to tolerate this sort of thing?" UW-Madison Professor of psychology Caton F. Roberts asks.

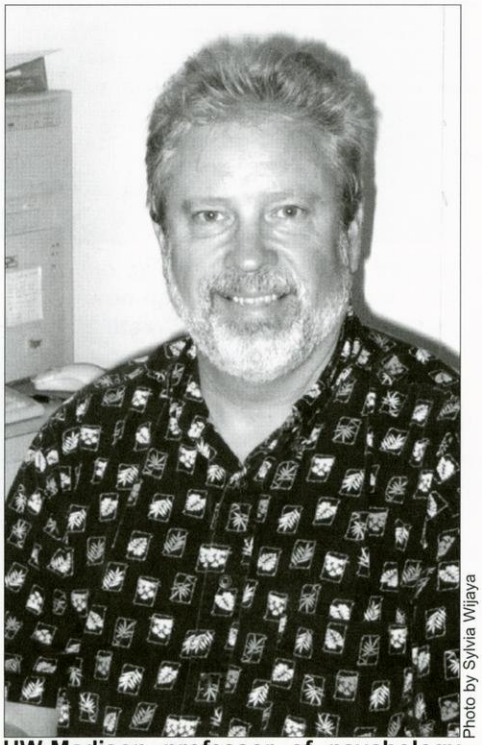


Photo by Sylvia Wijaya

UW-Madison professor of psychology Caton F. Roberts teaches his students about the innocent bystander effect.

Social psychologists answered these questions by developing the concept of "diffusion of responsibility." This theory states that one's reactions to a situation changes depending on the number of people around. As the number of people who observe a distressing situation increases, the probability of an individual offering assistance decreases.

In a situation where only one person witnesses someone in distress, he would be more likely to offer assistance. However, within a group, responsibility is shared (or diffused) and a single person is less likely to act.

Roberts states that diffusion of responsibility fits within a four-step cognitive psychological model for helping behavior. According to the model, in a potentially distressing situation an individual has to:

1. Notice the event
2. Interpret it as an emergency
3. Assume responsibility for the event
4. Decide to help and act

If at any point in this process the person does not proceed to the next step, he will not offer help. As the diffusion of responsibility theory suggests, the third step is the hardest when many people witness the event.

Given the high likelihood that the average person would not go through all the steps,

it seemed bystander inaction was doomed to repeat itself, Roberts says.

However, in the 1970s Janet Ballenoff, a student at Carleton College, hypothesized that if people were aware of this theory, they would be more likely to help a person in distress.

In the spring of 1977, Balenoff decided to test her hypothesis. She told 72 students to meet with her individually at a certain place and time. However, the students did not know they were being observed on their way to the building. Balenoff arranged that when a student neared the building, a passerby acted like he was in pain, slumped to the ground at a visual distance from the student.

The subjects were separated into two categories: those who had learned about the cognitive model in a prior psychology class, and those who hadn't. Balenoff found that people who took the psychology class were three times more likely to offer assistance than those who hadn't taken the class.

"What the diffusion of responsibility theory demonstrated was that many people didn't help because they thought that someone else was going to, or already had," Roberts says.

What would YOU do if you saw someone in DISTRESS?

People who weren't aware of the model failed to help the person in distress. Thus, they did not feel the obligation to do something. The people who knew the model were aware that others were not likely to help.

Looking back on the Genovese case, Roberts advises a person witnessing a dangerous situation to help "because you might be able to make a difference." We

Author Bio: Sonny Suciawan is a senior in industrial engineering. This is his third article for *Wisconsin Engineer*.

Photo by Sylvia Wijaya

Innocent bystander: In a situation where only one person witnesses someone in distress, he would be more likely to offer assistance. However, within a group, responsibility is shared (or diffused) and a single person is less likely to act.

Senior at the reins of ASME

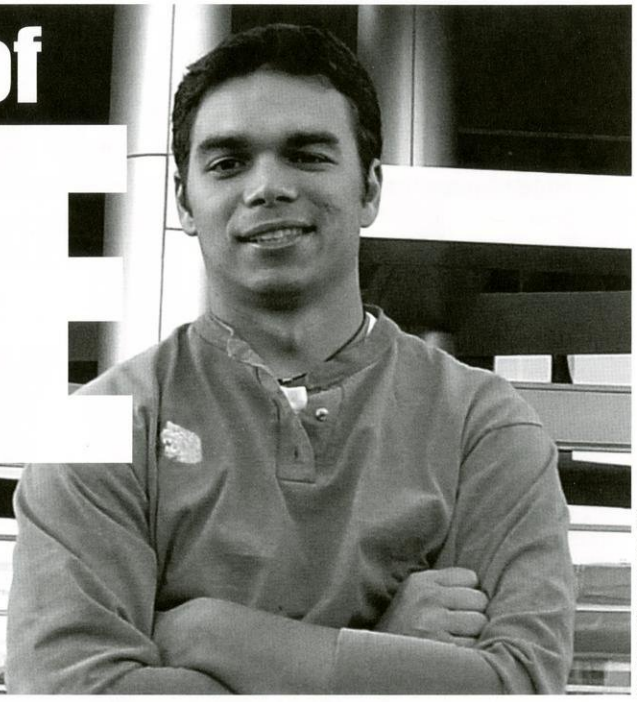


Photo by Khawaja Daniyal

By Nick O'Brien

On a warm night at the Rathskeller, the melody of an old Peter Frampton song softens the mood of the evening. Conversations rustle like autumn leaves. A stout young man enters the room, his face beaming.

The young man is Chandler Nault, a fifth year senior and head chair of the American Society of Mechanical Engineers at UW-Madison. He drinks tea and excitedly talks about the wide variety of events and accolades associated with AMSE.

Nault, who has been a chair board member since he arrived on campus his sophomore year, says chairs start the meeting by talking about the business ASME has at hand. The second half of the gathering is designated for a company speaker. An invited company representative who talks about a company and what it does.

Nault says he likes to have some kind of entertainment before hearing the guest speaker.

"Last week the theme was 'Save a Horse-Ride an Engineer'," Nault says as he sips on his tea. "We had the girls find a male engineer and lasso them."

That meeting's guest speaker, a global manager of manufacturing from Halliburton, didn't participate in the horseback riding, but complimented Nault for keeping the gathering exciting and entertaining.

"[The Halliburton guy] said this was the biggest ASME he had been to, as well as the most fun [one]," Nault says.

Nault knows how to keep a meeting exciting and how to keep people motivated. The Minnesota native was a born leader in high school where he led Bloomington to its first Minnesota Lacrosse State Championship as the captain of the team. After the state tournament, Nault was asked to join the Minnesota high school team and compete at the national tournament in Vail, Colo. At that tournament, Iowa State University recruited him and gave him a lacrosse club team scholarship. He stayed at Iowa State University for one year before transferring to UW-Madison.

Nault says he chose UW-Madison over other schools because students here study a lot and still "rocked hard on the weekends." "This is the most enthusiastic place I've ever been to," Nault says, adding he also liked that people can be themselves.

In addition to being in the mechanical engineering department and ASME, Nault juggles a membership in the Sigma Phi Epsilon fraternity and work. During a typical week, Nault spends about 10 hours working on ASME issues.

"One Thursday I spent all night creating a budget," Nault says. "It was a blast!"
He works for SUB- Zero, a local refrigerator manufacturer. There, he had a co-op for nine months.

"I enjoyed what I was doing so much [that] I asked if I could stay. A couple days later they gave me a job," Nault says.

He also recalled one of his first jobs.

"[I] was a weight, age, month born guesser at the Valley Fair," Nault says and smiles as he continues. "I used to always tell these middle aged women that I thought they were nineteen. They absolutely loved it."

After graduation he hopes to get involved in an engineering development program. Nault says it would be an ideal way to incorporate engineering skills in the business realm.

"This [UW] is the most enthusiastic place I've ever been to" -Chandler Nault

For now, Nault is happy living in Madison and being part of ASME. He hopes ASME is not only a place to network, but a place where engineers can build confidence.
"Engineers just have to take some more risks with communication," Nault says. "They have to fall on their faces, make notes and improve."

Author Bio: Nick O'Brien is a sophomore double majoring in theatre and chemical engineering. This is his second semester with the *Wisconsin Engineer*.

Racing to success

Photo by Professor Peter Bosscher

By Michael Verner

Don't tell Tony Soprano, but UW-Madison's student engineers made concrete float! Not only that--0they converted a standard SUV into an environmentally friendly truck. In fact, these busy Badgers did both these things better than any other school in the country.

Linda Vanevenhoven, Jaime Kurten and the rest of the "Concrete Canoe" team brought home their second national title in as many years.

"Rock Solid" the name of UW-Madison's 2004 canoe, was a huge undertaking. The team started by drawing the layout of the canoe using a computer-aided design program. They sent this out to a private company last December who helped them produce the mold. In January the concrete was placed on the mold, at which point the team had to wait 28 days for it to cure. Afterwards, the team sanded the canoe down, to get it in final racing form. While this may seem like a rather simple process, don't let it fool you. The team members put in an incredible amount of work.

"The co-chairs were caught sleeping in the lab several times last year," Vanevenhoven recalls. The core members would spend upwards of 80 hours per week between the months of April and June readying the canoe for its final competition. The four paddlers also practiced close to 15 hours per week.

Photo by Professor Peter Bosscher

The paddlers and co-chairs at the 2004 national concrete canoe competition. From left to right: Linda, Amy, Preston, Shannon, Dave, Arick.

After all the preparation, the team was able to triumph at nationals. There they had to compete in several different events, which were all added up in a point system. The most visible of these were the races, five of them in all. In all, UW-Madison finished no lower then 4th place including a victory for Vanevenhoven and fellow paddler Amy Roth in the women's sprint. The races, however, only made up one quarter of the total competition.

"Rock Solid" was also judged on its aesthetics. The team had to present a cross section of the canoe to the judges, as well as prove that it could still float even when completely submerged. The rest of the points came from a paper the team had submitted before the competition, which included information on UW-Madison, the year's planning, design drawings and a list of all materials used, as well as a five minute oral presentation.

The Concrete Canoe team was not the only "engineering group" to be successful this past spring. The Future Truck team also enjoyed its third consecutive national title, easily fending off runner-up Penn State. Last year's team leader, Katie Orgish (class of 2004), made sure that everything was completed.

"It felt like I was responsible for everything and nothing," Orgish said. As team leader she needed to make sure that the team met its goals for competition. Those included designing a Ford Explorer with lower emissions ratings and better gas mileage while still exceeding consumer demands. These might include things like the vehicle's off-road capability, seating capacity and towing limit.

The car was then tested at Ford's Michigan Proving Ground in mid June. The eight days of competition included maneuvering through an off-road course, towing a 2000 lb trailer over fifteen miles of hills and improving acceleration time. While going through all these demanding tasks, the student engineers measured both gas mileage and tailpipe emissions. UW-Madison came out on top in both of these important categories.

"The competition has really spanned over the past 5 years," Orgish explained, "with the first two years spent working on a GMC Suburban, and the last three on a Ford Explorer." During the first year of the Explorer conversion the team had to complete major overhauls, such as swapping the motor for a hybrid engine and replacing parts of the frame with lighter weight materials. The past two years the team made more minor adjustments to their truck to ensure they kept a leg up on the competition.

"The last couple years the competition was a little closer," added Orgish. "Everybody on the team puts in a lot of work to make sure we stay ahead."

How much work? Comparable with the amount that the Concrete Canoe team was putting in. Members of the team would spend over 40 hours a week in the garage during the school year. Some of the core group members would be in the garage all night or all weekend and, as Orgish remembers, "would sleep outside the vending machines on the carpet."

The dedication and time put in by the members on both of these teams show what it takes to win a national title. While football and basketball athletes get most of the recognition on campus, these budding engineers also represent UW-Madison at the national level. It's their hard work and academic skill that keep us on top of America's premier engineering universities.

Author Bio: Michael Verner is a sophomore in electrical engineering from Eugene, Oregon. He enjoys running and is currently the assistant coach for the Edgewood High School cross country team.

Knee Deep

UW-Madison fishes for a new water-management plan

By Amanda Austreng

It's raining, it's pouring, but the old man isn't snoring--he's fishing in the backyard.

This may not be the case on the shores of Lake Mendota yet, but local research groups are taking measures that will hopefully prevent the possibility of flooding.

Madison's Lake Mendota covers 9,842 acres and is surrounded by two different environments. The northern half is relatively undeveloped, consisting mainly of farmland. A sprawling metropolis surrounds the southern half. It is here that the issue of water management of Lake Mendota developed.

Lake Mendota has experienced two serious floods in the last ten years. If the rate of urbanization continues and the campus keeps using conventional draining methods, severe flooding may happen more frequently. The lake naturally recedes at less than 0.1 foot per day through evaporation. With the campus constantly draining water into the lake, nature's cycle can not control the increase in the water level.

Research teams from UW-Madison, led by professor of civil and environmental engineering Ken Potter, have spent the last year scrutinizing a proposed policy to improve storm water management on campus. Much of the campus' 933 acres are covered by solid, man-made surfaces ranging from concrete sidewalks and asphalt roads to recently assembled stone buildings. These obstructions cover natural surfaces and do not allow rainwater to penetrate the

Photo by Aaron Arnold

The UW School of Pharmacy and walkway boardering a drainage pond on western campus.

Photo by Alex Long

All excess water from storms in developed areas around lakes Mendota and Monona drains directly into the lakes.

ground. As a result, the campus drains water into the lake.

"We are most concerned with the excess water being created by impervious surfaces and not being dealt with," says Potter.

Presently, there is one detention pond located on the west side of campus near the pharmaceutical buildings. Runoff water is collected in the pond and naturally seeps into the land. Detention ponds are easy to build. However, they only control the rate of the water drainage and not the amount. Continuing urbanization causes more water to be left as runoff.

We are most concerned with the excess water being created by impervious surfaces and not being dealt with

Detention ponds are not the most effective way to deal with the water level, especially when the amount of permeable area is steadily decreasing. Draining water into the lake is considered the most efficient method for managing the water at this time.

Potter's research teams proposed to campus officials to begin using porous concrete and asphalt to replace the materials currently used. This would bring the campus back toward the condition it was in before it was developed and remove some pressure from Lake Mendota.

Potter's teams considered many other options for drainage control in addition to detention ponds and permeable asphalt. Constructing so-called rain gardens throughout campus is the most promising and cost effective suggestion.

A rain-garden is a depression in the land where the soil is excavated, filled with a layer of crushed gravel and covered by a garden. The gravel allows water to gradually soak into the ground instead of saturating it and causing large puddles. This approach also reduces the loss of water to evaporation, recharging the groundwater for future use.

Potter believes the university is taking a positive leap by pursuing an active interest in this problem and possible solutions.

"That is an important commitment because there are not many universities that would do that," Potter says. "We may be the only one in the country to make that kind of commitment. It is a symbolic value because when the university does it, it sets an example for Madison and everywhere else."

As time goes on, the rain is going to continue to pour and need somewhere to go. The old man can snooze for now. UW-Madison has it under control. We

Author Bio: Amanda Austreng is a first-year student from Weyauwega, Wisconsin and is majoring in chemical engineering.

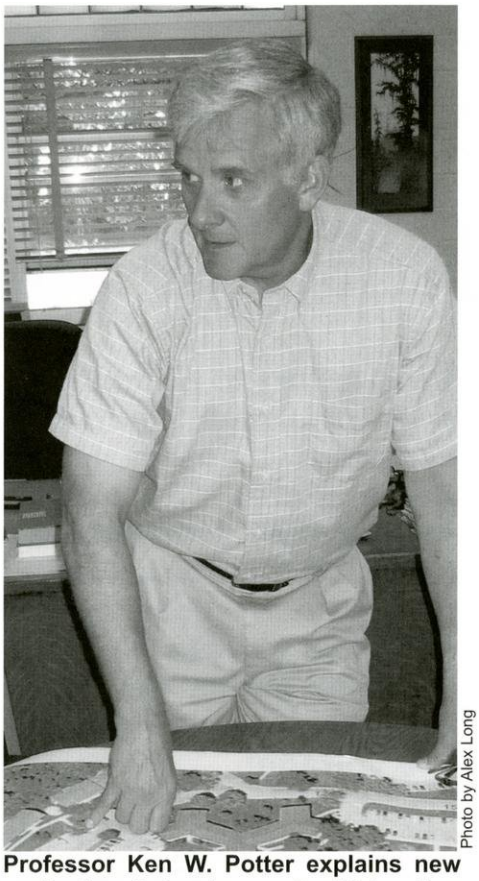


Photo by Alex Long

Professor Ken W. Potter explains new methods of development which allow stormwater to soak back into the ground in urban areas.

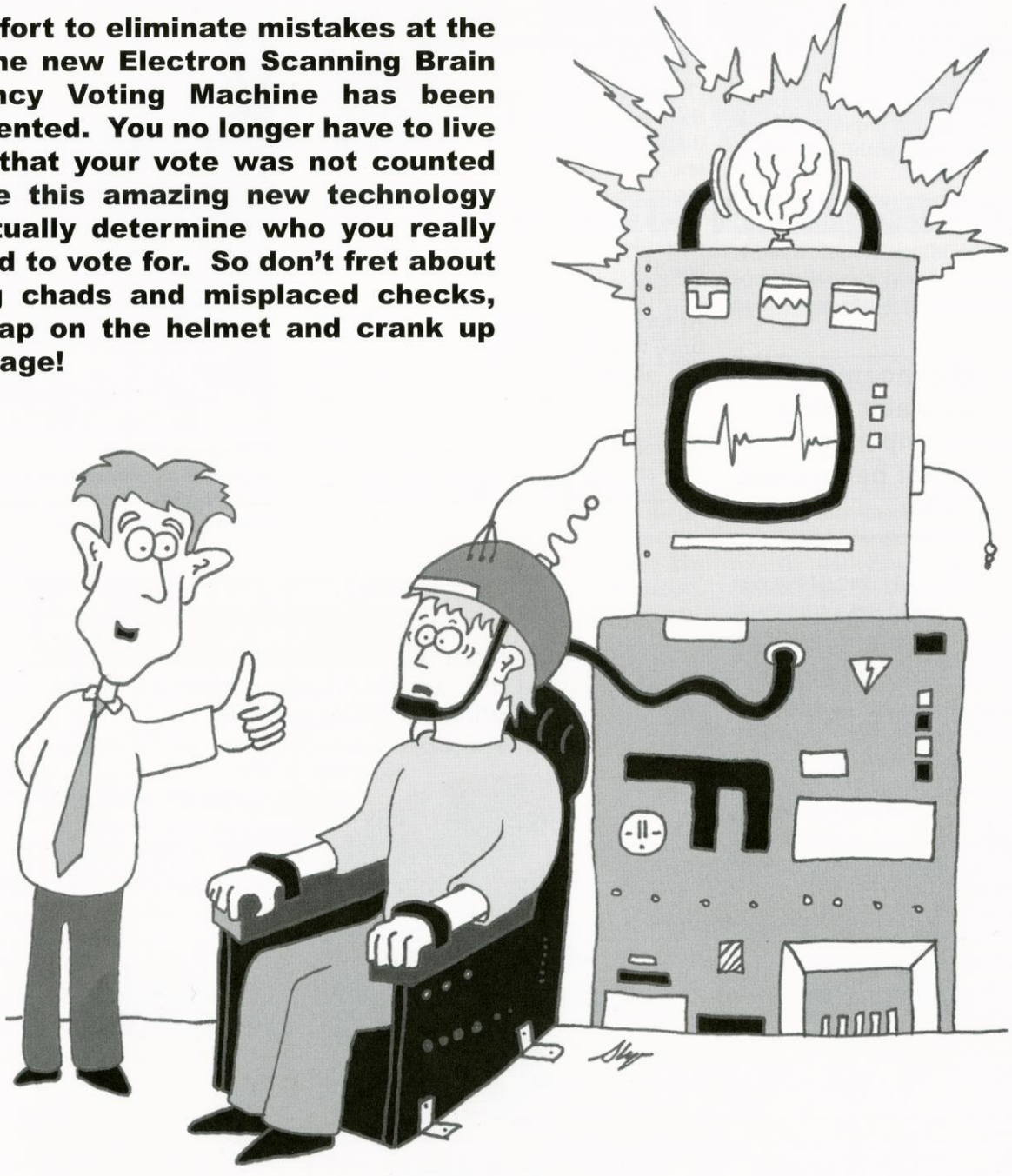
Just One More

The Finest in Eclectic Humor

By Skye McAllister

New Voting Technology

In an effort to eliminate mistakes at the polls, the new Electron Scanning Brain Frequency Voting Machine has been implemented. You no longer have to live in fear that your vote was not counted because this amazing new technology can actually determine who you really intended to vote for. So don't fret about hanging chads and misplaced checks, just strap on the helmet and crank up the voltage!



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