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wisconsin engineer

FEBRUARY 2011 VOLUME 115, NUMBER 2

Engineering Student Athletes

p. 12

Also inside:

wisconsin engineer

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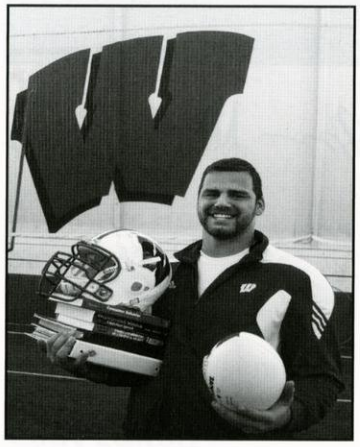
General



Cover photo by:
Alyssa George

Commentary

Letter from the editors

I recall, once upon a time, being a freshman at UW-Madison. It was almost like entering Disney World for the first time. "Where do I start?" I thought.

That first year I took on a job at the UW Foundation Telefund. It was great because not only was I paid for calling alumni and eating Ian's pizza, but I was also able to meet a lot of people my age.

In that year of working at the Telefund, my greatest calling success was with College of Engineering alumni. They were so interesting to talk to, especially since I was gravitating towards majoring in engineering. When the alumni on the other end of the line found this out, they shared their tips and recommendations for surviving in engineering. It was a lot like our bucket list story on page 20.

The main take away message is, as Mark Twain once said: Never let your schooling interfere with your education.

Your professors will probably tell you otherwise. That's their job. And I get it. Class work is necessary. But, speaking from experience, it is what you do outside the classroom that will really develop your character.

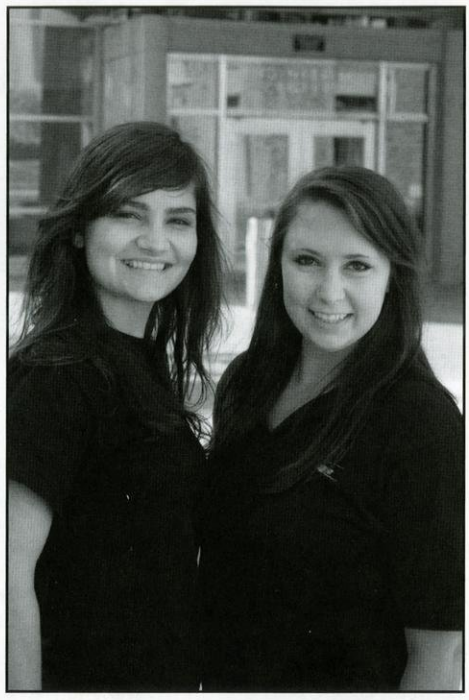
In my fifth year of college, I am a nearly graduated chemical engineer who is editor-in-chief of a magazine, opinion writer for a newspaper, bartender on the weekends, undergraduate engineering researcher on the weekdays, all while training for my first marathon and participating in Innovation Days (see page 8 to learn more about the competition). If you think this is excessive, you should have seen me as an underclassman. And I know plenty of engineering majors who do just as much.

It is not this magazine's goal to push people to get involved in so many extracurriculars that their class work gets neglected. We are just trying to prove a point that, even in engineering, it is very possible to balance your studies with your other interests. You can work. You can still have friends. You can still have a life.

Yes, it may make life a bit more challenging. As a result of a busy schedule, excelling in class may take more work. My many involvements on top of school have not come without struggle, lack of sleep and gray hairs. It was sometimes so hard to find classmates to do homework with in my minimal free hours that I had to settle for doing it on my own. This made things significantly more difficult. And I admittedly did not receive as high of GPA as I would have liked.

Now, in my last semester, with finally some time to breathe and reflect, I think I can better evaluate this decision. And I think it was well worth it. As our engineering student athletes say on page 12, if you enjoy what you do, it won't seem like work. If you only love class work, rock that. But if there are other things you would like to experience – these undergraduate college years are the time to do it. We

By Victoria Yakovleva



COLLEGE OF ENGINEERING
UNIVERSITY OF WISCONSIN-MADISON

THE UNIVERSITY of WISCONSIN MADISON

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gone with the wind

The only one of its kind, a new course on wind energy production and design has taken off at UW-Madison.

Professor James Tinjum's creation, "Wind Energy Site Design and Construction" – cross-listed as Geological Engineering 401 and Civil and Environmental Engineering 639 – was first taught last fall. The course aims to teach students about the science behind wind energy and the design and building of wind energy sites, commonly called "wind farms."

"We discuss scientific principles behind energy and wind," Tinjum says. "How wind turbines collect energy and convert it to electrical power, and we teach the design of those processes."

Tinjum originally developed the course to educate practicing engineers about wind energy and turbines. However, he soon found students also held significant interest in the topic and began the long process of molding a class from the material. After receiving a grant from the U.S. Department of Energy, Tinjum began the time-intensive task of writing lectures, making PowerPoint

slides, drafting homework assignments and tests, selecting reading materials and talking with experts in the field.

"It's a labor of love," Tinjum says. "But it's very time intensive to create a first-of-its-kind course."

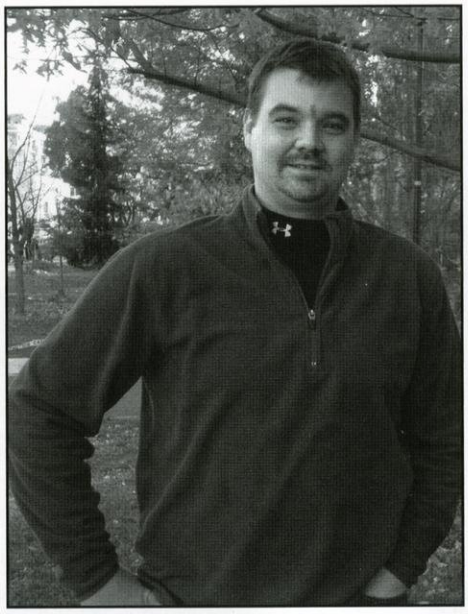
The time and effort Tinjum puts into the course reflects an educational devotion to provide the most up to date and realistic information possible. This might include, for example, researching new turbine technology or visiting sites in development to see the newest construction practices. Along this line of presenting a real-world look at the production process, the course also includes trips to some of the six major wind energy sites in Wisconsin to further teach students about wind farms and to show the tangible results of design.

"Students can really see how the subject matter gets put into real life."

-Andrew Keene

Last semester, 36 students, including ten graduate students and three practicing engineers, were enrolled in the course. The majority of the students were geological and civil engineering students, though nuclear engineers, engineering mechanics and mechanical engineering students were also represented. The only perquisite for the course is a junior standing, though Tinjum recommends experience in soil mechanics.

Civil engineering student Andrew Keene, who took the course last semester, says it was a great experience that provided a unique and realistic look at wind energy. He says students in the course "really see how subject matter gets put into real life." The biggest downside, he says, was the class' relatively late hours – from 4:45 to 6:00 p.m. – that allowed practicing engineers to attend after they finish work.



Professor Jim Tinjum, creator of the new Engineering course, CEE 639, entitled "Wind Energy Site Design and Construction"

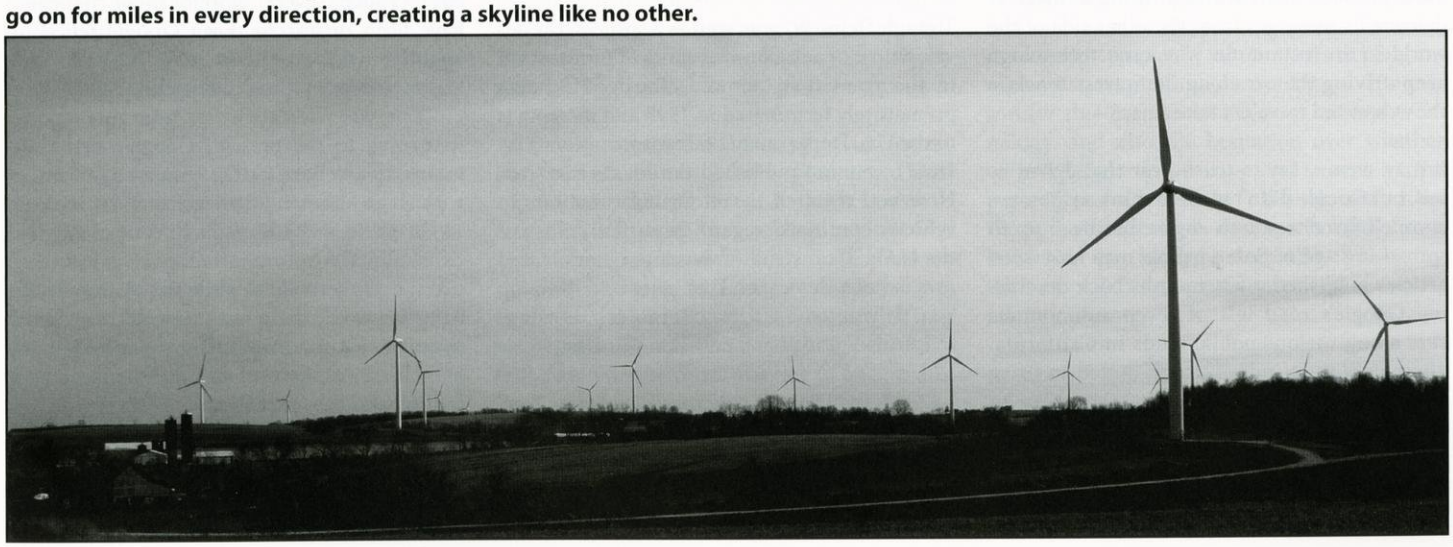
As for the future of the course, Tinjum sees it becoming a regular course within the college of engineering offered once per year. The frequency of the offering, though, will depend on interest in wind energy, as well as sustained government support. Wind energy is now supported by tax credits and cash grants as with other renewable energy technologies.

Wind energy currently provides 2 percent of the United States' total electrical energy, but that number is rising fast. From 1999 to 2009, energy collected from wind increased 14 times. Wind energy is becoming more favorable due to its many advantages: it takes only three years from inception to collection to build a wind energy site. It is one of two energy sources that does not use water. It emits no contaminants or greenhouse gases after installation. Lastly, an average turbine under normal conditions can power up to 500 homes. For these reasons and more, Tinjum sees education about wind energy as necessary for a more sustainable America.

"I teach what I believe," Tinjum says.

Article by: Andrew Golden
Design by: Evan Owens
Photography by: Sara Karraker

The horizon of the Butler Ridge Wind farm located in Dodge County, Wisconsin. In some locations it may seem as though the wind turbines go on for miles in every direction, creating a skyline like no other.



LOOK MA! NO HANDS!

Successful testing of autonomous cars on public roads offers a glimpse at the future of transportation.

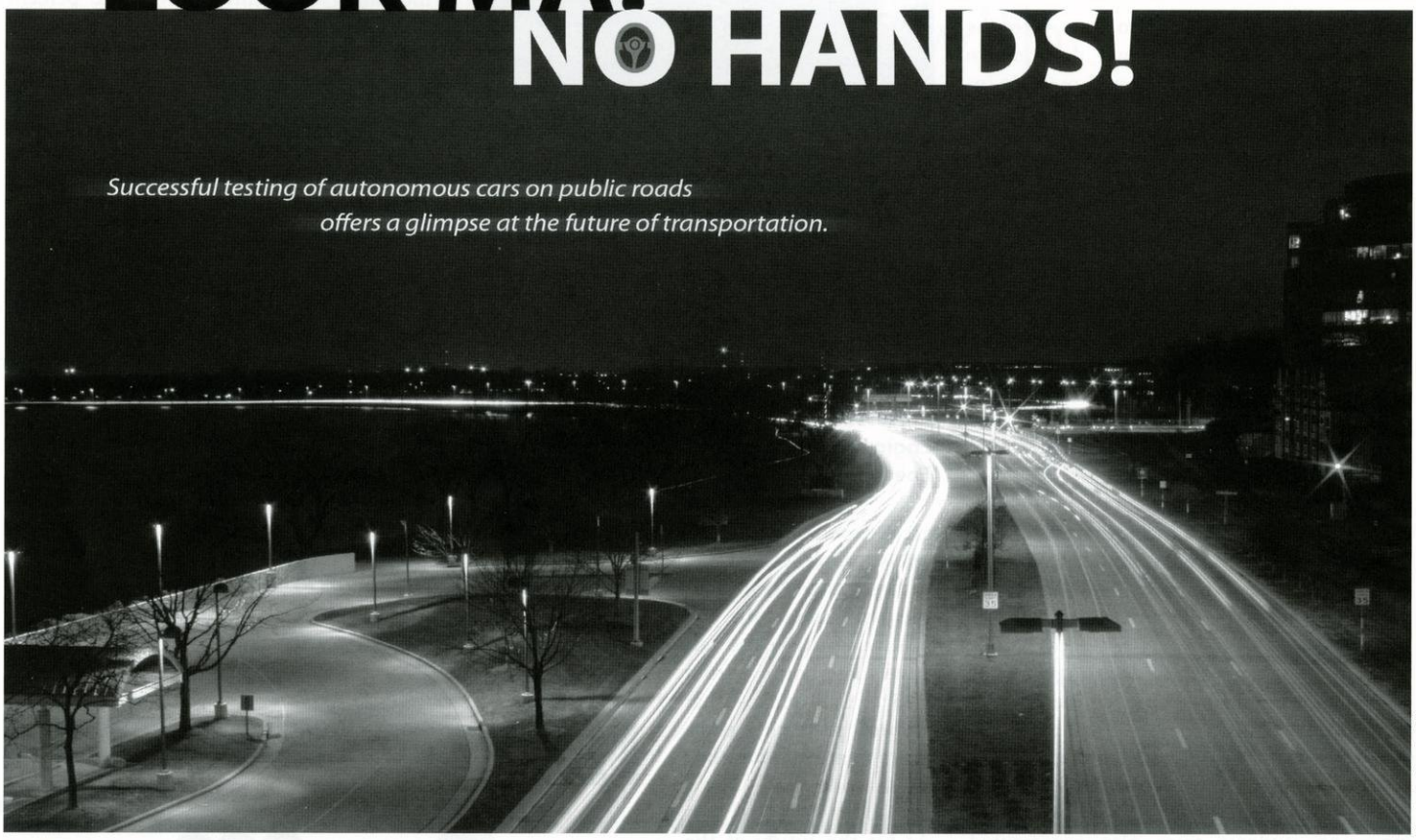


Photo by Travis Zehren

Can you relate to the argument about whose turn it is to drive on the road trip? Ever resented the errands your mom made you run the moment you thought you had some free time at home? Let's face it, driving can be a real pain sometimes. Wouldn't it be great if we could let our cars do the driving when we don't want to? Technology allows us to mass produce items without lifting a finger. It delivers us messages from the other side of the world in an instant. So why can't technology keep driving the car along the interstate while the exhausted travelers take a nap?

It may seem crazy to trust a car that drives itself, but Google didn't seem to think so. Yes, everyone's favorite search engine has been up to something again. Some people may have seen articles published a few months back describing Google's road test of seven autonomous cars along various public roads in California. These cars were indeed programmed to drive and navigate themselves along the route to their destinations.

Google's much hyped test drive was, in fact, just another in a long line of experiments involving autonomous cars. In August of 1997, the U.S. National Automated Highway System Consortium (NAHSC) organized a demonstration of feasible automated driving. The event, labeled Demo '97, was organized on a specially modified 7.6-mile stretch of Highway I-15 near San Diego, California. Guests were also invited to ride in live vehicle demonstrations.

Though Demo '97 was seen as a success, the development of autonomous cars lost momentum in the years that followed. The NAHSC was prematurely terminated in 1998 and its reports to the U.S. Department of Transportation (USDOT) were not published until a decade later. However, research in automated functions in vehicles continued regardless of the failure of the NAHSC. Instead of developing automated cars wholesale, carmakers chose to develop 'partially automated' functions such as adaptive cruise control and collision warning.

In 2007, the Defense Advanced Research Projects Agency (DARPA) picked up where the USDOT left off by sponsoring an automated car race. The DARPA Grand Challenge, as it came to be called, was aimed at demonstrating the driving capability of autonomous vehicles that were surrounded by traffic and other obstacles. Though the technology on show was impressive, the race highlighted the failings in automated driving. Several of the vehicles involved ended up in collisions or near collisions. All the same, the project served to strengthen development in automated driving technology. As such, several more of these challenges have been organized. Even Google relied on engineers with experience in the DARPA Challenges to develop their own technology.

Returning to the present, Google's seven automated cars have clocked up to 1,000 miles without any human intervention and more than 140,000 miles with humans in control only occasionally. The only reported accident was when one car was rear ended while stopped at a traffic light. However, these tests were all carried out in controlled conditions. Google never left any of their cars unmanned and always mapped out routes before testing their cars on them.

Controlled environment or not, a lot of high tech modifications had to be made to allow these cars to drive on their own. The most

striking of these is a large sensor mounted on the roof known as Lidar, or Light Detection and Ranging. It provides a continuously updated three-dimensional map of the car's surroundings. The device maps everything within 230 feet of the car at centimeter accuracy. The Lidar works in tandem with several radar sensors and cameras positioned along the periphery of the vehicle and relays information to the navigation computer. The computer has been programmed to recognize common markers on roads such as traffic lights, crosswalks and street signs, and is capable of reacting appropriately. Using this and an onboard GPS, the Google cars are capable of driving themselves from a starting point to the destination.

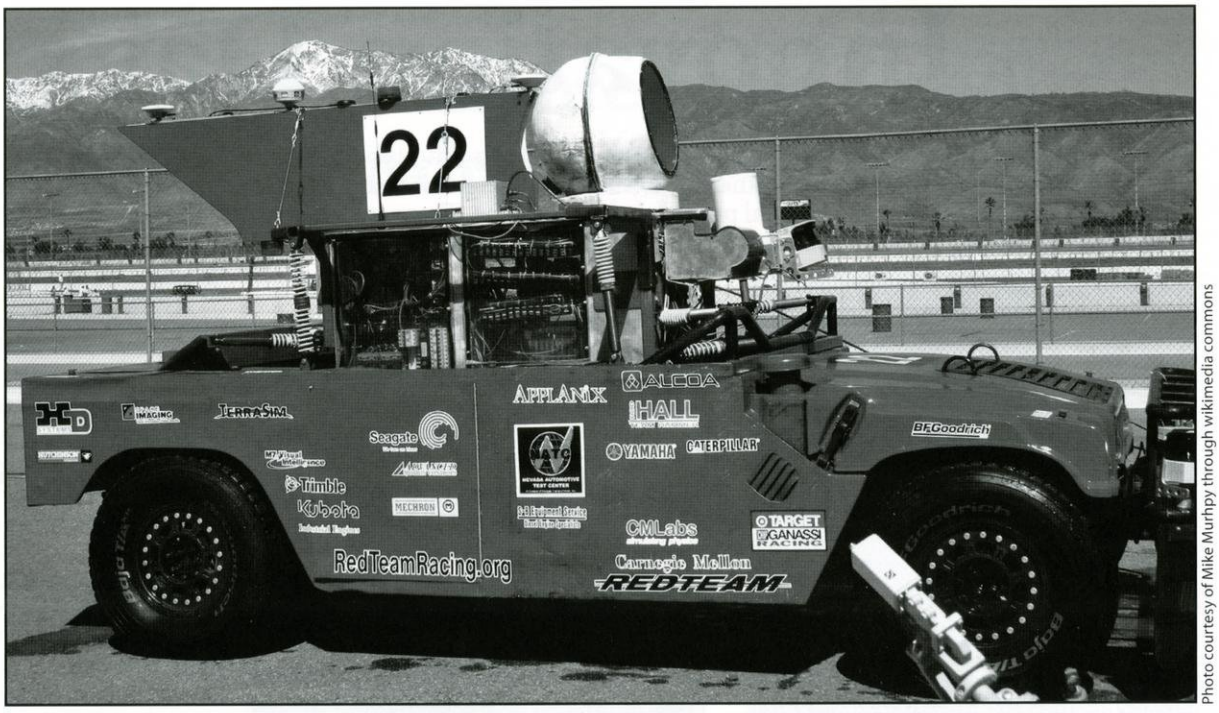


Photo courtesy of Mike Murhpy through wikimedia commons

For the last few years, vehicles like the one above have competed in the DARPA Grand Challenge, a competition testing the limits of driverless technology.

While the vehicles' sensor and computer program setup may be mindboggling, they are still far from fully autonomous. Remember how Google had to map out routes before they tested their cars on them? Because the surroundings of the road are constantly changing, each route has to be re-mapped each time a car drives on it. If you wanted one of these cars to take you to class or work, you would need someone to map the route every single day! Even then, the car's driving is nowhere near fool-proof. At this moment, Google still faces an uphill battle in programming the computer to recognize hand signals from traffic police and crossing guards. This and the overall unpredictability of driving on the roads makes fully autonomous driving a distant goal for most scientists and engineers.

Autonomous cars may be a long way away but automation is becoming an increasingly large part of everyday driving. Bin Ran, professor of civil engineering and Director of UW-Madison's Intelligent Transport Systems Program, says, "The major car companies are going in the same direction [as Google] but at a slower pace because they are making cars to sell. In the near future, vehicle automation will at least be partial. Now we have cruise control and adaptive cruise control where we can take our feet off the accelerator pedal. Adaptive cruise control should improve [to the extent] where we can take our feet and hands off sometimes but not all the time."

Ran also highlights three types of development in automated vehicles: safety, intelligent driving and informed navigation. Safety refers to vehicle safety and roadway safety. These functions, including smart airbags and automatic crash detection, are already being seen in some newer cars. On the other hand, intelligent driving is essentially the navigation of the vehicle and its communication with the vehicles around it. IntelliDrive, a USDOT sponsored initiative, has been conducting extensive research in these aspects. The third form of development, informed navigation, helps your vehicle drive more intelligently. "It is about how you avoid congestion and how you can minimize it. I think it is in this area in which [research at UW-Madison] is doing very well," Ran says. These three forms of development are slowly manifesting themselves into modern cars.

Automation may make driving easier for us, but it can also be a frightening prospect to trust a machine with our lives. As John Lee, professor of industrial and systems engineering, says, "Perceived control has a huge effect on the perceived risk, so if you are in control you tend to see a lot less risk in something. If you get periodic reports of cars crashing because of failed automation (even at a rate of one per billion), people will perceive that as terribly risky and reject the technology." This being the case, most car companies have to take driver mentality into account when implementing automated systems in motor vehicles. An example of this would be the use of collision warning systems, which detect possible collisions but only alert the driver instead of automatically responding. Recent developments give these systems more control over the car without compromising the driver's perceived control. As Lee says, "There is a particularly interesting system which detects panic situations by measuring how quickly you move your foot from the accelerator and uses that signal to push the brake down. So if you push the brake down hard but not as hard as you could, [the system] will push it all the way down thereby giving you more braking power." In this case, automation serves to aid human response to panic situations instead of just taking full control of the vehicle.

As automation plays a greater role in modern cars, we can fully expect driving to be an easier and safer task in the years to come. However, the idea of completely autonomous driving remains a concept of the distant future. The reason for this is the limitations of current technology, and also the hesitation over whether or not people would trust and accept it. The passengers on a lengthy road-trip may have the opportunity to get some much needed rest, but would they really be sleeping well knowing their car was in complete control? WE

Article by: Doraisingam Tamilwanan
Design by: Akhilesh Dakinedi

Innovation Days:

The winners of last year's Schoofs Prize for Creativity and Tong Prototype competitions discuss their designs. Innovation Day is an event that allows undergraduate students to submit an original idea or creation. The requirements are strict and students must have a well-prepared and technical proposal and prototype. There are two awards: The Schoofs Prize for Creativity and the Tong Prototype Prize. The first awards the idea and the self-conducted research. The second awards the prototype, a prepared model of the invention.

Apple Crisp, Deliberation, Piece of Cake!

First place winners of the Schoofs Prize for Creativity and second place winners of the Tong Prototype Prize: Fiancés Tom Gerold and Kara Andersen invented the Automated Pest Elimination System (APEL), an automated, self-contained system to spray fruit trees while minimizing pesticide overspraying. Gerold speaks to us about the experience.

So the basis for this invention was really a family affair?

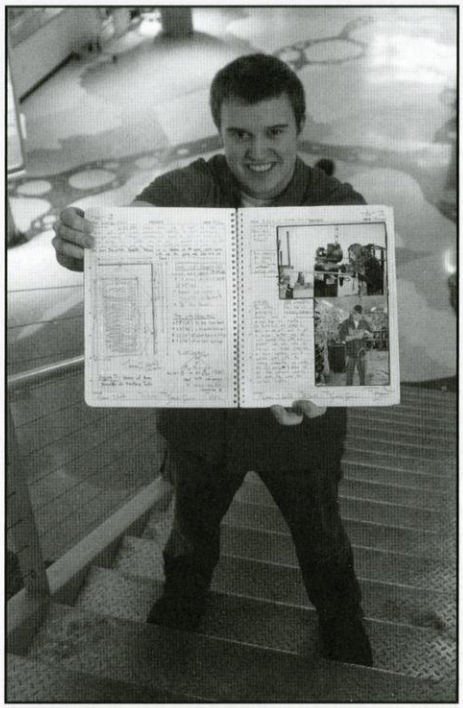
We came up with the idea when we went home for Thanksgiving. We were sitting around Kara's parents' dinner table eating homemade apple crisp, and we got to talking about the previous season's apple harvest. Both of our parents have a few apple trees, and they expressed disdain over their failure to keep a really strict spraying schedule. They sprayed regularly, but after rains and a few forgotten days before a spray, pests had already claimed a lot of the fruit.

Was the idea clear immediately?

No, we didn't get our exact idea at that moment. We just had a problem that we thought mattered to some people. After tons of thinking we came up with our final design. It was a work in progress the entire time, even when building the prototype! That is how innovations prosper, though: the best usually start out as a simple problem in search of a solution. Only after careful critical thinking and design does a valid invention pop out of the fray.

Yes, that is really helpful. The initial problem has to be a valid issue. So how did you build on finding a solution?

In building our prototype, we spent a lot of hours in Kara's dad's chilly garage (in January) tinkering with pumps, nozzles and piping trying to get the correct flow rates and pressures. Before we ever set foot in the workshop, however, I spent a lot of time flushing my first potential design out on paper. I found that this saved us a ton of time in the shop. I designed almost every aspect on paper, but in the real engineering world, specifically calculated components rarely ever exist that can be made for cheap. I calculated that we wanted around 35 psi out of our pump, but we couldn't find an affordable 35 psi pump, so we had to go with a 40 psi pump.



Tom Gerold shows off his winning design notebook.

What about presenting the idea for the competition. Did you focus on a polished presentation or was the strength of your design enough?

We prepared a lot for the actual competition day. We practiced our presentation for several nights until 2 or 3 a.m., just because we wanted to have it down and to show the judges that we meant business! We also crafted our presentation around information we thought the judges would want to hear. We invested a significant amount of time into the written disclosure to the judges—it was about 12 pages long! We edited the drafts very carefully, and spent time making sure everything was in a logical order and that it had the correct flow.

"I think this was not luck, but actually the consequence of our careful planning and my meticulous design beforehand."

-Tom Gerold

Well, it obviously paid off. But, how did you feel during the competition with such an investment?

We were both very nervous about the competition day, but once it came we found it to be exciting. It was still nerve-wracking to get up in front of people you have never met before and pitch your idea, but I was confident enough in our invention and my knowledge of the subject to not be too shaken up. After we gave our presentation, the rest was a piece of cake! We did get nervous during the awards ceremony, but it was more exciting that scary.

It is exciting that you designed something of such value. Do you feel you deserved to win?

Seeing the other people's 25 stands and speeches, I feel confident in saying that we worked at least as hard as anyone else. I actually feel that we did the most work out of any entry, from talking to others about how much time they spent on their projects. Going into the event, I wanted to be taken seriously. We

went in at 115 percent because we were also serious about winning.

Can you explain the moment of actually winning?
Receiving the prize was almost surreal. It was a long-awaited reward after hours and hours of work. We are thankful for the judges acknowledging our achievements the way that they did. That money helped us pay for school, and it is helping pay for the patenting process on the invention as well!

After succeeding like this do you think you can find another sizable problem that needs an innovative solution, and the motivation for an entry next year?
I plan on competing again if I can find the right idea. A lot of the ideas in past competitions seem like something that may be useful to the inventor, but wouldn't really have a market in the real world. I won't enter the competition this year if I can't find something completely original and creative. I have had hundreds of ideas for entries, but none of them completely fit that bill. I feel that this kind of entry is what the judges are looking for, and if I can't find something in that realm then I don't need to even show up. That being said, I am also planning a wedding with Kara, so things may be a bit hectic around that time.

Do you have anything to add, any mistakes made that could help people prepare if they are thinking of taking-on this challenge?
The shocking thing about our preparation is that nothing went drastically wrong. I couldn't believe how smoothly our project went together. We had a few minor issues with the motors I used on the prototype—they were from the 1970s I think—but the problems weren't major. I think this was not luck, but actually the consequence of our careful planning and my meticulous design beforehand. An old woodworking motto is, "Measure twice, cut once," and that totally held true in my case. Careful designs are rewarded with less headaches in manufacturing.

Are there any final thoughts or things you'd like to talk about?
I would just like to add that my experience with the Schoof's/Tong Competition was only positive. I'd like to thank coordinator Alicia Jackson. She is running a really tight ship, and I would just like to show my gratitude for her hard work. WE

Lighten-the-Load, Adrenaline & Success

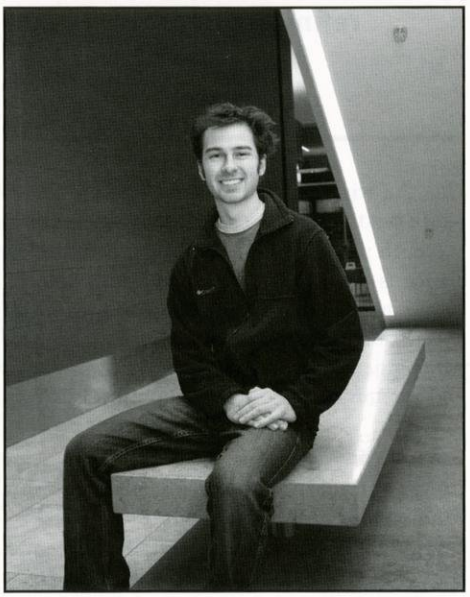
First place winners of the Tong Prototype Prize and second place winners of the Schoofs Prize for Creativity: Nate Cira and Alex Rio created the PolyFormPack, which combines a sleeping pad, backpack, sleeping shelter and chair into a lightweight, waterproof piece of backpacking equipment. Here, Cira talks about the PolyFormPack.

Tell us a little about your team and the project.
Alex Rio, a friend and fellow Evans Scholar, and I worked on designing the PolyformPack, a piece of backpacking equipment that incorporates a one man tent, sleeping pad and camp chair into a device that folds into a backpack and carries other gear. The theme for the device was maximizing functionality while minimizing weight by combining items together where possible.

How did you see the need for this product?
The idea for a backpacking invention was spurred by my passion for backpacking and the outdoors. As an engineer, problems involving efficiency and optimization always interested me, and our invention was an attempt to provide the most useful functions at the lowest weight.

In creating a winning invention, where was the greatest energy needed to make the seed idea a success?
For the competition, the most time was spent prototyping. Alex and I spent many hours making various prototypes of our design, from one-third scale mock-ups made of tape and garbage bags to full scale designs with cheap cloth and cardboard, then the final prototype. We also spent time recording our progress in our design notebooks, writing a document in the style of a U.S. patent and preparing a poster and a presentation for the competition. In total, we each spent over 100 hours preparing and refining our idea.

On the day of the event did the adrenaline kick in?
During the actual presentation day of the event, Alex and I should have felt tired, due to the lack of sleep. We later counted and had each slept only eight total hours in the five days preceding the competition. Instead, we both had a sense of excitement. We were eager to show what we had created and see the inventions of others.



Student-Inventor Nate Cira takes a break from his busy schedule.

Can you illustrate any personal growth or surprises from the demands of successfully inventing something?
In order to put forth an invention we were proud of, Alex and I both pushed ourselves quite hard. Aside from watching several sunrises while working away—Alex behind a sewing machine and me cutting fabric—we both consumed large amounts of coffee and skipped classes to get it all done. Alex became quite the seamstress, and I learned the rudiments of writing in esoteric patent language. In the end, it was down to the wire. We printed our poster the morning of the competition and sewed on the final zippers only hours before the design was due. We also got to know the kind ladies at Jo-Ann Fabrics quite well after they overcame their initial surprise at finding college-aged males in the store. We were asked several times, "What are you doing here?"

How did it feel to actually win?
We were very flattered. While the cash prize motivated us to start thinking about ideas, once we got to competing we realized the biggest rewards were the skills we had developed during the process and the fun we had designing and

building. Going into the award ceremony, we were hoping to win an award of some sort. In the end it was the practicality of our idea combined with the effort we put in developing it that allowed us to receive the awards.

"In total, we each spent over 100 hours preparing and refining our idea."

-Nate Cira

Has the win inspired either of you to enter again next year?

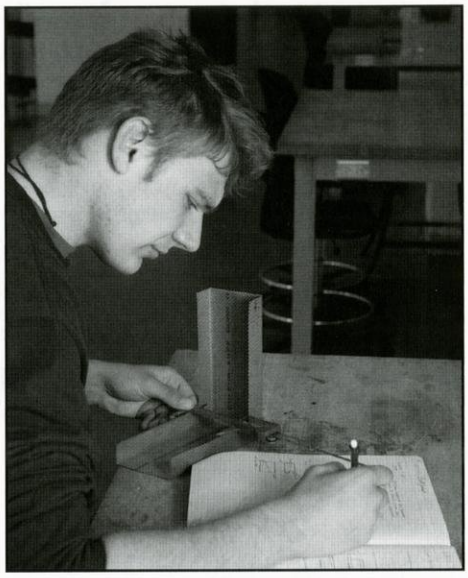
We both plan on competing again. The experience is too good to be passed up. We hope to pursue an invention this year related more specifically to our career interests, biomedical engineering and microfluidics in my case, and chemical engineering and sustainability in Alex's.

I hope you told the ladies you won! Can you offer closing words of wisdom?

I would strongly encourage all students to enter the competition. Your idea does not need to be something of great technological importance. Historically, practical ideas have done the best. Developing your creativity and the ability to determine what products and features a consumer is looking for are essential for a variety of professions. Since these things are not easily learned in a classroom, a design competition is an excellent place to develop them. We

Raising the Bar

Third place Schoofs Creativity Winner: Scott Johanek designed TriCrimp. TriCrimp is a lightweight, pneumatic crimping tool for steel fastening that replaces tedious hand-crimping tools and bulky mechanical crimpers. Johanek discusses:



Scott Johanek sits over his invention, the TriCrimp, a novel steel fastening tool.

Where did this brain wave spring from?

I came up with my idea as I was working on a construction project where I was using steel framing and how much of a hassle it was to use screws every time.

The other contestants mentioned that they had to spend a lot of hours perfecting their projects. Did you find the same thing?

I only spent about a few weeks on preparation, as I did not have much time over the holidays because I was working full time.

What were your feelings at the event?

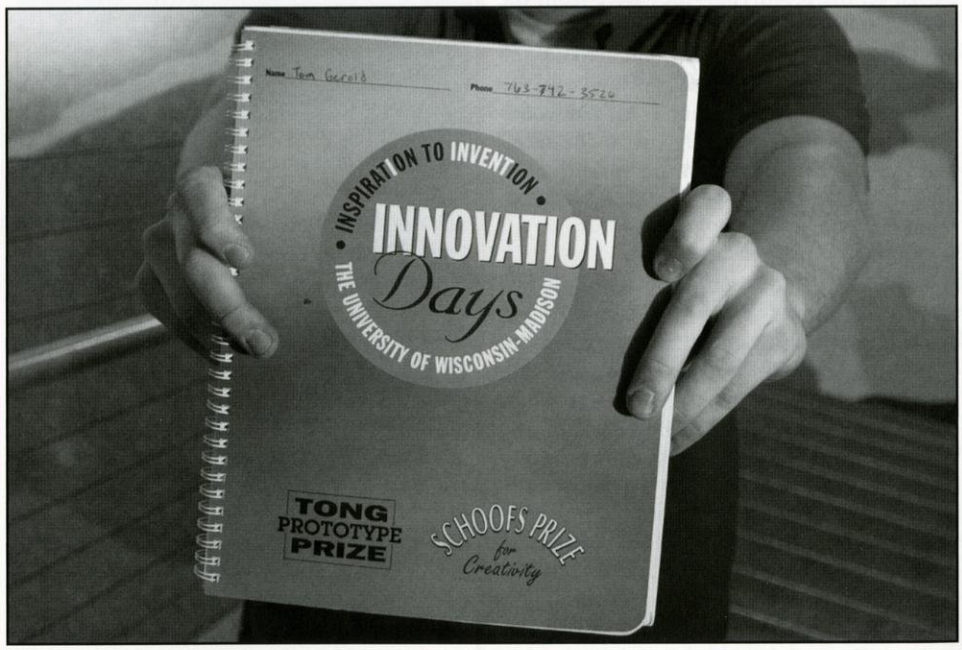
I was very excited during the actual day. I really enjoy events such as the Schoof's Competition. I really enjoy speaking with people about my invention and how I think it can play an integral role in society.

So did you think you might win?

Well, I'm going to have to give you the political answer on this one. It was a very tough competition and many very intelligent people were fighting to get top spots. I felt that I had as good a chance as anyone and that if I was excited about my invention that the judges would get excited too.

This is an exciting innovation! Are you looking to compete again this year?

Absolutely, I am very excited for this year's competition. I hope to be entering two inventions this year and take home the top spot. As I prepared more for the competition I realized that there is a lot more to it than meets the eye. I can't wait for this year's competition, and I hope to set the bar high. We



All participants are required to maintain a design notebook for legal documentation and the patenting process.

Article by: Alexandra Beletic
Design by: Tom Bernath
Photography by: Sean Metcalf

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COMPANY INFORMATION BOOTH

When: February 1, 2011, 11:00 a.m. to 5:00 p.m.
Where: Main Level (SE end of building)

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February 2, 2011
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Interview Rooms
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- Civil Engineering
- Chemical Engineering
- Computer Engineering
- Computer Science
- Construction Engineering
- Construction Management
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering

Engineering student athletes:
get your engineering degree and play your sports too

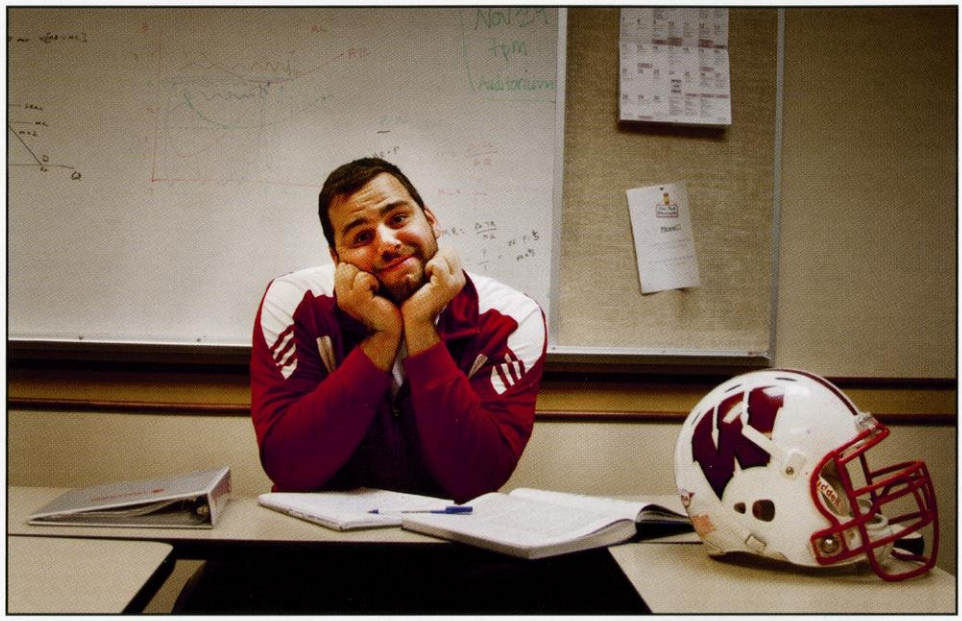
It takes a rare type of person to take on both engineering and Big Ten athletics at UW-Madison.

Whether or not they know what degree they are going to pursue upon arrival at UW-Madison, these student athletes are thrown into a relatively abnormal college life filled with more struggles and higher expectations than most of their classmates, not to mention that the real world awaits them just four or five short years away.

Phil Thomas, a senior member of the cross country team, had no intentions of studying engineering when he was recruited by UW-Madison. Thomas originally wanted to study biology but he "wanted to do something a little more difficult," so he decided to pursue a degree in biological systems engineering.

On the other hand, athletes like Angela Chupa, a junior on the Tennis team who is studying industrial engineering, and Game Carimi, a red shirt senior on the football team who is studying civil engineering, knew exactly what they wanted to do coming into college. Chupa and Carimi knew before even accepting their offer from UW-Madison. "In 7th grade my grandma gave me an engineering book and told me to be an engineer," Carimi says. Rob Korslin, also a civil engineering major and a red shirt junior on the football team, knew engineering was his career choice way back when he was considering his offers from Princeton and UW-Madison his junior year in high school.

The trend seemed to be that all these athletes had a natural knack for math and science and didn't want their sport to hinder their potential of using those skills. UW-Madison seemed to be an easy decision for most of these engineering students as well. "Madison is the best college town in the country—by far" Chupa says. Runners like Thomas always "dreamed about running for this [UW-Madison] team." Carimi says he has been a Badger fan all his life. For all the recruits, having both a top-notch academic institution in addition to the athletic program was important, and the College of Engineering here at UW-Madison was an excellent option for their academic aspirations.



Civil engineer senior Gabe Carimi balances difficult course work and being a top NFL offensive lineman.

Oh, and by the way, these aren't just any student athletes; they are the best of the best—academically and athletically. Thomas and his cross-country team just won the Big Ten Championship this past November. "There's not a much better feeling than that in the world," Thomas says. Chupa was the Sportsmanship's winner for Wisconsin as selected by other coaches in the state and was the teams most improved player in 2009. Carimi was first-team all-Big Ten in 2009 for offensive tackle and was awarded "rookie of the year" his red shirt freshman year. Chupa, Thomas, Carimi and Korslin have all been awarded with Academic All-Big Ten honors multiple times since the start of their collegiate careers.

Most members of the UW-Madison student community understand how much time engineering students dedicate to studying, working on group projects and finishing endless amounts of homework problems. If you add in hours for practice, conditioning and travel, that translates to significantly less time. Some don't even get home until after 8 p.m., and that's after a full day of class, lifting, watching film and practicing with the team. But the awards seem to prove that this limited time schedule doesn't hinder their grades or athleticism.

"I know that I am not going to have that block of time after class when I am at football to get work done so I have to find another time to do it," Korslin says. Thomas spends most of the breaks in his schedule away from home and on the engineering campus to accomplish more. "Using the time you do have efficiently is really important," he says. Carimi adds, "We [engineering students] probably spend the same amount of time studying as other engineering students but instead of me doing whatever I want to do to kill time, I am doing football."

Dealing with a limited schedule and countless assignments is not the end of the world for these student athletes, but it is definitely no walk in the park either. "Balancing academics and athletics is challenging since both aspects are very demanding," Chupa says,."It takes a lot of dedication and a lot of hard work."

"There are some days when it's pretty hectic and you see other people and their schedules aren't as

Industrial engineering junior Angela Chupa squeezes in some courtside studying.

demanding, but in the end you know it will all be worth it," Korslin says.

Carimi says it's pretty simple: "If you have to do school work you do school work. If you have to do football you do football."

To the average engineering student, the expectations of both an engineering degree and Big Ten athletics might seem nearly impossible to meet. However, Carimi brings up a valid point, that it is all [about] what you consider what work is." He claims the extended amount of time that would be required for him to write a paper would not be possible in his schedule. He would rather look at an equation and solve some statics problems. "So really... this major is saving me time," Carimi says smiling.

At this point one might be wondering if these people are super humans, but the fact of the matter is they love what they do—academically and athletically. Chupa says, "I definitely wouldn't be doing this if I didn't love it." For her, "it is all about passion; you got to love what you do, otherwise it's not fun." When asked about giving one (engineering or running) up, Thomas says, "[I] couldn't really forgive myself if I gave one up." Korslin responded similarly, acknowledging that his life is a little crazy but "when you take a step back and look at it, I wouldn't have it any other way."

Being a student athlete is not just a crazy lifestyle, but a gateway to experiencing and learning many different things. "It's only going to benefit me down the road," Chupa says. "I've learned so many things through this experience like leadership, time management, and commitment."

Chupa also notes that the combination of "engineering and tennis have made [her] into a better person, and a tougher person." She says that "the tennis team has taught [her] so much about teamwork and leadership which is very applicable in engineering."

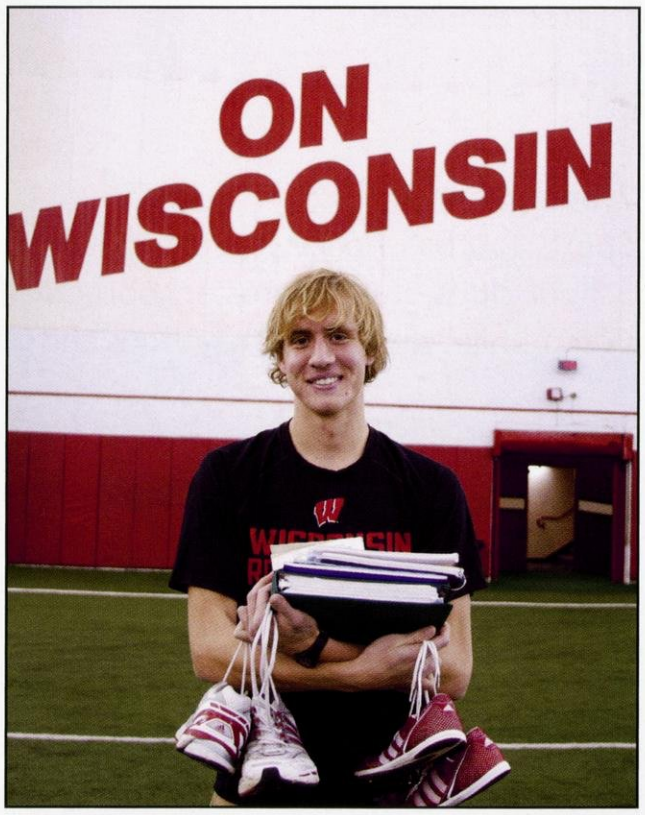
"It's definitely been a learning process," Korslin says. But he has figured it out along the way and has learned a lot about himself and being part of a team. It is evident that the lessons learned on the practice field and in the weight-room are ones that these student-athletes will also be able to apply to their careers in engineering.

A valid statement to keep in mind is that athletes are recruited by UW-Madison to play their sport but more importantly have the opportunity to graduate from a nationally recognized university with a rewarding degree. While some may have the opportunity to pursue their sport at a professional level (Carimi is projected as a top 15 pick in the 2011 NFL Draft), these engineering athletes have realized how amazing of an opportunity they have been given. "I just want to put as much into it as I can right now and not look back and have regrets," Thomas says. "I don't want to look back and have questions about what I could have done it college."

"If you're going to be at a university like this you have the best opportunities and should have the best degree you can walk out of here with," Korslin says. "You have to ensure yourself that you are going to have opportunities outside of athletics."

Undoubtedly, it takes a unique type of person to have both academic and athletic talents, but it seems that these student athletes don't really think anything of it. Engineering is something they chose to study because they excelled in math and science and they knew they could handle the academic rigor. They pursued their athletic talent because it is what they love to do. For these engineering student-athletes it is not a question between studying engineering or playing a Big Ten sport. The decision is simple because there is no decision to be made, these students are Big Ten athletes and the future of our society, and they wouldn't have it any other way.

Article by: Christina Wallhausser
Photography by: Alyssa George



Cross country runner and biological systems engineering senior Phil Thomas makes the most of practice time.

Bucky the Engineer

As cool as everyone thinks Bucky is, there is some "nerdiness" deep down—I mean he does go to a world renowned University so he has to be somewhat smart. Oh, and by "nerdiness" i mean "awesomeness" because, to much of the student body's surprise, Bucky is pursuing a degree in engineering.

Name: Bucky
Major: Industrial Engineering
Year: Sophomore
Hometown: Appleton, WI

"When you leave here you won't look back and say 'remember all that education I got?' No, you're going remember all the fun you had in addition to a getting a great degree."

Insight into the life of "Bucky the Engineer"

- It is best described as "organized chaos"
- His schedule changes every week. He pretty much "lives by the calendar"
- "There are definitely times when I wish I wouldn't have procrastinated."

Fact: This Bucky was awarded "Most Spirited" in high school—along with A's in math and science

Types of events:
Sports: football, hockey, soccer, volleyball
School: clubs, student orgs, school activities
Community: weddings, marathons and walks

Time commitment:

- Ranges from 1-7 events a week
- Sporting events usually take the longest
- On average, an event takes around an hour
- At least 10 hours a week dedicated to events

Practice schedule (please-no stalking):

- Lifting: 6:45 a.m-8:30 a.m
- Conditioning and skit planning: Tuesday nights
- Scheduling meeting: once a month

Advice:
"If it's worth it—keep doing it. I have fun as Bucky and I enjoy engineering so I keep doing it."
"Going to Wisconsin is the best experience –no matter what your major is."

Viruses

How to keep your computers clean

"Congratulations! You have been selected for a free trip for four to Disney World! All you have to do is fill out this simple survey!"

Pages of personal information, your social security number and a Visa card later, you're no closer to Orlando. You are, however, one step closer to identity theft. It happens every day. People click on advertisements and open e-mails in hopes of receiving exciting rewards or prizes. Instead, they receive viruses. Computer hackers have implanted the viruses into these links, allowing them to acquire personal information from users.

But are all viruses such malicious attempts to acquire credit card information or social security numbers? Scott Hahn of UW-Madison's Department of Information Technology (DoIT), says no.

"I once saw a virus designed to simply replace all of the files on a computer with pictures of squids," Hahn says. In fact, there is an entire strain of viruses that are not designed to harm the system they infect at all. Instead, these viruses just use the system to spread themselves to other systems. A person may be sending out the virus thousands of times a day, but since his computer remains unharmed, he does not realize he is doing so. These viruses are called automated viruses and are most often sent through e-mail.

"It used to be that hackers targeted certain individuals, but hackers are now writing automated viruses," Brian Rust, the communications director for DoIT, says. "It's scary because now everyone is at risk."

The newest form of hacking the DoIT helpdesk has seen is called Firesheep. Firesheep allows its users to intercept private data packets from anyone using Firefox on the same wireless network. After intercepting this information, Firesheep users can access other people's Facebook and Twitter accounts. Firesheep is only able to intercept private data packets sent over unencrypted sites, so sites like WiscMail are protected.

Ironically, Firesheep was originally designed to prove a point. Its creator wanted to show how easy it had become to access accounts that many people consider secure. But the program was leaked, and Firesheep is now available to anyone for download. Hahn has a friend who, out of curiosity, downloaded the program while at Memorial Union. Within minutes, he was in someone else's Twitter account.

A program called Fireshepherd has already been created to protect computers against Firesheep. But you can also protect yourself just by using a secure network. DoIT offers software for users to create a Virtual Private Network, or VPN. Those with MyUW accounts can download the WiscVPN to transform their network connection into a secure network. According to the website, "Since wireless networks are notoriously insecure, using VPN can give you another layer of security and protection, particularly when you're sending sensitive information."

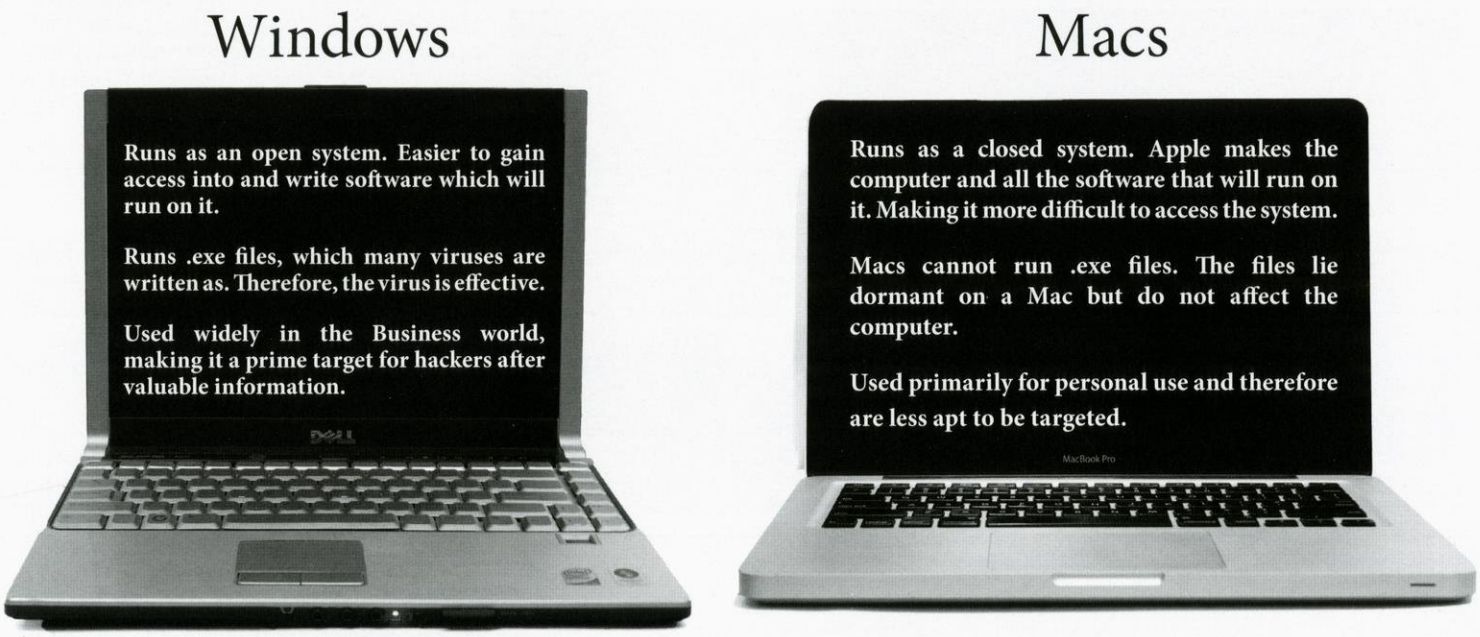
DoIT also provides free Symantec virus protection in their stores, which they recommend for

VIRUS TERMINOLOGY 101

Virus: Software designed to infect, harm or modify a computer system. It can reproduce itself but usually with human assistance, through emails for example.

Malware: Malicious software designed to damage a computer system. It is more easily spread from computer to computer than a virus.

Spyware: Software that lies dormant on your system and tracks your online activity meanwhile spreading through a chain of machines. This chain can be used to obtain personal information.



all students. "What is nice about Symantec is that it will actively prevent viruses from forming," Hahn says. "Other softwares like Spybot will only try to fix a virus that is already present." The download is available for both Windows and Macs, though Macs are less likely to get viruses, largely due to the fact that there are fewer viruses written for Macs.

Another way to protect yourself from potential hackers is to use complex passwords. Including a combination of uppercase and lowercase letters as well as numbers and symbols will make it infinitely harder for a hacker to break in to an account.

"A good password is like the difference between using a skeleton key and a more sophisticated key," Rust says. "The skeleton key is clearly much easier to make a copy of."

An obvious but often overlooked piece of advice is to not store what the computer world calls "sensitive data packets," such as your credit card number or password, in files saved to your computer. Naming a file "Passwords" may seem ridiculous, but some people do it, and hackers take notice.

Hacking is no longer just breaking into a peer's Facebook account; it has grown into a multi-billion dollar industry. There are people who make a living through hacking, but how often are these hackers caught? Unfortunately, it is often hard to trace a virus back to its creator. According to Hahn, recently more viruses are being traced back to international sources.

"Viruses on computers in the United States are being traced back to computers in Russia. But the hacker who designed the virus is not from Russia at all. He had simply stored the program there," Hahn says. "And after that there is not much that can be done to find the creator."

Rust compares hacking to another illegal activity. "It is much like the illicit drug industry," he says. "When people get caught, you hear about it. But you never know how many more people are out there who aren't getting caught."

As the Internet becomes the central hub of personal activity, it's important that users take proper precautions to protect their identities. Be aware of the networks you use daily, vary your passwords and keep them creative. Don't post anything you wouldn't want a stranger to know—even if you think only your friends can see it. And of course, stay away from the free trips to Disney World. WE

Article by: Kelsey Coleman and Rachel Feil
Design by: Linc Wenqing Han
Photography by: Thai Nguyen

Researchers on campus and people throughout the Madison community are increasingly promoting the benefits of meditation.

Meditation:

Not just for monks

Shelly Dutch, Laura Pinger, and Dr. Lisa Flook are fit. No, they cannot squat more than John Clay and will not be challenging Usain Bolt to a race any time soon, but they do exercise their minds regularly through meditation.

Pinger, a specialist at Mindfulness Based Stress Reduction (a form of meditation focused on self-recognition), began meditating when she was in her 40's. Pinger describes the mindfulness approach as "a particular way to pay attention in the present moment non-judgmentally."

Prior to mediation, Pinger would walk State Street and notice different people unaware of how she was judging them. "I would see a person with piercings all over their face and immediately judge them," Pinger says.

Meditation has helped her become self-aware of these subconscious thoughts. "I became aware of my thoughts and could recognize when I was judging someone. Not only that, but I began to judge myself for judging others."

The self-identification and awareness learned from meditation has helped Pinger regulate her emotions and thoughts. Dr. Flook, a researcher on mindful awareness, says that "mindfulness is seeing the commonality amongst yourself and others."

Flook and Pinger conduct their research as a part of The Center for Investigating Healthy Minds, located in the Waisman Center on campus. Here they promote the idea that just as one can exercise and train their body in the gym, one can exercise and train their mind through meditation.

"Dr. Flook says, one of the major findings coming from this lab is that more activity occurs in the left prefrontal cortex—an area of the brain associated with positive emotions—with people who have gone through the mindfulness meditation training."

Flook and Pinger currently conduct meditation research with Madison area children in both kindergarten and the fifth grade. Flook studies behavioral trends in children who receive the treatment, while meditation specialist Pinger teaches techniques of mindfulness meditation to both the teachers and students.

Theoretically, mindfulness training will help students become more aware of their internal emotions and thoughts. According to Flook, it is instrumental that a child brings this awareness to interactions with peers, teachers, and family members. "As stress increases on students with their age, mindfulness can help them focus and experience more success in school," Flook says.

Flook and Pinger stress the importance of mindfulness to regulate and choose among emotions, not suppress them. Flook described suppressing one's emotions as harmful and dangerous, citing that emotions are a large part of what makes us human.

The purpose of meditation is to have one's mind open to themselves and their environment. By doing this, humans can direct their emotions and thoughts in a more constructive manner.

Personally, Flook hopes the mindfulness training will help the children come to a realization she did not reach until college. Initially, Flook was a typical college student, studying hard and focusing on her career. After beginning to meditate, Flook says, "I became less concerned with where I was going, and more concerned about what I could do with my skills to benefit others."

Flook encourages all college students to try meditating, because life, especially at UW-Madison, is perpetually stressful. Here students often use binge drinking on the weekends as a way to clear their minds and escape the reality of midterms, project

deadlines and pending assignments. It is not uncommon for a typical college student's habit of binge drinking to turn into a real alcohol problem after college.

Shelly Dutch, an alcohol and drug counselor at Connections Counseling, urges her clients to use meditation to help cure addiction. Meditation is a more constructive and healthy manner than binge drinking for students—or anyone—to clear their busy minds.

Dutch sees a huge emphasis in the current world culture on instant gratification to fill personal voids. Drugs and alcohol provide this instant gratification, but so can mediation.

"Meditation fills that emptiness—that void that people have that causes them to use alcohol, drugs, food, and money in the first place," Dutch says. Meditation helps addicts slow down and recognize the present moment. This recognition allows them to manage their choices and look inside of themselves for centeredness in their lives, instead of using outside stimulation.

Across the nation, Dutch notes that inpatient programs for addiction are starting to use meditation just as they use physical exercise. Here meditation is used to reduce cravings and work on the dopamine and pleasure centers of the brain. These centers in the brain mimic the feelings of euphoria, thus providing a constructive alternative to medication.

"The insanity of addiction is preoccupation with outside stimuli and meditation is one of the avenues to slow down your thinking and stay present for that hopefulness within yourself," Dutch says.

A specialist is not needed for one to meditate or learn how to meditate. Meditation can be something as easy as experiencing nature, breathing exercises or having quiet time to become aware of the feelings within one's body. It is recommended for one to read a book on meditation or buy meditation CDs to steer a beginner in the right direction.

The Center for Investigating Healthy Minds believes that in 10 years it will be well accepted that mental fitness is just as important as physical fitness when it comes to leading a healthy lifestyle. Pinger says, "Mindfulness provides the opportunity for us to see what we are doing, while we are doing it, and regulate it." WE

Tips for Meditation

1. Focus—Pay attention to whatever you are placing in the center of your awareness during meditation. This should be one part of your body, an object, a person, or whatever you feel like focusing on.

2. Maintain good posture—If your body is well-balanced your mind will be as well.

3. Pay attention to your breath—A great way to anchor oneself in the present moment is to keep attention on your breathing.

4. Experiment—Try sitting, eyes open, eyes closed, lying down. Find what works best for you.

5. Emotions—Focus on the body feelings associated with different emotions.

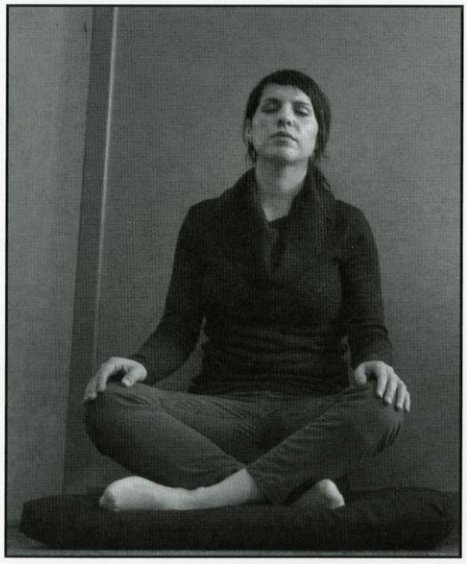
6. Length—Start out with 10 minutes and extend to 25 minutes when you are ready. Meditation is hard work. Notice when your mind begins to wane.

7. Silence—Nothing beats meditating in simple silence.

8. Location—Pick a special place to meditate. Often lighting a candle helps to set the mood.

9. Manage thoughts—When you notice your thoughts wandering return to focusing on your breath.

10. Meditate with purpose—The art of focusing one's attention to a single point is hard work. Make sure you are putting in your best efforts to benefit your mind.



Article by: Christopher Aberger
Design by: Tom Bernath
Photography by: Adam Dircz

What's in your bucket?

UW-Madison seniors offer ways to make the most of your engineering education.

Let's get things clear here. We don't mean the list you create of things to do before you kick the metaphorical bucket. We mean the more fun one, the list that you create even as you battle through the geekiest degree of them all – Engineering.

Another day filled with classes. You are up early, even before the alarm goes off, because you never actually went to sleep. Gathering up the papers that contain your half-hearted attempts at calculus, and physics derivations that seem to have no purpose, you rush from one class to the next through the day. More assignments due the next day, and you are replacing much needed sleep with much more needed coffee. You might be a freshman attempting to enter engineering and are suddenly filled with doubt. Or you might be an upperclassman, wondering how you're still pushing through it all.

We asked people who have been there and done that, what could be so much fun about engineering? The unanimous answer: everything. This raises the question: What could be made more fun because of engineering? We set out to frame the 'bucket list' of fun things to do when studying and practicing engineering. Engineers around campus generously shared their lists with us. We found, much to our delight, that you could jazz up every aspect of life with everything you learn on the way to the degree.

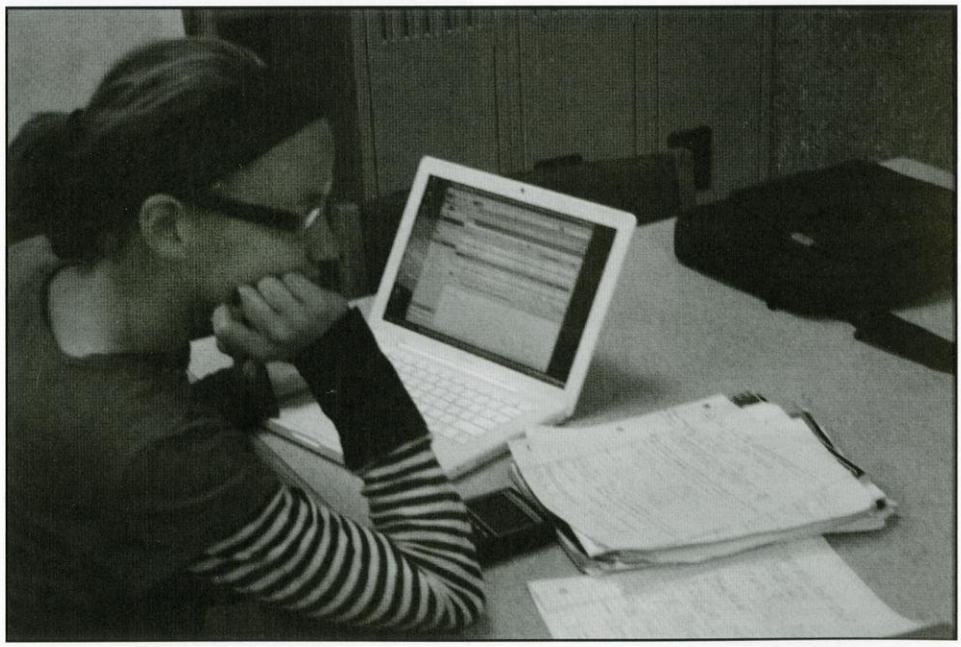
1: Take up a new hobby. Victoria Yakovleva, a chemical engineer and a 5th year senior got into rock climbing in her junior year. She claims that apart from being a great exercise and a great escape, it helped her apply her statics and dynamics to a real-life adventure.

2: Trek on Lake Mendota. Harley Hutchins, class of 2009 and a nuclear engineer, dares you to trek over the frozen Lake Mendota from the Union Terrace to Picnic Point. He says, "It is about two and a half miles there and back. If you are lazy, bike. Remember, every good engineer knows that you need at least four inches of ice to cross on foot and six inches on bike." As an added comfort, he recommends a thermos of hot chocolate mixed with some Bailey's Irish Cream or peppermint schnapps to keep you company.

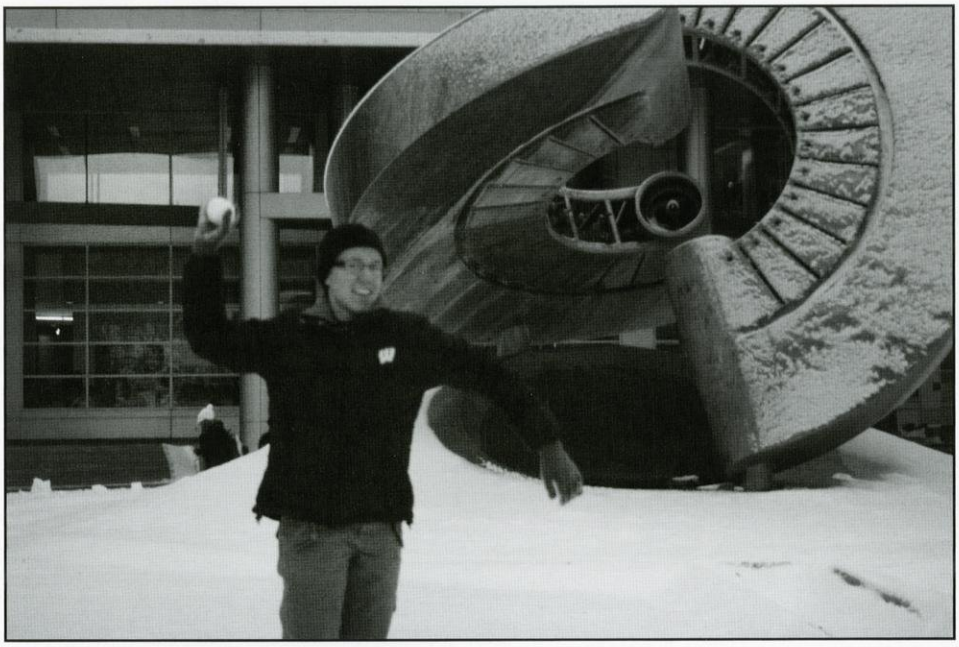
3. Don't be afraid to nerd out. It's a great feeling when you're able to describe an every day phenomenon using theories you've learned in class. George Hanzal, a senior in the chemical engineering department, once placed pitchers of warm beer in the freezer and had a group of friends figure out how long it would take to cool it enough to drink. Applying theory to practical life is what engineering is all about, after all.

4. Learn to enjoy the light and sound. If you're lucky enough to be in Madison for the summer, be sure to catch the Independence Day Rhythm and Booms fireworks show from Observatory Drive. As an engineer, you will appreciate the chemistry behind the pyrotechnics, and you can analyze which elements produce which colors. For instance, calcium produces deeper orange hues when burned. Just sit back and enjoy the show while you're there, however.

5. Get around, meet people, network and be loud. Chris Larson, a senior in the department of electrical engineering, recommends socializing as an important aspect of growing up in engineering. "Get to know others in your major. It helps when you take classes together year after year. Getting to know your professors early in your education is also a big plus," Larson says. His suggestion is all the more valid for an engineer, because you get to prove to the rest of the world that you are not a geek—at least not all the time.



Somewhere between the countless hours of studying and assignments, engineers should take time to create and cross off those items on their respective bucket lists.



as much work as I can into my small breaks during the day, instead of reading the paper or something. That way, I buy myself some free time in the evening." Never postpone, because your exciting new idea today, if left unheeded might cost you a whole engineering project tomorrow.

12. Seasons come and seasons go, enjoy every day of life. Madison might lead you to believe that there are just two seasons: winter and construction. But if you bundle up for winter and learn the best routes to avoid construction, you'll be just fine. Even in your worst moments, it helps to remember that you're working towards something. And it's okay to take a break for your sanity sometimes. You'll forget about that assignment in a matter of months, but you'll remember your college experience forever. WE

6. Don't let engineering ruin you. "If your homework is threatening to drown you, compartmentalize it and take one assignment at a time," Larson says. Once the weekend rolls around, take some time off of homework to go to a football game, enjoy your friends company or completely laze out. You will need that separation, and having a life outside of engineering will help you appreciate the joys of your major that much more. As an engineer, you might know that every action has an equal and opposite reaction.

7. The College of Engineering loves you. Love it back! Be sure to take advantage of the great resources the departments offer. Use your 300 free pages of printing for the semester—double side whenever possible (be eco-responsible). Keep in mind, the tutors at Wendt Library are your best friends when you are ready to throw your physics book out the window without calculating its velocity and force of impact when it hits the ground. And be sure to use Engineering Career Services to help you land that internship or full-time job.

8. Break out of comfort zones. Engineering is a dynamic field, so your education should also be dynamic. Practicing engineering requires you to constantly think and act out of the box (or cubicle). Don't be a machine focused on numbers and set equations; you'll need to know more than that to be a successful engineer. Carrie Boecher, a civil and environmental engineering student, puts it simply. "Gain as many different experiences as you can, you never know when they will pay off in an interview or in the real world."

9. Explore and enjoy UW-Madison. Even on campus, there are tons of free events for students every night. Watch a sporting event you wouldn't normally see. Attend a seminar or lecture from a world-famous scholar. See a movie at the Union. Rent a canoe from Hoofer's for the afternoon. Whatever you choose will enrich your college experience far beyond the classes you take.

10. Explore and enjoy the city of Madison. Madison is a busy, beautiful city. Browse the produce and amazing baked goods at the farmers market. Bike around Lake Monona. Take part in the annual Polar Plunge in Lake Monona. "Take advantage of all the awesome restaurants that Madison has to offer. Rising Suns Deli (Thai food) and The Old Fashioned (burgers) are two of my favorites," Nathan Jones, a senior in the department of chemical engineering, says. Also be sure to pick up your free bus pass each semester to easily get around town.

11. Time doesn't wait for you, even if you are an engineer. Tracey Mayer, a civil and environmental engineering student, knows what it is to value time. "Be productive with it," Mayer says. Boecher adds, "I like to squeeze

Article by: Vindhya Venkatraman and Lori Bierman

Design by: Vindhya Venkatraman and Lori Bierman

Photography by: Thomas Pfeifer

what's all the Energy Hub-aloo about?

Tick tick tick tick. The constant up-tick of the price at the pump as you fill the car's gasoline tank for the millionth time is like nails on a driver's mental chalkboard. The average American drives around 12,000 miles a year. The average UW Energy Hub (eHub) member wants to be able to get that far on just one gallon of gas, and knows it is possible. At the annual eHub Conference, keynote speaker John A. Laitner, Director of Economic and Social Analysis for the American Council for an Energy-Efficient Economy, brought to light the Shell Eco-Marathon. Just last year a team of university students from France built a car that got 11,516 miles to the gallon. It is energy-related issues such as this that eHub is excited to tackle.

At the Alternative Vehicles Expo held this year at the Monona Terrace, Corey Singletary presents his poster to local attendees.

Energy Hub is an interdisciplinary, student-run organization. It was started in 2007 when a group of students decided to fill a perceived lack of opportunities to engage in energy-related discussions and activities on campus. Energy Hub was influenced heavily by the UW Energy Institute, but the original members felt that students needed their own organization. All students are welcome to be part of the group, which hosts a large annual conference along with smaller events throughout the year, in addition to their weekly meetings. Although there are currently only around 25 active members, there are approximately 350 students who participate throughout the year. According to the group's 2009-2010 president, Corey Singletary, eHub is driven by student ideas. "All interested students are encouraged to bring their own ideas on energy issues to the club. EHub is a resource for these students, for whatever they need," Singletary says. There are numerous examples of students taking advantage of the openness of eHub; an alternative vehicle expo held during this year's conference at Monona Terrace and a smart cookout on the engineering campus are just two recent student-run events.

"We hope students will take the information and form their own opinion on matters"

-Corey Singletary

Energy Hub is not simply about supporting students' event ideas, but is also an advocate for students' futures in the market of energy-related jobs. This year's conference consisted of an alternative vehicle expo, talks from industry experts, and information booths from the event's various sponsors. Intermixed were students standing beside their research projects, like Claus Moberg with his iPhone application for checking your green footprint

Singletary also stresses that Energy Hub is "Policy agnostic. [Energy Hub] is about providing information for students, not supporting certain policies. We hope students will take the information and form their own opinions on matters." Before even speaking with Mr. Singletary about this issue, it was apparent that eHub was set up in this manner. One of the first talks during the annual conference this year was a panel discussion. Leaders in a variety of alternative energy fields (specifically focused on transportation) all sat on a stage in front of an audience and took turns explaining their own areas of expertise. At the end students were encouraged to ask questions, to which each panel member was able to respond. Energy Hub did not promote any one particular alternative energy solution; instead, a variety of ides were presented that were all working towards the same goal.

Energy Hub is constantly active on UW-Madison's campus and encourages newcomers to get involved. The wide open inclusion of students' diverse ideas coupled with the depth of information and knowledge supplied by the organization itself are extremely tempting opportunities available so close to home. "There's always a role to be played, small or large," Singletary says. "Students can learn much more about energy-related issues in society today through participating rather than sitting in classrooms." WE

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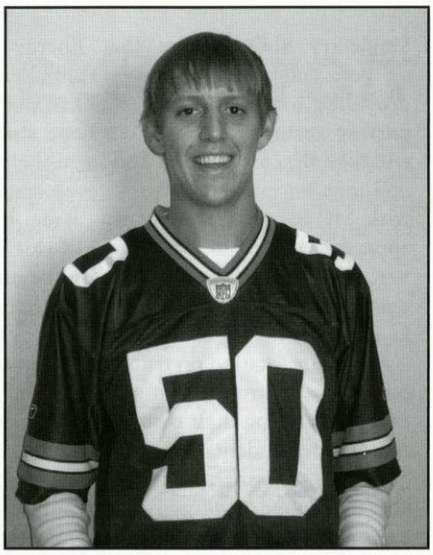

Editorial:
Political Pollution

This past winter break I had the displeasure of finding myself trapped in a conversation focused on the often sticky crossroads between science and politics. A friend of my father's was over for a chat before the holidays. The conversation found its way to the "negative" side of renewable energy. My engineering mind immediately turned to the intermittency of wind and solar and the daunting task of upgrading our aging electric grid. Days removed from a class on wind power and the finishing of a research paper on residential electricity use, I was ready to discuss virtually any aspect of renewable energy that was of concern. I should have known, however, that these were not the negatives on this rural-Wisconsinite's mind. "You know they don't even make those wind turbines in the United States," he explained matter-of-factly. This comment left me with a look of disbelief mixed with rage which my family members knowingly turned to look for.

The silence that followed was partly due to my desire to be polite to our family friend and partly due to the fact that I had once again found myself completely shocked by the power that political persuasion had over seemingly nonpartisan issues. Comments like these have made me ever-more pessimistic about our chances to solve the unbelievably large problems of energy use and climate change. How someone could think that we have been shipping in mass quantities of wind turbines that are larger than football fields, loading them on trucks and driving them all over the country is beyond me. Furthermore, the fact that a very large portion of wind turbine towers are actually manufactured less than two hours away from my hometown in Manitowoc, WI meant that not only are the turbines being manufactured in the United States, but they are being manufactured right here in Wisconsin!

I believe that comments like these, dripping with misinformation, can be traced back to a problem that is going largely unnoticed by society—the unhealthy mixing of science and politics.

For example, an association with a political party typically comes prepackaged with a stance on climate science, relieving you of any need to think for yourself. Should you trust the experts who have made it their life's work researching our climate and carry the letters PhD after their names, or should we trust politicians who receive millions form the oil and gas industry? Don't worry, your political leanings will tell you.

The dangers of this type of behavior are made extremely clear by the German philosopher Theodor Adorno: "The conversion of all questions of truth into questions of power... has attacked the very heart of the distinction between true and false." The scientific findings related to climate change imply negative economic impacts (a decrease in power) to the fossil fuel industry, leaving us with a debate on the undebatable and leaving me with a headache.

I was given a renewed sense of optimism, however, during my final day home for winter break. My 90 year old grandfather had a question for me that had clearly been weighing on him for quite some time. He said that he had been watching and reading about the severe weather events that had been occurring at a seemingly ever-increasing rate and asked for my thoughts on the matter. He cited flooding the size of Texas that was rushing through Australia, severe droughts in Russia, landslides in China, and the disastrous floods of the Midwest in 2008. I reminded him just weeks earlier we were half-joking about the potential for my flight to Los Angeles for the Rose Bowl to land in the city's uncharacteristic December floodwaters. I then went on to tell him that scientists had been predicting an increase in severe weather events for decades but since it's difficult to make a direct link between a single event and climate change many people refuse to 'connect the dots.' We also discussed how the curtailing of greenhouse gas emissions is typically associated with behavioral changes (think turn off the light or ride the bus) and how engineers can go to work solving complex problems such as this.

His willingness to spend the time thinking about an issue and realize that the conversation has taken a turn of the wacky was sadly refreshing. If this begins to happen more often, I might just be able to avoid another headache or two. It's now time for those people close to science to start respecting it by restoring the conversation to one of science. Armed with a potent mix of creativity, math smarts, and a basic understanding of economics; engineers and scientists are perfectly positioned to help accomplish this. The first step, however, is to make sure that we are keeping our "questions of truth" far away from our "questions of power."

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