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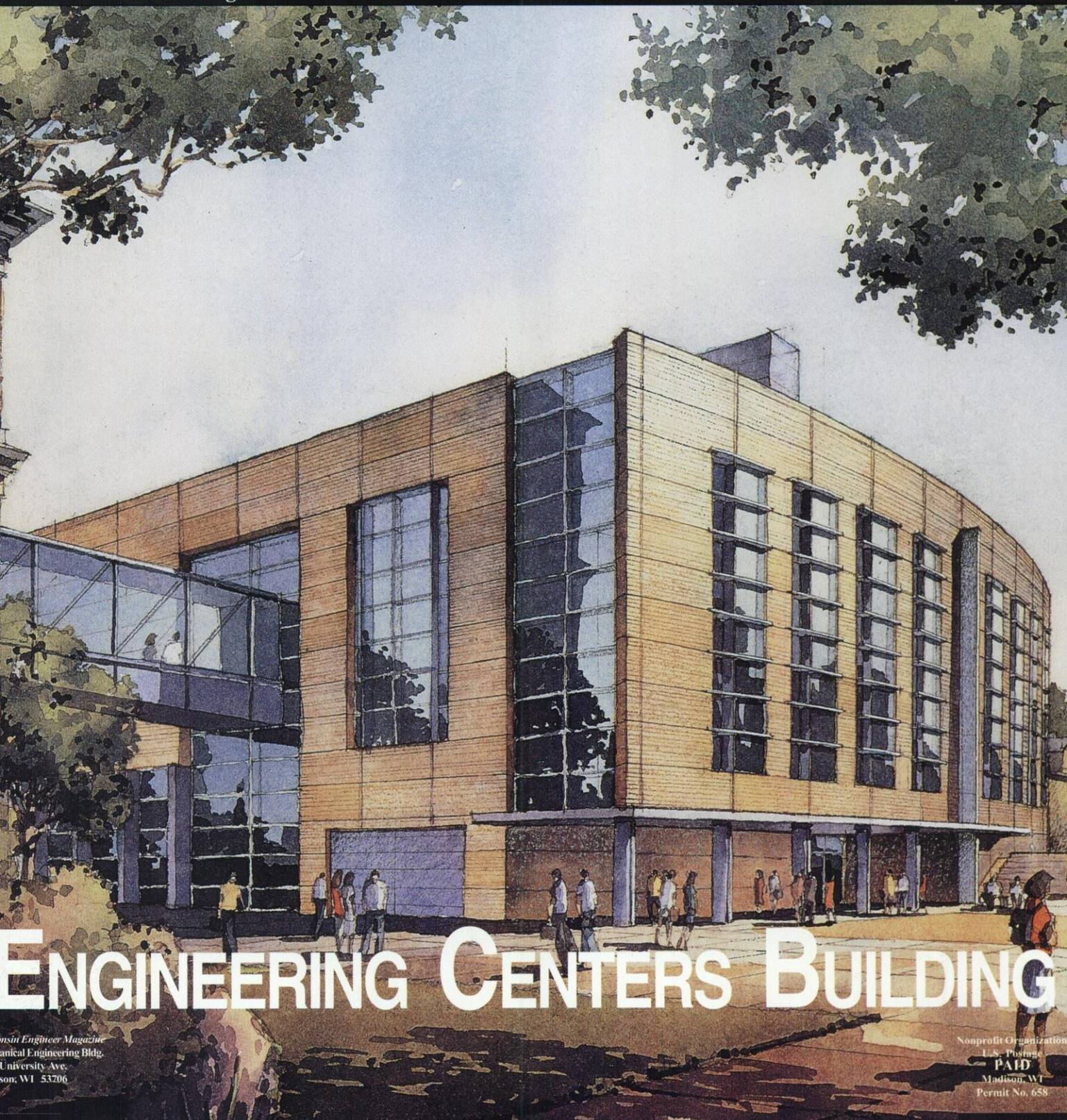
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Volume 102, Number 4




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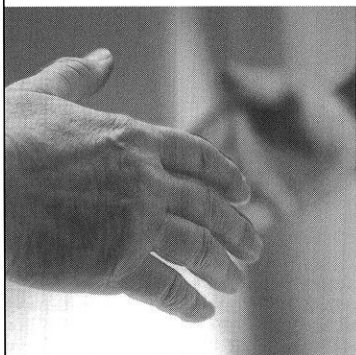
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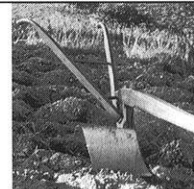
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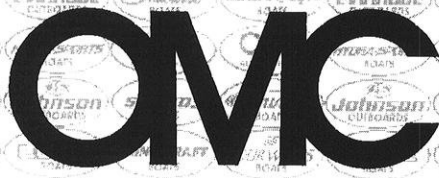
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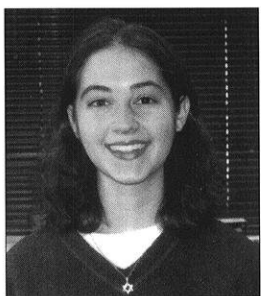
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Editorial: Right to Privacy

Imagine a world where we no longer had an inherent right to privacy . . . even inside our home. Secret cameras inside TVs would monitor and document our every move. George Orwell, author of the novel 1984, predicted the world government could one day act as “Big Brother” and keep close surveillance over its citizens’ daily lives. Although we currently don’t see this extreme of a situation, with rapid technological growth, the issue of the unjust exposure of privacy already has become a shocking reality.

I agree that most technology allows for safer environments, makes our life easier and, overall, benefits our daily lives. For example, the invention of cellular phones gives us the ability to make important calls, such as business or emergency calls, from the road. Quick access to computer medical records after a car accident could save a human life. E-mail allows fast and easy communication between corporations, co-workers, or just between friends. However, the same technology that helps us also can make us more exposed, especially when it falls into the wrong hands.

Most large corporations would agree that cellular phones are a communication necessity for their employees. But, cellular communications are among the most common sources of information leaks. According to the American Society for Industrial Security (ASIS), a Virginia-based research organization, in 1997, “cellular phones made information-rich targets in an escalating game of industrial espionage that cost American businesses \$300 billion in intellectual property losses.” It does not benefit companies or employees to get rid of cellular phones, so other methods of precaution, such as using digital instead of analog, could be implemented. Although not all wireless networks currently support digital, eventually this might be a required step to prevent telecommunication fraud.

The privacy of the Net is another largely debated and controversial issue. Americans rely on frequent web use and thrive on new web capabilities. Yet, even with safety precautions, such as quitting Netscape after entering personal information, it is easy to access personal information entered on the computer. In the electronic world, only encryption — “the electronic version of the envelope” — can provide absolute privacy. Encryption gives security to businesses and individuals by preventing eavesdropping, snooping or theft of information. The Clinton administration is not supportive of this protective device because Government wants the police and spy agencies to have instant access to our e-mail and other computer files. But, the privacy of innocent individuals is being invaded. Criminals can steal credit card numbers, social security numbers and access personal files. Also, is it ethical in cases where private industries like insurance companies deny someone a job or insurance coverage because of easy access to an individual’s entire health history? Fortunately, privacy organizations such as Americans for Computer Privacy (ACP) have been fighting to keep and implement encryption to limit leaking of private information.

What thriving corporation doesn’t use e-mail as a communication link? E-mail gives employees easy contact to their customers and coworkers. According to a new study, six out of ten companies now monitor their employees, but as many as 23% of employers never tell workers they’re being watched. Lewis Maltsby of the American Civil Liberties Union Workplace Rights Project explains, “The employer owns the computer, the e-mail and phone systems.” I believe that companies have the right to search your e-mail with just cause, such as when they suspect an employee is revealing internal information or suspect that their employee is involved in illegal activities. However, I recently read a disturbing article. A woman named Sarah was denied a promotion after her boss read an e-mail Sarah had written to a coworker announcing her recent pregnancy. Sarah’s boss told her she wouldn’t be “up to a new job.” Although she wrote that e-mail on company time, her boss had no reason to search her e-mail. Sarah’s privacy had been unfairly invaded.

Certainly, benefits of technological advancement far outweigh the drawbacks of inappropriate privacy invasion. As future engineers aware of technology’s power and possibility for misuse, we should help set the course of America’s technological future.

Shana Madlin

The *Wisconsin Engineer* magazine, a charter member of the Engineering College Magazines Associated, is published by and for engineering students at UW-Madison. Philosophies and opinions expressed in this magazine do not necessarily reflect those of the College of Engineering and its management. All interested students have an equal opportunity to contribute to this publication.

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AD INDEX

SUBE Success Leads to Second Year

In its inaugural year, Students Uniting Business and Engineering (SUBE) laid the foundation for a successful student organization serving a need previously unmet. The organization, founded in September of 1997, works to break down the traditional barriers between business and engineering students.

Leon Baumann and Jim Buswell found the need for an engineering and business organization while attending the 1997 LeaderShape conference, a conference that focuses on developing leadership skills for business and engineering students. At LeaderShape, the students were asked to create a vision of what they wanted to accomplish, and the idea behind SUBE was born.

"We seek to mirror the cross-functional teams in industry today and develop an awareness of the different curricula in both areas," reads part of the vision statement they created.

Baumann and Buswell wanted to create a different outlet than other student organizations. SUBE provides a business venture and allows students to be a true part of the organization by working together in a real-life situation. The mechanical engineering department has a rapid prototype machine at the students' disposal, and SUBE is using the machine to develop projects for business world clients. With the equipment available, business and engineering students can work together to find clients, create a model of the project and produce a prototype of the part as a group.

"Everybody will have some input in all aspects of it; engineers will get some business training, and the business people will get some of the technical aspects of it," Buswell said.

Buswell and Baumann envision the project as a major part of SUBE. There will be the opportunity for both types of students to work together in a more informal atmosphere than the workplace, but students will still be able to learn from each other.

Another aspect of SUBE is the development of professional contacts. SUBE hosted a "Meet Your Future" event last spring. A variety of business professionals met with business and engineering students to discuss real-life situations and answer questions from students. SUBE also plans on hosting monthly speakers.

SUBE wants to hold a number of social activities for their members. Baumann sees SUBE as an opportunity to, "help break down stereotypes that engineering students were geeks and that business students were engineering school dropouts. We're finding, when you really get down to it, there's really not all that many differences between the students in the two schools," he added.

Check out SUBE's homepage at www.cae.wisc.edu/~sube/ for up-to-date information on their activities.

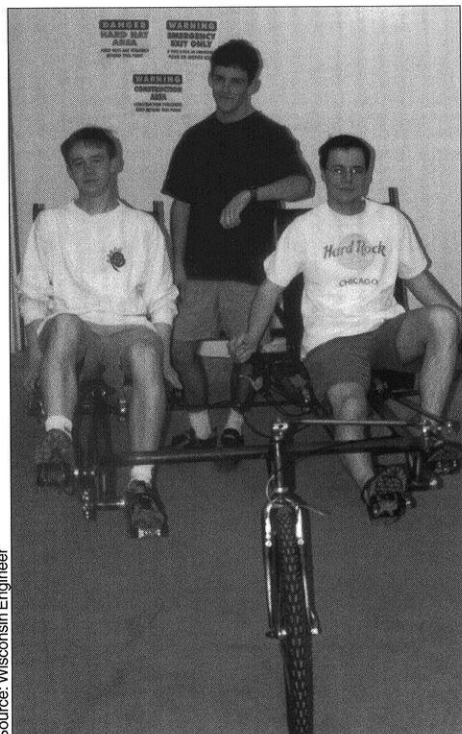
-Robin Gigot

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Engineers for Environment and Technology Kickoff Meeting

The EET kickoff meeting is September 22, 7:30 at Union South. The title is "Environmental Management Systems: Implications for the Next Generation of Environmental Professionals." Everyone is invited, and food will be provided.

For more information, contact EET at eet@cae.wisc.edu or visit the website at <http://www.cae.wisc.edu/~eet>



Source: Wisconsin Engineer

BRAINSTORM!

...a little creativity could win you big money

Has the start of a new semester brought some new creative energy? That energy, channeled in the right direction, could win you more than \$10,000.

BRAINSTORM, The Schoofs Prize for Creativity, is an annual competition sponsored by UW-Madison alumnus Richard Schoofs. Schoofs is a 1953 chemical engineering graduate who wanted to promote entrepreneurship as a possible career for engineering students. The contest awards student inventions based on originality and patentability. The four prizes range from \$1,000 to \$10,000. The Aschenbrenner Best Prototype Prize is awarded at the same time and gives two \$2,500 prizes to the two entrants with the best working models. The awards are presented in February in recognition of Thomas Edison's birthday.

Eric Wobig, Dave Waters and Brie Howley won last year's Schoofs Prize along with the Aschenbrenner Prize to rake in a net of \$12,500. Their invention, Turbo Mule, is a human-powered vehicle designed to carry heavy loads over long distances and rough terrain. They envisioned it to be used by industries in third world countries.

How much effort does it take to win? According to Wobig, the number of people turning in application forms was much greater than the number present on judging

day. Wobig said that the time and effort commitments are tremendous and estimated the Turbo Mule team spent about 500 hours on design, construction and presentation.

Other winning inventions from past years include a faster and more efficient beer tap, a photodiode-controlled toasting system to make a perfect piece of toast, an in-line skate suspension system and a radio controlled robot that plays laser tag. Some of the inventions are patented and even are being put into use nationally.

Several of the participants developed their inventions before the competition simply because they saw a need. Last year's third place winner, Scott Kuszewski, entered a clamp he made to hold a snowmobile to the trailer. He came up with his idea because he wanted a faster and cleaner way to secure a snowmobile. Refining that idea earned him \$4,000.

The competition is open to all full-time UW engineering undergraduates. For more information, including application forms, contact the UW Technology Enterprise Cooperative (UW-TEC) at 2620 Engineering Hall. Application requests can also be made via the web, at www.engr.wisc.edu/students/brainstorm.

The application deadline is September 25, and final entries are due January 19. That means you have four months to enter, design and create. Use that time efficiently, though, because one of last year's winners is making a second appearance. Wobig is planning to enter the competition with a new invention. Said Wobig, "You don't win \$12,000 then not do it again."

Author bio: Emily Bauer graduated last May in Agricultural Journalism and the TCC program.

Who can enter?

Any full-time undergraduate in the College of Engineering. You can enter individually or as a team. You can form teams with undergraduates outside of COE, but at least one member must be from COE.

When is the deadline?

Applications are due by September 25, 1998. The final project is due January 19, 1999.

What do I have to turn in for the final project?

Idea notebook - describing your process
Abstract - describing invention

How it would be applied in the field
Background - why your invention is necessary

Specifications with drawings
List of Original Features

What are the prizes?

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Who are the judges?

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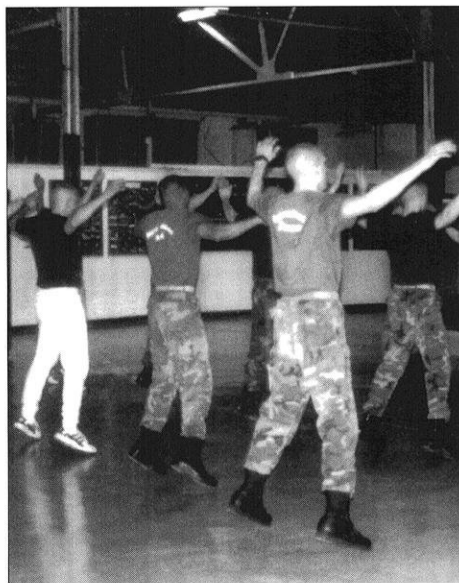
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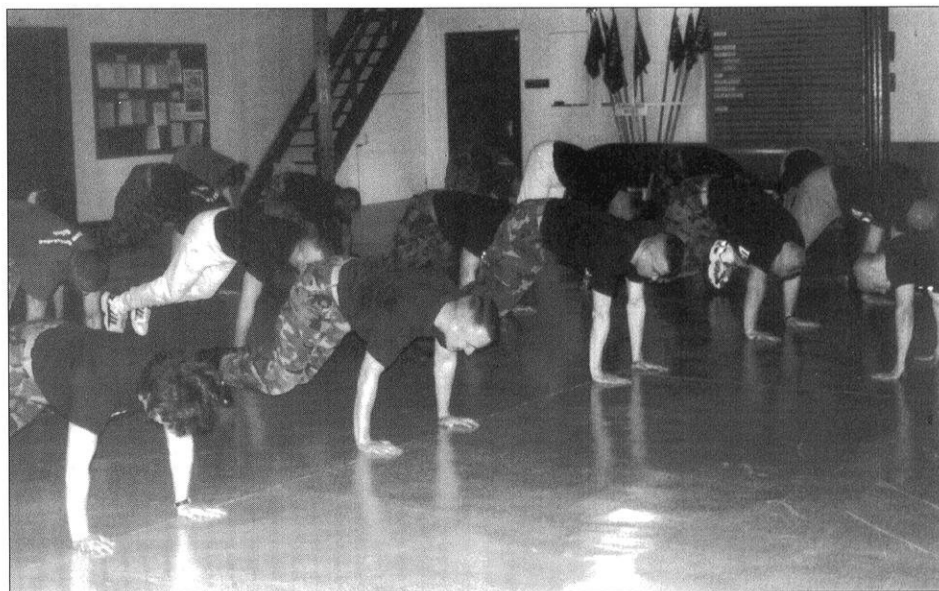
ROTC: A Different Approach to Education

You've seen them on campus, on their way to Engineering Hall or perhaps a math class in Van Vleck, moving with a bit more purpose in their step than the average student. Their crisply pressed uniforms and close hair cuts set them apart from the rest of us. They are midshipmen and cadets, going about their daily routines in search of the same seemingly elusive undergraduate engineering degree we all covet. However, the deal they've struck up with Uncle Sam has them concerned with opportunities and commitments beyond graduation.

A common concern among students in the college of engineering is post-commencement employment. For most majors, the job market today seems adequate. But when you sum up the actual costs of school and the time invested, entertaining thoughts of a guaranteed paycheck, supervisory experience and quality benefits can become a minor obsession. For some, the financial benefits alone may be enticing enough to consider serving their nation.



Source: Wisconsin Engineer



Source: Wisconsin Engineer

ROTC cadets at their early morning workout.

The Reserve Officer Training Corps (ROTC), represented on the UW campus by all four major military service organizations, is a program that prepares students for a military career while they attain an undergraduate degree. Most participants are on a scholarship that pays full tuition and some book fees. Depending on the particular branch and unit, in-semester commitments can include morning workouts, drill practices and additional course work related to the cadet or midshipman's field of interest.

Navy Lieutenant Mark Evert, a nuclear submarine officer currently on instructor duty, teaches a three credit naval history course required for UW midshipmen. He also serves as a freshman advisor to new ROTC candidates. "We've got other majors in the program, but those with an engineering background can definitely have a head start," Evert said. The military is a modern, electronic world where technical expertise is a valuable asset. Any engineering major can find a home in the military. Special units

such as Navy SEALs or Marine Reconnaissance need communications and transportation specialists, the Army needs construction professionals and a nuclear powered engine room on a naval ship demands stringent maintenance. In the years since the end of the cold war, the military has experienced a downsizing in manpower and an increasing reliability on high-tech modern equipment. Few are likely to be better at fulfilling these needs than young engineers in search of experience.

Depending on the service and student's year in school, summers prior to graduation can involve a variety of activities. Cadet Sergeant Major David Frattinger, a senior mechanical engineering student, recently spent part of a summer acquiring airborne assault skills and combat knowledge as he rappelled out of Army helicopters. Frattinger intends to eventually earn his Army flight wings as a combat helicopter pilot and feels his engineering background

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UW FutureCar Takes 1st

What weighs under 3000 lbs., runs on diesel fuel, squeezes out 83 MPG and is the best of its kind? If you guessed a UW-Madison engineering student, you're close! The correct answer is UW-Madison's latest student-built FutureCar, a hybrid electric vehicle named the "Aluminum Cow".

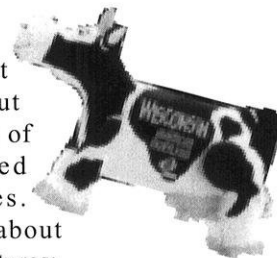
FutureCar Challenge is a competition that involves 13 engineering schools from around the country. Their goal is to modify a mid-size car to maximize fuel economy and minimize emissions. All this is done without sacrificing consumer demands such as comfort, performance and safety. Each school was given either a Dodge Intrepid, Ford Taurus, or Chevrolet Lumina.

another 70 HP. Since the standard Taurus engine only made 140 HP, the Aluminium Cow is actually more powerful – and faster.

So how does it get 83 MPG? The secret is in how it is controlled. For normal driving, the car is powered by the diesel engine, which is very efficient. When extra power is needed, the electric motor kicks in for the added boost. The motor is powered by 600 C-sized nickel-cadmium batteries weighing only 125 pounds and housed in the spare-tire well. The motor also recharges its batteries using regenerative braking and recaptures the kinetic energy of the car when brakes are applied.

FutureCar members are mostly undergraduates with little to no prior

overall, but not without their share of unexpected challenges. Read on about their adventures:



Day 1: June 3, 1998

Most of us didn't know it was June 3. We'd been awake since sometime in May. But around noon, two vans, a station wagon and a Suburban pulling the BIG RED TRAILER left for Detroit. One van swung through Chicago to pick up some teammates. Later that night it ran across the Suburban and trailer sitting on the side of the interstate 2 hours outside of Detroit, seemingly abandoned and missing a tire on

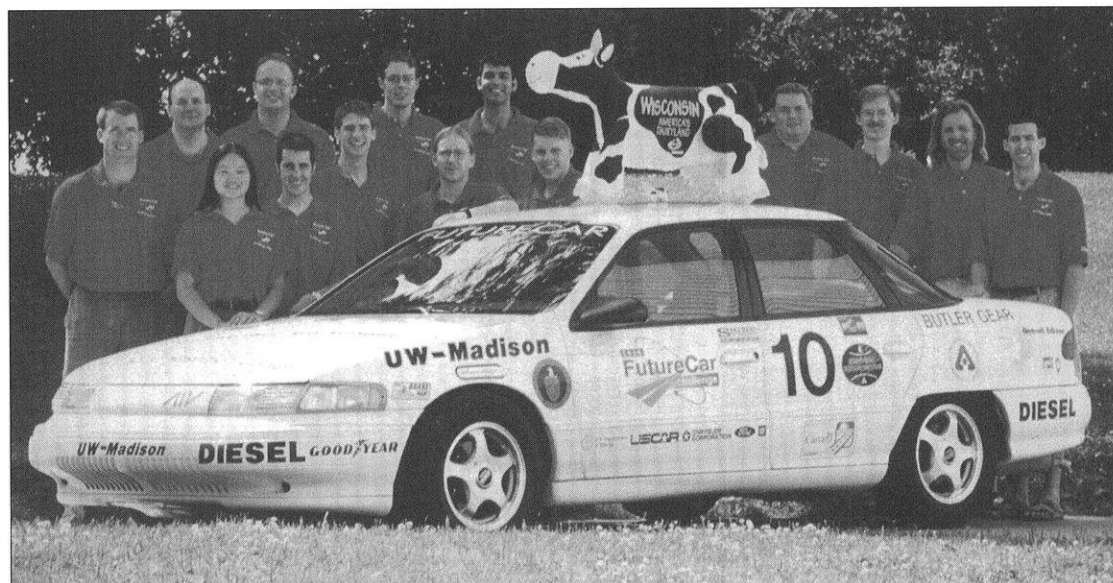
the trailer. Three hours later, about the time the occupants figured the rest of the team had been abducted by aliens, they showed up with a tire. They had been calling AAA (who wouldn't help), racing from garage to garage and waking up tire shop employees, who didn't want to help until their jobs were threatened. Seems it's kinda hard to find trailer tires at 9pm in Nowhere, Michigan. We got to Detroit at 3am.

Day 2:

Filled the gas tank for the first time. It leaked. After a short diesel bath for a few team members, the problem was fixed. Exhaust system leaked – let's try installing a gasket! Mascot (inflatable cow) cow-napped at skit ceremony!!!

Day 3:

Braking test results – they don't work all that good. Telling Anton to push harder



The 1998 UW FutureCar Team with their winning car and mascot, the "Aluminum Cow."

The Aluminium Cow is based on an all-aluminum prototype 1994 Ford Taurus. Only 25 of these were built, and Ford donated one to the UW. UW's strategy was to install a parallel hybrid powertrain. A parallel hybrid vehicle is one which uses conventional fuel combined with electric power to propel the vehicle. The Aluminium Cow also uses one of the 100 European Ford, turbo-charged, diesel engines ever made. This engine is rated at approximately 90 horsepower. It also has a Unique Mobility AC motor good for

experience with cars. There are nine groups with various responsibilities such as mechanical, engine, electrical, controls, and weight reduction concerns. Weekly team meetings are held for all the groups to communicate their progress, problems and discuss work times.

Each June, FutureCars from across the US and Canada are tested and compared to one another during a nine-day competition in Detroit. This past June, the UW FutureCar Team's Aluminum Cow seized 1st place

continued on page 30

continued from 9

will prove a valuable asset. While a technical degree is not required for ROTC participation, the skills acquired in the course of earning an engineering degree can certainly help. "I think it's my experience managing time wisely that will help the most," commented Frattinger. Some programs, such as Air Force Communications-Computer Systems or Navy Nuclear Propulsion consistently utilize the basic concepts taught in engineering curricula.

A student interested in becoming a nuclear qualified naval officer, regardless of major, must perform competitively in the base calculus and physics courses required of engineering undergraduates. After graduation, they are commissioned as ensigns and head off to school in Orlando, Florida, for future academic training and certification. Much of the Naval Nuclear Power School's curriculum, though classified, parallels concepts and technology taught at the UW. Electrical, mechanical, chemical and nuclear engineering concepts are applied to the task of supervising the safe and reliable operation of a nuclear powered ship in combative environments. It is a position of immense responsibility not taken lightly by the Pentagon; every nuclear officer recruit interviews with an Admiral in Washington D.C. before being considered for enrollment.

There is no such thing as a free ride, however, especially when dealing with the federal government. A common commitment for a new officer is four years of service. Special programs, such as flight or nuclear training, involve a stiffer payback due to the large amount of time and money invested by the government in each candidate. After a Navy pilot earns their wings, which can take two years, the commitment is seven years. Salary, when considering the extensive medical and dental benefits, rivals that of the private sector. A common selling point used by the military is the "30 days paid vacation" provided to all service members, which, while technically valid, is a bit misleading. Thirty days off after spending nine months at sea in the North Atlantic or in a Saudi Arabian desert does not always prove to be adequate compensation. In addition, it is rare that an individual's ideal vacation requests comply with the needs of their unit.

ROTC is not for those who simply need an easy way to help pay for college. It's for those who thrive on the challenge of leadership and intimidating environments. The academic and critical thinking skills learned by an engineer in pursuit of a degree helps to prepare a young officer for a time in their life when rapid accomplishments and goal realization can be critical to future successes. Few civilian jobs can provide positions of such immediate responsibility, challenge and rewards. Then again, you can "quit" a civilian job, a concept not familiar to any recently commissioned officer.

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CAMPUS INTERVIEWS — OCTOBER 8TH, 1998

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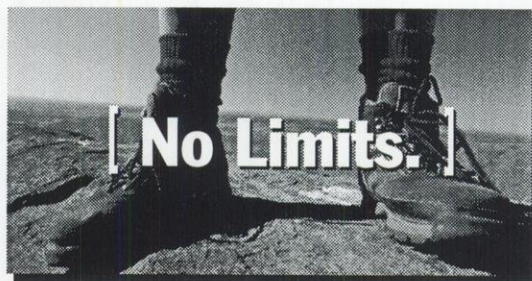
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Ernest Micek
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Cargill

BS ChE 1959

Recently Ernest Micek traveled to South Africa to encourage free trade with America. Micek is a past recipient



Source: Engineering Communications

of the College of Engineering's Distinguished Service Award. Cargill, Inc. is a global merchandiser, processor and distributor of agricultural and other commodities.

Richard J. Schwartz
Dean, School of Engineering
Purdue University
Professor, Electrical and
Computer Engineering

BS 1957
SM, MIT 1959
ScD, MIT 1962

Research interests include semiconductor devices, direct energy conversion and solar cells.

Michael Gluck
President and CEO
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previous: Executive Vice
President at Fujitsu Computer
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James G. Berbee
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MS ME 1987
BS ME 1985

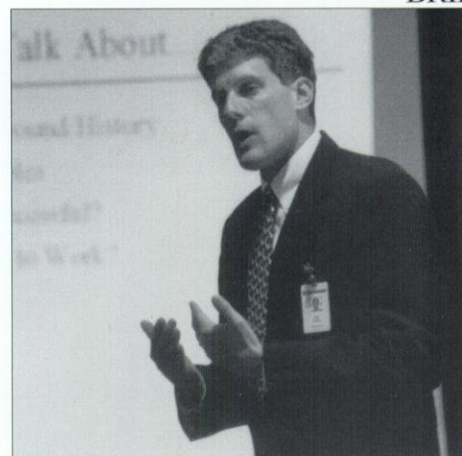
James Berbee can take you for a walk on Madison's Blackhawk Country Club golf course and show you the trees he planted as an employee during his high school days. He can also tell you the ins and outs of the Regent Apartments, which he managed for four years as an undergraduate.

In those early days, Berbee was thinking about owning his own business someday. He used his education at UW-Madison as a solid base for eventually striking out on his own. He holds BS and MS degrees in mechanical engineering and an MBA in finance.

"One of my most sobering experiences was flunking thermodynamics the first time I took it," Berbee says. It brought home the need to concentrate on his studies. He mastered thermodynamics to such an extent that he became an instructor in thermodynamics for the Department of Mechanical Engineering during his master's degree work. He also worked as a project assistant with the Engine Research Center.

BS 1968

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Source: Del Brown

In 1989, Berbee began work as an IBM systems engineer in Madison. "It was a great learning experience-I got thrown into all kinds of complex customer problems. But I really learned to think on my feet. My engineering education, even though it wasn't strictly about computers, set up an excellent base for the type of problem solving skills I needed at IBM."

But a different kind of corporate experience beckoned. He left IBM and started Berbee Information Networks Corporation in his basement in 1993. The company focused on solving network computing problems.

Within a year, the first employees had been hired and the company moved out of the basement. The company has experienced rapid growth, moving its Madison location three times in three years to accommodate the expansion. In 1997, the company moved into a new \$2 million corporate headquarters in Fitchburg's Research Park.

In 1996, the company opened its Milwaukee branch. In one year the Milwaukee office grew from two employees to 11, and monthly revenues grew from \$50,000 to \$1 million. In 1998, the company opened its Fox Valley branch in Appleton. The company now concentrates on network consulting, Internet services, and hardware and software sales. It now has more than 80 employees.

leaders, Vanguard develops solutions for use on UNIX-based platforms. Additionally, Vanguard's Professional services offers system design and implementation, software development and network administration.



Source: Vladislav Yeliseyev, Engineering Communications

ECB still 2 years away

Making up the western edge of campus, the Engineering Centers Building is seen as a link between the university and adjacent neighborhoods. Said Dean John G. Bollinger, "It is intended to be an architecturally interesting structure providing a transition from the Mechanical Engineering Building to the First Congregational Church, a prominent building just west of the engineering campus. The Engineering Centers Building will be a dynamic facility, combining both educational and research activities within the college. The development of this facility is viewed as an opportunity to enhance the quality of the teaching and research environments, and to aid in the recruitment of talented faculty, students and research staff."

Construction of the ECB will begin in about two years at the southeast corner of Breese Terrace and University Avenue. The new facility will replace the "temporary" buildings that are still in use.

The college's proposed 130,000-square-foot Engineering Centers Building was one of the original buildings included in the Wisconsin Initiative for State Technology and Applied Research (WISTAR), a major initiative proposed by former Chancellor Donna Shalala's advisory council to facilitate several critical UW-Madison construction projects.

from UW Foundation and Engineering Communications

BY THE NUMBERS

Average Engineering Salary
 BS \$38,500 MS \$45,400
 PhD \$59,200 National Association of Colleges and Employers, 1997, no experience

Interview Opportunities

12,857

thru ECS, 1997-1998

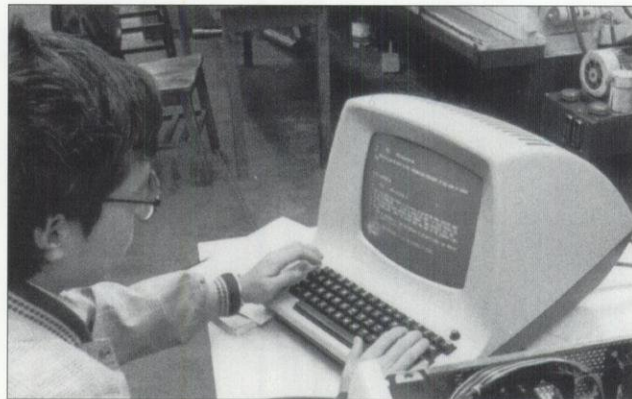
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150,000 Users
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Nov. 1997 International Demographics, based on per capita use

We've seen iMac before!



Source: Wisconsin Engineer Archives

(left) The Apple iMac, released August 1998. This funky looking machine is a keystone in the New Apple company headed by Steve Jobs. Available at the DoIT Tech Store.

(above) The ADM3A+, produced by Lear Siegler, Inc. This similar looking terminal was found in the ME Building. No longer available, it boasts an uncommon 9" monochrome screen.

Courtesy of Apple Computer, Inc. Terry Hefferman



Want to Lose Weight?

Have you ever heard of Conjugated Linoleic Acid (CLA)? The name sounds like something you made in organic chemistry. CLA is actually a dietary supplement that helps you burn fat and create better muscle tone. CLA is a form of linoleic acid, an essential fatty acid used by cells within the body. The weird part about CLA is that it's found in meats, cheeses and other dairy products. The same foods people have been avoiding for dietary purposes supposedly contains a weight loss chemical. It sounds a little ridiculous, right?

CLA seems to be too good to be true. It is an all natural supplement that reduces fatty tissue, not just water weight, and there are no known side effects. Animal feeding studies have shown that CLA causes loss of fat and promotes muscle development. In addition, CLA does not require massive amounts of exercise like other dietary supplements. So, why isn't there a gold rush for this new discovery? The main reason is lack of knowledge. CLA has not been thoroughly tested yet.

Michael Pariza, head of UW-Madison Food Research Institute, discovered the

beneficial effects of CLA ten+ years ago. He was very surprised when he found that well-done hamburger, previously suspected of causing cancer, actually contained appreciable amounts of CLA (which helps retard cancer growth in mice).

The Clinical Nutrition Clinic in Madison is currently conducting one of the first documented tests of CLA consumption by humans. Dr. Richard Atkinson is leading the study. Both Atkinson and Pariza have tried the drug themselves and found extraordinary results. They reported that CLA significantly reduced their appetites.

Currently, CLA is produced by chemically altering linoleic acid residues found in sunflower oil. Natural Nutrition and other vendors make CLA and currently have it out on the market. Even though it is rather expensive (\$25 - \$45 per bottle), CLA is being sold at a rapid rate in local stores.

Doctors do not recommend taking CLA until the human tests are completed. It is definitely wise to remain cautious about CLA. Some dietary supplement reviews

even have contended that CLA is totally ridiculous. "The notion that one could avoid physical activity and eat anything you want while reducing fat and improving muscle tone sounds like a dream." The main contention is that, to date, the tests have been conducted on animals and the anticipated results may not be the same for humans.

Even if CLA does not prove effective in humans, it can still be used in raising animals. Leaner pigs could be produced with less feed than before. A small reduction in overall feed costs for a pig and higher yields of meaty tissue could have a large impact on pork costs.

Pariza and others believe CLA has a bright future. One day it could be commonly used as a daily supplement like Vitamin A or C.

Author Bio: Dan Pierpont is a senior in chemical engineering who is researching the production of CLA.

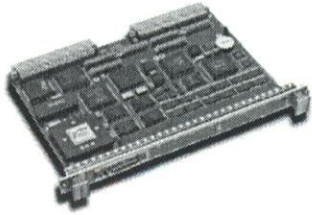


CLA is already being sold at many local grocery, drug, nutrition and natural food stores.

Source: Victor Chen

For more information about CLA and recommended dosages please call the UW- Madison Clinical Nutrition Clinic at 265-4584.

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Right in Your Back Yard

Advantages of a Two-Year College

Is your decision about what college to attend giving you a headache? Do you have limited financial resources or a below average G.P.A.? If you answered yes to either one of these questions, you can put your mind at rest. There are many two-year colleges out there that offer an excellent education at a lower cost. UW-Marathon, the two-year college I attended, is one of 13 two-year UW colleges in the state. Other UW colleges are located in Baraboo/Sauk County, Barron County, Fond du Lac, Fox Valley, Manitowoc, Marinette, Marshfield/Wood Co., Richland, Rock County, Sheboygan, Washington County and Waukesha. The 13 UW colleges are spread throughout the state and just miles away from your home. A two-year UW college is an excellent way to start your education because it has major cost and educational advantages.

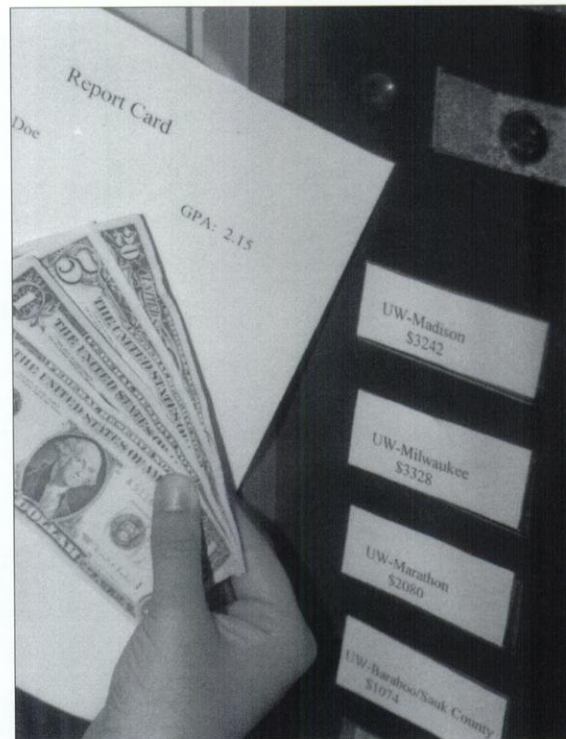
Attending a two-year UW college simply costs less. With rising tuition costs and more families with multiple children in school, many students have to finance their own education. This is why students need to be aware of a smarter, cheaper alternative to starting their education at a four-year university. Two-year UW colleges offer prerequisite classes for engineers at a lower cost. For example, the tuition cost to attend UW-Madison for the 1997-1998 school year was \$3241.90. The average tuition cost to attend a two-year UW college for the 1997-1998 school year was \$2080. This results in tuition savings of \$1161.90 per year. The biggest example of saving money at a two-year college, however, comes from the fact that a student can live at home for free or at very little cost. (Only two of the 13 colleges, UW-Marathon and UW-Richland, have residence halls).

Another major advantage of a two-year college is the education. Because two-year colleges have fewer enrollments than four-year colleges, there are less students in each classroom. Classrooms are smaller, more personable and more conducive to learning.

Therefore, students have better opportunities to meet and get to know their professors as well as each other. Your professor teaches your lecture, discussion and lab. At UW-Marathon College, for example, there are no TA's. Better professor-student interaction can give you a better handle on the dreaded prerequisite classes such as physics, chemistry and calculus. Also, study groups are easier to form because everyone knows each other. Professors learn students' names and have more time, in general, for each individual student. This is something you miss at a bigger university. Prior to one physics exam at UW-Marathon, a friend and I were extremely frustrated and felt hopeless about the material we were studying. After endless hours of aggravation, we decided to call the professor at home to ask him some questions. Not only did our professor answer our questions, he ended up coming to school on a Sunday afternoon to help us, too.

For those high school students who do not have the finest G.P.A., a UW two-year college might be the answer. Many high school students do not realize the importance of getting good grades until it is time to apply to a university. If you think your dreams of attending UW-Madison or UW-Eau Claire are dashed because of a poor high school academic record, think again. Two-year UW colleges are very fair with their admissions. Students can attend them for the first two years and, if their grades are sufficient, transfer to a bigger, four-year university for additional education.

Two-year colleges are excellent alternatives to starting your education. They offer a variety of classes taught by extremely knowledgeable professors at a low cost.



Tuition, time, GPA, and the anticipated end result all play a role in selecting a 2 or 4 year college.

They also offer student jobs, student organizations, financial aid and athletic programs to their students. Today I am attending UW-Madison. I am very grateful that I attended a two-year college. I had the wonderful opportunity of meeting excellent professors, staff and students without getting further in debt. I truly had and am having a wonderful college experience.

Author Bio: Courtney Koch is a junior majoring in industrial engineering.

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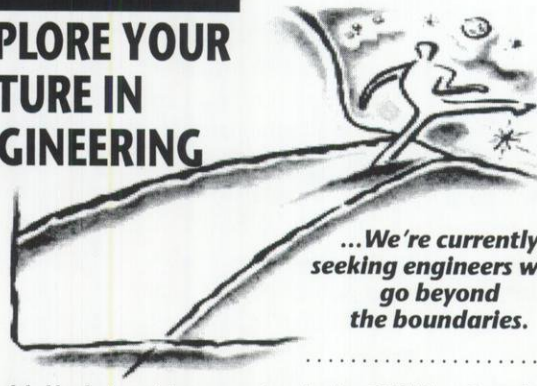
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Chemical Engineering Undergrad Research Projects

Every campus has professors and graduate students hard at work on research projects. But there are also many undergraduate students toiling away on those projects. The duties undergraduates are assigned can be mundane, but they are part of a critical process in research. Engineering undergraduates at UW-Madison have a number of reasons for choosing to work on a research project as an independent study course. The topics being researched are interesting to them, research allows them experience outside of class and they may be able to fill elective credits with this independent study.

Chemical engineering major Peter Heinzelman is working with Professor Murphy on an ongoing biotechnology project. Heinzelman, a junior, is working with beta ammeloid, a peptide found in the human brain. A major factor of brain degradation in people afflicted with Down's syndrome and Alzheimer's disease is the aggregation of this peptide when it becomes toxic.

There are two general experiments that the project is currently focusing on. One is a light scattering experiment that tells the researchers the shape of the aggregation. This information is useful because it tells them what shapes are toxic. The other experiment involves using the results of the light scattering experiment. The researchers take the peptides of certain shapes and combine them with the beta ammeloid taken from the adrenal glands of rats. A color change test tells the researchers if the cells are living or dead.

"Hopefully, if we can understand how the beta ammeloids aggregate and what the connection between the morphology and toxicity, we think it would be a very important mechanism to understanding Alzheimer's and what goes into causing the condition," said Heinzelman. He has worked on the process for three and a half semesters. He is excited to be working on

the project and is happy he has stayed with the project so long. "It's good because it gives you something tangible. It makes you feel like you are more than just a gopher," he said.

Junior Robin Kratoska is also working on a research project. To fulfill a chemical engineering elective, she joined Professor Hill's dairy research project. She is working on creating a synthetic alternative to an enzyme found in the saliva of dairy animals that has the potential to be an anti-oxidant and an anti-carcinogen. Kratoska is taking corn oil, a substance found in hundreds of foods, and reacting it to make an isomer that is identical to the enzyme in dairy animal's saliva.

The end result would be to be able to take a common ingredient in most foods and have it contain something identical to the natural enzyme. Previous literature has shown that this particular isomer reduces breast cancer in mice, and it would benefit everyone if this anti-carcinogen could be put in food. Other students in Hill's laboratory are working on different common ingredients in food, such as butter.

Kratoska chose an independent study to fulfill an elective as well as to also see how a research project is run. "This gave me a different view of a lab from labs in the workplace," said Kratoska.

Senior and chemical engineering major Zack Zwitter is working with Professor Wedgewood on adapting Lodge's theoretical model of molecule movement between two planes. His adaptation tries to predict the properties of a polymer flow, including how viscosity changes as a function of sheer rates and time. Industry can use this type of model to predict how a fluid will behave when it is in a certain type of plastic bottle or when it comes through a nozzle.



Source: Victor Chen

Peter Heinzelman, is working on research with Prof. Murphy that could help people with Alzheimer's disease.

After Zwitter finished writing the actual program, most of his time was spent waiting for results to come back from the computer. In order to perfect the model, he has to run trials with different fluid properties and initial conditions. The end result of this project will be to predict the relationship between viscosity and sheer rate.

Zwitter became interested in independent research because he wanted to work with computer modeling, and his classes didn't offer much experience. "It seemed like I would enjoy it more than just another chemical engineering class. The one-on-one with the professor is a lot of fun and I've learned a lot," he said.

Author Bio: Robin Gigot is a senior majoring in journalism and political science.

O Arnn



Source: Engineering Communications

**Sandra Arnn, Director,
Engineering Career Services**

Interview by Atul Khosla and John Marmet
August 5, 3:30-5pm, www.engr.wisc.edu/services/ecs

Has there been a period in the past where there has been a similar level of excitement surrounding the job market for engineers and how has the wave [of the job market] moved through time?

The engineering job market has always been cyclical. Since I've been here as director over the past 11 years, I've not seen anything as intense as we've seen during this past year. I'm told there were in previous decades huge hiring drives by companies like General Motors, Boeing, Westinghouse, General Electric and IBM, providing multiple offers to many graduates.

I would say that over the past decade none of us in engineering career services offices around the country has seen anything quite like this market — in particular, the drive for computer engineering students and computer sciences students. Students in *any* engineering discipline who have outstanding computer skills are often very marketable. It's been really intense interest...especially for programmers.

Do you ever have the sense that you're competing against other universities?

Definitely! We *know* that it's a competitive process and the best companies all over the country have a lot of choices about where they recruit. It's our goal to be on their "key school" list, which generally means that they have a relationship with the College that includes more than recruiting — often research and scholarship partnerships. Employers select our College for on-campus recruiting for two main reasons. First is the quality of the faculty and engineering educational program which is reflected in the engineering education our graduates receive. The second reason, based on extensive feedback, is related to the number and quality of services we provide to welcome and assist them during their campus visit. We offer recruiters many "hospitality" services such as parking permits, morning coffee, maps, restaurant and hotel recommendations, contacts with student groups, faculty and administrators. Little things mean a lot in this business.

Over the past 5 years, many companies have greatly reduced the number of schools they visit. They sometimes find that recruiting in their immediate geographic area yields the greatest number of hires. But we certainly have a very broad cross-section of employers throughout the country and now throughout the world.

There is a ranking for Coop/internship programs. What is this program ranked?

I'm not certain what ranking you are citing. Our cooperative education program is not specifically ABET accredited. This has not been any problem, as evidenced by our very large recruiting program. A strong component of an ABET accredited coop program requires that students work the "strictly alternating" coop assignment schedule of academic semesters and work periods. Our innovative, more flexible program which allows students to work during "back to back" terms (adding a summer to a spring or fall semester) has been extremely popular among employers and has enhanced both our employer and student participant bases. The important fact is that, of course, all of our engineering departments *are* ABET accredited.

What are your feelings towards electronic resumes, the websites that offer to circulate resumes, and do many students find opportunities that way?

It's hard for us to get a grasp on the actual numbers. I think that last year, when we did our exit surveys, we had four or five graduates who said that they'd found their jobs on the internet. That's one of the big shifts that I've seen here over the last 10 years – the utilization of technology – in trying to market our students and provide information to both students and employers. We tell students considering resume websites to use good judgment about how much personal information they disclose. You're representing yourself to the universe at large, and you don't know who may review your information. We certainly encourage students to use many pathways beyond our office during their job search.

What are some of the future plans of this office?

Gene Masters and David Minor, who are our College of Engineering computer con-

sultants, have worked since last fall to develop an on-line web resume service for us which will be offered to students this fall for the first time.

I can't say that it (or any computer system!) will be perfect or without any problems. But it is a *vastly* improved system for our students and employers. We survived a very rough ride with a commercial system that failed last fall semester. We are grateful to have our new customized web-based software up and running!

We will also, for the first time, be providing our employers access to on-line resumes. We have many employers, even very high-tech companies, who have requested both the traditional hard copy and web access resumes. We will continue to offer both services, but we are encouraging employers to move to the web. We know that computer technology is going to make possible many things for us in the future that we can't even imagine right now. But certainly an automated interview signup system is under discussion. In doing exit surveys with our users each spring, students have preferred our current sign up system to a computerized bidding system or lottery. However, as we gain access to more sophisticated computer technology, it is inevitable that we will find a workable alternative.

No matter how many computerized services we provide and how many things the new millenium brings in technology, there are always going to be some things that computers can't do. That includes providing a welcoming person with a smile at the front desk to greet employers and students. There is always someone here to sit down with a student who's had one too many rejection letters. Students can get pretty depressed about that. Susan Piacenza and I hold masters degrees in counseling programs. While that's not our primary focus, if students who need help with serious personal problems affecting their job searches – we're here to provide it or to make the best referral. We also help students make decisions in comparing offers from more than one employer. We have substantial feedback from students indicating that the workshops and individual appointments we provide are highly valued services, especially on a campus of this size

Has anyone ever done a teleconference interview?

Yes, there have been a few. We purchased equipment and service capability through Viewnet, a local teleconference company. We've had it available for several years now, but we don't do intense marketing. We've probably had fewer than five requests from employers over the last few years. We have the technology to do it, if any company requests this service. It is a valuable tool for some international employers who wish to minimize recruiting travel expenses. A recent national study of college students' assessment of recruiting practices indicated that students much prefer a face-to-face interview over a video interview. Most employers tell me that they want to meet candidates face to face in an interview. Sometimes teleconference interviews can be used as a screening tool prior to on campus interviews.

Are there any indicators that students can follow to try to give them a sense of the job market?

There are both external and internal indicators. Reviewing our on campus recruiting, hiring and salary statistics for the most recent graduating class is one suggestion. Reading *Business Week* & *The Wall Street Journal* provides access to a great deal of information on the economy and job market. When the stock market takes a tumble like it did this past week, these resources will extensively analyze and project its probable effect on the job market.

Our ECS Employer Development Manager, Linda Guerin, is always a good internal resource. She serves all employers scheduling on campus interviews and reports that all 30 of our interview rooms are booked every day in October and well into November. Each day will provide 350 – 400 interview opportunities for co-ops, interns and graduating students at all degree levels.

The fact that so many companies wanted to attend Career Connection 98 that ECS & POLYGON decided to add a 4th day to bring in an additional 50 employers is another very good indicator of the strength of the job market. Alumni Services Manager Kathy Prem is working closely as professional liaison with Career Connection Student Co-Chairs Kari Fischer (IE) and Andy Lamer (ME) to manage this huge event which will bring nearly 200 employers to

Sandra Arnn (continued)

campus on September 15, 16, 17 & 18. Students can ask these employers directly about their hiring projections for the coming year!

When was the [ECS] office established and what type of emphasis does the college place on this office alone, as opposed to individual academic departments? How large a role do you see ECS playing in the success of the College?

The office was established more than 40 years ago. The director who preceded me was Professor Jim Marks who held this position for 31 years until 1987 when I was appointed. So, I am just beginning my 12th year in this position and my 16th year in the College. It probably won't surprise you that as director of the office, I see ECS playing a very large role in the success of the college. Education for the sake of learning has always been important and it continues to be important. But, I can tell you for sure that educational institutions and programs which cannot provide direct linkage between a student's academic preparation and his or her place in the world of work are experiencing very serious problems. ECS has always received excellent support from College of Engineering administration and faculty.

Some schools are now guaranteeing employment of their students by publicizing that if a student graduates from their college or university and hasn't found a job, he or she can come back and do coursework free of charge and receive career counseling until employable in the field of study. We haven't had to do that, but this practice indicates a real shift in priorities. This is true not only in engineering, but also in liberal arts. Parents are intensely interested in the employability of their children, regardless of their college degrees!

Successful employment or graduate school acceptance will be very important indicators in the outcomes driven method of accreditation that the college will be undergoing for the "ABET 2000 Review," which is conducted by the Accreditation Board for Engineering and Technology.

Comments about UW-Madison College of Engineering students

*Finding and developing a few very bright and energetic construction engineers is critical to Graycor's long term growth and prosperity. Because we have found the University of Wisconsin's construction program to be **one of the best** in the Midwest and because of its graduates have proven so successful with us, we have been very happy to consider UW-Madison a partner in this effort.*

- Matt Gray, Vice President, Graycor

*Dorgan Associates is **proud** to say that we have had great success recruiting students through UW-Madison's co-op program. Our company maintains at least one student co-op employee at all times and currently have two on staff. The UW-Madison co-op program has been a **great** source for talented, self-motivated individuals looking for an opportunity to **excell** professionally.*

- Ryan Meinholz, Dorgan Associates

*We recruit at UW because myself and our president, Mike Schultz, are alumni. We have had **excellent** students work for us and hope to continue for many years to come.*

- Eric Neuhauser, CGC Inc.

Following up with our graduates regarding their destinations after they finish their education at the College will become increasingly critical. It is already a process in which our ECS staff invests a lot of time and resources. We try early on, to talk with students about remembering when they finish up, not just to "take the money and run," but to please let us know because we work hard year round to try to make these opportunities possible and it's really important for ECS and the College to know what happens to our graduates.

Our role is essential because many observers, both inside and outside academia, would say the largest part of the success of an engineering college will ultimately be judged by the satisfaction of industry and governmental agencies and educational institutions which employ our graduates. So we're trying to provide as many services as possible to facilitate the best matches between both students and employers —

which in turn, helps bring the best employers and the best students to the college. An increasing number of important national surveys are focusing on placement and salary data.

What are your feelings towards placement and salary data?

This data should certainly be viewed as indicators, but it is important is to be sure that uniform survey methodology is used at every school, because there are a lot of semantics involved in this! Some schools consider students "placed" when they are either going to graduate school or "have accepted jobs." Some remove the numbers of all foreign national students before providing their data because the employment rate of foreign national students is very limited when they do not have work authorization in the US. This step can radically skew statistics. What happens is that 50 schools may be surveyed, using 20 different data gathering methods. I feel strongly

that there should be an agreed upon and somehow "observable" method for surveying schools. The economic climate, of course, has huge impact on these figures.

The College also relies on us to assist in the recruitment of students to the College through outreach to middle school and high school students. Providing resources and speakers for the annual "Expanding Your Horizons" conferences is an example of an effort to attract 7th and 8th grade girls to engineering.

ECS plays an important role in the retention of students through opportunities in our rapidly growing Cooperative Education and Internship Program. If students are very engaged in their educations and are having experiences which greatly strengthen their interest, that's a bonus. Pro-active students are seeking cooperative education and internship possibilities. There are some schools that don't offer them, so this is another big plus for the College of Engineering.

Our services to industry also help provide a link to research funding for faculty. Companies know that faculty prepare students to go out into industry and government agencies and many of them support research important to the success of their industries. We are an important link for fund raising for the college through the UW Foundation. We frequently are asked to provide data on how many BS, MS or PhD graduates [have been hired by] a particular company during the 5 years prior to their fund raising visits. In addition to the whole array of services we provide to students and employers, the front desk is often a visitor information desk. We have many, many people wander into this office for the first time because they are looking for faculty or programs in the building. Our front desk lead receptionist, Mischelle Manz offers a welcoming smile and helpful information for our customers and visitors. Dean Bollinger has remarked that our office is a "window" to the College and often the point of first contact for visitors.

Have students from the College of Engineering gone outside the traditional engineering internships and how have they performed in those situations?

The salaries earned by our co-op and intern students are about 80% of entry level engineering students salaries. I know students in just about every other field who say, "I had to fight like crazy just to get an internship as a volunteer, but I was not compensated in any way financially." So it is a big plus that our students can finance a large portion of their college education expenses through these programs. The program's popularity has grown dramatically from 80 -100 placements annually in 1985 to 800 placements during the past academic year. Cooperative Education and Internship Director John Archambault reports nearly 1,000 students registered last year.

Do you handle graduate school applications through this office and assist students in that?

No, we don't assist in the application process. However, some of the career advising offered here is directed at students exploring whether to go to graduate school or whether to seek employment. ECS Assistant Director Susan Piacenza provides excellent assistance for exploring this decision through individual appointments. Certainly we consider graduate school a very important destination for many of our students and we often recommend that as a best course. When the job market is outstandingly good, some students decide to seek employment prior to applying for graduate school.

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I've often heard that a PhD student will have more difficulty in finding a position outside of academia, than an MS student. Do you find that to be the case?

The market for PhD's in many disciplines is currently strong. However, your comment rings true when employers are in a period of retrenchment or downsizing. What seemed to be the case in past years was that many employers hired masters level students. Sometimes they were trying to avoid the higher price tag of a PhD and recognized that MS students can do a number of things beyond the capability of most BS level students. These hiring trends largely depend upon the economy and the job market. There are years when PhD recruiting is very successful and many of our registered candidates find jobs through the on campus interviewing process. Other years during a recession period they have had to be more creative in their job searches.

For more information contact Engineering Career Services



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The World Beyond the University

A huge door of opportunity is opening today. You feel it happening all over again: the joy, the excitement, the hope and the anxiety. But this time you feel a sharp twinge of sorrow and the promise for a brighter future as you drive to campus. You watch your son unpack, wide eyed and anxious to meet any new face that goes past the door of the little room he will now be calling home. You know he's thinking about who he will meet, where he will go and all of the new trouble he might find. You can't help but wonder what he will learn and who he will become.

You see your son off and drive home. Then you go to work and greet your fellow co-workers. One of them seems edgy. You ask him what is wrong, and he says he isn't sure. Something is not normal. You joke, "Maybe we're all getting laid off!" As you approach your office, your boss walks by.



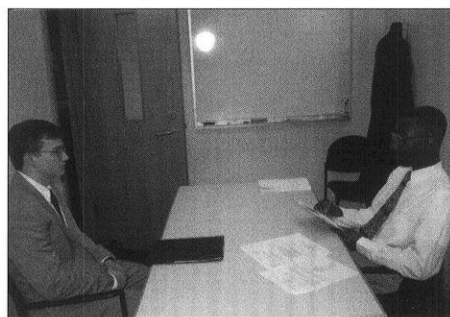
You greet him, and he asks you if you have a minute to talk. As you go into his office, he shuts the door and hands you a binder and several envelopes. He says, "As of right now, you no longer work for us. Here is your severance package, and there is a meeting this afternoon at the outsourcing plant."

What is in the severance package? Not much. One week's pay for every year you spent working there. If you sue, you get nothing. The agreement says you have a certain number of days to sign, but their math is off and you have less than a month. In a short time, you have to decide if you can put a case together against them. This story is becoming common among older, white-collar workers. This particular story

actually happened to an engineer in his mid-fifties who, for protection of privacy, will be called Joseph Smith.

Huge layoffs can happen for a number of reasons, but mergers seem to be a major contributor. Between 1979 and 1995, 43 million jobs were eliminated in the U.S. 18.5 million of those were white-collar jobs with the majority of them lost in the early 1990s. More specifically, between 1993 and 1996, more than four million people over the age of 20 with at least three years tenure lost their jobs. Overall, 12% of the jobs in large corporations were eliminated in 1993. Of course, there were new jobs created, but where does that leave the people who lose theirs? Joseph Smith explained it this way:

"One minute you're making \$80,000 a year, the next minute you're making nothing. And what's more, you have nothing to do. All of a sudden, all of those projects that you worked on and all of those plans that you had downstream are wiped out in one nod. Gone... There was no explanation. They wouldn't give you an explanation. You weren't laid off because you weren't performing... it's just that the company needed to get rid of some people and your name came out of a hat. But if you tried to sue them, they had a personal file on you...



every time I parked my car backward... forgot my pass..."

What could he do? After analyzing the situation and finding a lawyer who was willing to take the case, he decided to try to get on with his life. It was not that they didn't have probable cause or enough information, it was that the company had the personal file that could discredit him. Could he have won? No. Someone else tried and lost.

What was in this personal file? A large portion of it was review sheets. He received very high ratings in job performance. They were not disappointed with his work. However, there was a pile of smaller notes, all written in the past four years, with negative comments.

What does this all matter? According to my source, it actually does affect your job. "It has a hell of a lot to do with whether you get promoted or not... because most bosses don't understand what you're doing technically."

Pension and other Money Issues

An option that many of us see is for those layed off people to retire. Is this realistic? That depends. Generally, pensions accumulate slowly until the employee has about 25 years of service. So if you have not worked for them for 25 years, this may not be a feasible option. Also money typically doubles every seven years. Where will that leave you at age 62?

Smith said, "The expectation is that when the kids have left home, in the last four to six years before I retire, I'll be able to set some money away and I'll be set. Then I got laid off in my mid-fifties. What are the social ramifications if they do that across the country? Who is going to take care of them when they are in their 70s and 80s and don't have any money left?" He suggested something for all of us who are just getting out of college and entering this new workforce. He said, "Save your money."



When layed off after many years with the same company, interviewing for a job becomes a whole new ballgame.

Why the Engineers?

"For the company I worked for it was, 'Who can we do without?'"

Engineers are typically in a position of a lot of knowledge and not a lot of power. The managers do not understand the technical issues that the engineers deal with. Consequently, they do not always feel that the engineers are doing a beneficial job. Additionally, more engineers are entering the workforce now than before, deeming us more disposable than before simply due to the laws of supply and demand.

"One minute you're making \$80,000 a year, the next minute you're making nothing. All of a sudden, all of those projects... that you had downstream are wiped out in one nod. Gone..."

Looking for a New Job

When we think of someone looking for a new job, we typically get a picture in our heads of a student or some other young person. Where does this leave the older interviewees? Although age discrimination is illegal, it is still something that exists. It cannot be eliminated unless we go to the confessional for interviews, the parties separated by a dark screen. Even then, age would be apparent since the older person has more work experience, earlier graduation dates that would appear on the application and a unique social security number that is often requested for a background check.

How does the older person who was just laid off find a new job? Smith said, "You are going into an interview knowing that you just lost a job, and you have to go in there and persuade them that you are the best person... How do you do that emotionally?"

The Moral of the Story

The only constant in life is change, and as the world changes, we are going to have to learn to flow with it. As has happened and will always happen, the world is changing again, and there are effects that have to be

dealt with now. For us, this means more job and career changes as well as more opportunities for us in the future.

Smith said, "The companies don't owe you a career. In the past there was an understanding. I don't think that what has happened is necessarily bad. It's just that my expectations when I went out to work was based on a time frame that my father had. The rate at which things change now is so fast that that era is no longer valid. It's gone."

As more and more older people go out looking for work, society will begin to accept this, and there will be more opportunities for them. So when we are looking for a new job at age 50, we will not be alone, and it will not be considered unusual. However, this all could change later, too, as companies seek to hold on to employees longer.

Try to keep in mind why you are working in the first place. Joseph Smith said, "You want to work because you want to be fulfilled in what you do. I think that's what really drives us all. But it's hard to get job

satisfaction when you can't pay the electricity bill and your car is always breaking down. You can laugh at it for a while, but eventually it gets to be a real problem."

Smith had some final advice for students. "I strongly identified with my job, and I think most guys do. The job is what they do. That's who they are. There is a saying, *To Thine Own Self Be True*, and I don't think you should ever forget that. You have to look at yourself in the mirror in the morning and you have to be happy with who you are and what you do. But do not, under any circumstances, let your identity be tied to a company. Learn everything you can and take on new challenges, and don't ever be scared you're going to get fired. I think in this day and age you will be fired at some point."

Author Bio: *Diana Zeller is a senior who thinks it is important to bring information about the workplace to the students.*



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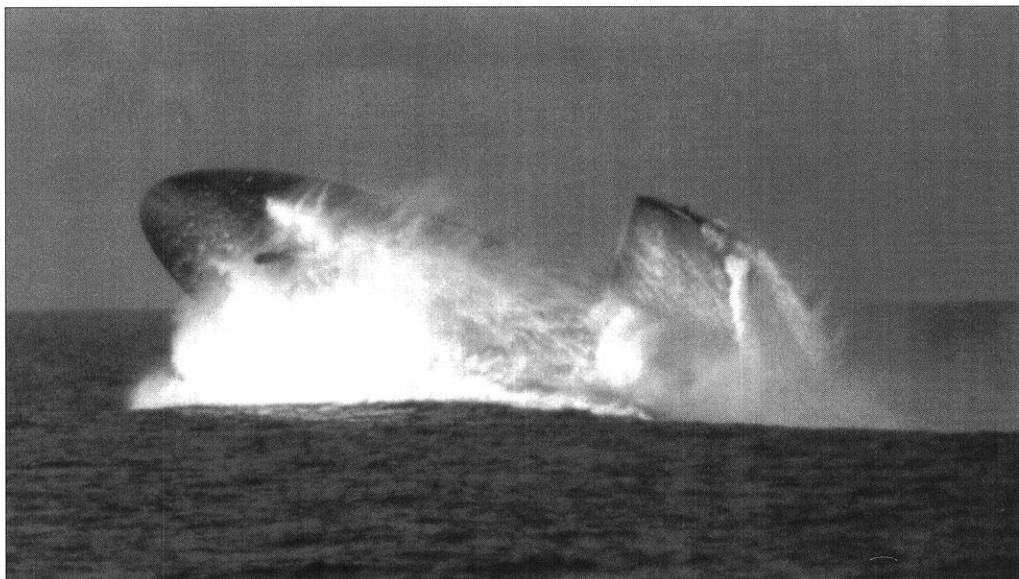
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In the Navy

Hey oncoming, wake up. It's 11:20. You're due on watch in ten minutes and I'm not coming back again," the swing helmsman said as he hurriedly poked my arm and moved through the darkened forward crews berthing in search of other delinquent oncoming watchstanders. It was his second visit to my "rack" (a navy term for the coffin sized space that served as my sleeping area). I was trying to squeeze as much sleep as possible into my six hours of free time before I headed back into the engine room for another 18 hour rotation. I had been asleep for approximately four hours, recovering from a six hour watch followed by six hours of repairs to an electric motor with a blown bearing. I had conveniently managed to shower and eat before hitting my rack, so my spare ten minutes were spent using the bathroom, grabbing some coffee, and signing into the logs as the midwatch electrical operator. Life as a submariner is not for those who need a regular, predictable schedule. It's not for those who need long hot showers and clean fresh air either. And it's certainly not a life for those with an aversion to battery acid and engine grease, working until the job is done and fighting the occasional fire.

Intending to eventually use the GI Bill to pay for college, I had joined the Navy shortly after graduating high school. My route to an engineering degree started a bit differently from what most military and civilian engineers experience. Many choose a path that takes them to college first, an ensuing commission as an officer, and a career front-loaded with a bit more authority than an enlisted person. Enlisted sailors, such as myself, are often fresh out of high school but soon find themselves



A Navy submarine surfaces.

faced with challenging leadership roles. Between high school graduation and my arrival at the fast-attack submarine USS Albany (SSN 753) I spent approximately two years attending school for the Navy's nuclear power program. The deal with Uncle Sam included pay incentives and accelerated rank advancement, while I agreed to a two year contract extension. New officers and enlisted sailors, though different in rank, arrive at their first submarine for sea duty immediately burdened with new and sometimes peculiar responsibilities.

The Navy's academically oriented nuclear power program appealed to my engineering interests, and I soon found myself learning Carnot engine cycles, electric circuit theory and reactor power physics. My first true assignment was to learn the trade of a Naval Electrician's Mate - the shipboard electrical expert. I was trained heavily in AC/DC motor and generator theory and repair, digital circuit analysis and troubleshooting and repair techniques. Being designated as a

nuclear electrician meant that on top of conventional electrical work, I was to be certified as a nuclear reactor "electrical operator" and maintenance technician.

Shortly after beginning my classwork at the Naval Nuclear Power School in Orlando, Florida, I volunteered for the submarine service. The thought of serving in "the silent service" had appealed to me for several reasons. I had seen and experienced the brash attitudes displayed by my submariner instructors in the presence of regular surface sailors. For a reason at that time mysterious to me, they appeared to have more experiences to be proud of. Becoming a crewmember on a submarine seemed both more challenging and dangerous than working on a surface ship. I had seen the standard World War II submarine movies: *Destination Tokyo*, *Operation Petticoat*; the unpredictable and perilous life of a submariner was attractive to my eighteen-year-old curiosity. Too naive to realize there was probably a good reason why submariners earned larger

Source: U.S. Navy

paychecks than other sailors, I was on a path that would lead me to the USS Albany for a four year tour as a nuclear electrician.

Arriving at my first command, having recently graduated from a nuclear prototype simulation unit in upstate New York, was a jolting experience. All new sailors are tagged with the nickname "Nub" (Non Useful Body) until they are certified to stand a watch and thus able to support the daily progression of operations and maintenance. Nubs are expected to "hot rack" while the ship is at sea - there are not enough racks for everyone to have their own. This dreadful routine involves two nubs rotating their sleep and work time so that while one is working, the other is sleeping. Due to the heavy maintenance and operational demands, the rack usually ends up empty regardless of a well planned sleeping schedule.

Fast attack submarines are not built with comfort in mind. In the design phase of building a new fleet of submarines, highest priority is given to engines and weapons. People comforts are not high on the list. It is not uncommon to be assigned a rack that has a large hydraulic pipe running right where your knees should be. Nubs are not permitted to watch movies, play cards, or otherwise enjoy themselves. Their off watch time is consumed with learning the duties and responsibilities of their future watchstations. Every aspect of the physical makeup of the boat must be understood - from general operations to mechanical design. Because I was an electrician, I was expected to learn every detail of the electrical distribution system and its operation.

The pinnacle of a junior submariner's career is the awarding of their "Dolphins," or submarine warfare insignia. They symbolize a thorough understanding of submarine construction and operation, reliability under stress, and their shipmate's confidence in their ability to perform reliably when things get ugly. Ugly situations can consist of fires, flooding, steam line ruptures, or radioactive spills. Submariners train incessantly for such situations, instilling a second-nature type of confidence into each sailor's abilities during times of adversity.

A submarine fire is a deadly situation that requires immediate and certain response. With limited air for breathing, a submarine must surface in the event of a major uncontrolled fire. Surfacing allows the submarine to exchange air and ventilate the ship. However, when a submarine is under the polar ice cap or under attack by an enemy ship, surfacing may not be a feasible option. Therefore, the fire fighting training and certification each sailor experiences is taken very seriously. Responses to fires or steam line ruptures must be immediate and certain - there is no time to deliberate what should be done when a steel shell under the ocean is quickly filling with virulent fumes and deathly heat.

Slowly, over a period of 18 months or so, I was transformed into a fully qualified watchstander and found myself in positions of responsibility and gradually assembled leadership. I was placed in charge of repair and maintenance jobs of increasing importance and was assigned other electricians to work under my supervision. I stood watch in the reactor's control room, operating various portions of the propulsion and electrical power plant.

I participated in three extended deployments while an Albany crew member. Long periods of time spent submerged on patrol were rewarded with trips to France, Italy, Scotland and England. The old sales pitch "Join the Navy and see the world!" turned out to be a valid claim, at least in my case. The majority of our time at sea was spent in the North Atlantic conducting training operations, sometimes with the Navies of ally nations. At one point in time, we surfaced in a small "lake" surrounded by ice and I had the opportunity to go topside and witness the pureness of the Arctic. The most enduring memory of that occasion is the feeling of our intrusion upon a pristine environment - we

did not belong there, an oily steel giant floating among the chunks of bluish ice.

Working inside our colossal machine provided practical engineering experience beyond any of my initial expectations. In hindsight, it was unquestionably a pivotal moment in determining the depth of my interest in engineering and the sciences, and how they can relate to human achievement. The mix of differing personalities, skill levels, and job demands created an extraordinary experience I will likely never duplicate. My naval service eventually came to an end, and within days of leaving the USS Albany I was an older-than-average freshman squirming through Physics 201. My route thus far in search of a career as a professional engineer has certainly been a bit longer and meandering than the average undergrad. Distinct among my professional desires is to again find an environment and occupation as challenging and rewarding as that of a U.S. Naval submariner.

Author Bio: Dave Handley is a senior in Industrial Engineering and currently on co-op at Alcoa.



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continued from page 11

didn't fix the problem. It took another hour and a brake fluid bath for some team members and the problem was fixed well enough. We took second place. Later we realized someone had forgotten to connect all the vacuum lines to the heater controls leaving no vacuum for the power brake booster, whoops!

Then we went to do skidpad testing. For the skidpad, you drive the car around a tight circle to test handling and grip. Our car handled pretty well until we blew out a drive axle. We found a new one 15 miles away at a place that was closing in 30 minutes. Have you ever driven through a Detroit rush hour in a Suburban? Advisor Glenn Bower has. We put it in fast enough to make any pit crew proud, then we took first in this event.

Day 4:

Computer died for the acceleration event, but we took second anyway. 12V car battery is dead again – Wonder if the alternator is working???

Day 5:

Display all day at the Detroit Grand Prix, then went to Ann Arbor for emissions testing. About 11:00pm, the gearbox connecting the electric motor and diesel engine broke. The Suburban had to go back to the hotel, about 40 miles away, so three team members were left stranded in the Environment Protection Agency's parking lot with the trailer, Aluminum Cow and junk food. They pulled out the broken components and patched the car together by 3am, at which time two attempted catching some zzz's in the trailer while one got the back seat of the car. It was about 50 degrees outside.

Day 6:

Wake up at sunrise, get the car in testing, finish mid-pack in emissions testing. Go back to the pits, pull the entire powertrain (engine, transmission, electric motor).

Day 7:

Fixed gearbox, reinstalled engine. Car runs again. Removed tire from car prominently displaying our stolen mascot – left ransom request – "One tire for one Cow!"

Day 8:

Ran the endurance event, refreshingly uneventful except for Jamie Pitterle (driver) and Amanda Pertzborn (co-driver) almost dying from boredom driving 4.5 hours, 166 miles around a 1.8 mile track on 2 gallons of fuel. Oh, we won that too. (83 MPG!)

Then we ran the autocross, a small race around cones, it rained the whole time. The Aluminum Cow posted the fastest time, beating out even the stock version of the Taurus and a Police Car.

Day 9:

Awards Ceremony. We'd love to have driven the car away but the alternator didn't work and the battery went dead. Who cares? We won!

Started back to Madison with 3 spare trailer tires.

-submitted by the FutureCar Team

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But now it is gone.

The Web site you seek
cannot be located, but...
many more exist.

Chaos reigns within.
Reflect, repent, and reboot.
Order shall return.

ABORTED effort:
Close all that you have.
You ask way too much.

First snow, then silence.
This thousand dollar screen
dies so beautifully.

With searching comes loss
and the presence of absence:
"My Novel" not found.

The Tao that is seen
Is not the true Tao, until
You bring fresh toner.

Windows NT crashed.
I am the Blue Screen of Death.
No one hears your screams.

Stay the patient course
Of little worth is your ire
The network is down

A crash reduces
your expensive computer
to a simple stone.

Yesterday it worked
Today it is not working
Windows is like that

Three things are certain:
Death, taxes, and lost data.
Guess which has occurred.

You step in the stream,
but the water has moved on.
This page is not here.

Out of memory.
We wish to hold the whole sky,
But we never will.

Having been erased,
The document you're seeking
Must now be retyped.

Rather than a beep
Or a rude error message,
These words: "File not found."

Serious error.
All shortcuts have disappeared.
Screen. Mind. Both are blank.

Error in Solve Block:
You are in big trouble now
and should start over...

...find a manual.
Read pages one to ninety.
Better luck next time.

Invalid Index
I'm Mathcad, King of Evil.
Your work won't be done!

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like a typewriter :)

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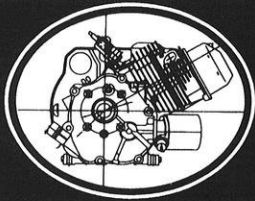
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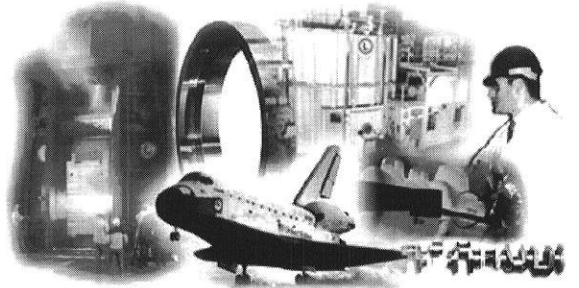
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