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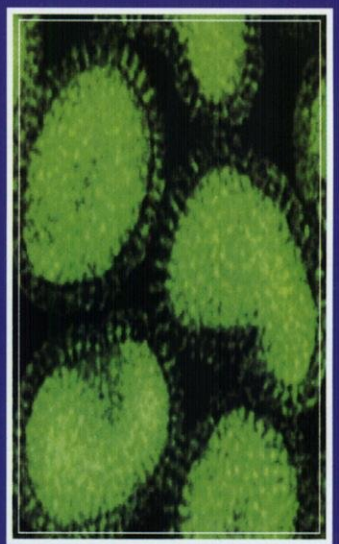
FEBRUARY 1999
VOLUME 103, NUMBER 2

WISCONSIN ENGINEER

Cryptosporidium

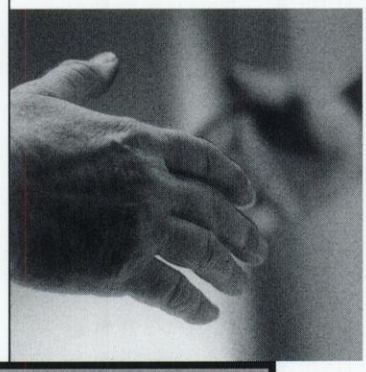
BAD BUGS!!



Influenza virus

Whatcha Gonna Do?

WHERE Opportunity



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WISCONSIN ENGINEER

Published by the Students of the University of Wisconsin-Madison

VOLUME 103, NUMBER 2

FEBRUARY 1999

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Y2K Illustration done by Sarah Williams

Cryptosporidium photo courtesy of Jon Standridge, State Laboratory of Hygiene

Influenza virus photo courtesy of Linda Stannard - University of Cape Town
http://www.uct.ac.za/depts/mmi/stannard

DEPARTMENTS

TO CONTACT THE *WISCONSIN ENGINEER:* 1513 University Avenue Madison, WI 53706 wiscengr@cae.wisc.edu http://www.cae.wisc.edu/~wiscengr 608-262-3494

What Might Not Have Been

Sometimes you look back at the decisions you made over the past couple years and wonder what would it have been like if the decisions were made differently. What colleges should I apply to, which major should I take, or how much should I study tonight? You can always wonder what might have been, but sometimes it is probably better to think more positively and wonder what might not have been.

One decision that has turned out to be invaluable to me was the decision to get involved with the Technical Communications program. Typically it is thought that an engineer works with the opposite side of the brain than that of a writer. For the most part this is true, but I think the future, and the present for that matter, will dictate an overwhelming need for qualified people who can do both.

Despite completing the coursework for a Technical Communications Certificate (TCC) and being the editor of a magazine, I do not claim to know where a comma goes. But I do claim to understand something about communicating technical information in a clear, understandable manner. Without the experience in communications that I have gained through the Technical Communications program I would not be where I am today.

During my internship this summer, even though it was apparent that I had a lot to learn about industry, it was also clear that the ability to express my ideas clearly and understandably was a huge asset. When I started my internship, I was the only person in the plant under 40 years of age. Because I had confidence in my communications skills, I was able to relax and contribute to the project.

Even though I spent a lot of time on my communications classes, and I probably sacrificed a few grades in my more competitive chemical engineering classes, it will definitely prove to be a good decision in the long run. Getting involved with the *Wisconsin Engineer* magazine, for example, has taken up a lot of my time that would normally be devoted to my hard core chemical engineering classes. However, if I had it to do over again I would spend just as much time on the *Wisconsin Engineer* because it gives me a sense of pride and accomplishment that I can't get in chemical engineering. I have something that I can look back on over the years, and I feel like I contributed something to this University.

If you are interested in developing your communications skills, the TCC offered here at UW-Madison is well worth your time. I believe every student who graduates with a TCC has an edge that will prove extremely valuable to them in the future. Earning the certificate shows that engineers can write if they put their minds to it.

The College of Engineering
University of Wisconsin-Madison

UNIVERSITY OF WISCONSIN MADISON

ASM

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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Correspondence: *Wisconsin Engineer* Magazine, Mechanical Engineering Building, 1513 University Ave., Madison, WI 53706. Phone (608) 262-3494.
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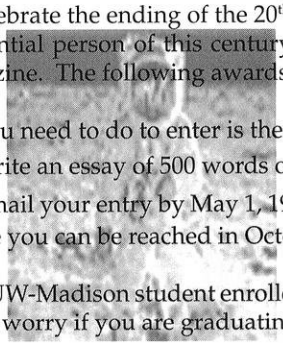
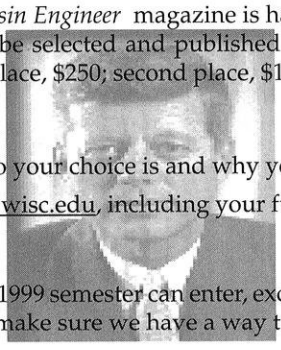
The *Wisconsin Engineer* is published four times yearly in September, November, February, and April by the Wisconsin Engineering Journal Association. Subscription is $15 for one year and $25 for two years.

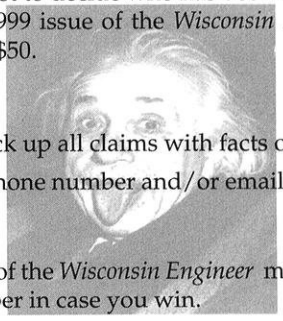
Who Would You Name as the Person of the Century?

"...I'm gonna party like it's 1999." It seems like I've been hearing the song "1999" by Prince for such a long time. Although January 1, 1999 has come and gone, I still can't believe that it is 1999, and this century is nearly finished.

To celebrate the ending of the 20th Century, the *Wisconsin Engineer* magazine is having an essay contest to decide who has been the most influential person of this century. Three essays will be selected and published in the November 1999 issue of the *Wisconsin Engineer* magazine. The following awards will be given: first place, $250; second place, $100; and third place, $50.







All you need to do to enter is the following:

⇒ Write an essay of 500 words or less explaining who your choice is and why you feel that way. Back up all claims with facts or logic.

⇒ Email your entry by May 1, 1999, to wiscengr@cae.wisc.edu, including your full name, address, phone number and/or email address where you can be reached in October 1999.

Any UW-Madison student enrolled during the Spring 1999 semester can enter, except for current staff of the *Wisconsin Engineer* magazine. Don't worry if you are graduating. Please enter, and make sure we have a way to reach you in October in case you win.

1999 is a year for reflection. People make history. Who do you think has been the biggest history maker of the 1900s? Think about it, and get busy writing.

Jennifer Schultz
Editor-in-Chief

MECHANICAL ENGINEERS

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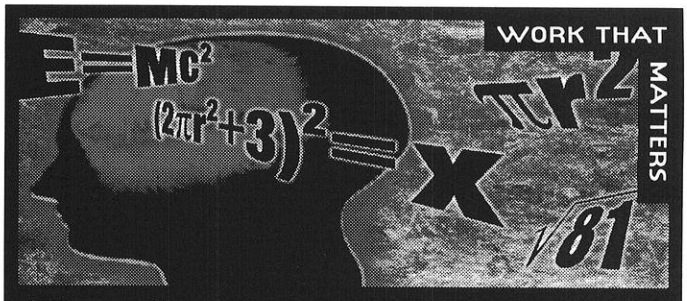

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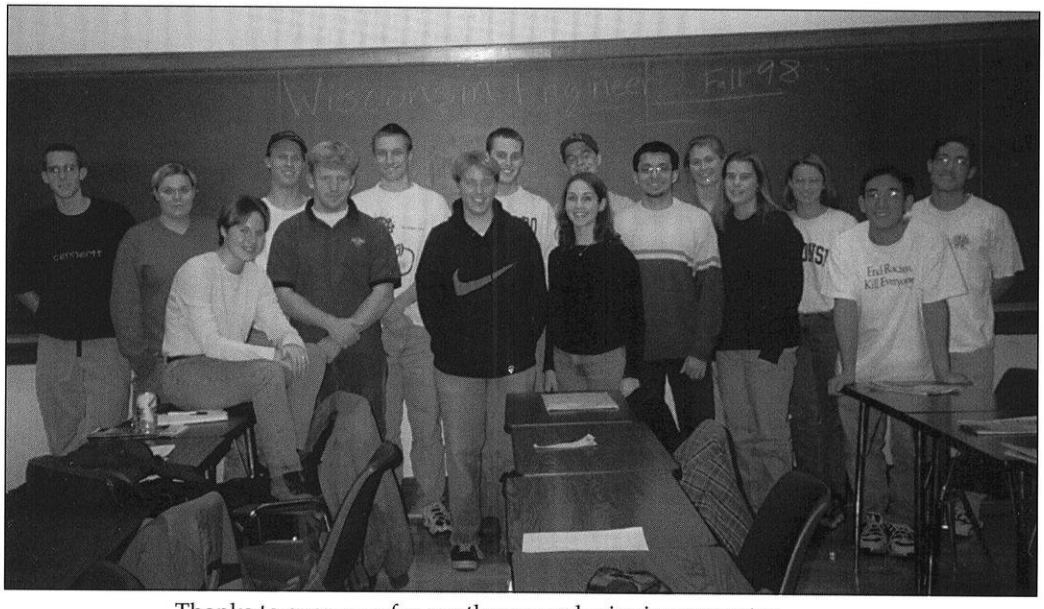
The *Wisconsin Engineer* Staff Fall 1998



Thanks to everyone for another award winning semester.

Want to join the *Wisconsin Engineer* but don't know where to find us?

We meet every other Wednesday night at 7:00pm in 318 Mechanical Engineering.
Our next two meetings are Feb. 17th and Mar. 3

News from COE Organizations

To announce your organization's events in the *Wisconsin Engineer,* contact Brian Kuhn at 262-3494 or email at bakuhn@students.wisc.edu

Here is a look at what is going on with some busy student organizations this semester.

American Institute of Chemical Engineers

Chapter Meetings:
2/10 Nestle
3/3 Air Products
3/24 Alternative Career Paths
4/14 Equistar
4/28 Elections

Plant Trip:
2/19 Kraft

Other Activities:
March – 4-6 — Regional Conference, Toledo, Ohio
2/13 and 3/13 — MathCounts (volunteer opportunity)
All semester — Intramural sports teams
Other social and volunteer events, TBA
Contact us at **aiche@cae.wisc.edu** or visit the website at **www.cae.wisc.edu/~aiche**

Polygon Engineering Student Council

The Polygon Engineering Student Council will be hosting the National Association of Engineering Student Councils (NAESC) Region 4 Conference in Madison, April 16-18. Region 4 is comprised of engineering schools throughout the Midwest, and this Conferecne will bring together more than 150 delegates from 17 universities to network, share council ideas and projects, and make progress on our regional and national projects, such as CareerExpert and Project BEST. The theme for this year's Conference is "Forming the Foundation for Our Future", and will encourage visiting councils and delgates to not only network and work together to improve the National Association, but also to improve the unity and lines of communications within their own councils to allow them to accomplish more, both on their respective campuses and within NAESC. To find out more about Polygon or the 1999 Region 4 Conference, visit us on the web at: <http://www.cae.wisc.edu/~polygon>www.cae.wisc.edu/~polygon, or e-mail us at: polygon@cae.wisc.edu.

Institute of Electrical and Electronics Engineers

What is IEEE?
The Institute of Electrical and Electronics Engineers (IEEE) is a group of more than 300,000 professionals and students from more than 150 countries. IEEE was founded in 1884 and is the largest professional association in the world. It is the best source of Electro-technology publications in the world. At the local level, we have more then 200 members! We have at least one plant tour a semester and chapter meetings once a month. During the meetings, we have companies or distinguished speakers present for our group. We also have social activities such as a barbecue and volleyball.

Benefits of IEEE?
All IEEE members receive a personal subscription to the IEEE Spectrum magazine. With this, IEEE members gain an edge with the best technical information on electrical and computer engineering in the world. This is a monthly magazine that even UW-Madison professors have written for. IEEE is a great opportunity to network with other students and industry. It is an organization to become involved in if you want to contribute your own personal talents and skills.

So, GET INVOLVED!!!!
Applications are available at the meetings and are posted on our bulletin board next to the ECE mailboxes. If you can't make a meetingand want an application, email IEEE@cae.wisc.edu and we will makesure you get one. When you receive your application, please fill out the last page and attach your check or credit card number with the application. Student membership rates for 1999 are only $19. Place the application in the IEEE mailbox. It is located with the ECE professor and T.A. mailboxes in Engineering Hall. To get to the mailbox, walk into the doors of Engineering Hall with the statue of the student next to them. Walk straight until you reach the Edison invention. Here you will take a right. The mailboxes will be on your left side. We are in the lower middle area of the mailboxes.

Itinerary for IEEE for spring 1999
Thursday, March 19th, 5:30 - 7:00 P.M.
Joint Meeting with the IEEE Professional Chapter and the Student Chapter Presenter: Microsoft

Tuesday, March16 or 23rd
Kimberly-Clark Plant Tour in Neenah, WI

Friday, April 9th, 4:00 - 5:30 P.M.
IEEE Meeting Lama Nachman from Intel will present the new IA-64 architecture
If you have any questions or comments, please email IEEE@cae.wisc.edu.

Chi Epsilon Honor Society

Some of the eventswe have planned are:
February 27 - Habitat for Humanity
March 27 - School of Engineering wide Food Scavenger Hunt
April 10 - Habitat for Humanity

We are also holding the Conclave 2000 meeting.

Advanced Mathematics and Physics

Why not AMEP?
Engineers want to know how things work and why in the physical world. In servicing the needs of tomorrow, an undergraduate's mastery of the tools for investigation is essential. The University of Wisconsin-Madison affords as opportunity to develop these skills while acquiring greater training in physics and mathematics than prescribed by a typical engineering program.

Students can be more creative in tailoring their curricular trek for tomorrow's trends within the University's Applied Mathematics, Engineering and Physics (AMEP) program. Undergraduates blend their knowledge of physics, engineering and mathematics to address challenges and creates solutions. The Letters & Science program consists of approximately eight courses in mathematics, seven courses in engineering science and eight in physics. Twenty credits not from the Division of Physical Science area also required from the College of Letters & Science, and a maximum of eight credits in the biological sciences may be included. AMEP uncz,graduates may select any engineering major for their emphasis in the course of fulfilling the 125 credits needed for graduation.

An undergraduate consults with advisors from the mathematics, engineering and physics departments respectively. It's recommended to consult with an engineering advisor from a specific department, then select a series of physics and mathematics courses to compliment the engineering emphasis.

Employment opportunities for AMEP graduates are excellent in the public and private research and development programs, especially in the advanced technology industries. Undergraduates have access to interview through the Engineering Placement Office. Recruiters are attracted to breadth of mathematics and physics courses which exceed a more traditional degree.

"AMEP is a wonderful program for graduates school because 80% continue on to graduate school," Dr. Wayne Dickey, a mathematics advisor. "Several students have gone on to law school to practice patent law."

Typically, an engineer works as part of a team including scientists and technicians. For example, a physicist investigates the fundamental laws of nature and defines the principles governing them. An engineer applies those laws and principles to solve challenges and thus create something beneficial to society.

An engineer observed, "scientists explore what is; engineers create what never has been." Upon matriculation, an AMEP graduate has a strong, multi-faceted foundation to do both within academia or the corporate.

For additional information, call 608-263-2546 for an advisor.
Eric Buchanan is an AMEP undergraduate and freelance writer.
erbuchanan@facstaff.wisc.edu or 608-345-0630.

Houston: We Are Go For Launch!

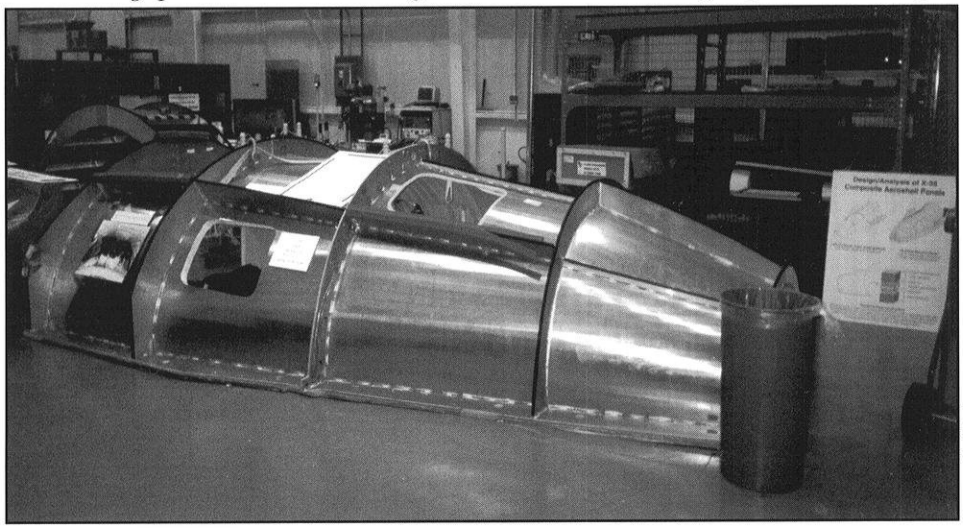
Source: Neil Kuhn

AIAA members at the NASA-JSC complex in Houston, Texas. AIAA makes a trip every year to really cool places.

What's the only thing AIAA members would drive 22 hours to see? The NASA Johnson Space Center (JSC), of course. That's right: in two vans and one day of driving, the 12 members found themselves in Houston, Texas. This is just one example of the kind of trip AIAA coordinates each year. Karina Shook, who is currently working for NASA and is an alumni of the University's EMA program, escorted the group around JSC.

Karina was able to guide the students through many "behind the scenes" operations at the NASA-JSC complex. The first day the group toured the The Advanced Space Propulsion Laboratory (ASPL) where astronaut Dr. Franklin Chang Diaz spoke about the most recent advancement in rocket technology, known as the Variable Specific Impulse Magnetoplasma Rocket (VASIMR). He has been working on the development of the VASIMR since 1979. VASIMR technology will greatly shorten human transit times between planets.

Starting bright and early the second day, the group toured the Neutral Buoyancy Lab inside the Sonny Carter Training Facility, where they watched astronauts suit up and train in a large pool that simulates zero gravity conditions. Next was a visit to see the X-38. The X-38 is going to be the Crew Return Vehicle for the astronauts aboard the International Space Station. What the group saw was the actual building of the V-201 which is an experimental model of the X-38. The students then were taken to the Mission Control Center. The group toured the old Mission Control room, which was used until 1991. Shortly after, the group was brought into the present-day Mission Control room. That afternoon the group walked through a full-scale mock-up of different sections of the International Space Station. This led them to the tour of the full-scale mock-up of the shuttle that the astronauts actually train on. The group got to see everything first-hand that the astronauts use in space—from the cockpit to the food hydrator to their toilet. The group wrapped up the day by touring the astronauts' shuttle simulator equipment.



Source: Neil Kuhn

A mock-up section of the X-38. The X-38 will be part of the crew return vehicle for the International Space Station currently being built in outer space.

The next day was spent at Space Center-Houston, where there are many interactive activities and informational programs for the general public. The AIAA group ended the sight-seeing at Galveston Island's Moody Gardens on the Gulf of Mexico. All in all, it was a very fun and educational trip. It was a great experience and the members are eager for next year's trip. Students interested in going on the trip next year should join AIAA.

Author Bio: Neil Kuhn is a sophomore in EMA.

UW Tackles Y2K Computer Problem

By now, you have all heard of the Year 2000 (Y2K) computer problem. Some of you may even be sick of hearing about it. But have you stopped to think about what the University of Wisconsin is doing to prepare for it? Will students be able to pay tuition or receive financial aid information on time? Will employees be paid in the next year? Who knows, will we be able to set our VCRs correctly to tape the Wisconsin Badgers in their second consecutive Rose Bowl?

To keep track of information for 40,196 students and 17,711 employees, the University of Wisconsin uses an IBM mainframe computer located at the Division of Information Technology's (DoIT) lab. This computer system, which has been in place since 1974, uses an outdated COBOL (common business-oriented language) compiler.

Preparing for January 1, 2000

In preparation of the year 2000, the University promoted Bob Irons as DoIT's Year 2000 coordinator. Irons has worked for DoIT for 20 years on various tasks. Irons became the Year 2000 coordinator in July 1997 and now has five people working with him full-time. Irons has a lot of experience with large mainframes, especially those running on COBOL, making him a wise choice for solving the University's Year 2000 problems.

Focus Areas

Because it is so large, the University has prioritized its computer-related problems to ensure it will solve the Y2K problem successfully. According to Irons, scanning the IBM mainframe for two-digit dates is the top priority because 95-100% of the University's problems would come from this IBM mainframe. It will fail if something is not done too. What that could mean for the University is that employees may not be paid on time and even student records could be lost. The mainframe, processes information for many areas that keep the University running as a business: the accounting system, research grants, and student registration, among many more.

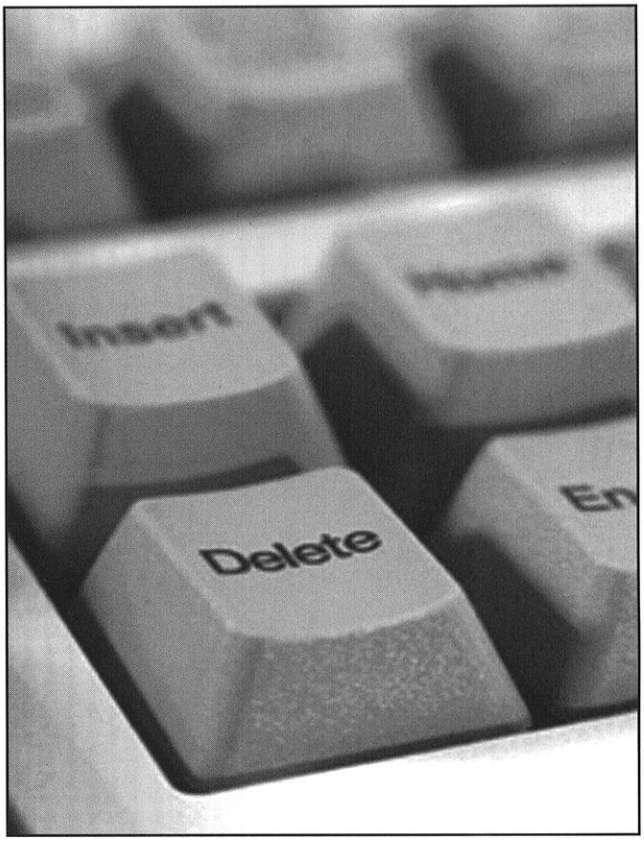
"No."
- Bob Irons, DoIT's Y2K Coordinator, when asked if we should be worried about the University's computers crashing

To ensure the University has no computer-related problems on January 1, 2000, the five trained people working with Irons are examining the mainframe's ten million lines of code. Code is the instructions that a computer reads to perform its functions. Examining all this code is done using very sophisticated scanners. These scanners go through the code and find areas that use two digit dates. Irons is betting that these scanners are capable of finding 98-99% of the problem areas within the code. When the scanners find two-digit dates, the Y2K staff can rewrite the code using four digits to represent the year. The problems not found by the scanners, if any, will be found when testing the mainframe.

After the Y2K staff has rewritten the code to contain four digits, they must test the changes. They do this by keeping the changes extremely localized within the specific part of the mainframe in which they are working. This way, their changes will not affect, or be affected, by other areas within the mainframe.

Should we be Worried?

According to Bob Irons, the answer is, "No." Right now, the evaluation and testing of the code is going very well. Three million lines of code have successfully been tested within the first two and a half months of testing. That puts the Y2K staff on pace to finish evaluating the code well before 2000. Irons' goal is to complete the Year 2000 project by July 1, 1999. But that doesn't mean the University will be finished worrying about the Year 2000 problem. There is always the potential of unexpected problems.



With one year to go before the turn of the century, everything may seem rosy for the University and DoIT, but what if something does go wrong with the mainframe before, or on, January 1, 2000? The Y2K staff currently has no contingency plans in case something does go wrong. Irons has given himself a nice six-month cushion before the immovable deadline, but the Y2K staff has no plans of what to do in case of unexpected problems with the mainframe within the last year. Irons has enough confidence in the scanners and their testing that he feels there really is no need for contingency planning.

Another positive note about the University's Year 2000 problem is the cost. Irons has projected that the cost to use the scanners and to test the code in the mainframe is well under $1 million. Irons was very happy with the relatively low cost of the project and is pleased with the progress his staff is making.

The year 2000 is almost here and with it, comes the potential for a global disaster- no one on earth knows what may happen. The year 2000 computer problem will affect every one of us if something is not done and done quickly. It is a comfort to know that the University began its preparation nearly three years ago.

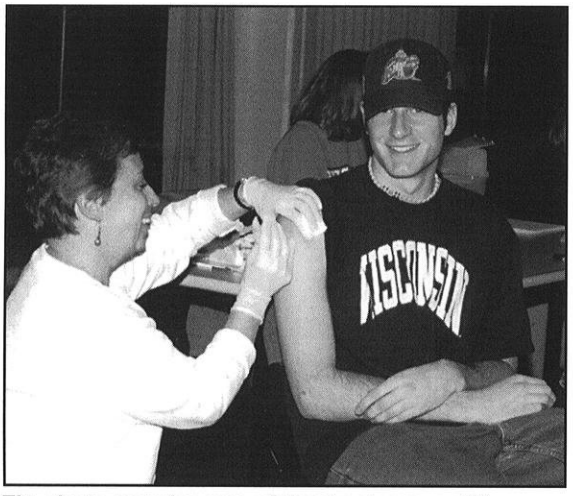
Author Bio: Brian Kuhn is a senior in chemical engineering who worked on the Year 2000 problem during his summer internship at Cargill.

Mr. Hyde the Flu: How a Virus Becomes Deadly

The seasonal flu bug will never be brushed off so casually again.

In 1918, the world was overrun by a virus that killed at least 20 million people. Called influenza, all the chicken noodle soup in the world couldn't drown this monster, and "sleeping on it" didn't evict it from your closet (or under your bed)! Good thing it's not 1918 and the virus is gone, dried up on the sill outside the immune system for 80 years.

But, snifflers beware! Researchers have discovered a mutation that could give one of these aspiring offspring a crack at epidemic status! Studying a descendent of the 1918 influenza virus that claimed so many lives, UW-Madison virologists Hideo Goto and Yoshihiro Kawaoka have found a molecular mechanism by which viruses could become deadly to humans. Usually, an influenza strain relies on respiratory cells to render it infectious. In this case, infection is localized in respiratory organs and is easily treatable. However, the altered strains sport molecular differences that allow them to sidestep the need for respiratory cells and spread infection throughout many organs, which has lethal consequences. As scary as it sounds, this mechanism sheds little light on the disaster of 1918, and, due to the constant adaptability of viruses, it promises little in the way of curing a pathogenic one.



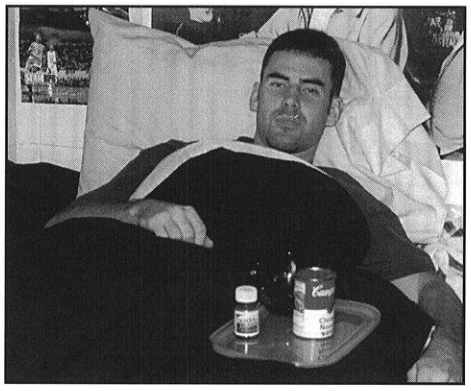
Source: Matt Vischulis

Flu shots may be one of the best preventitive measures against the flu virus.

Funded by the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, Goto and Kawaoka, researchers in the UW-Madison School of Veterinary, began by analyzing an influenza virus closely related to the strain responsible for the 1918 epidemic. This virus appeared in humans about ten years after the 1918 strain, and it is known to replicate in the brains of mice. However, Goto and Kawaoka found that the virus could also replicate in several other organs, a feat traced to the proteins on the surface of the virus.

In order for an influenza strain to infect a host, the protective outer protein shell, hemagglutinin [HA], of the influenza A virus must be cleaved, or split, by specific enzymes. Normally, the virus uses an enzyme from the cell it is attacking to cleave the HA, and then proceeds to infect the donor cell. The enzyme that splits the HA is usually localized in respiratory organs, confining the virus to those parts of the body.

The mechanism outlined by Goto and Kawaoka threatens organs. The process concerns neuraminidase, an enzyme that occurs in influenza viruses as an antigen, or protein-synthesized "guard." This enzyme, like HA, acts as a sentry, patrolling the outer surface of the virus. But, the team discovered that the presence of a reactive amino acid, carboxyl-terminal lysine and the absence of a small chain of sugars, an oligosaccharide chain, at a specific site unusually alter the function of the policing neuraminidase protein. Under these circumstances, neuramini dase can join with plasminogen, a common enzyme precursor. This neuraminidase-plasminogen union cleaves the HA, taking over the job usually credited to a respiratory cell. Because the



Source: Zach Lewis

Despite the long told tales, aspirin and chicken soup may not do the trick for a flu anymore.

respiratory cells are no longer needed to feed the virus, and plasminogen is common throughout the body, the influenza strain can suddenly infect other areas of the body. Thus, when the neuraminidase-plasminogen compounds splits the HA, it initiates a potentially fatal cycle; more cleaved HA leads to higher concentrations of the enzyme-enzyme precursor, which cleaves more HA and affords the virus to steam-roll more cells. It is possible that the altered virus could gain enough momentum to flatten its hapless host.

Goto and Kawaoka confirm, "This [the mechanism] could be another important indicator of whether a virus is dangerous and potentially lethal." What is worse is that it is possible for the mechanism to be carried out in mammalian viruses other than influenza strains, given the prerequisite of a similar plasminogen-binding protein. Kawaoka echoes, "Our finding may have broader implications in the virology field and will prompt researchers to look for a protein of this kind in other viruses."

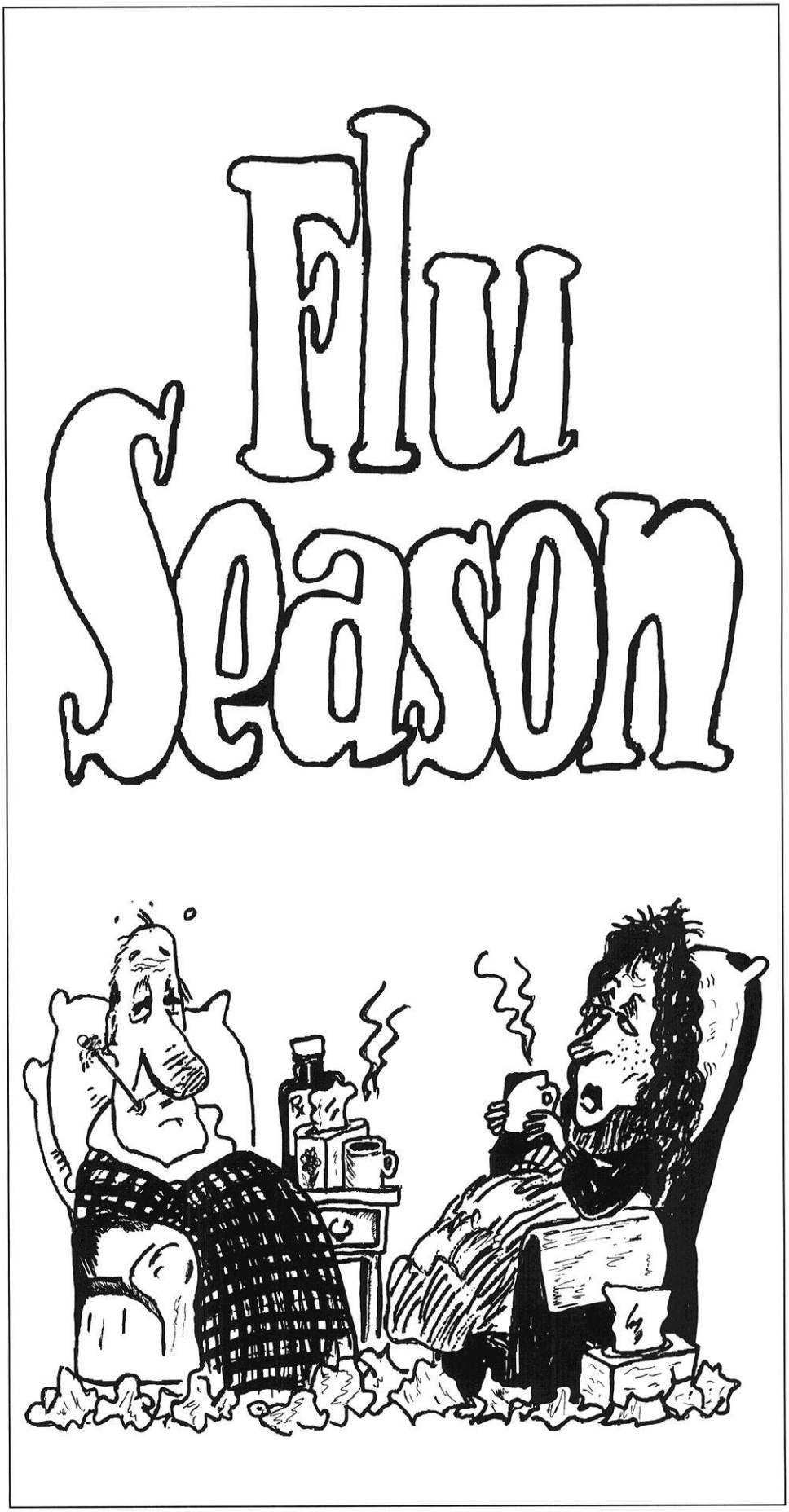
Candidates for this mechanism may have included the influenza virus of 1918, but the pair is not sure. Samples of the virus from a victim of the 1918 strain have been shown to closely mirror the altered mouse strain. Unfortunately, there was not enough information on the key chain of sugars, oligosac-

charide chain, and reactive amino acid, carboxyl-terminal lysine, to determine if it followed the mechanism outlined by Goto and Kawaoka. Until these questions are answered, the reasons for the extreme virulence of the 1918 strain remains unknown, and the virus will retain its classification as a public health mystery a while longer.

Another mystery to virologists is how viruses will change from year to year. These constant adaptations occur in the surface proteins of viruses and are called "drift." Sometimes, two different viruses mix together to form a new strain, an occurrence known as "shift." These changes often render vaccines obsolete and send virologists scrambling to identify the changes and update their countermeasures. In this light of constant change, a pathogenic virus can be very tough to defeat.

Let's hope that we do not have to deal with another virus like the ravenous influenza strain of 1918 anytime soon. If we do face another deadly virus, it may very well be a product of the plasminogen-binding mechanism discovered by Goto and Kawaoka. No longer restricted to the respiratory organs, and bred with the ability to constantly adapt, such a virus could take the world by storm. Until it does, don't throw out the chicken-noodle soup when you get the winter sniffles - just toss in a rabbits foot for luck!

Author Bio: Ethan Erickson is a climber that regularly on-sights 5.14d trad routes.



Drawn by: Alfred Halaka

The Rising Tide

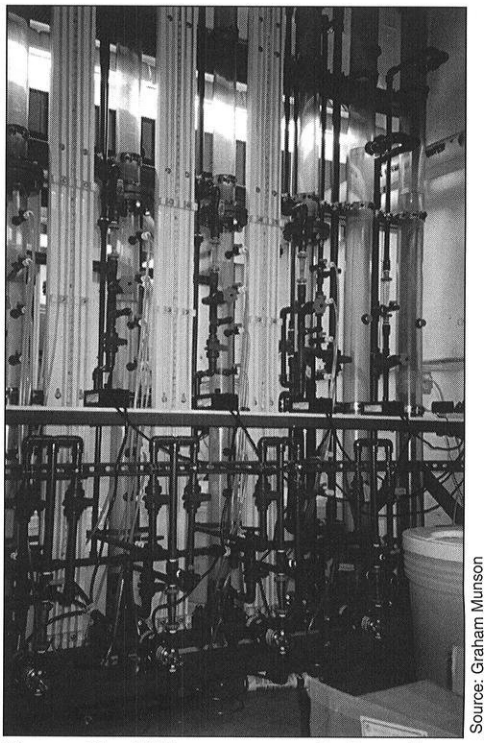
Is your tap water safe to drink? In 1993, Milwaukee residents thought it was safe, until thousands of people became ill because of contaminated tap water. The outbreak escalated and a boil water order was mandated throughout the city. The culprit of this incident was a microscopic pathogen, cryptosporidium parvum (crypto). In the fight against disease, crypto as well as other micro-organisms have become the focus of water purification researchers. Crypto's ability to withstand chemicals and slip through filter systems has resulted in thousands of people becoming sick and in some cases dead.

Crypto is not new or unique to Milwaukee. Documented outbreaks have been occurring around the world since 1984, when the crypto pathogen was first identified. The United States' first major outbreak of crypto occurred in 1987, when more than 13,000 Georgia residents became very sick. The fact that the water filtration system in use at the time complied with all current safe drinking water regulations increased the seriousness of the mass infection. The early warning of new pathological diseases was not enough to prompt the needed improvements, and more outbreaks continued to arise in model water purification systems world wide. Even after the Milwaukee incident, where more than 403,000 people became sick and 100 died, crypto continued to spread. Crypto was soon showing up in water systems such as Las Vegas, London and Sydney, Australia, as recently as 1998. Crypto did not only spread to drinking water systems. Crypto also spread to other surface water systems such as water parks and pools. It became glaringly obvious that we needed to learn more about crypto and devise a means of stop it.

Crypto is rarely life threatening in humans, and symptoms are not typically apparent in most cases for two to ten days. Although not usually severe, the infection is characterized by watery diarrhea and can be accompanied by headaches, abdominal cramps, nausea, vomiting or even a low-grade fever. In cases where these symptoms persist, infection can lead to weight loss and dehydration. Most people are able to recover from the infection in one to two weeks, or sometimes less. Exceptions to this include people with weak immune systems, such as AIDS patients and people who have had recent organ or bone marrow transplants. In these cases, the infection can become life threatening. The reason crypto is considered so dangerous is because of its ability to thwart our attempts to kill it. The pathogen is primarily transmitted through feces. It can survive in water over a week because of a strong oocyst wall encasing the crypto organisms. It is this shell that is resistant to disinfectants, such as chlorine and ozone, which are typically used to chemically purify drinking water and other water systems. In addition to crypto's strong structure, it is very small, four to five microns wide, making it very difficult to filter out of the system. The result of crypto's traits, such as life span in water, chemical resistance and small size, has enabled crypto to invade some of our best water treatment systems.

Source: Graham Munson

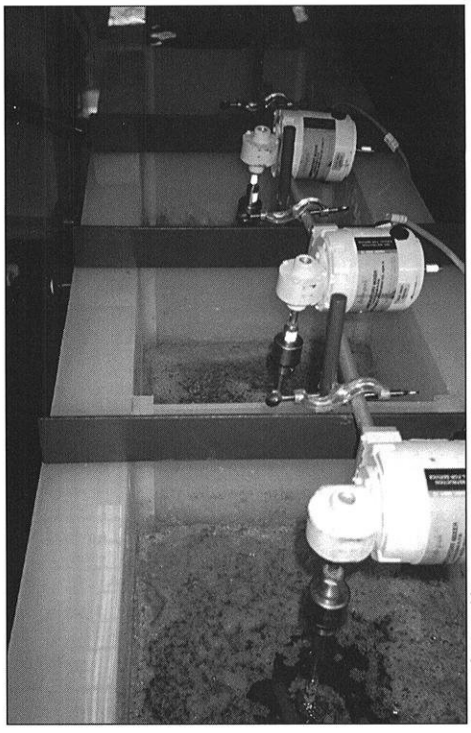
Greg Harrington, an assistant professor of civil and environmental engineering, conducts research on filtration techniques that will prevent pathogens, such as crypto, from entering drinking water systems.



Source: Graham Munson

The vertical filters use gravity to pull water through various media removing very fine particles from the water.

Fortunately, Madison's risk of crypto infection in drinking water is "very nearly zero," responds Greg Harrington, an assistant professor of civil and environmental engineering. Harrington is among a group of UW-Madison researchers working on improving drinking water filtration techniques. Madison's risk of crypto infection is low because it is a ground water system. Unlike Madison, many cities depend on surface



Source: Graham Munson

Coagulant in these vats is mixed into the water early on to make fine particles easier to filter and remove.

water systems and are in jeopardy of crypto outbreaks without proper filtration. With these new techniques developed by r e-searchers, city officials hope to avoid future problems with crypto, or any other micro-organisms that may compromise the purity of drinking water systems.

Although Madison's drinking water may be safe from crypto, because of its many underground sources, Madison's pools and lakes are not as infallible. Very few people in the surrounding area have been diagnosed with crypto. But, in the summer of 1998, three public pools shut down for at least a day to flush the filter systems to avoid the possibility of a crypto outbreak. Crypto is a surface water parasite very immune to chlorine and difficult to filter, making it a treacherous hazard to public pools and water parks.

Although there currently is not a cure for cryptosporidiosis, preventive measures such as Harrington's research, tests run by water plants and monitoring of public pools has dramatically reduced the risk of waterborne infection in the United States. If you are concerned about crypto or any other diseases, you can get more information from the Center for Disease Control (CDC) via the web at http://www.cdc.gov.

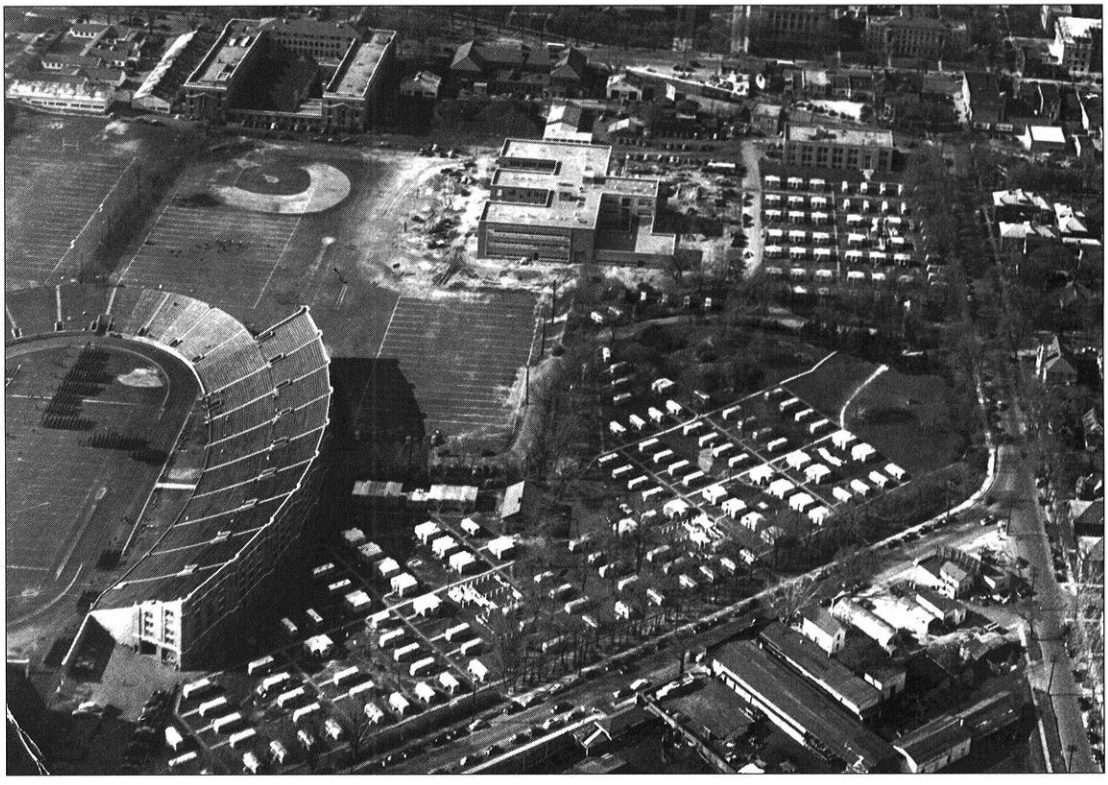
Author Bio: Graham Munson is a junior in Mechanical Engineering.

Engineering Mall: A Walkway Through History

Water splashes from the two fountains on Engineering Mall as students socialize on the grassy mall at the center of the University of Wisconsin - Madison's Engineering campus. On either side of the fountains, pathways run from Engineering Hall, the center of technology, northward to Henry Mall and the Agriculture Campus. The southern fountain is called Maquina, which is Spanish for "machine." Made of stainless steel shaped into connecting "C's", Maquina sits upon a steel cone and in the middle of a grassy plateau surrounded by rocks, a short brick wall and small trees with benches nearby. Water spouts from the hemispheres toward a single point of collision, and flows down a channel that connects Maquina to the pool and tower fountain at the northern end of Engineering Mall. Centered in the square pool, a column sprays water from above while being surrounded by other water sprays acting much like moving geysers. On either side of the pool are conical structures engraved with the College of Engineering logo, presiding as landmarks for the area's current usage. Sitting on Engineering Mall, one hears the spraying, rippling water and it is a calming experience amid the hustle and bustle of the campus life.

The fountain and mall, created in 1994, produced a place where students could gather and socialize, replacing a parking lot with a landscaped grassy knoll flowing with water. Sculptor William Conrad Severson, a 1947 UW-Madison art graduate, created this sculpture as part of an elaborate system that includes an underground control room and controls to the south of the fountain allowing the public to change the stream of the fountain. The fountain stands in the center of the major buildings of the College of Engineering: Engineering Hall to the south, Engineering Research, Mechanical Engineering and Mining and Metallurgy to the west and Computer Aided Engineering to the east. In the future, the fountain will include light, sound and compressed air along with water as liquid, vapor and solid. Today, however, buildings from the technology center of the UW surround the walkways and sprays of the Descendant's Fountain, as Maquina is otherwise known. The sidewalks of Engineering Hall visually connect to the Agricultural Mall to the north, connecting technology with the age-old tradition of farming. The interconnection between farming and state of the art technology in this area is an old tradition. Over the past 1500 years, Engineering Mall underwent a transformation from a native hunting path, to an agricultural showcase, to a gateway to and from the war, and finally into a walkway between agriculture and technology. The transformations of this place came about because of alterations in mindset of how the land should be used and managed. In each time frame discussed, the people used the current knowledge to improve their technology. This is mirrored in the shaping of the land. Looking back over 1500 years, the land now containing buildings dedicated to the development of emerging technology was thinly timbered with oaks and had an undergrowth of prairie grasses and forest herbs. The natives maintained this landscape by setting annual fires each fall. Villages and workshops for processing game and making tools were located on the shores of both Lake Wingra and Lake Mendota connected by a

WALKWAY continued on pg 18



Source: UW Archives

A photo of the engineering campus taken in the early 1950's. Notice the half-finished Engineering Hall (the backwards E-shaped building) and the plethora of temporary buildings.

Source: UW Archives

A painting displaying the proposed UW Engineering Hall. The hall was approved in 1948.

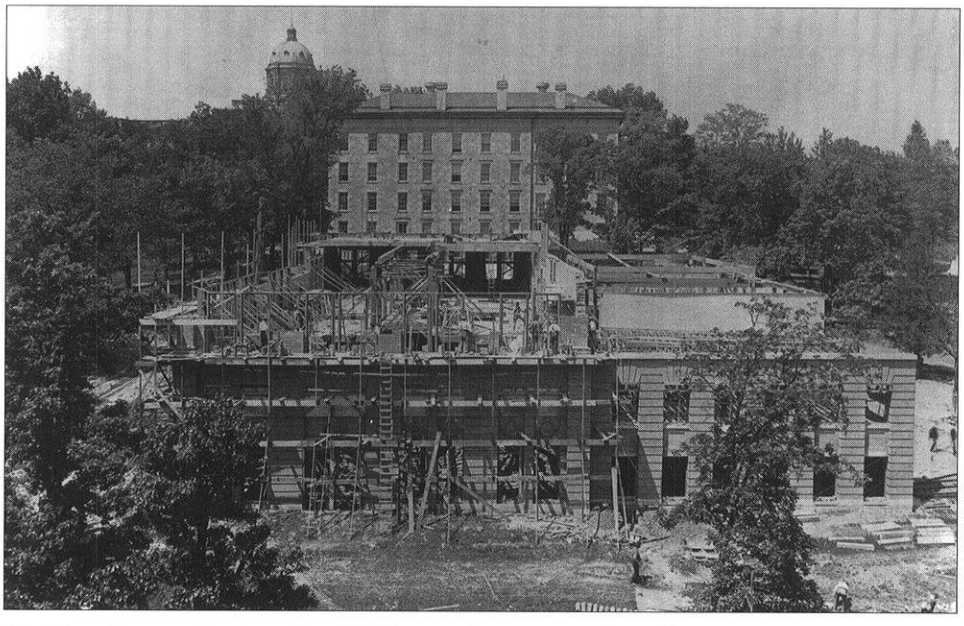
WALKWAY (continued)

trail running through the timber. This trail, as drawn by historian David Mollenhoff, ran directly through the land now known as the Engineering campus and seemed to be a trail used by hunters to transport game to the workshops of the village.

The natives present around 400 A.D. lived a "sophisticated woodland lifestyle" according to Mollenhoff, cultivating corn, beans and squash, using the bow, arrow, other stone tools and pottery and building mounds. The natives used the land and its resources to sustain their culture rather than to bring economic advantage. By 1634, when Jean Nicolet first explored the area, the Winnebago nation dominated the Madison area. These people were hunters and agriculturalists living mainly near the lakes with paths connecting the small villages. They dressed mainly in deerskin, lived in wigwams and used birch-bark canoes. The Winnebagos sustained the same lifestyle as the previous natives with some new tool and technology increases. In 1832, changes to the land began because of two major events. The first event was due to the Black Hawk War. Chief Black Hawk, of the Sauk nation, traveled over the area proceeding the US army through Madison. This was the first time European Americans viewed the area. After the war, also in 1832, the treaty signed by Winnebago Chief White Crow ceded the Madison area to the US government. This treaty marked the beginning of a new era for the land, one that would form the land into a Neo-Europe as new settlers brought European animals, plants and ideas into the area. These European ideas included commodifying many of the resources the Winnebagos had used minimally or not at all. The ideas of selling resources for profit changed the surrounding landscape considerably.

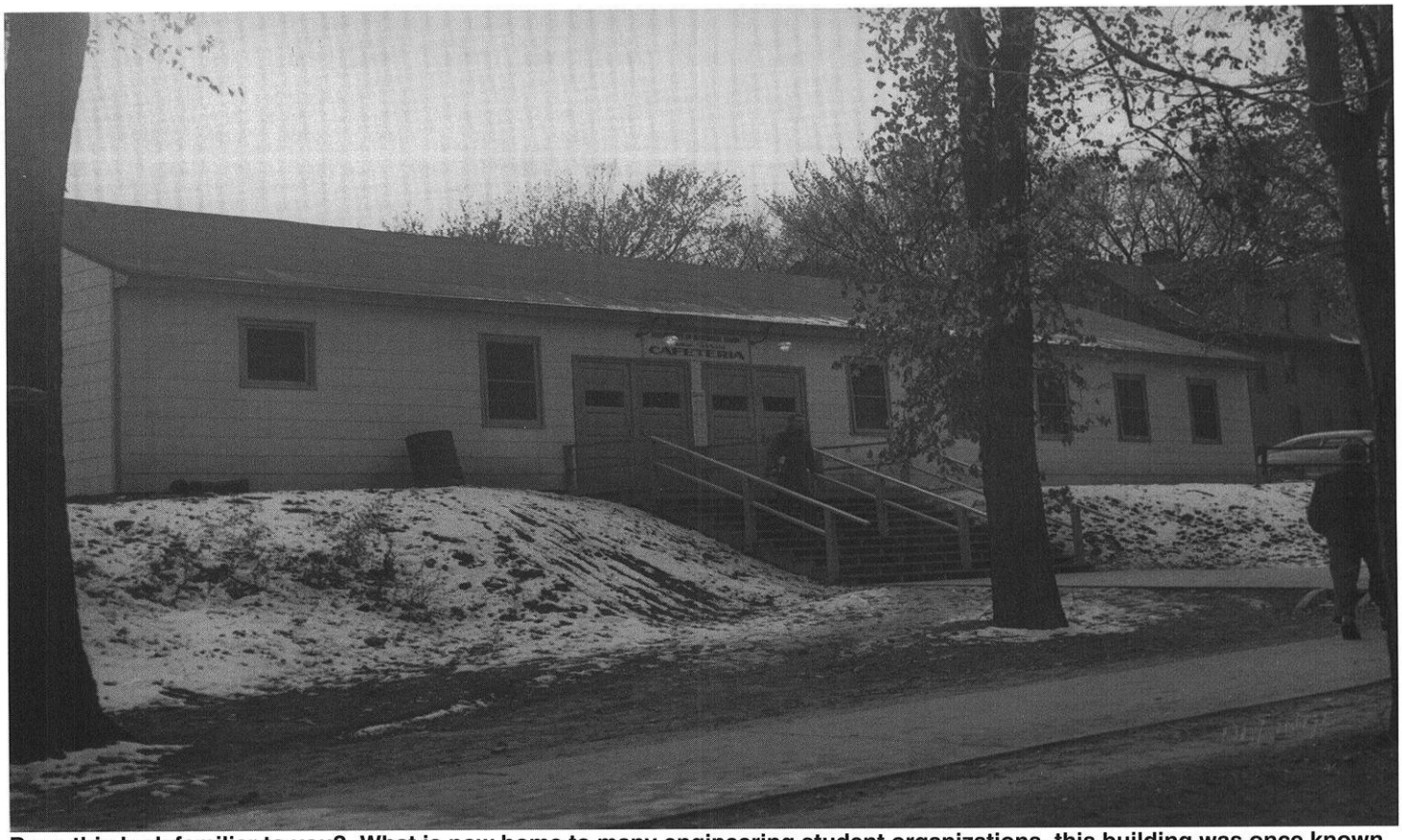
The change to European settlement and ideas did not occur instantaneously. The "path" was still used by Winnebagos throughout the next ten years, although European settlers were beginning to move to the area. By 1858, the "path" area was part of the Bruen Estate. William Bruen leased the area including a Fine Arts Hall and Manufacturer's Hall to the Wisconsin State Agricultural Society and for the first time in September of 1858, the society hosted the state fair on the estate. The state fair manifested how much European ideas had invaded the area. It was an exhibition comparing European imported flora and fauna using quality standards, which were a precursor to the standards for wheat set by the Chicago Board of Trade. This was the first time in history that the estate accommodated a large gathering of people. The crowd of people present revealed how established the European culture became in Wisconsin, and the temperate climate in Wisconsin allowed the European co-invading species to do well.

The Agricultural Society used the property for the state fair the year after and in 1860 the legislature approved a levy of one thousand dollars per year to go to improve the fair grounds. Hoping to increase attendance, the society planned to build new buildings and landscapes. The following year, however, marked the start of the Civil War and the society cancelled the fair and offered the military a place to train. The start of the Civil War in 1861 began a period that had the most impact on the land. Madison's response to President Abraham Lincoln's call for troops was tremendous and the new camp was named after current Wisconsin Governor Alexander Randall. During the Civil War, 70,000 troops trained at Camp Randall and marched to their barracks across the grass where previously the Winnebago path laid. In 1862 the camp also housed fourteen thousand Confederate troops and brought back a confederate cannon that stands as a monument in the Randall Memorial Park today. By the end of the Civil War, Camp Randall was a place of nostalgia and Union pride for veterans, but the state returned the land to the Agricultural Society for future fairs. The society purchased the land in 1869 after two more state fairs were held there. Camp Randall was chosen for the location of six more state fairs, before the Agricultural Society put the land up for sale in 1892. On April 29, 1893 the State of Wisconsin bought the 53-acre piece of land from R.B. Ogilvie, R.M. Bashford, and H.C. Thom for $25,000 as a gift to the University for athletic purposes and possibly future state fairs. However, the state fair was not held at Camp Randall again, changing the Camp into an exercise area instead of a showcase. In 1913, veterans of the Civil War, fearing the loss of their blessed camp forever, insisted on a memorial park in part of Camp Randall. The southeast section of Camp Randall became known as Camp Randall Memorial Park.



Source: UW Archives

Construction on Engineering Hall began in an area where trees were once very abundant.



Source: UW Archives

Does this look familiar to you? What is now home to many engineering student organizations, this building was once known as the Breese Tereace Cafe. The picture was taken during the 1940's.

University ownership did not mean that the military days of Camp Randall were over. In 1918, during the First World War, the Student Army Training Corps (SATC) located barracks at Camp Randall and also trained there. The training area was reduced because Camp Randall Stadium already stood in the south and the Forest Products Lab was in use in the northeast corner. By the Second World War, more buildings blocked the field, but the grounds were again used to train the SATC. The post-WWII era stamped the most noticeable changes on the land. Camp Randall became not only a gateway into the war, but for some veterans it was also an entrance back into America's intellectual society. The land that held temporary homes for soldiers during all three wars hosted housing for WWII veterans when the University brought in sixty temporary trailer houses in 1945. Due to the high demand for housing, more trailers were brought in to total 177 trailers with community laundry and toilet facilities dotting the area where Engineering Hall stands today. The popular Randall Trailers which, restricted to veterans and their families, became a route for many ex-soldiers to reacquaint themselves with a world at peace. The Randall Trailers were not the only addition during the post world war era. The buildings that are now standing on the Engineering campus are almost all examples of post-war buildings.

One of the pre WWII buildings was Forest Products lab; it was built just before the First World War in 1910. Today housing the Mining and Metallurgy department, the building stands between the Engineering Research Building and Mechanical Engineering to the west of Engineering Mall. Established while Gifford Pinchot was head of the growing Department of Agriculture's Forestry Division, the laboratory served as a research facility for conservation forestry during the time Forest Products leased the land. The early 1900's, under Theodore Roosevelt's administration, were growing times for environmentalism and conservation. These ideas, led by both Pinchot and T. Roosevelt, increased the number of national forests and parks and promoted sustainable management of resources. This shift to conservation happened due to the fast disappearing old wood forests during the late 19th century. During WWI, the laboratory focused on aviation research. After the war, Forest Products was active at the location until it expanded and moved in 1931. The University reclaimed the building, and the Mining and Metallurgy department moved in where it still is today. The main building to the east of Engineering Mall is Computer Aided Engineering (CAE), a post-war building. What would seem to be a relatively new addition to the campus is slightly deceiving. In 1939, during the rise of automobile popularity, the State Highway Laboratory was constructed on the site. Construction of the lab required the removal of the old railroad spur from the Illinois Central Railroad Company that had previously served the Forest Products Lab. The switch between these two modes of transportation shows the importance Americans were giving on both automobiles and railroads. Now cheaper and more convenient than trains, the auto acted as the new method of transit for both people and products. Consequently, the State Highway Lab needed more space and leased the land to do road research for forty years. Because of this and other road research, travel became easier and more accessible. Shipping goods from farms by road improved and farmers did not need to rely

This mall has not been around forever, but the land has had the purpose of a pathway for many years

WALKWAY continued on pg 20

WALKWAY (continued)

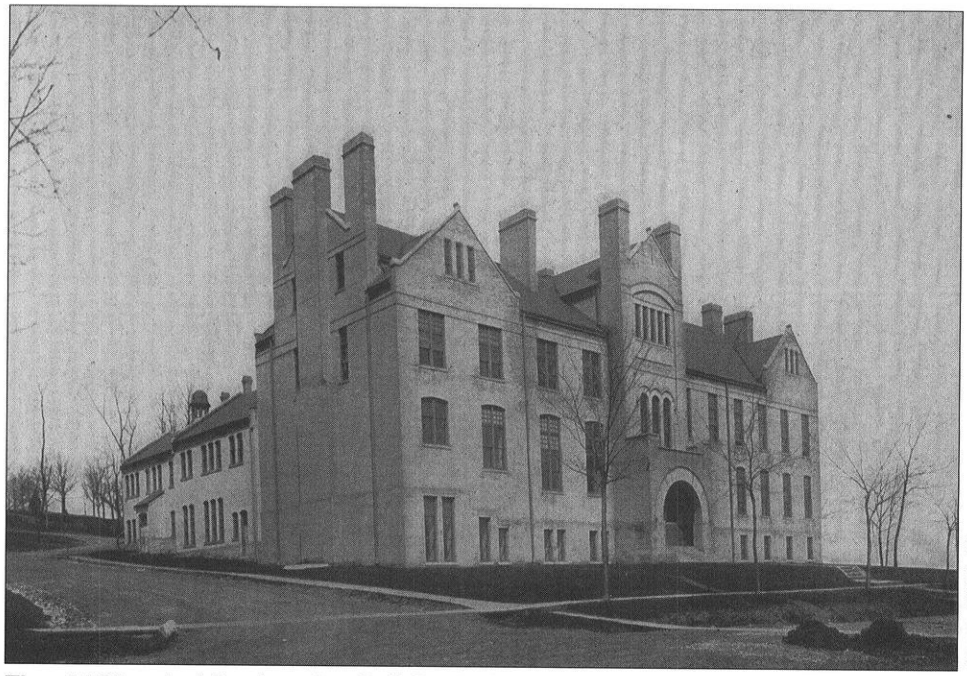
1977. The University converted the State Highway lab into the center for the electrical and computer engineering program along with computer sciences and physics. Many of the soil labs are still located in the basement of CAE from the days of the highway lab. Today the Civil Engineering Department uses these labs for road construction classes. Most of the building, including the 1983 north side addition, holds computer-engineering laboratories and offices. This electrical pathway is a new phenomenon with a lot of potential. It is a fast changing subject that has improved many fields, as well as the agricultural field. Agricultural engineers also use this building to simulate fertilizer and pesticide applications over specific terrains. The mall has become connected to an electronic pathway to improve society's living techniques.

Another example of a post-war building is the Engineering building that was first approved in 1948. Created in four different sections, the colossal building stands to the south of the fountain. The construction of Engineering Hall required the removal of the Randall trailers. The west wing displaced approximately sixty of the trailers in 1948 and the other wing required the removal of the rest in 1962. The latest and most prominent addition, built in 1990, accommodated the growing electrical and chemical engineering departments and also to provided large lecture halls for classes and other functions. This last addition overtook the existing courtyard previously surrounded by the two wings. Engineering Hall dominates the Engineering campus and houses three major departments: Chemical Engineering, Electrical Engineering and Civil Engineering. The increased interest in these departments shown by the building additions can be attributed to a number of things. The Chemical Engineering department, for instance, grew rapidly due to the petroleum industry. Both auto transit and increased energy needs from industry compelled the chemical industry to expand. This increase in overall energy consumption reflects the suburban sprawl in the 1950's and 60's. The creation of suburbia shaped today's society into a more consumptive group with the pressures of imposed conformity in an already capitalistic community. Recently, growth in the chemical industry is largely due to the manufactured foods and other goods that we consume. Manufactured items then place the consumer farther and farther from the initial field or mine and much more dependent on today's technology. Since WWII, the changes the University has made can be seen in the buildings and landscapes that now stand. Today from the fountain on Engineering Mall, one can see the many buildings that preside over the engineering walkway. This mall has not been around forever, but the land has had the purpose of a pathway for many, many years. The interpretation of the pathway changes throughout time, as it always will, and American culture has changed greatly over the time period since the invasion of the Europeans. Native Americans simply used the land as a means to acquire their daily needs. The path led from their hunting and gathering areas to their technology center where they preserved food and made tools. Early settlers used the area as a pathway to greater knowledge and fame at the state fair. Soldiers from multiple wars used it as a gateway into the war and also as a bridge back into society. Today, the pathway has become a sidewalk amidst the University of Wisconsin Engineering campus. It not only stands as a boulevard for walking, but also as the beginning of a journey for many students into the future of technology and the world society.

Source: Victor Chen

The Descendant's Fountain, built in 1994, currently stands tall at the top of Engineering Mall.

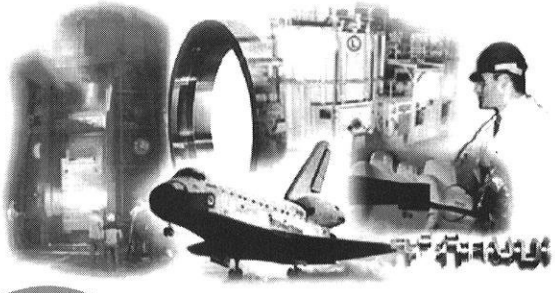
Author Bio: Ramona Johnson is a senior in chemical engineering.



Source: UW Archives

The old Chemical Engineering Building before the department moved into the present day engineering hall. Still standing, it is now known as Science Hall.

FORGE AHEAD WITH



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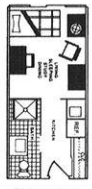

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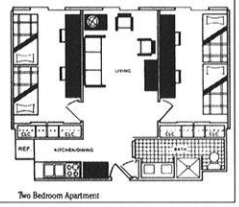

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Plesha Offers the Low-Down on Finite Element Analysis and Night-time Hockey Games

With his approachable demeanor and variety of interests, Mike Plesha has been a successful component of the engineering physics department for fifteen years. Professor Plesha recently shared his thoughts during an interview with a member of the Wisconsin Engineer editorial staff.

Were you always interested in engineering and achieving your Ph.D.?

I have always been interested in engineering. I knew that right from the start of high school. However, I didn't have any idea what type of engineering I wanted to major in. If someone had told me I'd go on to get a Ph.D., I would have probably told them that they were crazy. But, I always knew I wanted to be an engineer. In fact, the way I selected the discipline was in part from a statics class, where the instructor offered an invitation for students to come by and discuss the fields of mechanics and structural engineering. I went to visit him and found what he had to say actually very interesting. In fact, I still correspond with this fellow today.

I understand that you went to the University of Illinois-Chicago and then to Northwestern for graduate school. Could you tell me a little bit about these educational experiences?

The University of Illinois at Chicago was completely down to business. People went there to take classes, and then they were off to jobs or things like that. It was largely a commuter campus. Northwestern was a very enjoyable place to go to school. I liked it there.

In light of your college experience, is there any advice you have to give students?

Enjoy your opportunities. Don't rush through life. I guess that's one thing I've tried not to do. Enjoy the present for what it has to offer, even though it may not always be enjoyable, like getting ready for exams and being overloaded. When you get into your professional practice, time management will be very important. You are getting exposed to that now in a big way. Nonetheless, I think a person still has to enjoy what the present has to offer. Otherwise, you just end up rushing through life.

After getting your Ph.D., did you come directly to work at Madison?

I was in the mechanical engineering department at Michigan Tech. for one year. From there, I came to Madison (1983).

What three main reasons attracted you to Madison?

(1) It's a great university
(2) The separate mechanics program
(3) It was closer to family

Could you give me some insight to your current research interests? Also, please explain your past successes and future goals.

The common thread to the research that I've done is to work on computer methods for modeling problems with contact, discontinuity and material interfaces. Friction is one example. Another example is material interfaces, which occur in composite materials or in soil structure interaction problems. The common themes between all of the methods is that the interface has unique properties that are different from either of the contacting materials. I've worked on several fronts to address that. One front would be trying to develop constitutive models—mathematical models usually in the form of differential equations that characterize mechanical response—like stress and strain response. In parallel with that, I've also worked on developing numerical techniques for dicretizing problems, or, in other words, describing it to a computer so that you can analyze it. I'm also branching out into trying to use fractal geometry to describe discontinuity problems. In particular, I'm working on developing scaling laws. The question is, if you change a sample by orders of magnitude and size, how do its properties change? I'd like to do some theoretical work on this in the future.

Source: Mark Croft

"I think our students in the college of engineering are great. They're smart students and they're hard workers," said Professor Mike Plesha.

Do you teach any courses on campus besides statics?

I teach mechanics of materials courses, both the elementary course and the advanced course. I teach vibrations and a couple courses in finite element analysis. Occasionally, I teach engineering computation, but I haven't done that in a long time.

What do you enjoy about teaching these classes, and what do you find challenging?

I like seeing people get excited about the material and subject matter. I think it is exciting and I guess it's my job to present it in a way that does justice to it. I think it's great stuff. What's really neat about it is how far-reaching the applications are. You can see that in some of the research that I do, I've worked in ceramic composite materials, and at the other end of the spectrum, I've worked on geo-materials. Yet, the laws of mechanics are universal and apply to all of these. That is what I find exciting.

Would you give me some idea of what life is like for you outside of the engineering physics department? I know last time we talked, you mentioned fishing as a hobby.

Oh, I like the outdoors. I like playing hockey. It's pretty inhuman hours; I play every Wednesday night at about 10:30 p.m. It's kind of hard to get up the next morning, but I like playing hockey. I spend a lot of time at soccer fields, swimming pools, and ice rinks watching my kids do their various activities.

Are there any final bits of information you have to add?

I think our students in the college of engineering are great. They're smart students and they're hard workers.

Author Bio: Tanya Kosmo is junior majoring in mechanical engineering.

What do Plesha's students think?

"The way he presented the material made it very easy to understand."

-Tom Graham, Senior
Mechanical Engineering

"I think he's awesome. His teaching style is very down-to-earth. He doesn't make it so intimidating; he makes you feel as though you can accomplish it."

-Ya-Quin Childs, Junior
Mechanical Engineering

"I think he's cool."

-Shana Scheiber, Sophomore
Mechanical Engineering

Just One More

At a recent computer expo-(COMDEX), Microsoft head Bill Gates reportedly compared the computer industry with the auto industry by saying: "If General Motors (GM) had kept up with technology the way the computer industry has, we'd all be driving $25 cars that get 1000 miles to the gallon," to which GM issued their own press release. The GM statement held that if GM had developed its technology the way Microsoft has, cars would indeed be much different!

1) For no apparent reason your car would crash twice a day.
2) Every time they repainted the lines on the road you'd have to buy a new car.
3) Occasionally, your car would simply die on the freeway. You would just accept this, re-start and drive on.
4) While executing a maneuver such as a left-hand turn, your car would shut down and refuse to re-start. You'd have to reinstall the engine.
5) Only one person at a time could use the car, unless you bought "Car 95" or "Car NT." But then you would have to buy more seats.
6) Macintosh would build a car that was solar powered, ultra-reliable, five times as fast and twice as easy to drive. But it would run on only five percent of the roads.
7) The oil, water temperature and alternator gauges would be replaced by a single "General Car Default" warning light.
8) The new seats would force everyone to have the same size posterior.
9) The airbag system would say "Are you sure?" before going off.
10) Occasionally, for no reason whatsoever, your car would lock you out and refuse to let you in until you simultaneously lifted the door handle, turned the key and grabbed hold of the radio antenna.
11) GM would also require all car buyers to also buy deluxe set of Rand McNally (now a GM subsidiary) road maps whether they wanted them or not. Attempting to delete this option would automatically reduce the car's performance 50% or more. Moreover, GM would become the target of a Justice Department Investigation.
12) Every time GM introduced a new model, car buyers would have to learn to drive all over again because none of its controls would operate in the same manner as the old car.

And finally,
13) To shut off the engine you'd have to press the "Start" button!

Spell Checker

Eye halve a spelling chequer
It came with my pea sea
It plainly marques four my revue
Miss steaks eye kin knot sea.

Eye strike a key and type a word
And weight four it two say
Weather eye am wrong oar write
As soon as a mist ache is maid
It nose bee fore two long
And eye can put the error rite
Its rarely ever wrong.

Eye have run this poem threw it
I am shore your pleased two no
Its letter perfect in it's weigh
My chequer tolled me sew.

Any Questions?

The *Wisconsin Engineer* congratulates the 1998 Badger Football team on an excellent season.

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