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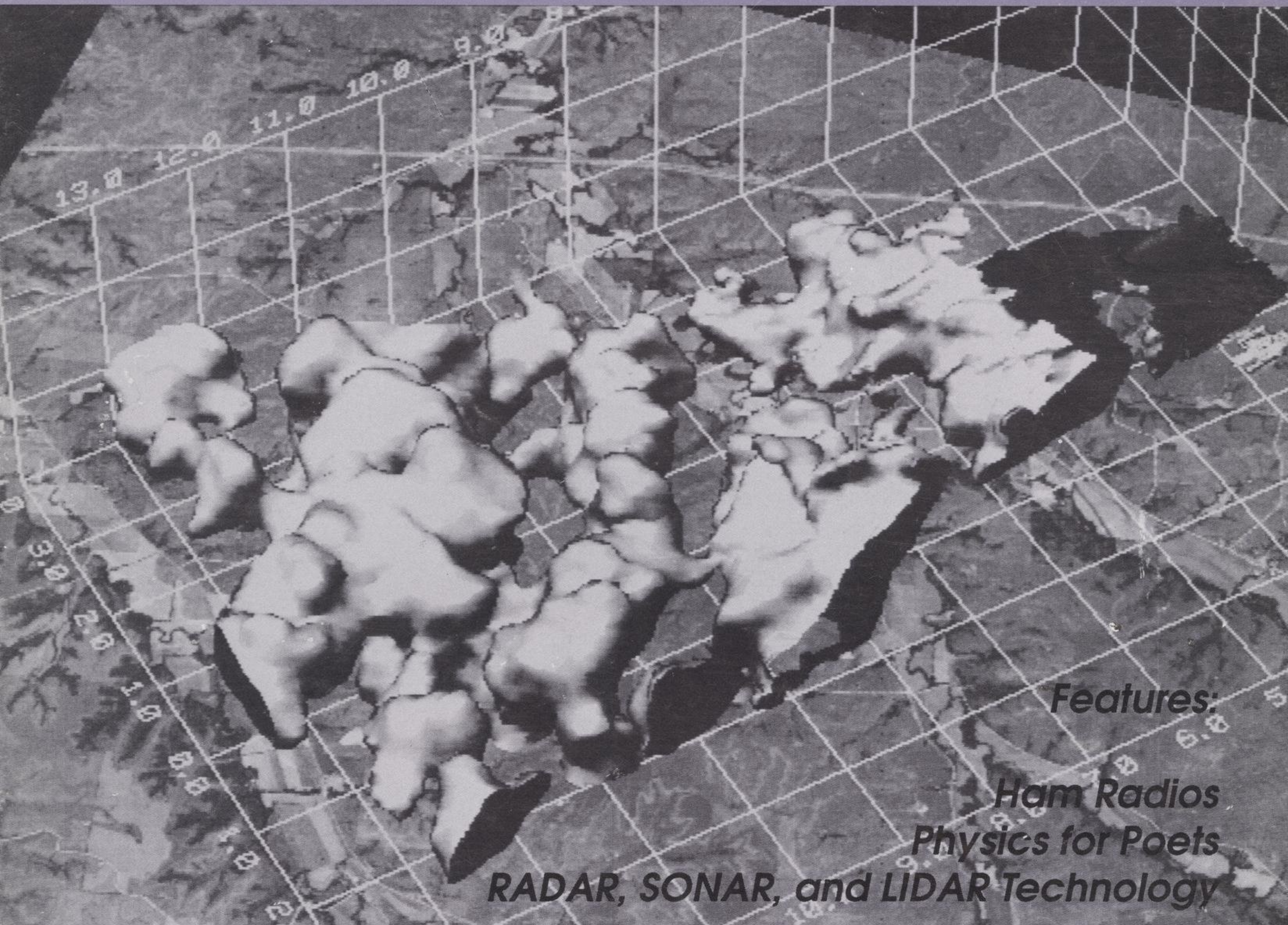
wisconsin engineer



Features:

Ham Radios
Physics for Poets
RADAR, SONAR, and LIDAR Technology

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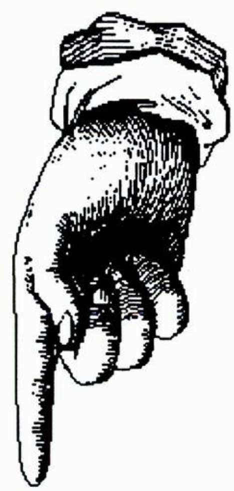

We have positions available for any interested students in writing, advertising, business, art, photography, computer graphics, or layout. Being part of our friendly staff gives you a great opportunity to develop and apply you skills in producing an award winning magazine, not to mention the valuable experience of working with other students like yourself. For more information, stop by our office in room 115 T-21, call us at 262-3494, or contact any one of our friendly staff members.

wisconsin engineer

Published by the Students of the University of Wisconsin-Madison, October 1991

Cover: Particles in the atmosphere were detected by LIDAR, resulting in this computer-generated image. (Image courtesy of UW-Madison Deptartment of Meteorology.)

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Editorial

What I did this Summer

Amy Damrow, Co-editor

May 20, 1991. This day was a very memorable day in my life. It was the day I began my co-op with the Wisconsin Department of Transportation. For the next three and a half months, I would be building highways and preparing for a career in Civil Engineering. This was the first day of the rest of my life—or perhaps the end.

As if the first-day-on-the-job anxieties were not enough intimidation, I had the unique opportunity to look forward to a summer of dodging 300,000 ton machines bigger than Camp Randall. On this first day, I was duly warned of the many occupational hazards that lay ahead of me. Between meeting ten thousand new faces, (" You'll be issued a hard hat to prevent skull fracture and extensive brain damage when big things come crashing down on your head."), and signing a million forms, ("And you'll need a sturdy pair of steel-toed work boots to protect your feet from mutilation when big machines roll over them."), and learning of every possible policy and procedure known to man, my head was spinning so fast I barely noticed my ulcer bleeding. When I was informed of my eligibility for Accidental Death and Dismemberment insurance, I really began to wonder what I had gotten myself into.

After a few days out on the job, I came to a couple of astounding realizations. First, I realized that "Be careful when working near live traffic" really meant "Don't get hit when marking pavement two inches from the tire of a semi doing 75 in a 35 m.p.h. construction zone." Secondly, and most importantly, I realized that "what I had gotten myself into" was most likely one of the greatest opportunities of my lifetime.

It was like a dream come true. I had never imagined earning that much money to learn so much. (And get a tan.) It made all the classroom theory come to life, and it gave me the motivation to stay in engineering. I had the opportunity to work with a lot of great people who were more than happy to teach me the tricks of the trade. I made a lot of new friends, and a lot of invaluable business contacts for my future career. It was, without a doubt, the most rewarding summer of my life.

In fact, if it were not for my co-op this summer, I would not be an engineering student right now. At the end of last semester, I was through with engineering. I was thoroughly disgusted with equations and formulas that seemingly had no practical purpose. I was tired of staying up until all hours of the night studying things that made no sense to me. I started to believe that I couldn't be an engineer.

This summer I learned what an engineer really does. I found that I could be an engineer. Applying all of those meaningless equations and mindless formulas to practical purposes made them seem much less meaningless and mindless. I saw that engineers do not have to be stuck in a lonely lab crunching numbers all day. Engineering can be a "people" profession. I realized that I still wanted to be an engineer, now more than ever.

Don't pass up the opportunity to

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Credit Where It's Due

Dean's Corner

C. Allen Wortley, Associate Dean for Outreach

As an associate dean in the College of Engineering, I help engineering students by promoting outreach and continuing education. As you know, "it ain't over 'til it's over." In your case, as engineers you have chosen a profession in which lifelong learning will be required. My job is to make sure our college will be one source of assistance to you as you begin and continue your careers in engineering.

Another way I can help is to give you students advice and admonishments from time to time. So, here are two suggestions.

Work hard, have fun and harbor a healthy skepticism of the establishment. Engineering is a profession with rich traditions. Most of these traditions are good. Some are not. Champion the good ones. Question the others.

As students, you can improve the advising services the College provides by taking advantage of the knowledge of your advisor, being informed about the materials your department makes available, being persistent and assertive before making course and instructor choices and planning ahead, leaving your options open.

Well, you say you think you have heard all this before! Yes, you probably have if you're a reader of the *Wisconsin Engineer.* One way to expediently put together a column such as this is to plagiarize the writings of others.

"To plagiarize" is "to take and use as one's own, the writings or ideas of another." In this column, it was done to make a point, but regrettably, plagiarism may be on the rise. Recently you read allegations about the words of Martin Luther King, Jr., Senator Joseph Biden and College of Communications Dean H. Joachim Maitre at Boston University.

My admonition to you is learn what plagiarism is and take the high ground in all that you communicate. The National Society of Professional Engineers Code of Ethics and the opinions of the NSPE Board of Ethical Review are helpful references.

In NSPE Board of Ethical Review Case No. 75-11, Engineer A performed certain research and then prepared a paper based on that research which was duly published in an engineering magazine under his byline. Subsequently, an article on the same subject under the name of Engineer B appeared in another engineering magazine. Much of the text of Engineer B's article was identical word-for-word with the article authored by Engineer A. Engineer A contacted Engineer B and requested an explanation. Engineer B replied that he had submitted a list of six references with his article, one of which had been inadvertently omitted by the editor. He offered his apology to Engineer A for the mishap because his reference credit was not published as intended.

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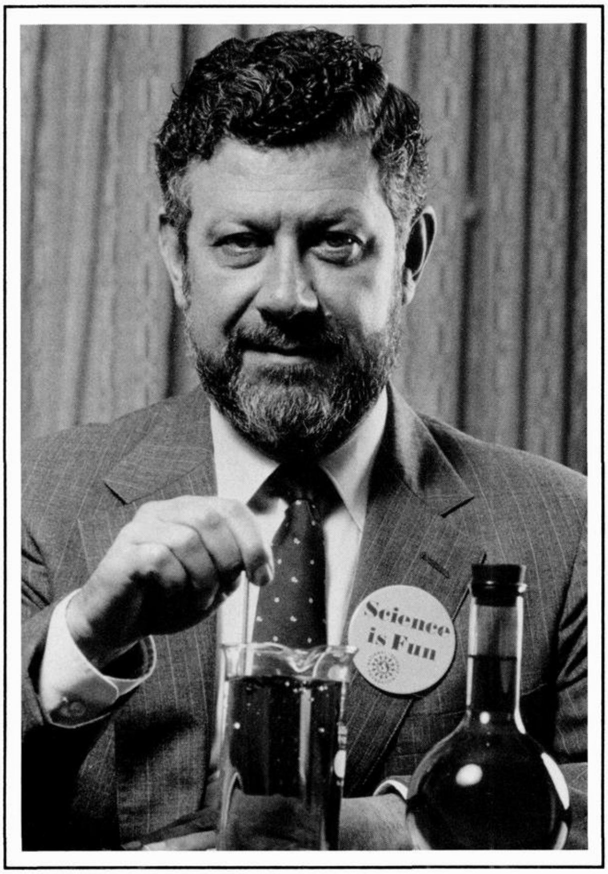
Dr. Bassam Z. Shakhashiri: Science is Fun!



Dr. Bassam Z. Shakhashiri sporting his now famous "science is fun" button.

The molecules that have bonded on the top floor of the chemistry building to form the walls of Dr. Bassam Z. Shakhashiri's office are very lucky molecules, indeed. The walls of Shakhashiri's office have witnessed a great man breathe life into a dying national education system. These walls are adorned with photos of a man holding colorful flasks and wearing a "science is fun" t-shirt, and posters advertising his annual Christmas-time chemistry magic show. With all the bright, energetic wall coverings, one might oversee a very important element of this office's personality, a plaque hanging near a far corner that reads, "Excellence is not only a tradition, it is also expected."

Dr. Shakhashiri's commitment to excellence has brought him far in the world of science education. After arriving in the United States from Lebanon at age 18, Shakhashiri went on to earn a bachelor's degree in Chemistry from Boston University, and master's and doctorate degrees from the University of Maryland.

After two years of teaching chemistry at the University of Illinois at Urbana, Shakhashiri hung his lab coat at the University of Wisconsin in 1970. Here he inspired many young chemists, yet he still aspired to do more for science education on a larger scale.

Dr. Shakhashiri, a naturalized citizen of the U.S., takes his commitment to the citizenship oath he swore very seriously. His commitment to excellence and to the advancement of science education prompted him to found the Institute for Chemical Education in 1983.

Dr. Shakhashiri did not stop there. In 1984, he earned the title Assistant Director of the National Science Foundation for Science and Engineering Education. With this new power in hand, he set out on a "twin mission." This twin mission focuses on what Shakhashiri feels are two major educational issues that must be dealt with for the U.S. to have a productive future. One part of this mission is to increase the number of scientists and engineers, and people studying the sciences. The second part is to make the public scientifically literate. He is concerned with the rest of the population and their survival in our technological age. He states, "The public must be aware of the hazards involved with advances in technology." With his twin mission in mind, Shakhashiri took on the responsibilities of his position with the NSF with ambition and vigor.

He established numerous programs and revised and revitalized the few existing ones. New programs, such as the Engineering Curriculum Coalition, recruitment programs for minorities and women, and the Statewide Systemic Initiative program, promised to renew the U.S.'s failing supply of scientists and engineers.

Shakhashiri is a man who truly believes in a bright future for science. He pleaded his case before Congress, never without wearing his "science is fun" button, making them aware of the national crisis facing the future of science. His hard work and determination paid off. Congress stood behind Shakhashiri and his crusade for the sciences. With their support, Shakhashiri managed to increase the NSF budget of $50 million in 1983 to and astounding $285 million for 1991, and a projected $600 million for 1993.

After making this phenomenal accomplishment for revitalizing science education and giving hope to the future of the United States, Shakhashiri was fired. On June 1, 1991 NSF director Erich Bloch informed Shakhashiri that he could either go back to UW-Madison to teach or take a different position at NSF. Shakhashiri was offered the position of Senior Staff Associate in the NSF directors' office. He returned to Madison last fall, and is once again teaching chemistry.

The loss of Dr. Shakhashiri's leadership in a national capacity is a veritable tragedy. However, he is still very committed to his twin mission and is dedicated to the fight for science and engineering education. The nation's loss is the University of Wisconsin's gain. The University can take pride in having such a great man teaching its students. If you are not so lucky and have not had the opportunity to witness Dr. Shakhashiri in action, be sure to catch his annual Christmas chemistry extravaganza, "Once Upon a Christmas Cheery/In the Lab of Shakhashiri." You can see his show at the National Academy of Sciences, the Smithsonian National Air & Space Museum or right here, at the University of Wisconsin. You will find yourself captivated by the chemistry and rapt in the "ooh's and aah's" and giggles and claps of many young children who are learning at an early age that "science is fun."

AUTHOR

Amy Damrow is in her third year as an engineer at Wisconsin. She is now entering her second year as *Wisconsin Engineer* co-editor .

Dean's Corner

(Continued from page 3)

The Board of Ethical Review concluded that Engineer B did not act ethically. Engineer B apparently believed that he would have been without fault if the list of references had been published at the end of his article. This attitude reveals ignorance of what constitutes plagiarism. As the Board stated, "If extensive portions of the work of others are to be utilized it is ethically required that permission be obtained from the original author (and copyright holder if the work is copyrighted) as well as citing the original source."

Sixteen years ago I was in private engineering practice, and I filed this case with the National Society of Professional Engineers because I could not find definitive statements on just what constituted an act of plagiarism. The Board of Ethical Review accepted the case and provided some educational guidance to me and others who follow. I hope this case will help you in the future.

And by the way, in case you're wondering, I was Engineer A. Engineer B was a dean of engineering at an out-of-state university. He too learned about plagiarism.

Catch the Wave

Radar, Sonar and Lidar

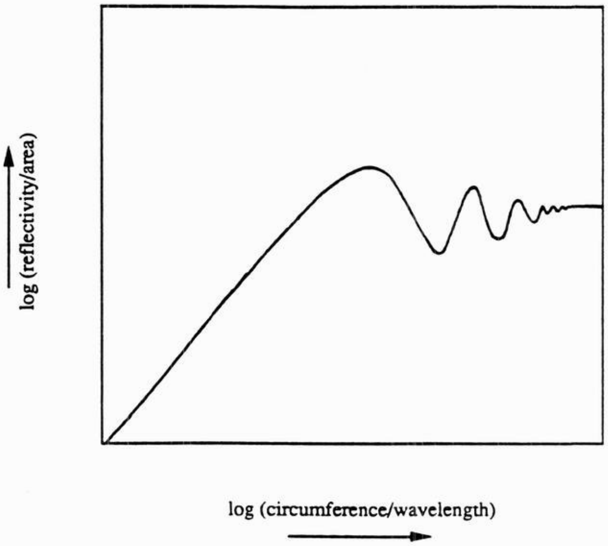
"Captain! The destroyer is turning towards us! They must have picked us up on radar!"
"Attention all hands! Crash dive! Commander Lifeson, take the submarine down to 200 feet!"
One minute later, a high pitched ping lashes through the entire hull of the submarine.
"Captain! They've got us on their sonar! Here come the depth charges!"

Radar and sonar are more than just staples of World War II movies. In fact they have come to permeate many aspects of modern society and scientific research. Lidar, which is similar to radar and sonar but uses light rather than radio or sound waves, is a relative newcomer which is mostly unknown.

RADAR (RAdio Detection And Ranging), SONAR (SOund Navigation And Ranging) and LIDAR (LIght Detection And Ranging) are similar sensing technologies based on certain principles exhibited by all moving waves. First, a wave travels with a predictable speed, based upon the medium through which it travels. The wave has a certain frequency and wavelength. The wavelength is equal to the speed divided by the frequency. Second, when a wave encounters an obstruction, part of the wave is reflected. Third, if the wave strikes an obstruction which is moving, the reflected wave will have a different wavelength and a different frequency from the original wave. Radar, sonar and lidar all use the first two properties, and sometimes the third, to detect objects in the environment through which the waves travel.

Radar, sonar and lidar systems can be divided into two categories: active and passive. Active systems generate a pulse of waves and then wait for reflected echoes from any objects encountered. Passive systems rely on the objects themselves to generate the signals. Sonar systems used to detect surface ships and submarines fall under the passive category while most other systems are classified as active.

A typical active radar, sonar or lidar system contains at least a signal generator, which creates a pulse of waves, whether radio, sound or light; a receiver, which senses any reflections or echoes of the pulse by objects; and a timing circuit. The receiver and transmitter are usually in the same location. During operation, the timing circuit is used to determine the distance to the objects. The time delay between the transmission of the pulse and the recep-



The amount of energy reflected by an object varies with the ratio of wavelength to object size.

This view of a Venusian crater was created using surface reflectivity and altitude information gathered with Synthetic Aperture Radar.

tion of the echo is equal to the distance traveled by the pulse divided by the speed of the wave. Since this distance is the round trip, from the transmitter to the object and then back to the receiver, it is divided by two to yield the actual distance from the object. This distance can be used in several ways. For example, the most familiar representation is a radar display in which a television screen displays a rotating beam mapping out a picture of detected objects. Among other applications, this type of display is used in airplanes, air traffic control and weather forecasting.

The speeds of the waves used for the three sensing technologies varies significantly. Radar uses radio waves and lidar uses light waves. percentage reflected from each wave depends upon several criteria.

First, the reflecting object must be about as large as the wavelength or larger for a significant amount of energy to be reflected. The system's frequency of operation can be chosen so as to emphasize or reduce the reflections of certain objects. For example, weather radar uses radio waves of a high enough frequency to result in rain drops reflecting a significant amount of energy. A radar with a wavelength of four inches would be inadequate for sensing rain, although it could be used for detecting abnormally large hailstones.

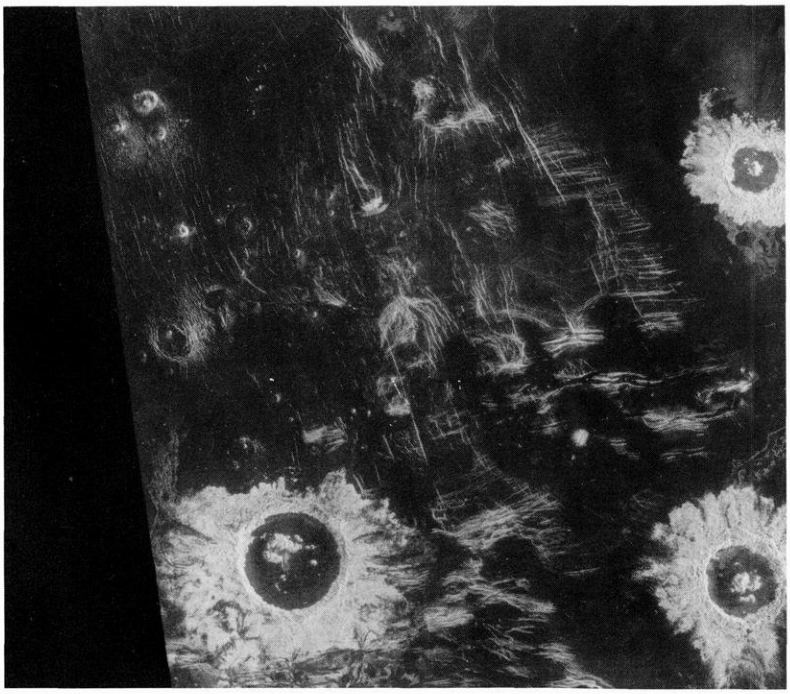
Second, the amount of energy reflected depends upon the material and shape of the reflector. In order to increase radar visibility, many boats use metal reflectors specially shaped to reflect any incoming radio waves back to the same direction from which they came. The shape of an object can be changed to modify the amount of energy reflected. The now-familiar Stealth airplanes are shaped to absorb and scatter radio waves striking them. In addition, they are covered with a material, similar to that found in magnetic recording tape, which absorbs the energy in radio waves.

Third, radio waves and light waves can be polarized, meaning the "up and down" motions we associate with waves, conceptually similar to those in water, can be directed sideways, diagonally, more up-left and down-right than up-right and down-left and so on. The amount of energy in each direction of polarization can be modified by passing the waves through a filter or by reflecting the waves. Normal sunlight is not polarized. However, when it is reflected by a wet road at sunset, for example, it becomes polarized. Polarized sunglasses are popular because they filter out the polarized light, such as a glare on the road, while allowing most of the other light to pass, such as that from the trees on the roadside. This polarization can also be used for radar and lidar in order to determine whether the reflecting objects are shaped so they reflect energy with a certain polarization.

Whenever the transmitter and receiver are moving toward or away from the reflecting object, the frequency and wavelength of the waves received changes. This phenomenon is called the Doppler effect. If the separation is increasing, the wavelength increases and the frequency decreases. The opposite is true for a decreasing separation. This behavior applies to all waves; it is responsible for the falling pitch of the sound of cars passing a microphone in the Indianapolis 500 race. Using this property, one can determine the difference in velocity between the transmitter/receiver set and the reflector. Police radar uses the Doppler effect to determine the speed of vehicles.

Lidar is similar to radar in that it uses electromagnetic waves. However, it uses bursts of laser light rather than radio waves. Light has a much shorter wavelength than radio waves; therefore, it can be used to detect objects too small to be sensed by radar. One application of lidar is range finding. Some tanks have lasers which send a brief pulse of light to a target. By timing the delay of the echo, the range is found and used in aiming the tank's barrel. Lidar is popular for range finding, because unlike radar, very narrow low energy beams are used. This quality makes lidar, compared to radar, much harder for the enemy to detect. Therefore, there is no warning given by the range finder, helping to maintain surprise.

Lidar is used for generating images and maps by using a lidar range finder, a device capable of being aimed in many directions quickly. For example, research is being done in the Department of Meteorology in the University of Wisconsin-Madison to measure dust and chemicals in the atmosphere within 20 kilometers of the surface of the Earth. As the laser beam travels through the atmosphere, parts of the beam are reflected by dust, chemicals, water vapor and air of the atmosphere. By recording these reflections of light, the position of particles in the beam can be determined. Such a technique can be used to generate images which illustrate the positions of these particles in the earth's atmosphere.



This image, showing the reflectivity of the surface of Venus, was created using information from several orbits of the SAR-equipped Magellan spacecraft.

UW researchers in the meteorology department have been using lidar for several years. They have been studying both the positions and movements of particles in the air. Members of the team include Ed Eloranta, the senior scientist; Jim Rose, who specializes in the electronic aspects of the system; Dan Forrest, who uses computer graphics to produce images with lidar; and Dick Sharkey, who deals with the mechanical aspects of the lidar construction. The system used for generating these images, called Volume Imaging Lidar, shoots out thirty beams of light per second for three minutes to generate an image. Lidar has been used for many projects in the Department of Meteorology, receiving funding from NASA, the Department of Energy, the National Science Foundation, the Naval Research Laboratory and other groups.

Variations on the basic lidar system enable more elaborate measurements of the atmosphere. For example, different types of molecules reflect light differently, based on the wavelength, and therefore, the color, of the light. A blue piece of paper reflects much ticles found in the air, their positions and their concentrations. This technique is used for locating airborne pollutants near cities and factories.

Since the spectra of many different kinds of molecules are known, these spectra can be compared to the measured reflected spectra to determine the speeds of the reflecting molecules. The speed can be found by measuring the Doppler shift of the reflected spectra. Among other applications, lidar is used to determine wind speed based on the Doppler shift of the reflections.

Radar, sonar, and lidar offer tremendous opportunities for the future. Given the promise of increasing electronics and computer power at decreasing prices, more and more problems can be solved feasibly and inexpensively with one of these three types of systems. ▮▮

Photos courtesy of University of Wisconsin-Madison Department of Meteorology.

AUTHOR

Alexander Dean is a sixth year ECE and Spanish senior who is finally graduating. His worst Halloween horror involves "calculus and giant crabs in a final exam".

Physics With A Twist

Two large desks sit on either side of the room. A computer rests on one while a disheveled array of books and papers adorns the other. Still more books fill the tall shelves lining the small yet spacious room. A fraction of the afternoon sun, still recovering from the morning's rain, shines in through the eastern windows. An inviting couch rests underneath the windowsill. The office is well-suited for the prestigious work of an Integrated Liberal Studies physics professor.

"Haven't you ever asked yourself," queries Aaron Deoppers, an ILS physics student, referring to the myriad of laws and equations encountered in a typical physics class, "'When will I ever use this stuff?'" Although engineers may find this question easy to answer, many students have trouble finding applications beyond building bridges and designing engines. At first glance, physics appears to be full of complicated mathematical and scientific equations, yet many do not realize that physics operations also have several social impacts. ILS physics courses emphasize these social impacts. In ILS 251, Contemporary Physical Thought, Professor Robert March exposes students to the effects of physics in today's world.

Although many physics theories involve complex mathematical and scientific computations, March portrays these ideas using everyday logic. The internationally renowned textbook, *Physics For Poets*, offers an example of March's technique for simplifying elaborate concepts. Although some of the students might not have a strong grip on mathematics and sciences, "The students found in my class are bright and eager to learn," states March. According to one student, the course attempts to solve problems from a variety of approaches. Yet, to March, solving problems is not as important as understanding the concepts and ramifications of these problems. To drive this point home, students must write a term paper before the semester is out. Past papers, illustrating the diverse subject matter explored in the class, have included,"Einstein and Picasso," "God and Science" and "Schrodinger's Cat Lives!" Creativity, not scientific logic, is emphasized. March teaches his students physics through a medium that is commonly used throughout the ILS program, philosophy.

Robert March, Professor of the UW physics department, gives a new dimension to physics in his course, Contemporary Physical Thought.

Relativity theory, quantum mechanics and nuclear physics are among the subjects discussed in March's class. Starting with a history of Newton's physical theories, the course gives the students the background necessary for understanding recent theories in physics. March stresses the importance of Newton's ideas, saying, "None of these theories has come close to matching Newton's triumph."

As the course content grows into more complex theories, the philosophical aspect also grows. An example of theoretical physics is the Quantum Theory, claiming that atoms and their components are controlled by pure chance. This idea contradicts the purpose of science, "the psychological necessity to feel

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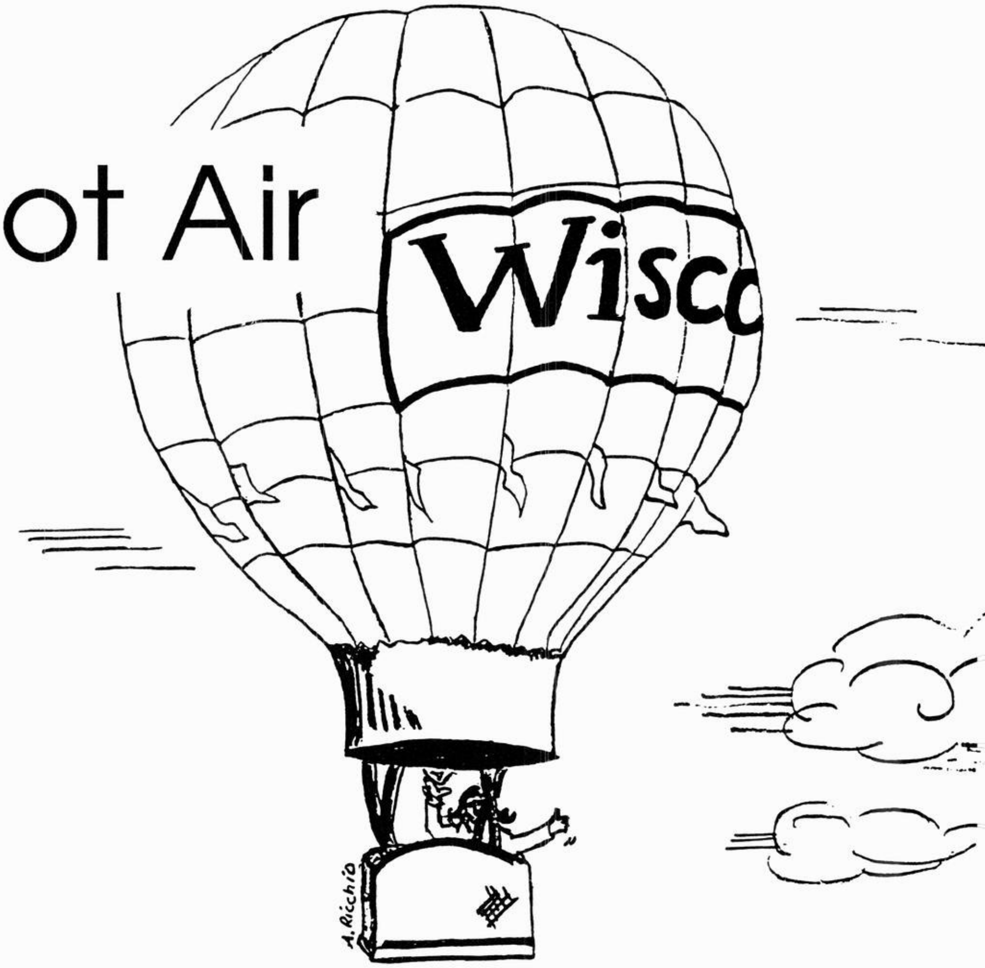
Full of Hot Air



Imagine yourself slowly ascending into the sky with a gentle breeze at your back. As you look down, all you see is the patchwork of the earth below. Sound peaceful and relaxing? In hot air ballooning, anyone can experience those feelings of serenity. In fact, the first hot air balloon experience, by Jean Francois Pilâtre de Rozier of France on October 15, 1783, occurred 125 years before Orville Wright flew the first airplane at Kitty Hawk, North Carolina. The physics of hot air ballooning are simple and the ride is enjoyable.

The balloon's design, unlike the airplane's, has not changed much. The hot air balloon is composed of three basic parts, the basket, the burner and the envelope. To keep the overall weight down, the basket is made of wicker. The burner may burn a number of different fuels, but it usually uses propane gas. The envelope, the fabric portion, is made of a non-conductive material and sealed with a special coating to prevent leakage. At the top of the envelope, there is a valve which keeps the balloon grounded while deflating at the end of the flight. The envelope's life expectancy is 300-400 hours of flight time. After continuous heating and cooling, the material becomes porous. During annual inspections, the envelope and the rest of the balloon are checked for strength. The average balloon can usually carry two to three adults.

Hot air balloons are weather affected airships. Pilots must know the weather conditions for taking off and landing. Hot air balloons need only an acre of unobstructed land for arrival and departure.

The mechanics of the hot air balloon are simple. In ascent, the air in the envelope must be less dense than the air outside. Sometimes it is too hot and humid to fly. The weight in the basket must be proportional to the size of the envelope. As for steering the balloon, it can go in only one direction—with the wind. To avoid hitting obstacles or to enable landing on target, pilots can use the air currents of different altitudes to alter their direction. Most balloons fly at 2,000 feet but are able to ascend to 12,500 feet. They follow the same regulations as aircraft without oxygen. When flying near airports, balloon pilots must keep in constant radio contact with the airport. Balloons have the right-of-way over all other aircraft. During descent, pilots have three options for landing the dirigible. They can allow the air to cool off in the envelope, vary the length and frequency of the burner blast or open the valve at the top of the envelope. The longest time a balloon can remain in the air depends on the weather. In the summer, at temperatures around 80° F, the balloon can remain in the air for an hour and a half. In the winter, that same dirigible at 15°-20° F will stay up from three to three and a half hours.

Hot air balloons are used for a number of purposes, with the most well-known being sight-seeing. Meteorologists use dirigibles to measure temperatures, humidity and air pressures. Balloons have also been used to relay radio or hand written messages to far reaching areas. In 1794, Napoleon used dirigibles in the French Army. In the Civil War, the Union Army used balloons to report troop movements. Ballooning can also be a sport. Balloon rallies are held almost every weekend all over the United States. Pilots compete in high-paced, accurate flying by dropping markers on targets.

While in flight, balloon passengers experience a gentle floating sensation interrupted by only a slight jolt as the aircraft lands. The cost for a ride depends on the area of the country and the length of the ride. In the Madison area, a half hour ride costs $125 per person. An hour ride, which also includes souvenirs and a welcome back party, costs $185 per person.

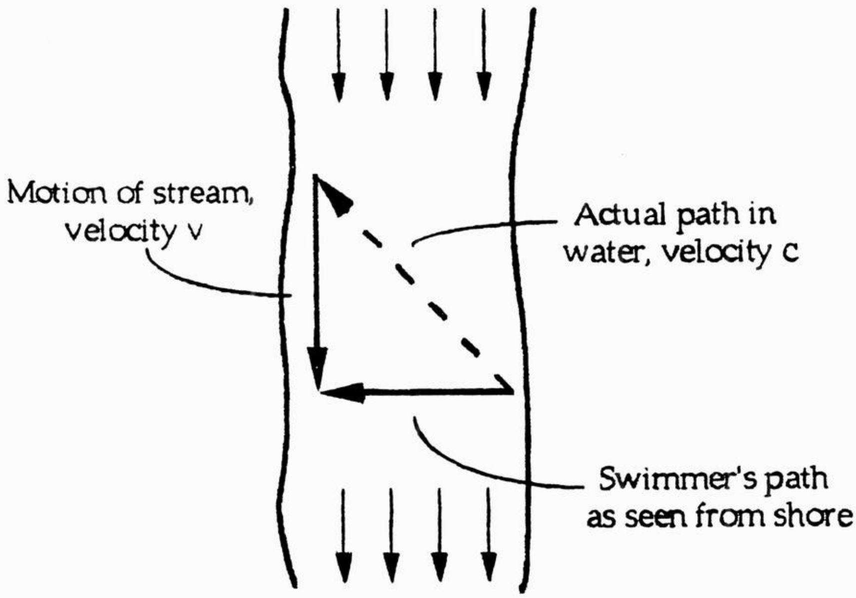
Although a few accidents have occurred in unfamiliar territory or near power lines, ballooning is a fairly safe activity. Pilots must continually inspect and repair their equipment. Before a flight, a pilot must instruct passengers on how to hang on and to flex their knees during landing. People interested in becoming balloon pilots must go through the same training and examinations as airplane pilots. Most pilots are members of various ballooning organizations. The Balloon Federation of America keeps records on the nation's top pilots. The Wisconsin Balloon Group is a state group that holds safety seminars and meetings.

For those adventurous at heart, stressed out or just looking for a new hobby, hot air ballooning might just send you skyward. ■

AUTHOR

As a first semester student, Robyn Ryan plans on entering the Engineering Mechanics department in the future.

ILS Physics (continued from page 9)



Description of the effects of Force. Photo adapted from March's text, **Physics for Poets**. *Graph by Joe Skidmore.*

less at the mercy of chance." In addition, Einstein's Theory of Relativity shows a different way of proving Newton's laws of physics. Again March explains the significance of Einstien's discovery in relation to the society of that time period. Nuclear physics is stressed as well. Giving the facts about nuclear physics, March allows the students to make their own judgements on the morality and effects of the nuclear age on today's society. ILS physics gives the philosophy behind the theories of physics.

"The majority of the students who take ILS physics are political science or international affairs majors," states March, "although there have been some engineering students taking the course." With heavy course loads already involving many science requirements, engineering majors might find difficulty in scheduling the course. Engineers need to know more than just solving equations, though. Offering an unconventional look at science, ILS physics could be an interesting and valuable course to consider. ■

AUTHOR

Jim Webb is a sophomore in Mechanical Engineering and a skeet-shooter wanna-be.

New Addition Adds To Bike Rack Shortage

Cyclists have been forced to find alternative places to lock their bikes.

When construction began on the addition to the Engineering Building after *EXPO* weekend this past spring, the bike racks in front of the building were removed. These racks were replaced by new racks on the east side of the building. *They taketh away, they giveth back.*

At the same time, the post-and-chain fence which students consistently used to lock-up their bikes was also removed, but nothing was installed to replace this form of theft prevention. This fact combined with a campus-wide increase in the number of bicycles has made the bike rack shortage most severe on the engineering campus.

Naturally, some students have resorted to parking their bikes illegally rather than risk theft. Bikes have even been parked directly beneath the "Please respect the disabled, do not park your bike here" signs on the wheelchair-access ramp to Union South and Wendt Library on the corner of Randall and Johnson.

Both *POLYGON* Engineering Council and WSA made this problem known to the administration of the UW Department of Planning and Construction (DPC), but so far little has been done to fulfill the need for more bike racks. According to James Roeber, a member of the Campus Planning Bicycle-Pedestrian Subcommittee, the problem only exists for the first six to eight weeks of the fall semester because students stop riding their bikes when the weather gets cold, take their bikes home over winter

The 73,000 square foot addition will provide laboratory and office space for the ChE and ECE departments and centralize the administrative and deans' offices. The addition will consist of four stories and basement space, with the first floor featuring a large terrace and three auditoria to be used for meetings with industry to inform them of new technologies. The entire project will cost $16 million, $2 million provided by the Grainger Foundation for the auditoria and the remaining $14 million coming from the state. The state has also pledged $2.9 million for renovation of the current Engineering Building. Construction is scheduled to be completed in January, 1993.

break and don't bring them back after spring break.

In an attempt to quantify the problem, the DPC performed a "saturation study," a count of the number of bicycles on campus by location, on Monday, September 30, during 9:55 and 11:00 classes, which the DPC considers peak attendance periods. The study was to have taken place earlier in the semester, but previous dates had been squelched by rain.

According to Bob Hendricks of the DPC, the study revealed that

Naturally, some students have resorted to parking their bikes illegally rather than risk theft.

there are enough stalls on campus to accomodate the number of bikes, but some of them are not in the right location. Hendrick's stated that some racks could be moved to the engineering campus from other locations. He added that temporary bicycle parking could be installed by putting down pads to place bike racks on, but this could not be done until late October, at which time the problem may no longer exist.

AUTHOR

Mike Waters, *POLYGON* President, spoke directly with Dean Bollinger and Bob Hendricks to inform them of this problem and to cooperatively 'engineer' a solution. Despite Mike's efforts, he is not optimistic that the problem will be completely resolved this semester. However, he promises to follow up on this issue and he encourages all engineering students to bring such issues to *POLYGON*'s attention in the future.

Student Profile: Andrew 'Chip' Hogan—*Breaking New Ground*

"There were many memorable moments during my term as *POLYGON* Engineering Council President, but there is one I will NEVER forget!.....It was the time Dean Bollinger asked me to participate in the ground-breaking ceremony for the Engineering Building addition. I willingly agreed.....what else was I to do?

Months later, the day finally arrived, so I put on my best suit and set off for the designated spot. When I arrived, I found myself amidst a crowd of dignitaries and media people. I asked one of the associate deans what was going on. He told me the governor was making a surprise appearance. Then I asked if I'd have to speak. He said he wasn't sure, we'd have to play it by ear. *'Play it by ear?!'* I thought to myself as panic sent chills to all my extremities.

A few moments later, I was called to take my seat with the dean, Governor Thompson and other high-ranking individuals. They each took their turn addressing the crowd (meantime, I prayed for profound linguistic aptitude and for bladder control). When all had gone but me, Dean Bollinger went to the podium and said, '...and now for the real reason we are all here, the students!.....And representing the students is the president of *POLYGON* Engineering Council, Andrew Hogan.'

My life flashed before of my eyes and I almost soiled my briefs. I went to the mike and attempted to emulate the polished speaking style of my fellow orators. Relying on my Comm Arts 105 skills from sophomore year, I cracked a joke about how no one told me I'd have to give a speech and that I'd agreed to participate because it was my understanding that we'd all roll up our sleeves and start digging a big hole. When the laughter subsided, I went on to say how honored I was to represent the engineering students and how necessary it was for us to have facilities so that we could study and er, uh, get smarter in a nice place.

Feeling my linguistic aptitude rapidly dissipating and my bladder control close behind, I thanked the Dean, shook the Governor's hand, and sat down. Once seated, I vowed that if I ever had to do this again I'd be sure to calm my nerves with a modest shot of Jack Daniels, prepare a speech, and wear my most absorbent pair of Depend undergarments. What a harrowing experience!"

'Bo' *Don't* Know Engineering

Would you men like a muscular torso like 'Bo' Jackson? Are you women jealous of 'Bo' Derek's slim figure? Do you want to know their body secrets?!.....I'll tell you!.....

.....Primarily, their bodies are their livelihood, so staying physically fit is of utmost importance. These 'Bo's *don't* know the excessive demands one has as an engineering student at the UW! But quitting college won't help you in your pursuit of a 'Bo'-bod because these 'Bo's are also blessed with superior genetics. Fortunately, I understand your struggle (all too well!) and will share with you a not-so-'secret' I learned recently which is helping me to attain the level of fitness I desire.....

Standing 5 feet tall and weighing 135 pounds, I was a FAT child! But as puberty came around and I began getting more involved in sports, I began to grow out of my pre-teen flab. Now 5 feet, 9 inches tall and a

Physical fitness and proper nutrition directly affect how we perform in our daily lives

reasonably lean 160 pounds, I still carry around a little 'baby fat' as a souvenir of my *rotund* days.

When I came to the UW, however, I made a vow to rid myself of this 'lipid' reminder once and for all. Of course, that was when I thought I would have more than enough time for studying, socializing, and exercising. Being the "18-credit-a-semester, get-involved-in-everything" fool that I am, however, I soon discovered that there is not enough time in a UW-day to do everything.

In my first three semesters, I learned and used many formulas, but I failed to derive a formula to balance academics, extracurricular activities and physical fitness. However, last (my fourth) semester, I have made a discovery which is helping me to do just that.

Many of you may have already made this discovery for yourself, but if you haven't acted on it, I encourage you to do so in future semesters. Physical fitness and proper nutrition directly affect how we perform in our daily lives (and how long we live). Our physical appearance also has a lot to do with how we feel about ourselves and how others perceive us.

Since arriving at the UW, I have divided my priorities into what I call the three 'A's—academics, activities, and amusement (not usually in that order, unfortunately). In high school, I had a fourth 'A' on my list of priorities, namely athletics, but back then academics and activities were much less of a time commitment. I didn't choose to drop athletics from my list when I came here. I just didn't have (or make) the time for physical fitness after taking care of items one through three on my straight-'A' agenda.

Over last winter break, however, I was reminded of the saying about the human body being a 'temple'. I took a good look in the mirror and realized that my body was not exactly an 'object of worship'. Not that it *ever* was, but rather than simply accept this painful truth, I made a firm resolution to improve my physical fitness and overall health in the new year. Like many of you, perhaps, this is not the first year that I have made this promise to myself, but this year has been different in that I made the ever-important *FIRST STEP* early in the spring semester.

My first step toward achieving my fitness goals was registering for 'Cross Training' (PE Elective #131). I figured if I couldn't make athletics a

separate priority on my list by taking fewer credits, why not make it part of my number-one priority—academics. Besides, I have had fewer than 18 credits, but then I usually chose to use my free time for social activities rather than physical activities.

When I first signed up for 'Cross Training', I was a bit concerned about the possibility of not getting a good grade in the class, but I convinced myself that the grade didn't matter, reasoning that the 'grade' wasn't my goal, 'fitness' was, and that I probably wouldn't act on my motivation to 'get fit' if I didn't take a Phy Ed class. On the first day of class, however, my grade concerns were dispelled by the discovery that I could take the course 'Pass-Fail'.

For those of you who know about the UW College of Engineering's policy for taking classes 'Pass-Fail', this article will hopefully enhance your understanding of it. For those of you like me in the uninformed (or simply 'forgetful') majority, you will learn some important 'old news'. At some point in your college career, you may have received a twice-folded brochure in red lettering entitled *"Official Regulations For Undergraduates In The College Of Engineering Of The University Of Wisconsin-Madison."* If you even vaguely recall having a copy of this, you probably read the title and said, "Rules! I hate rules!", and promptly placed it in the cylindrical file. For those patient few who bothered to read further, I shall remind you what it contains.

Similar to my three 'A's, this brochure describes what Donald Dietmeyer, Associate Dean for Academic Affairs, likes to call the three 'R's of the College of Engineering—rules, regulations, and requirements. The brochure itself is divided into three broad categories, namely 'Admissions', 'Registration', and 'Performance and Evaluation'. The Pass-Fail policy is detailed in Regulation #13 under 'Registration', which states that "all engineering students with a degree-granting classification and in good standing may count toward an undergraduate degree two Pass-Fail courses. These courses must be liberal or free electives."

You may wonder how this applies to Phy Ed courses. It doesn't! It turns out that engineering students can take as many courses outside their degree requirements as they want Pass-Fail by following the same procedure as they would for taking liberal and free elective courses Pass-Fail. Students simply go to their department office, ask for a Pass-Fail Declaration Form, fill it out, get their advisor's signature, and take the completed form to Dean Dietmeyer's Office (266 Mechanical Engineering) for action.

Your next question may be, "How well do I have to do to 'Pass'?" The way the process works, the instructor is not informed that you have decided to take the course Pass-Fail. At the end of the semester, the instructor simply reports a letter grade to the Registrar. The Registrar converts a grade of 'C' or better to 'S' (Satisfactory) and 'D' or below to 'U' (Unsatisfactory). Unfortunately, this information cannot help you this semester, as you must declare Pass-Fail courses during the first four weeks of the semester, but it is definitely something to consider as you finalize your spring semester schedule.

Our physical appearance has a lot to do with how we feel about ourselves and how others perceive us

For those of you who have taken a lower credit load to make time for physical fitness, you are undoubtedly experiencing at least some of the many benefits of exercise, including more energy in your daily lives! But for those who are taking higher credit loads or feel you just don't have time for a regular workout, think about the information that I have shared with you and decide whether or not you can use it to become more physically fit. The benefits of exercise may not come quickly and easily, but (as amateur philosophers like me often say) the important things in life never do.

To obtain more information about the Pass-Fail policy or any of the many other 'rules' of the UW College of Engineering, pick up a copy of the *Regulations* brochure from your department office or Dean Dietmeyer's Office (266 ME).

AUTHOR

Mike Waters, a junior in engineering mechanics, is taking two Phy Ed classes this semester, Tennis and Tae Kwon Do. In addition to participating in many athletic activities, Mike admits that he also enjoys watching *females* "in athletic competition" (translation: 'sweating'). He insists that he did not receive extra-credit in his *Cross Training* class for writing this article, but we are continuing our investigation.

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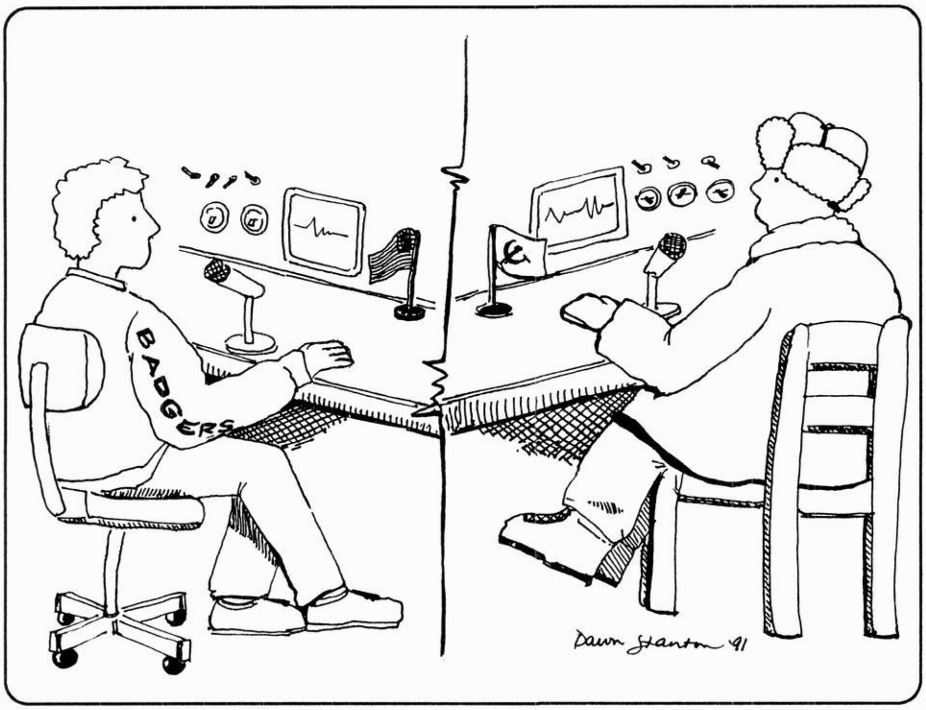
Hamming It Up



Have you ever seen radio antennas emerging from a car, truck or house? Chances are that the antennas are an essential part of equipment for one of many ham radio enthusiasts.

A ham radio, or amateur radio, is a two-way, non-commercial shortwave radio communication system. Amateur radio operators, better known as hams, communicate by voice or Morse Code. Their equipment consists of an antenna, a receiver and a transmitter. There is radio equipment that can be held in your hand, or it can fill up a room. People can communicate via radio from their cars, on their bikes, from boats or virtually anywhere, making it a very versatile communication medium.

The radios are generally used for recreational purposes; however, they are extremely useful during emergencies. Ham radio operation is an important hobby, sometimes crucial to the lives of others. In an emergency, ham radio operators are an important link between the outside world and the disaster area. During many hurricanes, floods, forest fires and other disasters, ham radios are the only means of communication between the outside world and the stricken communities. Ham radios were used as a communication system during Operation Desert Storm as a connection between families and friends of the servicemen and servicewomen.

Using ham radios, one can communicate with a neighbor, a friend in another state or even someone on another continent. English and Morse Code are the official languages of ham operators, as communicating with foreign countries is a common occurrence. There are many friendships among ham operators around the world.

Hamfests, or Eyeballs, are a popular form of socializing. At the fests, the hams can meet the people they have been talking to on the air, hence the name Eyeball. There are various hamfests around the United States. County hunting is a common activity for many hams. The object is to contact at least one person over the radio from each county in the United States and obtain proof via a postcard. When this long-term goal is achieved, an award is earned.

In order to operate a shortwave radio, one must earn a license from the Federal Communication Commission. There are five different classes of radio operation: Novice, Technician, General, Advanced and Extra. In order to get the basic license, Novice, one must pass a written exam and be able to decipher a five word per minute code. One must know about the following concepts in order to pass the test: electrical principals, circuit components, practical circuits, signals and emissions, operating procedures, amateur radio practices, rules and regulations, radio wave propagation, and antennas and feedlines.

The FCC makes up many rules and regulations that hams must follow. There are limitations on frequencies used to communicate, depending on the class license one possesses. People with a Novice license have fewer privileges than operators with an Extra license.

Each operator has his own call sign consisting of letters and numbers. Sometimes the call signs can be seen on license plates where the operator communicates from his vehicle. Each person is identified by a call sign when speaking on the radio.

In an emergency, ham radio operators are an important link between the outside world and the disaster area.

Ham radios are an important and fun hobby for many people around the world. Improving international goodwill, contributing to radio art and learning about the technical advances are only a few reasons to get involved in ham radio operation.

If you are interested in amateur radios, there is a UW-Madison ham radio club known as the Badger Amateur Radio Society. It is located in B-265G Engineering (262-1142).

AUTHOR

Amy Erickson is a second year ECE major who likes all types of music and sports.

The Tool of the Trade: Morse Code

A	• -	N	- •	1	• - - - -
B	- • • •	O	- - -	2	• • - - -
C	- • - •	P	• - - •	3	• • • - -
D	- • •	Q	- - • -	4	• • • • -
E	•	R	• - •	5	• • • • •
F	• • - •	S	• • •	6	- • • • •
G	- - •	T	-	7	- - • • •
H	• • • •	U	• • -	8	- - - • •
I	• •	V	• • • -	9	- - - - •
J	• - - -	W	• - -	0	- - - - -
K	- • -	X	- • • -		
L	• - • •	Y	- • - -		
M	- -	Z	- - • •		

period	• - • - • -
comma	- - • • - -
colon	- - - • • •
query	• • - - • •
apostrophe	• - - - - •
hyphen	- • • • • -
fraction bar	- • • - • -
parentheses	- • - - • -
quotation marks	• - • • - •

See if you could be a ham radio operator and decode the message below:

- • - - / - - - / • • - // - - / • • - / • • • / - //

- • • • / • // • - • / • / • - / • - • , / • - • • / - • - - //

- • • • / - - - / • - • / • / - • • //• - • - • - //

Engineering Honors Program? Stay Tuned!

A proposal has been drafted to establish an Honors Program for the UW College of Engineering. Specific details of the proposal are yet unavailable pending examination by the Academic Planning Council and the College of Engineering Education Committee. We hope to make this information available in our next issue.

Engineering Briefs

by Mike Waters

Changes Make Registration Easier For Freshmen

For the first time ever, incoming freshmen were able to register for their fall semester classes at SOAR. While making the SOAR program more intense, this change made the registration process much less frustrating for those who attended. In the past at SOAR, students were instructed how to use the *Timetable* and received advice in choosing their courses, but they did not know if the sections of the classes they had selected were open until their date of registration. Freshmen at SOAR '91 were told which sections of courses were open via computer, thus avoiding the hit-and-miss registration frustration experience by previous freshmen. This year's freshmen class was also helped by computer controls which reserved sections for them. Computer controls were also used to limit the number of students registering for specific sections each day, thus maintaining a wide variety of times to choose from for the majority of the summer.

Student Lounges: One Sacrificed, Two Saved

Even before the state legislature approved budget money for more computer workstations for engineering students, CAE had been looking for a place to put them. With limited space available until construction is completed on the addition to the Engineering Building, planners set their sights on the Mechanical Engineering Building lobby and the ECE Student Lounge. When students learned that they might lose these areas, they reacted quickly. IEEE began a petition drive to declare their unwillingness to sacrifice study space for computers. *POLYGON* Engineering Council, who has been part of the CAE Student Planning Team, was informed that the ME lobby was the primary target and discussed the issue during one of its meetings early in the semester. *POLYGON* members were opposed to giving up the ME lobby but, wanting more computers, they compromised by suggesting that the student study area on the second floor of ME be sacrificed instead. Acting on the *POLYGON* recommendation, Mike Redmond, Director of CAE, submitted a proposal for a new computer facility to be located in the second floor area. Pending approval of the CAE proposal, the new facility should be operational when students return after winter break.

POLYGON Needs *You*!

POLYGON Engineering Council is looking for people to organize this semester's Pre-Finals Engineers' Bash and to help with preparations for next semester's Engineers' Week activities. The Pre-Finals Bash is tentatively set for the first Friday in December. E-Week will take place during the week that overlaps March and April. If you have a suggestion about where to hold the Engineers' Bash or ideas for events to offer during E-Week, contact *POLYGON* President Mike Waters (264-0891) or E-Week Chair Bart Heldke (238-0036). *POLYGON* offers these events and many other services as part of their mission to help create a friendly, comfortable atmosphere for all engineering students to pursue their academic and extracurricular interests.

POLYGON also wishes to announce that it has allocated $3000 to help students who wish to join an engineering organization by paying the base membership fee to that organization. To be eligible for assistance, students must be first-time applicants and be receiving need-based financial aid.

Hangman To Tetris

Over 16,000 computers can be found on campus. Many more personal computers can be found in the residence halls and in nearby apartments. These computers serve as indispensable tools in research, data storage and education. But many of them serve another purpose as well—entertainment. Computer gaming has been present on campus for a long time and plays an important role in student life.

Computer game development began in the late 1960s. A few rudimentary games could be played on Link computers by utilizing an oscilloscope display for a monitor while interacting with the game by means of two knobs. However, these games were severely limited by the mere two kilobyte memory capacity of such computers.

More advanced and amusing games began to appear throughout the 1970s. The games of this era generally did not allow arcade-style user interaction. Instead, they consisted of giving the user a series of options with little or no graphic display. Popular choices of the time were *Hangman, Adventure,* and *Dungeon* . The popularity of such games was evident by the large number of students who went to computer centers and played them when they should have been doing their homework.

During the same time period, artificial intelligence became an important field in computer science. As such, checkers and chess computer games began to appear. One computer science student of the time recalls, "It seemed that we spent over half the time in our artificial intelligence course playing games."

The past decade has brought about enormous advances in the complexity and entertainment value of computer games. Computer graphics have been one of the most noticeable improvements in the gaming field. The old *Pong* graphics of the early 1980s have evolved to the near-television quality graphics utilized by some games. In any case, games today are better, faster and more abundant. From role-playing games to flight simulators to arcade games, something can be found to match any taste.

But such gaming developments do more than enhance entertainment. Artificial intelligence is still a growing field and an important part of the computer science curriculum. Computer Science 540, Introduction to Artificial Intelligence, emphasizes various forms of computer games. In fact, one of the final projects involves writing a program that will play three-dimensional tic-tac-toe with the user. Grades are in part determined by how well the computer plays.

While games have definitely become more sophisticated, many of them today involve little thought. Certainly advanced chess games and complex problem-solving adventure games challenge the user's reasoning like never before. But the games preferred on campus generally do not require such a mind strain. Instead, they tend to be more along the lines of *Tetris,* which simply requires quick reactions to a visual display. Of course, games like this require less time to play, which is good news to students and faculty members alike who need a short break from their work.

AUTHOR

Greg Gruber is a third year ECE major who enjoys computer games.

Editorial
(Continued from page 2)

co-op or intern. Even if you are a freshman or sophomore, and think that you don't know enough about your engineering field yet, don't put the opportunity on the back burner. Many companies hire ambitious underclassmen. Don't be afraid to try—you have nothing to lose. On the other hand, you have everything to gain: Experience, friends, money, and much more. Even if you do not get the job, at least you have the interview experience under your belt. When I applied for my job my freshman year, I did it "just for the interview experience," and I got the job. Now I have a job for life. As the Nike people would say, "Just do it."

If you would like to find out more about co-ops and internships, trek over to the co-op office on the fourth floor of Wendt library. Go to career fairs. Check the newspapers. Cruise the Yellow Pages. Talk to company representatives. Write them letters. Tell them you would like a job, and go out and get it.

Many other engineering students co-oped or interned this summer. A majority of them will agree that it was a very positive experience. Not only does the engineering work experience look great on your resume, but it also gives you a focus on your engineering studies. Even if you don't like your job, wouldn't you rather find out now than five years down the road? You might not be lucky enough to get the opportunity to risk bodily harm on a daily basis building highways, but you just might get the chance for to blaze the trail to a successful engineering career. ▮▮▮

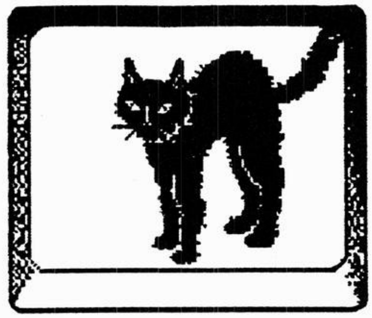
The Longest Day

As a friend and I walked along, a black cat crossed our path.

"Oh, no!" he cried. "A black cat!"

"So?" I asked, feeling rather contrary.

"We'll have bad luck for sure," he said. "Come on. Everyone knows that if a black cat crosses your path, you'll have bad luck."



That superstitious statement sent me reeling. I gathered up all of the logical powers from the deep recesses of my brain. Syllogisms, affirmed antecedents, denied consequences and valid conclusions flashed through my consciousness. However, all I managed to muster was, "Well, what is the physical connection between that cat's direction and position in space and time versus ours?" I was rather surprised when my question stumped him.

Later that week, I snickered to myself as I remembered that conversation, on my way to the Madison Academic Computing Center. I was ready to exercise logical powers of another sort as I finished my program for Computer Science 302. Just as the looming M.A.C.C. building came into my view, a coal-black feline slinked across the sidewalk before me. "Ha," I thought to myself, "luck, schmuck."

After reaching the M.A.C.C., I skipped down the stairs and found my way to the computer room. About fifty people sat at the four long rows of Macintosh computers. I squeezed through the aisle to an empty seat and set to work.

The night before, I had written out my entire program. It was designed to load a database created by my T.A. and show certain pieces of data depending on the user's input. It was a very complicated task; I estimated that it would take me four to five hours. I glanced at the clock. It was only one o'clock, and I hoped to be back at my dorm in time for dinner.

After an hour of typing, the normally wonderful strains of Steve Miller's voice had become stretched and slow. My walkman batteries were failing.

At two-thirty, I paused to stretch. My mind wandered a bit, but I called it back before too long. I bent over to get a Life Saver out of my backpack. As I did I heard a tremendous "AH-CHOO!" The hair on the back of my neck stood on end, and when I reached up to calm my goosebumps, it was evident that I had been sneezed on. Thank goodness for the "reserve kleenex" in my backpack.

I scrolled up and down the computer screen, trying to gauge my progress and figure out how much more work I had to do. Only half of the program was typed in, and I hadn't even tried to run it. It looked like I might be here a little longer than I had originally planned.

"Tap. Tap. Tap," my middle school typing teacher used to say. I reminded myself that remembering pre-adolescence probably wouldn't make me feel any better about my situation right now. Right now the incessant tapping of five hundred fingers was driving me crazy. Actually, I was on the edge of a headache. In a vain attempt to avoid my project, my brain ran through every analgesic commercial I'd ever seen. "Like a rope around your skull...Pounding...A headache so bad it shows...Headache (ache, ache, ache... an eternal echo)." The echo in my head got louder as I futilely searched for some aspirin in my trusty backpack.

I looked at the clock with pride at four thirty-seven, seconds after typing the final "end;" on my program. Then, I tried to run it. "Semicolon (;) or end expected after previous statement," flashed the computer screen. The statement was rudely punctuated by a high-pitched beep. Okay. There was an error message that I could handle. Unfortunately, the computer had found this mistake in the third line of my eight page program, and I had a feeling it wasn't the only one.

Forty error messages and two hours later, I was rather frustrated. And I had missed dinner. " I was looking forward to having macaroni and cheese cooked in a hot pot anyway," I muttered to myself.

"What?" asked the guy sitting next to me.

"Oh, nothing," I replied. "I guess this program has got me pretty frustrated."

"Yeah. I know what you mean," he said, smiling.

"Hey, hanging out in the computer

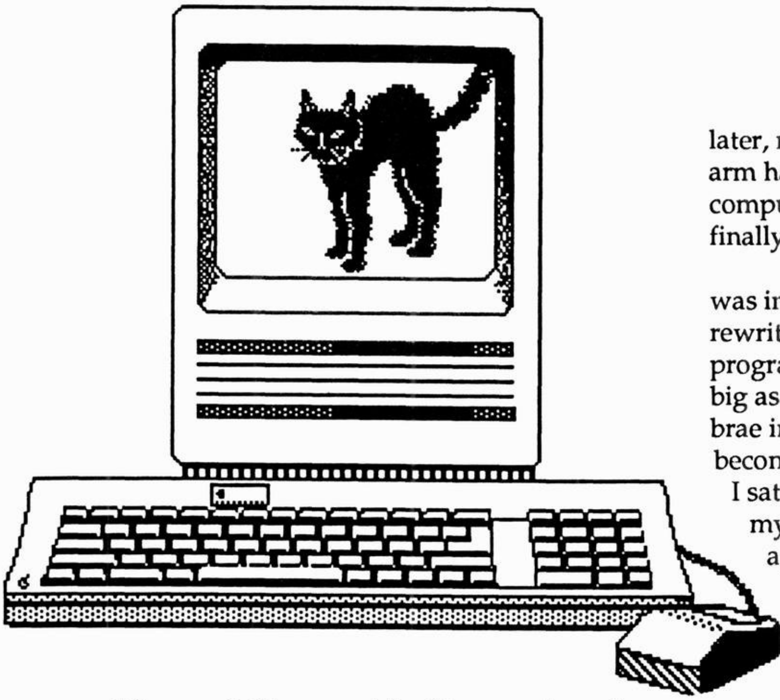
lab might not be so bad," I thought to myself. "This guy is cute!"

I tapped away with new found energy, tackling error messages bravely. I foiled the computer's attempts to break my stride. "Boolean expression required" did not phase me a bit. When "Invalid formal parameter lists" appeared, I validated those parameters like never before. I was only interrupted by the guy next to me.

"Hey," he said. " Can you watch my stuff for a minute? I've got to run home to get something—it's just across the street."

"Sure," I said, scarcely looking away from the screen.

By eight-seventeen, the computer had stumped me. I sat dazed at the keyboard, trying to focus my eyes. I imagined that lethal radiation was oozing from the glowing grey screen and poisoning my brain. It seemed as though the computer had a mind of its own. If I could talk to it just right, if I could hug the monitor to let it know how much I needed to finish this program, maybe then my program would run. "Please? Please, Mr. Computer," I begged in my very best teacher's pet voice, addressing the computer with admiration and respect, "Please run my program." I patted the top of the monitor and unsuccessfully tried to run my program. I decided to give it a last ditch effort. "I'll give you 2.5 megabytes of memory if you fix my program," I practically sobbed. The computer did not respond.



"Please? Please, Mr. Computer..."

I realized just how low I had sunk when my friend returned from his errand.

"Hi," I said.

"Hi," he said. I realized at that moment that person-computer interaction will never replace conversation between two people. It was so nice to be responded to with something other than a beep.

"Hey, thanks for watching my stuff," he said. "Sometimes I just really need a chew," he slurped as he spit tobacco juice into a paper cup.

"Oh, um, ah, no problem," I managed to choke out, wondering if my realization was a bit premature. I turned back toward my work, and my stomach did the same.

It was time to admit that I needed help. I raised my hand.

Twenty minutes later, my hand and upper arm had fallen asleep, but a computer consultant was finally coming to my aid.

At nine fifty-four I was in the process of rewriting major parts of my program. My eyes were as big as saucers. The vertebrae in my back had become fused together and I sat perfectly upright in my chair. I was a teen-age computer zombie.

I don't remember much of the next two hours, but at eleven forty-five, I snapped out of my trance when my program ran correctly. I'm sure that I could hear angels singing the "Hallejulia Chorus." I felt like I was glowing. Miraculously, I managed to print out my results and my program without too much difficulty.

At midnight I strode out of the M.A.C.C. into the fresh, unair-conditioned night air. I skipped home pondering the fate of that black cat and the plot possibilities for a movie called "I was a teen-age computer zombie."

AUTHOR

Annelies Howell is a second year engineering student who likes to discuss philosophy and avoids black cats.

Society Spotlight: The Society Of Women Engineers

It is easy to see why the Society of Women Engineers is this issue's society in the spotlight. This organization is the largest engineering society on campus, and with 177 members it continues to grow each year. It is unique in that it welcomes members of all engineering disciplines and is active not only on campus, but in the community and industrial world as well.

Campus involvement is a high priority for SWE. Making young women comfortable on the engineering campus and giving them a place to "fit in" in a large university is an important goal of this organization. A mentoring program, called "Big Sib/Little Sib," helps new freshman engineering students make a smooth transition into college and engineering.

As the students' needs change through the years, so do SWE's programs. A Senior Luncheon is held in March providing an opportunity for students to compare job hunting notes and have a relaxing lunch. The strong SWE network continues with its members on up to a graduate level. A Graduate Concerns committee organizes a SWE sponsored luncheon for all women faculty and graduate students in the College of Engineering to help acquaint them with each other so they can share information and advice.

This organization is very visible on campus largely because of their fund-raising events. Over $1,600 was raised last year as a result of five doughnut sales, as well as two SWE-enie Weenie sales. The traditional SWE-enie Weenie hot dog sales, sponsored by local Oscar Mayer Foods, Inc., have become very popular in the last four years, and are now a much anticipated social event for the College of Engineering students.

Many of the funds raised by the Society of Women Engineers are given away in the form of student scholarships. Last year, four $400 scholarships from SWE's scholarship trust fund were awarded, as well as a $200 scholarship from the National SWE Organization as a result of the Madison chapter being named Best Student Section in their Region.

The Society of Women Engineers at UW-Madison is also very active in the community. Arousing interest in engineering before college entrance, especially in young women, is a high priority for this organization. Eight area schools, as well as 17 other schools around the state, were visited by representatives from the SWE Outreach program. SWE members spread the word about engineering to over 1350 middle and high school students with a video presentation and interactive discussion about engineering and college life.

Once high school students have been accepted in the UW College of Engineering, they may receive phone calls from SWE members offering a wealth of information. Females received an invitation to attend SWE's annual Day On Campus event. Last year 40 girls and five parents came to Madison to familiarize themselves with the campus environment and ask questions. The girls also had the option to stay overnight with SWE members in dormitories and near-campus housing. One visitor, now a UW freshman, stated, "I decided to attend this university because I was so impressed with the friendship shown on that weekend."

This Society has its hands in engineering industry also. Meetings are held twice a month with guest speakers from industry at almost every meeting. For the past seven years, SWE has held a dinner and awards banquet called Evening with Industry. Over 30 companies were represented last year and almost 300 people attended. This dinner gives company representatives and students a chance to talk in an informal, relaxed atmosphere.

The Society of Women Engineers is a very diverse society at the University of Wisconsin-Madison. The group intends to stay in the engineering spotlight for many years to come!

AUTHOR

Amy Ricchio is active in the UW-Homecoming Committee which raises money for the student crisis fund. She has co-oped twice with General Electric in Cincinnati, OH.

Calculator Virus Epidemic Hits UW

(Madison, WI) Researchers at the University of Wisconsin Madison are currently working to find a vaccine for a calculator virus that has plagued the University for the past month.

The virus, identified as *Reekis Havicus,* has been appearing unexpectedly throughout the Madison campus. Originally thought to be several isolated cases, the virus has spread one hundred fold in the past week. The nature of spreading is not known.

The virus is known to attack any calculator with the capacity for multiplication, division, and subtraction. It is characterized by its ability to give unreasonable numbers and demonstrate unusual behavior, particularly during an exam.

According to one engineering student, "In the middle of my dynamics exam, the stupid thing kept giving me fluid velocities of jello in a non-viscous medium."

Reactions to the virus outbreak have been diverse. For obvious reasons, the College of Business has reacted to the outbreak badly. A hysterical panic has swept the Business School, and Business 570 classes have been cancelled until a vaccine can be found.

Though the hardest hit, the College of Engineering has taken a reasonable approach to the situation. Until an antedote is developed, students and professors are resorting to alternate methods of calculation such as slide rules, abaci, and fingers.

One die-hard, slide-rule using professcr has even professed,"I've always known calculators were just a fad."

According to Bob Chuck, owner of *Quik Calc,* a local book store,calculator sales have dropped and slide rule sales have increased by approximately 666% since the epidemic was first reported.

Approximately $3,145,159.27 in funding was provided to the University by Texas-Packard for research into understanding the virus mechanism.

Until a cure is found, experts suggest avoiding calculator use and if calculator use is necessary, users should exhibit extreme caution.

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