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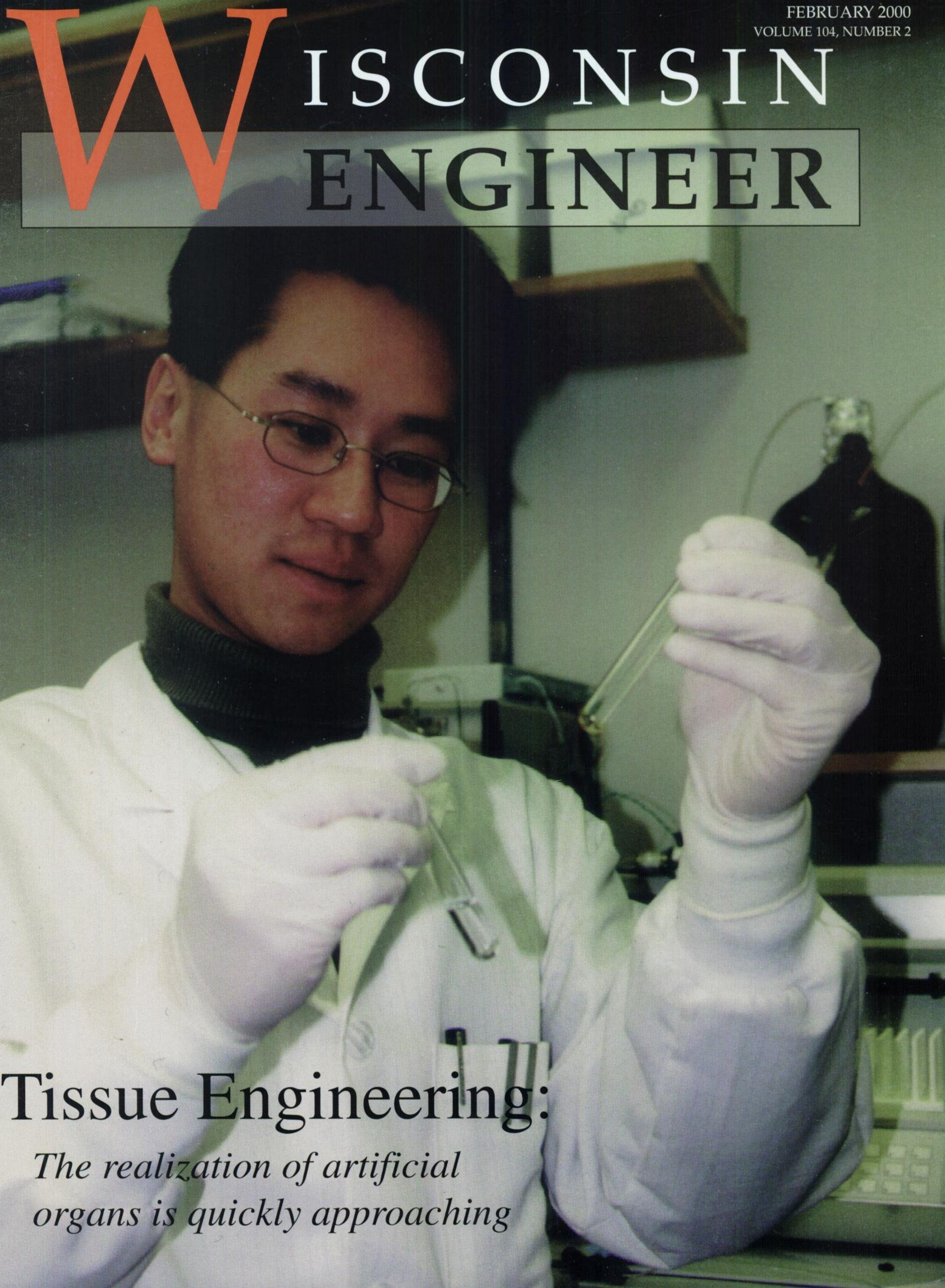
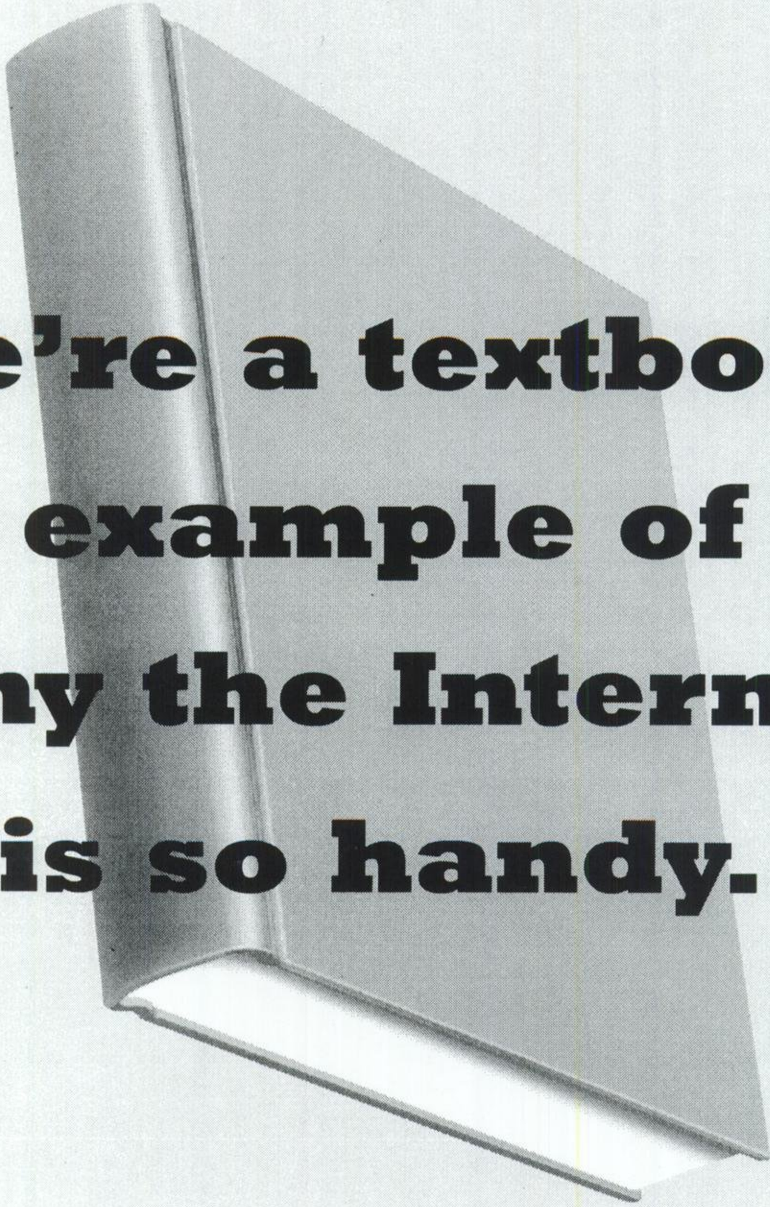
FEBRUARY 2000
VOLUME 104, NUMBER 2

WISCONSIN ENGINEER



Tissue Engineering:

The realization of artificial organs is quickly approaching



WISCONSIN ENGINEER

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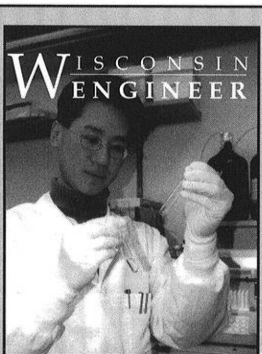

Tissue Engineering: Weiyuan John Kao, Ph.D., works on synthesizing new bioactive materials to modulate host response for tissue engineering.

Photo by Victor Chen

DEPARTMENTS

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Final Comments from Your Editor-in-Chief

The night before classes began in the fall of 1996, I showed up at CAE around 7:00 p.m. Kurt and Jon had been there for a few hours and had about three pages of the magazine laid out. We needed to have the September issue ready for the printers the next morning and, at this point we had only a few stories and essentially no pictures. I remember we had an article called, "What came first: the chicken or the egg?," and around 3:00 a.m., I was still searching the Internet for a picture that would illustrate the age old question.

Around 6:00 a.m., I finally went home to get some sleep before class. I wasn't upset or frustrated. I was proud that we produced a good magazine. Granted, now I realize that photo captions and the table of contents should never be written at 4:00 a.m. because they get way too corny, but that was part of the fun.

The *Wisconsin Engineer Magazine* has come a long way since that night. The staff is four times larger, and we have developed ways to try to prevent those crazy nights. Nevertheless, occasionally we're together at those wee hours of the morning, but our concerns have shifted from "Do we have enough articles and photos?" to "What color should we run the cover and how are we going to pay for 36 pages."

Many people have wondered why I worked so hard on this magazine–why I stayed on for four and a half years. Part of the reason is that I've loved seeing how much improvement has been made from issue to issue. Also, the magazine was a way for me to leave a mark on campus. The major reason, though, is that I have worked with so many great people who cared just as much about making this magazine a success. Thank you to Steve, Jon, Kate, Matt, Jamie, John, Dan, Ben, Brian, Vic, Shana, Tanya, Art, Bill, and so many others that I can't mention because the list would probably take up the entire magazine.

It is my turn to say goodbye now, and I know that next year's magazines will be even better than this year's. It makes me proud to know that the tradition of 104 years of the *Wisconsin Engineer Magazine* will only continue to grow and get stronger.

I know that when I look back on my time here at UW-Madison, I'll probably first think of football games (I'm sorry, but two Rose Bowls have just been too much fun), and I'll remember all those late nights, meetings and getting to know a new staff every semester. Thank you to everyone who has worked on or supported the *Wisconsin Engineer Magazine*. We wouldn't be where we are today without the help of a hard-working staff and the dedication of you the reader.

The College of Engineering
University of Wisconsin-Madison

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The Lockheed SR-71 Blackbird was created at a facility known as Skunk Works, led by the legendary Kelly Johnson. Skunk Works is a small group of about 50 veteran engineers and designers and 100 expert machinists. The group works independent of corporate oversight and in relative secrecy. The theory is that top secret, technically advanced aircraft can be built faster and more efficiently without the red tape. During the cold war, the Skunk Works location was one of the most secure facilities in North America and was high on the Soviet Union's "hit list."

Almost 40 years later we can still look back on the creation of the SR-71 with awe

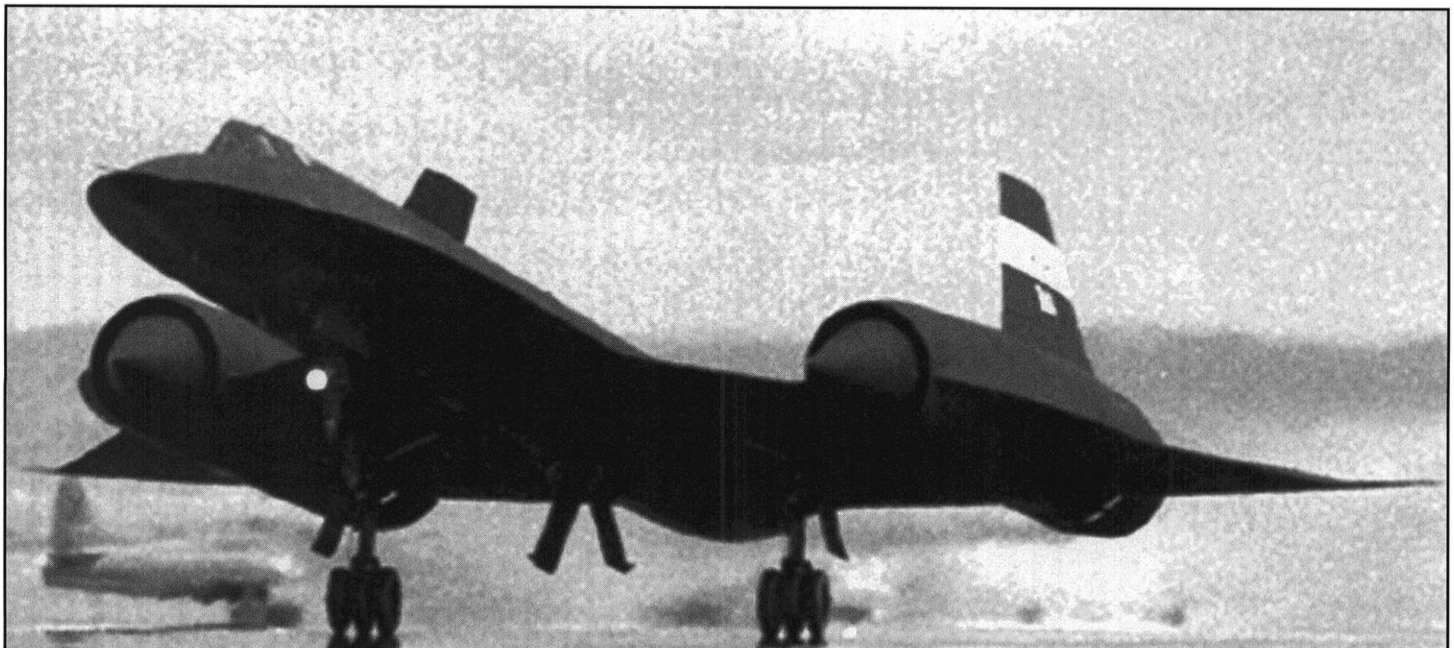
Kelly Johnson's group did a remarkable job engineering the SR-71 because they had to start from scratch with virtually every aspect of the aircraft. Project staff compared the design process of the SR-71 to the U-2 bomber and said it was like comparing an Indy 500 car to a covered wagon. A great deal of the parts, processes and tools used had to be invented for the project. Even such basic components as wires, washers, o-rings, hydraulic fluid, oils, greases and plastics had to be re-engineered to withstand the extreme heat. At that time, the titanium used for the body was unproven and the idea was risky. The metal was difficult to obtain and a lot had to be learned about working with it. If a mechanic used a cadmium-plated wrench to tighten a bolt, when the bolt got hot, it would fall off. If the tap water used in spot welding contained chlorine, the welds would not hold. The titanium quality was also not very consistent. An extensive quality control program was developed just to deal with the titanium problems. For every batch of ten parts, three were made for material testing. The parts were numerous because even the titanium screws and rivets had to be manufactured. Throughout the entire project a total of thirteen million separate parts had to be specially manufactured for the aircraft. The press that shaped the titanium had to be invented because nothing else was capable of making the needed parts. Even a separate cooling system needed to be designed just so the pilot could read the oil pressure gauge.

Had the SR-71 been produced today, the feats achieved by Kelly Johnson and the Skunk Works team would be amazing. In the 1960's the results were unbelievable. Virtually all the calculations in the engineering process of the SR-71 were done by hand with a slide rule. The group had access to the latest computer technology, the IBM 710. The calculations the computer was capable of performing could be done today with a hand-held calculator. Almost 40 years later we can still look back on the creation of the SR-71 with awe. The engineers were able to make the impossible possible. If nothing else, the creation of the SR-71 can teach us that even the most impossible problems can be solved.

Author Bio: Molly Mitten is a sophomore in mechanical engineering who hopes to someday work on something almost as remarkable as the SR-71.

It's All in the Name: Skunk Works

Skunk Works was started by Kelly Johnson in 1943. Ever since, its name has prompted questions. The name was taken from cartoonist Al Capp's L'il Abner comic strip. The strip featured a hidden still in a secluded hollow called "The Skonk Works" where "kickapoo joy juice" was made from old shoes and dead skunks. Kelly Johnson's secret team of expert engineers once worked in a rented circus tent next to a smelly plastic factory. Story has it that one day an aircraft designer answered the phone "Skonk Works." The name stuck and became Skunk Works. Skunk Works is now a registered name and is even included in the dictionary. The formal name is "Lockheed Martin Advanced Development Program."



On the ground, it's difficult to imagine this plane can fly three times the speed of sound.

"Junk That We Don't Need"- New Technology Meets Resistance

By Katherine Friedrich

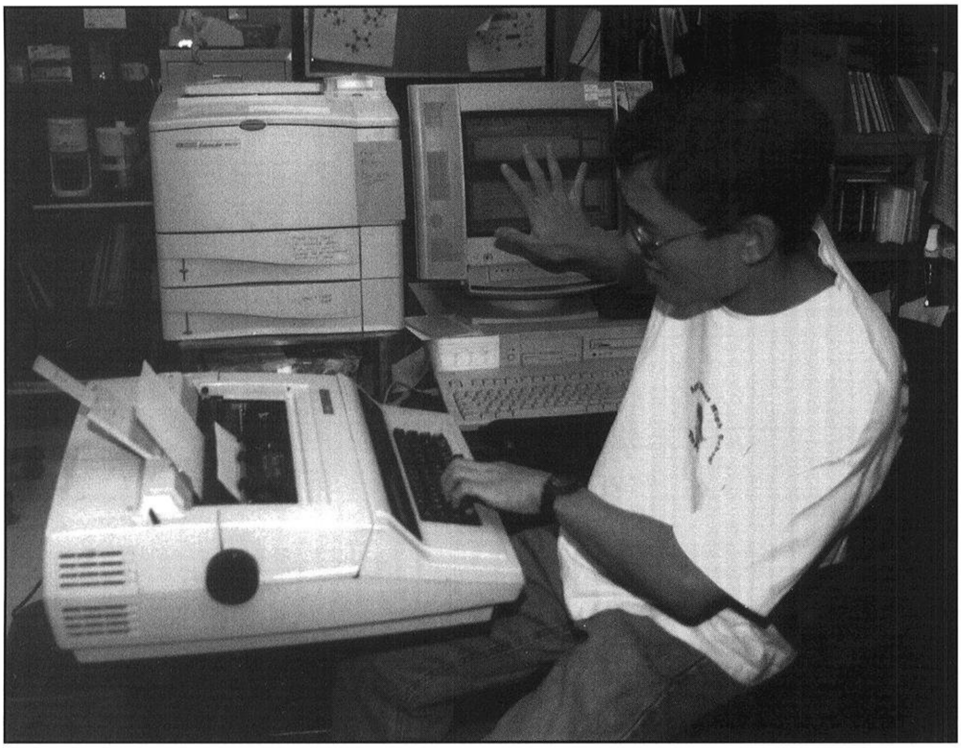
Picture yourself sitting in a traffic jam on a crowded freeway. You wait there in the hot sun and glare, hoping that the cars around you will start moving. You start to wonder why people ever invented the automobile. Then, you look over at the car in the next lane and see that it has a bumper sticker that says, "Kill Your Television!"

"Modern technology was designed to empower us and set us free. So why do we often feel more like its slaves than its masters?" ask Technostress researchers Dr. Larry Rosen and Dr. Michelle Weil.

"Twenty years ago," say Weil and Rosen, "technology was magic." But as the pace of change has increased, people have become more jaded. Alvin Toffler, in Future Shock, compares the tension of coping with accelerating technological change to the stress that soldiers experience when on active duty in a war zone. In southern California, a hotbed of technical progress, both executives and clerical workers are becoming resistant to new technology, according to a study done by Weil and Rosen.

Faced with distaste or indifference towards new products, what can engineers do? We may need to revisit our priorities and ask ourselves some hard questions about why people might not be interested in our products, and why we invent and market certain products as opposed to others.

Gregory Davis, in Technology-Humanism or Nihilism, points out that we sometimes look to new technology as an end in itself or a means of generating profits, rather than a way to solve problems for humanity. This ignores what engineers call "human factors"—the long-term happiness and well being of human beings in the global ecosystem.



Source: Victor Chen

Some people just are not open to new technology.

Neil Postman, a writer and cultural critic, suggests six basic questions to ask about any new technology:

1) "What is the problem to which this technology is a solution?" For example, one might ask this question about cosmetic liposuction. Is the problem being solved by the fact that not everyone physically conforms to accepted beauty standards? Or is the problem that people are not appreciating themselves as they are? If so, does the solution fit the problem?

2) "Whose problem is it that the technology addresses?" A recent article in the Isthmus expressed concern about technology that creates sterile planting seeds. This technology addresses the economic interests of seed companies by making it necessary for farmers to buy new seeds every year. In this situation, the seed companies would be the winners, while the farmers—and the grain species—would be the losers.

3) "What new problems will be created by the technology?" Farmers in some regions of the globe use "slash and burn" agricultural methods that cause entire fields to be destroyed by erosion, leaving them without topsoil and unable to grow crops. Their existing technology produces short-term results, but destroys the area for future generations, according to Randy Haselow, a former sustainable agriculture volunteer for the Peace Corps.

4) "Which people and institutions might be harmed by this technology?" Genetic testing, although it might be useful, could also be used in a discriminatory fashion. For example, a woman could not abort her child if it did not have the desired characteristics.

5) "What changes in language are forced into the culture by the technology and what is gained and lost by that process?" To quote Jackie Giuliano, reporter for the Environment News service, "Technology has... changed the very way we perceive distance,

space and time. We now have ideas like acceptable risk, side effect, birth defect and toxic waste. The information age has forced redefinition of the concepts of community, conversation, [and] debate…"

6) "What people and institutions will get special privileges as a result of the technology?" "Race matters in Internet access," say the authors of a study published in Science magazine. Caucasian students surveyed were 2 to 3 times more likely to have access to the Internet than African-American students, whether or not they owned a computer.

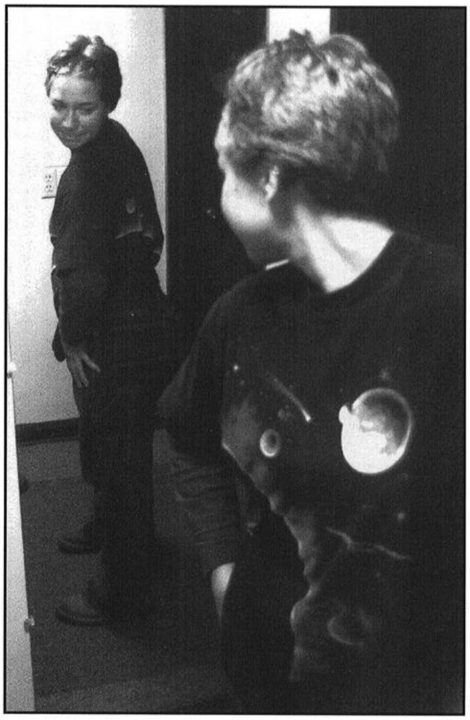
Modern technology was designed to empower us and set us free. So why do we often feel more like its slaves than its masters?

"None of this is the fault of the technology, but how we choose to apply it," says Haselow. The same types of technology can be used for very different purposes. For example, atomic fission can give a city electricity, while an atomic bomb can destroy a city.

Modern technology is not going away, and people are becoming more skeptical towards it. How do we deal with this? We need to find out why people dislike new technologies.

Several movements in engineering, such as the increased focus on quality and customer satisfaction, ergonomic design and design for the environment (DFE), are addressing the issues that prejudice people against new technology. There is a movement towards "sustainable technology," which Haselow describes as "creating a way of life which can persist indefinitely... [one that] will be available to your great-great-grandchildren." In the interests of conserving resources for the future, Haselow says, "what we have to do is look at needs versus wants," rather than creating, as he puts it, "[more] junk that we don't need."

Author Bio: Katherine Friedrich is looking forward to graduating in mechanical engineering. She thinks that engineering is a creative occupation that changes society all the time.



Source: Dan Kenan

A young lady standing in front of a mirror looking over herself. Do people appreciate themselves less due to advances in technology?

Spare Organs:
The Future of Tissue Engineering

By Kari Cox

Doctors and nurses scurry frantically to the ambulance. There has been a terrible accident, and a man is rushed in bleeding profusely. After emergency surgery, the doctor realizes that the man needs a new liver immediately. He directs the nurse to salvage the new liver out of the ER cooling unit for a transplant. Hours later, this man wakes in the recovery room to find out that his life has been saved because he received a new liver. A person reading this scenario may be amazed on how quickly and efficiently the doctors received the donor organ for the emergent situation. The liver, however, was not donated; it was created. This fictional scene represents the future of organ transplantation—tissue engineering.

The young field of tissue engineering is a frontier in the scientific and medical worlds. Through our growing knowledge of genetics and cell replication, we are able to create artificial tissues that mimic real human tissue. The reality of tissue engineering is in our grasp right now. The successful manufacturing of skin, cartilage and bone tissues has already been achieved. This technology is advancing so quickly that the possibility of creation of entire human organs, like hearts and livers, is in sight.

At the University of Wisconsin–Madison, Weiyuan John Kao, Ph.D., an assistant professor in the School of Pharmacy and the Biomedical Engineering Program, is now researching tissue engineering at its most basic level—the cellular level. Kao and his students are studying how red blood cells will react to biomaterial, the material produced by tissue engineers. Commenting on his research, Kao states, "If we understand the mechanisms of how cells interact with the material, then we can better design material that will be more biocompatible in the body."

The creation of artificial skin has jumpstarted this field, and its use will soon become commonplace in hospital procedures. And as Kao states, "Artificial skins are definitely a very hot research area in clinic[al] product development." Artificial skin will soon be a viable alternative to conventional skin grafting procedures, such as autografting or grafting using cadaver skin. Significant disadvantages arise with the standard skin grafting methods. Autografting, or harvesting skin from donor sites on the victim's body, can be a painful procedure. Cadaver skin is not abundant and may carry disease or infection. However, artificial skin, which is prepared in advance, will be free of disease and readily available. It also does not cause unnecessary scarring on the uninjured areas of the victim's body, like autografting. Of course, one disadvantage to artificial skin is that it may lack natural functions, such as sweating.

Source: Bill Ketterhagen

Assistant professor W. John Kao observes biomaterial created through cell culture techniques.

The process of artificial skin creation is a simple one. A nutrient-rich matrix containing various types of collagen is prepared. Cells taken from the circumcised are dispersed in the porous matrix where they will replicate. The matrix will also act as a framework for the cells' structural foundation. Epidermal keratinocytes and dermal fibroblasts, the connective tissue cells, are added to the matrix for formation of the dermis and epidermis layers of the skin. After extended cultivation and environmental control, sheets of artificial skin ready to be used in skin grafting are the result. In fact, "one piece of foreskin can produce four acres of engineered skin."[1] One-layered artificial skin is also widely manufactured, but neither one-layered or two-layered skin has been proven to be better.

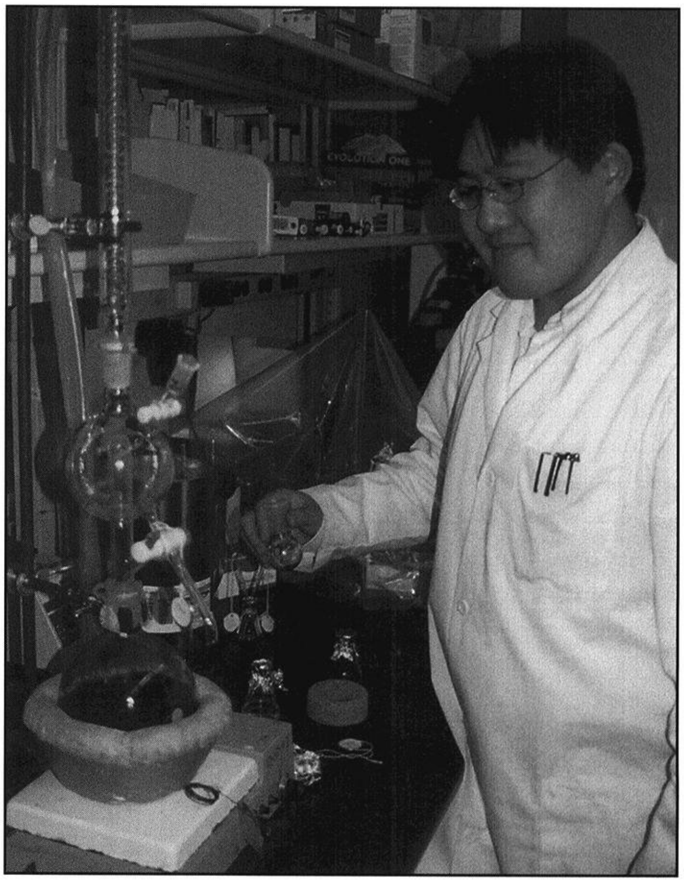
Many hospitals are beginning to use this new technology to help treat the damaged skin of burn victims and painful skin ulcers of diabetics. The Food and Drug Administration (FDA) has recently approved many types of artificial skin to be used in everyday hospital procedures. Regulation of donor-cell screening for diseases and infections, such as HIV, is currently waiting to be approved. In fact, Professor Kao explains that the "FDA is working really hard with the scientific community and the National Institute of Health to come up with some sort of regulatory standard, so more of these products can be brought to these patients."

Other engineered artificial tissues, such as cartilage, are currently seeking FDA approval. Artificial cartilage will be an important factor used in knee surgery. Cartilage cannot heal itself after injury, so artificially constructed cartilage will undoubtedly benefit reconstructive surgery.

Technology is advancing so quickly that the possibility of creating entire human organs, like hearts and livers, is in sight

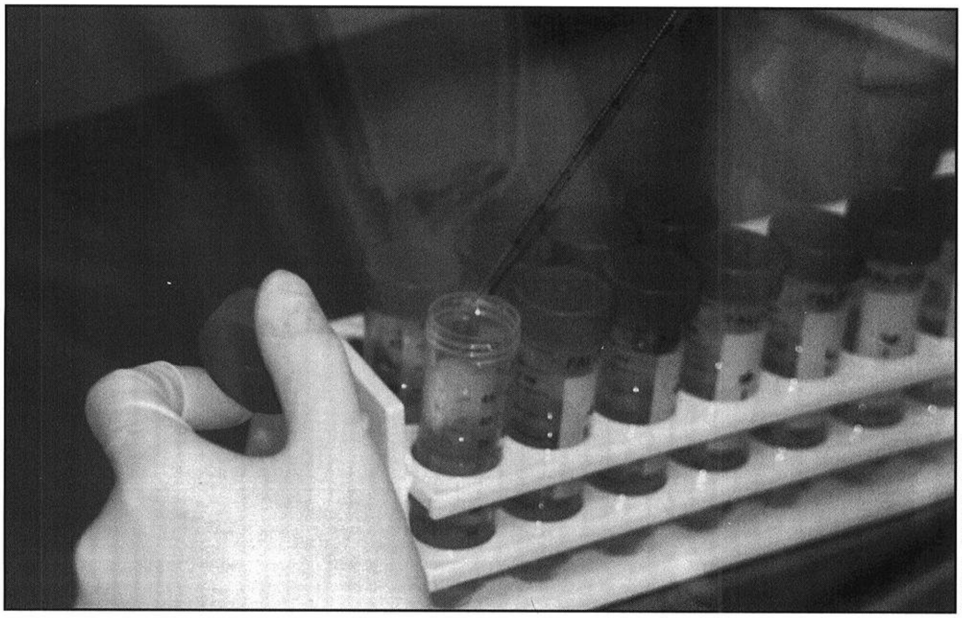
Despite the tremendous technological advances that have already been made in the field of tissue engineering, the true goal of many tissue engineers is to construct functional living organs for transplantation in human bodies. Thousands of people die every year because a donor organ, such as a heart or liver, was not available. The waiting lists for people in need of life-sustaining organs are years long. Unlike artificial skin, these complex organs cannot just be wholly grown from a petri dish in a lab. Like the field's name, they must be engineered from many different tissues from many different cells and put together to function properly. Researchers believe that the end to this wait is unreachable right now, but in Kao's words, it "definitely is a realistic prediction." Sometime early in the next century, tissue engineers may have the knowledge and skills to manufacture hearts, livers, bladders and kidneys.... and hopefully any organ that a dying individual needs.

About the future of tissue engineering, Professor Kao enthusiastically says, "I think the excitement of tissue engineering is that it is so new...and has a lot of potentials, but at the same time we also know the scientific hurdles that we have to overcome." Of course, creation of entire organs is years away, but it is becoming an attainable reality every day as tissue engineers perfect their techniques and learn more about the growth of specialized tissue. Significant steps have already been taken with the manufacturing of artificial skin and its current use in hospital procedure. People in the near future will be comforted when, in the case of an emergency, there will be a liver or heart available to save their lives. Hopefully, the opening scene may just be an example of another everyday trauma faced by doctors, nurses and surgeons in any hospital. Someday a doctor may call for the nurse to bring a "spare" heart or liver in order to save a person's life. Until then, researchers will continue their work to revolutionize the future of tissue engineering.



Source: Bill Ketterhagen

David Lock, a member of Kao's lab, performs organic chemical synthesis for tissue engineering research.



Source: Bill Ketterhagen

Assistant professor Kao researches tissue engineering at the cellular level to observe cell reactions to biomaterial.

[1]Arnst, Catherine, "The Latest from the Labs: Human Skin," *Business Week*, issue 3578 (05/18/98), p. 118.

Author Bio: Kari Cox is a junior majoring in English and Technical Communication. She is trying her hand at scientific and technical writing… a little different than thematic analysis of Shakespeare.

UW-Madison Libraries Update MADCAT and Face "The New Software Blues"

By Katie Wooddell

Although the Y2K crisis may have been avoided for the UW-Madison library system, the side effects of the millennium bug still linger. As library staff and students have realized, treating the year 2000 compliance problems involves much more than simply changing the operating system. Despite the numerous advantages and opportunities the UW-Madison's new Voyager system has to offer, dilemmas with implementation and bugs in the operating system are still posing challenges for the University's faculty and frustrations for students.

Source: Zach Lewis

The new MadCat system on campus, while in the long run will benefit students in many ways, has also caused headaches for users as well.

Implementation of the new system began last summer, when the UW-Madison libraries embarked on a project to switch the old, mainframe computer system to a new client-server system. This decision was made for several reasons. Mainly, eliminating reliance on mainframe technology avoided problems associated with Y2K compliance. Furthermore, the previous system used by UW-Madison was 25 years old and sold by a vendor that no longer markets the product. When you consider the advances in technology over the past 25 years, such as cordless telephones, microwaves, CD-players and laptop computers, these library system changes seem long overdue, regardless of the imposing millennium.

The solution: a system called Voyager. The UW-Madison purchased Voyager from Endeavor Information Systems of Des Plaines, Illinois for $6.4 million payable over a span of 3 years. This fee includes software, installation, data transfer, and hardware. Voyager is an integrated information system. This means that the services offered by libraries, such as: the online catalog, circulation and the Web site, have the ability to become one seamless interface that is accessible through a graphical browser such as Netscape or Microsoft explorer. It is the system used by the Library of Congress, the National Medical Library, and approximately 350 other libraries. In addition, Voyager is "free of 2000 problems," rejoices Dianne McCutcheon, coordinator of the National Library of Medicine.

One of Voyager's major advantages for students is a new Web interface for MadCat, the UW-Madison's online catalog. This new interface supports a number of new features, not available in the former web interface. These features include:

- Access to your library record (checkouts, recalls, and due dates)
- Ability to renew items online
- Up-to-the minute additions of newly acquired materials
- Improved access to collections of UW libraries statewide
- Easy to use journal title and call number searches
- "See" and "See also" references for better results
- Search terms highlighted in the results

Also, once the kinks are worked out, Voyager is expected to be far more user-friendly than the last automation system. In a recent interview, Ken Frazier, Director of Library Systems at the UW- Madison, explained that we are moving from a time where there was a scarcity of information to a time where there is an abundance. Therefore, one of the goals of the new system is to make it easier to sort through information and search results. At the same time, Voyager will bring new opportunities to the entire UW system. Because the other UW campuses are also implementing this new system, it will soon have the capability to connect Madison with the other UW campuses. It is also in the plans to get the UW Madison connected with the rest of the Big Ten universities. However, this is going to be tricky, reminds Frazier, as the Big Ten schools do not share

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Vision for the Future

New Dean Paul Peercy Leads the College of Engineering into the 21st Century

Source: Victor Chen

By Kristin Shuda

Dean Peercy – a name that has been floating through the halls, a person that has been mentioned on campus-wide e-mails and a face that has recently entered the surroundings of the College of Engineering. So who is Dean Peercy? The dictionary definition might read, "Dean Peercy – Dean of the College of Engineering at UW–Madison, former graduate student of the same university, past president of SEMI/SEMATECH and director of Microelectronics and Photonics at Sandia National Laboratories." But who is Dean Peercy, and what does he have planned for the College of Engineering?

Paul S. Peercy is more than just the dean of the College of Engineering; his past will speak for itself. Peercy was born and raised in Kentucky (the accent sneaks out every once in awhile). He received his undergraduate degree in Physics in 1961 from Berea College, a work-study college in Kentucky, where he graduated with a 3.97/4.0 grade point average. The .03 was lost due to a physical education class (Peercy's former track coach was the physical education instructor) and a health class (he refused to make a poster). Peercy then moved on to UW-Madison to pursue an MS and a PhD in Physics, in 1963 and 1966 respectively.

Peercy has many memories of his time at UW-Madison and still keeps in touch with many friends he made, but his greatest memory is meeting and marrying his wife Cathy, who he has been married to for 35 years. Peercy and his wife have two sons, Michael and Mark, who have followed their father's technical academic path. Michael received a PhD in Electrical and Computer Engineering from the University of Illinois and Mark received a PhD in Applied Physics from Stanford. Peercy considers one of his biggest accomplishments to be helping to raise his two sons of whom he is very proud.

After receiving his PhD, Peercy worked for Bell Laboratories for 2 years and then moved on to Sandia National Laboratories in Albuquerque, New Mexico where he worked for 25 years. After working as Director of Microelectronics and Photonics at Sandia National Laboratories, Peercy moved to Austin, Texas where he took a position with SEMI/SEMATECH, a nonprofit consortium of more than 160 of the nation's semiconductor industry suppliers. Peercy served as president of SEMI/SEMATECH from 1995 until a couple of months ago, when he accepted a position as the Dean of the College of Engineering. In addition, Dean Peercy is tenured in Materials Science and Engineering, has written more than 175 technical papers, holds two patents, and has been involved, held positions and volunteered in many organizations.

Interesting Facts abooout Dean Paul Peercy

Age: 58 years old.
Favorite Color: Red of course, but if he had another choice he would choose blue.
Pets: Grew up owning pets. Currently owns a Brittany Spaniel.
Type of car he drives: Ford SHO, manual transmission.
Favorite vacation spot: Cancun or Cozumel because he can scuba dive and he likes the interesting Mayan artifacts and history. Hawaii also ranks pretty high on his list.
Hobbies: He used to hike, travel, and play sports. Now, hobbies include being involved in organizations, reading and playing tennis.
Favorite Sports...To watch: football and basketball...**To play:** tennis
Second Languages: He used to be fluent in German and read proficiently in French. However, he has not kept up with the languages, so he has lost a lot of it.
Advice he would give to an undergraduate: "Pick an area of study that you love. You will spend a lot of time working, and work should be fun. You should look forward to going to work and enjoy what you do. You should feel like you cannot believe that people are actually paying you for what you do."

Dean Peercy has an interesting past, but why was he interested in applying for the dean position? Rest assured, he is not in it for the money. He took a significant pay-cut to come to the University. First and foremost, Peercy feels that education is extremely important. And with that, he feels that he can make a difference and lead the college through the necessary changes essential to keep pace with the growth of future technology. Peercy also says that he is an academic by nature and sees industry moving more research to universities – a process that he is interested in helping advance. The Dean sees his role in the college as being both employer and employee. As such, he seeks to be a servant of the college who will provide support, see that all jobs get done, sell programs that need to be sold, and recognize the strengths and weaknesses of the college so that the strong will get stronger and the weak will get help to make them stronger. To accomplish this, Peercy believes the key is to hire and keep world-class faculty, which will attract and promote high quality students. Peercy is also getting involved with student organizations, working to increase diversity on campus, and encouraging students to take advantage of opportunities offered by the UW-Madison outside of the College of Engineering.

As Dean Peercy found out, there is definitely no such thing as easing into your first year as the dean of the UW's College of Engineering. For this particular day, Dean Peercy starts off in his office revising letters to be sent out to colleagues (8:50 a.m.). A few hours later, he finds himself at a holiday party held for faculty and staff of engineering, as well as student leaders (11:31 a.m.). Later, he has a meeting with the UW-Tech committee (3:02 p.m.), and finally, he chats with EPD 160 instructor Pat Farrell after watching freshman students present final projects (6:10 p.m.).

Source: Victor Chen

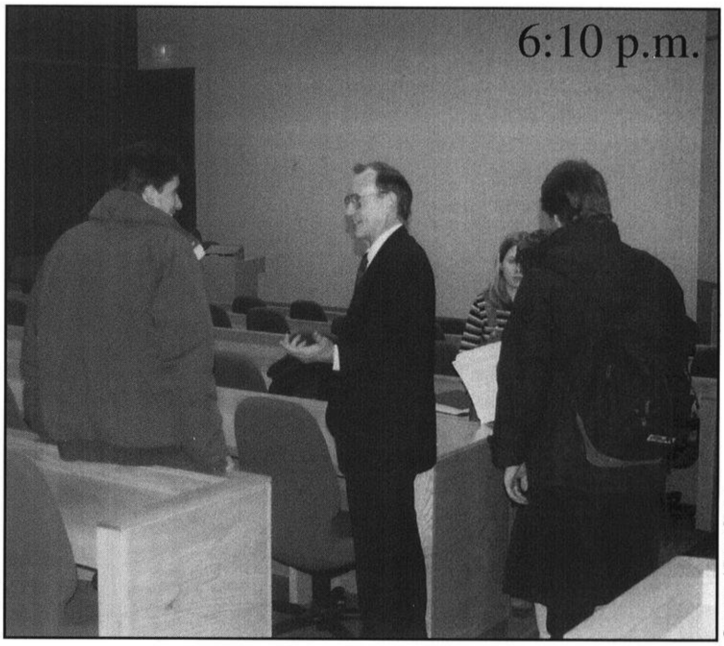
Research is also very important to the Dean. Peercy recognizes that his connections with the semiconductor industry will be very valuable. He hopes to improve research in this field at UW-Madison and knows that industry will offer its support.

A goal Peercy has for the College of Engineering is to reach a top 5 ranking among U.S. engineering colleges. His plans for reaching this goal include creating a subcommittee of the Industrial Liaison Council (ILC) to help him with this issue. He wants to benchmark the best departments in these rankings, look at what made them great, adopt some of these same policies here at UW-Madison, hire the best people and expect the best from them, and provide funding and the infrastructure to support this goal.

Peercy has no plans of leaving the University anytime soon and mentions that he did not take this position merely as a stepping stone for another position. Time will tell what Dean Peercy has in-store for the College of Engineering and what the College of Engineering has in-store for Dean Peercy. Welcome back to UW-Madison Dean Peercy!

What is the process of selecting a new dean?

1. A dean selection committee is formed (17 members including student, faculty/staff, each department, industry, and college-wide representation).
2. A press release announces a position opening.
3. An active search for a candidate begins by collecting curriculum vitas (much more extensive than a resume because it includes a list of publications, grants, speaking appearances, conference participation and other honors, often as long as 25 pages).
4. Vitas are read as they come in and every week the committee meets for a 3 hour long meeting to discuss new vitas. A 50% vote is required for a candidate to move on to the next level. After this step approximately 10% of all applicants remained.
5. Additional information (i.e. references) is gathered about the remaining candidates and the group is narrowed down further.
6. Interviews are held in Madison for the remaining candidates (10-12 people invited to interviews from the 160+ curriculum vitas that were gathered). This step includes a 3-hour interview, a presentation by the candidate, dinner and a tour of campus. After this step the committee calls upon non-references to get additional information about the candidates. A knock down meeting then takes place (about 6 hours) to get down to a short list (3-5 names suggested, 3 were submitted) of names that will be submitted to the Chancellor and Provost, who will select a candidate.
7. The remaining candidates are announced.
8. The candidates make presentations to the College.
9. The Chancellor and Provost select a candidate, make an offer to the candidate and announce the candidate when the acceptance is received.
10. The new dean begins.



Source: Victor Chen

A Magical Mystery Tour:

The Best Study Spots on Engineering Campus

By Michael Hsu

Everybody wants a place for contemplation, self-reflection and maybe for a little bit of studying. New students on the engineering campus (and even many veterans!) still trudge to the Wendt Library for their studying needs. Sick of your surroundings? Staring blankly at the stacks? Get out of the academic factory and find your own "shady lane"—a plot of land where you can expand your horizons and cultivate your mind.

As a service to loyal *Wisconsin Engineer* readers, I have done the leg work and found some nooks and crannies on the engineering campus which you can call your own. Below, I have included "highly classified" information on a variety of exotic destinations. The streets defining the engineering campus are Breese Terrace, Linden St., Orchard St. and Dayton St.—every spot described below is under five minutes from Engineering Hall.

STANDARDS FOR EVALUATION:

The following qualities were estimated in a completely non-scientific, totally statistically irrelevant manner on an arbitrary scale from 1 to 10.

Ambiance: This refers to how comfortable you would be at the spot, taking into account the decor and the general "feel" of the room.

View: It's important not to feel trapped when you study—such a sensation engenders feelings of hopelessness. An inspirational view is sometimes enough to encourage even the most burned-out students.

Noise: On the scale below, 1 designates noisiest and 10 the quietest. Obviously important quality for an acceptable study spot.

Chairs: The two keys to focused studying: quiet for the ears and comfort for the rears.

Secrecy: Somewhat of an intangible quality, this judges how well-known a particular spot is to the general engineering student populace. Higher scores means that the locale is more "secret" and obscure. (Let's keep this information between you and me.)

ENGINEERING HALL

Known as ground zero for UW-Madison engineering students, this industrial-looking building is where it all begins. Students are often found in the lounge area outside the recruiters' booths on the first floor, but you can escape the hustle-bustle rat chase by climbing to the third floor....

"Maquina Heights"—a study nook by room 3640 or room 3612

Ambiance: 8 This little nook is a wonderfully private spot for studying. On sunny days, you might feel the fuzzy warmth of hanging out in a four-season room at a friend's house.

View: 8 You can sit up on the window ledge and gaze at the throbbing heart of the engineering world—the water fountain Maquina. Also, in the panorama are the CAE (Computer Aided Engineering) building and the flowery ribbon of Henry Mall.

Noise: 5 Some occasional hall traffic.

Chairs: 8

Secrecy: 6

UNION SOUTH

The engineering campus' center for fun and food, Union South also has the Martin Luther King Lounge in the basement—which is a fairly well-known spot. With a little luck, however, you might be able to move into the...

"Cattle Black Bluffs"—a pair of chairs just outside the Union Office (room 203)

Ambiance: 3 The doors of the Union Office are not terribly titillating.

View: 6 You get an non-sexy street scene.

Noise: 7 A tired student had pushed the two squarish chairs together to form a dugout trough and was lying fast asleep in them. The light filtering through the mini-blinds is quite pleasing, and the spot is also obviously quiet.

Chairs: 10 Made of leather or really snappy vinyl, these chairs are like the ones found in the quasi-mythical Kohler Art Library at the far-off Elvejhem Museum. This much is true however: they are very comfortable.

Secrecy: 7

BIOCHEMISTRY BUILDING

The uber-modern addition to the Biochemistry building is one of my favorite buildings on campus. Its imposing modernity and futuristic sleekness conjures up images of Ethan Hawke and Uma Thurman in "Gattaca." Colorful molecule groups, tetrahedra and DNA helixes adorn the floors, while twisted pieces of art featuring dried organisms like frogs and goldfish hang on the walls. And they have digital wall clocks that not only display the time, but also the date! 21st Century, here we come!

"Tomorrowland Tower"—fourth or third floor lounge (room 431 or 321)

Ambiance: 6 The room itself is plain, reflecting the building's clean modernity.

View: 9 This crisp white room has high windows which provide 270 degrees worth of gorgeous views. You can see the full sweep of engineering students' space and time—the Stock Pavilion out one window, the First Congregational Church out the next and Camp Randall out another.

Noise: 8

Chairs: 7

Secrecy: 10 WARNING! This room is ostensibly reserved for biochemistry faculty and staff; please do not come here in droves. If someone tells you to leave, simply go out into the hallway and sit in the coolest lounge chairs on campus, covered with olive green fabric stitched with frenetic Picasso squiggles. Each floor has a set of chairs and coffeetables, and even though the setting has an open air atrium feel, it's generally quiet enough for studying.

TAYLOR HALL

Tucked behind the shiny new Genetics building and under the shadow of the "tetris-block building" McArdle Labs, you will find underappreciated Taylor Hall.

"The Kitchen Table"—Taylor-Hibbard Library (room 106)

Ambiance: 7 Very cozy, and would be more comfortable if Mr. Taylor and Mr. Hibbard were not staring at you from their place in the frames on the wall.

View: 2 None to speak of.
Noise: 9 How many people do you think are at the agricultural economics library?
Chairs: 6 There is exactly one light wood table with five chairs around it. If you sit at the table with newspapers scattered all about, you'll feel like you're in fourth grade again, studying at the kitchen table.
Secrecy: 9 Since practically no one goes here, it closes at 4:30 p.m.

GENETICS BUILDING

Like the Biochem building, it is one of the newer additions to the engineering campus. The metal colonnaded lobby is a soothing and meditative area—the air is always cave-like cool and the sound of water trickling down the double-helix fountain has a calming effect.

"Engineers' Outlook"—open lounge area on the fourth floor (turn left after getting off the elevator and walk to the corner of the building)

Ambiance: 5 The room itself is unremarkable, but for a warmer feel, there's a little patio with happy red and white furniture.
View: 10 This friendly lounge has arguably the best views of the Engineering Empire. The big windows look out on Engineering Hall, the Church, the Biochem building, Camp Randall, University Health Services and the flowers along Henry Mall.
Noise: 8 During non-eating hours, it's fairly deserted.
Chairs: 3 Rather hard on the posterior.
Secrecy: 8

BOCK LABS

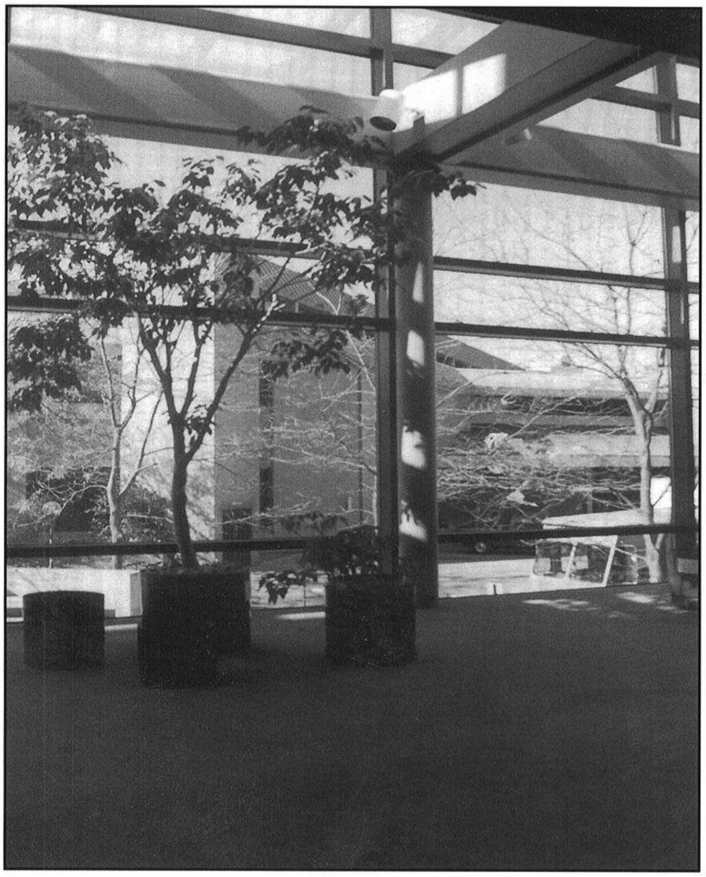
This towering terror of biological experimentation is literally and figuratively "far out." It is the tall skinny building on Linden Dr. kiddy-corner from Ag Hall and next to Agricultural Engineering. A long hike will be worth it to see....

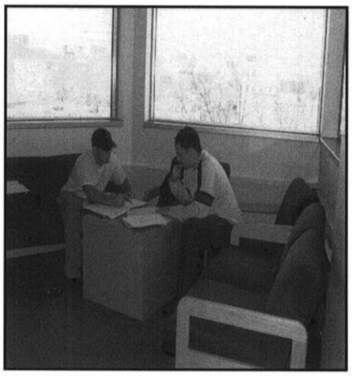
"The Penthouse"—take the elevator to 8, then find stairs to the penthouse

Ambiance: 6 It's a conference room with long tables, plastic chairs, a refrigerator and sink.
View: 9 This top-secret deck is rivaled only by the observation decks in Van Vleck and Van Hise for its view of the broad swath of Lake Mendota. You can see the full arm of Picnic Point, the crown of Ag Hall and the fringes of Allen Centennial Gardens.
Noise: 10 There is no one here...probably because no one is authorized to be here. You may want to ask permission if you are planning to bring a large group to this sanctuary.
Chairs: 6 Mostly seminar chairs, but some cloth armchairs too.
Secrecy: 10 WARNING: Please do not abuse the privilege to sneak up here!

COMPUTER SCIENCE AND STATISTICS BUILDING

Contrary to perceptions that this is a nerd colony, the Comp Sci building is hip. So hip that it refuses to face any street, instead angling at a 45 degree angle to the intersection of Orchard and Johnson St.






Source: Mindy Gadlin

Left: On the wide, shadowed plain under towering arbor, students at the Computer Science building can enjoy a sweeping pastoral view of Union South. Top center: "West end" students do not often realize that their own "Memorial Union Terrace: is just minutes away – on the fourth floor of the Genetics Building.

Top right: Tucked in a cozy corner of Engineering Hall, these two industrious students seem oblivious to the spectacular window views all around them. Bottom right: Despite the distraction of foamy blue chairs and a newspaper rack with the exciting Sawyer County Record, this student manages to concentrate in the quirky Agricultural Journalism Library.

"The Sunroom"—entering through the doors facing Union South, turn right and go up the stairs...continue down the hall until you come to an open area with four couches.

Ambiance: 2 Plain walls!
View: 8 The main attraction is the flood of natural light from a wall of windows looking straight at Union South. If you like light, this may be the best spot.
Noise: 7 There's some traffic between classes, but usually quiet.
Chairs: 5
Secrecy: 4
(NOTE: If you want to try something different, clamber over the stairs railing and enter the bare, carpeted area above the entrance. There are no chairs. Sitting there, surrounded by glass on three sides and potted trees, you'll feel like a greenhouse plant.)

WEEKS HALL (GEOLOGY AND GEOPHYSICS BUILDING)

Although this building is technically outside the defined boundaries, its merits deserve inclusion in the list. You can find it next to the Dayton Street Skyscraper of Atmospheric, Oceanic and Space Sciences. It's a strange building because you have to get "in" (the courtyard) to get in.
"See World"—follow signs to the Geology Museum and outside the entrance to the exhibit area there are two benches.

Ambiance: 9 You can study under the shadow of a gigantic blue globe and gaze mystified at the light shining through the colorful stained glass windows.
View: 6 You really get to see some rocks through the windows!
Noise: 5 Depends on the traffic in the museum—could be bad.
Chairs: 2 Trust me—benches are not chairs.
Secrecy: 6

AGRICULTURAL JOURNALISM

Another fine building on the prime real estate of Henry Mall and a perfect escape from the impassive modernity of the Genetics and Biochem buildings.
"Small Town, USA"—Ag Journalism Library; enter the doors on Henry Mall, go right and follow signs to the library.

Ambiance: 8 A rare nostalgic feel of a small town. In this cozy and snug little den, you can peruse the easily accessible newspapers (read the Sawyer County Record to find out the happenings in Hayward, Wisconsin) or walk down memory lane flipping through the 15 drawer card catalog.
View: 3 An obscured view of Henry Mall.
Noise: 8 The sound of water running water through the building is all you will hear.
Chairs: 5 They are a strange blue color and have an even stranger foamy feel.
Secrecy: 8

Author Bio: Michael Hsu is a sophomore journalism major who searches the farthest reaches of this earth, always dreaming of a better place...to study.

MADCAT continued from page 12

the same software. Further, the process involves more than, "just technology," he warns, as a policy commitment is also warranted. By his example, being able to get a book from Penn State is useless if it can't be delivered to the student in a timely fashion. Here, policy commitment is key.

The new system has other advantages as well. According to Frazier, Voyager will offer great benefits for the library staff. With Voyager, tasks such as acquiring and cataloging materials, circulating items, and managing reserves and digital materials can be accomplished in new, more efficient ways. Further, it allows for all orders, claims, and payment transactions for books and journals to go directly through the system.

As many students have noticed, however, these changes have not come without a price. "We've got the new software blues," informs Frazier with a shake of he head. In expressing his disappointment with the progress of the implementation due to bugs in the system, he remarks: "This is the UW's second automation system, and it's taking longer to implement than the old one." As a result, some of the service development has been delayed, with implementation of certain features being set aside until the summer of 2000. Some of these bugs in the system have included problems such as slow searches for items receiving a large number of hits, an unavailable "j-key" which makes it possible to search for words within a journal title, titles missing from search lists, and journal information missing from e-mails, prints, and saves. Additionally, students and staff members have identified a number of design issues. These issues include problems with the back button, the inability to do many of the things that the old system allowed and a number of inconsistencies in the system. For a complete description of these problems, visit *http://www.madcat.library.wisc.edu*. According to Mr. Frazier, this list is now being used by numerous libraries to aid in solving their own implementation problems.

If you keep in mind the fact that all new systems will have problems, the outlook for the new Voyager system implementation does not look so grim. However, if you still find the new system nothing more than a pain, you better get used to it because it is here to stay. But, don't sweat! There are a number of things you can do to get better aquatinted with the system. First of all, MadCat offers on-line help to students who find themselves in a bind. Also, training sessions and workshops are offered at many of the libraries around campus. The schedule of classes is posted on the web at www.library.wisc.edu/libraries/Instruction/calender.htm. Check it out, and sail smoothly into the new millennium with Voyager.

Author Bio: Katie Wooddell is a sophomore in the College of Engineering.

Science at the Speed of Molecular Motion:

Ultra-Fast LASERS Are Changing the Way We See the Chemical World

By Ryan Sydnor

Everyone cheered when those amazing cameras that take clear action shots came out. It was truly a grand triumph for technology: at last parents could take successful pictures of their kids playing soccer. While such gadgetry is certainly impressive, even the most sophisticated Kodak action lens seems like something out of the Flinstones' era when compared to what scientists are using today—a laser device touted as "the world's fastest camera." Most of us feel proud just to get a snapshot of that ridiculous trick the dog performed. Meanwhile, scientists are reaching far loftier goals: they are actually photographing *molecules* as they react with each other.

It sounds like an impossible feat, which could explain why the scientist who first achieved such photographic mastery was awarded the Nobel Prize for Chemistry last October. Professor Ahmed Zewail of the California Institute of Technology received the prestigious award for his work with ultra-fast lasers that are capable of taking molecular "snapshots." Such lasers can emit high-intensity light pulses of only a few femtoseconds (10^{-15} seconds) in duration, which allows for extraordinary time resolution. Zewail is known as the founder of femtochemistry—the study of chemical phenomena that occur on a time scale of femtoseconds. To get an idea of just how brief a femtosecond is, consider the fact that one femotosecond is to thirty seconds as a second is to a billion years.

In the 1920s, chemists watched reactions in progress by allowing solutions to mix as they flowed through transparent tubes. By observing a reaction at different points along the tube, they were able to discern its stages within a time resolution of a few thousandths of a second. By the 1950s, innovative scientists improved this resolution to a few *millionths* of a second by using two consecutive flashes of light – one to start the reaction, and another to illuminate the reacting molecules. Over the next thirty-five years, more sophisticated devices were developed, and new techniques – such as allowing molecules to collide within a vacuum – allowed scientists to observe reactions on an increasingly minute time scale.

Then, Zewail ingeniously applied laser technology to produced a time resolution one billion times better than that achieved in the 1920s. Zewail and his team began by mixing beams of reactant molecules in a vacuum chamber. An initial "pump pulse" from a laser, lasting only a matter of femtoseconds, would excite the molecules and kick the reaction into motion. By initiating millions of molecules at the same time, the system was "synchronized," with all of the molecules vibrating together like a spring. A second "probe pulse" was then used to observe the reacting molecules. Zewail's team timed the probe pulse at specific intervals by directing it along infinitesimal detours via mirrors. This allowed them to literally watch a slow-motion "movie" of a reaction in progress. In 1987, Zewail's research team published a report that shook the science world. In the separation of iodine cyanide (ICN) into iodine (I) and the cyano radical (CN), they had directly observed the breaking of the bond between the iodine and carbon atoms. Zewail's team followed this remarkable accomplishment with further insights into numerous chemical processes.

Ahmed Zewail, a professor of physics at Cal Tech, recently won the Nobel Prize in Chemistry.

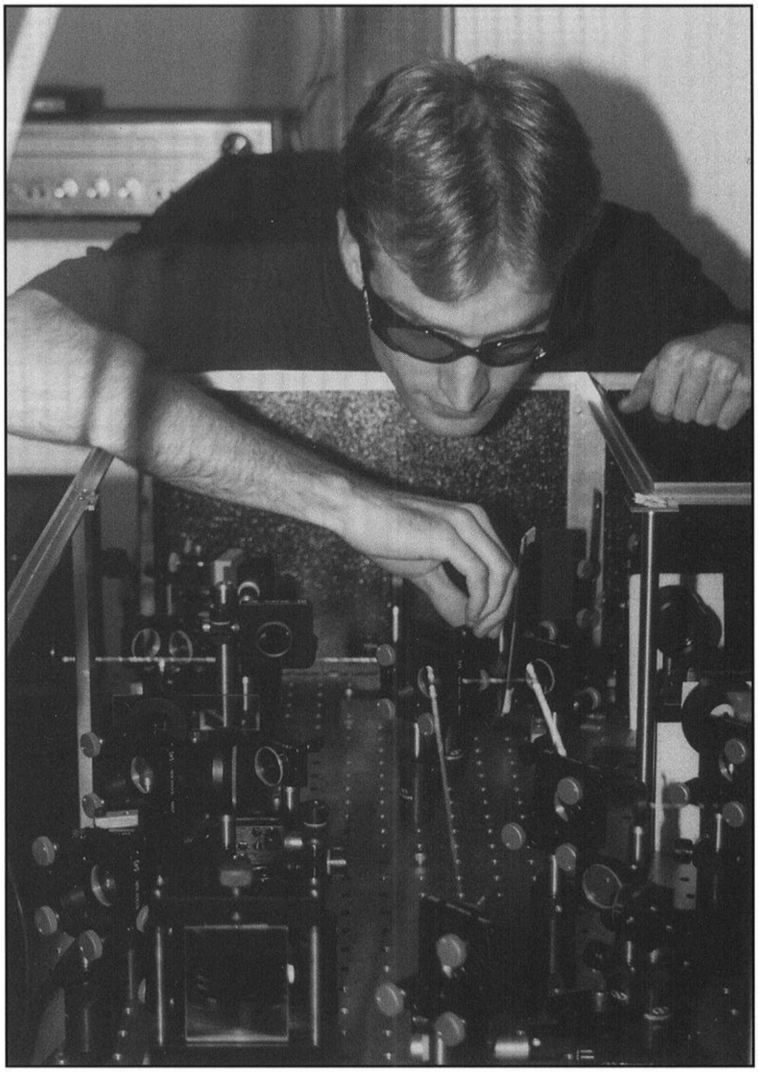
Thus, the field of femtochemistry was born, and chemical reactions ceased to be merely vague metaphors. Zewail's work held profound implications not only for the field of chemistry, but for science as a whole. The use of femtosecond laser technology has risen dramatically since those first momentous "snapshots," as scientists of all genres seek to understand, predict, control and see crucial chemical processes as never before.

The research led by UW-Madison Professor Fleming Crim illustrates the strides being made with such advanced techniques. The Crim Group specifically focuses on the field of vibrationally mediated chemistry, which deals with the effects of molecular vibrations

Scientists have also used femtosecond laser pulses to:

—Induce deuterium (^2H) clusters to undergo "tabletop" nuclear fusion
—Observe the process by which chlorophyll molecules trap and localize the energy of sun light
—Study changes in molecular structures due to excitation by light, as occurs in the pigment molecules responsible for light detection in our eyes
—Study the behaviors of hazardous waste compounds, with the hope of finding ways to properly deal with them
—Develop new polymers for use in high-speed electronic devices

on chemical reactions. When endowed with energy, molecules not only move from place to place, but they also rotate, bend and vibrate in numerous directions – as would a slinky if you were to attach balls to its ends and throw it across a room. As a molecule vibrates, its bonds stretch and contract in a specific rhythm or pattern, known as its "normal mode" of vibration. Understanding this, chemists have sought to use such vibrations to their advantage. As Crim writes in *The Journal of Physical Chemistry*, "…an overriding aim of much of chemistry is breaking selected bonds," and scientists have aspired for nearly three decades to manipulate chemical reactions by causing specific bonds to "jiggle." When energy is deposited into a selected bond, the stretch vibrations that are induced naturally weaken the bond. Hence, scientists could influence the course of a chemical reaction by energizing (jiggling) the bonds they want to break. It almost sounds simple.



Source: Grayson Harms

Max Heckscher, a graduate student working in Professor Crim's research group, adjusts an optic on a femtolaser.

As you might have guessed, it is *not* that simple. Scientists were frustrated for years by the fact that energy focused into a selected bond is almost immediately distributed throughout the entire molecule — which, of course, negates the whole purpose of placing it in the bond in the first place. Crim overcame this stumbling block in 1989, when he used a laser to control the reaction between water and hydrogen atoms. In his groundbreaking experiment, Crim used a special form of water, HOD, which contains a deuterium atom (a hydrogen atom with an extra neutron) in place of one of the hydrogen atoms. Crim's basic technique involved exciting the O-H bond with a laser beam tuned to the necessary frequency and then reacting the water molecule with hydrogen atoms. Because the deuterium atom had a different mode of vibration than the lighter hydrogen atom, the energy was not immediately partitioned between the two bonds. The excited O-H bond was the one that broke in the reaction, making Crim's experiment a success.

Crim's team earned international recognition as the first to successfully display bond-selected chemistry, or molecular surgery. Since they began applying Zewail's femtosecond laser techniques a few years ago, Crim and his coworkers have probed into the very nature of chemical change. As vibrationally excited states of molecules typically last from 10^{-12} seconds to 10^{-10} seconds, only femtosecond pulses offer the time resolution necessary to allow the researchers to observe bond-selected chemistry in action. "This technology," says Crim, "makes it possible to watch phenomena that are right at the limit of chemistry." Ultra-fast lasers have allowed the Crim Group not only to observe and control the destruction and formation of chemical bonds, but also to watch the flow of energy from bond to bond within a molecule. With characteristic enthusiasm, Crim states that today's research "gets to the very heart of how we think about molecules."

Fascinating applications of such ultra-fast laser technology can be seen in countless other fields of science. For example, molecular biologists are using femtosecond pulses to observe and manipulate individual proteins involved in biological processes. They are gaining a world of information by "filming" and analyzing reactions between proteins (such as enzymes) and the molecules to which they bind. Scientists have also managed to utilize laser pulses to design entirely new biomolecules, and they hope to eventually create photoactive molecules (i.e., molecules that are activated by light) capable of recognizing proteins related to certain diseases.

The newest laser technology offers a number of other promising applications to the field of medicine. For instance, infrared laser pulses have been used to release "caged" neurotransmitters at specific locations. Neurotransmitters are chemicals that transmit messages from one nerve cell to another, and they may be "caged" by synthetic molecules. By releasing such neurotransmitters at precisely selected sites, scientists can closely examine their effects on localized regions. Besides giving scientists a better overall understanding of biochemical processes, such knowledge will also aid in the design of future drugs.

The list of advances made using Zewail's ingenious technique goes on and on, and the possibilities for future applications are bounded only by the imaginations of scientists. With the ability to perform experiments on the very time scale of chemical reactions, scientists can control processes once thought to be uncontrollable, understand phenomena once thought to be incomprehensible, create molecules never seen before and see things that no one knew existed. Thanks to the inventive application of an incredibly fast camera, studies are now moving past the question of *what* happens and delving into the riddle of *how*.

Author Bio: Ryan Sydnor is a freshman from Racine, Wisconsin, who plans to major in biomedical engineering. His main goal is to combine his interests in medicine, engineering and (hopefully) writing into one exciting career. His more short-term goals include having fun and getting smarter.

Is Nuclear Energy Safe?

By Lynn Weinberger

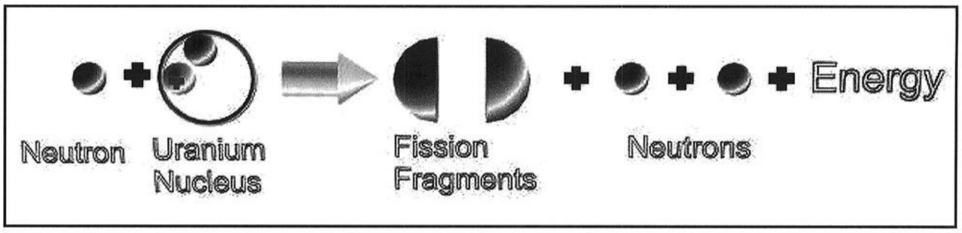
One little uranium pellet, about the size of the top third of your pinky finger produces as much energy as one ton of coal. This amount of energy is equal to that produced by three barrels of oil or two tons of wood. Compared to coal, oil and wood, uranium makes an extremely efficient energy source. Uranium 235 is the fuel that produces nuclear power in the United States. How does nuclear power work and is it a safe energy source?

Nuclear power results from a chemical reaction. A neutron is fired into a chunk of uranium. The uranium splits in half, releasing energy and neutrons. These neutrons bombard the remaining uranium, split more atoms and release more energy. The energy boils water, which powers turbines to create electricity. This is the chain reaction of nuclear energy.

On April 25, 1986, this same chain reaction got out of control and killed approximately 40 people at Chernobyl. Soviet engineers were testing the reactor coolant pumps to make sure steam generators could be kept at a certain level. They needed to test all the Russian nuclear reactors within a short time period, so they negated safety restrictions to get the test finished quickly. They pumped water into the steam generator and boiled it down, causing an alarm to sound, which they bypassed. They continued to boil away the water and another alarm sounded, which they also ignored. Steam produced by all this water boiling exploded and blew the top off the reactor.

Chernobyl's reactor had no containment structure, so the explosion blew radioactive particles into the atmosphere. The contamination in the surrounding area resulted from these particles getting out of the reactor. All that remained in the reactor was carbon, which if water were present would control the reaction. Because there was no water left, the carbon burned, and actually sustained the nuclear reaction. Soviet firefighters and cleanup teams were sent to the reactor to put out the fire and construct a containment structure, now called the sarcophagus, to prevent any more radiation from being released. Thirty-two of these workers died, making up the majority of the casualties at Chernobyl.

Another nuclear meltdown occurred on March 30, 1979, at Three Mile Island. A leaky valve caused the water to leak out of the coolant system, but the valve was closed just enough that an alarm was not triggered. The alarm that measures the temperature of the coolant was triggered but ignored because it had been malfunctioning earlier that week. Soon, the workers realized what had occurred and shut down the reactor. A portion of the uranium fuel melted, making the plant unusable because it would be too costly to repair. The containment structure prevented any radiation from leaking out, and there were no resultant deaths.



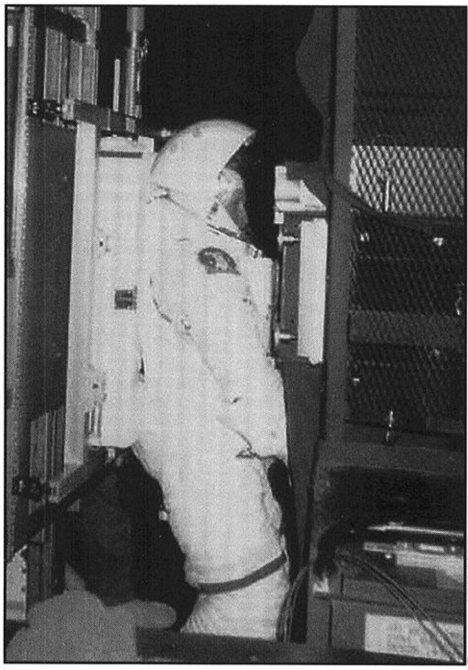
A model of a fission process.

Just this year in Tokaimura, Japan, two workers were killed at a uranium processing plant when their company decided that they needed to produce more uranium and rewrote the procedures for uranium processing to speed things up. However, they ignored safety regulations. The workers had no nuclear training, so they had no idea that they were acting dangerously. They poured 32 kilograms of uranium into a system that was only supposed to hold eight kilograms of uranium, causing an uncontrolled nuclear reaction.

While the fatalities experienced at Chernobyl and Tokaimura may seem daunting, they are minimal when compared with the fatalities experienced in other electricity-producing industries. For instance, 15,000 people died when the Gujarati hydroelectric dam burst in 1979. Another hydroelectric dam, Vaiont, failed in Italy, in 1963, killing 2,000 people. 90,000 coal miners have been killed in mining accidents in this century. Approximately 50 coal miners die each year. Approximately 1,000 people were killed in 24 natural gas accidents in the last twenty years. Over 2,000 were killed in fifty-seven oil accidents in the last 20 years.

Comparatively, nuclear power causes fewer deaths. Why is this? Wayne Ness, the communications officer of Madison's chapter of the American Nuclear Society, says "I consider it [nuclear energy] safer than most forms of energy because there is so much extra regulation on the safety of the nuclear industry. And it's a lot more of a conscious safety… The engineers design in multiple layers of separation or multiple stages of safety into the actual design of the reactor. One of the most prominent things in the industry is the safety factor."

There are four main layers in a nuclear reactor to keep the radiation contained. The first is the fuel cladding itself. Each fuel pellet is a tube of ceramic filled with uranium oxide. The product would have to get out of the non-porous ceramic to cause any damage. The second layer is the inkanell sheath holding the pellets. This is the fuel rod, and any radiation would have to escape from this sheath. The third layer is the pressure vessel. This is generally made out of steel, and the reaction takes place inside of here. The



Astronauts try on spacesuits at the Johnson Space Center in Clear Lake City.

Another project that AIAA is involved with is the solidification of composite materials in reduced gravity fields. This experiment was designed by a small group of undergraduate students in March of 1999. Their goal was to analyze how a reduced gravity field affected the solidification of particles. While on ground, they had a liquid material with small particles in it. Then, they triggered a solidification of the small particles. Sometimes, the particles would solidify in an organized manner and sometimes the particles would simply get pushed out of the solution. In late August, they went down to Texas to conduct the same experiment in a reduced gravity field. The reduced gravity field is produced in a plane called the KC-135, also known as the "Vomit Comet." The plane's path is a series of parabolas. At the top of each parabola, there are about 20-30 seconds of microgravity. In those 20 seconds, the students had to perform their experiment.

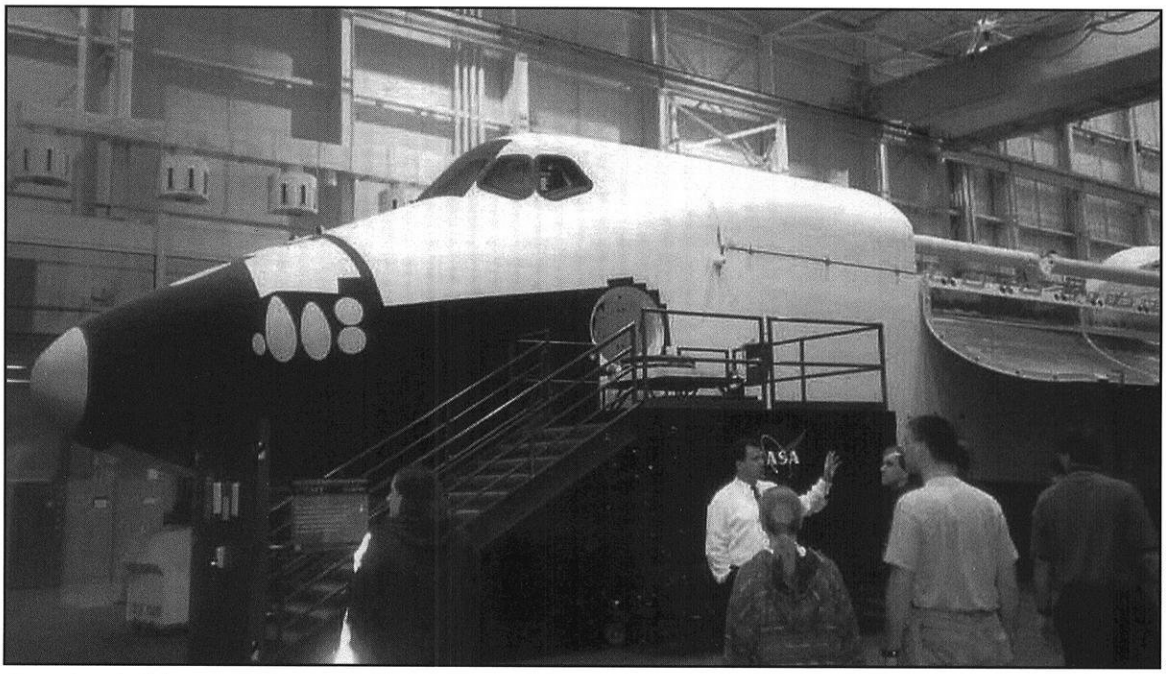
Nikki Malone, one of the students working on this project, commented that the experiments were successful, despite her bouts with air-sickness. Gabe Hoffmann also had a chance to perform experiments on the KC-135. Hoffmann said that it was a challenge to conduct the experiments because there was no frame of reference on the plane. He felt it was very difficult because there was nothing to hold onto or stand on. Fortunately, he got used to it. In fact, Hoffmann got so used to it that by the end, he was able to race some astronauts, Superman style!

The experiments in reduced gravity fields were sponsored by the NASA Reduced Gravity Student Flight Opportunities. This program is funded by NASA and the Texas Space Grant Consortium. Undergraduate students design an experiment and submit a proposal to NASA. Then, selected projects are performed in a reduced gravity field of the KC-135.

The UW-Madison chapter of AIAA has also been given the chance to tour some of the space centers in the United States. During winter break in 1999, some of the members went to Clear Lake City, Texas to visit the Johnson Space Center. At this space center, the members had a chance to see the Neutral Buoyancy Lab, where they watched astronauts train. The Neutral Buoyancy Lab is a large pool that simulates zero-gravity conditions. They also were able to see the X38, an emergency transport vehicle that will be used by astronauts on the International Space Station. The group was also given a chance to see the Advanced Space Propulsion Laboratory where they learned about some of the most recent rocket technology, including the Variable Specific Impulse Magnetoplasma Rocket (VASIMR) which will greatly reduce the time spent traveling between planets.

The interests of AIAA are diverse and pertinent. The effect of microgravity on medicine has been an important field in the past few years and will continue to be important for decades to come. The members of AIAA also foster an interest in space. Someday their research may help generate a more accurate picture of outer space. We will never know exactly what space has to offer unless it is thoroughly explored and analyzed. And when this has been done, we will know whether Douglas Adams was a prophet or just a guy with a wild imagination.

For more information on AIAA, you can contact Elizabeth (Betsy) Reinecke, the UW-Madison chapter's president. Or, you can check out their webpage at *http://www.cae.wisc.edu/~aiaa/*. Anybody is welcome to join in the fun.



People admiring a shuttle kept at the Johnson Space Center.

Author Bio: Soma Ghorai is a junior majoring in electrical engineering. Although she has been told on many occasions that she must be from a different planet, she doesn't recall ever being in outer space.

[1]*http://www.aiaa.org/gen-info.com*

Just One More

Understanding Engineers

TAKE 1:

Two engineering students were walking across campus when one said, "Where did you get such a great bike?"

The second engineer replied, "Well, I was walking along yesterday minding my own business when a beautiful woman rode up on this bike. She threw the bike to the ground, took off all her clothes and said, "Take what you want."

The first engineer nodded approvingly, "Good choice; the clothes probably wouldn't have fit."

TAKE 2:

Arguing with an Engineer is a lot like wrestling in the mud with a pig: After a few hours, you realize the pig likes it.

TAKE 3:

To the optimist, the glass is half full. To the pessimist, the glass is half- empty. To the engineer, the glass is twice as big as it needs to be.

TAKE 4:

Three engineering students were gathered together discussing the possible designers of the human body. One said, "It was a mechanical engineer. Just look at all the joints." Another said, "No, it was an electrical engineer. The nervous systems many thousands of electrical connections." The last said, "Actually it was a civil engineer. Who else would run a toxic waste pipeline through a recreational area?"

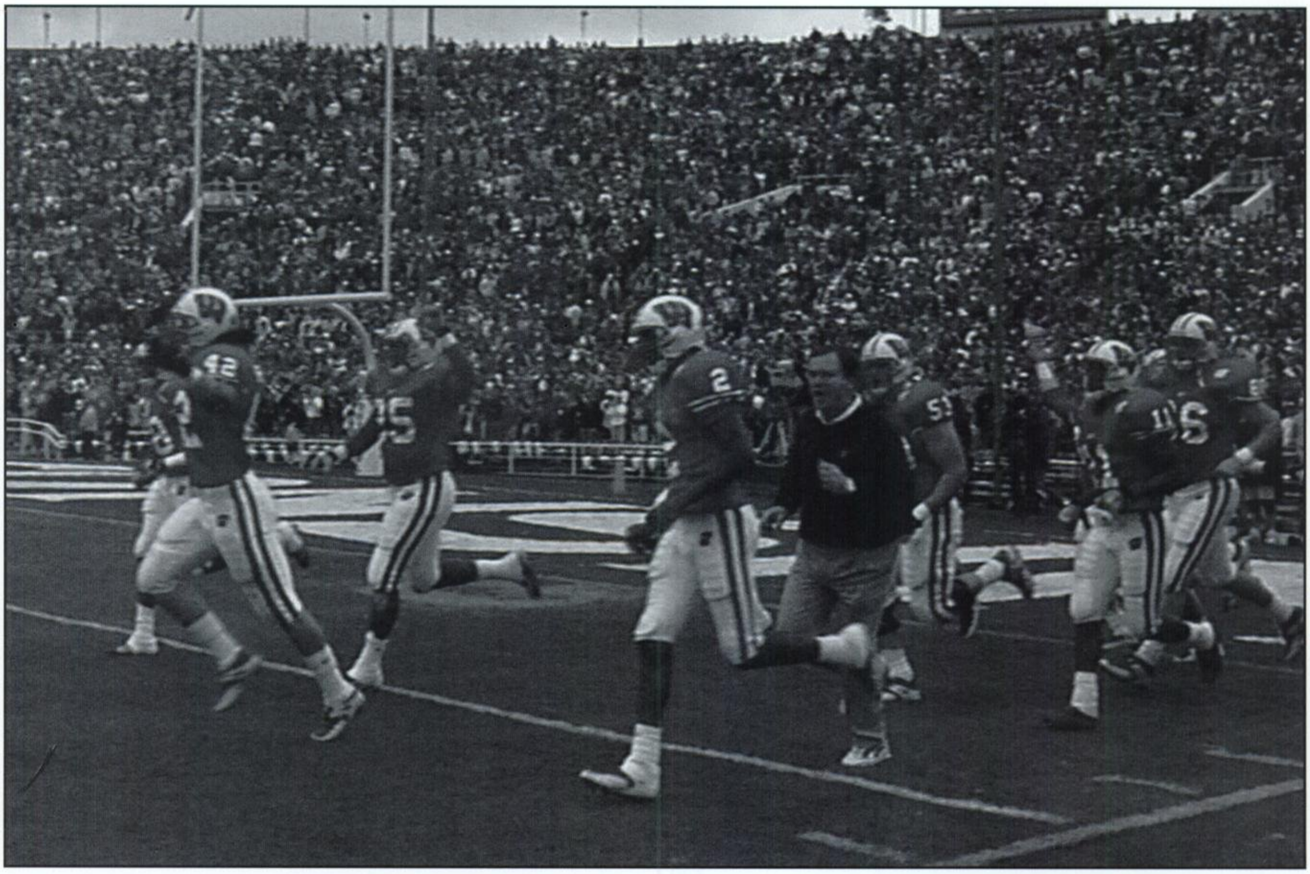
TAKE 5:

Construction Definitions:

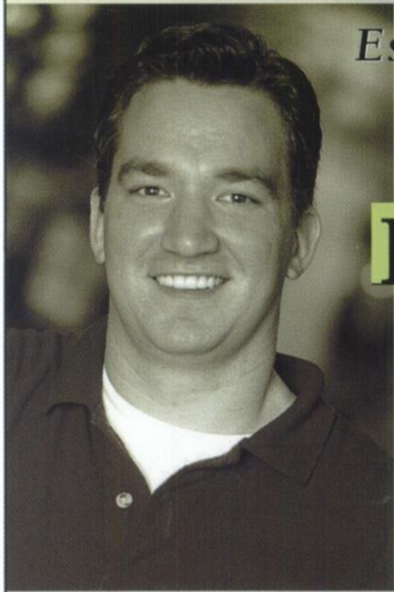
Contractor - A gambler who never gets to shuffle, cut or deal!
Bid Opening - A poker game in which the losing hand wins.
Low Bidder - A contractor who is wondering what he/she left out.
Engineer's Estimate - The cost of construction in Heaven.
Project Manager - The conductor of an orchestra in which every musician is in a different union.
Critical Path Method - A management technique for losing your shirt under perfect control.
OSHA - A protective coating made by half-baking a mixture of fine print, split hairs, red tape and baloney - usually applied at random with a shot gun.
Strike - An effort to increase egg production by strangling the chicken.
Delayed Payment - A tourniquet applied at the pockets.
Completion Date - The point at which liquidated damages begin.
Liquidated Damages - A penalty for failing to achieve the impossible

Source: ***http://engineeringnot.netfirms.com/jokes.htm***

CONGRATULATIONS TO THE WISCONSIN BADGER FOOTBALL TEAM FOR THEIR ROSE BOWL VICTORY



Source: http://www.wisc.edu/ath/sport/fb/schedule/stanford/postgame.html



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