

ENGINEERS' FORUM

VOLUME 15 • NO. 4

DECEMBER • 1995

Virtual Corporations

What You
Need to
Know about
Tomorrow's
Workplace

Before you
USE THE DEW,
Read This!

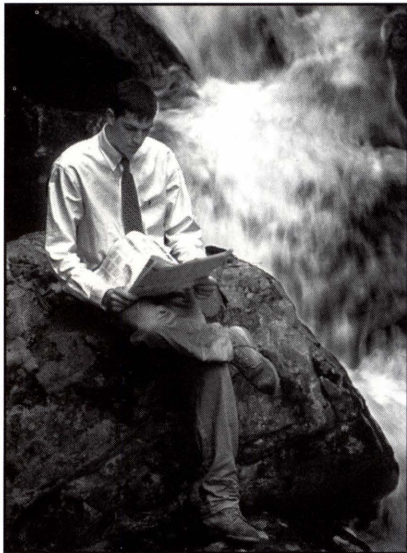
The Duck Pond
Laboratory

It's Your Parent's Fault:
Check Your DNA

SCIENCE AND POLITICS DON'T MIX

What is great for entertainment is startling for the political arena.

On the Cover



Natural Ability: Virtual business provides opportunities as great as nature's expanse.
Model: Tad Rogers
Photo by Mark Ashley.

Another vapid and arduous election year has come to an end. The rumblings of disquieting campaign ads have relinquished our television sets. The newspapers have to find something else to report. All of the political talking heads have gone back to ... well, where ever it is that political talking heads come from.

As much as I want to put all of the political philandering, waffling, gerrymandering, and wavering of 1996 behind me and forget about it, there is one issue which continues to cause me uneasiness: the misuse of technology for political advancement.

I am referring specifically to a case involving a United States senatorial race in Virginia between John Warner, the republican incumbent, and Mark Warner, the democratic challenger. It was a typical race not necessarily distinguishable from any of the hundreds of other races occurring at the same time across this nation.


With one exception.

In this race, a television ad for the incumbent aired containing a picture of the challenger's head super-imposed on another person's body shaking hands with a former Virginia governor. The hoax would have been indistinguishable from a real photograph, with the exception that Mark Warner had not actually shaken hands with the former governor at this venue. The democratic candidate notified the media and John Warner's camp promptly issued apologies and the ad was pulled. John Warner then went on to win the election in a fairly close race.

What is disconcerting here is the lack of ethics, both generally and with regard to technology. I don't hold any cause with either of these men's politics or views, I simply feel that technology is not a weapon to be wielded, rather a tool to be used with care.

The technology exists to make fiction reality on video. We saw how stunningly real these computer generated pieces could be in movies like Terminator 2, Independence Day, and Toy Story. With enough time and technical know-how, just about any event can be put onto video tape. But what is great for entertainment is startling for the political arena. It is shuddering to think what damage could be done to careers and to the nation at large should such unethical practices persist.

Perhaps politicians should start taking a few more engineering classes so that maybe they can learn a little about ethics and responsibility.


Ray Esterling
Editor

World Wide Web address:
<http://www.vt.edu:10021/eng/forum/index.html>

Named Best All-Around Magazine at the 1995 national ECMA Conference; second place at the 1996 conference

Editor-in-Chief
Ray Easterling, ISE '97

Managing Editor
Lisa Traub, CE '97

Business and Advertising Manager
Monika Meckley, BSE '97

Graphics Editor
Mitch Hazam, ART '98

ECMA Conference Chair
Steffanie Liskey, CHEM '99

Computer/Internet Consultant
Bryan Deehring, CpE '99

Staff

Jim Laurence, GE '00
Chris Lundberg, AOE '98
Ryan McClanahan, GE '00
Beth Oborn, MSE '98
Nathan Phillips, PHYS '98
Chris Primavera ESM '98
Amy Simms, ISE M.S. '97
Scott Walters, ME '98
Anna Wegman, AE '97

Photographers
Rich Parrish, COMM '98
Andy Turnbull, AOE '98

Editorial Advisory Committee
Lynn A. Nystrom
Head; Director of News and External Relations for the College of Engineering

Sam Riley
Professor of Communications Studies

Design/Typesetting Advisor
David Simpkins
Graphic Designer, College of Engineering

Engineers' Forum is Virginia Tech's student engineering magazine. *Engineers' Forum* is published four times during the academic year. The editorial and business office is located at 108 Femoyer Hall, Virginia Polytechnic and State University, Blacksburg, VA 24061. Phone (540) 231-7738. Bitnet address: ENGForum@VTVM1. World Wide Web address: <http://www.vt.edu:10021/eng/forum/index.html>. Member of Engineering College Magazines Associated, Lee Edson, Chairperson.

The opinions expressed in *Engineers' Forum* do not necessarily reflect those of the administration, faculty, staff, or student body of Virginia Tech.

Copyright 1996, *Engineers' Forum*.
Darkroom Facilities donated by Virginia Tech Communications Department.

Table of Contents

- 2 An Office Without Walls** With increasing telecommunications technology, working isn't so much a matter of where you are but what you're doing. *By RAY EASTERLING*
- 4 Casali: Leading by Example** John Casali takes the reigns of the Industrial and Systems Engineering department. *By RYAN McCLANAHAN*
- 7 Water, Water, Everywhere** It's not just for ducks anymore. Virginia Tech's Duck Pond is being used to determine ways to eliminate waste water pollutants. *By STEFFANIE LISKEY*
- 8 Building a Better Human** The Human Genome Initiative is tracking down the building blocks of your body. The question is: What will they do with them when they find them? *By CHRIS PRIMAVERA*
- 10 Your Diet Soda Could Kill You** In the rush to ingest caffeine to make it through the day, are you doing damage to your body? *By JILL THOMASSON*
- 15 Joseph Tront: A Man Focused on Achievement** Catch a glimpse into the life of one of Tech's finest professors. Find about his efforts to computerize classrooms and help society. *By BRYAN DEEHRING*
- 20 Training for the Future** MAGLEV trains could be society's cure to traffic congestion and pollution, but is the loss of vehicular freedom too bitter a pill to swallow? *By JIM LAURENCE*
- 22 The Cataclysmic Effects of Comet Impact** A look at the possible whats and ifs of a collision with our speedy stellar neighbors. *By NATHAN PHILLIPS*

AN OFFICE



WITHOUT WALLS

IMAGINE WORKING IN A WORLD WITHOUT CUBICLES,
WITHOUT TIME CLOCKS AND FLICKERING FLUORESCENT LIGHTS.

IMAGINE YOUR OFFICE IS WHEREVER YOU
HAPPEN TO BE AT THAT MOMENT.

IMAGINE THAT WHO YOU ARE AND WHAT appointments you make are based on you, your schedule, your guidelines. In a society embracing the blossoming of technology, we are approaching that time where we can go to work and stay in our bathrobes. Company executives are telecommuting, conducting business on the go, and saving time to watch their children grow up. **Now**, Virginia Tech is embarking on a similar experiment.

Continued on page 18

STORY BY RAY EASTERLING
PHOTOS BY MARK ASHLEY

CASALI

LEADING BY EXAMPLE

BY RYAN McCLANAHAN

The 1996-97 academic year yields a new leader for Virginia Tech's Industrial and Systems Engineering Department. John Casali is now in his first official year as department head, after being interim head during the past year.

Casali has been a Hokie since entering Tech as a freshman from West Virginia in 1973. He received his B.S., M.S., and Ph. D. from Tech. He said he is enthusiastic about his new position but is still committed to his research and teaching.

"To be an effective academic administrator, I believe you need to have come up through the professorial ranks in the traditional way," Casali said. "That is to say, you should have been involved and stay involved in teaching and research to be able to effectively lead others in these activities."

Even though his administrative duties and research take up most of his time, he still finds time for racquetball, restoring old sports cars, and offshore fishing. His fishing expeditions have been very fruitful. He has caught two large marlin, one of which was a blue marlin that weighed about 350 lb., and an 800 lb. tiger shark, which was too dangerous to try to boat.

When asked how he plans to lead the ISE department into the twenty-first century, Casali said his major goals are to move from a top-ten ISE department to a top-five department nationwide, to ensure the teaching and research labs have the latest technology, to continue to obtain and maintain top quality faculty, and to maintain the Industrial Advisory Board, which is made up of top industrial engineers from industry.

Casali is now in his thirteenth year at Tech, and he is the founding director of Auditory Systems Lab and co-director of Environmental and Safety Lab. He is

also working on several research projects at this time. With the help of Laura Clark, Ph. D. student, and Randy Waldron, research machinist for the ISE department, Casali has been working on an device which converts any standard manual wheelchair into a powered wheelchair. They started the project in 1994. They are into the second prototype, and they are very close to getting a patent for the device, which would be Casali's third patent. One advantage of the invention is that it can be attached by the person in the wheelchair and can be stored in the passenger seat of a car, eliminating the need for an attendant or special purpose van. Also, the price will be much lower than a conventional powered chair. To get a powered chair would be around \$6,000, while Casali estimates the price range for the device at about \$1,200 - \$1,500.

Casali is not only developing new products, but he is also principal investigator on the Commercial Trucker Hearing Requirement Project, funded by the Federal Highway Administration. He is researching the noise levels in the cabs of trucks and putting commercial truckers through various tests, including signal detection tasks. Along with a task analysis, which is finding out what truckers need to hear to do their job, such as emergency signals, brake problems, and air leaks, Casali will conclude the minimum hearing requirement that truckers must meet. This research is being watched very closely by industry because his findings will most likely be translated into federal regulation.

National attention is nothing new to Casali, however. He has been inter-



John Casali, ISE head, with his latest invention.

ANDY TURNBULL

viewed about his research by *Men's Health* and *Men's Fitness*, both of which are national publications, and he has appeared on several CNN shows, including *World News Tonight* and *Science and Technology*.

Though he is very proud to be able to maintain his research laboratories and his first love is working with his graduate and undergraduate students, he is also working very hard to improve the ISE department. He has several new initiatives, including proposals to companies to endow the ISE department with money for various student-oriented projects, such as an ISE Learning Center in the New Engineering Building, as well as scholarships. He said he believes that attention to undergraduate research and teaching are of paramount importance.

Casali's attention to his research has enabled him to become an effective leader of the ISE department, especially in advising student researchers and young faculty members. He encourages students to "not be bashful," but to talk to their professors and get involved. Research provides beneficial experiences and will open many doors for young engineers. Casali has demonstrated that by example, leading some 25 graduate students to completion of their degrees and employment at companies and universities across the U.S. and abroad. **EF**

Meaningful Careers Start Here

Baker



*A Total
Quality
Corporation*

Notable project engineering work in the areas of civil and water resources, transportation, environmental management and facilities planning and design has established the Engineering Group of Michael Baker Corporation as one of the leading consulting engineering firms in the nation.

And to maintain our position of leadership, we are always looking for talented, creative engineers.

If you fit this description, are interested in working in the above consulting areas and possess a solid academic foundation of excellence, we probably ought to talk.

You may contact us at:

Michael Baker Jr., Inc.
770 Lynnhaven Parkway,
Suite 240
Virginia Beach, VA 23452
(804) 463-8770

Michael Baker Jr., Inc.
3601 Eisenhower Avenue,
Suite 600
Alexandria, VA 22304
(703) 960-8800

*Michael Baker Corporation is an Equal Employment Opportunity corporation,
promoting a non-smoking and drug-free workplace.*



**LAW ENGINEERING AND
ENVIRONMENTAL SERVICES**

We are a professional services firm seeking bright, energetic, and talented engineers, and scientists who share our enthusiasm for client service and professional development. We are seeking the following specialists to work in our over 100 offices.

- Civil Engineering
- Environmental Engineering/Science
- Materials Engineering/Science
- Engineering Science and Mechanics
- Geology
- Mechanical Engineering (HVAC)

Wherever LAW operates, its services are guided by uncompromising principals of integrity, quality, and innovation. The principals ensure that our work enhances life while serving client objectives in every possible way.

If you share our devotion to learning, developing as a professional, and client service, please forward a letter of interest, with geographic preference, and a current resume to:

Law Engineering and Environmental Services
4465 Brookfield Corporate Drive
Chantilly, Virginia 22021

NOT JUST KNOWLEDGE KNOW HOWSM

WE OFFER YOU A CAREER NOT JUST A JOB

If you are looking for an environment that is different from a typical job, provides an opportunity to work on the leading edge of technology and encourages on-going professional fulfillment, consider a career with Coopers & Lybrand L.L.P.

C&L's Arlington, Virginia based Government Consulting Group offers services in information engineering, information systems development and implementation and financial management systems. We also specialize in business process reengineering, change management, activity based management, training and benchmarking. Our practice provides specialized services to the Federal Government, public and private sector clients.

To be considered for a position with Government Consulting Group, send resume to:

Coopers & Lybrand, L.L.P.
1530 Wilson Blvd.,
Attn: VA/Tech, Arlington, VA 22209

C&L's Computer Assurance Services Group (CAS) is recognized as a leader in systems auditing, microcomputer advisory services, client/server assurance, information system security, business continuity planning, internal audit services, information technology benchmarking, service organization audits, attestation services and system quality services. Employment opportunities exist in the Mid Atlantic and Philadelphia Clusters (Washington Metro, Baltimore, Richmond, Carolinas, Philadelphia and Harrisburg).

To be considered for a position with CAS, send resume to:

Coopers & Lybrand, L.L.P.
15245 Shady Grove Rd., Suite 350 South,
Attn: VA Tech, Rockville, Md. 20850-3222

For more information on Coopers & Lybrand, visit our Web Page on <http://www.colybrand.com>.

No faxes or phone calls, please

An Equal Opportunity/Affirmative Action Employer

**Coopers
& Lybrand**

Coopers & Lybrand L.L.P.
a professional services firm



WATER WATER EVERYWHERE

BY STEFFANIE LISKEY

***The concept
is a simple
one in
reality,
something
we each
know without
being told;
the more
pollutants we
remove, the
better the
habitat.***

The Environmental Protection Agency has declared that one of the largest causes of impairment to natural streams and rivers is runoff water from agricultural and urban sources. Thus, improving the water quality of our natural streams by removing non-point source pollutants is a big issue these days...

For some of the students that usually study in Patton Hall or Seitz Hall, school's out...outside that is, and their new classroom is located just off the golf course. The new classroom is the Commuter B parking lot and its detention pond located near the 5th green of the Virginia Tech golf course. Two monitoring stations have been built to take measurements of the water flow to and from the detention pond — the detention pond outflow goes directly into the campus Duck Pond.

The project, a joint venture between the Civil and Biological Systems Engineering Departments, is aimed at the problems of water quality created by an urban watershed rather than dealing with the Duck Pond itself. Dr. David Kibler in Civil Engineering is highly involved in this project. His field of interest is urban hydrology and storm water management. For several years now he and his colleagues in BSE, Saied Mostaghimi and Philip McClellan, have been trying to establish some type of interactive outdoor laboratory, and as of January 1995, their attempts have been successful. It was then that the monitoring station was installed. The first storm data was collected in June of 1995.

The water that ends up in the Duck Pond takes a long and twisted route. Starting at the Commuter B lot, the rainfall-runoff flows under West Campus Drive into the detention pond. After sitting in the detention pond for a period of time, the water then flows under Duck Pond Drive and into the Duck Pond. The Duck Pond also receives runoff water from other parts of campus and Blacksburg. The Commuter B lot has an approximate area of 22 square acres, just about the same size as the Drillfield. Fill that area with just a half inch of water and you are dealing with almost 4000 cubic feet of contaminated runoff water.

The purpose of the project is to investigate the effectiveness of a holding pond in removing suspended solids, metals (cadmium, lead, nickel, copper), and nutrients carried in runoff water discharged from urban areas, like paved parking lots. The Duck Pond site is an ideal place for the holding pond because it sits at a very low point in the Stroubles Creek watershed, which takes up much of the campus and the town of Blacksburg. Consequently, runoff water from the commuter lot, as well as from other sections of campus, flows into the Duck Pond after every major storm. With the existence of the detention pond, the polluted runoff no longer flows directly into the Duck Pond. Rather, it sits in the detention pond for a period of time that may be as long as 48 hours. During that time, suspended solids are allowed to settle out of the water column to the bottom, along with the pollutants attached to these solids.

PHOTOS BY RICH PARISH

Continued on page 14

Ask anyone you see at your local gym, hair salon, or family physician and most will probably say they are unhappy with their visit. Many would love to be the stereotypical perfect physical specimen. They would love to be a natural blonde, instead of a brunette. They would love to have a set of rippling abs instead of ... well, what they have. Of course, who doesn't want a doctor visit that results in everything being fine. Well, what if your physical characteristics could have been altered before you came into the world? It sounds unreal, but efforts are currently underway by scientists in and around Virginia to finally discover the reasoning behind our DNA. Secret for centuries, the exact recipe for the genetic makeup of the human being is very close to becoming available. Though in theory this knowledge would be paramount in the history of medicine, one must ponder the dangers of the reality of being endowed with such power, and consider the repercussions of our haste. Still, excitement mounts as each new gain produces phenomenal research projects; the results of which may scare you.

In 1953, a thrilling breakthrough was made that would blast the scientific community into the future. Scientific detectives cracked the genetic code. Now famous researchers Jim Watson and Francis Crick published a paper diagramming the structure of DNA. Through countless careful studies of various nucleic acids in the body, scientists discovered four organic bases: adenine, guanine, cytosine, and thymine. Using their respective abbreviations, A, G, C, and T, scientists

could now identify combinations of the four bases. Arranged in sets of three, the nucleotides combine to form 64 possible codons for amino acids, for example glutamic acid, coded by ACT. Sequences of codons constitute the DNA chain and determine the structure of proteins. The proteins in turn determine specific features such as

only knew more about gene function and behavior, the medical profession could change forever. However, with only about 20percent of the genes identified, the incredible momentum to continue could come to a stand still.

Programs like the Human Genome Project are continuing the search for more data

to come closer to reaching an extraordinary goal. By 2005, supporters of the initiative hope to achieve full knowledge of gene function and performance.

Proposed in 1985, the Human Genome Project began an intensive five year gestation period in which experts attempted to convince government administrators that the initiative had purpose and promise. Dr. Victor McKusick, professor of Medical Genetics at Johns Hopkins University and a noted expert in the field of genetic research, was one of the many minds that came together to consider, as he states, "whether it could be and should be done." By Oct. 1, 1990, McKusick and his colleagues obtained Congressional approval for add-on funding, two-thirds of which came from the National Academy of Sciences, and the remainder from the Department of Energy. From that moment, Human Genome and the NAS set out to map and sequence the human gene. The group estimated that remarkable gains could be made using approximately \$200 million per year for fifteen years. In early 1995, Francis Collins, a program affiliate, announced that the Human Genome Project was ahead of schedule and under budget.

Although the United States is taking some of the first steps towards achieving this goal, it is not alone. For years, HUGO, the Human Genome Organization, has coordinated individual national undertakings under an international purpose. The agency, founded by McKusick, has assembled the specialists of nations such as France, Japan, and the United Kingdom. The fruition of

BUILDING A BETTER HUMAN

BY

CHRIS PRIMAVERA

hair color and disease probability. As all of the codons compile, they eventually form what is known as a gene. Commonly referred to as the genome, these microscopic masterpieces help determine who you are. At conception, you are given 22 chromosomes and 1 sex chromosome from both your mother and father. Out of the total DNA in the human body, 100,000 functional genes reside across these 46 chromosomes in the nuclei of every cell. If we

and knowledge in this field. This ongoing research initiative is attempting to map the paths of gene codes as they are passed from one generation to the next and on again to the next. By continuing to observe these patterns, experts strive to master the manner in which codons conglomerate to form certain anatomical and psychological attributes. Through meticulous experiments with generations of genes, the members of the project strive each day

McKusick's organization has lead to an affectionate reference to HUGO as the "UN of the Human Genome."

Working together, the scientists of many countries continue to make discoveries using an intensely complex research process.

Scientists employ precise biochemical methods to extract DNA from a cell nucleus. The DNA chain is then systematically cut in an attempt to isolate one gene. By using calculated cloning techniques, available now for decades, scientists can determine which gene is responsible for a specific trait. As these details emerge, scientists can link specific traits to the genes they observe, thereby coding the subject.

Although this method of splicing allows us to identify the behavior of each sequence, it is a controlled behavior based on ideal conditions in isolation. Therefore, the conclusions are tainted by more questions. Attaining information about gene behavior is not perfect. The behavior of genes depends upon the nature of surrounding genes. This variable, dependent upon interaction, is just one of the many that plague scientists with road blocks in their research. Yet, with every new obstacle overcome, the complicated network of genet-

ic sequencing slowly but surely unwinds.

The most pessimistic of skeptics cannot deny the awe-inspiring possibilities that this discovery could yield. The opportunities that could be available as a result of the Genome Project's success should shock the young, old, and young at heart. The Human Genome Initiative could provide the essential basis to improve the quality of life. People would know their personal risk factors early. McKusick concludes that "medicine will be more predictive and preventive." By utilizing the new advances in gene identification and diagnosis, physicians' duty and mission could change from a frequent healer to an occasional "Mr. Fix-it". That'll be the day.

Or will it? Past experience dictates that when things sound too good to be true, they usually are. What would the world hold in store for a generation of people exempt from medical anxiety?

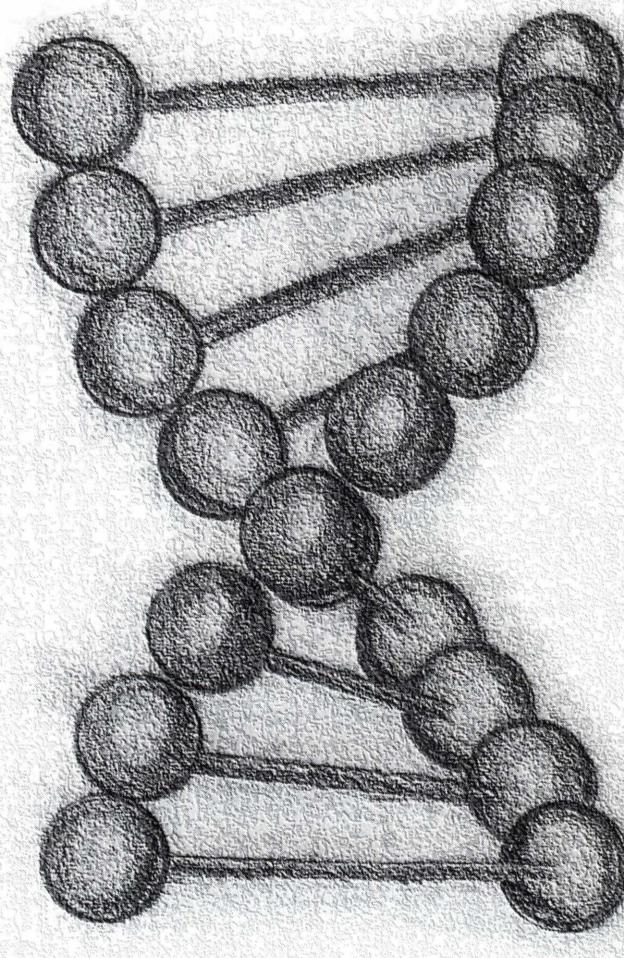
Though medical and pharmaceutical advances have all but eliminated the encumbrance of disease, the supremacy of genetic ingenuity would obliterate it. How can we insure that developments in this field continue in a responsible, safeguarded manner?

We can only look to ourselves. Dr. Daniel Schneck, professor and co-director of the Biomedical Engineering program at Virginia Tech along with Dr. Wallace Grant, tries to keep an optimistic faith in our educational institutions. Though Schneck said "[science] has a history of often finding a bad way to use technology before finding a good way," he encourages students to be aware of their ethical responsibilities

as professionals. He strives to urge faculty and students to include courses stressing the social obligations of scientific progress in the engineering curriculum. A course such as Bioethics would be an asset as a tool to enhance students' consciousness of the ends of their means.

Advocates of the Human Genome have put ethical concerns on the top of their prestigious priority list. At the

Continued on page 12



GRAPHIC BY MITCH HAZAM

YOUR DIET SODA COULD KILL YOU

BY JILL THOMASSON

Think about this scenario: You are the typical college student. You live for caffeine, whether it be coffee or sodas. You read labels: you count calories, fat, and sugar. You switch to diet sodas and artificial sweeteners because you're health-conscious.

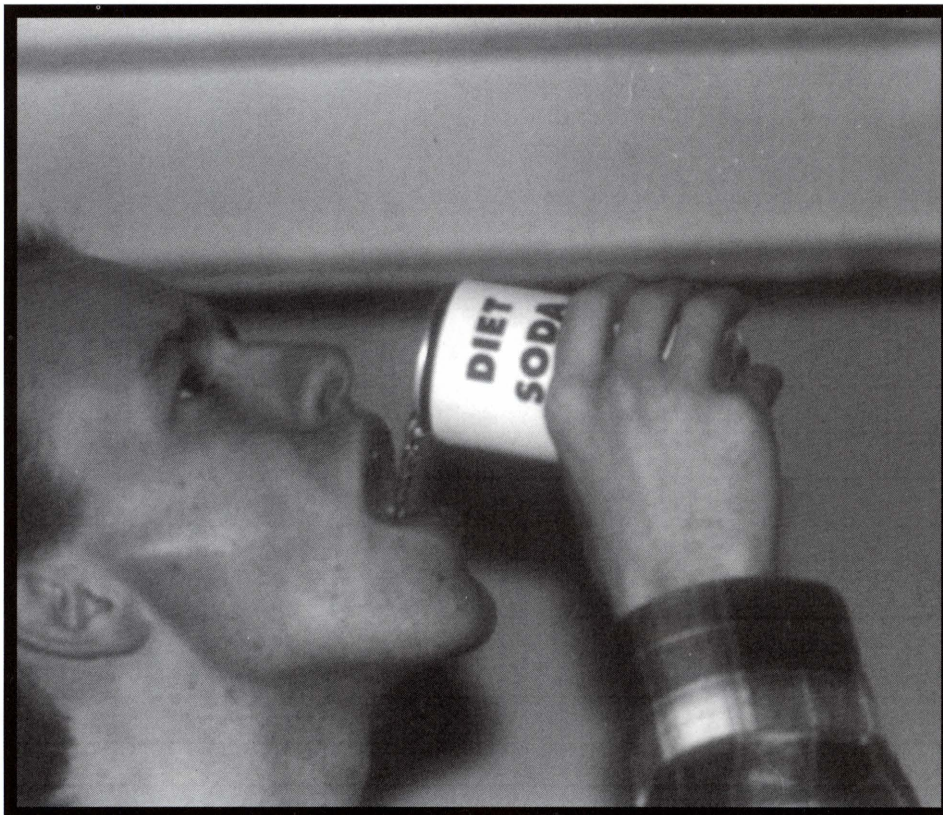
Have you ever really looked into artificial sweeteners, though? Do you really know what you are drinking? If you knew what was in artificial sweeteners, however, you probably wouldn't be using it today. They are also known as

"The Sweet Poison". Why? Because they often have aspartame, a substance of which you should monitor your consumption.

Aspartame consists of three main components. The first is aspartic acid, which makes up forty percent of aspartame. It is called an excitotoxin because it is a necrosis, or, in other words, it excites cells to death. This happens when the acid puts too much calcium into cells. The second component is phenylalanine, which is best known as

the amino acid in human brain tissue, and it makes up fifty percent of aspartame. Too much phenylalanine causes phenylketonuria, a condition in which the body is unable to metabolize. This causes levels of serotonin in the brain to decrease, causing depression, memory loss, headaches, and even schizophrenia. Phenylketonuria destroys brain tissue a little at a time, and the cumulative effects can be dangerous. The last component of aspartame is methanol, and makes up ten percent of aspartame. It is commonly known as wood alcohol, which causes blindness and even death. Methanol is highly toxic, and very poisonous. Just two teaspoonfuls are lethal to the average person. When consuming small amounts, the effects of methanol can be severe or less noticeable. The three components of aspartame, when put together, can comprise a serious mixture.

Once aspartame is in, say, a diet soda, the amount of toxicity increases. Just six months after an artificial sweetener has been added to a soda, 28.62mg of methanol, 158.31mg of aspartic acid, and 42.22mg of phenylalanine exist, and the amounts continue to increase with time. After three years, the initial amounts will quadruple. This is why soft drink manufacturers put expiration dates on their products. Unfortunately, expiration dates are not always observed. It is because of this aspartame is also known as "Gulf War Syndrome in a Can". According to *Businessweek* (Dec. 1990), a large soft drink manufacturer shipped



MITCH HAZAM


free diet sodas to troops involved with operation Desert Storm. According to military sources, however, once aspartame sits in temperatures above 85 degrees, the three main components break down into neurotoxic substances, or greater amounts of methanol, formaldehyde (embalming fluid), formic acid (ant sting venom), and DKP, which is a brain tumor agent. So, the diet drinks broke down into highly toxic substances while in storage in the desert heat. Additionally, reports indicate the drinks sent by the company had expired.

Aspartame has also been linked to problems with airline pilots, as well. Airline pilots generally consume large quantities of aspartame, and were reporting symptoms similar to sufferers of the Gulf War Syndrome. Some pilots reported grand mal seizures and blackouts in the cockpit. By 1986, the FDA and Center for Disease Control had evaluated 3,000 known complaints in the United States alone. The Aspartame Consumer Safety Network (ACSN) installed a special pilot hotline and over 800 pilot-related calls have been recorded, according to Mary Nash Stoddard, founder of the ACSN. One reported incident included a pilot that had consumed just two cups of hot chocolate before his flight. He later reported being unable to read the instruments in the cockpit and had to land the plane by computer. In fact, 80 percent of all pilot complaints to the FAA are aspartame related. However, ties to the aspartame industry are so strong that these issues are remaining unaddressed. The United States Navy and Air Force, however, have taken action by warning their pilots of the dangers of aspartame in their May and August 1992 Flying Safety publications. Also, *Plane and Pilot* magazine warned of flying while consuming aspartame in their January 1990 edition.

There are over 90 different symptoms associated with aspartame over use. They include: headaches/migraines, seizures, numbness, weight gain, depression, irritability, insomnia, hearing loss, heart palpitations, breathing difficulties, tinnitus, memory loss, dizziness, nausea, muscle spasms, rashes, fatigue, tachycardia, vision problems, anxiety

attacks, slurred speech, loss of taste, vertigo, and joint pain. Additionally, brain tumors, Chronic Fatigue Syndrome (CFS), Parkinson's Disease, mental retardation, birth defects, Multiple Sclerosis, Epilepsy, Alzheimer's, Lymphoma, fibromyalgia, diabetes, and other chronic illnesses have been associated with aspartame.

Consumers should also be aware that aspartame is not only in diet drinks and artificial sweetener packets. It can be found in instant breakfasts, cereals, coffee beverages, gelatin desserts, laxatives, milk drinks, soft drinks, tea beverages, wine coolers, breath mints, cocoa mixes, frozen desserts, juice beverages, multivitamins, shake mixes, tabletop sweeteners, topping mixes, yogurt, sugar-free chewing gum, pharmaceuticals and supplements, instant teas and coffees, and more. Aspartame has also been found in products where it is not listed on the label.

Consumers who have any questions or comments concerning aspartame are encouraged to contact the Aspartame Consumer Safety Network (ACSN) at (800) 969-6050, or write them at P.O. Box 780634, Dallas, Texas, 75378. 

SYMPTOMS:

Headaches/migraines
Seizures
Numbness
Depression
Irritability
Weight Gain
Insomnia
Hearing Loss
Heart Palpitations
Breathing Difficulties
Tinnitus
Memory Loss
Dizziness
Nausea
Muscle Spasms
Rashes
Fatigue
Anxiety Attacks
Loss of Taste
Vertigo




MITCH HAZAM

Continued from page 9

project's onset, the NAS issued grants to philosophers, historians, and sociologists to explore the impact, positive or negative, that the Genome Project's results will have on the future. Organizations such as ELSI, the society investigating Ethical, Legal, and Societal Implications, continually cooperates with project leaders to warrant the proper treatment of ethical concerns. Even though the project aims to accomplish potentially dangerous objectives, the realization of those goals will merely be turning point. By its completion, the Human Genome Initiative will provide the ability to identify each gene along with its characteris-

*"I don't have
all the answers,
but I sure have
a lot of questions."*

tic hallmarks. Yet, gene function will remain a mystery to be researched. McKusick predicts that project will yield "a sourcebook for biology and medicine, an encyclopedia of genes," to be referenced by numerous people who would profit from these advances. The progress that is to come long after the project is consummated is anyone's guess.

Many fail to understand that projects like the Human Genome Initiative are just a stepping stone for what is to become of genetic manipulation, for good or bad. Once published, the wisdom of the genetic code will be up for grabs for a potpourri of scientific disciplines. Yet there is still much to be discovered. Though at this point the scientific community remains confidently enthusiastic, it is still very ignorant at best when it comes to the demeanor of DNA. A long road is ahead and like many of us, Schneck admits "I don't have all the answers, but I sure have a lot of questions." 

**The Engineers' Forum is
recruiting new staff
members. Positions are
available in all aspects
of this award winning
magazine.**

**Writers
Photographers
Copy Editors
Layout Staff
Graphic Designers
Business Staff**

Advertising Representatives

**The Engineers' Forum is
a dynamic organization
with opportunity for
advancement. If you'd
like to make a
difference, join the
Engineers' Forum.**

Call 231-7738

**DOES YOUR ORGANIZATION
NEED HELP WITH LAYOUT OF
PAMPHLETS, BROCHURES,
OR NEWSLETTERS?**

**THE ENGINEERS' FORUM CAN
HELP. PUT THE POWER AND
EXPERTISE OF AN AWARD
WINNING PUBLICATION TO
WORK FOR YOU.
CONTRACTING OUT OUR
EXPERIENCED
PERSONNEL IS AS EASY AS
DIALING A PHONE.**

CALL 231-7738

Unlocking Doors to a Rewarding Career.

From ranking 7th on the Washington Technology Fast 50 List for three years running to leading the way in developing innovative information systems, SETA Corporation is one of the nation's fastest-growing companies in technology services. If you are an exceptional individual who wants to work in trend-setting environments with today's most advanced equipment, key into SETA.

- UNIX Systems
- Local Area Networks
- Systems Engineering
- Client/Server Applications Development
- Database Management Systems

SETA Corporation offers college graduates an excellent compensation/benefits package, including assistance for continuing education. Get ready for a career that offers key growth potential, and mail your resume to: SETA Corporation, Attn: HR Dept., 6862 Elm Street, McLean, VA 22101, or fax it at: (703) 821-8274.
E.O.E M/F/H/V.

SETA
★ ★ ★
Key In.

PLOT IT!

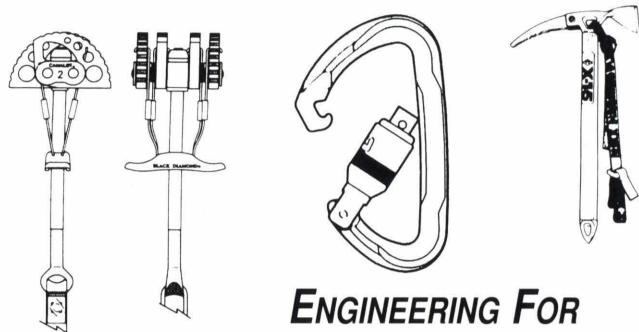
Whether your plotter needs fiber-tip, liquid ink or rollerball pens, we can meet your needs in outfitting your Hewlett Packard, Houston Instruments or most other brands of plotter.

We also carry papers for plotters, laser and ink jet printers.

**mish
mish**

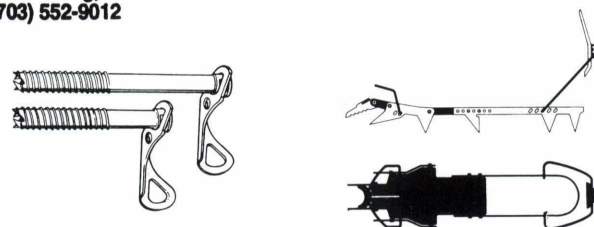
email: mishmish@bev.net
204 Draper Rd.
Downtown Blacksburg
552-1020

Blue Ridge Outdoors



**ENGINEERING FOR
THE ASCENT OF MAN**

211 Draper Rd.
Blacksburg, VA 24060
(703) 552-9012



Water Water Everywhere

Continued from page 7

The concept is a simple one in reality, something we each know without being told; the more pollutants we remove, the better the habitat will be for the wildlife and fish that live in the Duck Pond.

Significant concentrations of metals and nutrients can be found in the water column and in the bottom sediments of the Duck Pond.

In particular, if the nitrogen and phosphorous content in the pond is too high there can be oxygen depletion in the water and algae blooms.

In addition, metal toxicity causes deterioration of the water quality from a habitat standpoint.

However, the ducks are not the only ones to benefit ultimately from this project. Students now have an outdoor laboratory for training in the use of sophisticated instrumentation for measuring the quantity and quality of urban runoff. Two masters theses have been produced to-date dealing with mathematical computer models of the pond and parking lot system. A number of undergraduates

have assisted with the data collection and water quality analysis work, most as volunteers as part of an independent study course.

A second monitoring station will be built near the Veterinary Medicine building in the near future. The new pond will help filter the storm water runoff that comes from the new stadium parking lots now being built.

The new site will be different from the existing pond in its design and layout. It will consist of two basins. The first basin will be a forebay or wetlands area, designed to trap sediment and pollutants. The second basin will be a flood control pond designed to keep

flood peaks from increasing. Just as the water from the Duck Pond does, the water leaving the new detention system will flow into Stroubles Creek.

The state of Virginia also benefits from this research. The state Department of Conservation and Recreation is trying to accumulate data on the performance of different pollutant management techniques and structures. Tech's model is considered a good candidate for controlling the pollution levels carried by urban runoff. However, a bigger database is still needed. The new site is expected to contribute significantly to this objective. *CF*

Storm Water Data:

Formula used to determine performance:

$$(\text{inflow} - \text{outflow})/\text{inflow} \times 100 = \%$$

Removal on total suspended solids : 67%

Non-point source pollutants -

Heavy metals (Cd, Cu, Pb, Zn) ~ 30% removal

NH₄ ~ 92% removal

total Ph ~ 35% removal

tKN ~ 50% removal

NO₃ ~ 31% removal

Average holding time: 48 hours



UNIVERSITY MOTORS, LTD.

1

PRICE

USED CARS

SEE US FOR COLLEGE REBATES ON MOST NEW VEHICLES



3809 S. Main Street
Blacksburg, VA 24060
552-4140

Joseph Tront: A Man Focused on Achievement

BY BRYAN DEEHRING

Dr. Joseph Tront, assistant dean in the Bradley Department of Electrical Engineering, believes in living life to the fullest.

This educator and researcher is a family man, professor, and sports fanatic. And his love for sports doesn't stop at a Hokie football game. Tront is a active water-skier, volleyball player and college football referee. He teaches several high-level computer engineering courses and is presently active in various research projects. The rest of his time is filled with the company of his family, and he still manages to spend every week on campus, helping out his students.

Tront spent about 10 years getting his education and holds both bachelor's and master's degrees from the University of Dayton as well as a doctorate in computer engineering research at SUNO Buffalo. Tront, an educator for the past sixteen years, said he loves his job. He believes firmly in his work and in all aspects of life. Listening to Tront talk about his research, his expertise is evident. His research spans the areas of both electrical and computer engineering. His research interests include microprocessor applications, VLSI design and simulation, radio frequency interference in integrated circuits, and general simulation methods.

Tront's area of expertise is in computers, VLSI design and multimedia design. He has been working with various students and faculty on the Virginia Tech Engineering

Tools CD-ROMs. This is a package of compact discs distributed engineering students, supplying them with aids, application software, course information, general engineering tools, interactive learning aids, and educational videos showing subjects from the College of Engineering to tutoring

lessons in Statics and Dynamics. These compact discs provide essential material to all Tech engineering students and are considered very informative.

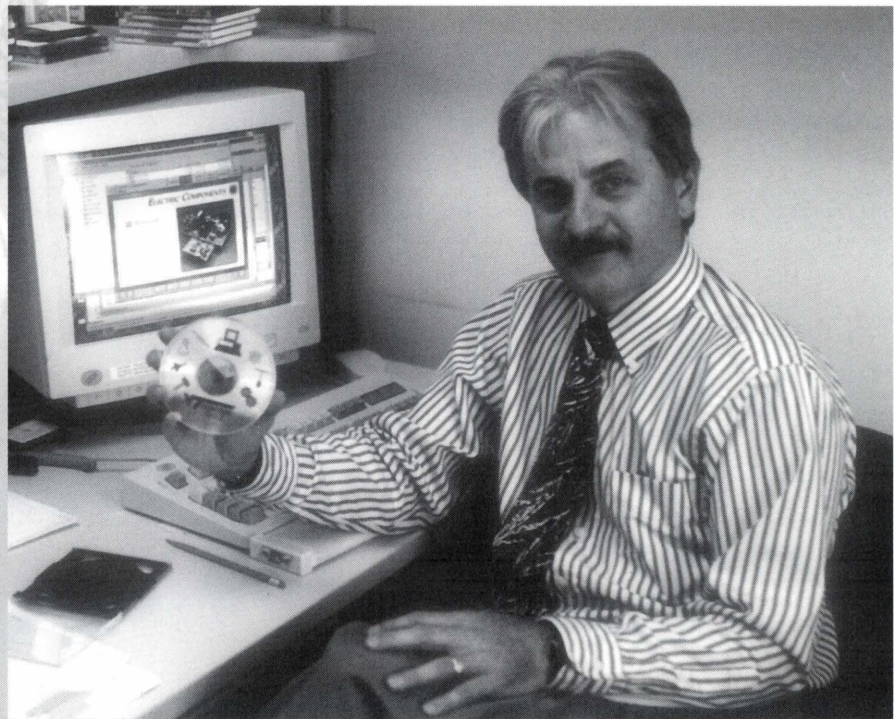
Tront is currently working on integrated circuit testing. The purpose of his work is to study the electromagnetic interference problems in integrated circuits and find a way to prevent these circuits from providing false or bad results. Through this research, he attempts to bring radio frequencies close to integrated circuit activity, and observe the upset that occurs. The possible upsets the circuit generates produce the opposite logic, or rather, the signal takes the opposite state than previously predicted.

This problem in the real world is very dangerous, which is why experts such as Tront are searching for the

answers to these problems. If the signal upset happened in a communications satellite, incorrect data could be outputted. Planes, people, and radio towers could receive inaccurate data or incorrect flight information.

Developing the innovation in which to solve these prob-

multimedia are some of the many resources used in this new look at engineering education. SUCCEED, the South East University College Coalition for Engineering Education, is actively involved. They are in their fourth year. Eight schools are in this consortium and are pro-



MITCH HAZAM

lems, finding out the transmission properties, and writing software to detect these problems is the aimed goal. This high tech problem solving is a typical example of Tront's philosophy of creativity and expertise.

Tront also is working on a program called Computers in the Classroom. This program uses education technology to enhance engineering itself. The resources of the World Wide Web, video conferencing, distance learning, and

provided with over \$6 million dollars annually by the National Science Foundation.

As a scientist and an educator, Tront has an sincere motivation from the love of his work. He will continue to better the life of the engineer and the engineering. Tront is creating the path to serve this changing world by bringing out the best of computers and technology, without ever losing sight of the importance of family, recreation, and the love of life. **ET**

TRAINING FOR

Transportation has changed the way we live. Indeed, it has become the way we live. Inventions such as the automobile and airplane have made traveling easier, faster, and more comfortable than in the days of the horse and buggy. The transportation system in this country, however, is not without its problems.

First, how many of us are really awake enough to drive to work at seven in the morn-

ing a car and only to turn it off in a matter of minutes actually cause more wear and tear on a car than longer rides.

Air travel presents its own unique set of hazards and obstacles. The simple act of checking in and boarding has become an act equivalent to the pentathlon, while safety remains an issue with aging air craft and increased terrorist activity.

What is needed is a public transportation system that is

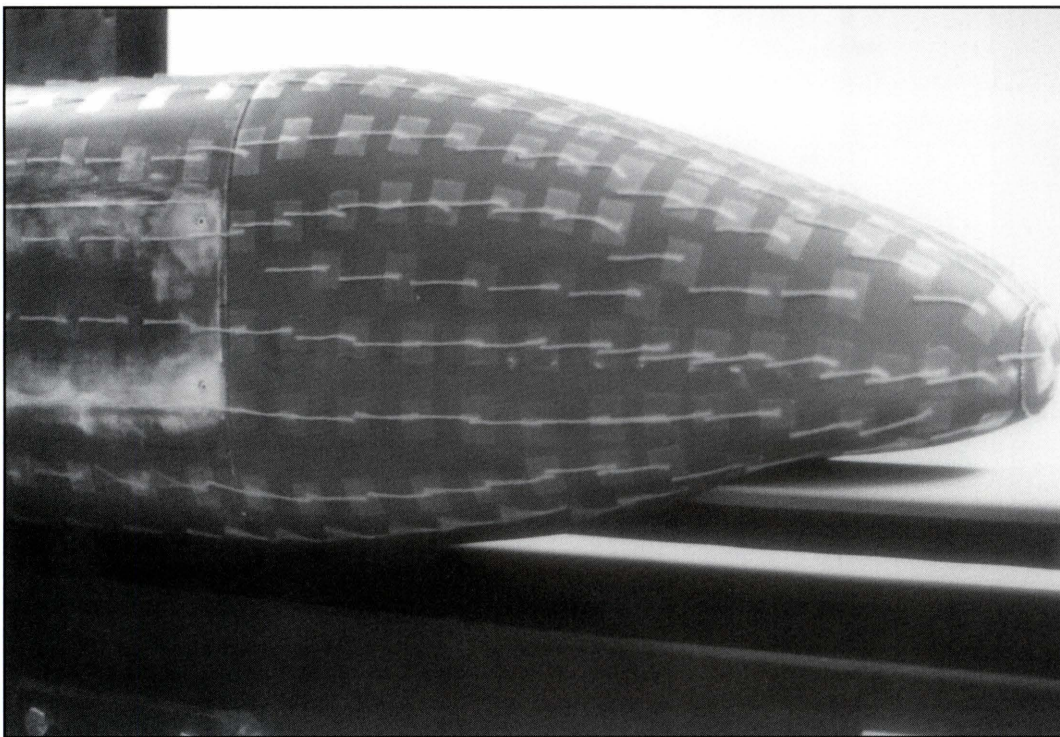
to friction, MAGLEV eliminates the friction by using magnetic fields to lift the carriage and propel it along the track.

As recently as the 1970s, the power requirements of such systems were not economical. After years of refinement, MAGLEV now has the potential not only to relieve congested roads, but to replace short distance flights as well. Other benefits of the system include faster trips, use in most weather

to the US Department of Transportation, have the potential to travel at speeds exceeding 300 MPH.

The primary research into MAGLEV occurred in Germany and Japan. The two countries however are taking different approaches. The Japanese use a system based upon Electro-Dynamic Suspension. Under this situation, if the train approaches the track due to external forces, the similar magnetic fields repel each other. As the train is levitating above the track, attracting and repelling forces in front of and behind the train cause it to move. A problem in using this design is the fact that there is no physical hold on the train. To a passenger, it would appear that the train could possibly leave the track.

The system that the Germans, and to some extent the Americans, are using has a track designed to hold the train thus preventing such a possibility. The train's undercarriage is wrapped around the track. Even if the system fails, the train will never leave the track due to this restraint. The method used to propel and suspend the train is Electro-Magnetic Suspension. With this system, the electro-magnetic forces of the train and the track attract one another. Thus the fields must be carefully controlled to prevent the train from hitting the track. This is the major drawback of this system. One beneficial factor about the EMS system however is that the train can



Locomotion: *The nose section of the Mag950 model undergoes wind tunnel tests.*

ing? If that isn't enough, there is the matter of having to fight all the other drivers who are in as much of a hurry to get to work as we are. And for those of us who don't have that long of a distance to go, there is the fact that start-

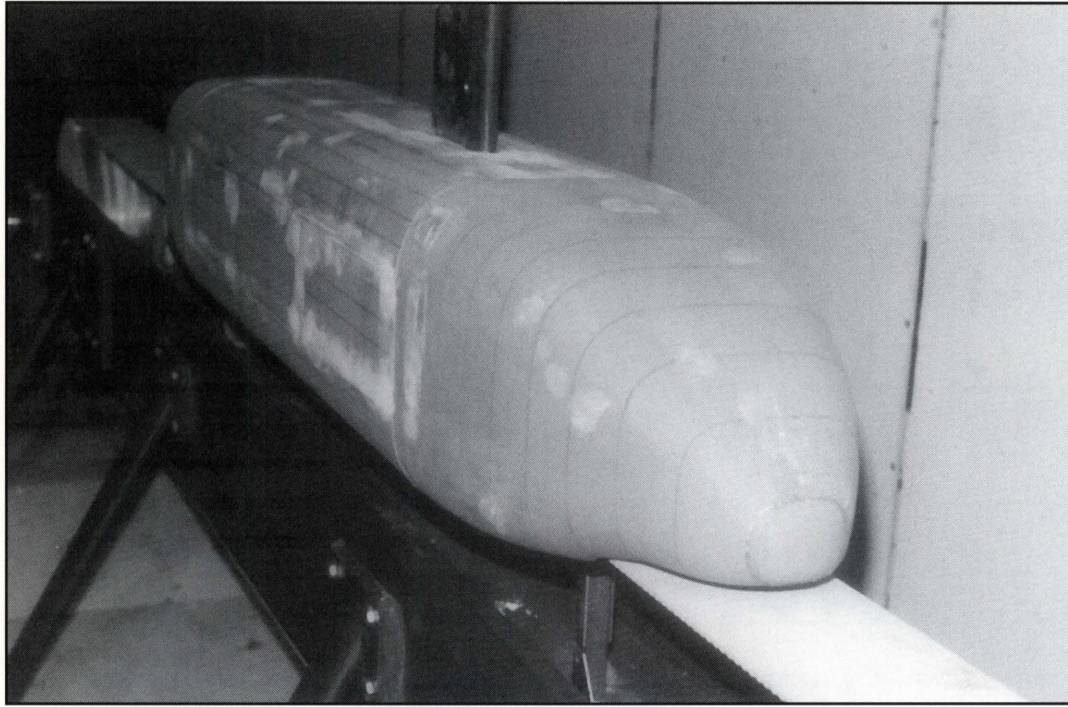
fast, efficient, environmentally friendly, and above all else, cheap. The technology for such a system does indeed exist. It is called magnetic levitation or MAGLEV for short. Unlike standard trains, which lose speed and energy

conditions, greater efficiency than current rail systems, reduced dependence on foreign countries for petroleum, and greater convenience than flying.

While not as fast as planes, MAGLEV trains, according

THE FUTURE

BY
**JIM
LAURENCE**



All aboard: *Mag1002 model during preparation for wind tunnel testing.*

remain levitated while stationary while the EDS system must land when not in motion.

Virginia Tech entered the MAGLEV scene in 1994. In 1993, the Department of Transportation asked NASA where would be a good place to have aerodynamic tests conducted on MAGLEV train designs. This concept area was still not researched extensively because most work has centered on designing the track and magnets. NASA sent the Department of Transportation to Virginia Tech's department of Aerospace and Ocean Engineering. A team consisting of students Ding-Jen Liu, Jason Tyll, Jessica Wilt, the AOE department Assistant Head James Marchman III, and Professor Joseph Schetz,

also of the AOE department, conducted the studies in the Tech Stability Wind Tunnel.

The studies conducted focused on both in-ground and out-of-ground testing. In other words, the aerodynamic flow around and under the craft with the track and without it. Having a stationary track underneath the model is not realistic enough. In order to truly simulate the effects of wind turbulence, the track underneath must move as

would a real track and as close to the actual speed as possible. After a few

**It is up to
the private
sector to
continue
research and
implementation**

attempts, a track was created consisting of a belt and pulley system capable of moving the track at 134 miles per hour.

The test project used two model designs based on data given by the Grumman Aerospace Corporation and these designs were ultimately built at Tech. The in-ground tests consisted of studies on forces exerted on

the entire vehicle and on both nose and tail, surface pressure on different positions of the nose, and studies of the wake of the air behind the vehicles. Out-of-ground tests consisted of similar studies.

The results of the tests proved that the MAG1002 design submitted by Grumman was better suited for actual construction due to its lower lift and drag than the MAG 950. Overall, the results supported computer simulations previously conducted at Grumman.

As is the case with many government projects, financial support fluctuates with interest. In the year that has passed since the DOT received the test results, government support for a MAGLEV transportation system has subsided. It is possible that government funding will resume at a later date when the desire for a better and more efficient mass transportation increases. Until then, it is up to the private sector and other governments to continue research and implementation. **EZ**

Sources:

Schetz, Joseph, et al. Experimental Aerodynamic Comparison of Two Magnetically Levitated (MAGLEV) Vehicle Designs. United States. Department of Transportation. Final Report on the National MAGLEV Initiative. Online. Internet. 10 Oct.1996 Available: <http://www.bts.gov/smart/cat/TNM.html>



An Office Without Walls

Continued from page 3

Students are running their own virtual corporation, meeting deadlines, and making business decisions from the comfort of their own campus, even their own dorm rooms.

At least, that's what the College of Engineering envisions. Currently, fifteen faculty members are in the process of submitting proposals to start a new form of education: the student-run virtual corporation.

The idea of a virtual workplace is a relatively new one, yet it has been quick to catch on. The number of telecommuters has doubled in the last five years to 8.1 million employees and experts anticipate that more than 50 percent of large or mid-size companies will use telecommuting in some sense within the next 10 to 15 years. Companies are posting assignments, contract revisions, software updates, and even company newsletters, all for download, on their home pages. Employees can transmit files, upload and download information, and modify databases, all in the comfort of their own home or a remote location. Associates from around the globe can access information and resources with a few clicks of a button.

The federal government has taken advantage of this new trend, with about 5,000 workers using some type of telecommuting arrangement, according to *USA Today*. Government officials are reportedly looking to have 60,000 workers telecommuting before 1999. Consider the benefit of eliminating a two-hour morning commute through Washington, D.C.

traffic. Not only is there a the elimination of a frustrating morning drive, there is the fact that many people are not driving to work, thus fewer polluting cars on the road ways.

Not only does such a workplace cut down on car and fuel expenses for employees, it also saves the company paper, phone charges, and postage.

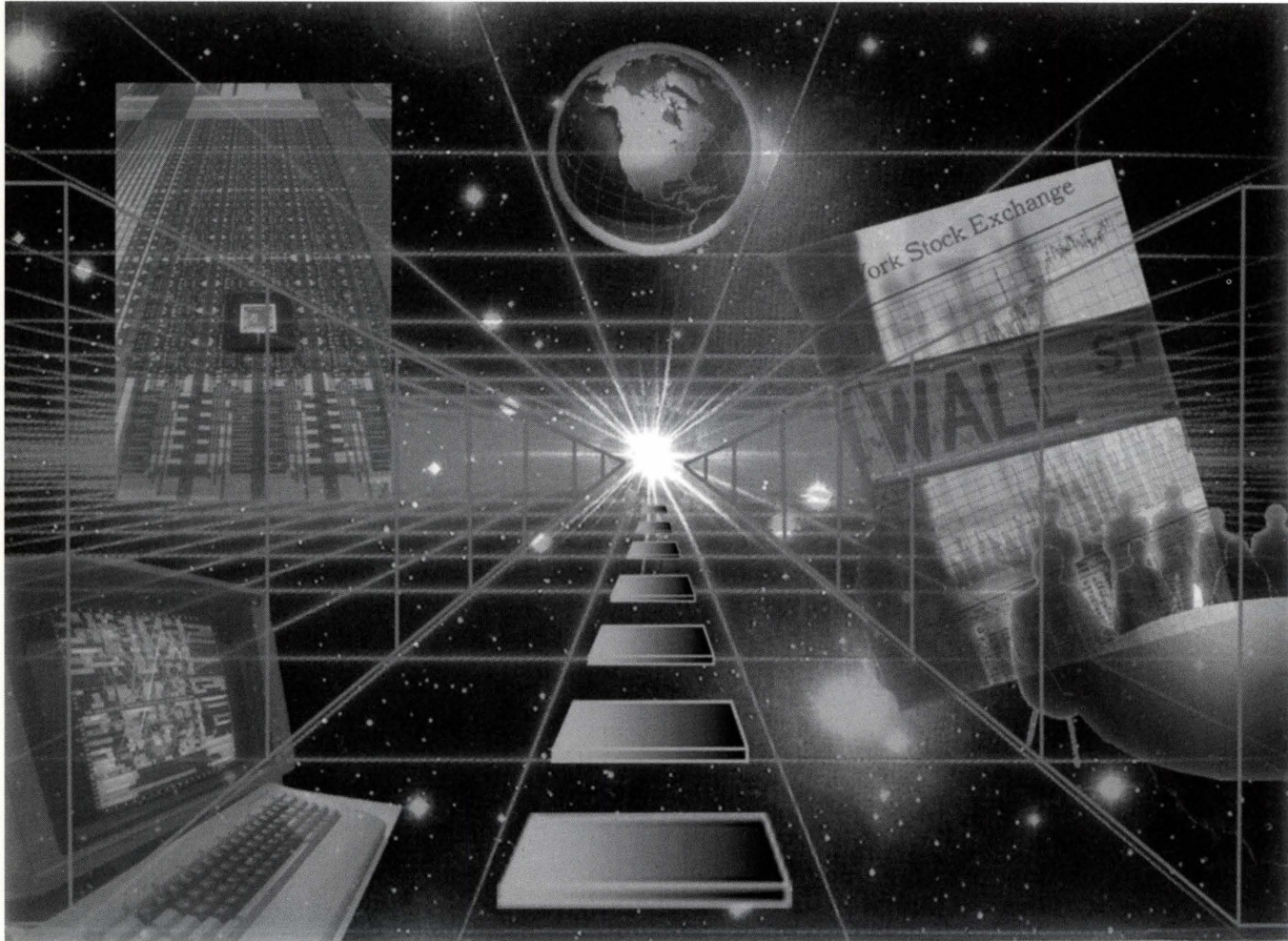
have the overall virtual project closely resemble an international business, incorporating students into departments such as marketing, research, engineering, manufacturing, and human resources. It is hoped students will be able to use this tool to work in teams, discussing real-life problems. In the college setting, however, students have the opportunity to ask questions of facul-

ty and staff, as opposed to facing problems alone as in the real world.

is moving ahead with its first project: designing a hospital database for the Montgomery Regional Hospital. Working in conjunction with Andy Cohill of the Blacksburg Electronic Village, the students are looking to increase the town community network.

While this program may help students in the future, there are certain rules to follow in any virtual workplace

Handbook, said often employees working at home are more productive than those at the office partly due to fear that others will think they aren't working. Bredin stresses the importance of taking personal time out. She suggests employees of the virtual workplace should spend the time saved by not commuting doing unrelated work.



MITCH HAZAM

Of course there are always technical difficulties to such ventures, but many companies are providing specialized training specifically for those employees who wish to work out their home-based offices.

The Tech program is designed to give students an opportunity to experience the reality of modern corporations while still continuing their studies. The goal is to

ty and staff, as opposed to facing problems alone as in the real world.

The proposals outline plans for corporations ranging in areas from the transportation-industry to communications infrastructures. The purpose of the diversification is to allow students from many disciplines to participate.

Though the projects have not yet been approved, Tech

situation.

When working in a virtual office, it is important to maintain visibility by attending staff meetings and other functions, as it is the personal relationships you develop which business is typically based upon.

Also, be conscious of making your own time. Alice Bredin, author of *The Virtual Office Survival*

Also, get to know your computer and the software you using well. Some companies don't provide technical support for at-home users. Besides, it's best to know your own system so you can do your own troubleshooting.

Regardless of the outcome of Tech's proposals, one this is for certain:

Virtual corporations are here to stay. **EF**

THE CATAclySMIC RESULT OF COMET IMPACT

(Or, What Would Happen if a Comet Landed in the Drillfield?)

Comets: The latest fear facing thousands of astrophysicists, politicians, and weathermen. After the comet Shoemaker-Levy 9 struck Jupiter in the summer of 1994, discussions about what would happen if

BY NATHAN PHILLIPS

the unthinkable happened here abound. But what about those of us who were more involved with the O.J. Simpson media-epidemic, which started about the same time, than activities 400 million miles away? Some of us may never have even heard of this collision, too caught up with jobs, vacations or (shudder) attending summer school! Besides, it was over two years ago—surely if such a significant event garnered some aspect of media coverage which would have stapled it to our minds? Actually, the media was less at fault than general public opinion. Shoemaker-Levy 9 was covered for several weeks, but the fear of such a

rare event was quickly abandoned for life's more pressing concerns.

So, what would happen if a comet landed in the Drillfield? Your first instinct may be that UVA would be thrilled, and perhaps a certain Texas school still sore from last New Year's would join in the cheers. Students at both of these schools might reconsider if they had heard of Shoemaker-Levy 9. This comet, which was actually a series of about 23 large comet-fragments, scarred Jupiter with marks brighter than the Great Red Spot. The first few hit on July 16, and the largest pieces continued until July 22. For about a month, smaller particles from the comet's tail continued to pelt Jupiter—these particles ranged in size from mere dust to the size of a small house. The largest fragments have been argued to be between 600 meters and 4 kilometers across—producing plumes (or flares) about 3300 kilometers above Jupiter's outermost cloud layer. At a speed of about 135,000 miles

per hour, or about 60 km per second, these fragments penetrated about 300 kilometers into Jupiter's atmosphere.

One might wonder, then, what would happen on Earth? Jupiter's rotation caused the fragments to hit in a series of explosions, creating a "belt" of dust clouds that lasted for over a year. However, several of the largest particles created clouds greater than the Earth in a matter of hours! The sight of a dust cloud as dark as one caused by a volcanic eruption, spreading over China, Iraq, and the Arctic just as completely as the United States, would reek havoc on crops for decades. Even those holed up in UVA and Texas wouldn't be saved from mass starvation (Tech, of course, would be spared this horror due to instantaneous flattening from the initial shock-wave). If one thinks about old films on nuclear war, or even the scenes of mass destruction in Independence Day, one might get an idea of what most land would look like. Maybe the lack of food would be a less

pressing concern with so few people to feed, though.

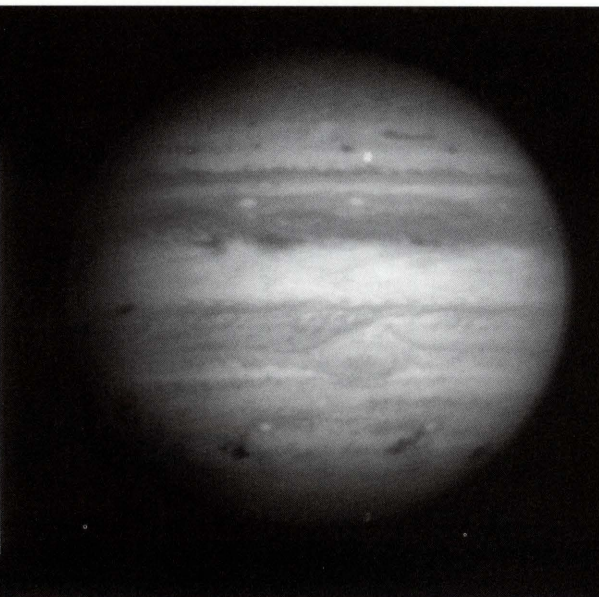
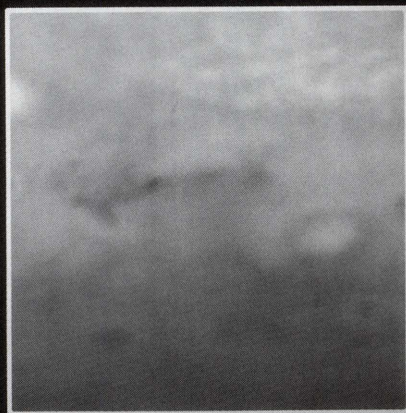
The idea of a land impact is, obviously, unpleasant at best. But, statisticians might argue that most of Earth is water, and so most fragments (if the hypothetical comet was fragmented) would land in the ocean. What then? Well, it is true that less dust would be raised. However, no matter where the impact, pieces of the comet would be ejected almost globally. This would be less significant except for the heat produced entering the atmosphere. These pieces would trigger fires around the world. Perhaps the large-scale tsunamis would help put them out, after crossing inland as much as 20 to 30 kilometers. The climate changes and crop devastation would still occur with such a large impact, and so while Tech may be spared initial annihilation, the dream of getting a degree and a job might become somewhat less important.

After all this, two questions still remain. First, is this what happened to the dinosaurs? If we are to believe the evidence and most modern physicists, yes. Second, what is the chance of it happening here?

Fortunately, the United States government, with NASA, has identified several hundred asteroid and comet orbits, and have found none that will come close to Earth for many thousands of years. Not all potential hazards have been identified, but they're working on that. One has to wonder, though, if we did discover an imminent impact, what could we do about it?

And, more importantly, would it hit the Drillfield? **EF**

"A" impact site
after 5.5 days



COURTESY NASA

ENGINEERS' FORUM****

... IS LOOKING FOR YOU.

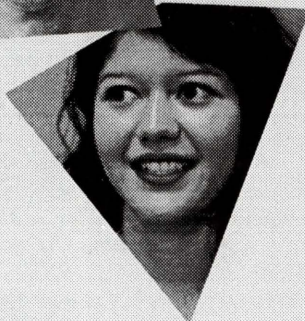
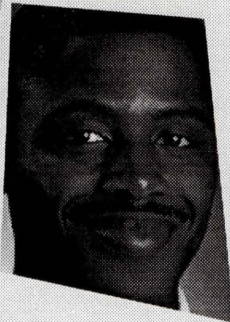
**THE NATION'S PREMIER
COLLEGE ENGINEERING MAGAZINE**

**IS LOOKING FOR
NEW STAFF MEMBERS.**

**IF YOU'D LIKE TO BE
PART OF A WINNING TEAM,
CALL RAY AT 231-7738
FOR MORE INFORMATION.**

**NO EXPERIENCE IS NECESSARY
AND ALL MAJORS ARE WELCOME.**

a passion to be the best



"The diversity of our businesses, our market leadership, our financial strength, the talents of our people - and the change initiatives in place - will result in dramatic growth in the years ahead." — Larry Bossidy
Chairman &
Chief Executive Officer

Intense. It's the best way to describe our environment.

Passionate. It's the only way to describe our commitment to a set of core values that defines our culture.

Customers, Integrity, People, Teamwork, Speed, Innovation and Performance — our shared belief in, and determination to focus on, these values has helped us write one of the most impressive success stories in the global business community.

Sales currently stand at \$14+ billion. Over the last five years, earnings have risen at a compound average annual rate of 25%. Operating margin is nearly double what it was in the early 90's. Our stock price has quadrupled. We hold leading positions in many of our major markets. And we rank in the top 75 on the Fortune 500 list.

We are an aggressive, dynamic high tech enterprise which operates globally in a diverse range of industry sectors. Customers in virtually every corner of the globe view us as a quality producer of aerospace and automotive systems, chemicals, fibers, plastics and advanced materials.

The future? Our goals are ambitious. We're aiming for consistent annual earnings growth of 13 to 17% into the next century.

So if you share our passion for success and our belief in the power of people and their ability to do great things, let's talk.

For additional information, check out our site on the World Wide Web: <http://www.alliedsignal.com>

We are an equal opportunity employer.

