ENGINEERS' FORUM

VOLUME 18 • NO 1 FEBRUARY • 1999

Understanding Bedtime: The Mystery of Sleep

Also inside:

E-Week at Tech

The Ares Conflict, Part 2

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The Student Engineering Magazine of Virginia Tech

ENGINEERS' FORUM

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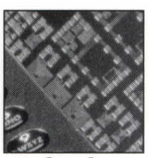

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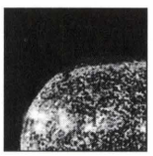

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Engineers' Week is Here Again

What?

An annual nationwide celebration of engineers and their profession, Engineers' Week (also known as E-Week '99). This year's motto is "Engineers: Turning Ideas into Reality."

Who?

People from any year, any major, who want to learn more about what engineers really do and have mega-Joules of fun.

When and Where?

Corporate Speakers: Hear why they became engineers and why they like their careers.

Mr. James Turner, President and COO, General Dynamics Corp. (of Falls Church)
Virginia Tech Alumnus - Agricultural Engineering
Mon., Feb. 22, 5:00 PM to 6:15 PM, Hancock 100

Mr. Allie Waldron, President and CEO, All Weather Inc. / Systems Management Inc.
Virginia Tech Alumnus - Physics
Tues., Feb. 23, 7:00 PM to 8:15 PM, Whittemore 300

Dr. Charles Pryor, Chairman and CEO, Westinghouse Electric Co.
Virginia Tech Alumnus - Civil Engineering
Thu. Feb 25, 5 PM to 6 PM, Location: TBA

Fun Events:

ASCE Earthquake Proof Structure Contest: Build 'em, then see if an artificial earthquake can knock 'em down! Mon., Feb. 22, 8:30 PM, Location: TBA

Edible Tower Contest: See who can make a tower with the lowest calories and cheapest materials while reaching the required height. Bring own materials. Wed., Feb. 24, Location: TBA

Monte Carlo Night: Gamble the night away with safe, fake money. Fri., Feb. 26 Time and Location: TBA

SEC Olympics: Volleyball, Mouse Pad Toss, Tug-o-War, Relay Race, and More! Sat Feb 27, 9:30 AM till 2 PM War Memorial Hall

Penny Wars to benefit Science, Mathematics, and Technology Education in Montgomery County Public Schools. Pennies in your department's jar count plus points, nickels, dimes, and quarters in other departments' jar count multiplied minus! Feb 22 through 26, Location TBA (likely on academic side of campus).

Departmental Info sessions: Undecided? Come hear what each department's really about!

A0E Mon Feb 15, 7 PM, Randolph 221
MinE Wed Feb 17, 7 PM, Room TBA
CEEN Mon Feb 22, 7 PM, Patton 211
ESM Wed Feb 24, 7 PM, Room TBA
ChE Wed Mar 3, 7 PM, TBA
BSE Tues Feb 16, 7 PM, Room TBA
MSE Thu Feb 18, 7 PM, Room TBA
EE / CpE Tues Feb 23, 7 PM, Room TBA
ME Mon Mar 1, 7 PM, TBA
ISE Tues Mar 2, 6:30 PM, Hancock 100

Why?

"It's important because we're showing spirit in our profession. You get to hear, especially as a young college student, from three experienced people from industry, and get an idea why they are engineers. Also see an enjoyable side of engineering with the earthquake-proof building contest. It's a way to see the other side of engineering outside of class." E-Week chair Jeff Arbogast.

The Ares Conflict

by Jeremy West

The End of the World as We Know It

PART 2 OF 3

ENEMIES ALWAYS HAVE ONE THING IN COMMON: THEY SHARE IN THE SADNESS OF WAR.

—Epitaph on a president's tomb

Fire danced across the mountains as the fall foliage flowed in the gentle November breeze. Bill watched in silence from his glass enclosed balcony as the view that should have inspired him to new levels of spirituality tore apart his soul. Somehow in his dreams this had all seemed more real.

His wife had left him, again. Though, this time he would not use his vast resources to hunt her down. Living in his dream house and working at his dream job were no longer enough for him. He wished that he could say that he never really wanted it, that the family, who would no longer live with him, had always been more important, but he had proved that argument false. Power had killed the man whose shell he now occupied and living that man's dream gave him no relief.

He had to let them go. They belonged to a life that was no longer his. And only with them gone would he do what he had to do. For too many years they had been his reason for complacency. Protecting them had been his excuse to remain in the conspiracy doing the unthinkable deeds that he did. Maybe at first he had only played along to save his family, but the power he came to know was an addictive thing, and in the end that was all that remained important to him.

There were things the president was supposed to be doing tonight, but tonight he was not the president. He sat in the unsettling silence and stared vacantly into the television. He did not believe it, he knew too much, but he did allow it to steal the haunting thoughts from his mind. Tomorrow was the problem. Tomorrow, the meeting that he was now skipping would be forgotten. Tomorrow, no one would ask what the president was doing last night. For tomorrow, a probe launched from the shuttle of NASA's first manned mission to Mars would make contact with Martians. Tomorrow would be the end of the world as everyone knew it.


The Voice of Washington

EU ASSASSINS SLAY FIRST LADY

Shooters Aiming for President, say officials

MARS MISSION REAL TARGET

EU Intended to Delay US Mars Mission, Says Cabinet

Illustration by Doug Kelley

Time was running out, but tonight he was content to sit in his sadness contemplating what his life would have been had he never accepted this position of power. There were still two years left in his presidency, but he knew that he would not see them through. Perhaps if they were generous they would simply allow him return to his prior occupation, an alcoholic used car salesman, but who could expect generosity from the elitist men who were responsible for killing a quarter of the earth's population? In the big picture, his job had always been to die, and he had come to accept this. Even if he never went back to selling cars, being president had not been a bad gig.

KILL ONE MAN AND YOU WILL BE CALLED A MURDERER. KILL MANY AND YOU WILL BE REMEMBERED AS A CONQUER. KILL EVERYONE AND THEY WILL MAKE YOU A GOD.

Bill greeted each guard by name on his way into that familiar dark room with its black marble table. Today the Ares group was meeting with the intent purpose of killing the president. It was not everyday that one planned an assassination of the president, and Bill felt particularly nervous about conducting this planning session within the president's own lair. It was, of course, the safest place to meet, as their gathering anywhere else would be looked upon as unusual to the many unseen eyes that monitored them night and day.

Looking around the table he saw that passion had long-since been drained from these men. They were all living in the dream worlds they had only imagined years before, but everyone knew that this nightmare would come to an end. Not one of them was happy anymore, nor could they ever again be. They now knew too many things about the evils of men to ever walk innocently among them, and they had to live with the role they had played in the atrocities the world had experienced in the last few years.

This one collection of mankind had been responsible for planting nuclear weapons under all the major cities of Pakistan, starting the war that returned the rising economic superpowers of southeast Asia to the stone age. Between the war in southeast Asia, which China was sucked into, and the

By the time the aggravated voice of NASA could be dead and the images of their demise were halfway to

pestilence which had by now killed millions due to hunger, the billion-strong Chinese empire had been reduced to only a few million, surviving only by the generosity of foreign aid. Russia, too, was gone. What the increasing severity of the arctic winters had not destroyed, Europe had taken in a land war just to prove once and for all that it could be done.

Europe remained, united in one country as no diplomacy could ever have done. There had been a war no lesser in scale than the two prior. However, this time an America distrusting of anything across an ocean and locked in the deepest isolationism it had seen since the turn of the century did not come to the aid. The leader of this European Union, which the Ares Project had spent so much time making the people of America afraid of, was of their own choosing. And the reports that he submitted to them were for the most part left unread, as in this one person's cruelty and holocaustal tendencies each member saw what they were really doing.

The problem was that everyone wanted to be the hero who put the knife in the president's back, but the members of this secret society were no longer of heroic nature. They were all rich and powerful, and as a result of that wealth, they had become cautious. Too cautious to ever be successful at something as risky as killing the president. However, from the meeting did come two productive things. First, there was now total agreement among those in the Ares group that the president needed to be killed, and secondly, a better plan needed to be established as to how this was to be accomplished.

Bill received his notification in a report passed to him during an official Ares Project meeting. He read it quietly to himself as the president spoke only meters away. In this cryptic note, he learned that there would be separate groups attempting the assassination in any way they saw fit. These groups would work totally independently of each other such that, in the situation that one was discovered or failed, the others might still be successful. Bill read the names of those in his assassination guild, all people close to him that he could regularly meet with without drawing suspicion, and commented to himself on the simple elegance of this plan. There were probably only four or five groups, but that would not matter — eventually someone would succeed.

THERE IS A THEORY THAT IF EXTRATERRESTRIAL LIFE WERE EVER DISCOVERED, MANKIND WOULD SEE THEMSELVES AS ONE PEOPLE AND IT WOULD UNITE THE WORLD IN PEACE. OF COURSE THERE IS ALSO A THEORY THAT PEOPLE WHO BELIEVE THAT THEORY ARE MAD.

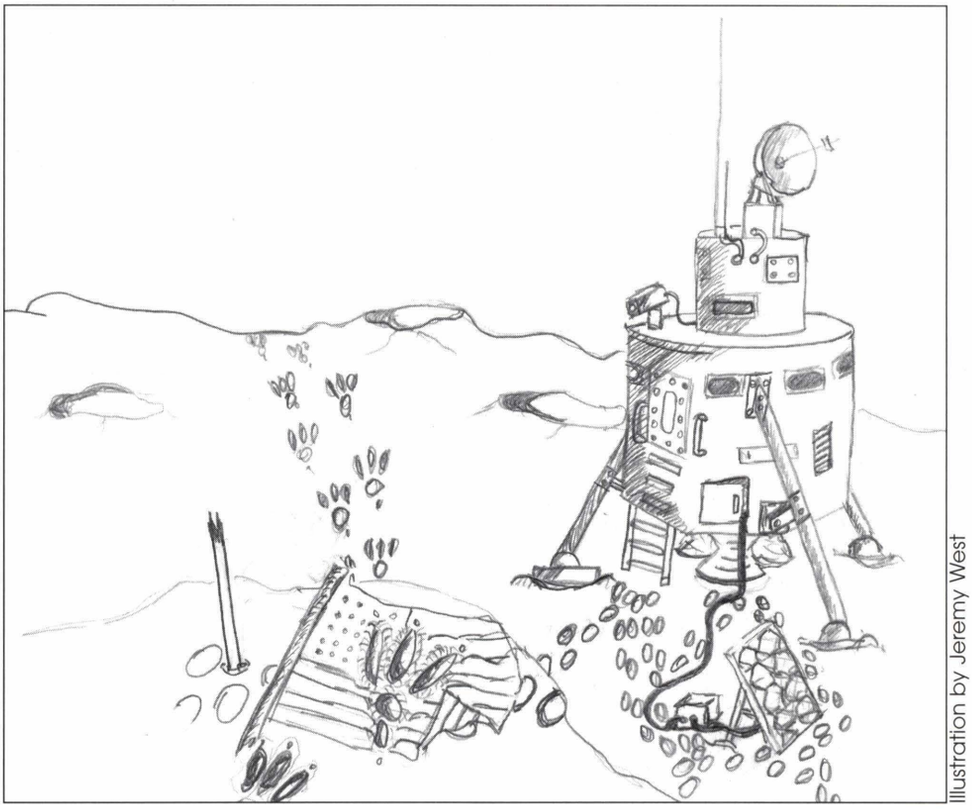


Illustration by Jeremy West

GREAT MEN DO NOT MAKE HISTORY; HISTORY MAKES MEN GREAT.

Slowly the surface of Mars came into focus as the probe's signal, being broadcast to every working television on earth, was adjusted to perfection. As the probe began its descent to Mars' surface with the morning sun sparkling off of polar ice caps made for mass media eye candy. The president watched knowingly, looking for that speck that would not turn up until the production company on earth added it to the tape to be seen when the networks played the tape back frame by frame. Right on que there was a flash and the screen turned to snow. The president watched as the network anchors scrambled to fill the void with mindless drivel passing the time until an explanation was given by NASA.

Within hours the tape was being played back in an endless loop as experts pointed out what looked like a missile shot from the surface. The official response from NASA to questions of this nature was that this in no way proved that life existed on Mars and was simply interference caused by a solar flare.

Bill was beginning to worry, which seemed of late to be his natural preoccupation. All of the men who had assassinated major political figures had become known by their full names and he was not at all pleased with his middle name. Not that he

heard telling the astronauts to use the script they were all earth, ready to be broadcast live across the entire world.

blamed his parents — how were they to know that one day their son would grow up to be a president killer? And even if they had known, it is quite a responsibility, picking that decisive middle name which will forever define you throughout history as the one who killed someone important.

It wasn't that Bill felt any more up to the task, yet it seemed that he would have no other choice. There had already been two failed attempts and one group caught planning. With these failures, it was doubtful that there would be many more attempts made. Even within his own group of assassins, members were shying away from any decision which involved even the smallest factor of risk.

Bill sat silently thinking in a small town library surround by books about names. He had found a dark, secluded corner suitable for the planning of a presidential assassination, even though the process of changing his name was only remotely connected to that affair. It was only because of his nervousness surrounding this whole president killing business that he noticed the janitor, or the man pretending to be a janitor, watching him. He had gotten used to being watched, even made a game out of trying to spot them, but today he just wanted to be alone.

"Excuse me," Bill said in an annoyed tone which cut through the silence of the room. "What is your name, sir?"

The janitor stopped what he was doing and walked over to the table. "Why do you want to know?" He spoke gently, with a slow stutter Bill could not distinguish as real or as an act.

"I am in the process of changing mine."

The man appeared genuinely puzzled, but Bill still believed that he could possibly be a spy. "I am afraid that I do not know anything about names." He picked up one of the books and began to thumb through the pages. "Are you trying to hide from someone?" the man asked. The thought had not occurred to Bill that this action might be interpreted by those watching him as an attempt to escape.

"Oh, changing a middle name would do little to help one escape now would it?"

"Not many people change just their middle name. Not that I know anyone who likes the one given to them, but not many people actually change it. Do you have children, Bill?"

Bill was disturbed that he was now being

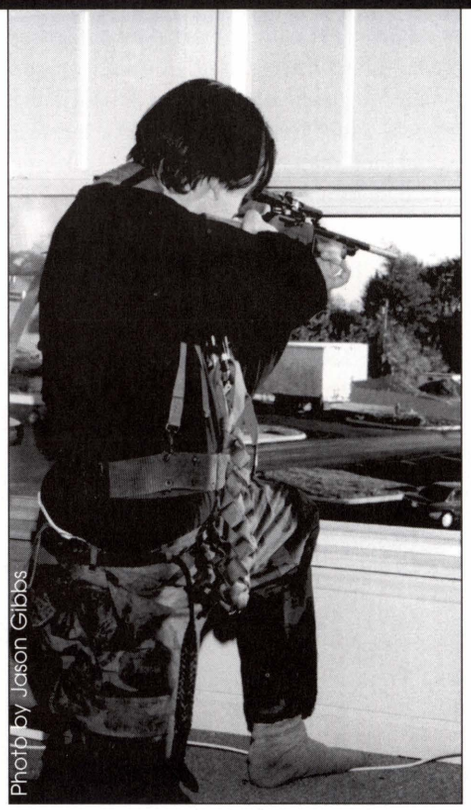


Photo by Jason Gibbs

addressed on a first name basis by a very odd man whom he did not know but got the distinct feeling that he should. "Yes, why do you ask?"

"Because I do not, and I always wondered why it was that parents always chose middle names that were so unsuited for their children. I thought that if you were a parent, you might lend some insight into the matter, you wanting to change your own name and all."

Bill thought of his children, his son, whose middle name was his own. "It is not that I dislike my middle name at all, it just simply does not suit my memory well." Bill thought of the middle name that had been his father's — it would not be fitting to drag him into this, that his name also be forever connected with an assassination.

"Here is one: Harvey." The odd man's tone had changed considerably. Bill looked up in shock.

This man was not the simpleton he was pretending to be as Bill had expected, but Bill continued to played the game, "That one has already been used."

"So you were thinking of choosing something, exotic? I have always found that simple is better."

"What is so great about simplicity, do you think we got to Mars by being simple?"

"Oh yes, Mars. That was not simple at all." He had returned to the simpleton's tone. "Nothing about Ares is ever simple."

That one word jumped to Bill's attention causing him almost to hit the pastel walls of this small room as he pushed away from the desk. But the odd man played his part well and Bill was left questioning once again whether this man could be anything more than just one of the many watching him.

"I did not mean to startle you. Ares is the Greek god of war from which Mars was named. Though Greeks did not at all like Ares the way Romans loved Mars. To the Greeks, Ares brought nothing but pain and suffering. He would start wars for his own amusement, and to see how much destruction he could cause. So disliked was he that they would not even allow him on Mount Olympus."

Bill listened carefully. Was he really being told by someone within the organization that killing the president would be a good thing, or was he listening to the ranting of an odd man, looking for justification within his words for a deed he loathed doing? "So are you saying that it would have been good to kill Ares?"

"Oh, you will not kill Ares, he is a god, an ideal, immortal." But Bill was already scribbling to completion the forms that would make his name change official. Bill Ares…what a headline it would make, and how ironic that he would name his victim in his own name.

One small step for man, one step too many for the Martians.

Even with the mysterious disappearance of the Mars probe fresh in their minds, the astronauts were reluctant to call it quits and return home. There was also the problem that the European Union's most recent effort was only two months behind them so if they were to fail to land, the US would finish second in this monumental race. However, America would win the Mars race, even if it did take them the rest of the century, because, unbeknownst to the astronauts orbiting Mars, there were no other countries competing in this race, and with the exception of the three colonies built by the Ares Project and their support fleet, there were no other spacecraft in the solar system.

The landing party nervously descended to

the ground, expecting that if their equipment failed to kill them whatever was down on the surface would. There was a small thud as the craft's landing apparatus settled against the Martian ice cap. There was a script prepared for them as they disembarked from the ship, but somehow, all of the drama had been stolen from the moment, and none of the astronauts felt like playing along with NASA's great plan.

The whole event was being captured by the many cameras attached not only to the landing craft, but also to the astronauts' space suits. There was quite a delay in the signal due to the vast distance between Earth and Mars, so, though the signal was live, it would be sometime before they heard NASA shouting at them to use the script. They ventured out in silence and explored for an hour before they began doing anything really productive, or scientific. This was to be expected though. You cannot cram a dozen astronauts into a tiny shuttle for months on end and then drop them off on a strange planet and not expect them to look about a bit before getting down to work.

However, by the time the aggravated voice of NASA could be heard telling the astronauts to use the script, they were all dead and the images of their demise were halfway to earth, ready to be broadcast live across the entire world. The pictures showed first contact with the Martians, but then after that, it was mainly just a lot of screaming and death. The last image to reach earth came from a camera on top of the landing craft as it was being towed deep under the Martian ice cap.

IT IS A SELDOM KNOWN FACT THAT THE TRUE JOB OF THE PRESIDENT IS NOT IN FACT TO RUN THE COUNTRY. HIS SOLE PURPOSE IS TO DRAW ATTENTION AWAY FROM THOSE PEOPLE WHO DO.

Bill stood in the center of the Oval Office holding the gun at arm's length, waiting for the president to look up from his paperwork. The whole experience still seemed unreal to him, as if he were simply dreaming again.

"Oh, hello Bill, what can I do for you today?" the president said, when he finally did look up from his paperwork. He smiled, and spoke as if Bill were extending his hand to shake. "I see you have finally come to kill me. Very well, go about your business, but may I ask that you allow me to sign this last bill. It will provide funding for low income families and help them send their children to college."

"What!" Was the only logic response that Bill could express. "No you may not. I mean, what?"

"Well, I guess that if you are so inclined to kill me now, those families will just have to wait, though I do not know of anyone else who would sign this bill." Having said this, the president returned his attention to the paperwork. He signed his name five or six times as Bill carefully watched to see that there was no trickery involved. "All right, you may kill me now."

Bill was totally confused now, and in no state to kill someone, not that he had any preconceived notion as to how this was all supposed to take place, but this was all just too weird. "You are just going to let me kill you?"

"Bill, you guys have been trying to kill me for some time now. Did you think that I did not know this? It was all part of the plan. They want you to take my place now, but they were concerned that you might not have what it took. This was like a test for you, to see if you had what it takes to kill a man point blank. I agree with them, I think you have great potential."

Bill collapsed into a nearby chair and dangled the gun loosely only inches from the floor. "You are not looking very well. Could I get you something, a cup of tea perhaps to calm your nerves?" Mid-sentence a door flung open and the vice president walked in.

Bill stood in the center of the Oval Office holding the gun at arm's length, waiting for the president to look up from his paperwork.

"How is he doing?" She asked seeing Bill in his semiconscious state.

"Not too well. You may have to do it after all."

"I did not think he would have it in him. None of them do you know. They have all lived the good life too long. They have too much to lose."

Hearing those words from the vice president brought reality crashing down on Bill. Even if this had all been planned, even if the president was not the head of the Ares Project, he had already lost everything and was left with no choice. He jumped to his feet and, with all of the rage within him, shot the president three times.

The action was so sudden that the vice president had no time to move away from the president's desk and was splattered by the tiny droplets of blood that exploded from his chest. "Very good! I knew you had it in you." She shouted with glee like a school girl let out to recess an hour early.

Several people rushed into the room, including the odd man who had participated in Bill's christening. Bill waved the gun at them once so that they would keep their distance and then brought the barrel to his head. Bill was tired of this assassination business, the constant conspiracies to destroy the world, of living a life that was no longer his.

Several shots were fired as he fell to the floor hard, the pistol falling from his hand. At first he did not understand what had happened to him, and the only thought in his mind was that they had gotten this all wrong, whoever they were.

"I hate you, will you not even let me die?" Bill yelled at the people who swarmed over his broken body.

"I am sorry Bill, but I cannot let you die yet. There is a war you know, and right now I need all of my generals." The odd man spoke as Bill was receiving medical attention to the gunshot wounds in his shoulders.

Bill was hospitalized for two weeks as his body healed. From his bed he could only watch the television and wonder what part of the future he was to play. The alien attack of the astronauts was big enough to overshadow the story of the president's unexpected death due to lead poisoning, but Bill had proven to Ares that he had what it took, and now that divinity would not let him go. He could only look forward to the day when he would see all of them dead. Whoever they were. EF

To be concluded in the next issue...

The Forum: Where and When

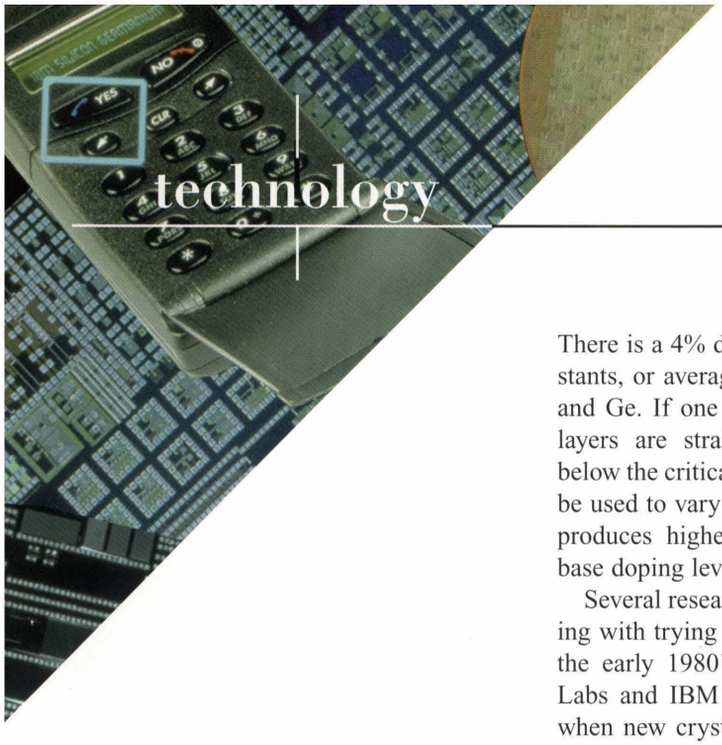
Ever wonder how often the Forum comes out or where you can get one? Here are your answers.

Where

McBryde 100 Lobby
Randolph Lobby
Norris Breezeway
Owens Dining Hall
Schultz Dining Hall
Dietrick Dining Hall
Newman Library Lobby
Whittemore 2nd floor, by EE advising
Burruss Breezeway
Hancock Atrium
Patton Lobby

When

Early February
April
September
December



SiGe Comeback!

by Michael T. Carr

The speed of microchips doubles every eighteen months. Chips are becoming triflingly small in order to keep increasing the speed barrier. However, this route will end in disappointment because one can only make a chip so small before it is impossible to work with it any longer, and the hardware companies know it. So what did they do? They rediscovered what Bell Labs, the people who built the first transistors, knew: Germanium is a superior semiconductor to silicon. But since it was devilishly hard to work with in 1947, silicon went onto conquer the high tech world.

Germanium has greater electron mobility than silicon materials. However, the extrinsic compound — a mixture of two semiconductors, silicon and germanium (Si, Ge) — is easier to work with. Thus composites were used. Composites are the next step in the process of breaking the speed limit. Doping tetra-valent elements (silicon) with penta-valent elements (arsenic) raises the barrier to new heights. This process of making composites relies on the fact that electrons speed up at the junctions of the different semiconductors. This process was initially proposed in the early fifties. The most promising of the mixes, cost- and speed-wise, was the pairing of silicon-germanium with pure silicon. Problems arose due to the relatively large size of the silicon-germanium's crystal lattice. This led to a large amount of stress between the layers of semiconductors. There is a 4% difference in the lattice constants, or average size of the crystal, of Si and Ge. If one is grown on the other, the layers are strained and must be grown below the critical thickness. This strain may be used to vary the bandgap energy, which produces higher currents from the same base doping level as a Si device.

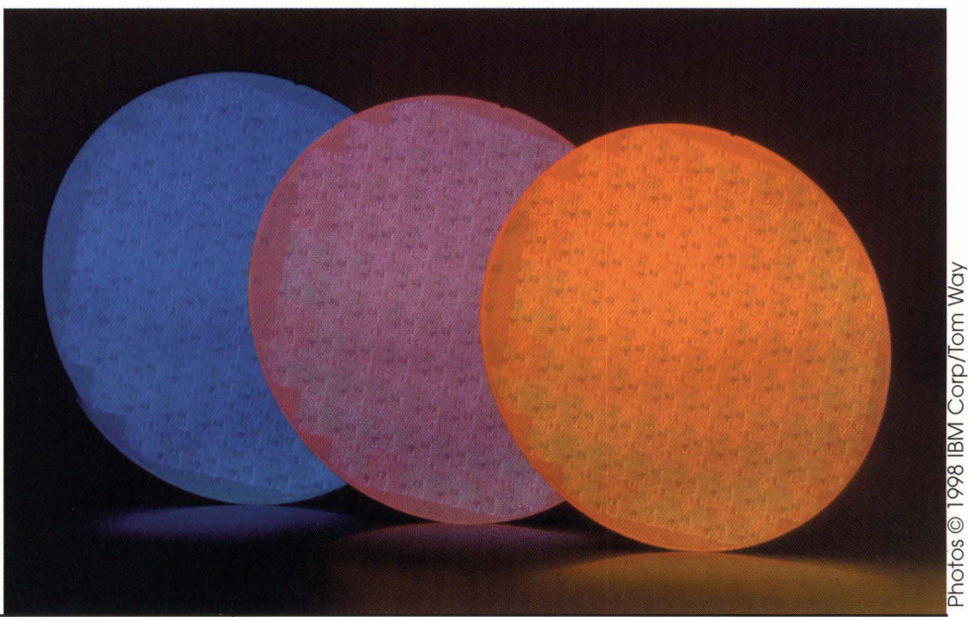
Several research groups have been working with trying to solve this problem since the early 1980's. The researchers at Bell Labs and IBM began to realize this goal when new crystal lattice growth technologies were discovered. However, the first large break in the mass production of SiGe occurred in early 1997. It was discovered that the addition of carbon to the doping process eases the strain between the layers, thus making it easier to control the bandgap energy and other physical attributes. Carbon's small atomic size reduces the size of the resulting compound, matching germanium to pure silicon more closely. Now despite all this technical jargon, here are a few clinchers: First, SiGe is pretty cheap in comparison to other high-speed semiconductors, only about $0.50 per mm^2 more than silicon rather than the several dollars for other compounds. Second, SiGe is compatible with existing CMOS technology; in other words we can use the same production lines and technology. Lastly, this technology allows chips to run cheaply at over 5.5 GHz! Imagine having that power in your PC.

This technology allows chips to run cheaply at over 5.5 GHz!

SiGe technology is out and about. You will see it in a variety of places. It will make its largest impact in the telecommunications industry. IBM has released several chips that run off SiGe technology for use with cellular devices, GPS and high-speed data transfer. High performance, wireless local area networks (LAN's) will get a boost to 5.5 GHz and up to 100 times that. There are also some advances in the production of automotive collision avoidance radar, road speed monitor, and airbag systems.

From this point on, speed will not double every eighteen months but will explode to new levels every day. Since I just got myself a Pentium II 400 MHz, now I'll have to try that much harder to keep up.

To learn more about Silicon-Germanium chip technology, see http://www.sp.phy.cam.ac.uk/~dp109/SiGe.html. EF



Photos © 1998 IBM Corp/Tom Way

The Mystery of Sleep

by Shuvom Ghose

It's a decision we've all had to make: go to sleep leaving some job unfinished, or stay up late and drag through the next day on half a night's rest? Like many people, when I find myself needing more time in the day, I steal some from the seven hours out of every 24 I spend lying in bed. After three straight days of this cat-nap burglary, several questions began to bother me. How much sleep did I really need? What's the best way to make up those lost hours, through short daytime naps or longer nights? And why do we need to sleep at all? What does it do?

Since my waking hours didn't contain enough time for research into this subject, I took the only path left open to me: I stocked up on cheap soda, hid all my pillows, and decided to stay awake until I had solved The Mystery of Sleep.

Late Thursday night to early Friday morning: Reading the night away

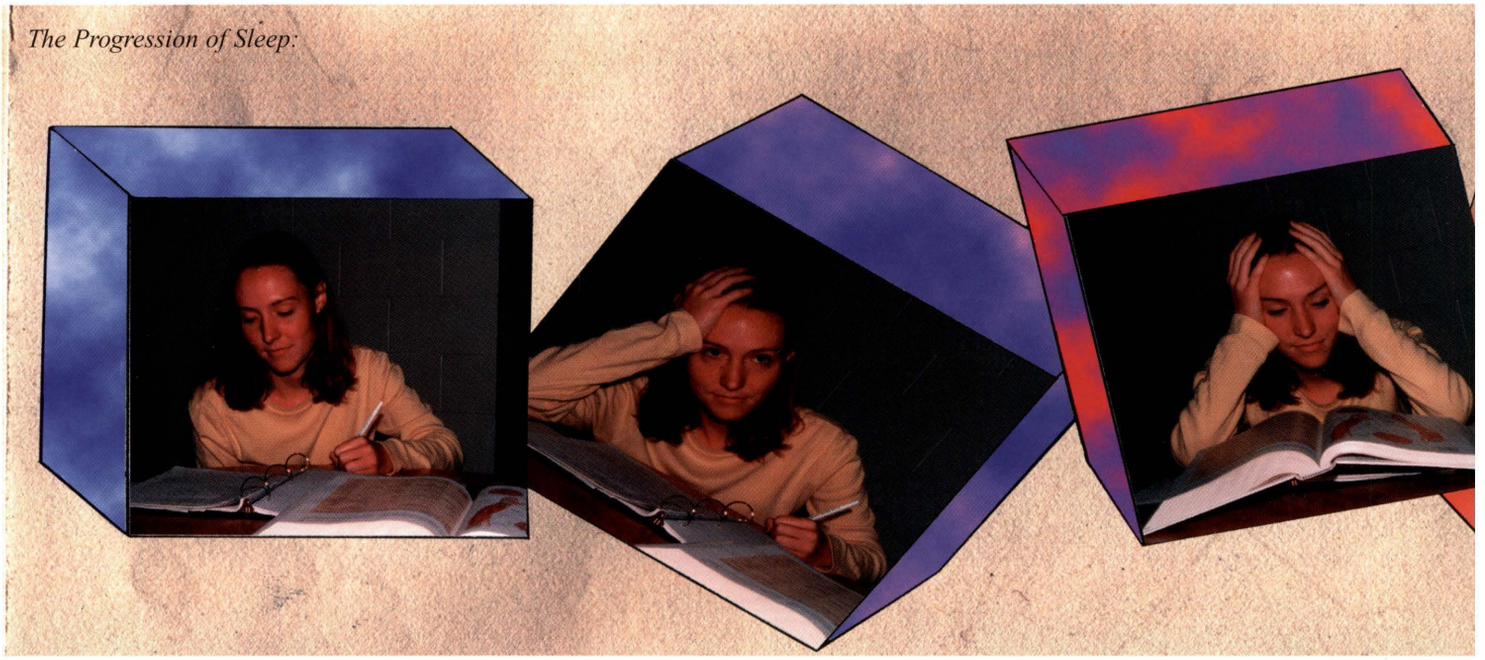
10:00 pm – I start my experiment. Technically, I've been awake since six in the morning but my daytime schedule has only just ended, so now my quest can begin. On the tape recorder I will use to record my findings and feelings throughout the night, my voice is alert and sharp. I wonder, what will it sound like twenty hours later? Over dinner, I start reading the first of my five library books about sleep.

Traveling through a typical night of sleep is much like driving from I-81 into campus. To pull your body off the high speed, intensely active highway that is waking life, you take an exit ramp called stage one sleep. In this light, transitional stage, your heart rate, muscle tension and brain activity are slightly lower than they were on the highway. If you were awoken now, you might deny you were ever asleep.

Next, you slow down to travel the smaller main roads of Blacksburg in stage two sleep, which is when the sleeper becomes actively detached from the outside world. This stage, which initially lasts ten to twenty minutes, is considered by scientists to be the actual beginning of sleep.

Lowering your brain activity and muscle tension even more, you begin to circle the Drillfield at 5 miles per hour in stages three and four sleep. These two stages, which happen within an hour of starting your journey, are called deep sleep, because they are your deepest states of unconsciousness. If awakened now, you would definitely spend a few minutes shaking cobwebs from your brain.

Next, you upshift into stage two for a brief moment while trying to pass a BT bus, and then you enter a period of activity so disjointed, hectic and bizarre it can only be compared to trying to find parking on campus. Your pulse and breathing quicken, your toes and fingers may twitch, and your eyes start darting back and forth underneath your closed eyelids. This is rapid eye movement (REM) sleep, a stage thought to be so important that sleep is sometimes only characterized into two stages, REM and non-REM (NREM). Discovered in 1952, this fifth and most famous stage is where the most brain activity of the night and the most vivid dreams take place.



Throughout the rest of the night, you run errands all over the Blacksburg area in 90- to 100-minute REM-NREM cycles. In each successive lap, the time spent in stages 3 and 4 sleep shorten and that in REM sleep lengthens. Even though such simple analogies can be used to describe it, a *Discover* magazine article I come across calls sleep and the question of why we need it "one of the great mysteries of science." It looks like I have a long night ahead of me.

12:15 am — Fellow *Forum* writer Jeremy West shows up to join my quest. After feeding him chocolate chip cookies, I put Jeremy to work reviewing the history of sleep research. After fifteen more minutes of reading, I've started to develop a slight headache. Jeremy reports that the most popular way to discover the effects of sleep has been to record the effects of no sleep, exactly like we are doing now.

1:30 am — I'm definitely feeling sleepy now, and having trouble keeping my eyelids open. (On the tape, what I actually say is that I'm having trouble keeping my eyelids "awake.") As I read my sleep book, I can't keep the main idea of the paragraph in mind, and my notes are becoming more and more fragmented. Jeremy, meanwhile, has been finding story after story of sleep deprivation experiments gone wrong.

Stories like that of radio DJ Peter Tripp who, as a fund-raising stunt in 1959, stayed awake for 200 straight hours. Near the end, Tripp began hearing sounds that didn't exist, fearing unknown enemies were after him, and suspecting that people were drugging his food to make him fall asleep. My book tells me this type of paranoid delusion is so common in extended sleep deprivation experiments that it has a name: nocturnal psychosis. Jeremy and I throw an ominous glance at each other and quickly decide to do something else for a while.

2:09 am — Heading outside to throw a frisbee around in the street, the icy cold night air slaps us awake. As we stumble around after a plastic disk in the near-darkness, Jeremy and I also demonstrate what is called the Ethological theory of why we sleep. It reasons that since humans have poorer night vision and hearing compared to our predators, being unconscious at certain times is actually an evolutionary advantage. Thus, sleep developed to keep us quiet, motionless, and therefore hidden from the dangers of the night. While the saber-tooth tigers who hunted our ancestors are now extinct, the car that almost runs Jeremy and I over proves the night is still a risky place.

When we return from the outside, the tape shows the difference. My voice is more charged than before, and I'm speaking in much more coherent sentences. (I use words like "bereft.") Jeremy and I feel so awake we decide to quit the book research and find some live information. There's only one place we're sure we will find students to interview at this time of night: Burchard Hall.

Friday Very Early Morning: On the prowl for insomniacs

Driving to campus at 2:30 in the morning is an eerie experience.

Being unconscious at certain times is actually an evolutionary advantage

Photos by Jason Gibbs

"You could rollerblade down [the middle of] Main Street," Jeremy says, noting the complete lack of people and cars. This early in the day, Blacksburg resembles an old west ghost town, only with less parking.

The first person we run into in Burchard hall is Ken at 2:40 am. He thinks that the average person should get seven hours of sleep a night.

"For me personally," he adds, "I'll get like four hours of sleep a night, and maybe the next night I'll not have as much work, so I might get nine hours, catching naps here and there." Ken does admit he'll pull an all-nighter for a big project and we ask him how he feels the next day.

"You're okay the day after, the day that

it's due. But it's the day after that that it really hits you." Jeremy and I wince at "it really hits you."

Working away at a drafting table close to Ken's, we find Seth. He thinks at least eight hours a night is healthy but then says, "Usually one night I'll get five hours sleep, then two nights I'll get like eight." I begin to notice a pattern between the hours of sleep people say they need and how they try to get it.

In a corner of the sprawling basement of Burchard, Andrew tells us the hours of sleep an average man should get "is individual, right?" He proves this by adding, "I usually try to sleep in the day and work at night." Why?

"It's great, I mean, computers magically work, printers print, stuff just happens like after two o'clock. Things start to work. You're not distracted and you can get stuff done." At 2:50 am, Andrew sends us down the row to a computer room to see Zach, our last interview in Burchard hall. My conversation with him starts:

Shuvom: You're Andrew, right?

Zach: I'm Zach.

Shuvom: Oh I'm sorry, Andrew was back there.

Zach: Sleep's getting to you too, huh?

Photo by Mui Vuong

A typical sight in class.

Zach thinks five hours of sleep a night is average, but actually advocates getting less than needed. He believes rested students with all their senses restrict what they say in class. But, he says, when you lose some sleep, "you start losing your senses a little bit…and you really get into what you really think. You kind of lose that private self and get a more public self."

Leaving Burchard Hall and heading across the Drillfield, Jeremy and I discuss who was right about the amount of sleep people should get. Truthfully, Andrew was the closest, because there is no single number for hours for everybody. Just like your ideal height or weight, your ideal need for sleep is determined by your genes. While most people get between 6.5 and 8.5 hours a night, there have been a few documented cases like Miss M., a 70-year-old retired nurse from London, who functioned perfectly well on just one hour of sleep a day!

The key is that Miss M. functioned perfectly well on what she got. Most experts on the subject say you need enough sleep to feel energetic, active, and awake throughout the whole day, even in boring classes. If you get sleepy instead of restless during a boring lecture, you're not getting enough sleep (see "Are You Running A Sleep Debt?" for other symptoms of chronic fatigue). Surveys show that more than half of America's population, particularly young adults and college students, is not as alert, personable or happy as they could be because they don't get the sleep they need. A study in Michigan even found that people who normally sleep eight hours a night and claim to be well-rested became more energetic, more alert, and better critical thinkers when they increased their nightly quota by two hours!

3:12 am — It really doesn't feel like it's that late. With the cold outside air propping up our spirits, we're pretty sure we are going to make it through the night. I want to conduct a few more interviews, and the dorms seemed the natural place to go. Given the time, I suggest a co-ed dorm. Jeremy, however, insists on an all-female one.

3:27 am — We meet Jonathon, the night monitor for Johnson Hall. He seems alert and very happy to see us. How does he make up his lost sleep?

"Oh, I crash on the weekends all the time," he says. "That's when I usually

catch up or get a sleep surplus so that I can function over the week." There's that idea of a sleep bank again. Just like Ken and Seth and many of the rest of us, Jonathon tries to balance his sleep account like a checkbook. The analogy is close, but not perfect.

Lost sleep does build up, so losing one hour a night for a week is just like pulling an all-nighter. However, unlike a large deposit in the bank to balance an overdrawn check, massive sleep debt cannot be paid back hour for hour on the following night. This is the same idea as trying to make up for five lost days of exercise by working out five times longer on the sixth day; our bodies just don't work that way. Missed sleep, like exercise, must be slowly repaid through a slightly increased regular schedule.

3:37 am — Jeremy and I run across Nishith, the night monitor in Miles. We ask him if he's had any bad experiences overdrawing his sleep account. Nishith looks thoughtfully past us at the wall, his eyes distant.

"Once," he begins, "I stayed up for four days straight and then I went asleep during my test. I was in chemical engineering and I was giving my test, and I just fell down. Nobody woke me up."

The night monitor in Barringer told us he's also messed a test up by staying up to study for it. I don't tell them what I've always believed and that this night is proving: as much as college students hate to hear it, the best way to study for a test is to keep up with the classwork throughout the semester, and then get a good night's sleep immediately before it.

As we walk up to O'Shagnessy, Jeremy and I hear a lot of grumbling voices that tell us there is another, larger, sleep deprivation experiment going on: a fire drill. Skipping the boxer and robe-clad angry mob, we meet fellow *Forum* writer Yaro at 3:50 am in Lee, who gives us the nightly news.

"Somebody or somebodies have been running around pulling fire alarms," he says. "Lee had one, O'Shag, Pritchard, and the New Residence Hall on the right had one." A Captain America feeling washes over me and I proclaim to Yaro that, should Jeremy and I see some suspicious guys going quickly from dorm to dorm, we will apprehend them. Jeremy then reminds me that *we* are two suspicious guys going quickly from dorm to dorm, and my idea is dropped.

4:00 am (approximately) — In between dorms, we've been yawning pretty regularly. The best word to characterize what I'm feeling right now is blah. I just don't want to put forth any effort. The feeling of just wanting to go to sleep is pretty strong. Instead, we climb in Jeremy's car and head to the other local hotbed of late-night activity: Wal-Mart.

A huge semi-truck sitting across two lanes of Wal-Mart's main parking lot gets me thinking about another theory of why we sleep, and the activity inside cements the thought. Everywhere inside the supercenter, Wal-Mart elves are taking advantage of the negligible customer traffic to restock shelves, move racks around, clean floors, and do all the other things that would cause massive disruptions in the daytime. This is the Restorative theory of sleep, that the body partially shuts down to repair the damage the day has caused. Though this is the leading theory on why we sleep, in experiments where rats are kept awake for 17 straight days, they die for no apparent cause. There is no particular tissue destruction gone unrepaired which seems to have caused their death.

Study after study has shown REM sleep aids memory

Jeremy's sleep-lowered inhibitions cause him to make a $100 calculator purchase he had been putting off for weeks.

4:50 am — We're yawning pretty regularly now. (The sound of me yawning on the tape actually caused me to yawn as I transcribed the night's record four days later.) I'm nodding off every time I close my eyes. Even worse, Jeremy is unable to drive at a constant speed. Images of sleep-induced disasters run through my mind.

Two hundred and fifty-eight thousand barrels of crude oil dumped into the Prince William Sound when the helmsman of the Exxon *Valdez*, apparently asleep on his feet, failed to respond to a clear signal to turn back into the shipping lanes.

Night technicians, fatigued in the early morning hours, misreading displays to cause both the Three Mile Island and Chernobyl nuclear disasters.

One hundred thousand sleep induced car accidents occur each year, including one in 1990 when the high school student named "America's Safest Teen Driver" fell asleep at the wheel, killing himself and the driver of an oncoming car.

6:36 am — We have made it safely back home, and through the night. Jeremy and I are feeling better now, after some food. If I lie down and close my eyes, however, I'll go right to sleep. (On the tape, I have to repeat that sentence three times to get it right.) Since I still don't know why we need to sleep, I embark on the hardest and final part of my quest: getting through a day of classes.

Friday morning to afternoon: Walking zombies

I feel tired and don't have the energy I did before. Unlike Zach predicted, I feel less outgoing, and I can't respond to my classmate's jokes as well. It feels like I'm always missing something, like I'm not thinking of something.

8:50 am — I was sitting, taking notes in my first class, and the next thing I remember is a friend poking me awake at the end of the period. I curse and shuffle to my next class.

10:00 am — It happened again, only in shorter segments. My mind is so out of sync from falling asleep and waking up six times this hour, I can't even retain material from the part of class I was awake. Sadly, one friend pulled me aside and said the way I'm feeling now, he feels like everyday.

In the student parking lot, I discover I've absolutely forgotten where I parked my car. I should have expected it, since a book I've just gotten says study after study has shown REM sleep aids memory. Like Wal-Mart, the brain shuts itself down to reorganize, repair and strengthen the connections that make memory what it is. I finally find my car, then remember I have more classes that day, and return to Hancock.

12:00 pm — I dozed off again in the Hancock atrium. It lasted for around half an hour, and I felt trapped in molasses when I woke up. Experts usually recommend abstaining from naps. But if you must nap, they say, nap responsibly. Sleeping from fifteen to thirty minutes during the day to refresh yourself is best. Anything longer and you'll lapse into stage 3 sleep, which leaves you feeling groggy when you wake up. Later, I read that if you are sleep deprived and must nap longer than thirty minutes, you should extend it a full hour and a half to complete a NREM-REM cycle.

Right now, if I keep moving, I'm okay. But if I sit down…

1:13 pm — Coming off an hour of work on my feet, I'm not feeling too tired, although I'm making very little sense on tape, repeatedly saying I don't know, I don't know.

2:02 pm — Things are starting to hurt that shouldn't hurt, like my left ankle and my back. Looking for answers, I come across the most painful clue in The Mystery: Stages three and four deep sleep are crucial to maintaining general health. I read that, in those stages, our metabolic activity is the lowest, and the secretion of growth hormone is the highest, providing the best conditions for repairing body tissue. Immune system modulators also reach their peak in deep sleep, proving that sleep is essential to keeping the germs away.

5:00 pm — After being mostly awake for 35 straight hours, I decide to end this experiment. I'm not together enough to do any more research, and I'm being seriously detrimental to my health, as shown by the fever suddenly upon me. I consider the quest a success; I've learned how much sleep I should get (enough to feel awesome the whole day), how to make up for missed sleep (gradually and on schedule), and finally, why we need sleep at all (to keep me from feeling like I do right now!).

As I sink my dazed, aching, and feverish body into the waiting bed, I have one last thought before drifting off to sleep: the only way I'll subject myself to being a lab rat in another quest is if I decide to investigate The Mystery of Swedish Back Massages. BF

Are You Running a Sleep Debt?

Answer True or False:

1. **I need an alarm clock to wake up at the appropriate time.**
2. **It's a struggle for me to get out of bed.**
3. **Weekday mornings I hit the snooze button several times to get more sleep.**
4. **I feel tired, irritable, and stressed out during the week.**
5. **I have trouble concentrating and remembering.**
6. **I often fall asleep watching TV.**
7. **I often fall asleep in boring classes or in warm rooms.**
8. **I often fall asleep within five minutes of getting to bed.**
9. **I often feel drowsy while driving.**
10. **I often need extra sleep on weekends.**
11. **I often need a nap to get through the day.**

If you answered true to two or more, you need to get more sleep. Taken from *Power Sleep* by Dr. Maas.

Alignment of Doom?

by Chris Thaiss

What happens when you take six planets and the Sun and line them up with the Earth at one end? Earthquakes, fire, tidal waves, nothing? Nothing is what scientists say, but some people think that this event will cause a much greater impact on the Earth. In about a year, the planets in the solar system will begin to align. The alignment will be apparent in early spring of 2000 with all seven of the classical solar system bodies, from the Sun to Saturn, converging eastwards across the sky, towards their smallest geocentric arc of 25 degrees, 53 minutes. Those people that think that this alignment of the planets and Sun will cause a massive gravitational pull on the Earth say that it will move the Earth's plates causing major natural disasters such as earthquakes, volcanic eruptions and tidal waves because of shifting and melting polar ice caps. The truth in the matter is that the gravitational pull on the Earth by the other celestial bodies will add only a small amount to the gravity that the Moon exerts on the Earth, something that will be unnoticeable by people here on the Earth. To show that this is true, we can use what Sir Isaac Newton taught us:

$$F = \frac{GMm}{r^2}$$

From this equation we can determine just how much force the other planets and the will exert on our dear home.

If we take the Sun's gravitational pull to be approximately constant through both aligned and non-aligned periods, we can take it out of the equation since the sun will exert the same amount of force on the Earth regardless of how the planets are aligned. Let's now see how much force the Moon puts on the Earth. Because the Moon travels in an elliptical orbit around the Earth its radius from the Earth is different at given points in its orbit so the force of gravity on the Earth is different at given points in the orbit. To get around this change, let's use the mean radius of the Moon's orbit, so

$$F = \frac{(6.67\cdot10^{11})\cdot(5.98\cdot10^{24})\cdot(7.36\cdot10^{22})}{(3.82\cdot10^{8})^2}$$

$$=2.0118\cdot10^{20}\text{ N.}$$

Now that we know how much force is exerted on the Earth by the Moon alone, let's sum up the forces that the other planets put on the Earth. By looking at the table to the right we can see that the sum of the forces yields a small change, one that will not affect the Earth at all. This is verified by Brian Dennison, an astrophysicist here at Virginia Tech: "We can calculate precisely the force caused by such an alignment and it is utterly miniscule and negligible in comparison with the force due to the Sun's gravity which maintains the Earth in its orbit. It is also negligible in comparison with the Moon's gravitational force acting on the Earth." If an astrophysicist says that nothing will happen, we should certainly believe that nothing will happen.

Virginia Tech astronomers were among those astronomers who correctly predicted in the 1970's that an upcoming alignment would produce no effects of any significance.

With such clear scientific evidence that the force of gravity put on the Earth is minute, how can people still believe that it will cause earthquakes? There are many astrologers and societies that believe this. One such society calls themselves "The Survival Center." They have a web page devoted to informing people of events and giving solutions to any cataclysms here on Earth. Their motto for the planetary alignment in May, "Prepare like you have never prepared for anything before," is probably nothing more than a clever ploy to get you to buy books from their inventory of thousands. Here is an excerpt from their web page telling us what's going to happen.

> *On or around May 5, 2000 (give or take a few days) these planets Mercury, Venus, Mars, Jupiter, Saturn and the Sun plus our moon will line up on one side of Earth creating major stress on Planet Earth. Predictions range from a few earthquakes to major earth crust movement (slippage), polar ice cap movement, sea levels rising 100 - 300 feet or more, huge tidal waves, high winds 500 to 2000 mph, earthquakes so massive that Richter 13 or more could be possible, both coasts of USA under water, magnetic shift and much more.*

This explanation of the events that will happen on May 5th is not very consistent with the forces that we calculated earlier. Even if we didn't calculate the forces, we know that nothing will happen because other planetary alignments happen often. "Such alignments have occurred in the past," Brian Dennison states, "and although some sensational (and baseless) predictions were made, none of the sensational effects ever occurred. Interestingly enough, Virginia Tech astronomers were among those astronomers who correctly predicted in the 1970's that an upcoming alignment would produce no effects of any significance." With the force put on the Earth being over 10,000 times smaller than the force the Moon puts on the Earth, how could anybody be afraid? Sorry all you end-of-the-world enthusiasts, but the Four Horsemen won't ride on May 5th, 2000. EF

We can calculate precisely the force caused by such an alignment and it is utterly miniscule and negligible in comparison with the force due to the Sun's gravity which maintains the Earth in its orbit. It is also negligible in comparison with the Moon's gravitational force acting on the Earth.

Body	Mass	Mean radius from Earth at alignment	Force
Moon	$7.36 \cdot 10^{22}$ kg	$3.82 \cdot 10^{8}$ m	$2.0118 \cdot 10^{20}$ N
Mercury	$3.337 \cdot 10^{23}$ kg	$2.079 \cdot 10^{11}$ m	$3.7899 \cdot 10^{13}$ N
Venus	$4.874 \cdot 10^{24}$ kg	$2.58 \cdot 10^{11}$ m	$3.5944 \cdot 10^{14}$ N
Mars	$6.399 \cdot 10^{23}$ kg	$3.78 \cdot 10^{11}$ m	$2.1984 \cdot 10^{13}$ N
Jupiter	$1.902 \cdot 10^{27}$ kg	$9.28 \cdot 10^{11}$ m	$1.0840 \cdot 10^{16}$ N
Saturn	$5.687 \cdot 10^{26}$ kg	$1.58 \cdot 10^{12}$ m	$1.1183 \cdot 10^{15}$ N

Total Force without Moon
$1.2378 \cdot 10^{16}$ N

Picture by Chris Thlass

Accessorizing for the 21st Century

by Shuvom Ghose

Fashion just got a lot more complicated. Instead of worrying if that halter top goes with those fishnet stockings, in a few years we'll have to ask ourselves, "What should I be seen in today, 200 MHz with 32 MB of RAM, or 266 with 64?"

Wearable computers are here, and unlike bell-bottom pants, they are garments that are here to stay. Now, we're not talking about those wristwatches that offer a watered-down version of Windows 3.1 with 2 MB of total memory or those digital notepads which allow you to scribble in a few thoughts while you ride the bus to work; these are complete platforms you can take anywhere. The Mobile Assistant IV, the latest model from the industry-leading Xybernaut Corporation, sports a baseline of specs that would make many desktop computers blush: a 200 MHz processor, 32 MB of RAM, and a 2.1 GB internal hard drive, all fitting inside 7.5 by 2.5 by 4.6 inches and weighing under 1.75 lbs.

The CPU module for the MA IV clips on your belt or wrist like a Walkman. The display screen goes either in a vest holster or over one eye in a Borg-like head-mounted display. The controls? Simple: just talk into the microphone and the newest voice recognition software from IBM translates so that the Windows 98 or NT operating system can understand, or you can use the built-in mouse. The most extreme accessories include wireless ways to hook up your MA IV to a local area network (LAN), which basically means you can get anything from anywhere. Its $5,000+ price tag, though, also meant the MA IV did not find its way under many Christmas trees this year.

In industry, however, where little advantages mean big profits, wearable computers are quickly coming into style. How much easier would it be if civil engineers could review and adjust the plans for a new building as they toured the construction site itself, without having to carry around 50 pages of blueprints? How much quicker would the turnaround time on flights be if airline mechanics could determine what part they needed, the tools to install it, and whether it was in stock as they checked the wing of a plane that just landed? How much would it be worth to the victim of a heart attack if, as the EMT's loaded him into the ambulance, they could search through a complete medical library and determine the best way to keep him alive long enough to reach the hospital?

For all these reasons and more, don't be surprised if your first employer out of college considers wearable computers standard issue equipment. Xybernaut predicts the market size for their products will reach $1.5 billion by the year 2000, and other sources have determined almost 25.8 million American workers could make use of wearable computers in their daily jobs.

While currently, the costs are high and the idea foreign to many people, wearable computers are predicted to eventually become as accepted as the Walkman, for the simple reason stated by Xybernaut employee Richard Wallfish: "People want their computers with them."

Yeah, but does this external floppy drive go with these shoes? EF

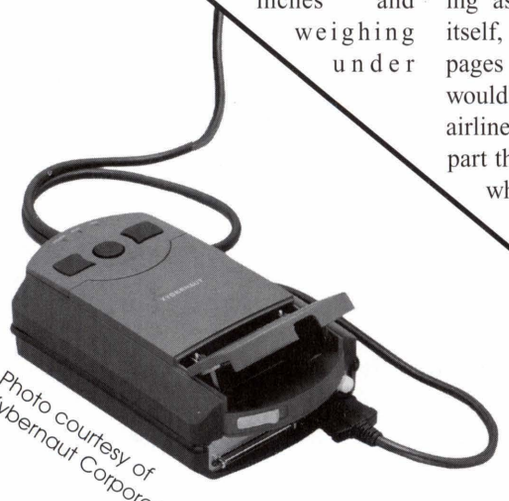
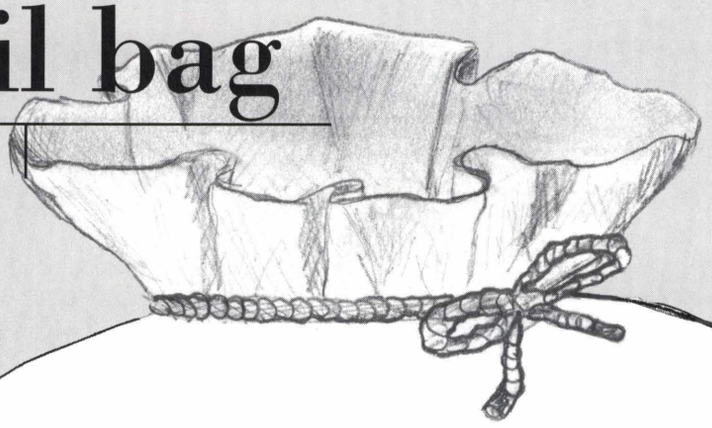


Photo courtesy of Xybernaut Corporation

from the email bag



Once there were three Medieval kingdoms on the shores of a lake. In the lake there was an island, over which the kingdoms had been fighting for years. Finally, three kings decided that they would send their knights out to do battle, and the winner would take the island. The night before the battle, the knights and their squires pitched camp and readied themselves for the coming fray. The first kingdom had 12 knights, and each knight had 5 squires, all busily polishing armor, brushing horses, and cooking food. The second kingdom had 20 knights, and each knight had 10 squires. Everyone at that camp was also busy preparing for battle. At the camp of the third kingdom, there was only one knight with one squire. This squire took a large pot and hung it from a looped rope in a tall tree. He busied himself preparing the meal, while the knight polished his own armor. When the hour of the battle came, the knights sent their squires out to fight (this was too trivial a matter for the knights to join in). The battle raged, and when the dust cleared, the only person left was the lone squire from the third kingdom, having defeated the squires from the other two kingdoms. This just proves that the squire of the high pot and noose is equal to the sum of the squires of the other two sides.

Reaching the end of a job interview, an executive asked the young MIT graduate who he was interviewing, "And what starting salary were you looking for?" The graduate said, "In the neighborhood of $125,000 a year, depending on the benefits package." The executive replied, "Well, what would you say to a 5-week vacation, 14 paid holidays, full medical and dental insurance, company matching retirement fund to 50% of salary, and a company car leased every 2 years — say, a red Corvette?" The graduate sat up straight and gasped, "Wow! Are you kidding?" The executive replied, "Yeah, but you started it."

The term "the whole nine yards" came from WWII fighter pilots in the Pacific. The .50 caliber shells used in aircraft machine guns came in belts exactly 27 feet long. If a pilot fired all his ammo at a target, it got "the whole nine yards."

Did you know?

The first toilet ever seen on television was on "Leave It To Beaver."
It takes 3,000 cows to supply the NFL with enough leather for a year's supply of footballs.
Thirty-five percent of the people who use personal ads for dating are already married.
The world's termites outweigh the world's humans 10 to 1.
On average, 100 people choke to death on ball-point pens every year. BE CAREFUL!

letter from the
editor

Some Modest Proposals

In honor of the upcoming Valentine's Day, a friend and I began stalking people last week. It was weird, at first, looking for someone to come out of class, then steadily driving along behind her, waiting, hiding, following. Creeping our car closer, closer, until we were practically grazing her with the bumper. She looks over her shoulder at us, we look away and give her some room. And then, a frenzy of action — her pulling car keys from her pocket, my friend jamming on the gas, and me jumping from the car to claim what we so desperately needed: her parking space.

While not the kind that gets much publicity, parking lot stalking is just as creepy and prevalent as the real kind, especially here at Tech. With over 9,000 registered commuter parking permits and around 1,000 spaces within reasonable walking distance of the classrooms, empty parking spaces in the commuter lot are approaching the status of dry land in the movie *Waterworld*: small, elusive areas that may have existed long ago but are only a myth now. And are worth beating up Kevin Costner for.

Empty parking spaces in the commuter lot are approaching the status of dry land in the movie *Waterworld*.

To address this problem, the university sent out two surveys. One, to the students, asked multiple choice reaction questions about proposed solutions. Its results have been widely published in the paper. The other lesser-known survey was sent to different academic departments on campus asking the faculty to actually *generate* ideas to create more parking. Its responses have come back just recently. The different departments' proposals, released exclusively here, shed much new light on this old enigma.

From a department not usually associated with civil construction, Art, came an elegant, intriguing proposal that would triple the amount of student parking available at a minimal cost. Upon further inspection, however, it was found that the Art department's "Escher" parking garage could not actually exist in our three-dimensional universe.

The English department apparently misunderstood the survey's instructions, and submitted a 10-page paper describing what might have inspired the parking lot's original creator and compared and contrasted the lot's construction to Lane Stadium.

The College of Engineering could not agree on one unified proposal, so each engineering department decided to enter its own solution.

The Engineering Fundamentals department suggested erecting row upon row of obstacles across the entrance to the lot, making it so difficult to park that 40% of the students would give up parking on their first try.

Deciding to make the university more time-efficient, the Industrial Systems department proposed to effectively double the parking man-hours available by separating students into day and night shifts, and then scheduling classes 24 hours a day.

The computer engineers simply suggested waiting for six months until someone came out with a new parking lot that works at twice the speed of our existing one.

The Engineering Science and Mechanics department did not feel the problem in its original form was worthy of their consideration, so they added a point force and moment to each car in the lot; their analysis is still pending.

The aerospace engineering faculty didn't understand the survey when they first got it. They consulted every text in their bookshelf, every program on their computer, and all their friends at NASA, but still, no one in the AOE department could comprehend the problem. After all, it wasn't exactly rocket science.

These proposals and those made by other departments have been sent for debate and review to the university's controlling body, the Board of Visitors. After that, they will pass on to the Board that cleans up after the Board of Visitors, the Board of Residents. From there, they could head to the Board of Sub-Leasers, and then the Board of Squatters, then the Board of People Who Just Kind of Hang Out Here, etc., etc., until everyone is just plain bored with the idea.

This means many years, or even ice ages, will pass before the parking problem is solved, leaving us to stalk and be stalked in the meantime. So please, don't flip out if, after you leave class, one or even two cars slowly cruise down the row shadowing you. We don't want to ravage your body; we aren't looking to steal your wallet or books; all we want is the few square feet of free land you currently own. But if Kevin Costner's waiting when we get there, there's gonna be trouble.

Shuvom Ghose
Executive Editor

VIASYSTEMS

Our Vision...Your Future

Viasystems is the world's second largest manufacturer of printed circuit boards and backplanes. Our Richmond location is the largest printed circuit board and backplane manufacturing facility in North America, with more than 2,100 talented professionals and 700,000 square feet of manufacturing space.

Viasystems' primary markets are telecommunications, computer, industrial and automotive. On-site research and development and state-of-the-art design capabilities provide our customers with the latest interconnection technology.

As one of Richmond's top 20 employers, we offer outstanding growth potential, excellent benefits and salary commensurate with experience.

We typically seek qualified graduates in the following areas:

- **Mechanical Engineering**
- **Industrial Engineering**
- **Electrical Engineering**
- **Management Information Systems**
- **Marketing**

Please forward your resume to:

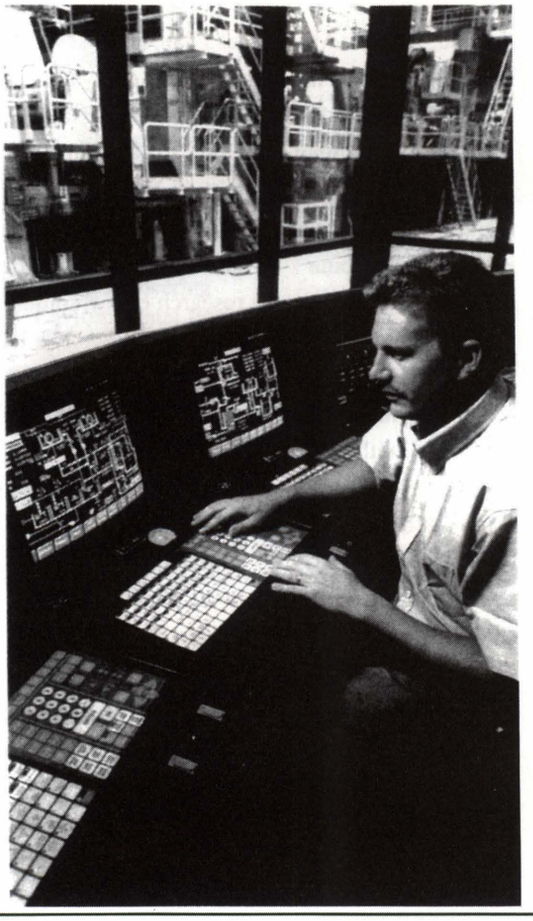
Management Staffing
Human Resources
4500 South Laburnum Ave.
Richmond, VA 23231

At Westvaco, we strive to be different. What about you?

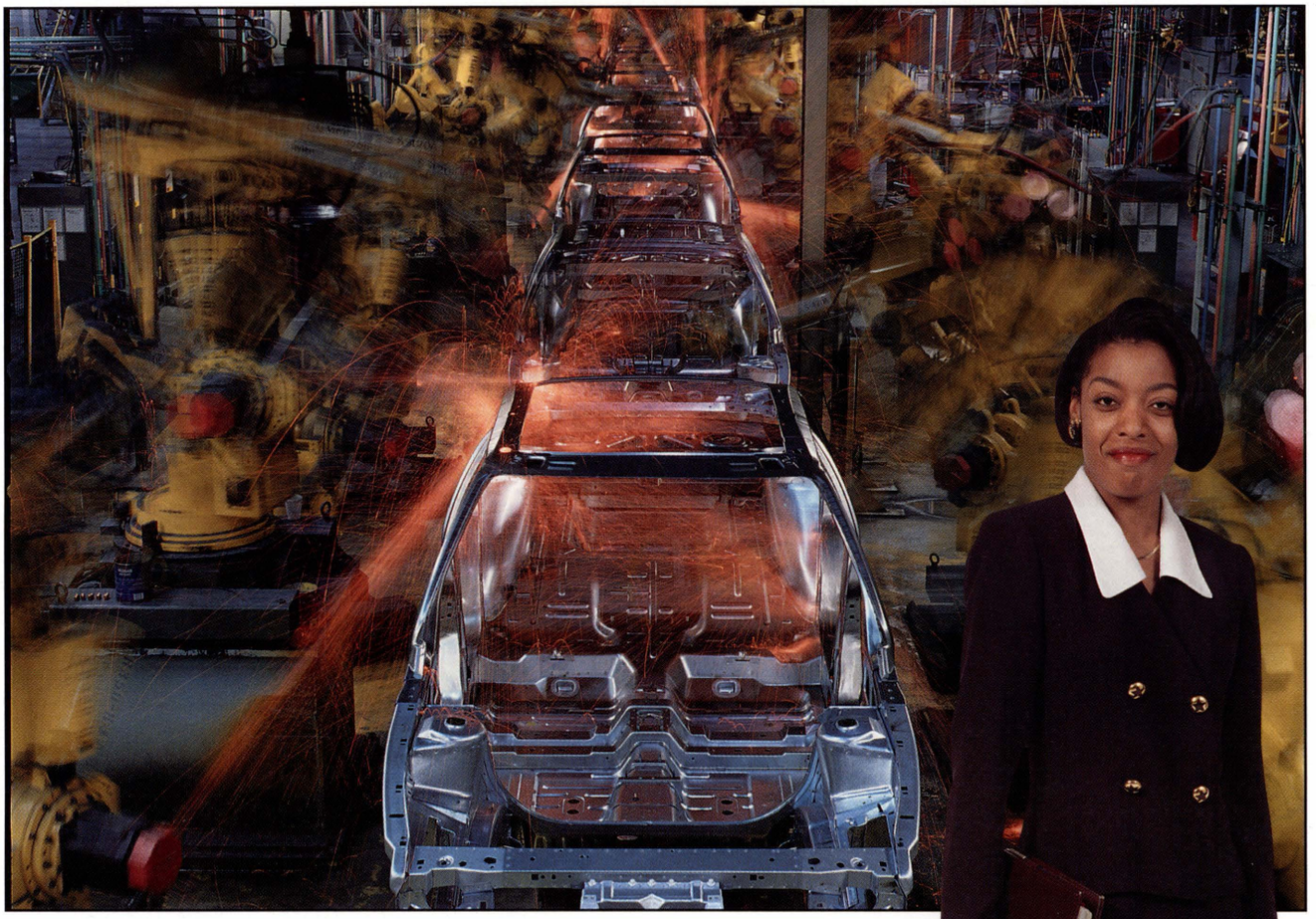
To work for Westvaco, you need to think about what it takes to apply technology in different ways. For us, it's an imaginative focus on research and the drive to create innovative products and services that others in our field find difficult to match. We have a well-defined strategy that has made us a major producer of paper, packaging and specialty chemicals, an industry leader in obtaining patents and a Fortune 200 company. We have over 14,000 employees worldwide, markets in 70 countries and annual sales exceeding $2 billion. That is just part of the difference that could make Westvaco an exciting opportunity for technically-oriented students. Would you like to know more about the Westvaco difference? Contact Rebecca Strong, Personnel Administrator, Westvaco Corporation, Bleached Board Division, 104 East Riverside Street, Covington, Virginia, 24426.

Westvāco

Bleached Board Division
Covington, Virginia



"What I've learned in the classroom, I'm perfecting at GM."



At General Motors, we're rewriting the book on succeeding in the automotive business. We're knocking down walls. Placing a greater emphasis on an open exchange of new ideas. Even underwriting non-formula product development programs that help formulate new thinking.

We're also recruiting the best and brightest to join our teams of world-class engineers, scientists and managers in one of the world's most important industries. To put your learning into action, send your resume to: GM Mid Lux Personnel, Fax: (810) 575-4468. For additional information, visit our web site at: http://www.gm.com/careers
Teamwork that touches the world.

General Motors®

An Equal
Opportunity
Employer

Theojuana Turner
GM Powertrain Group, Project Engineer