

ENGINEERS' FORUM

VOLUME 18 • NO 2

APRIL • 1999



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Are sports drinks beneficial?

The Ares Conflict
Part 3 of 3

Also Inside:
Sporn & Outstanding Senior awards announced

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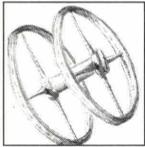


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**PARIS BOMBED!
EU DECLARES WAR ON U.S.**

Sometimes, when a phone rings, it does so with such a sense of purpose, as if, buried somewhere in the labyrinth of circuits and wires, there is an artificially intelligent force that monitors every call and can ultimately effect the receiving phone's ring on a subconscious level. This was not one of those times—but it should have been.

The entire office knew that it was Bill, Director of Earth Defense, calling from his armada of orbiting space stations that encircled the Earth. She watched the phone ring, allowing the appropriate amount of time to pass before answering. It was all an attempt to remain cool and in control, in light of the recent events.

But she failed. "What are you trying to do?!" the panic in her voice echoed through the vast distance that separated them. "You cannot just destroy every living thing within a fifty mile radius of Paris and expect the EU to stay out of it. I did not even approve of a strike against them."

His response came in the same monotone casual conversational tone that she

kind of hatred it took to change a person into that which is diametrically opposed to all that he formerly stood for, knew what it felt like at night when all of the distractions of the day were gone and the hatred still burned in the mind, keeping a watchful eye on that singular goal that will make the pain and suffering of a sad life worthwhile. He would do anything to exact his revenge, even if it meant the end of the planet. This she knew because she, too, would do the same to destroy Ares.

"I am starting a war." To casually speak of world events that result in millions of deaths was an ability that had only recently come to Bill.

"Starting a war?" she yelled into the phone alarming the staff of the Oval Office. "What about the Martians?"

He just laughed. "What Martians?" he mocked, trying to sound as afraid and surprised as her.

"This is not a secure line." There was a short silence. "Can we meet?"

"Do you think that I am going to come down to earth? You will have me shot down before I even land."

"No, there is something you do not understand. We have to meet."

ple of Earth, he was sure that it seemed like Mars and its mysterious Martians were the biggest threat to their existence, and yet if they only knew that humanity was the threat. But he was the Director of Earth Defense, and he would do his best to protect them, even if they did not know what they were being protected from.

He let the thought come to its natural conclusion and then focused on the more important task of planning the invasion of Earth. The three-year round trip to Mars had given him ample time to brainwash the world's best troops using the techniques developed by Ares' media conglomerate. And space, being a hostile environment, had refined even the most disciplined soldiers into the machines he would need. He was relying on the skill and vitality of his soldiers, especially in the beginning, while most of his army was still on the return trip from Mars. He always made it a point to be present for the return parade and inspection, seeing them march in unison and stand motionlessly at attention. Their bodies, accustomed to minimal nourishment and the chemical supplements that allowed them to physically endure, were tight with the ideal

had become used to. He was like a machine, with no emotion, just rigid precision. She was the President of the United States and dictator of the free world who would, with the slightest glance, bring leaders of nations to their knees, but she feared this one man. Ares had pushed Bill too far in his quest to find a successor, and now Bill had broken. The family man who had once tried to kill Ares in an attempt to stop the destruction was now destroying entire countries without remorse. But that was not why she feared him. That was simply the effect of Ares. Everyone involved at some point lost their humanity, lost their perspective on the value of life. She feared him because she knew what

REVELATIONS: PART 3 OF 3

"Well, I will be down in a bit, we can do lunch or something." The phone fell from Bill's hand into its cradle. He did not want to hear what else she had to say, because he was afraid he was beginning to believe her.

Yet her words echoed in his mind. What could there be on Mars that she was worried about? The first batch of troops were just returning, but there had never been any report of activity. It was just a barren rock floating in a cold space. To the peo-

amount of body mass. But more impressive were their eyes, which stared off into nothingness. They were like robots, barely human, broken men who had been put back together with Bill's caring voice ever present. He was not only their father figure, he was their creator.

**SWEEPING SUCCESS ON MARS,
VICTORY EXPECTED WITHIN THE
YEAR**

killed too many before for her conscience to stop the bullet with his unknown name on it, but he hesitated because of the all of the possible futures that revolved around this single point in time. His act would have to be perfect.

"Bill is Ares." He said it with such conviction and betrayal, that she could not help but believe him. She let the barrel of the gun drop slightly as the impact of the confession hit her. "He orchestrated the whole thing. He was the one who organized all of the suits. And once he got the money, it went straight into a secret space

"China is the key. They have the weakest air defenses and the most sympathetic populace." Bill remained silent as his generals fought.

"But we must strike the EU. If we do not hit them soon, we will not have an America to liberate."

"We do not have the troops to hit the EU. They are just too strong. Wait until we get the next cycle of troops in a month."

"We could missile them."

Bill looked up and his attention was noted.

"You mean bomb the whole of Europe,

aliens?"

"No sir, the only living things on Mars are our troops in training. Sir, I thought you told us that it was all a ploy. A hoax, to gather support against the EU?"

"It was, but the president is worried about Mars, and that troubles me because I cannot think of a single reason why she would even be thinking of that godforsaken planet."

"Sir, did she know that it was all a hoax?" The question came from one of the lower officers, who had only recently become aware of just how little he really

She was the president of the United States and dictator

program to make it look like there were aliens on Mars. He knew the Earth would unite against an alien threat, and now he is sitting in his space stations full of Earth's best troops waiting to invade."

She sat down. It was all that she could do. She would have to have him detained, in case he was lying, but now, more than ever, she needed to talk to Bill.

**DIRECTOR OF EARTH DEFENSE
DECLARED A TRAITOR!
TREASON TRIAL IMPENDING**

and half of Asia?"

"The major military targets and a few cities, enough to make them stop."

Bill thought of all of the lives his revenge would cost. There was no maybe about it, the cost far exceeded the benefits, but then again, maybe he was just getting too good at being the god of war and destruction.

The room silenced as soon as he began to speak. "Use the missiles on Europe, and land the troops in China. Bomb the EU sparingly, just enough to keep them out of the war for a while. I need to know about Mars. Are we sure there is no sign of

knew about the world.

"The former president was the one responsible for the planning and orchestration of the Mars conflict. It is possible that he did all of it without the knowledge of the then Vice President, but that is unlikely. However, it will not affect our plans. I will still lead a special forces unit into America to cripple communications and cause as much chaos as possible. Hopefully they will think that it is preparation for the invasion. Then we will try to take out the President." He paused as he looked at his officers, all devotedly loyal to him. "I am to be considered dead from this point on. I will not be coming back from this mission and I will be making no further contact. Any signals that you receive from me are to be considered false and ignored. You know they have the technology to forge such a signal or force me to give false orders. Is everything understood? I do not exist." They all stood at attention showing their respect with silence.

His orders were accepted and without further debate the generals all rushed out to start preparing. He sat silently in the small room, tired. His life, gone to years of Ares' secrecy. World domination seemed child's play compared to the battles he had fought within himself. This time it would end. He would kill Ares and everyone who knew of it.

**PRESIDENT PROCLAIMS MARTIANS
HOAX: "DIRECTOR OF EARTH
DEFENSE MADE UP THE WHOLE
THING"**

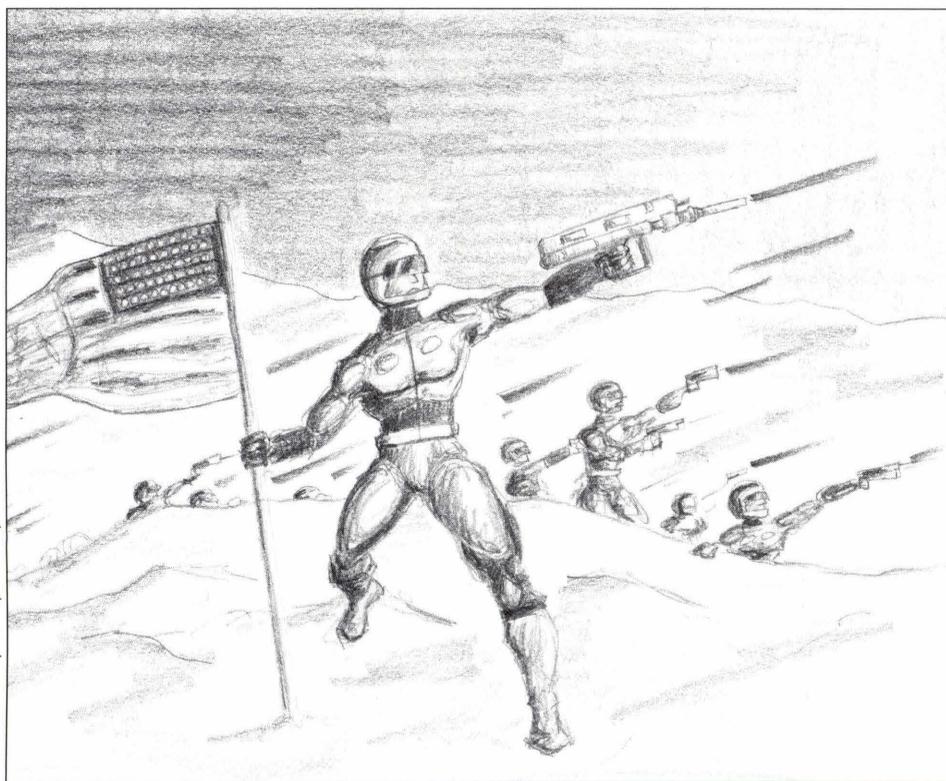


Illustration by Krissy Thompson

It was cold in space. That seemed to be the only adjective dull enough to describe life aboard one of the last troop transports slowly crawling through the void between Earth and Mars. Almost since the shuttle had taken him from the Earth to one of the space stations where his first training had begun, Shuvom had regretted his decision to join Space Command. It was a distinguished position, only the best soldiers were even given the opportunity to apply, and yet the rumors of the hardships endured during the transit had managed to make their way back to Earth, and thus far

"I am starting a war."

that he would soon face the mystery first hand.

Suddenly came an alarm, unlike any he had ever heard sounded, and the entire ship was swept with silence. He rolled out of his living space into the hall where most of the other soldiers were standing dumfounded awaiting instructions, but there were none.

The ship lurched violently and the walls came crashing in from all sides. Something had hit the ship. There were explosions in

see the shapes at which all fire was being directed, but it was difficult in the tight corridors to make out exactly what he was seeing.

Shuvom was hit as his squadron was overtaken. As he laid against the cold metal grillwork of the floor, he saw the enemy for the first time. This was not the EU, nor could it be any other creature indigenous to Earth. Shuvom crawled over to one of their dead and removed what he

of the free world, but she feared this one man.

those rumors had been understated to say the least.

There were no clocks of any kind on the ship, only alarms to signal when training ended and work began. At no point was a soldier off duty, and rest was rationed more than food. It would have been hard to say exactly how long they worked and trained, The drugs that were given to counter fatigue broke down the body's natural sense of time, and with no day or night, or any other external way of measuring time, what felt like a day could actually be only a few hours.

On Earth, no man could survive this type of conditioning. A natural predisposition to give up would at some point kick in and cause the person to remove himself from the hostile environment. However, in space, that was no option. Even now that the ship was on its return trip, having orbited Mars for three months, Earth was still three years away.

There was also a sickness aboard the ship, known to the crew only as isolation sickness. It was believed to be a side effect of all of the drugs that the soldiers were routinely given, but it was more of a breakdown of the soul. Everyone would get it at some point, and those who survived did so only in body. They were lost to the silence of space. They never spoke or socialized after their recovery, only sitting alone in the cubicles when they were not working. But that was only for the unlucky who survived, for almost a quarter of those infected would simply go to sleep and never wake up. Shuvom had seen it happen, could recognize the symptoms, and new

every direction, and then more silence. Conditioning and the instinct for self-preservation took over as Shuvom immediately reached for his weapon. The local leadership hierarchy was set into action and quickly the troops were organized into their fighting groups.

It was an hour of tense silence before the first sounds of small arms fire could be heard echoing though the ship. Terrified screams and the sounds of death were quick to follow. With complete order and efficiency, the soldiers began their march towards the battle, not even comprehending what could be happening.

The ship was quite large, transporting over two thousand crew, so it was some time before the exact location of the disturbance could be located. Even the millions of scenarios that Shuvom had run in his mind did not prepare him for what he saw when he reached the action.

The silent soldiers who had survived the sickness were fighting as he had never seen anyone fight before. Without hesitation they moved, every action defining efficiency, while those who had not yet suffered the disease stood in the shadows hiding. Through the smoke he could

could of the thick armor that covered their vaguely humanoid bodies. There was no mistaking that these were not human. He did not live much longer after that.

The ship drifted silently through space on its return trajectory towards Earth.

**54 MEMBERS OF CONGRESS
INDICTED FOR SEDITION,
PRESIDENT STILL IN HIDING.**

She finished packing to the sounds of air raid sirens and small arms fire. The witch hunt she had started by declaring Bill a traitor had turned into a coup. The paranoia within the government had brought the system to a stand still. There were actual subversives hidden in the top levels of government, but self-righteous politicians had used her proclamation to further their own careers and to destroy their enemies.

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The United States was on the verge of breakdown. Law and order had recently been replaced by riots. Most of the major cities were now under martial law, with local leaders acting independently of the national government. Some of these city states were still loyal to the old ways of democracy, however, the vast majority had been overrun with corruption.

The EU had been bombed into a temporary surrender, but that could not be

were assembled on the Mall in front of the Capitol building, their ranks extending almost to the Washington Monument. As she was led to the steps of the Capitol building, she could only wonder if Ares had planned a last speech for her before she disappeared into a history book, but instead of leading her to the empty lectern she was kept out of sight in the background crowd.

The spokesman of Ares, as she now

some good would come from it. She did not know it for sure, but she suspected that he was already in America. One by one, all of the members of the Ares conspiracy were disappearing and only a few people knew who really was involved.

She had been discarded, her power to govern destroyed, she was now of no use to Ares. That was why it surprised her when she was summoned only minutes before she was to be taken out of Washington. She had assumed that they were only keeping her alive to use as a scapegoat when Bill did decide to step in and save the day, but as she waited for her escorts, she could not help thinking this could be the last hour of her life.

The local national guard units and what few armed forces that could be spared

becoming larger as it fell. She looked around for anti-aircraft fire, but there was none. The dot soon was recognizable as an Earth Defense transport. As its engines fired to slow its descent, she could only assume that Bill was beginning his conquest of the new world, and that her part in this ceremony would be that of defendant in what could only be considered the ultimate people's court.

Two more transports could be seen descending on the horizon, as the first transport calmly touched down between the Monument and the Lincoln Memorial. There was silence as the great bay doors opened and out rushed things. It was as if every single person was suddenly caught in one grand illusion. Aliens were now pouring out onto the Mall, weapons blazing. The soldiers immediately broke from their columns and ran. They had not come to fight, and they certainly were not prepared for what was running towards them.

"What is happening?" she yelled as the crowd around her desperately attempted to escape.

"Ares has arrived!" He shouted with reverence.

She could do nothing. Her mind, accustomed to sudden shock, had developed a natural defense against this type of situation which left her in a surreal state of watching the world as if she were no longer a part of it.

Within an hour, the Mall was quiet again. The shock troops that had poured out from the Earth Defense transports were now dispersed within the city. She stood on the steps of the Capitol looking out across the undisturbed bodies with only the spokesman of Ares. "Why have you kept

expected to last if the United States did fall into a civil war. Her last remaining hope rested on Bill. She hated to see him win, especially if he really was the Ares mastermind, but at this point it was the only way the world would not take a giant step back into the dark ages. If he could take over the United States within the next few weeks, the damage might be reversible. Of course that would mean her death, but at least

called him, in his usual manor, slipped through the crowd and stood next to her, barely noticed in all of the ceremony.

"So, what am I to do today? Give a speech, renouncing America?" Her sarcasm was lost to his unusually happy constitution.

"I just thought you might want to see this before you left." He pointed at a small dot in the sky. Slowly it descended,

me alive?"

"We need you to deliver a message to Bill."

"You know he will kill me as soon as he sees me."

"Yes, that is probably true, but you will try."

"And why would I do anything for you?"

"Because Bill is the last chance your planet has, and you will do whatever you can to save your planet. Bill is not Ares, he

He was just getting too good at being the god of war and destruction.

tried to kill himself when presented with that option. No, Bill will fight us. That is why we need you.”

“I will not kill him.”

“I know, but when you tell him of what has happened he will have to react. He will be forced to bring his troops out of hiding and counter attack, and that is when we will be able to destroy him.”

“What if I tell him your plan, or what if I do not tell him at all?”

“He is a good commander, a smart man, he will know exactly what we plan to do whether you tell him our plans or not, besides, you have learned not to trust a word I say so why should you start now? And if you do not tell him—well, just consider your freedom reward for all of your hard work in making this all possible. He will find out sooner or later.” He stood looking out across the destruction with violent happy eyes.

Trying to formulate some plan, she slowly walked away from the Mall. There was no place for her to go. She would have to contact Bill, tell him everything and let him react in his own way. If she was lucky, he would still kill her, but death would be too kind a fate.

Filled with rage, she found a gun on a dead soldier and returned to the Capitol steps. He was still there, bathing in the beauty of the chaos, but she made sure that he saw who it was that killed him.

ARES, GOD OF WAR AND DESTRUCTION, CREATED BY MAN IN HIS OWN IMAGE.

She found him in Ares’ conference room,

the place where he had been taken when he was first abducted and brought into this whole affair. He sat at the head of the table with a bottle of whiskey, a gun, and two bullets. He did not speak to her when she entered, only slightly looked up at her past the glass in his hand.

“Ares is a Martian—” but he cut her off before she could say anything more.

“Actually there are no Martians, but you are right, they are aliens from somewhere.”

“You knew?”

“I still get reports from space, they took over one of the space stations before anyone knew what was happening.”

“Why didn’t you do something?”

“I am considered dead, I have ordered my men not to acknowledge any order from me.” He finished his drink.

“So you are going to quit?”

“This is just the first wave, an exploratory force. Ever since we learned of their existence we have been watching for more. We think they have built some bases on Mars, but even if they did, it will be a year or so before they can land the second wave.”

She sat down letting her head fall into her hands. “I thought you were patrolling Mars.”

“Yes, we did send ships to Mars but that was all training for the troops. I thought that the Martians were all a hoax.”

“What about the ships already en route to Mars? Could they help?”

“We stopped sending ships to Mars over a year ago. The last few were not even equipped with weapons. That was why it was so easy for Ares to capture them.”

“But you said it will be at least a year before they can get anymore troops here. I only saw three ships land. Couldn’t you retake Earth?”

“From the reports I have received this first wave was not that large, but have you seen the world today? We have cried wolf one too many times, there is no way the Earth will unite again under either of us, and frankly, I am too tired to do the world domination thing again. No, for us it is game over. Let someone else play god.” **EF**

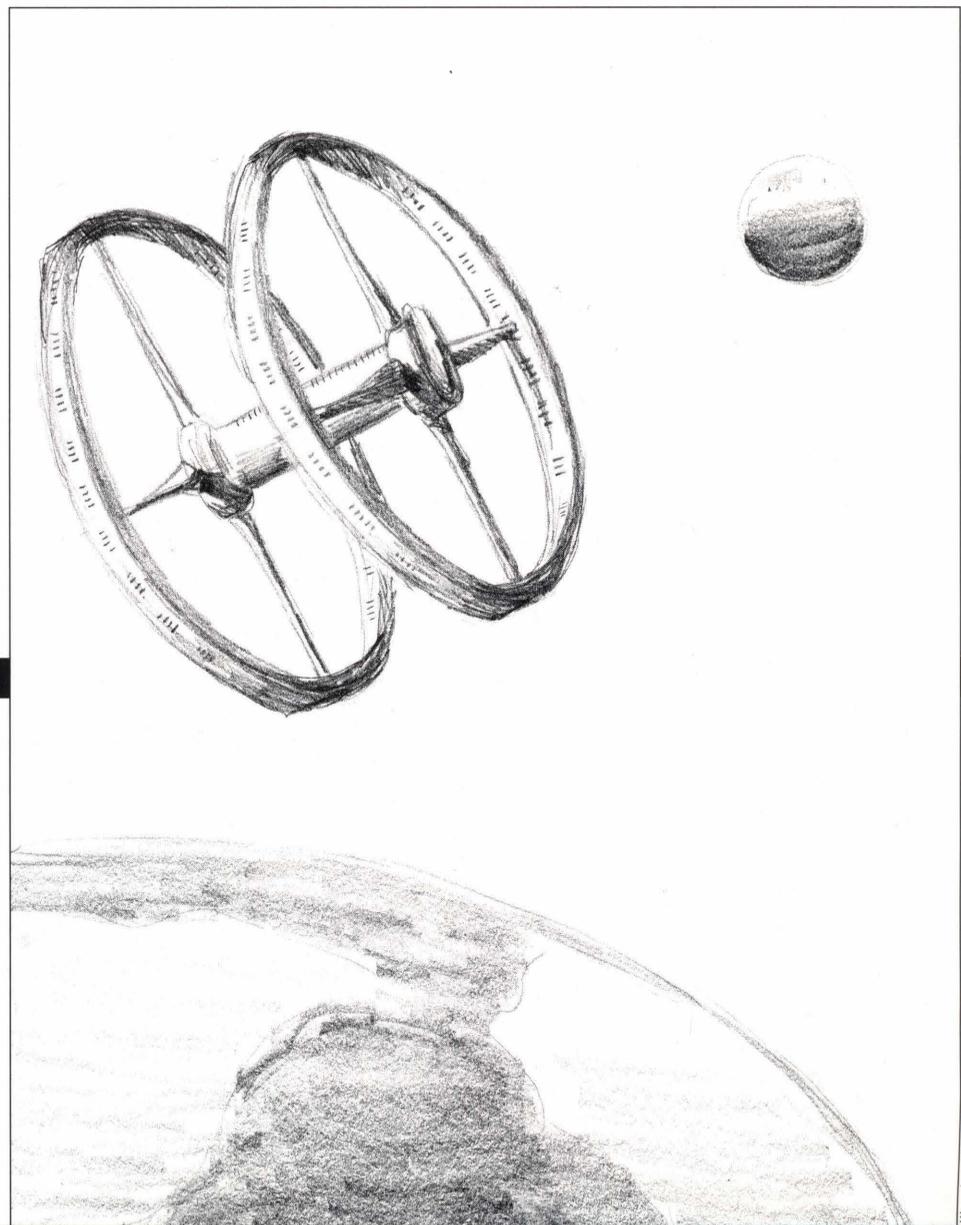


Illustration by Krissy Thompson



Hydration or Hype?

The Science and Myth of Sports Drinks

by Tom Catherwood

Summertime. It's 90 degrees outside, but on the basketball court it feels about 130. The heat is reaching up from the black top and through the soles of your high top Nikes. You can almost hear Dick Vitale yelling, "It's hot, baby!" So you take a break, sit down on your Orange and Maroon mesh shorts, and reach for your bottle of Gatorade!

We've all had it. The drink so synonymous with activity and sports that you can find it anywhere from a sporting goods store to a 7-11 or Walmart.

Gatorade and its competition, mainly All Sport and Powerade, are as common a sight on a hot summer's day as a basketball, football, or frisbee.

Why are sports drinks so common? The advertisements claim the drinks help us maintain our peak activity levels. Powerade's slogan states "Energy, Power, Performance."

Need we say more? Yes we do. What exactly does that bottle of Gatorade, Powerade, or All Sport do for you? What do these sports drinks have that water doesn't? What should you really be drinking?

Sports drinks

To achieve maximum performance, an athlete's body must have a careful balance of water, blood sugar, and electrolytes. Water aids the blood in transporting glucose to working muscles and carries away

lactic acid. Water also dissipates body heat in the form of sweat, and eliminates metabolic waste products through urine. Blood sugar, in the form of glucose, is the fuel for our body when glycogen, fuel already stored in muscles, runs out. Electrolytes are salts like sodium and potassium that aid in the absorption of water, but are lost by the body in sweat.

When we exercise, our muscles use the stored form of glucose, glycogen, as fuel. Water is crucial in the transportation of glucose to our muscles. Yet, water is lost as we

Water is a better, and more economical, choice than sports drinks.

sweat, as are the electrolytes that help us reabsorb water. With this lack of water comes dehydration, and the blood is unable to transport fuel to the muscles. Without fuel, the athlete's muscles cease functioning to their maximum capabilities and performance drastically decreases, hence the so-called "hitting the wall" syndrome.

Enter the sports drink. The general premise of the sports drink is to provide water, carbohydrates (for conversion into glucose), and electrolytes to an athlete to prevent them from hitting the wall. The flavor of sports drinks is also meant to encourage an athlete to drink more, thereby combating dehydration. Sports drinks were first created at the

University of Florida back in the 1980's when scientists were seeking a way to keep football players hydrated in the Florida heat. What resulted was a drink "For that Deep Down Body Thirst". Gatorade, named for the Florida school's mascot, hit the market in 1987 and has grown ever since. The introduction of Coca-Cola's Powerade and Pepsi's All Sport in the 90's has built an industry with 1.2 billion dollars in sales in 1998; that's a lot of Lemon Lime and Riptide Rush.

Gatorade, Powerade, and All Sport contain similar carbohydrates which are all convertible to glucose in the body. They also contain some amount of sugar for instant energy. Gatorade contains salt, potassium and sodium as electrolytes to encourage an athlete to drink more while aiding in fluid and glucose absorption. All Sport contains B-vitamins that the company claims are essential in the energy metabolism process.

Reality

So should everyone use sports drinks during exercise? The answer depends on what kind of activity a person is doing. Two hours of basketball in the hot sun is going to put a greater strain on the body's water, glucose, electrolyte balance than a 20 minute jog in the winter. In general, experts suggest



Photo by Jason Gibbs

Drinks (8 oz servings)	Calories (g)	Carbohydrates (mg)	Sodium (mg)
Allsport	70	20	55
Apple juice	120	29	20
Gatorade	50	14	110
Iced tea, bottled	100	25	10
Orange juice	110	27	25
Powerade	70	19	55

that ingesting carbohydrates has no effect on athletic performance in events or activities lasting less than 90 minutes. Therefore, during many athletic endeavors the body does not need all the energy-laden carbohydrates in a sports drink. On the other hand, an athlete in intense training, like an endurance runner or football player with twice-a-day practices, can benefit from sports drinks.

Virginia Tech's Women's Track Coach Lori Taylor says that she stresses the importance of staying well hydrated before, during, and after workouts, "Hydration is extremely important no matter what, and we tell our athletes, particularly our runners, distance runners. It would be the same for a football player two-a-days in the middle of August." Coach Taylor also said her athletes drink a wide variety of liquids, including fruit juices, sports drinks, and water, in order to stay well hydrated. Tech Professor Christina Baum in the Human Nutrition, Foods, and Exercise Department also emphasized the correlation between hydration and athletic performance. Professor Baum noted that sweat does not rapidly evaporate in the usually hot and humid summer environment of Virginia. When

sweat doesn't evaporate our body releases more in an attempt to cool itself down. An athlete can lose a greater amount of water and electrolytes exercising in humid weather than in a place with dry-heat.

So staying well hydrated before any athletic activity is key to athletic performance. What should a person drink

Quite simply, the optimum sports drink is the one that tastes best and causes the least stomach irritation on an individual basis.

to stay well hydrated during exercise? Both Coach Taylor and Professor Baum warned of the possible adverse reactions sports drinks can cause during exercise. Professor Baum stated that the carbohydrate and sugar concentration in sports drinks is too high for many people to digest during physical exertion.

This can in
t u r n

lead to nausea and stomach cramping. Coach Taylor also cited the tendency of athletes to perform on empty stomachs as a main reason for sports drink induced stomach pain. To combat this side-effect Coach Taylor's runners might drink a 50/50 mixture of water and sports drink, "My athletes will probably never drink that [sports drinks] straight. We'll usually mix it 50/50 [with water] because, one, it's too thick. It's harder to get the fluids or water directly into you're system. Two, a lot of people have trouble with their stomach"

Sports drinks can be very advantageous. When we exercise, our muscles exhaust their stores of glycogen-stored energy. After exercise there is a small window of time in which the body can most efficiently and quickly replenish these muscles glycogen reserves. Sports drinks function well after exercise to quickly supply the body with lost minerals, carbohydrates and liquids. Coach Taylor extolled the virtue of these drinks after exercise in aiding the body's recovery, "Post competition is a critical period. As quickly as possible, replenish those

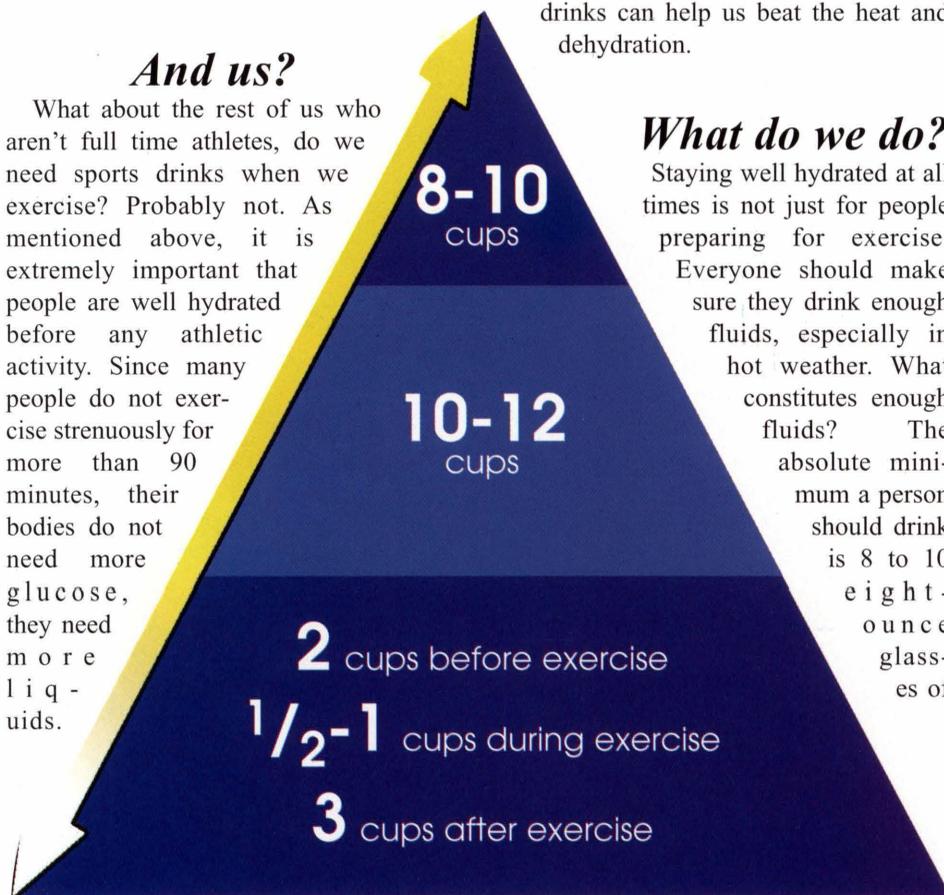


fluids because if you're not, your body is going to cramp; it's going to fatigue; it's going to take longer to recover."

Furthermore, research has shown that the taste of sports drinks can motivate people to drink more. Many people drink a small amount of water and feel they have quenched their thirst. The taste and added salt of sports drinks can facilitate further liquid intake by athletes. More drinking means more water, better hydration, and enhanced performance.

And us?

What about the rest of us who aren't full time athletes, do we need sports drinks when we exercise? Probably not. As mentioned above, it is extremely important that people are well hydrated before any athletic activity. Since many people do not exercise strenuously for more than 90 minutes, their bodies do not need more glucose, they need more liquids.



From this standpoint, water is a better, and more economical, choice than sports drinks. Furthermore, Coach Taylor said most people don't need electrolyte or carbohydrate replacement because they eat enough salt and calories already, "Water is better because they're probably getting a high salt intake in their diet and they're probably getting a wide variety of foods."

After exercise, sports drinks can be beneficial, as can water and a carbohydrate rich meal, or Coach Taylor's suggestion, diluted fruit juices, "Juice is almost the same stuff [as sports drinks], a little more acidity, but if you dilute it enough you're going to be fine."

Yet, even though the glucose and electrolytes in sports drinks will not do us any

good during exercise, their taste could be the key to avoiding dehydration. When outside playing basketball in hot weather, it is not easy to lug around a cooler full of cold water. Trying to drink warm water, especially during exercise, is almost as hard as the exercise itself. Sports drinks can counteract this problem. They can be left on the side of a hot court or field and still allow an athlete instant refreshment. So, when it's hot outside and carrying a cooler of water isn't an option, sports drinks can help us beat the heat and dehydration.

What do we do?

Staying well hydrated at all times is not just for people preparing for exercise. Everyone should make sure they drink enough fluids, especially in hot weather. What constitutes enough fluids? The absolute minimum a person should drink is 8 to 10 eight-ounce glasses of

means of fluid replacement.

Active people can generally gauge their fluid loss during exercise by recording body weight before and after a hard workout. Every pound lost translates to two cups of sweat or roughly sixteen-ounces of water.

So we finally decide to buy a sports drink to aid in pre-exercise hydration, post-

The key to picking a sports drink is to avoid all the hype and commercialism surrounding these products.

exercise replenishment or whatever, what is the optimum sports drink? Quite simply, the optimum sports drink is the one that tastes best and causes the least stomach irritation on an individual basis. Coach Taylor and Professor Baum both stated that the three main sports drinks, Gatorade, All Sport and Powerade, have the same general makeup, so the determining factor is just an athlete's personal preference. Questions have been raised about the small amount of carbonation in All Sport, as well as the amount of salt in Gatorade, but as of yet no research has proven it harms athletic performance.

The key to picking a sports drink is to avoid all the hype and commercialism surrounding these products. Sure, everyone wants to "Be like Mike", but drinking Gatorade will not get anyone there. Many athletes endorse sports drinks as a supplemental source of income, not because the drinks improve their performance. The general rule when it comes to exercise is drink often and a lot, avoid diuretics, and when sports drinks can be beneficial, pick one that suits individual taste preferences, not the one with the greatest hype. **BF**

water a day. For an active person, this number jumps to twelve glasses of water. Hydration not only allows our bodies to perform optimally during exercise, but also to perform normally during rest. However, drinks with caffeine and alcohol act as diuretics. This means coffee, coke, and beer actually remove water from our systems. Hence, beverages containing alcohol and caffeine are not suitable

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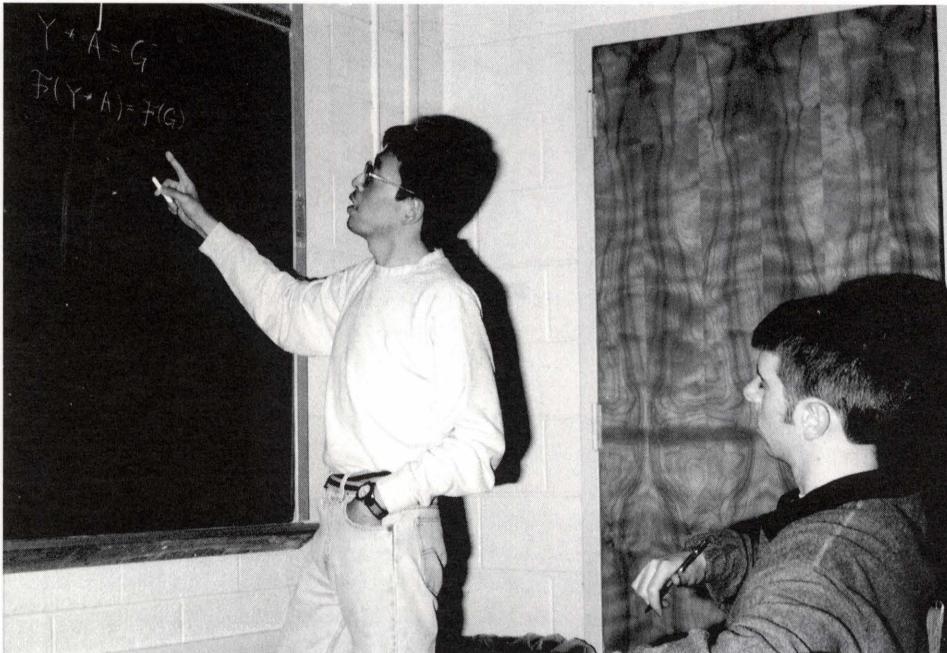
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Chang Wins Sporn Award

by Michael T Carr

Photos by Jason Gibbs



Mr. Chang guides his students through difficult homework assignments.

After a couple of long hours struggling over a mechanics problem, I was completely lost. So I packed up my notes and books and trekked over to Norris Hall to go to office hours. I walked into Roger Chang's office to the sight of two other students getting assistance. Still, Roger looked up and smiled, ready to help instantly. He went over each question in detail, not answering the question, but making me do it. I left feeling much better because I now knew what I had done wrong.

This is not an uncommon event in the life of many of Roger Chang's Mechanics students or for many of his ex-students either. This is one of the numerous reasons why Mr. Chang is the winner of this year's Sporn Award. The College of Engineering Sporn Award is given each year to a professor that has exhibited excellence in undergraduate instruction. Past winners of the award include Dr. Torgersen, Dr. Curtis Stern, Dr. R. Kander, and Dr. Y.A. Liu. The most notable fact about the Sporn Award is that the student body decides who wins it.

"Roger is a teacher that exhibits an

unsurpassed respect and genuine concern for his students. He works tirelessly to help students not only succeed, but understand what they are doing as well," said Jennifer Amaral, a CE student that has taken Professor Chang's classes. And it is true! Roger has shown a complete dedication to his students and all mechanics stu-

dents in general. He offers two and a half to six hours of office hours every day. On top of that, he also offers regular study sessions, which are usually well attended. His dedication reaches so far that he gave out his home phone number for anyone who could not make his office hours. Also, he often helps students in classes that he is not presently teaching, as well as other professors' students.

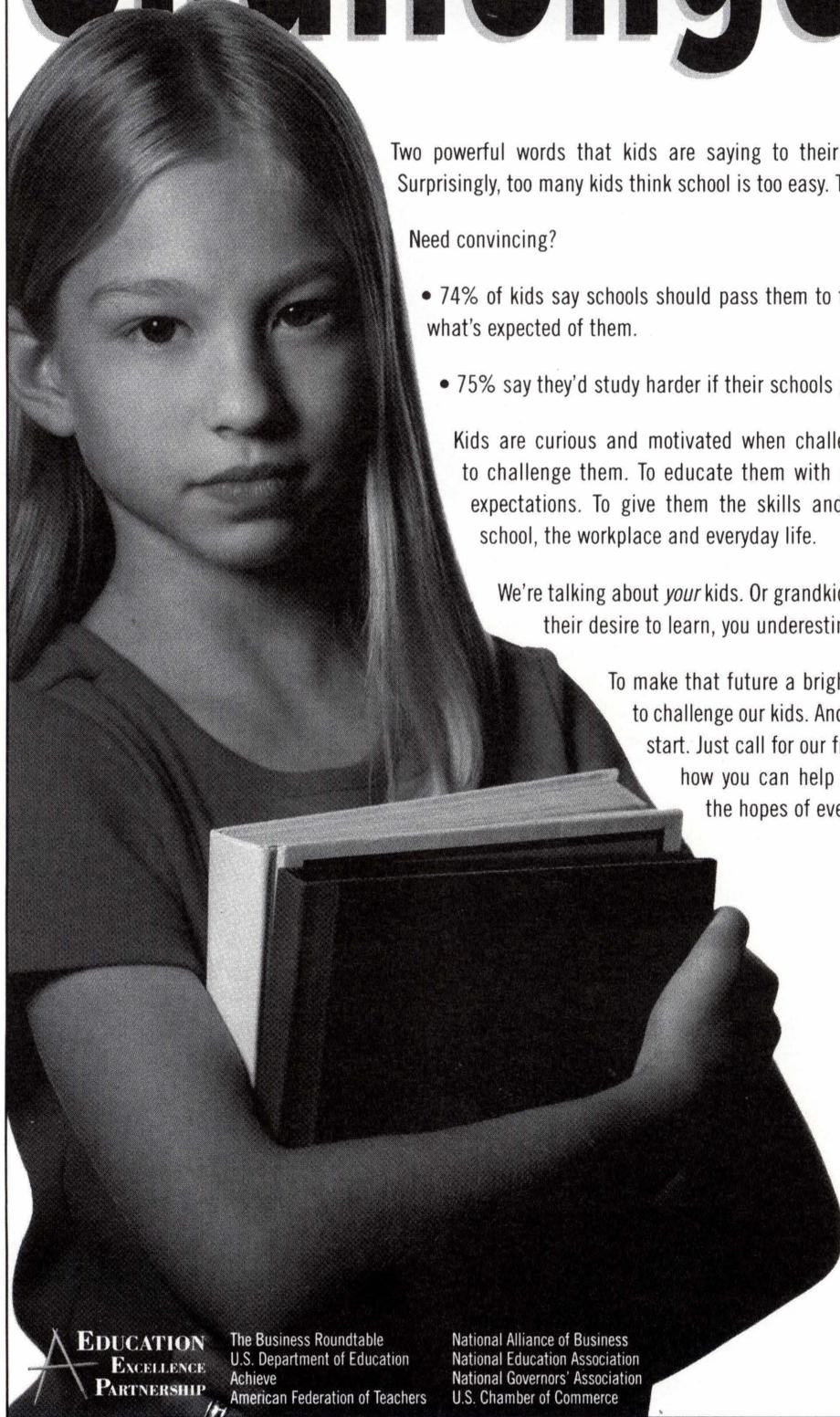
Beyond the academic aspects, Roger Chang has also excelled in being a peer. Often times you can find him talking to ex-students about their days or having dinner at Owens with more students. Many of his students to whom I have talked tell me how he truly cares what is going on in their lives outside of their classes. To many, he has become a friend more than a professor.

Roger Chang is in Virginia Tech's Ph.D. program. He has been teaching classes for the last five years. He has put off finishing his thesis for so long because he truly enjoys helping the students.

Roger Chang will be teaching during the summer sessions, however it is not sure whether he will be teaching in the upcoming fall semester. If he does not return he will be sorely missed. **EF**



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Tech Student Receives Outstanding Senior Award

by Mary Beth Ellinger
Intern, University Relations



Photo by Bob Veltri

The College of Engineering announced the recipient of its 1998/1999 outstanding senior award on Feb. 10, 1999. Bev Watford, Associate Dean of Academic Affairs, stated that many students were considered for this honor but the winner exhibited the combination of scholarship and service that represents the award.

Elise Caruso, a senior in the College of Engineering, will graduate in May with a Bachelor of Science in Industrial and Systems Engineering. Her degree program also includes a minor in Spanish. In the fall semester of 1997, Caruso studied abroad and attended the University of Valencia in Valencia, Spain. Throughout her college career, she has maintained an overall QCA of 3.43 with an in-major QCA of 3.66.

Last fall, Caruso began taking classes toward her graduate degree in ISE while still completing her undergraduate work. This semester, she continues to take both

graduate and undergraduate courses to finish up her degree. According to Michael P. Deisenroth, PhD., Professor and Assistant Head in the ISE Department, "From all indications, her graduate performance will be as outstanding as her undergraduate work."

Caruso has achieved many academic awards during her three years at Virginia Tech. She has been in the University Honors Program every semester but one since her freshman year. She has also made the College of Engineering Dean's List quite a few times since the fall of 1995. Caruso has been a recipient of many scholarships including the John Grado Scholarship in 1998/1999, the Charles O'Brien Scholarship in 1996/1997 and again in 1997/1998, and the Seay Scholarship in 1996/1997. She is a member of the national industrial

engineering honor society, Alpha Pi Mu, and a member of a national service honor society, Gamma Beta Phi. She was a National Collegiate Engineering Award Winner in 1997. In the 1997/1998 school year, she was chosen as the Outstanding Junior in the ISE Department. This year, she was chosen as a member of the well-known Who's Who in American Universities and Colleges.

Caruso has also been remarkably active in the student chapter of the Institute of Industrial Engineers since her freshman year. During her undergraduate years at Virginia Tech, she has continuously been a participant on the Publicity Committee, helping to spread the word on chapter activities. During her sophomore year, she served as Service Projects Chair. Her responsibilities for this position included organizing many different projects

including the Montgomery County Christmas Store. In her junior year, she was co-chairman of the Professional Development Committee, where she was responsible for planning and organizing the chapter meetings and interacting with companies and speakers who participated in the programs. This year, she served as President of the chapter. Her responsibilities as President included planning, organizing, and introducing new activities into the chapter. According to Deisenroth, the new activities that Caruso implemented have added to the reputation of the organization and the department. For the past two years, she was given a gold and a silver award from the national chapter in recognition for her contribution to chapter activities.

Outside of the student chapter of IIE, Caruso was active in the Women in Engineering Support Teams-Mentor Program. She planned activities and helped out as a resource individual. She has also served as a workshop facilitator for the College of Engineering for the Engineering Fundamentals Classes. Over the past two years, she volunteered in the Montgomery County Christmas Store and participated in the cleanup efforts of Blacksburg's Bloomin' and Broomin'. Caruso has also been active with intramural sports. She played intramural softball and flag football.

"From all indications, her graduate performance will be as outstanding as her undergraduate work."

She was co-captain of the softball team for two years and this past year was co-captain of the football team.

"She is an excellent representative for the department, the college, and the university," said Deisenroth. "Through her contact with people both on and off campus, she has continued to enhance the image and reputation of the department." **EF**

Engineering Students Create Satellites

by Liz Crumbley

In 2001 NASA's Space Shuttle will launch the first satellites created at Virginia Tech—and undergraduate engineering students will be the designers, builders and operators.

During fall semester 1998, a team of nine aerospace and ocean engineering (AOE) students drafted detailed designs for the Virginia Tech Ionospheric Scintillation Measurement Mission (VTISMM) as their senior design project. Previously, their adviser Christopher Hall, assistant professor of AOE, and electrical and computer engineering (ECpE) faculty members Wayne Scales and Warren Stutzman had submitted conceptual designs to the University

individuals. "Even some weapons are guided by GPS now," Hall said.

GPS satellites orbit above the ionosphere, the region composed of layers of earth's atmosphere ionized by ultraviolet radiation. As GPS navigational signals are transmitted through these ionized layers to receivers on earth, instabilities in the ionosphere cause scintillations in the signals. Problems arise when scintillations cause GPS signals to fade, resulting in errors in navigational signals.

The two Tech satellites will orbit in the ionosphere, taking scintillation measurements that could help scientists and engineers learn how to decrease the effects of

Adam Bram, Raphael Castillejo, Brendan McCullers, Kristin Makovec, Michael Powers, Anita Santiago, and Jana Schwartz—have been joined in the project by several other AOE and electrical and computer engineering (ECpE) undergraduates.

Most of the original students will graduate this May, said Santiago, who chose this as her senior design project because of her interest in space design and her desire to pursue satellite technology as a career. This semester, she said, the seniors are helping to train the underclassmen who have joined the group. The most challenging facet of the project, Santiago commented, has been working as a team toward one unified goal.

Acosta, who is joining the Air Force after graduation in May and also wants to work with the space program, said the seniors and underclassmen will work this semester to complete the design and get the project ready for the next phase—actually building the satellites.

The project's schedule calls for the satellites to be delivered to the Air Force in November 2000. Later this year, Hall said, the project team will have to create a "clean" facility at Tech—similar to the dust-free facilities in which microchips are produced—for assembling the satellites and the GPS receiver hardware to be carried as payloads.

The College of Engineering has two laboratories, the Spacecraft Simulator Laboratory and Satellite Tracking Laboratory, that will be used in constructing and operating the satellites. The satellites from all ten universities that have won grants in the NanoSatellite Program will be launched from the Space Shuttle in 2001.

The AOE and ECpE juniors who are working on the project this semester will help build the satellites during their senior year, Hall said. However, they will have to work on original design projects in addition to the satellites. The best solution? "I think as seniors they'll design the next generation Virginia Tech research satellites," Hall commented. **EF**

The two Tech satellites will orbit in the ionosphere, taking scintillation measurements.

NanoSatellite Program, a competitive grant program sponsored by the U.S. Air Force and the Defense Advanced Research Projects Agency (DARPA).

The Virginia Tech project was one of ten selected nationwide for the \$1 million program. Each school will receive \$100,000 to construct their satellites and the Air Force and NASA will take care of the launching costs.

Hall said the Tech students will build two basketball-sized satellites, each weighing about five kilograms and containing a computer, power supply, and communications equipment. Orbital Sciences Corp. will provide materials for the satellites. Hall has requested technical assistance for the project from Orbital, the NASA Goddard Space Flight Center, and INTELSAT Corp.

The project was selected for its scientific and technology demonstration potential, Hall said. The Tech-built satellites will orbit the earth for a month or more, measuring the effects of ionospheric irregularities, or scintillations, on Global Positioning System (GPS) signals. GPS is used for navigation and locating purposes by NASA, the military and aircraft, as well as by millions of

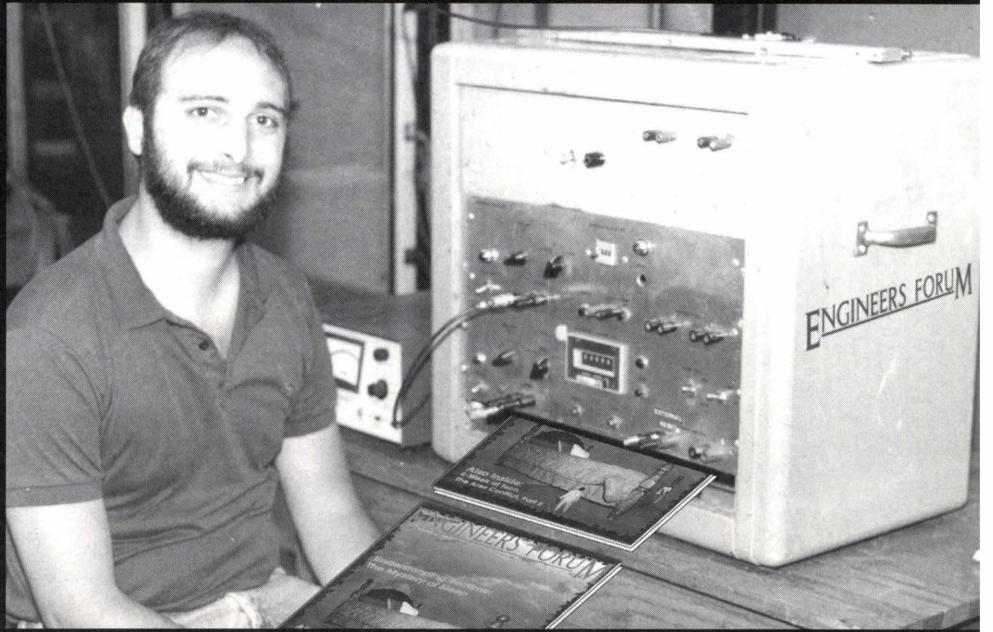
irregularities on GPS signals and may add to the body of knowledge about radio wave propagation. Hall said the students will design two satellites working in tandem because the Air Force and NASA are interested in the concept of launching flying clusters of small satellites in future communications programs. That way, if one satellite fails, the others can continue to carry out their mission. Hall is discussing additional formation flying capabilities with the professors at Utah State University and the University of Washington, who also have received grants under the Nanosatellite Program.

Another new technology that will be demonstrated by the Virginia Tech project is the use of GlobalStar communications satellites. One of the Tech satellites will have a GlobalStar telephone and will be able to place a call to the university for downloading science data.

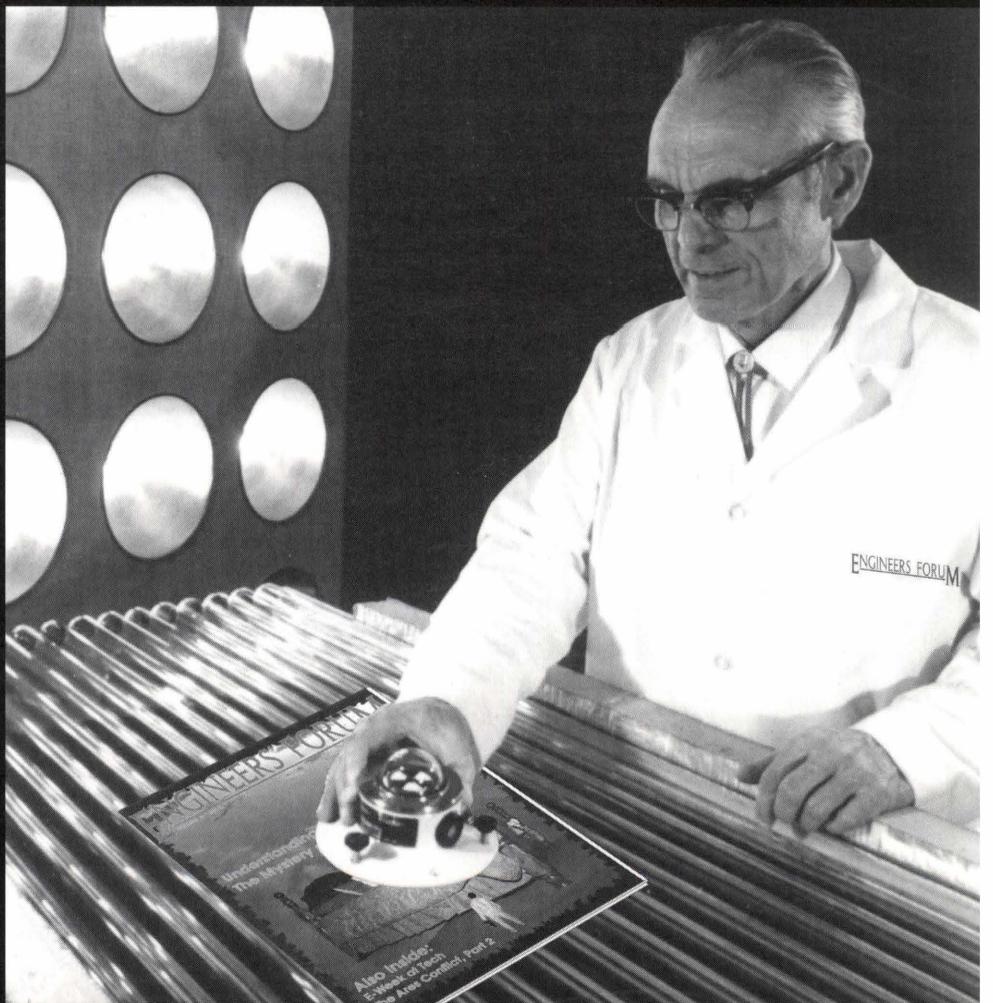
In addition to Hall, Scales and Stutzman, ECpE faculty Nathaniel Davis and Jaime De La Ree, who have related research interests, are working with the project.

This spring semester, the original nine AOE seniors—Ivan Acosta, Elbert Adamos,

COMPUTERIZED PRODUCTION.



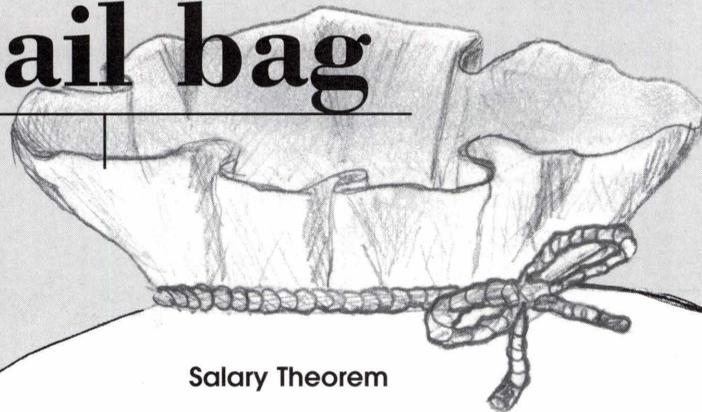
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from the email bag



Salary Theorem

Dilbert's "Salary Theorem" states that "Engineers and scientists can never earn as much as business executives and sales people." This theorem can now be supported by a mathematical equation based on the following two postulates:

Postulate 1: Knowledge is Power

Postulate 2: Time is Money

As every engineer knows, $\text{Power} = \text{Work}/\text{Time}$, and since $\text{Knowledge} = \text{Power}$ and $\text{Time} = \text{Money}$ it is therefore true that, $\text{Knowledge} = \text{Work}/\text{Money}$. Solving this equation for Money, we get: $\text{Money} = \text{Work}/\text{Knowledge}$.

Thus, as Knowledge approaches zero, Money approaches infinity regardless of the amount of work done.

Conclusion: The less you know, the more you make.

"Why Engineers Don't Write Recipe Books"

Chocolate Chip Cookies:

Ingredients:

- | | |
|--|--|
| 1.) 532.35 cm ³ gluten (flour) | 7.) 4.9 cm ³ methyl ether of protocatechuic aldehyde (my guess vanilla flavoring) |
| 2.) 4.9 cm ³ NaHCO ₃ (baking Powder) | 8.) Two calcium carbonate-encapsulated avian albumen-coated protein (eggs) |
| 3.) 4.9 cm ³ refined halite (salt) | 9.) 473.2 cm ³ theobroma cacao (cocoa) |
| 4.) 236.6 cm ³ partially hydrogenated tallow triglyceride (Crisco) | 10.) 236.6 cm ³ de-encapsulated legume meats (sieve size #10) (nuts) |
| 5.) 177.45 cm ³ crystalline C ₁₂ H ₂₂ O ₁₁ (Sugar) | |
| 6.) 177.45 cm ³ unrefined C ₁₂ H ₂₂ O ₁₁ (sugar) | |

Method:

To a 2-L jacketed round reactor vessel (reactor #1) with an overall heat transfer coefficient of about 100 Btu/F-ft²-hr, add ingredients one, two and three with constant agitation. In a second 2-L reactor vessel with a radial flow impeller operating at 100 rpm, add ingredients four, five, six, and seven until the mixture is homogenous.

To reactor #2, add ingredient eight, followed by three equal volumes of the homogenous mixture in reactor #1. Additionally, add ingredient nine and ten slowly, with constant agitation. Care must be taken at this point in the reaction to control any temperature rise that may be the result of an exothermic reaction. Using a screw extruder attached to a #4 nodulizer, place the mixture piece-meal on a 316SS sheet (300 x 600 mm). Heat in a 460K oven for a period of time that is in agreement with Frank & Johnston's first order rate expression (see JACOS, 21, 55), or until golden brown. Once the reaction is complete, place the sheet on a 25°C heat-transfer table, allowing the product to come to equilibrium.

Well readers—it's that time of year again. It's time that the staff changes, the management shuffles, and we recruit new members who want to help us continue to keep the *Engineer's Forum* fresh and maintain our reputation of top quality work. Oh—and time for those seniors to graduate and get out of here!

First, I'd like to thank all those staff heads that are stepping down. The entire staff's biggest thank you goes to Shuvom Ghose who has been our executive editor

present guiding hand.

Second, I'd like to offer congratulations to all of our new staff heads: Ted Hessing, managing editor; Stephen Drowne, production manager; and Josh Baugher and Prianka Nandy, web editors. To all of our writers, photographers, and layout staff, I look forward to seeing you take these positions in the upcoming years.

The last order of business is that class of graduating senior engineers who will go on to make this world better, or maybe just more technologically complicated. I know

more engineers in the world? The simple fact is that engineering is hard. Did you ever get that response from relatives and parents' friends when you tell them what you do? That "Ahhh, wow, that must be really hard!" response? There's a reason for that—it's true! Anyone who graduates with an engineering degree obviously has some level of intelligence, common sense, and quite a few marketable skills. We deserve to be proud of ourselves. Not to say that other graduates don't deserve that. Everyone works hard to get a degree. But, you don't hear *us* accusing *them* of majoring in Latin or Philosophy for the great opportunities to commune with long dead people.

I've heard *them* accuse *us* of taking all the school's money, of being the "teacher's pets." Now, calm down, don't we all pay tuition? Pay the same fees? I'll admit it, we have some pretty sophisticated equipment in our research labs, but we also bring in a lot of money through research. Engineering just happens to be one of those professions with a lot of research to do and a lot of money available to do it.

Why all the hostility? Does it really matter why we chose our majors? Someone has to do the work. Granted the motivation shouldn't be money, but even if it is, the work will still get done. Are *they* just jealous? Or...maybe they just don't have so much work to do that they only sleep 3 hours a night, giving them time to ponder their life choices. I've made mine and I intend to stick to it and be proud of my accomplishments. To each his own, I say!

Anyone who graduates with an engineering degree obviously has some level of intelligence, common sense, and quite a few marketable skills

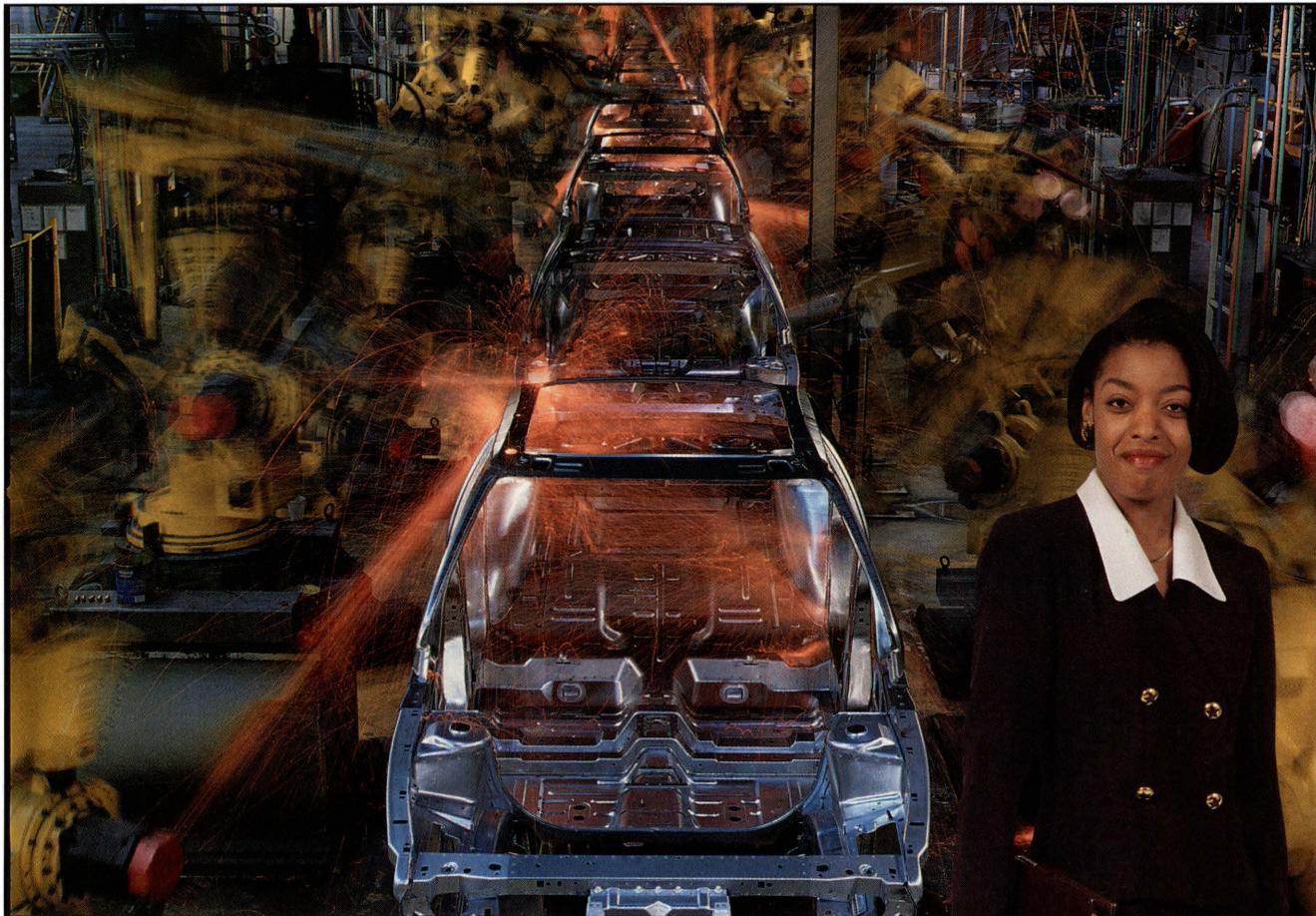
for about the last year and a half. He has offered continuous support and encouragement. Next, thanks go out to Doug Kelley, our production manager. He made sure that each issue progressed from a group of pictures, ads, and articles to the excellent publication you see in front of you. Two staff heads are staying on for another year, Jason Gibbs, our photography editor, and Mark Duerr, our business manager and we thank them for keeping up the good work. The last thank you goes to Lynn Nystrom, our advisor and ever-

that you are counting down the days, struggling to stay motivated and scrambling to find jobs. Actually, in today's society, engineers aren't having too much trouble finding those jobs. Many students are receiving multiple offers with increasing salaries and benefits. I'd say that this is something for engineers to be proud of, but that's not how everyone feels. I've heard students outside of the college accuse those of us in engineering of training to be engineers only for the money. If that were true, wouldn't there be a lot

Rebecca Gassler

Rebecca Gassler

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



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