



# Engineers' Forum

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## *Resigning A Small Wind Turbine*



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# More Money for Engineering Students

Contributed by Liz Crumbley

As part of an effort aimed at increasing the number of engineering graduates in the U.S. — which is experiencing a significant decline in new engineers — the National Science Foundation (NSF) Science and Technology Expansion Program has awarded a \$2 million, five-year grant to the Virginia Tech College of Engineering for expansion of its undergraduate mentoring and retention programs.

The target students for the project will be engineering freshmen and transfer students, said Bevee Watford, the College of Engineering's associate dean for academic affairs and director of the Center for the Enhancement of Engineering Diversity.

"The freshman-to-sophomore transition is critical," said Watford, who is co-principal investigator for the NSF grant. "The majority of drop-outs among engineering undergraduates occur at this stage, but most students who make a successful transition to sophomore year will graduate."

Watford and Jean Kampe of the Virginia Tech Department of Engineering Education will oversee three new programs to be funded by the NSF grant. All three are based on existing programs, developed over the years by Watford and her staff, that in the past have helped improve retention and graduation rates for under-represented engineering students.

The Student Transition Program will offer mentoring and academic development to 100 incoming freshmen for five weeks during the summer before they enter Virginia Tech. Faculty from the engineering education, chemistry and mathematics departments will teach introductory courses and upper-class students will provide mentoring on academic skills and university life.


Academic Hispanic OutReach Alliance (AHORA), Black

Engineering Support Teams (BEST) and Women in Engineering Support Teams (WEST) — three existing programs originally developed for under-represented engineering students at Virginia Tech — will be expanded to assist 400 freshmen and 60 transfer students, most of whom come to the university from community colleges. Upper-class mentors will help the freshmen and transfer students learn how to cope and succeed during their first semester in engineering.

The third program, "Galileo," will offer a residential learning environment to 200 freshmen male students during their first semester. Galileo is based on Hypatia — the College of Engineering's residential program for first-year women in engineering, Watford said. Galileo will be a collaborative effort of engineering, other academic departments including chemistry and mathematics, and the university's Housing and Dining Services.

In addition, the engineering college will continue to offer numerous existing mentoring, tutoring, academic enrichment and scholarship programs through the Academic Affairs Office and Center for the Enhancement of Engineering Diversity.

Currently, Watford said, the Virginia Tech College of Engineering's retention rate for undergraduate students through graduation is 52 percent. Watford and Kampe have high expectations for the new NSF-funded programs — their ultimate goal is to increase freshman and transfer student retention into the second year to a level of 85 percent.

"This should translate into about 300 more Virginia Tech engineering graduates annually," Watford said. 

# NSF Awards Virginia Tech \$1 Million for Engineering Education

Contributed by Lynn A. Nystrom

The National Science Foundation (NSF) has awarded \$1 million to a team of Virginia Tech faculty to enhance part of the undergraduate curriculum in the Department of Biological Systems Engineering.

The curriculum, bioprocess engineering, is a relatively new area in the emerging field of biotechnology. It encompasses a wide range of engineering practices involving the use of biological feedstocks for the production of food, fiber and other value added products such as pharmaceuticals, biofuels, plastics, and industrial enzymes.

Graduates of this option normally work in the food, pharmaceutical, and biotech industries or with numerous other companies that manufacture bio-based industrial products.

The three-year NSF award comes at the same time as the Department of Engineering Education (EngE) at Virginia Tech is revamping its curricula to expand from offering only freshman level courses to offering graduate degrees in engineering education. EngE will continue to provide a modern, student-focused introduction to engineering for freshmen, and it will place a new emphasis on conducting research and offering courses and programs to alleviate the national shortage of engineering and technology instructors.


The National Academy of Engineering has lauded these efforts, citing Virginia Tech for initiating a “groundbreaking degree program in engineering education.”

With the NSF’s support, several members of the EngE faculty are now reaching out to improve engineering teaching practices with departments associated with the college. This unprecedented collaboration between engineering and education faculty, represents seven departments and three colleges.

Virginia Tech created the bioprocess engineering option five years ago, and student enrollment in this option has since increased by a factor of four. BSE anticipates a continued growth in this area, and is seeking to add three new faculty positions in molecular, metabolic and fermentation engineering.

The NSF project is under the direction of Vinod Lohani and Jeffrey Connor of EngE, Kumar Mallikarjunan and Theo Dillaha of BSE, and Terry Wildman of the Center for Excellence in Undergraduate Teaching and the School of Education. Additional members of the team include Tamara Knott, Jenny Lo, Richard Goff, and Mike Gregg from EngE, Mary Leigh, Mike Zhang, John Cundiff, Dave Vaughan, and Foster Agblevor from BSE, Ed Fox from computer science, G.V. Loganathan from civil and environmental engineering, Greg Adel of mining and minerals engineering, and John Muffo of the University’s Academic Assessment Program.

Lohani, the project’s principal investigator, said that the multidisciplinary effort “will serve as a model for promoting improved undergraduate pedagogy in the other 10 departments of the College of Engineering as well as in other engineering programs. Our NSF grant comes on the heels of an NSF planning grant received in 2003 under its Bridges for Engineering Education program. That grant is creating a contemporary framework for undergraduate engineering pedagogy.”

BSE is a department that resides in both the College of Engineering and the College of Agriculture and Life Sciences. 

# Resigning a Small Wind Turbine

## A Bona Fide Engineering Science and Mechanics Senior Design Project

by Enoch Dames

The concept is simple: you've spent three or more years taking all kinds of engineering classes, stuffing your brain with more information than you think you can handle, and Virginia Tech kindly forces you to take a class, which could be your first opportunity to put your knowledge to use. For those of us in Engineering Science and Mechanics (ESM), it's a chance to flex our "muscles of fundamental engineering principles." For you seniors going through the same process, you'll find this article is a great source of comparison to your own group's work. For underclassmen, reading this will hopefully give you something to look forward to your senior year. Nonetheless, every senior design project should clearly illustrate a student's ability to apply what he or she learned both effectively and comprehensively.

Finding something to work on can be the hardest part of the process, because selfishness always manifests itself through the desire to work on something you are interested in. The first thing I learned in my senior design class was that the teachers would not allow us to work alone. Yes, engineers are stereotypically asocial and over-confident. But, just like in a professional job, you must make compromises, and prepare to work closely with a group of people that you will call your team. Virginia Tech history shows that there have been groups that became so fed up with each other, they never completed their project. Of course, this is not the case with my team. My team, or more appropriately, our team, works with an Arizona-based company redesigning an existing small wind turbine, the Lakota.

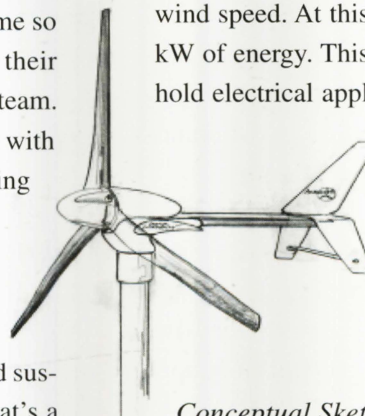
Before I get into our project, it's important that I mention what has motivated us to work on this project. It's probably obvious that our team agreed sustainable practices are important to our future. That's a

motive and a good one. Great, we're working on something we can be proud of. But, to satisfy the engineering department, we must prove that we can walk out into the workforce prepared to tackle real problems and tough projects. We must all complete this task.

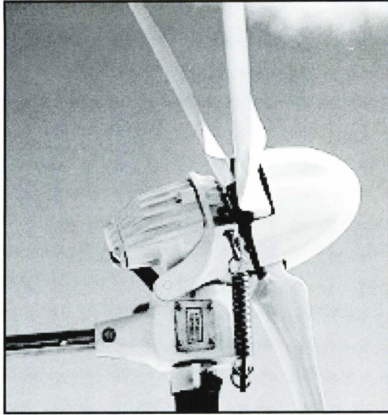
Can you imagine leaving Tech and joining a team at IBM working on the first marketable quantum computer? What about joining a team at Boeing building a new plane capable of holding over 700 passengers? It sounds intimidating right? Dynamics, E-theory, fluid mechanics — all those classes will only be there to support you so much. Working with others and sharing knowledge is the driving force of every successful engineering project. Most universities want their students to know what it's like to work on a real project before they graduate, and rightly so.

Our real project involves the current top performing wind turbine of its class for the past 20 years, the Lakota. This small turbine would interest anyone who either wants to get off the energy grid or is simply environmentally conscious.

Ideal wind conditions for the turbine are a steady 25 mph wind speed. At this speed, the turbine generates around 1 kW of energy. This energy can be directed to feed household electrical appliances or converted into heat. Furthermore, the energy can easily be stored in batteries for later use. Now, what are the problems with the current design and how do we plan to fix it?



*Conceptual Sketch of the new design*



*The Lakota furling around its two pins. Photos for this article compliments of the Lakota ESM senior design team.*

Above optimal wind speeds can overheat and damage the turbine. To prevent this, the turbine will rotate upwards, and therefore reduce the wind-induced force to the blades, which solves the overheating issue.

Take a look at the picture at the top of the page and notice the spring. This spring, and another one on the opposite side, allow the turbine to rotate upwards (furl) at high wind speeds. Unfortunately, the current springs are not designed to function optimally at the turbine's ideal operating conditions. More specifically, the turbine furls too early and too quickly.

Let's consider how this affects the performance of the turbine itself. If the turbine furls at wind speeds below 25 mph, it doesn't generate its optimal 1 kW energy output. If the turbine furls too quickly, it goes from producing its quota of energy to producing almost nothing (the blades will still spin when the turbine is furled). So, wouldn't it be nice to optimize the spring such that the turbine produces 1 kW of energy at speeds above 25 mph and while furled? Yes, and that's what we will do.

Knowledge of applied fluid mechanics, dynamics, and modeling techniques are allowing us to determine the forces on the turbine at any wind speed and furling angle. Determining this will allow us to design and select the appropriate spring.

But wait, here's another problem — water getting inside the turbine. Therefore, our goal also includes internalizing the wiring and springs, and keeping water from getting inside. With an internal spring, a coil design might serve best.

Knowledge of such design programs, such as AutoCAD, will allow us to construct our new design on the computer, before we actually build a prototype. Having just one prototype of the turbine built could exceed \$1,000.00. So, yes, being forced to learn AutoCAD in EF generally ends up being helpful irrespective of what field of engineering you enter.

Lastly in our goals for redesigning this wind turbine, we must consider industrial and marketing concerns. Know that any problems that surface in the stator (the motor casing) of the Lakota require part of it to be damaged. It sounds paradoxical, but it's the truth. We will redesign the casing to allow for easier serviceability, and thus reduce serviceability-associated labor costs.

Additionally, we will base our design on economically sound principles. You don't have to be a business major to know when to take advantage of simple business principles. There is no point in redesigning the Lakota, at its current cost of around \$1,600.00, if the new design will cost consumers over \$5,000.00. We plan to keep the consumer cost the same, or reduce it.

So there you have it — the quintessential ESM senior design project, just like every other one in ESM (yes, authoring this article gives me the right to advertise my major). Underclassmen, your efforts will not go unused. You will have to complete a senior design project. You will have two choices: half-ass your way through it like you've inevitably done with some other classes, or make the best of it and really apply yourself. Choosing the latter path will give you a taste of what is likely to come. It will give you something that sticks out on your résumé, and it will give you the confidence you need to enter the world of engineering. 📖

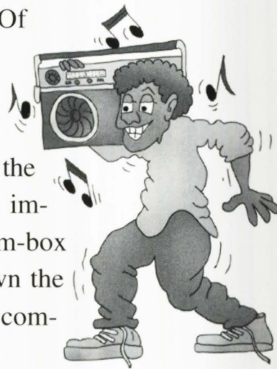
# Weird Technology

## Coming to a Surfboard Near You

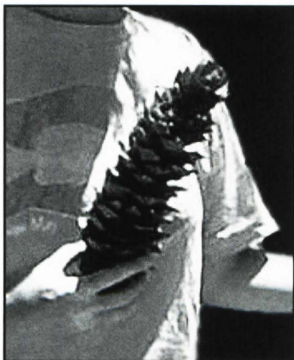
by London Fraser

### *Clothing of the future*

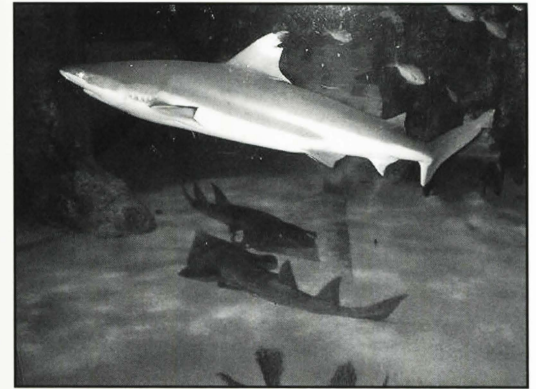
What happens when you weave copper wire and magnets into cloth? You get speakers in your clothing. That's what a Japanese firm claims to have created. They claim to have developed speakers that can be woven into cloth and wrapped around the face. This technology is not new, says a representative at Phillips research and development. Fourteen years ago, they were claiming that you would soon see a microprocessor in a tie. Of course, when this new technology will actually appear on shelves is up for debate. Perhaps soon, when you are walking down the street, instead of that early '90s image of a guy carrying a large boom-box on his shoulder as he walks down the street will be replaced by music coming from his shirt.



Another developing clothing technology takes its inspiration from pine cones. Pine cones, you ask? Yes, pine cones. This textile, designed by a London College of Fashion PhD student, Veronika Kapsali, would have weaves that open and close to keep you from getting too hot or too cold. Pine cones have two layers to help determine when to release their seeds. Lack of water stimulates this process, such as when they fall off the tree. The new fabric consists of a layer of thin wool spikes, or other water-absorbent material that opens when moistened by sweat, and then it closes again when the sweat dries. Underneath that layer of wool would be a waterproof layer that protects the wearer from the rain. We all know how in Blacksburg it can go from freezing cold to really warm within the span of a few hours. This material



is designed to make all that layering we use unnecessary. This is part of the new wave of "smart textiles," of which heaters built into ski-wear fall.



Technological research into textiles, whether it is practical as in the pine cone fabric or just for fun as in the speakers in your clothes fabric, is an interesting area with many possible uses for the future. What will they think of next?

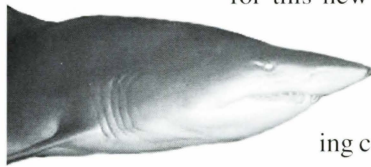
### *Shark-be-gone in a board*

Imagine this — you are innocently swimming in the ocean, or perhaps you are surfing, when all of a sudden a shark, unbeknownst to you, swims up behind you and chomps off your leg. This wouldn't happen if you have the ultracool shark-repellent technology — or would it?

Now, the idea of shark repellent sounds a bit off-the-wall I am sure, but it implements electronic technology that is being used for a number of marine and submarine applications. In the early 1990s, the Natal Sharks Board of South Africa developed its own successful shark deterrent. It consists of a particular electronic wave-form that affects the receptors on a shark's snout by over stimulation. Once the sharks swim within 4 - 7 meters of the electronic device, they experience pain and eventually muscle spasms. The bigger the shark, the more it will be affected by the electric field. You can consider it the "electric fence" for sharks, though it is not designed to hurt the sharks. Unless the shark cannot get away from the electronic field, they will be ok. This electronic technology is incorporated into a shark deterrent device called Shark POD.

Several similar devices for divers, snorkelers, swimmers, and surfers have been developed. Shark Shield™ is a smaller, newer version of the original Shark POD. It was developed by a South Australian company called SeaChange Technology. There are many professional divers who won't dive without the Shark Shield™.

For the surfers of the bunch, a new surf board is currently being developed using this electronic-wave form technology, and it should be available early next year. Other uses for this new technology, such as life jackets, are being considered. Oceanic environment testing is still being conducted, and the full impact on sharks is not known, but this new technology is expected to be implemented in quite a few more devices.,



### ***Another Final Frontier***

The Starship Enterprise isn't the only way to visit the final frontier. Previously, semi-conductors have not been able to function in environments where electronic devices have to run at high power. Now there is a new generation of silicon carbide semiconductors that could make the impossible possible; jets and cars could run cleaner and with more powerful, provide for clear radio and telephone communications, and send spacecraft on missions previously deemed suicidal. These new semiconductors are both larger and more reliable, consequently making them cheaper and more useful than ever before.

The problem with the current silicon chips is that they are very sensitive to heat and tend to malfunction in high temperature environments, which means that fans are necessary to cool them down. High quality silicon carbide chips have been hard to manufacture until now. Building up the crystal layer-by-layer produces reliable chips that can be used in high temperature or high power environments.

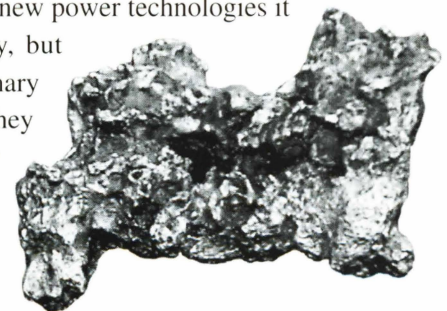
Possible uses of this new technology are huge. With this new technology, we could explore deep space and "go where no man has gone before."

### ***A Golden Opportunity for Hydro-powered cell phones***

Can water power your cell phone? Canadian researchers have demonstrated that it could. They have shown a new way of producing electricity that could power anything from mobile phones to the national power grid. This new method harnesses a liquid's electrokinetic properties. When a non-conducting glass container is filled with water, the glass develops a tiny electric charge while the water takes on the opposite charge. This could be the new alternate energy source, although it would require commercial development of large water bodies. Some are skeptical of the system, but the researchers, among others, are remaining cautiously positive. The team hopes to develop a prototype, in a battery, for eventual commercial use.

How about using gold to power your cell phone? Professors from Australia and South Africa have developed tiny sponges, made from pure gold, that hold promise to provide power. The researchers replaced the carbon in ultra-capacitors with gold, which are the devices that boost battery output during high demand. This increased the energy six fold. Gold is not that much more expensive than carbon, so there is only a slight cost increase. For the extended life, that cost is inconsequential.

For both of these new power technologies it is still very early, but given the preliminary research results, they both are very promising. What a golden opportunity. ☺



# Good Things Come in Small Packages

## Discovering the Diverse Microscopic World We Share

by Sarah Lewis

Imagine a world of strange creatures, captivating light patterns, and unbounded diversity. This world may seem strange, exciting, and captivating. It has captured the attention of scientists and artists for hundreds of years. No, it is not the farthest corners of outer space. You can find it right in front of you, if you know how to look, and you possess the right tools. This is the microscopic world.

The human eye can only easily detect an object as small as 1mm diameter. Only part of the world we live in falls into this category. Otherwise, we have to turn to science to peer into an invisible world. Through the first microscope, Anton van Leeuwenhoek offered civilization the first glimpse into the expanses of an ever-present but previously unseen world. Now, the technology that enables us to see this world continually improves. We can now see with such clarity and magnification, using new techniques and equipment, that we can actually see the p-orbital of a silicon atom.

Since Leeuwenhoek's first light microscope, scientists and engineers continue to improve and change his design to look deeper into a hidden world. Leeuwenhoek's light microscope was the first in a line of microscope technologies researchers discovered throughout the following years. The field of microscopy has evolved from relying on only light and lenses, to bombarding an object with small particles in order to observe its chemical make-up and smaller and smaller features.

Today, scientists and engineers use microscope technology to analyze specimens on the cellular, molecular, and even atomic levels. These observations and analysis can only sometimes be seen by a standard light microscope. The light microscope works on light-wave principles. Our eyes detect an enlarged picture from reflected or refracted light waves coming from a specimen. Because of the definite nature of light waves, our eyes cannot distinguish anything

smaller than 0.275 micrometers (1/2 the average wavelength of visible light), in a standard light microscope.

In order to peer deeper into this microscopic world, researchers had to find a method that would allow them to see more differentiation between objects. In order to accomplish this, they used the same principles as the light microscope, but with a smaller wavelength. Max Knott and Ernest Ruska co-invented this solution to this problem. In 1930, they created the first electron microscope. Researchers were then able to achieve a much greater focus and specimen differentiation.


As the electrons aimed at the object either scatter or absorb, the scattered ones form a representative image on an electron-sensitive photographic plate. Because an electron is smaller than an atom (since they make up part of an atom), optimally an electron microscope can distinguish the diameter of an individual atom. Researchers use this in order to see a molecule's construction.

With this method, unfortunately, the researcher cannot see what makes the atom unique or which atoms specifically make up a molecule, only its general shape and size. In order to "see" deeper into an object another tool must be used. An electron microprobe, while it does enlarge an object on the monitor, does not give a graphic image of an object. Instead, it gives the chemical make-up of a defined area. The researcher can then use this information to identify the sample or the sample's parts based on known chemical signals and combinations. This information can then be used to analyze the sample and determine how it was made (naturally or through industry) and what of. Engineers commonly use it to indirectly test and analyze strength through composition of a fabricated material, like steel.

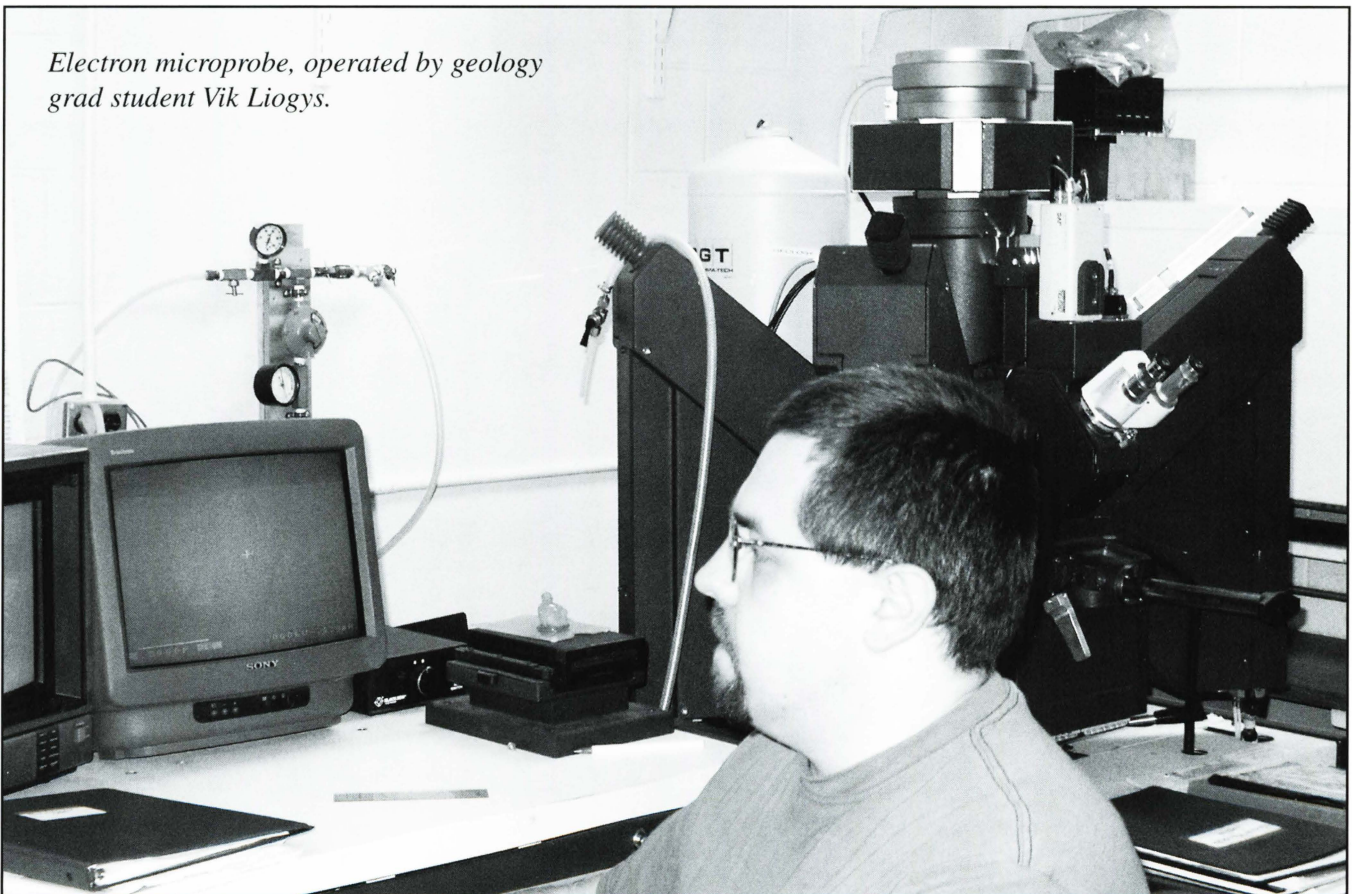
There are also many other microscope types used today for almost every field from biology, to engineering, to geology, to chemistry, and physics to name a few. Engineers use the increasingly sophisticated technology for a variety of projects. For example, these powerful new microscopes provide a useful new tool for semiconductor research and nanotechnology.

During the fall of 2004, an Oak Ridge Tennessee research team broke their own record, and according to The STEM group website (<http://stem.ornl.gov/index.html>) the research team, using a scanning transmission electron microscope, created an image of  $0.6 \text{ \AA}$  (0.6 of an average

light wavelength). This image not only broke their previous record of  $0.7 \text{ \AA}$ , but brought new clarity to atomic imaging. This is not the first microscope to show an image of an atom, but it is the first with this much clarity and definition. In the black-and-white image created, pairs of silicon atoms appeared as a regularly-spaced grid of infinity symbols ( $\infty$ ). These infinity symbols are actually the silicon atoms' p-orbitals aligned end-to-end.

So far this represents the deepest we have seen into the ever-expanding microscopic world. The more we uncover, the more we discover we don't know. What will we discover next as we probe deeper into the unknown? 

*Electron microprobe, operated by geology grad student Vik Liogys.*



## Alice is in UNIX land

"Can you help me?" asked Alice.

"No," said Negative.

"I'm looking for a white consultant." Alice pointed in the direction she had been walking. "Did he go this way?" she asked.

"No," said Negative.

She pointed the other way.

"Yes," said Positive.

Soon Alice came upon a large brown table. The Consultant was there, as was an apparently Mad Hacker, and several creatures that Alice did not recognize. In one corner sat a Dormouse fast asleep. Over the table was a large sign that read "UNIX Conference."

Everyone except the Dormouse was holding a paper cup, from which they were sampling what appeared to be custard. "Wrong flavor," they all declared as they passed the cup the cup to the creature on their right and graciously took the one being offered on their left. Alice watched them repeat this ritual three or four times before she approached and sat down.

Immediately, a large toad leaped into her lap and looked at her as if it wanted to be loved. "Grep," it exclaimed.

"Don't mind him," explained the Mad Hacker. "He's just looking for some string."

"Nroff?" asked the Frog.

The Mad Hacker handed Alice a cup of custard-like substance and a spoon. "Here," he said, "what do you think of this?"

"It looks lovely," said Alice, "very sweet." She tried a spoonful. "Yuck!" she cried. "It's awful. What is it?"

"Oh just another graphic interface for UNIX," answered the Hacker.

Alice pointed to the sleeping Dormouse. "Who's he?" she asked.

"That's OS Too," explained the Hacker. "We've pretty much given up on waking him."

Just then, a large, Blue Elephant sitting next to the Dormouse stood up. "Ladies and gentlemen," he trumpeted pompously, "as the largest creature here, I feel impelled to state that we must take an Open Look at..."

A young Job Sparrow on the other side of the table stood up angrily. The Elephant noticed and changed his speech accordingly. "...what our NextStep will be."

Half the creatures bowed in respect while the other half snickered quietly to themselves. Just then, OS Too fell over in his sleep, crashing into the Elephant and taking him down with him. No one seemed a bit surprised.

"What we need," declared a Sun Bear as he lapped up custard with his long tongue, "is a flavor that goes down like the Macintosh."

"Suddenly, the White Consultant began jumping up and down as his face got red. "No, no, no!" he screamed. "No one pays one fifty an hour to Macintosh consultants!"

"Awk," said the Frog.

"Users," explained the Sun Bear, "want an easy interface that they will not have to learn."

"Users?" cried the Consultant in disbelief. "Users?! You mean secretaries, accountants, architects. Manual laborers!"

"Well," responded the Sun Bear, "we've got to do something to make them want to switch to UNIX."

"Do you think," said a Woodpecker who had been busy making a hole in the table, "that there might be a problem with the name 'UNIX?' I mean, it does sort of suggest being less than a man."

"Maybe we should try another name," suggested the Job Sparrow, "like Brut, or Rambo."

"Penix," suggested a Penguin.

"Mount," said the Frog, "spawn."

Alice slapped him. "Nice?" he asked.

"But then again," suggested the Woodpecker, "what about the shrink-wrap issue?"

Suddenly, everyone leaped up and started dashing about, waving their hands in the air and screaming. Just as suddenly, they all sat down again.

"Now that that's settled," said the Woodpecker, "let's go back to tasting flavors."

Everyone at the table sampled a new cup of custard. "Wrong flavor," they all declared as they passed the cup to the creature on their right and took the one being offered on their left.

Totally confused, Alice got up and left. After she had been walking away, she heard a familiar voice behind her. "Rem," is said, "edlin."

Alice turned and saw the Frog. She smiled. "Those are queer sounding words," she said, "but at least I know what they mean."

"Chkdsk," said the Frog.

*Alice in UNIX land* was created by Lincoln Spector. © TEXAS COMPUTER CURRENTS SEPTEMBER 1989

## Car break trouble

A Software Engineer, a Hardware Engineer and a Branch Manager were on their way to a meeting. They were driving down a steep mountain road when suddenly the brakes on their car failed. The car careened almost out of control down the road, bouncing off the crash barriers, until it miraculously ground to a halt scraping along the mountainside. The car's occupants, shaken but unhurt, now had a problem: they were stuck halfway down a mountain in a car with no brakes. What were they to do?"

"I know," said the Branch Manager, "Let's have a meeting, propose a Vision, formulate a Mission Statement, define some Goals, and by a process of Continuous Improvement find a solution to the Critical Problems, and we can be on our way."

"No, no," said the Hardware Engineer, "That will take far too long, and besides, that method has never worked before. I've got my Swiss Army knife with me, and in no time at all I can strip down the car's braking system, isolate the fault, fix it, and we can be on our way."

"Well," said the Software Engineer, "Before we do anything, I think we should push the car back up the road and see if it happens again."

## FUN AND GAMES

### Engineering Creativity + Too Much Free Time =



Source: Aha! Jokes, <http://www.AhaJokes.com/>

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## PHOTO FEATURE

### Question: What are your plans for break?



**Rebecca Barnett**

Sophomore

Landscape Architecture

*"Work for money and see family."*



**Michael Rayl**

Junior

Civil Engineering

*"U.S. Army Reserves training."*

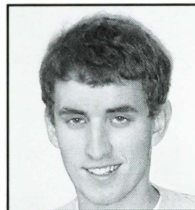


**Fred Gibson**

Junior

Industrial Systems Engineering (ISE)

*"Home to Houston to visit family."*

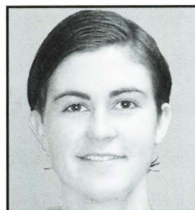


**Zack Bailey**

Sophomore

Accounting

*"Green Briar Resort with Juxtaposition."*

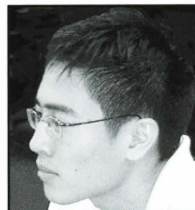


**Libbie Ayers**

Junior

Interdisciplinary Studies (IDST)

*"Chill with my family and am in a wedding."*



**George Luc**

Senior

Computer Science

*"Working at VT then traveling with the family to someplace warm."*

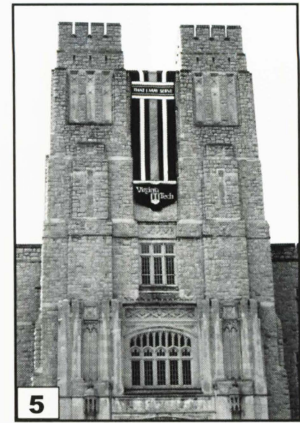


**Emily Rakes**

Junior

Psychology

*"Just working."*

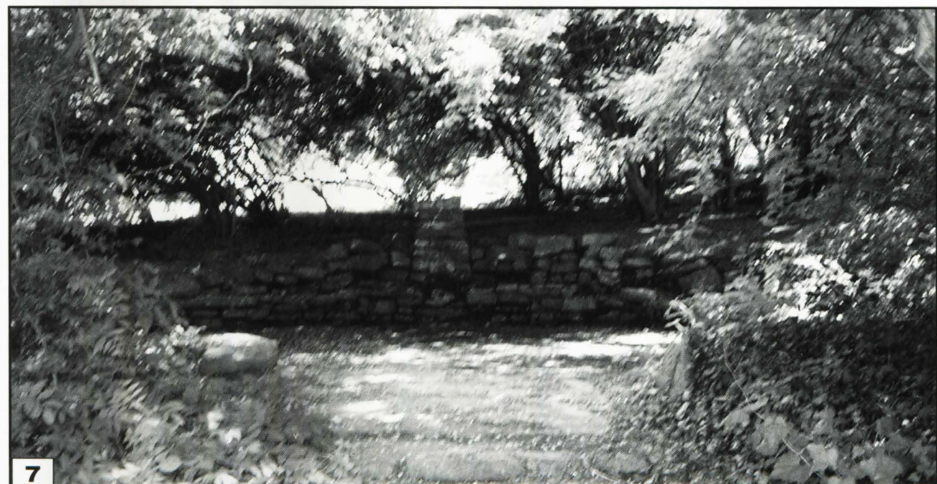
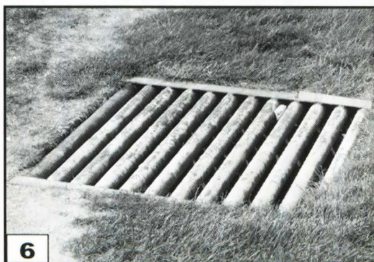
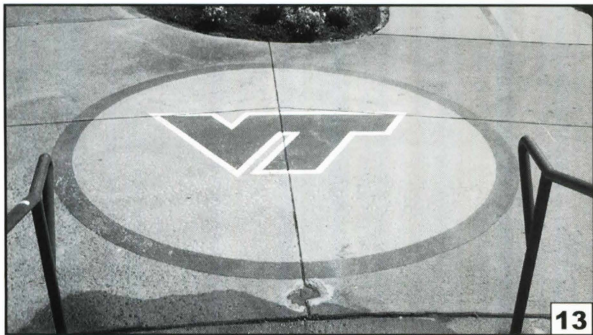


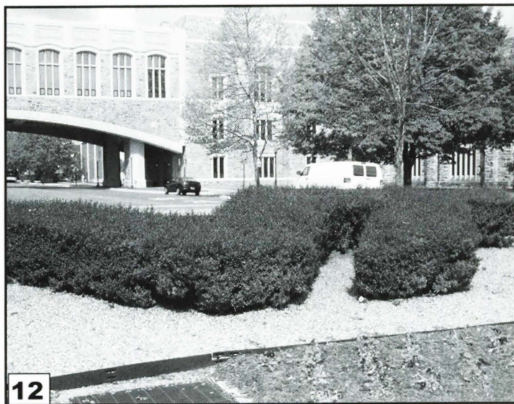
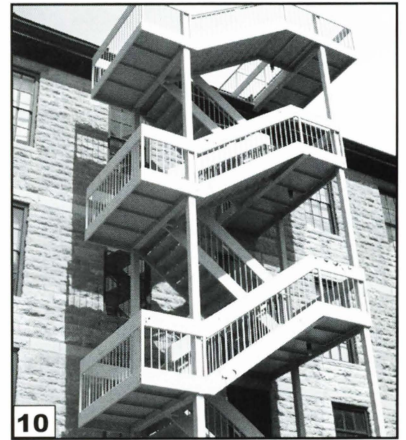
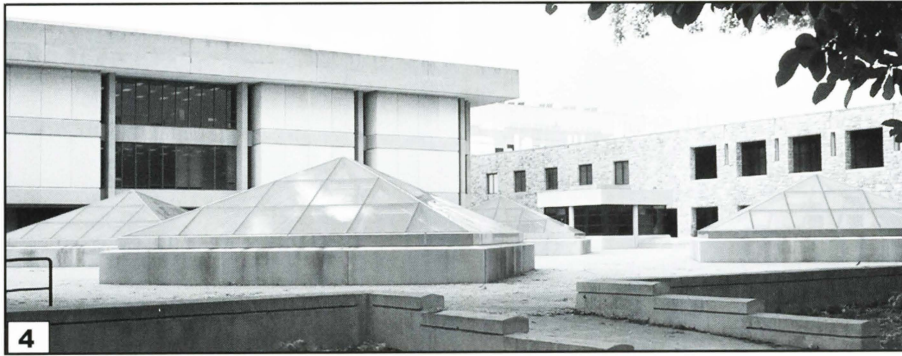
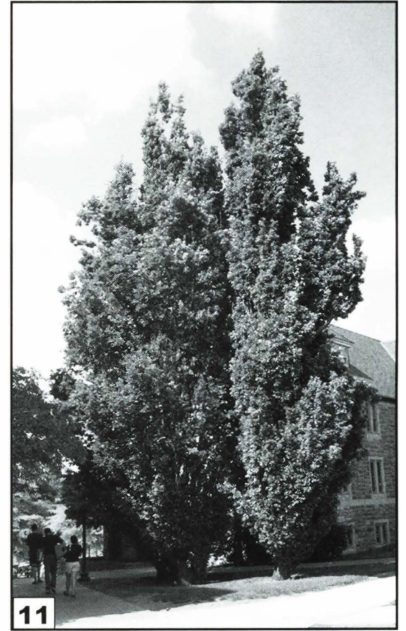
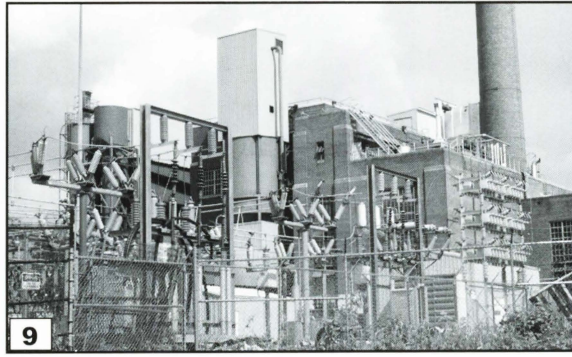
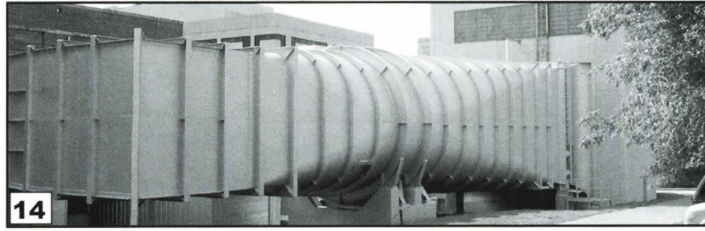
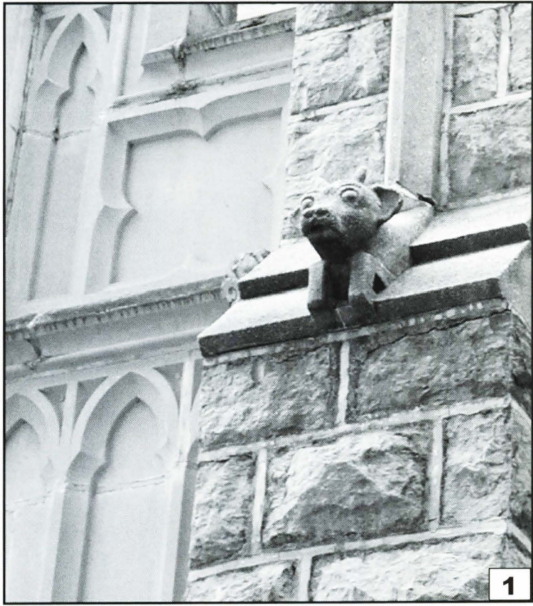
# where on *campus?*

Challenge: Identify what these pictures are of. Send in your answers by email to [forum@vt.edu](mailto:forum@vt.edu)

Reward: The people with the highest number of correct answers will be entered into a random drawing. The winner of the drawing will receive **two \$20 gift certificates** to the Outback Steakhouse in Christiansburg, VA, and his or her name will appear in the next issue.

Deadline: **Monday, January 10, 2005**





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# Engineering evolution

Written by Sarah Lewis

I was recently looking through our archives, and I noticed how much has changed in the past 60 or 70 years, as well as how much has remained the same. Change is one of the ideas propelling us to excellence as individuals, communities, nations, and as a species.

However, in the field of engineering and elsewhere, there are certain fundamental ideas that have remained relatively unchanged throughout the years. They have proven themselves to be either a system that works well, or just too old and crotchety to change. In any situation there is always something that needs work. Hey, that's what engineers are there for, to improve systems, technology, and lives.

In an old article from February, 1948 the *Virginia Tech Engineer* (as the *Engineers' Forum* was called then) ran a story titled, "Something for the Girls." In this article, the author explained the basic ideas behind calculus, under the intention to help girlfriends not "feel panicky when [her] man begins one of his explanations." The author compares calculus to making soup. He then ends with a moral of, "When he starts on a long-winded explanation, it is time to start supper, or take a vacation."

Being a scientific female, I am very grateful that this opinion is not so common anymore, and that women are not automatically assumed to only understand things in the kitchen. Through change, we are now accepted in any field, and can be found in pretty much any field.

So what has remained the same since the late 1940s? Virginia Tech's desire to make the engineering curriculum the best it can be has remained a constant through the years. In a letter from the dean, he described how the current requirements (at the time) were going to change in order to enrich the major by adding technical writing, economics, and western civilization, among others, to the list of required classes. He also addressed the concerns that the Engineering major should focus more on fundamentals.

Even today, with the new restructuring of the department and major, the College of Engineering continues to evolve and prepare its students for a dynamic and competitive work force.

~ Sarah Lewis

Readers are encouraged to send in suggestions, puzzles, jokes, puns, and anything else humorous and in good taste, for possible use in an upcoming issue. If you want to send something in, for whatever reason, either email us at [forum@vt.edu](mailto:forum@vt.edu), or send in a piece of paper, with your name, major, year, and submission. All paper submissions should be sent to:

VA Tech Engineers' Forum  
333 Norris Hall  
Virginia Tech  
Blacksburg, VA 24061



# Challenge

*It's like trying to find a slide-rule  
on an Engineering Campus!*

Your challenge, should you choose to accept it, is to locate the slide-rule somewhere in this magazine. It may be hidden anywhere: a photograph, an illustration, anywhere we could deviously think of to hide it. When you locate it, either send an email to [forum@vt.edu](mailto:forum@vt.edu) or an index card to:

**VA Tech Engineers' Forum  
333 Norris Hall  
VA Tech  
Blacksburg, VA 24061**

Here's what it looks like ...  
HAPPY HUNTING!



with your name, major, year, email address, and where you found the slide-rule by Monday, January 10, 2005. All correct entries will be combined in a random drawing, and the winner will be notified by Friday, January 15, 2005.

Also, the staff here at the *Engineers' Forum* would like to congratulate last issue's slide rule challenge winner, **Justin Baity**, a junior in Ocean Engineering. He won a \$5.00 gift certificate to Starbucks in Blacksburg. What will the next prize be? Enter to find out!

**writing,  
business,  
graphics ...**

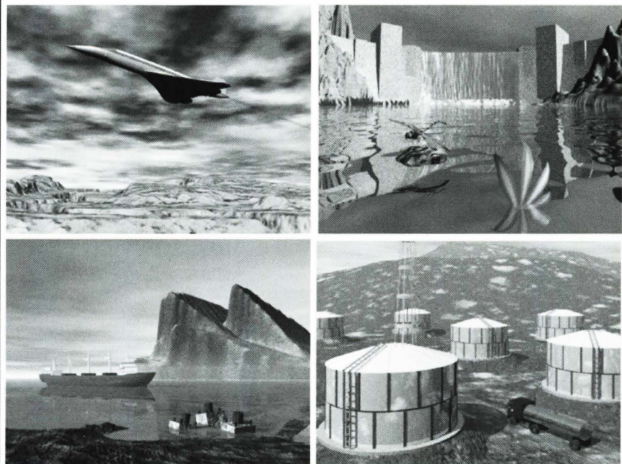
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