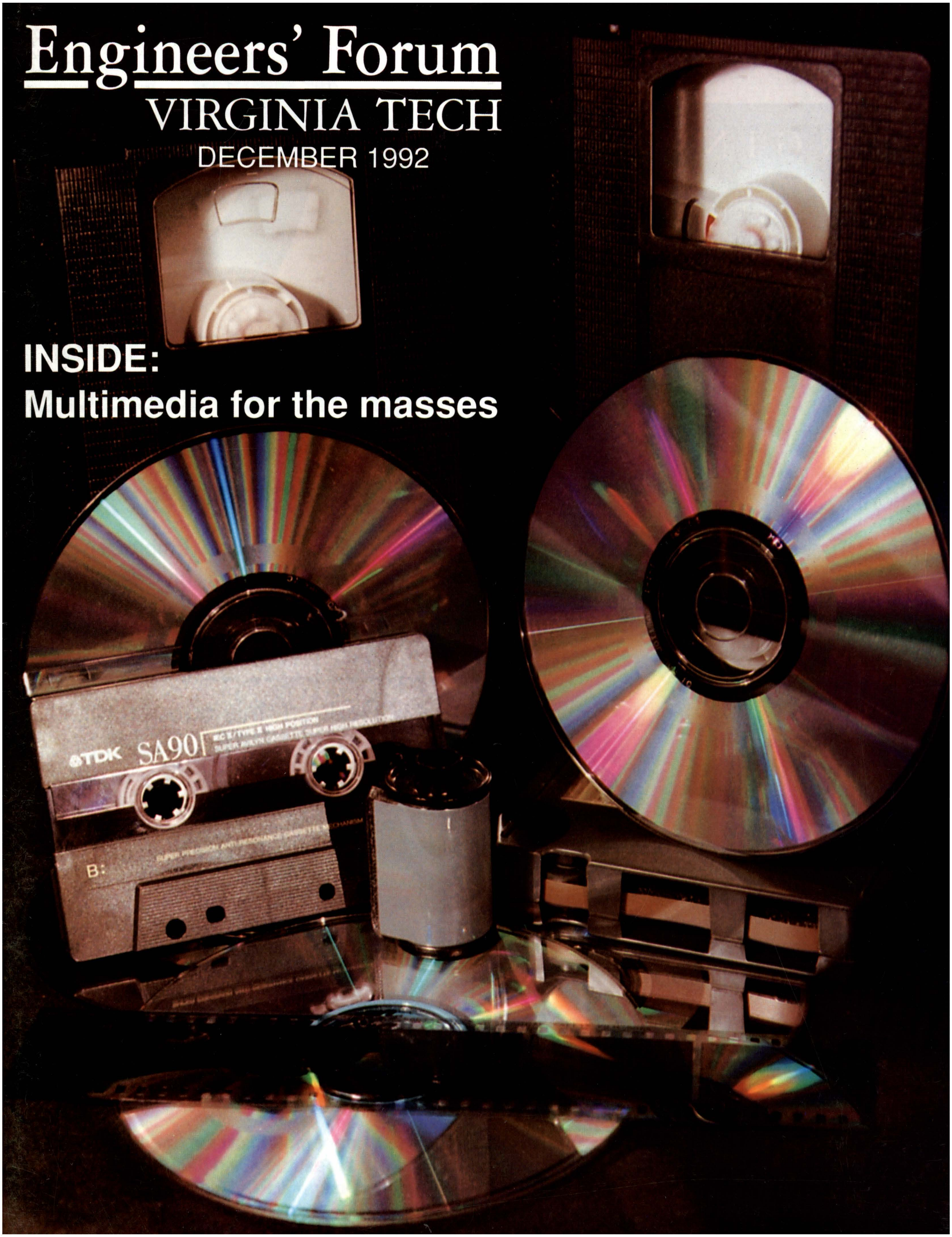
Engineers' Forum

VIRGINIA TECH

DECEMBER 1992

INSIDE:
Multimedia for the masses



ON THE COVER: *Multimedia merges video, audio, photographic, and computer technologies in the classroom. Photo by Mark Cherbaka.*

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Engineers' Forum
VIRGINIA TECH

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Educational diversity needed

As many engineering students are acutely aware, the current economic recession has significantly affected the availability of jobs. Although there are some fields which have benefited from an increased interest in environmental protection, many students, particularly those in defense related engineering disciplines, have found employment opportunities increasingly limited. To compete in such a restrictive job market, students must pursue a broadly based curriculum which both encompasses a variety of subjects and complements traditional engineering, math, and computer science courses.

In addition to fundamental engineering concepts, graduating engineers will be expected to grasp topics such as economics, manufacturing, and political science. Further, as many companies based in the United States look overseas to expand their markets, engineering graduates will be expected to posses a knowledge of one or more foreign languages. As markets in the former Soviet Union and other once closed countries become open, there will be numerous opportunities for entry level engineers who demonstrate such diverse skills.

At the undergraduate level, students may prepare themselves by choosing appropriate electives in the humanities and social sciences. However, it may be necessary for a student to pursue further courses beyond the required electives in order to become competent in one or more particular disciplines.

Beyond the undergraduate level, many prominent engineering universities have initiated multidisciplinary programs which combine engineering, business, and other related professions. MIT's School of Engineering and Sloan School of Management offer a two year program during which participants earn dual engineering and management degrees. Similarly, Stanford offers a graduate program which is comprised of both engineers and business majors. The students in this program design an actual product, build it, and then sell the product to a simulated market. Thus, business students learn manufacturing processes and techniques while their engineering counterparts learn financial management and marketing strategies.

As competition increases for the few available engineering jobs, prospective employers will have the luxury of choosing from the very brightest and most highly qualified applicants. However, the students will be measured on a scale which is not based solely on grade point average, but one that includes breadth and diversity of educational experience. Undergraduate engineering students must choose such educational paths to be competitive in future job markets.

Anthony Giunta
Anthony Giunta
Editor-in-Chief

What's a "Coofer?"

The mysterious origins of the word Tech students are all too familiar with is finally revealed in an Engineers' Forum *exclusive.*

Rumored to be tucked away in almost every fraternity and sorority house and supposedly hidden in a Corps of Cadets vault are vast collections of old tests, quizzes, homework solutions, and class notes for almost every course that has been taught at this university. These sources of information are commonly referred to as "coofers." Why is it that Virginia Tech students use this term when students from other universities use unimaginative names such as "old tests?" In an effort to uncover this mystery, *Engineers' Forum* staff members embarked on a search which led to our own magazine archives. The following article is reprinted from the February 1944 issue of the *Virginia Tech Engineer* magazine.

The Origin of the "Coofer"

by William Smith

Once upon a time there lived in Bluefield, West Virginia, or Virginia, as the case may be, a group of boys who attended Bluefield College — one of Tech's extension schools. They were, as a group, exemplary embryo engineers whose faults are common to all of us, but whose imagination has served to enrich the vocabulary of this campus by one word, that euphonious and vitally important morsel of slang, "coofer," and its various and multitudinous derivatives.

Their sophomore mechanism problem, one afternoon, was a difficult one and one of uncertain answer, even to this group of near geniuses. Ah, me, they wondered, what could be the right answer?

At this juncture, one of the more consecutive thinkers in the crowd recalled that a junior down the hall had completed the course. Could he help them? Down the hall they all streamed and into the junior's room.

"Sure, help yourself. There's a file of all those old problems of mine over there in that old coffer," and the junior indicated a trunk standing in the corner. The sophomores, after a reassuring glance at its concrete correctness, trouped back to their problem and a successful finishing of it.

As the days passed and the course became more difficult, frequent and still more frequent became these raids on the old coffer and its store of answers. Eventually, through constant reference to it, the coffer came to mean the problems referred to and not the old box they were kept in, and colloquialism changed the harsh sounding coffer to the more harmonious and beloved form, coofer.

The word was transferred to this campus along with several of the group of its originators, and it swept the campus like wildfire, for it exactly suited a long-felt need for a word of such definition. It soon began to appear in forms other than the noun, and is now used as a verb in such constructions as "to coofer a problem" — or the abbreviated form, "to coof an answer" — and as a very descriptive adjective as in "the coofer king" or "the coofer kid."

Its spelling, we believe, should be standardized in the form used herein, as this construction indicates the etymological derivation of the word from its worthy and deserving origin, the old Bluefield College coffer. Such transitory spellings as keuffer (from the slide rule of the same name) and koofer are frowned upon by modern reputable usage.

Today, cooferism is a popular aid to course passing, and the gathering of any and all old problems is held by some as a prerequisite for advancing in engineering work.

An eminent authority on the campus has stated: "The answer to all your problems is in the literature." A number of people rank the coofer as reference literature in its most useful form. The coofer will never replace brains and the slide rule as the engineer's greatest aids in gaining an education, but it will remain as the best short cut now available for faking one.

From surround sound to stealthy subs: **Intelligent**

by Beth Mader

Airplanes with wings that flap like a bird... wallpaper that plays music?

Last summer, Ann Carrithers, a senior in Mechanical Engineering, worked for the benefit of humanity. Tangible results of her work can be seen in the research lab of Virginia Tech's Center for Intelligent Material Systems and Structures (CIMSS). The lab is filled with well-designed graphic layouts explaining past research projects as well as the accoutrements of research in progress. Among the computers and delicate testing apparatus, on a shelf in the corner, is a box of earplugs.

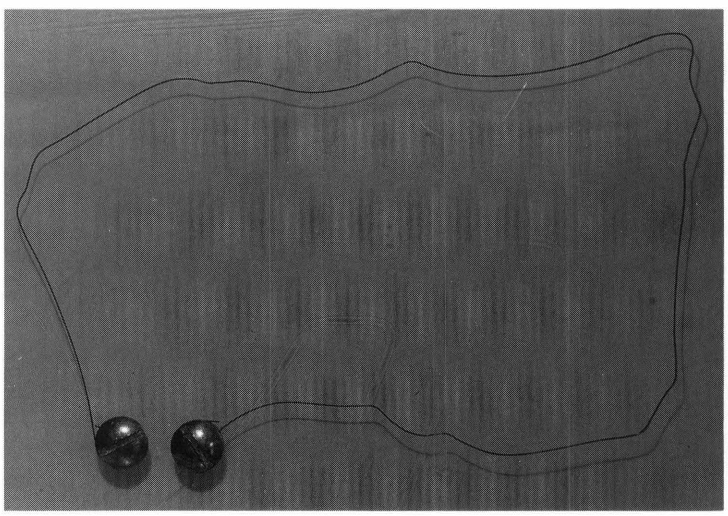
Ann's research, funded by the National Science Foundation, was concerned with testing a piezoelectric patch. As explained by Ann, her undergraduate research project dealt with "using piezoelectric patches as actuators. Basically, we bonded them in different configurations on an aluminum beam and looked at the response to particular input voltages over a range of frequencies, then observed the acoustics from the beam. Specifically, I compared at different configurations how much sound pressure was radiated from the beam at particular frequencies and at the natural frequencies of the beam."

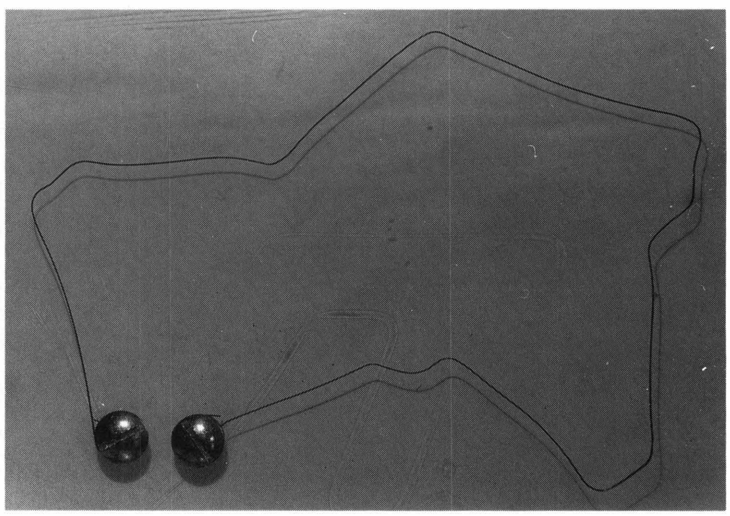
"The research had its annoying aspects. Specifically, when you actuate something at its natural frequency it goes wild and it makes a lot of noise—a really high pitched noise. There were two of us in the lab doing noise experiments at the same time, and we'd compete." Here she laughs, then concludes with, "They [the Center] didn't have earplugs when I was there; but after the two of us did sound experiments...they now have earplugs in the lab."

Ann's undergraduate research last summer does not only promise benefits for CIMSS researchers, however. Although many intelligent materials have broad applications, Ann described this project as "geared toward one particular application...for submarines. The piezoelectric actuators can be used on the hull of a submarine. When you use a radar system you send out waves and they bounce off the hull of the submarine. These actuators act as a control device. When these waves come and hit the hull they would cancel out those waves essentially."

Such a project might seem challenging to many undergraduates, but Ann said that, although the research was a full-time job, she enjoyed both the opportunities to work in an interesting field and the chance to investigate the realities of university level research. Commenting on her research, Ann said, "I was acting as a grad student. I worked forty hours a week as defined by my fellowship."

To make matters more challenging, the research was not the kind of experi-





Smart materials in action....

materials research at Virginia Tech

mentation for which undergraduate-course labs often prepare students. She was not given a set of procedures to follow, but instead was given a set of results which must be obtained. "They defined what I was supposed to get. The method was my part. I was lucky in that I had a lot of interaction with Dr. Liang Chen and Steve Stein, another researcher. Steve dealt with the theory behind my results."

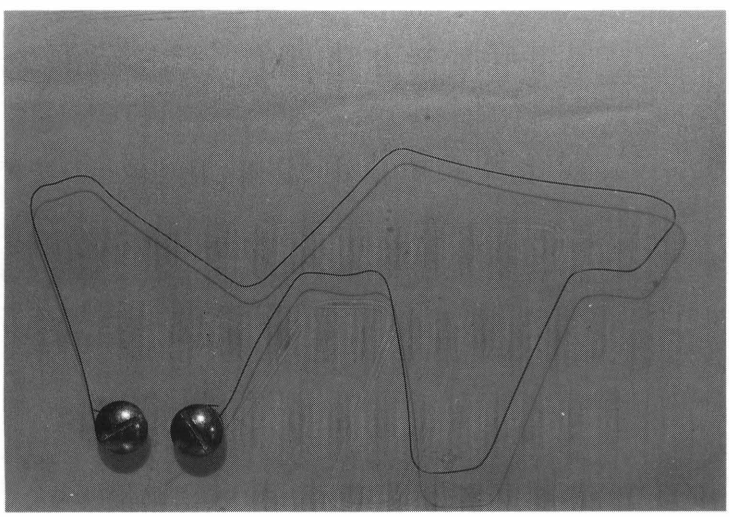
Far from being daunted by her challenging research, Ann did not stop her research when the summer ended. She is now doing more research for class credit. Although she does not foresee future work with the acoustics of piezoelectric patches, she is interested in continued work in smart materials.

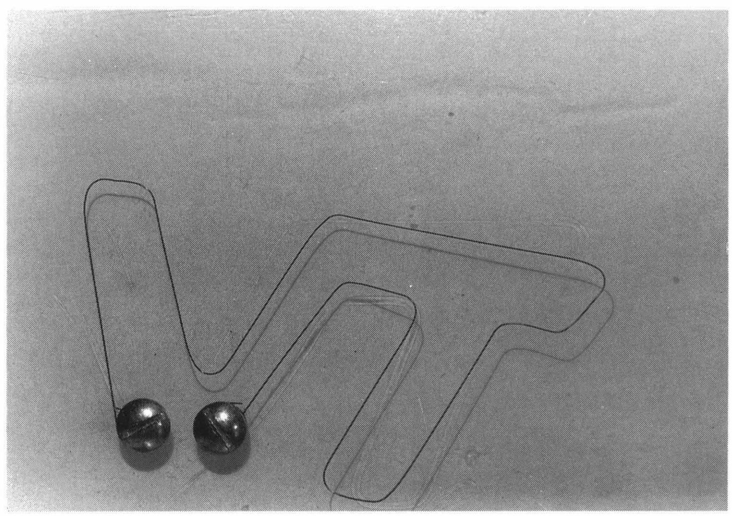
There is a lot of such work to be done. Intelligent materials is the new hot topic in international science. From surround-sound systems to super stealth submarines, from *Business Week* to the *New York Times* to *Science News*, the world science community is abuzz with the possibilities of intelligent materials. In this fast-growing area, Virginia Tech's influence is strongly felt. In the October 1991 edition of *Materials Engineering*, CIMSS's research into fiber optics and composite materials is cited as an example in the field. In the future there may be a thirty mile "smart highway" connecting Blacksburg and Roanoke. In the November edition of *Virginia Business*, Don Gardiner, manager of the physics division of Hercules Inc., a financial backer of Tech's research, is quoted as saying, "Tech is definitely in the thick of things...making an effort to place themselves in the middle of a new technology." In the same article Richard Hess, a research manager for Du Pont, another backer of Tech research, explains why Virginia Tech may become "one of the preeminent centers in the world for this sort of work....at VPI there's the fiber optics center, the composites center and a number of good mechanical engineering people. What I see there is a capability and all the pieces in place."

What is it that Virginia Tech and various other institutions across the world are striving for? Perhaps the question should rather be, what aren't they striving for — and the answer would be: "Not much." Intelligent materials hold the promise of a better world. Projects now underway include an airplane with wings that flap like a bird's, bridges that sense damage to their structural integrity and work to repair that damage, materials that 'remember' their shape and return to it after being bent, windows that darken in response to bright sunlight, wallpaper that plays music, pocket sized supercomputers, bricks that sense overloading and communicate that information. The list is as endless as the human imagination. As smart materials become more economical to develop and produce, they will be used more widely and in more applications.

Dr. Craig Rogers, head of CIMSS at Tech, sums up the aim of smart materials as the mimicry of biological organisms. In the foreseeable future, human beings may have at their disposal materials that respond to stimuli, fix themselves and perhaps even evolve.

Ann Carrithers is interested in continuing in the field of intelligent materials, however that was not her main purpose for looking into undergraduate research. She is now checking out graduate schools and says that one of the best results of her summer's work is that she has gained a better idea of what to look





Photos by Mark Cherbaka

...electrical current transforms the wire to its original shape.

Smart materials hold the promise of a better world

for in graduate schools and programs. She learned what facilities and opportunities she should expect from a graduate school. At the same time, she learned the fundamentals of research: "What it involves, methods, instrumentation. I learned what I wanted to learn. The bonus was learning about CIMSS as I checked out the graduate world."

For similar reasons, she would recommend undergraduate research to anyone who intends to continue on to graduate school. She asserts emphatically, "Definitely look into undergraduate research if you're looking at grad school. If you have any particular interests like thermodynamics or robotics, try for a project that is concerned with that. But either way, I advise research because it prepares you for what to expect in grad school."

She adds a word of encouragement: "A lot of research isn't as exciting as it could be." Away from the glamorous projects of surround sound and supercomputers, however, "the behind-the-scenes projects can also be very interesting, if not quite as exciting" or easy to explain. She emphasizes that an undergraduate student has to be "persistent" in seeking research position. To avoid getting involved in research which is not appealing, a student must be careful to investigate all of the possibilities.

Most Tech students do not realize how many opportunities for undergraduate research exist. Almost every science-based department receives grants and fellowships to fund undergraduate research. In Ann's case, she heard about the project in which she would eventually take part in classes she had with Dr. Rogers. "I was in his office and he mentioned that there was a research position open. I think the first thing that really interested me in smart materials was a pair of glasses he had. He could bend them...and they'd return to their original shape. I just thought that was really neat."

Once she decided that she was interested in the research position, she interviewed with Professor Rogers.

This interview lead to a summer of loud noises, a summer of collaboration with co-workers in a department that is at the forefront of a new frontier of science. Would Ann Carrithers do it again?

"Oh yes, definitely I would. But I'll be doing something new." Which is, of course, one of the most appealing aspects of research, undergraduate or otherwise.


Photo courtesy of CIMSS

Ann Carrithers intently works on the future of smart materials.

Pounding pollution is profitable

by Steve Walder

In one of the latest developments in the ongoing fight against pollution, Tech senior Jon Showalter has developed a process to filter out contaminates present in soil at coal mining sites.

In recent years, pollution of the earth has become a major concern of the world community. In response to this concern, Virginia Tech has devoted many of its resources, the main one being Tech's student body, to developing new ways in which to clean up the planet. Through student research, new ideas can be explored and applied to this worldwide problem.

One such effort is currently being researched at Tech by Jon Showalter, a senior in mining engineering, who is involved in the clean-up of coal mining sites.

When coal is mined, contaminates are present along with the raw material. These impurities are left behind after filtering and they contaminate the soil around the work site. This soil has recently been classified as a hazardous material and therefore is expensive for the company to dispose. Costs can be as high as $300 per barrel to store the material at proper sites.

Showalter, under the advisement of Dr. Gerald H. Luttrell, has come up with a process he believes can reduce the amount of contaminated soil while also cleaning up the already contaminated soil.

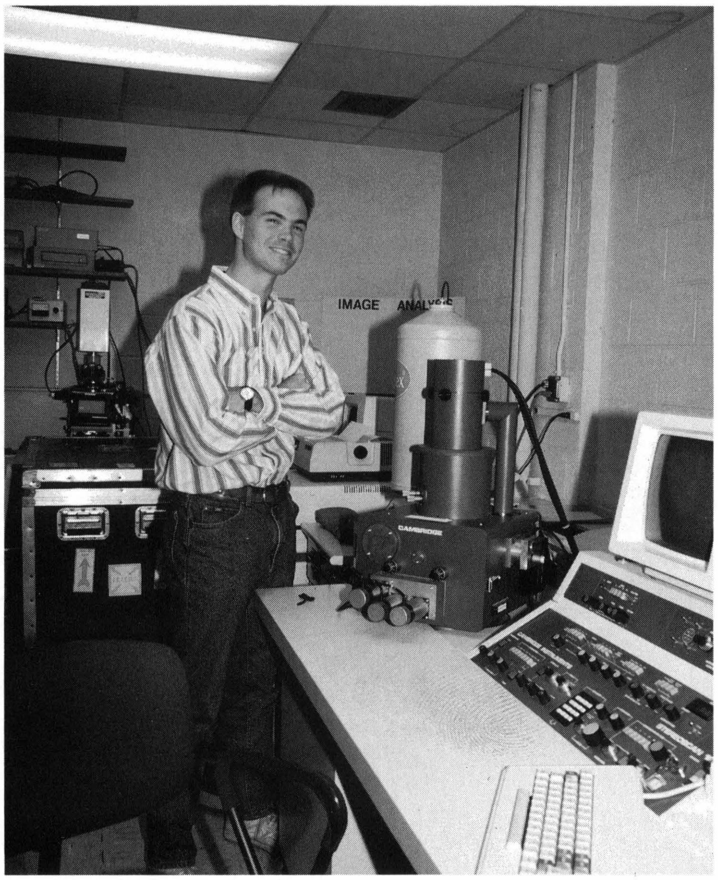


Photo by Lisa Traub

Jon Showalter uses the Scanning Electron Microscope to analyze soil samples.

One way in which coal can be processed is through the Microcel process, patented by Virginia Tech. In this process, coal which is bonded to hydrocarbons floats to the top of a floatation column while other impurities settle to the bottom.

Showalter believes that if the contaminated soil is put through the Microcel process along with the raw coal, the hydrocarbon contaminates will bond with the coal and the remaining clean soil will settle to the bottom. These hydrocarbons will then be sent to the furnace and burned with the coal causing little effect on the environment.

The investigation into this proposed process has just recently gotten underway and is still in the field work stage. Showalter has taken soil samples from various Pittston Coal sites, the company sponsoring the research, and analyzed them with the equipment at the Virginia Center for Coal and Minerals Processing, located here at Virginia Tech.

One of the major tools used in this research is the Scanning Electron Microscope (SEM). This tool allows the soil samples to be analyzed on a minute level. The use of the SEM has already led to some interesting results. When the proposed process was first tried, it did not work. By analyzing the soil under the SEM it was found that the hydrocarbons and the soil had clumped together and could not be filtered out using the Microcel process. Showalter then decided the soil should therefore be blunged (broken down) before entering the flotation system.

The research into this process is still continuing. If the process can reduce the amount of hazardous material by just one percent, it will save the company thousands of dollars, and it just may save the earth a little longer.

MULTIMEDIA: The education

Computers are taking on a new and more varied role in education. Virginia Tech leads this movement as it steps up to the responsibility of educating tomorrow's engineers with multimedia.

by Mike Reese

Multimedia is the buzzword of the year on campus and around the country. The country saw one end of multimedia as the band U2 toured across the globe, captivating people with their ZOO TV broadcast tour. Utilizing multimedia, U2 took concert goers to a higher level. The College of Engineering in conjunction with the College of Architecture and Urban Sciences hopes to elevate their students to a new level of education with the newly opened Multimedia Lab in Hancock Hall.

Gordon Miller, director of the Multimedia Lab, gave this definition of multimedia: the combination of text, graphics, complex animation, video, and audio into a single interactive experience. Stored digitized video is retrieved along with digital audio, graphics, or text and merged into a visual/audio presentation.

One dimension of stored information is CD-ROM. CD-ROM has the ability to store up to 600 megabytes of data per disk, and is relatively inexpensive compared to other devices such as a fixed disk. Unlike a fixed disk, CD-ROM is transportable with little risk of damage. This makes CD-ROM disks ideal for sharing between a number of students within a class.

How does a student take advantage of all that is offered by multimedia? The answer is to simply go to class. Gordon Miller explains, "This facility is designed to help faculty and their graduate students who are working on developing multimedia for the classroom." The process begins when a professor creates a package, and then brings it into the classroom. As the lecture proceeds the professor can illustrate a point which cannot be done on a chalkboard, using a monitor or overhead projector connected to a computer. An example is the teaching of 3-D visualization. Students will be more apt to learn when a Macintosh can simulate 3-D motion in nearly real-time. Miller points out that this makes learning more efficient. Time is not wasted on drawing and redrawing pictures. Visuals which evoke emotion will keep a student's thought concentrated on the lecture. Studies have shown that students are twice as attentive and thus learn more when multimedia is used. If a student does not grasp a certain component of the lesson, he or she can review the information at their own pace, and as many times as needed at a later time.

Freshman computer packages, offered by the university, will hopefully contain a CD-ROM drive in the future. This means that a student would not even have to leave the dorm or apartment to get this extra exposure to material.

Though students will mainly see multimedia in class, they will not be completely excluded from the lab. If a project can be enhanced by the implementation of multimedia, the option to do so is there. Initially, the majority of student projects in the lab are expected to be graduate students working on their theses.

There has been a class which uses multimedia as a foundation. The Training Systems Design class (ISE 5634), is a first-year graduate industrial systems engineering (ISE) class that will have the option to build a user interface design that will actually be put into use. In the past, the class would have designed such a project on paper. Multimedia gives them a chance to create and implement, instead of just theorizing.

Undergraduates have the same access, but their need is foreseen not to be as great. Departments with a senior design project may instruct their students to augment their presentation. These seniors are ambassadors of the school. If these students can improve their performance, it not only helps them but it strengthens Virginia Tech's reputation.

Multimedia is not a new concept, the College of Architecture and Urban Sciences put together a presentation analogous to U2's concert experience in 1989. The project celebrated the college's twenty-fifth anniversary, giving a survey of past projects and focusing on different faculty. The project involved a total of a 180 students compiling more than 10,000 man hours, under the supervision of Ron Daniel, Associate Professor of Architecture.

The hour-long presentation used three 16-millimeter film projectors, three 35-millimeter slide projectors, and three video projectors. It was accentuated with nine ten-foot diagonal screens and an audio system. Although a computer was not used in final presentation, computer animation was stored on video cassette. It was Tech's first look at what was yet to come, and Gordon Miller's foundation for entering into this area.

As stated, multimedia is not a new idea, what is revolutionary is its extensive use in the classroom. This is one of the reasons this lab was made a reality at Virginia Tech. The College of Engineering is part of the seven member association SUCCEED (Southeastern Universities and Colleges Coalition for Engineering EDucation). This group is dedicated to reworking the engineers' education to suit today's engineering environment.

Virginia Tech was selected as the Information and Technology Center for this coalition in part because no other university in the group could meet the demands for the lab. Tech also has the largest CAD/CAM system of the group and UNIX workstations all over campus. This foundation led to the decision that Tech should be given the research

revolution

in the field of multimedia.

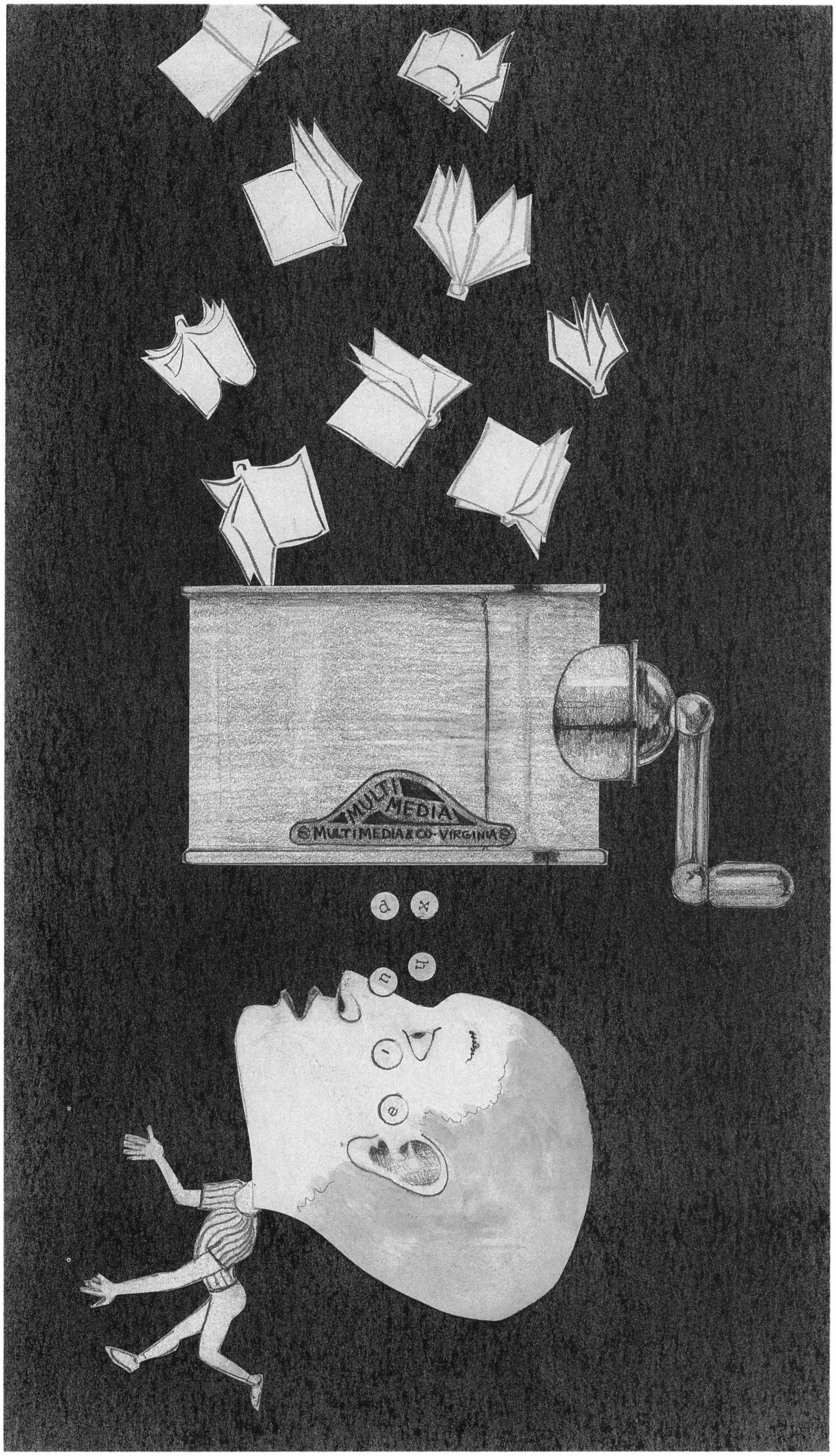
With SUCCEED's support, the support of the National Science Foundation (NSF), and university monies donated, Virginia Tech is leading the movement, which soon will have a large number of institutions jumping on the bandwagon.

It is obvious that multimedia is an important step in educating tomorrow's engineers, but ultimately where is multimedia headed? Gordon Miller summed it by saying that every century there is a revolution. In the late 1800's the Industrial Revolution changed peoples' lives, from day-to-day interaction to where they lived. The next century will see a communication revolution sparked by multimedia.

Communication media will become mainly digital. For optimum usage the networking must fall in place. It is good now, but not good enough. The computer will also include all audio and video from one medium instead of multiple sources. Computer Science and ISE students will be helpful in evaluating the effectiveness of multimedia. Working on projects and analyzing the outcome will determine what works and what does not in multimedia. Those who follow will know in what directions they should head, and what benefits to target.

Students today were the first generation to grow up with video games. They were the first children to play Atari, and since have moved on to Nintendo. Compact discs have outdated records and eight-tracks. Music videos are part of a daily schedule. Multimedia pulls all of these familiarities together in a learning environment. As students obtain computers with multimedia capabilities, the classroom will be expanded to the home. Students will be able to pull from a multimedia library of 5,000 to 10,000 images here at Tech.

Education must change to meet modern technology's demands, while accounting for elements which are part of today's students' daily life. Multimedia will play a key part in this education revolution, and in turn will create its own revolution.



Learning through multimedia as depicted by staff artist Aaron Golub.

Value engineering in structural analysis

by John Cole

The research team of Dr. Jesus De La Garza, Primo Alcantara Jr., and Tom Sayles, are constructing a Microsoft Windows application that will be able to analyze and interpret characteristics of a structure, from the inception stages to the actual completion of the structure, and beyond.

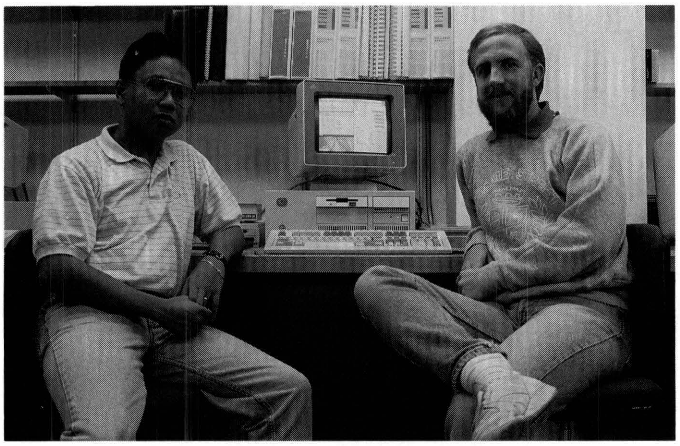


Photo by Mark Cherbaka

Primo Alcantara, Jr. and Tom Sayles at work in the computer lab.

Suppose someone wants to construct a building. That person will have specific ideas of what they want in their building, such as a large conference room, a weight room, or a controlled climate. After communicating the ideas to a designer, the building will pass through the draft stages, the construction stages, and the finishing touches. However, upon completion, the person will often find that the building is not all he or she expected, as their ideas for a wonderful building have been misconstrued. One solution might be for the person to singlehandedly design and construct the building. However, as that is probably unreasonable, the need becomes evident for an application that will bridge together all aspects of building construction.

This is the problem that researchers Tom Sayles, a senior in civil engineering, and Primo Alcantara, Jr., a graduate student in civil engineering are trying to remedy. The project, directed by Dr. Jesus De La Garza, is being developed as a Microsoft Windows application consisting of an artificial intelligence engine (Kappa), a computer-aided design platform (AutoCAD), and an electronic spreadsheet (Microsoft Excel). Sayles is handling the CAD and the spreadsheet work while Alcantara is handling the artificial intelligence.

Artificial intelligence as a whole consists of many separate fields. It can be used as a natural language processor, in which a computer will be able to 'converse' with a user. It can be used in a robotic sense in which a computer will be programmed to 'think,' react to stimuli, and to make decisions. In this project, however, the artificial intelligence is used as more of a knowledge-based system. The artificial intelligence application in this project is designed to be able to 'understand' the original intent of the owner, and to put those requirements into terms the designer and contractor can understand. This way, none of the owner's wishes for the building will be lost in the translation from design to construction. This program will also be useful as a reference tool after the building has been built in the sense that it will be known what the owner had in mind for the building when it was designed. That way, if structural, functional, or cosmetic changes need to be made, it can be understood why the building was designed the way it was. The knowledge base concerning the building and its design will be captured by the combination of the artificial intelligence, the spreadsheet, and the CAD program.

The knowledge base will contain all of the dimensions, performance and functional requirements, and specifications of the building. By doing this, the building can be analyzed in quantitative and qualitative ways. This can be useful if, for example, an engineer needs to see the effects of changing the length of a beam or changing the type of concrete being used.

While the artificial intelligence aspect of the project deals with converting ideas and designs into reality, the spreadsheet and computer aided design applications deal more with using those ideas and optimizing the structure. Optimizing the structure and its properties falls under the categorization of "value engineering," a concept the research team knows well.

Last August, Sayles and Alcantara traveled to Savannah, Georgia for three days to learn about value engineering. The event, sponsored by the United States Army Corps of Engineers, consisted of the intense evaluation and analysis of an Air Force hospital in Alaska. The conference participants first scrutinized the hospital, and then

See Value, page 14

To EF or not to EF
(The freshman engineering perspective)

by Seth Cox

It all began on a hot August Saturday. Thousands of anxious freshman began the first day of the rest of their lives. They said good-bye to their old lives and started their journey onto the road of the future. Many of these freshmen have enrolled in the grueling curriculum of the College of Engineering. These young men and women have come to Virginia Tech to pursue a career in an engineering field, but it is not exactly what they might have expected. I am no stranger to this feeling, though, for I am also one of the many who have decided to become an engineer. Our idea of what an engineer does has changed one way or another; some for the better, some for the worse. The opinions on every aspect of a freshman engineer's life vary greatly.

Just like for all freshmen, the biggest part of college is adjusting. The average freshman must begin an entirely new life. Basically, he or she must learn to live on their own, and become more independent. The transition from high school to college is different for everyone. For many of those who came from large high schools, the transition to college life was easy. Himanshu Panchasara, who is from the Richmond area, felt this way. He is from a large school, plus a lot of people from his class are attending Tech. Elizabeth Sproat, from Pasadena, Maryland, is also from a large school but she found the transition difficult because she did not know anyone here. She has met a lot of people, though. "It's just hard to make good friends," she says. There is just so much going on that students have too busy a schedule to get to know other students really well. It is simply a question of time when making new friends. This is but one sector of adjusting to college life.

The major difficulty for many freshman engineers is the work. For some it may be easy, but to most it is quite challenging. It is not always the material, though, it is mostly the amount of work. The overall consensus is that the amount of work assigned is more than was assigned in high school, I know it is for me. I have probably done more work so far than I did all of my junior year. Many found it easy to get by in high school without doing all the work. Here, though, it must be done to even keep up. Students have even found that they must do more than just the assigned work to keep from falling behind.

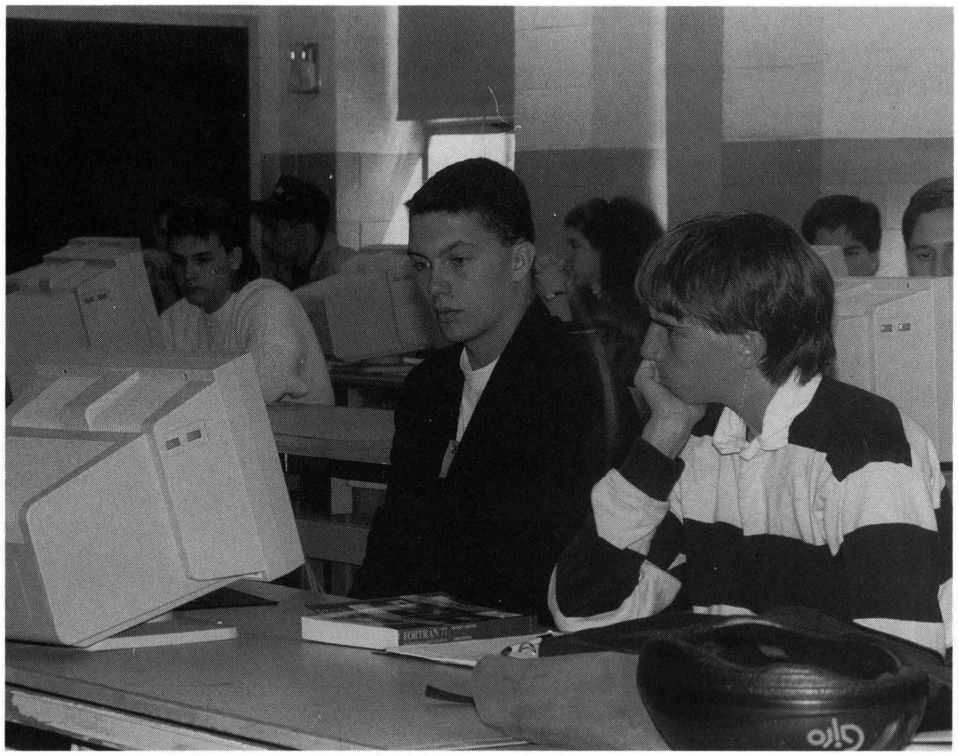


Photo by Lisa Traub

Professors teach EF students CADKEY and Fortran via a computer monitor.

Another part of classes that is much different from high school is the number of grades. In most classes there are four or five tests that are the only grades, as compared to at least ten or more in high school. It requires a lot more time to be put into studying. Each grade counts quite a bit, so students need to be well prepared for their tests. This preparation must be done mostly on the students' own. This is another big adjustment.

Two lessons that life here at Tech has taught many freshman engineers and other freshman as well, is self-reliance and self-discipline. Because very little work is collected, it is up to the student to take the initiative to do all the 'required' work. There are no parents to 'order' the work to be done. In the larger classes, there are no teachers directly telling each student to do all the work. The freshmen students must learn to motivate themselves and to strive for the best, pretty much on their own. It does not really matter whether or not the student is naturally independent because just being independent is not enough. It must be accompanied by motivation and discipline. Most freshmen have, or soon will have, finally learned how to keep up and still have a little spare time. It may

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EF

Continued from page 11

have taken a failed test or several missed classes to learn, but for some it just takes more of an 'awakening' to realize they must devote more time to their studies. Many, though, have found enough time to join different organizations, such as the University Unions and Student Activities, various fraternities and sororities, and of course, the *Engineers' Forum*. Freshmen have quite a few things to do on top of their initial studies.

All of these options can create problems in time management, though. Freshmen are faced with the dilemma of how to manage their time wisely. Many learn that procrastination is no longer possible. The more time work or study is put off, the harder it is to comprehend and remember. Too often, freshmen find themselves doing other things when they should be working. Then they are up quite late doing what could have and should have been done much earlier. This is especially true when it comes to working on the computer with Fortran or TK Solver. Many problems occur when freshmen work with such programs. As a part of the freshman engineering curriculum, learning to use these and other programs is a necessity for progress in an engineering education.

There are mixed feelings among freshmen engineers. Some students feel engineering is not what they want to do any longer, and withdraw from their engineering fundamentals class. Some still want to be engineers, but may not be doing too well in their EF classes. Then there are those who still want to be engineers and are doing well. Tina Joeh, who attended high school in Taiwan, feels EF classes teach students the foundations of engineering, which is basically problem solving techniques. She also feels, though, that EF is a "total weed out class." The class is meant to see who can keep up, and those who can will be accepted into a particular department in the spring. There is no majority opinion on EF classes mostly because the professors teach differently. Some freshmen like their EF professor and some do not. Some students like the actual class and some do not. It all depends on the student. He or she must be willing to learn and devote as much time as necessary to excel in their freshman year of engineering.

Most freshmen engineering students seem to like it here at Tech. There are some major complaints, such as the food, early classes, and the work. The overall opinion of life as a freshman engineer seems positive, though. I know I am enjoying my first year here, I am even learning a thing or two. We as freshmen engineers are the future and the future is all we have, so we must learn to improve it. I think we all realize this, we just forget to remember it sometimes. We will all learn, it just takes hard work and determination.

The facts about undergraduate research

by John Cole

One of the more unnoticed, and certainly one of the more underdeveloped, aspects of the College of Engineering is undergraduate research. Talk to any professor currently involved with an undergraduate in research (if you can find one; they are hard to come by), and they will gush forth about how advantageous it is for both the university and the student. They will tell you that we need to get more publicity for those kind of projects, and they will tell you about the funding and the capabilities this school has to make undergraduate research possible.

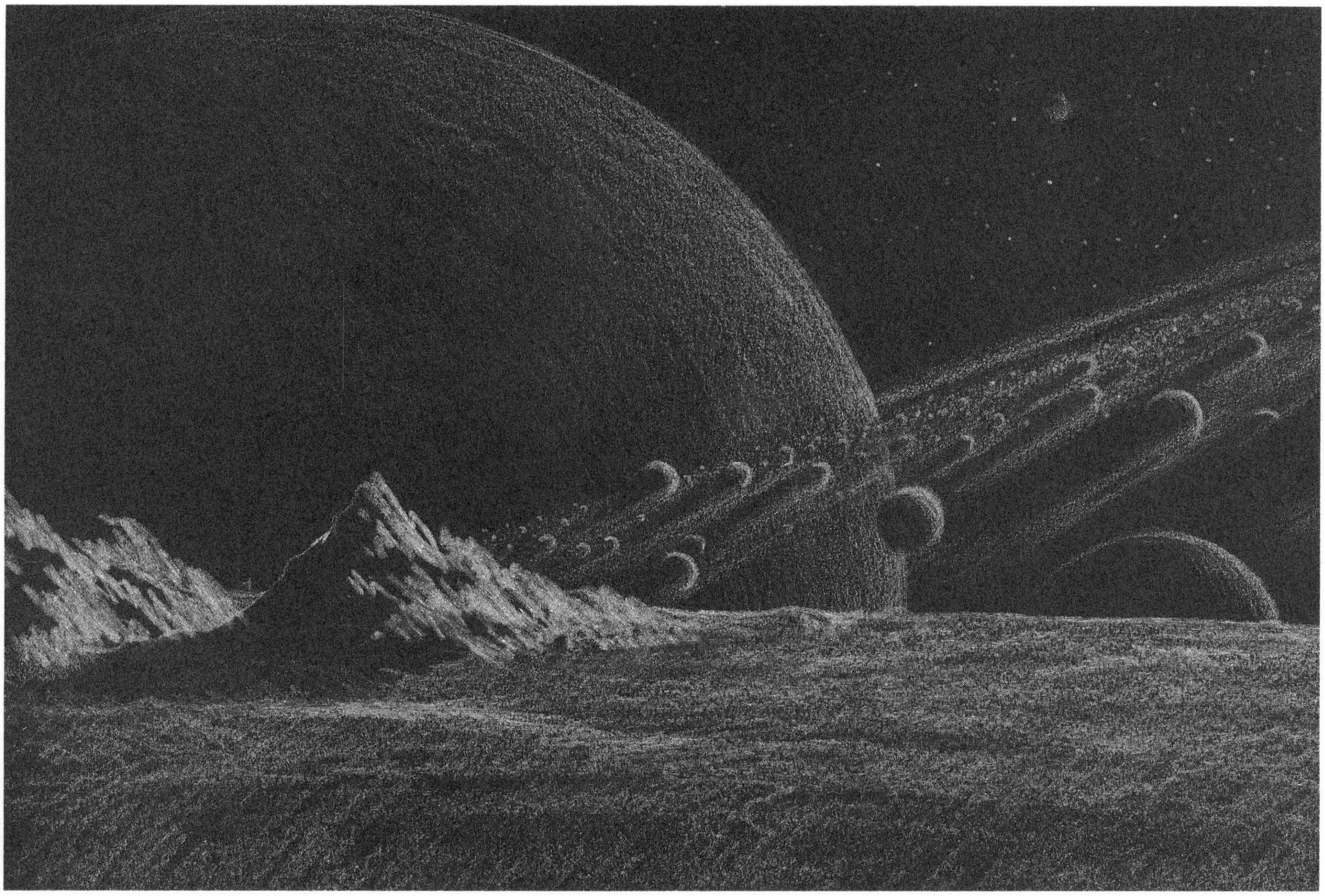
The way the system works is that professors apply for and receive grants from various sources. Funding from the federal government is provided through organizations such as the National Science Foundation (NSF) and many others. Each organization is allotted a yearly budget by the U.S. Government to fund research at colleges and universities across the country.

Many private companies also contribute funds for research projects. The reason these companies contribute this money, and why they want the research done, is actually for selfish reasons. If they sponsor research projects and come out of it with a new product or development that will help them get a leg up on the competition, it is a good investment for them. It is also advantageous for a company to use student researchers because the students have the tools, the education, and the time to tackle various problems.

The reason the National Science Foundation contributes money is not quite as selfish. When NSF funds a project, the research is conducted to increase scientific or engineering knowledge. The research projects are geared to benefit the public, not a particular private company. The knowledge gained from the research is then available for all individuals and/or companies to use.

The last main barrier preventing many undergraduates from doing research is that they think it is only for graduate students. Almost all professors would love to get more undergraduates involved. It gives the undergraduate a feel for graduate school and may help to push the student in that direction. As far as funding is concerned, the NSF grants even contain a special section for undergraduates, the Research Experience for Undergraduates (REU) fund. The money is out there, the professor in charge just has to apply for it.

Hopefully, as undergraduate research receives more publicity and exposure, more students will get involved. It helps the school, it helps government or industry, and it helps the student.



Artwork by Aaron Golub

KEBLE AND OREL, RIAs

by Shane Crofts

The brightly colored wires seemed to be a great contrast to the metallic panels on the side of the wall. The different colors swirled together creating the effect of a waterfall.

To the trained eye of Republican Intelligence Agent Keble it was as easy to understand as the directions for making Vittelum Cream Puffs. In fact, Keble was sure that the cherry red wire was the one that connected the detonation system to the mainframe. He pulled out his laser cutter from his belt and bent down to take a closer look.

"How's it looking, Orel?" Keble whispered to his co-agent, who was standing by the entrance to the small computer room which harbored all the control systems for the spaceship.

"I don't hear anything unusual," Orel replied, "Of course, this is a luxury ship with 2000 people on board, so I don't know what usual is!"

"Are you having a bad day?" Keble inquired.

"Will you just hurry up. I don't like the idea of being crushed by some crew member from Invicta. That's not on my list of how I want to die!"

Keble returned to his task, carefully using his laser cutter to make an exact incision through the wire.

"Alright," Keble sighed, "Come on let's access the information we need and go home."

After a few silent moments of Orel intently watching the screen located by the entrance he quietly spoke up, "I hate to be the one to terminate that plan, but I think you upset the computer, Keble."

"Why? What does it say?" Keble's expression changed quickly.

"I'm not the best at translating Hereses, but I think that this says 'Detonation commenced'!"

"When did that come on?"

"When I tried accessing the program," Orel mumbled.

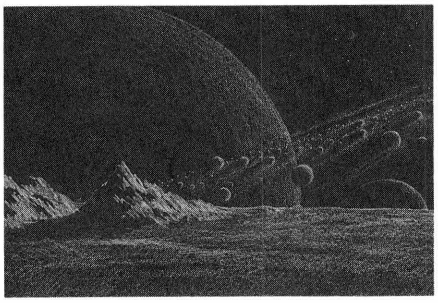
"Huh," Keble was stunned, "Where was this ship built?"

"Heres. Where else?"

"Great! That small detail never crossed my mind," Keble glared at Orel. "Well, let's

See RIAs, page 14

RIAs



The explosion of the luxury liner created a brilliant background of light for the small shuttle carrying the two agents.

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get out of here! The ship's going to explode!"

The passengers enjoying their vacation on the cruise ship stared as Keble and Orel ran to the nearest escape pod.

The explosion of the luxury liner created a brilliant background of light for the small shuttle carrying the two agents.

The tension in the room was so thick that not even a positronic alpha beam could cut it. Keble and Orel were unfortunately seated in front of their supervisor who was staring at his computer monitor with his beady, little eyes. Chief Esur never looked at them, but his voice conveyed his anger, "I send you out to retrieve a simple file. Just a list of a small crime network stored in the memory banks of a cruise ship, and you two end up blowing the ship up and killing thousands of innocent people!

"I could have both of you sent to the mines on Lancor, where your bodies will waste away and you'll eventually become a heap of flesh, bones, and worthless neuron cells!"

By this time Chief Esur was glaring at them, the red starting to show in his eyes as is common among Uvians when they're mad.

"I don't know who assigned you as a team, but they must have been smoking logis leaves, because no one in their right minds would put two cousins, no, two stupid cousins together."

The chief started breathing hard, as if had run a marathon. He gave a deep sigh and slowly focused on the two agents.

"I'm going to give you one more chance, and if you botch it up I'm going to kill you both with my bare hands.

"We've found out from our sources that Areth Garins has something going down again. You do remember who Garins is, don't you?"

Keble and Orel were trying to recover from the lashing they had endured, and their brains were unable to process any information let alone try to pull a name out from the depths of their memories.

"You two are unbelievable. Garins is the leader for the MAA. They've already blown up half of the Denma Territory with the few weapons they do have, and now we've found out that Garins is planning a rendezvous in the city of Thames in order to acquire the technology for a HD-4 bomb."

"HD-4!" Orel's eyes popped out, "He could vaporize a third of the Comut System. The government will never be able to keep his army under control."

"That's right, boys, so it's up to both of you to stop him," Chief Esur smiled sarcastically.

Keble and Orel left the office looking rather shaken.

"Isn't this about the tenth time Chief Esur has given us one more chance?" Keble glanced over at his cousin.

"Yes it is. So, cousin," Orel said slapping his shoulder, "Let's see if we can blow up the entire city this time."

Value

Continued from page 10
conducted brainstorming sessions about the problems and efficiencies of the hospital. As a group, they formalized and developed the feasible ideas into proposals to be implemented as changes in the design.

Overall, the concept of value engineering, as applied to this research project, means the optimization of costs and efficiency of a building, while still retaining the desired properties. "I think the system (research project) will enhance the ability to determine the impact of 'what-if?' design decisions, in terms of life-cycle costing models," said Dr. De La Garza. Life-cycle costing refers to an evaluation of all the costs of a building, from initial construction to, ultimately, demolition.

Although the program has a three year grant, and was just started last summer, the team hopes to start sending prototypes for testing to companies by the end of the year. Once the project reaches that stage, modifications will be made on an ongoing basis as companies use and respond to the prototypes. In addition to using that time as a validation phase, it will also be used to introduce companies to the project and familiarize them with it, as sort of an easing-in period. "Getting most companies to implement new technology is often a difficult process, as they are reluctant to change," added De La Garza, who worked for four years in constructing high-rise buildings before attending graduate school.

The three year grant for this project is being funded by the National Science Foundation. The grant is divided into different parts, one of which is being funded through Research Experience for Undergraduates (REU). Dr. De La Garza is very excited about the possibility of getting more undergraduates involved in research, through the REU program. If more undergraduates become involved in research it will not only help them, but the profession they wish to enter.

Engineering student society notes

Compiled by William Henshaw and Christine Curran

ACerS, American Ceramic Society
President: Shannon Namboadri 552-2413/231-9451
Advisor: Dr. Jesse Brown
In conjunction with ASM and SAMPE, ACerS provides a mechanism for students interested in materials/ceramics to interact with industry and university leaders involved with ceramics. Sample activities include participation in the "Science on Wheels" program (visiting local 5th grade classes to promote science), the refurbishment of display cases in Holden Hall, the organization of a video tape library related to materials, and participation in national conventions and student speaking contests.

AIAA, American Institute of Aeronautics and Astronautics
Chairperson: Jennifer Krahulec 951-7417
Advisor: Dr. Frederick Lutze
The goal of the AIAA is to keep students informed about recent advances in aerospace engineering, particularly in the areas of new technologies and the application of new theories and processes. The AIAA sponsors speakers from industry, government, and the academic community at various meetings throughout the year. In addition, AIAA members are active in several intramural sports programs. Meetings are open to all students.

AIChE, American Institute of Chemical Engineers
President: David Dean 951-8716
Advisor: Dr. David Cox
AIChE seeks to unite chemical engineering students from all academic levels. The society organizes plant trips, maintains the ChemE lounge, and sponsors social activities.

ASCE, American Society of Civil Engineers
President: Colleen McCloskey 961-3464
Advisor: Dr. Jesus De La Garza
The primary goals of the Virginia Tech student chapter of ASCE are to introduce students to the civil engineering profession and to promote practical applications of civil engineering through various projects. Programs include bimonthly meetings, social functions, an alumni tent party, banquets, and picnics. The chapter participates in national and regional competitions such as the concrete canoe and steel bridge contests. ASCE also assists the local community with projects like the Huckleberry Recreational Trail and Blacksburg Recycling. ASCE's biggest function this year will be the hosting the ASCE Virginia Conference and Concrete Canoe Competition. This conference will be attended by six engineering schools from Virginia and West Virginia.

ASM, American Society of Materials
President: Mindi Smith 552-7116
Advisor: Dr. W.T. Reynolds
ASM works in conjunction with ACERS and SAMPE. All three organizations recently participated in Expo '92. The ASM display case in Holden Hall has been updated with various materials related items sent in from corporate sources. A new project planned for this year is "Science on Wheels." A group of engineering students will go to area elementary schools and give science presentations that will allow students a hands-on technical experience. There will also be a T-shirt design contest this year.

ASME, American Society of Mechanical Engineers
President: Ann Carrithers 552-7037
Advisor: Dr. Charles Reinholtz
The Virginia Tech chapter of ASME currently has 458 members and is the largest in its region. ASME has won the Allied-Signal award several years in succession. This award is based upon the chapter's participation and activity level. Some activities include plant trips, industrial and academic speakers, student-faculty softball games, social gatherings, a video luncheon series and regional student conferences.

BMES, Biomedical Engineering Society
President: Susan Harp 232-1852
Advisor: Dr. Daniel J. Schneck
BMSE's objective is to provide a social and educational forum for the discussion of biomedical engineering and general medical topics of interest. Speakers and trips to nearby hospitals are planned throughout the year. The society is open to all majors.

IEEE, Institute of Electrical and Electronic Engineers Inc.
President: Scott Lambroff 951-7480
Advisor: Dr. Kwa-Sur Tam
IEEE is a student society for all electrical and computer engineers. The institute serves to provide members with relevant speakers and organized social activities to promote EE/CpE student unity. IEEE sponsors the Intercollegiate Hardware Design Competition and the Student Professional Awareness Conference (S-PAC).

IIE, Institute of Industrial Engineers
President: Mark Gunlicks 953-3996
Advisor: Dr. Woldstad
IIE supports the Industrial Engineering Department with various programs and offers professional, service, and social functions to the students. Professional functions range from speakers to plant tours while services are provided both to the IE department and to the community. Social functions include picnics, parties, and tailgates.

ISHM, International Society for Hybrid-Microelectronics
President: Mike Reese 552-6424, Butch Barton 552-6424
Advisor: Dr. Aicha Elshabini-Riad
ISHM is a professional society which provides electrical engineering majors with the opportunity to join their peers in an academic and social atmosphere. Members work in one of the most sophisticated labs at the university and relax at biannual happy hours. Each year, several ISHM student members attend the annual international ISHM symposium. At the most recent symposium in October 1992, Virginia Tech was awarded first place in the student competition. Meetings are held the first Wednesday of each month at 7:00 p.m. in Whittemore Hall.

NSPE, National Society of Professional Engineers
President: Eric Roback, 232-2264
Advisor: Dr. D. Ludwig
NSPE is a melting pot for engineers as it includes all of the engineering disciplines. NSPE strives to promote the Fundamentals of Engineering exam and the discussion of engineering ethics. Meetings involve speakers on topics ranging from the National Aerospace Plane (NASP) to ethical decision making in engineering.

SAMPE, Society for the Advancement of Material Process Engineering
President: William Henshaw, 953-3996
Advisor: Dr. Ron Kander
SAMPE, along with ASM and ACers, provides a forum for students and professionals in

materials engineering to establish communication links. Also, SAMPE participates in Engineering Expo and Engineers' Week to promote materials engineering. Some of SAMPE's activities include conferences, intramural sports, and T-shirt and book sales.

SES, Society of Engineering Science
President: Lee Thomason 552-3659
Advisor: Dr. R.W. Landgraf
SES, a professional society for ESM students, offers social and academic support for its members. SES provides for student and faculty/student interaction. SES represents the ESM student body. We also make very cool T-shirts.

Sigma Gamma Tau, National Honor Society in Aerospace Engineering
President: Eric Flint 951-0741
Advisor: Dr. Frederick Lutze
Sigma Gamma Tau honors aerospace engineering students who have demonstrated high academic achievement and operates as an interface between students and faculty members when and if problems arise. Current activities include repairing a low-speed, low turbulence wind tunnel in Randolph Hall.

SME, Society of Manufacturing Engineers
President: Brennan Bowen 232-4002
Advisor: Dr. O.K. Eyada
SME wishes to further the manufacturing education of the students and the community. The society organizes guest speakers and facility tours. Social activities are also provided for the students.

SNAME, Society of Naval Architects and Marine Engineers
President: Jason Marshall 552-2026
Advisor: Dr. Wayne Neu
SNAME promotes ocean engineering at Virginia Tech. The society brings in professionals to talk to students at meetings. The society also sponsors field trips to the annual SNAME convention and various places of interest (e.g. David Taylor Model Basin, ship trips). SNAME strongly support the OE senior design project and is interested in seeing more underclassmen involved with the society.

SWE, Society of Women Engineers
President: Joanne Chaney 552-5316
Advisor: Dr. Andrea Dietrich
SWE is an organization of both male and female members on the local, regional and national levels. The society serves to encourage women in technical/engineering careers by providing scholarships, support and information. The Virginia Tech chapter of SWE has many activities each year which include technical and non-technical speakers, social activities and seminars on such topics as self-defense, sexual harassment, interviewing and graduate school. Several members are chosen each year to represent Virginia Tech at the regional and national student conferences.

Triangle Fraternity
President: Shawn Looney 953-0096
Advisor: Dr. Hugh Munson
Triangle Fraternity is a Greek social fraternity of engineers, architects and scientists providing an intellectual and social brotherhood for its members. Triangle participates in intramural sports and interfraternity competitions and activities. Also provided is a tutoring system by which older members help younger members with various classes.

A bit of Tech trivia

by Jessica Smothers

1. What were the original Virginia Tech colors?
2. Which school is the only other school to have a Corps of Cadets along with a civilian student body?
3. How many trees surround the Drillfield?

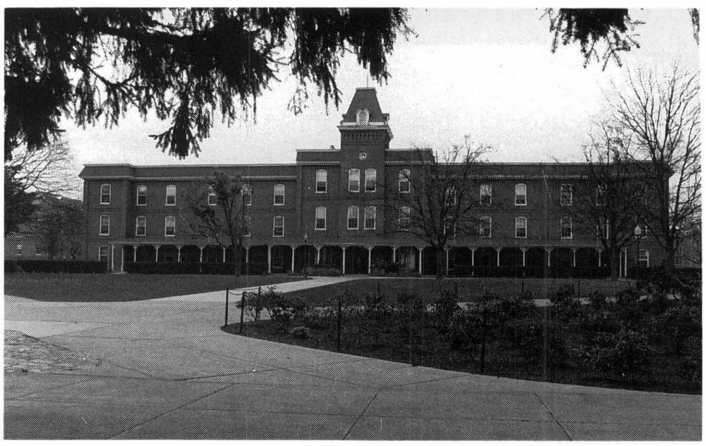

Photo by Lisa Traub

4. Which is the oldest academic building on campus still in use?
5. Who is Virginia Tech's only football player in the Hall of Fame?
6. What was Virginia Tech's original name?
7. When was "and State University" added to "Virginia Polytechnic Institute?"

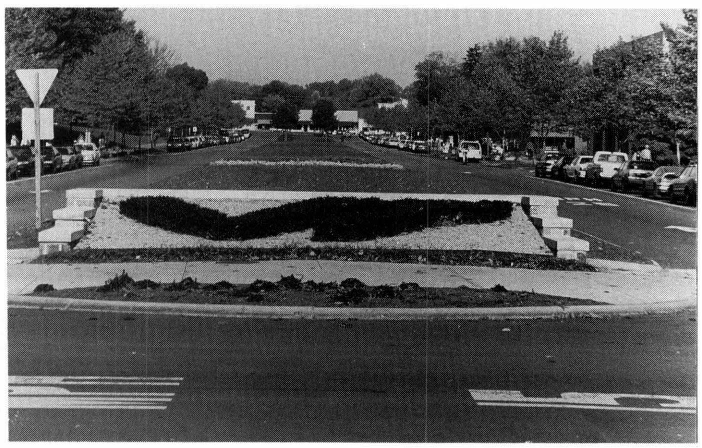

Photo by Lisa Traub

8. How long is The Mall?
9. How many seats are in Lane Stadium?
10. Who was the first student to register at Virginia Tech?

Answers:
1. Cadet gray and black 2. Texas A&M 3. 112 (one for each graduating class) 4. Lane Hall 5. Hunter Carpenter 6. Virginia Agricultural and Mechanical College 7. 1970 8. 0.19 miles 9. 54,157 (it is the largest stadium in Virginia) 10. William E. Caldwell