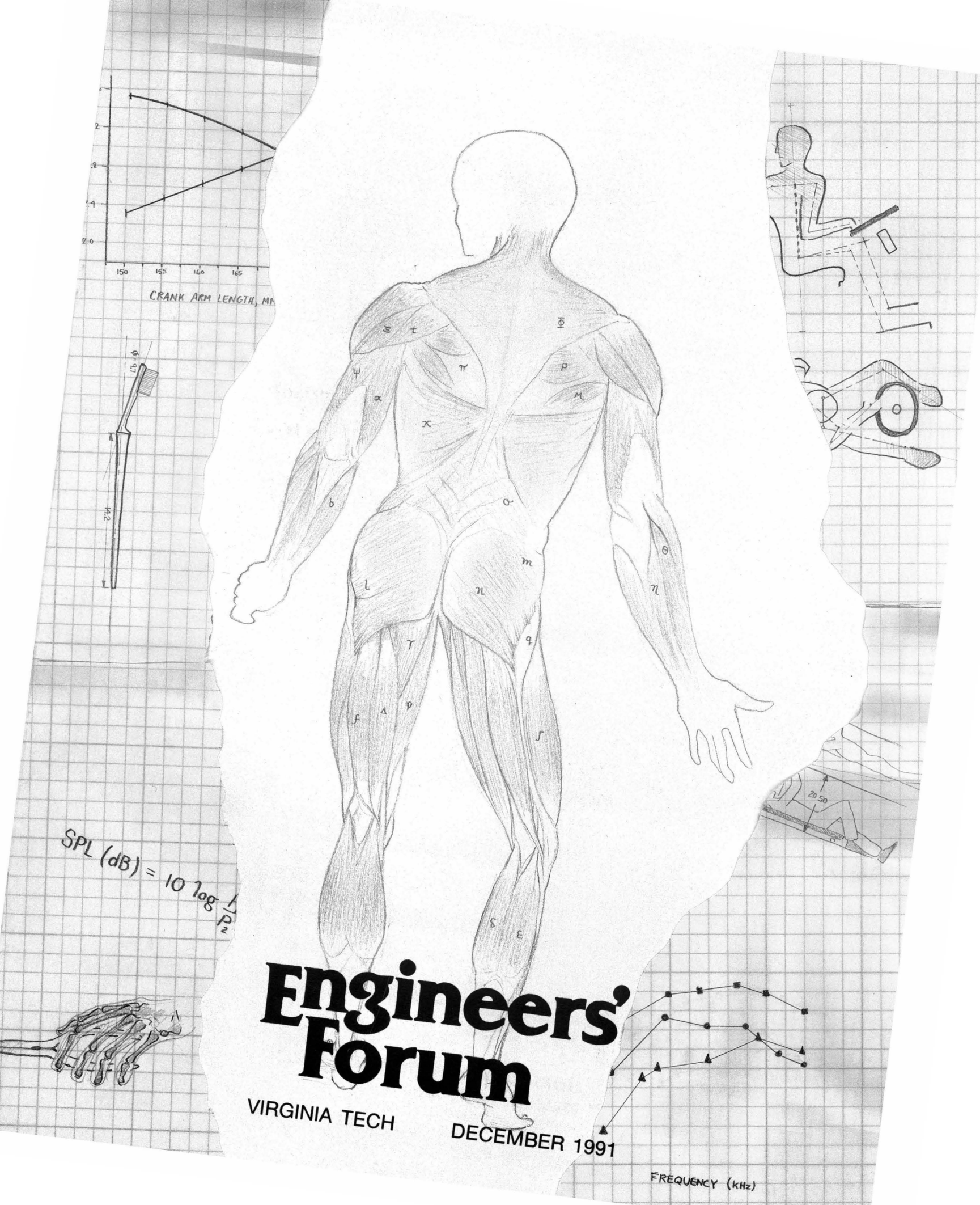

Engineers' Forum

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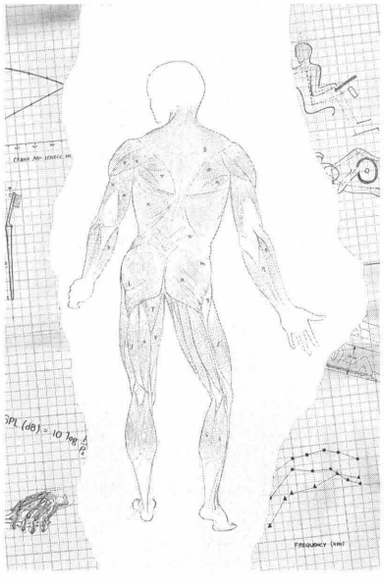

ON THE COVER

Human Factors Engineering as depicted by Aaron Golub.

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EDITOR'S PAGE

Modern dilemma: Graduate school vs. the working world

Seniors in engineering are consistently faced with the dilemma of whether to pursue graduate school or a job following graduation. This decision can be a very difficult one, especially when considering the cost tradeoffs.

When the economy is as depressed as it has been for the past year's graduating class and for the graduating class of 1992, jobs are very difficult to obtain. Many large companies who have historically hired a great number of engineers with undergraduate degrees are simply not hiring. How can they when they are forced to let loyal employees go because of fiscal year budget crunches?

Naturally, everyone is eager to make money, whether it be to pay off school loans or simply to live on your own earnings. However, the option of attending graduate school to further your education should not be ignored.

The costs of graduate school are expansive. For instance, tuition for Virginia Tech's Graduate Engineering Program is a humbling $1665 per three credit hours for a Virginia resident, and $2403 per three credit hours for an out-of-state student.

Meanwhile, for those engineers wishing to pursue a non-technical graduate degree such as an MBA, brace yourself — top-notch Harvard Business School's tuition is a paralyzing $26,000 per year. This figure includes just about all costs you will encounter including room and board and an estimate of living expenses. But considering that it takes about two years to obtain a masters degree, these expenses could very easily scare off potential graduate school candidates.

On a more pleasant note, students interested in graduate school can offset the burdensome tuition costs by applying for a grant and also by obtaining a part-time job through the university. Graduate school should never be ruled out as an option because of money. If the desire and ambition is present in the student, then there are plenty of ways to make tuition requirements more tolerable.

Many students obtaining their undergraduate degrees have ideas of returning to graduate school in the future. The current depressed economy has made job opportunities scarce. Despite this, a job offer should not accept be accepted on the basis of money alone.

Although money is important, it tends to cloud over what is really important — happiness. If you are not going to be happy with the job offer(s) you receive and if graduate school has entered your mind, perhaps the continuation of your education is the immediate answer. It certainly will be easier to attend school now, when you are well-practiced, than it will be after five years of work.

Engineers will always be needed, and there will be plenty of money to be made in your lifetime. Don't sacrifice happiness because the high expenses of graduate school seem too much to bear; in the long run it may be the best career decision you'll ever make.

Jonathan Hess, Editor

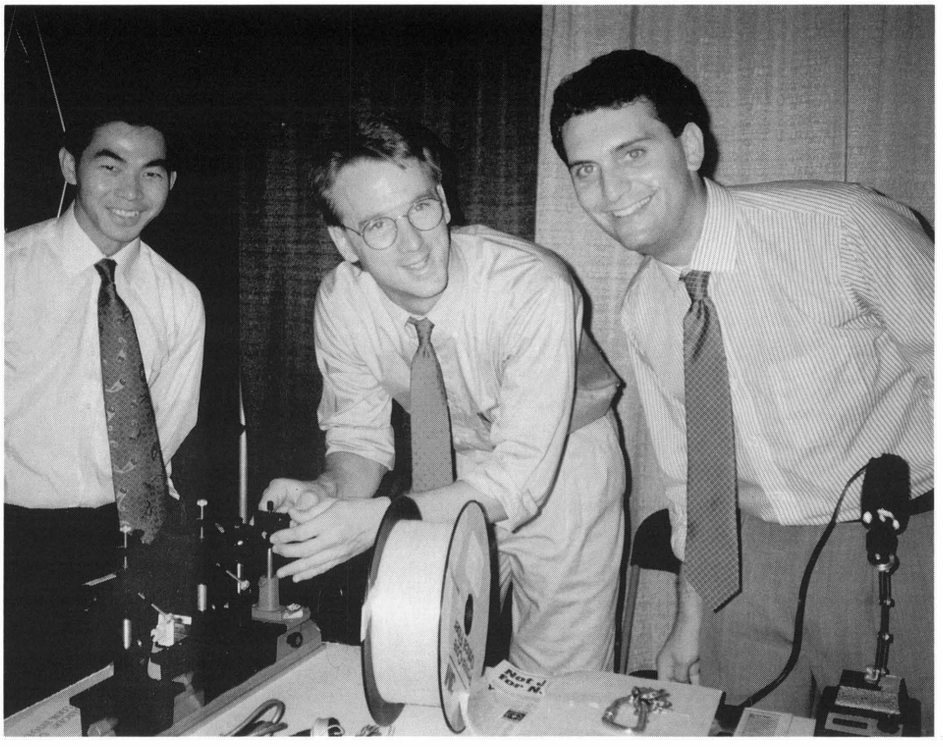
Optics society educates youngsters

In February 1991, the Virginia Tech chapter of the Optical Society of America (OSA) was formed. The goal of the organization is to increase and disseminate knowledge of optics. Currently, OSA has 45 active members that form two major groups — the Technical Projects Group and the Education Working Group.

The Education Working Group is led by Shari Feth and Jonathan Greene. Their purpose is to teach optics in local secondary and elementary schools. The group is advising the Roanoke Governor's School on fiber optics for their proposed Current Technology laboratory. They are also assisting the Dublin Governor's School in holography experiments.

The Technical Projects Group provides OSA members with the opportunity for hands-on laboratory experience, using the laboratory and equipment of the Fiber & Electro-Optics Research Center made available to OSA by Dr. Richard Claus, professor of electrical engineering. The Technical Project Group boasts five sub-groups: Holography, Lasers, Telescopes, Radio Communications, and Television Communications.

The Holography project, coordinated by Frank DiRoberto, teaches the basic concepts of making holograms. Each person in the group will attend a lecture on basic laser safety and holography principles. Then they will make a small single-beam hologram. Later they will research and experiment with more elaborate holograms.



Left to right: Cuong Lam, Marten deVries, and Frank di Roberto at OSA's EXPO demonstration booth.

The Laser group, led by David Forbis and advised by David Sherrer, will build a nitrogen, dye and high-power carbon dioxide laser, all from scratch. The laser may be used for projects such as computer control of beams for visual effects and computer-controlled cutting with the high powered laser.

Greg Nau leads the telescope project. The group has an eight-inch reflector (Newtonian) telescope that needs repairs. They are going to resilver the mirrors, clean the optics, and then realign the mirrors. Once they have finished, they will learn how to use the telescope. In the future they plan to build a hand-held refracting telescope.

The Radio Communications group, led by Cuong Lam, is going to build a transmitter and receiver circuit that uses a light-emitting diode (LED) as the optical source and a phototransistor as a detector. This circuit will convert radio signals into optical information that will be transmitted over a fiber link. Then the receiver will convert the signal back to radio frequencies, and the signal will be amplified by a speaker.

The Television Communications group, coordinated by David Sun, is designing and developing a transmitter/receiver circuit that will allow TV signals to be sent through a fiber. The initial circuit will be able to transmit channels 2 through 22, or more.

Students benefit from their membership by the opportunity to meet potential employers, by the free publication of resumes by OSA, and by complimentary subscriptions to OSA journals. General meetings are held monthly. Interested students can contact Marten DeVries or look for information posted on bulletin boards.

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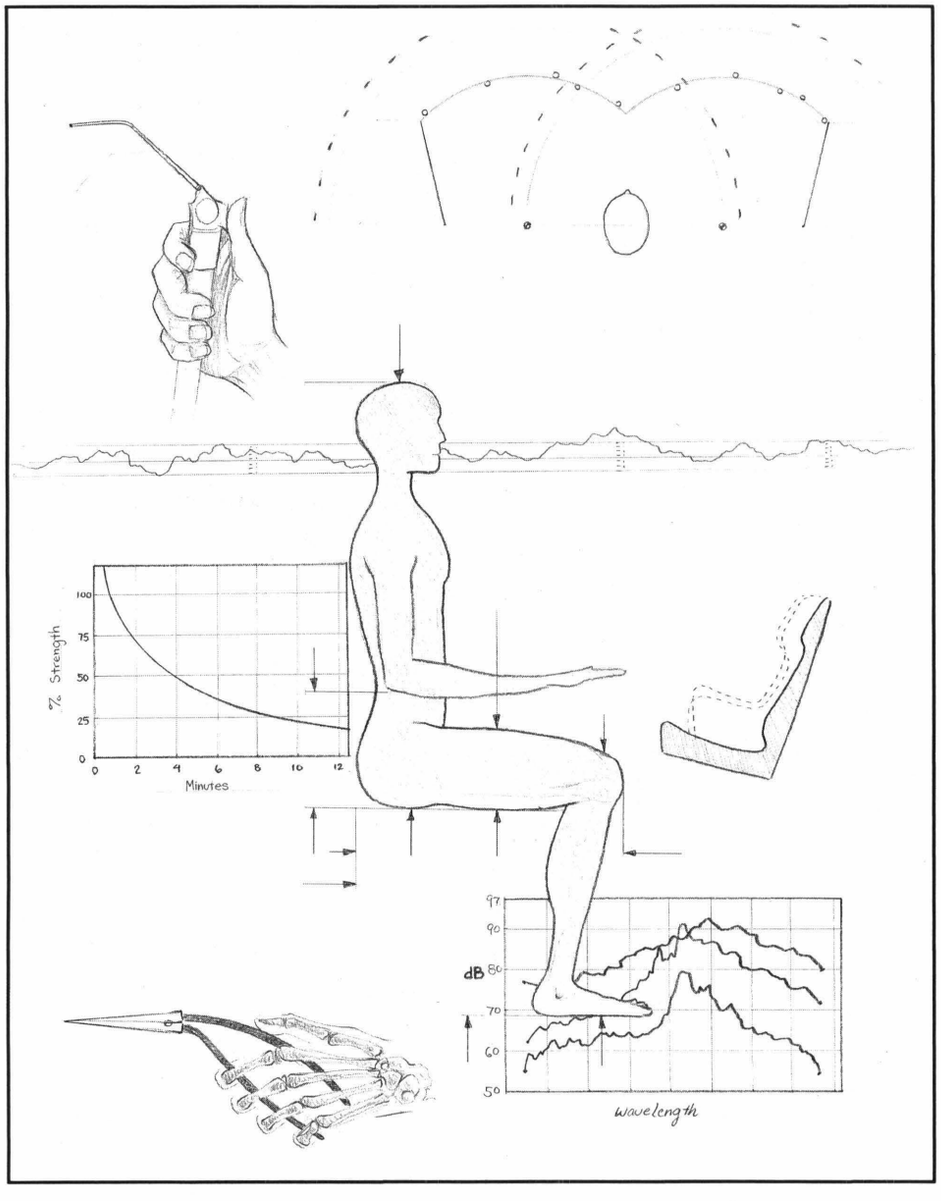
Human Factors at Virginia Tech

The Human Factors division of the Industrial and Systems Engineering (ISE) department is one of the best programs in the country. It has consistently been ranked in the top three due to its exceptional engineering centers, faculty members and research equipment.

by Collin Bruce and Omar Khan



The study of human factors comprises applying information about human abilities and characteristics to the design of machines, tools, and systems so that safe, effective work can be performed. To achieve this, human factors engineers perform extensive research to determine the limitations and strengths of the human body and the tendencies of the individual to maximize the productivity, safety and efficiency in widely different situations.

At Virginia Tech, this research is performed in the Human Factor Engineering Centers. There are seven engineering centers, or laboratories, located on the fifth floor of Whittemore Hall. The labs study all aspects of human factors engineering. Each lab studies a different aspect, as described by its name. These are the Rehabilitation Engineering laboratory, the Vehicle Analysis and Simulation laboratory, the Auditory Systems laboratory, the Human-Computer laboratory, the Environmental and Safety laboratory, the Displays and Controls laboratory, and the Industrial Ergonomics laboratory.

The Rehabilitation Engineering laboratory provides facilities for studying and assisting mentally and physically disabled individuals. The facility provides research and developmental capabilities to further study this area, provides consultants to businesses and the government, and allows extensive testing of individuals with respect to employment activities. The laboratory uses several pieces of equipment to do this. One of the most important is the Available Motions Inventory apparatus, which tests and evaluates disabled individuals based on strength tests, reaction times, and other tasks. The laboratory also uses an AG6010 Industrial Time Lapse Recorder to develop work standards, and features a complete wood and metal-working shop to develop adaptive devices.

The Vehicle Analysis and Simulation laboratory studies the problems encountered with vehicles. The core of the laboratory is the moving-base driving simulator and moving-base aircraft simulator. The laboratory also has several types of equipment which can be installed and used in actual vehicles. The moving-base driving simulator uses a computer-generated or videotape display combined with hydraulically actuated motion, four-channel sound, and vibration, to make the simulation as realistic as possible. The aircraft simulator is a single-engine aircraft simulation with full capability for all types of flying under all conditions, including instrument-only landings. This simulator, like the driving simulator, also features motion and sound to reproduce the actual situation, and it has been modified to measure pilot workload and physiological data during simulations.

The Auditory Systems laboratory uses equipment to test all types of auditory conditions and

displays. The laboratory also can measure the noise reduction rating (NRR) of hearing protection devices, it can measure the conduction of noise through bone and air using a Beltone clinical audiometer, and it features equipment to measure frequencies across the sound spectrum. The laboratory can also generate audio signals of any frequency, and it uses white and pink noise generators, equalizers, amplifiers, and other supporting equipment to test different situations. The laboratory features a 12-by-14 foot anechoic, or "noiseless"chamber and 8-by-10 foot audiometric test booth, both of which have complete monitoring capabilities. Research at the laboratory concentrates on hearing protection design and redesign, communication, and performance capabilities in different auditory conditions.

The Human-Computer laboratory uses a plethora of workstations and mainframes to study human-computer interaction. This involves researching and testing the problems and effects of computers, computerized systems, and system design, on humans. The laboratory specializes in research based on human-computer dialogues, online computer training and assistance, computer operator preference, input and output devices for speech and speech recognizition, and other devices designed to facilitate human interaction with computers. To achieve this, the laboratory includes a reception and waiting room equipped with computerized registration of individuals; a sound-deadened testing room; and instructional software measurement packages. The laboratory is connected to a dedicated VAX 11/750 computer with networked connections to other VAX machines as well as workstations located throughout the engineering and Computer Science departments at Virginia Tech.

The Environmental and Safety laboratory uses many devices to run experiments under different environmental conditions. The center of the laboratory, the environmental chamber, can have its temperature adjusted from 32 to 110 degrees Farenheit. The humidity of the chamber can also be adjusted from 40% to 95%. The temperature, humidity, and lighting of the chamber can be adjusted continuously and precisely, by means of a computer, to simulate almost any condition.

The Displays and Controls laboratories are designed to measure different aspects of computer input and output devices, such as CRT displays, mice, and others. The display and control laboratories are divided into seven divisions: the visual performance laboratory, which monitors eye movement; the matrix display laboratory, which determines the effect of video displays on operators; and the data input device laboratory, which allows researchers to determine the effects of computer input devices on individuals. The radiometric laboratory determines the safety of video displays and measures their emissions. The touch-entry device laboratory determines how efficient touch-input devices are, and explores different uses for these devices. The software and data analysis determines how software can be used for research, while the electronics fabrication and repair facility supplies various electrical equipment, including circuit boards and integrated circuits. All of the laboratories are dedicated to improving the safety of the computer-human interaction and to making this interaction more efficient.

The Industrial Ergonomics laboratory is equipped with measuring equipment to research and measure the interaction of the human body with the environment. Researchers working with tools, work stations, and computers measure the design of equipment and assist in the redesign of this equipment, based on the tolerances and strengths of the human body, to reduce fatigue and maximize efficiency. All types of equipment are used, including photographic equipment, strength test meters, and physiological recording devices and displays. The laboratory also has a host of tools, devices and equipment which can be used outside of the laboratory in actual situations.

Graduate courses in human factors engineering are designed to provide a maximum amount of knowledge in all aspects of human factors so that the graduate student is able to accurately analyze and redesign work conditions to maximize personal comfort, productivity, and efficiency.

The M.S. program requires 35 graduate credits in advanced classes such as system design, information processing and research design and training. The Ph.D. program requires at least an additional 27 credits for a total of at least 90.

Currently, there are about 55 full-time graduate students in human factors, divided almost evenly between the two degree programs. They are supervised by 11 distinguished faculty members, all of whom (save one) posses doctorates in industrial engineering. The human factors program is one of the best in the country, due to in part to its excellent facilities and equipment.

The Dean's Committee:

Constantly trying to improve the College of Engineering

by Keith Wieber

There are many academic and social organizations in the College of Engineering at Virginia Tech. One of the academic organizations that is very closely affiliated with the administration is the Dean's Committee.

The Dean's Committee is a student group with access to the dean, and which meets weekly and debates pertinent topics of improvement to the college. Every few weeks, when the committee members feel prepared, they meet with Dr. Wayne Clough, Dean of Engineering. Then committee and the Dean discuss their ideas and observations. The Dean reviews the committee's requests and gives his opinion on each topic of discussion. Once Dean Clough and the committee reach an agreement, experimental changes may be made.

Presently, two main topics on the committee's agenda are teaching evaluations and the problems involved with the computer terminals during schedule changes.

Within the realm of teaching evaluations, there is much being debated by the Dean's Committee. There exists an optional midterm teaching evaluation that many instructors do not use. The committee has suggested making this evaluation mandatory to complement the final teaching evaluation. Another committee suggestion is for the instructor to discuss the results of the midterm evaluation with the class in order to obtain feedback from the students.

Also, the committee is concerned about the amount of time given to students for the evaluation, and they want to highlight the importance of the comment section. Since many students feel that their instructors do not allow sufficient time to complete the evaluations, they tend to rush through the evaluation and give nonconstructive responses to the subjective questions. The committee also suggests offering pencils to ease the students responsibility, therefore increasing the response rate.

The present scale on an objective question in the teaching evaluation is one through four. The scale represents poor, fair, good, and excellent. The committee suggests that this scale be changed to a ten-point scale to enhance the accuracy of the teaching evaluation process.

The committee also recommended publishing a list of the top ten scoring instructors in the *Collegiate Times,* as positive reinforcement for teachers that score well on their evaluations.

Another change under discussion is to divide the questions into class material and teaching sections. Questions that rate the quality of the textbooks used and handouts given would be asked concurrently with questions regarding the characteristics of the instructor.

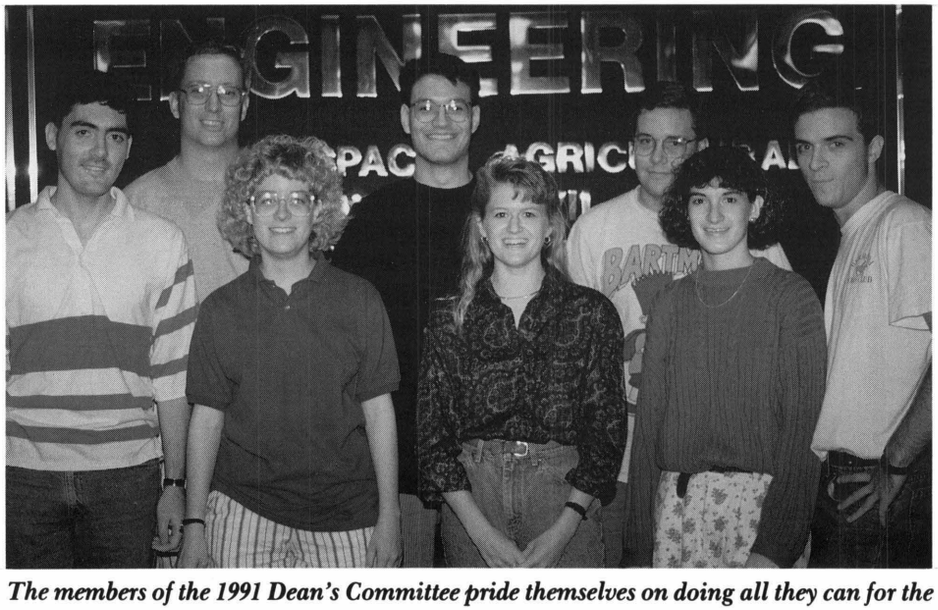
In addition to the above changes being reviewed, several new objective questions have been developed for possible addition to the teaching evaluations. Some of the topics for suggested questions include: the educational value of using a computer for class problems, the effectiveness of class assignments and tests, the positive and negative qualities of both the teacher and course, and a separate overall course and teacher rating.

Updating teaching evaluations is an important subject to the Dean's Committee because the evaluations have considerable effects throughout the college. The evaluations are used in the process of promotion and tenure; therefore, it is important that the evaluations accurately represent the performance of an instructor.

The second major discussion of the Dean's Committee, but by far a less-debated topic, is the use of terminals to change classes at the start of each semester. The committee believes the terminals should have at least two operators at all times. A schedule change on the Monday before the first day of classes requires that the student have a schedule conflict, a full class, or a class that has been withdrawn.

However, students with convenience changes clog up terminals on Monday because the terminal operators don't always check for clean class tickets. The committee suggests that class tickets be more carefully checked when a student makes a change. Posting a list of terminals available to engineering students and posting procedures for making changes are other ideas being debated.

The Dean's Committee and Dean Clough have an ongoing commitment to develop improvements for the College of Engineering. Their concern and efforts benefit all engineering students. This is not an easy process, but improvements are constantly being suggested and implemented.



B. PRITHAM

The members of the 1991 Dean's Committee pride themselves on doing all they can for the engineering student body.

The senior decision: *What's next?*

by Stephen Payne

As a senior myself, after many years in engineering, I can honestly say that, like most other seniors, I am looking forward to graduation. But truthfully, what's next?

I'm in the large pool of soon-to-be graduates who stand before the two most common paths of post-graduate futures: graduate school or the working world. How do I decide?

There are a lot of students in this predicament, and many people are aware that we're stumped. What follows here is an exploration of the plusses and minuses of each of these paths, to help you learn something about how the whole process works (or how it should work). If you are an underclassman, you should learn something new here, and you can prepare yourself for your final year when you must deal with this. And if you are a senior, pay close attention and revel in the fact that you are not alone.

GRADUATE SCHOOL

Graduate school is the next obvious academic step after getting your bachelor's degree, and there are many good reasons for going. You can be definite in your decision to be a graduate student if you can answer some of these questions positively: Do I want to go into a specialty within my field? Can I get a better job in my field with a graduate degree? And in general, do my career goals make a graduate degree necessary? These, in essence, are the really good reasons for considering graduate school.

There are a lot of "not-so-good" reasons for wanting to attend graduate school. A popular reason of late is the lack of job prospects. With the overcrowding present in some fields, coupled with the current economy, things can sometimes look grim. The total Virginia Tech College Of Engineering graduate enrollment increased by a large amount this year, due in large part to the lack of job prospects.

Another bad reason is the lack of career goals: If you do not know what you want to do, go to graduate school, right? Wrong. Don't be a fool. The very last thing you want to do is get tied up in graduate education in a field you "sort of" like, and specialize in a field that you aren't comfortable with.

And one final thing: Don't go to graduate school because you can't find anything else to do. Clearly plan out your goals and interests before investigating graduate school seriously.

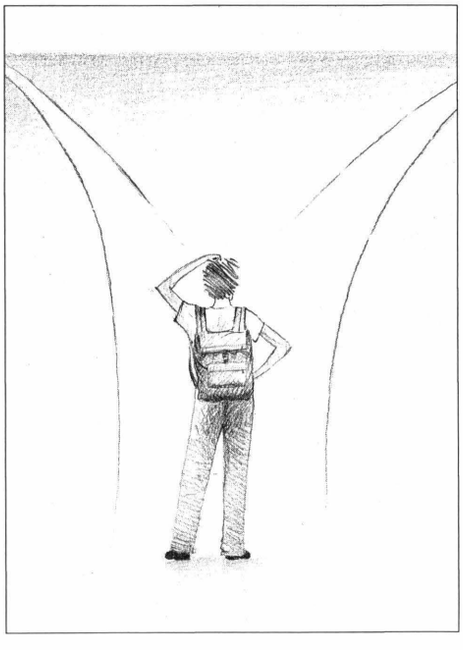
So what's the big deal about graduate school? What is the difference between this and the undergraduate level, besides the fact that graduate students seem to be able to play more golf? Well, there's a lot.

On one hand, there are fewer tests and other sources of feedback about one's performance; on the other hand, there are more projects, papers, and presentations involved. Things are much more research-oriented and more "on your own time."

Increased specialization within a specific area of a major is also one of the key facets of a graduate degree. Also, if you choose grad school, you will be competing with a higher class of students, and will be expected to maintain higher grades, usually a minimum of a B average.

In general, more is expected of you, so make sure you're ready to take it on. In addition, with a master's degree you can expect to command a higher starting salary than with just a bachelor's degree. However, you might want to take into account the amount of lost wages while attending graduate school, and figure this into your calculations.

So if you've gotten this far, then it's obvious that graduate school would probably do well for you. But which school is for you? Well, this depends on a lot of things, and it basically narrows down to your personal preferences, along with financial aid, quality of the program, and other factors.



One popular resource for more information is *Peterson's Guide to Graduate Programs in Engineering and Applied Sciences.* This reference book is in most libraries, and has all the basic information and statistics about schools you ever wanted to know.

Another often-overlooked but useful resource is the Virginia Tech faculty. I always wondered why the undergraduate catalog had a list of all the faculty and their degrees and alma maters. Use this list! If there is a place you don't know much about, but might be interested in, find a professor in your department who earned a degree there, or who knows a lot about the school, and talk! Your conversation will probably inform you about the program there better than a typical brochure or booklet would.

Finally, I would advise each of you who is even remotely considering graduate school to pick up one valuable, and free, resource —a booklet called *Planning For Graduate School* — published by University Counseling Services here at Virginia Tech. This several-page booklet contains a lot of information, ranging from descriptions of different types of assistantships and degrees available, to required entrance tests for graduate school in general, to how you should go about the whole application process. Read through this before you apply anywhere!

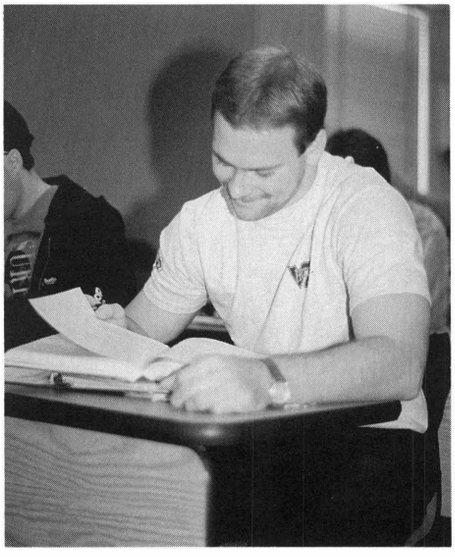
EMPLOYMENT

So you want to get a job; well you've obviously decided to get on with your life. Just remember, when you walk into the office for that first day on the job, there's no turning back: you've begun life in the real world. But at least you are finally getting a paycheck for all your hard work.

In looking for a company to work for, you need to scrutinize your goals closely. Employers begin seeking future employees and begin coming for on-campus interviews in the beginning of each fall, so you have to be sure to be on your toes. Where do you want to work? What do you want in a company? Do you want the big bucks? Do you

See Decision, inside back cover

Rusty Pendleton: Man of two worlds



B. PRITHAM

Rusty hits the books.

by Mike Reese

Every engineering student can relate to the long and grueling hours that go into schoolwork: late nights, early mornings, the mental stress. It takes a special breed to deal with this workload, and it takes an even more special breed to excel in academic endeavors. Then there is yet another level — the one represented by Virginia Tech junior Rusty Pendleton. Rusty not only carries a 3.0+ QCA in Aerospace Engineering, but also starts as an inside linebacker on the football team.

The stadium crowd gets to see Rusty put a running back, back in his place. They see the glory which goes along with being a predominant figure on the team. What they do not see is the hard work and determination which Rusty continuously puts forth week after week off the field.

Rusty's schedule is difficult to believe. Typically, his day starts out early with morning classes. At 2:30 p.m., he suits up for practice. Practice does not end until 7:30 p.m. By the time Rusty showers, eats dinner, and collects his thoughts, it is usually around 8:30 p.m. Then, when Rusty is done with his physical challenges, he begins a mental work-out. Homework takes him usually to 2:00 a.m. Then, at last, his long day ends.

As I listened to Rusty, I wondered where such a breed of engineer comes from. Rusty's home is Gate City, in southwest Virginia, only ten minutes from the Tennessee border. Rusty has been playing football since he was eight. He was drawn into football through his friends and from watching television.

Rusty gained widespread attention during his days at Gate City High School. He was picked for the first team All-State in the region, and was selected Linebacker of the Year. No wonder Rusty was recruited by Virginia Tech.

At Tech, Rusty encountered all the problems freshman engineers face in adjusting to the new environment of college. Yet Rusty also had to organize his time around football, and to deal with the strain of traveling. Rusty adjusted quickly, and was not red-shirted his freshman year. Rusty remembers it being hard to stay awake, and that he pulled many all-nighters just to keep up.

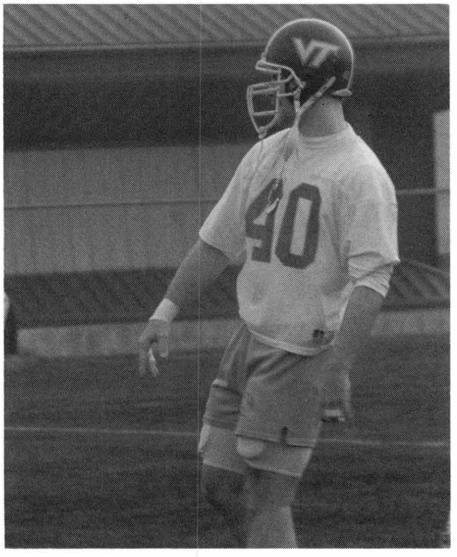
"The past few years have caused me to age quickly," Rusty chuckled. "I can't keep up the pace I did my freshman year." His smile hid the seriousness behind his words. He puts forth a great deal of effort to stay in control of his many roles. Rusty is not only responsible for his school work, he also must study the playbooks for each week's game. It's as if the work never ends. He admitted, "I'm burned out two-thirds of the time."

As an athlete, Rusty receives a few small breaks. He has access to a tutor. Mike Clark, a fifth-year senior in Aerospace Engineering, has been helping Rusty since the beginning of the semester. Rusty calls Mike a few days before he wants to review and they set a time. Mike reviews his own koofers and refreshes the material in his head before they meet.

Mike says, "There are times when I can't help Rusty; the only advantage is to have two heads working on the same problem." He adds, "Rusty is very determined; this can be seen by the way he performs on the field."

As a student-athlete, Rusty is required to spend ten hours a week in the academic study lounge in Cochrane. Here people like Mike Clark give their time to help tutor athletes in different subjects. Even if help is not needed, the study lounge gives the athletes a place to concentrate on their studies.

Rusty gives himself another break; although of a different kind. During the football season he only takes 15 credits. In the spring he takes the usual 18; and to make up for the loss of credits this fall, he will attend summer school this summer to catch up.



B. PRITHAM

Rusty (40) hits the practice field.

session, Rusty will train under the supervision of the athletic department. He says this will get him in good condition for practice in early August.

When he spends his summers at home, he is not freed of his obligation to practice. He must continue his training and submit progress reports to the coaches. When practice begins, the coaches evaluate his reports, and then give him a test to make sure has not been exaggerating his achievements.

With all this year-round work, I asked whether it was worth it. Rusty said the only way to survive was to enjoy it. Yet if he had to choose between sports and school, Rusty said he would choose school. He continually stressed the importance of his education. He points to the fact that a "sure thing" is rare, and that many deals could fall through.

Rusty was honest about the possibility of being approached by a professional team. Despite the complications which could arise, he said he might play for a team if, after studying the deal and looking at it from different angles, it would be a lucrative and secure contract. But he said he would still plan to finish his education.

Rusty Pendleton is very dedicated — not only to his team but also to his academic work. His dedication shows in his ability to handle the high-stress world of the exemplary student-athlete. Rusty's future holds a wide range of possibilities, all of which surpass many people's fantasies.

Decision

Continued from page 7

want a hands-on job? Do you want management, design, technical sales, production, process supervision, or what? There are many resources to find out which companies have what, and University Placement Services (UPS), in Henderson Hall, has the most organized information available on campus. Visit UPS and research potential workplaces, and make a list.

Now that you have a list of potential employers, the next step is to tailor your resume for each company, to let them know that you are interested in finding out more about them, and possibly working for them in the future. UPS can help in this regard as well.

Keep in mind that the competition is tough —very tough. Think of it this way: I'm sorry to be the one to tell you, but somebody is always more qualified for the job than you. But you must not let the recruiter know this! You should think of yourself as number one to the company, and believe that the company is number one to you.

Don't fret though. When asked what she would say to a graduating senior in engineering about the luck in the job market these days, Donna Cassell, associate director for student services at the University Placement Office, said, "It's getting better. Even though there is a lot of competition out there, employers are still looking at personality and diversity to be as much of an indicator of success as grades."

Also keep in mind that the "hidden" job market, the jobs that aren't very seriously advertised, is huge. According to UPS, nearly 80% of all jobs are not advertised. Writing to companies, visiting plants, and talking to relatives and other company contacts all are great ways to get your foot in the door.

In the end, these are the main two areas of post-graduate plans — and you might consider a possible combination of the two. For many government jobs, as well as jobs with some of the larger companies, continuing education is sponsored by the company. Yes —graduate school for free. This is a viable option, especially for those who have had enough school for the moment, but plan to go on for a graduate degree in the future.

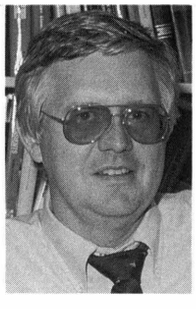
And one final thing to consider is that maybe you just want to take some time off, clear your head, and forget about everything. So why don't you join me in Europe next summer?

Biomedical engineering rises from its own ashes

by John Cole

Hot on the heels of last year's cancellation by Virginia Tech of the nuclear engineering option comes news that the biomedical engineering option also has been cancelled. It would seem that the biomedical engineering program here is declining — but, contrarily, there is reason for optimism for the program and its future.

The cancellation is the result of the decision by the College of Engineering to discontinue offering formal curriculum "options." Initially, options were developed to make it easier for students to take courses in other departments, with the option carrying no degree status. But now, other systems are in place, and students are easily able to take courses in other departments.



Dr. Wallace Grant

One reason for the cancellation of options could be the recent statewide budget cuts. But, according to Dean Marchman, "The budget cuts provided a reason to examine programs such as options, but they were not the prime reason (for the cancellations)."

The cancellation also could have been brought about with the separation of the biomedical option between the Mechanical Engineering (ME) and the Engineering Science and Mechanics (ESM) departments. For years, biomedical courses were offered by both the ME and ESM departments, neither of which offered a degree. All that was available was the option. Still, the enrollment remained consistent at 15 to 25 students, most of whom planned to continue in a medical field after leaving Tech.

Recently, a pioneer in biomedical engineering, Dr. Leon J. Arp, professor of mechanical engineering, retired. Dr. Arp held several patents in the biomedical industry and was an integral part of the biomedical engineering program here. Sometime after Dr. Arp's retirement, the ME department pulled out of the option. All the courses scheduled this year by the ME department were cancelled. Then Dean Clough and Dean Marchman proposed to transfer sole control of biomedical engineering to the ESM department. Last September, that proposal was approved by the Commission of Undergraduate Studies. The courses taught in biomedical engineering are no longer offered under the heading BME, but are now listed under ESM.

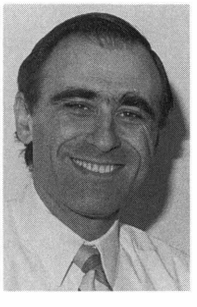
The ESM department is optimistic in its outlook towards the program. Dr. Wallace Grant, associate professor, and Dr. Daniel Schneck, professor, both of ESM, are presently the only two professors teaching biomedical engineering courses, which are offered at the 4000 level.

Future plans are to add more courses and another faculty member to teach the added courses. Tech has begun a collaboration with the Medical College of Virginia (MCV). MCV is technically a part of Virginia Commonwealth University (located in Richmond) but it is essentially a seperate entity. Currently, MCV is accredited to grant degrees in biomedical engineering at the graduate level.

The collaboration will affect undergraduate and graduate programs. It gives Tech access to facilities and specialization in the medical field which were previously unavailable. Tech students will travel to MCV to gain experience and education. Additionally, MCV will offer biomedical research opportunities for summer work or senior design. Tech will in turn offer its engineering expertise and facilities to MCV students who desire more detailed technical instruction.

The plan benefits both schools. The agreement is already in place, and should be formalized next year. This collaboration is important because of the limited availability of biomedical programs in other schools. Nationwide, there are only about 20 programs offering a degree. In this area, other notable programs are at Duke, Johns Hopkins, and the University of Virginia.

In the past, most students who pursued the biomedical option or just took BME classes went on to medical school, to graduate studies in BME, and to work in the medical industry as engineers. Corporations have also recruited Tech graduates with biomedical experience. Nationwide, in hospitals and in the medical care industries, there is a growing need for people with engineering backgrounds. An example is the orthopedic industry, which deals closely with physical systems. As medical technology advances, this need will grow. Also, biomedical engineers are needed for designing computer systems in hospitals or to design artificial limbs, hearts, and kidneys. Dr. Grant has been working on an ultrasonic hearing aid project at MVC for over a year.



Dr. Daniel Schneck

Evidently, the recent changes in the biomedical option will not diminish the program. Instead, because of the partnership with MCV and the optimism of Tech's ESM department, the future of biomedical engineering here looks stronger than ever. Perhaps someday a degree program in biomedical engineering will be implemented.

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