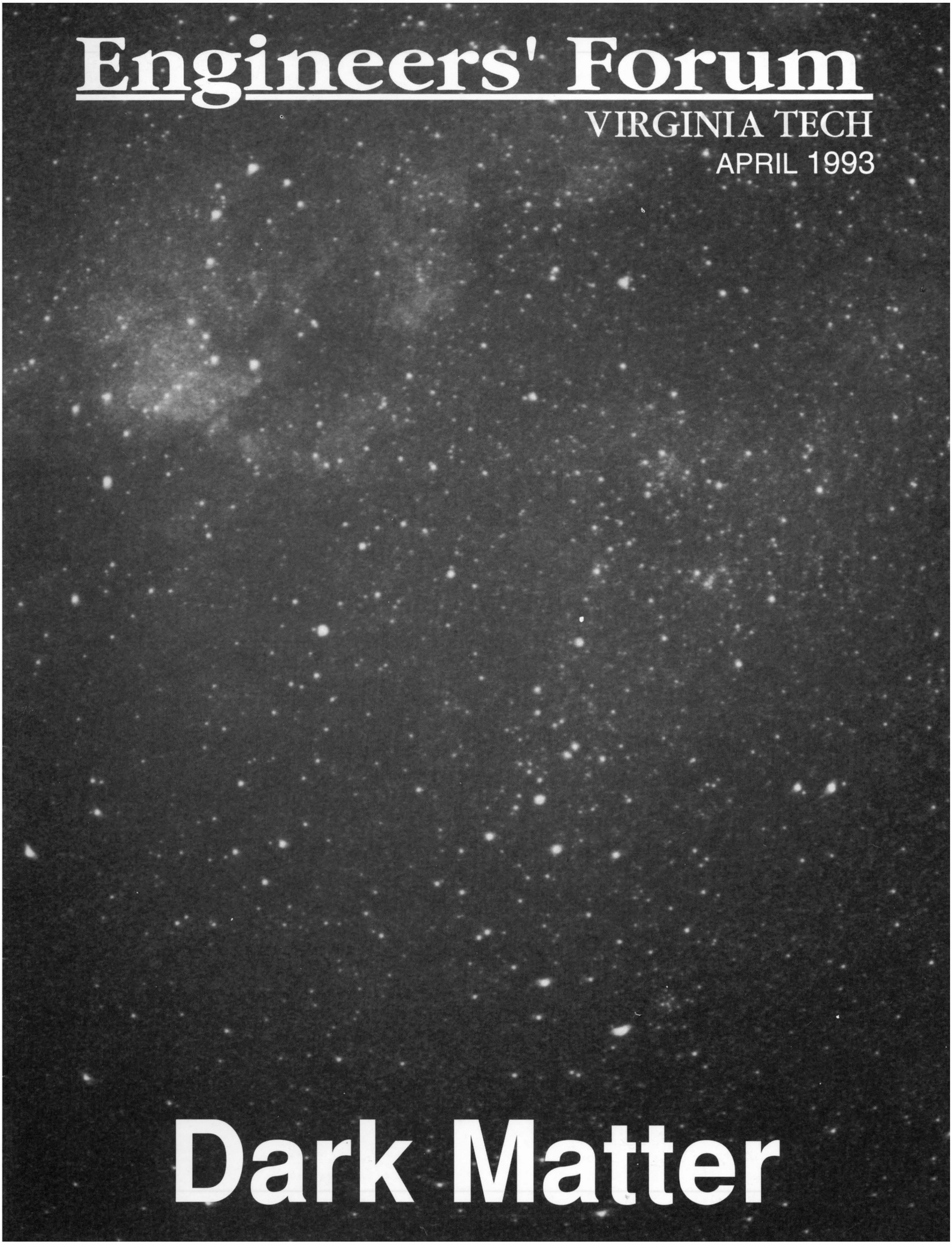
Engineers' Forum

VIRGINIA TECH

APRIL 1993



Dark Matter

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ON THE COVER:
A picture of the Milky Way in Sagittarius taken at Martin Observatory. (Photo by Lyle Evans courtesy of the Virginia Tech Astronomy Club.)

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Engineers' Forum staff

Top Row (l to r): ***Ann Steedly, John Cole, Scott Auer, Aaron Golub, Jessica Smothers, Mark Cherbaka.***
Bottom Row (l to r): ***Seth Cox, Howard Kash, Tony Giunta, Lisa Traub, Shane Crofts, Lynn Nystrom (Faculty Advisor)***
Not Pictured: ***Mike Reese, Keith Piercy, and Beth Mader.***

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EDITOR'S PAGE

The parking lot blues

Anyone who lives off campus is probably familiar with the commuter lot. For the on-campus students who never make it around to that side of campus, the commuter lot is that big gravel eyesore behind Whittemore and Derring. It has ferocious potholes, it turns into a giant mud pit when it rains or snows, and it spits gravel onto parked cars when people drive too fast through it.

Basically, there are a lot of fundamental problems with the new parking lot that are not hard to spot. The sad thing is that they could have easily been avoided.

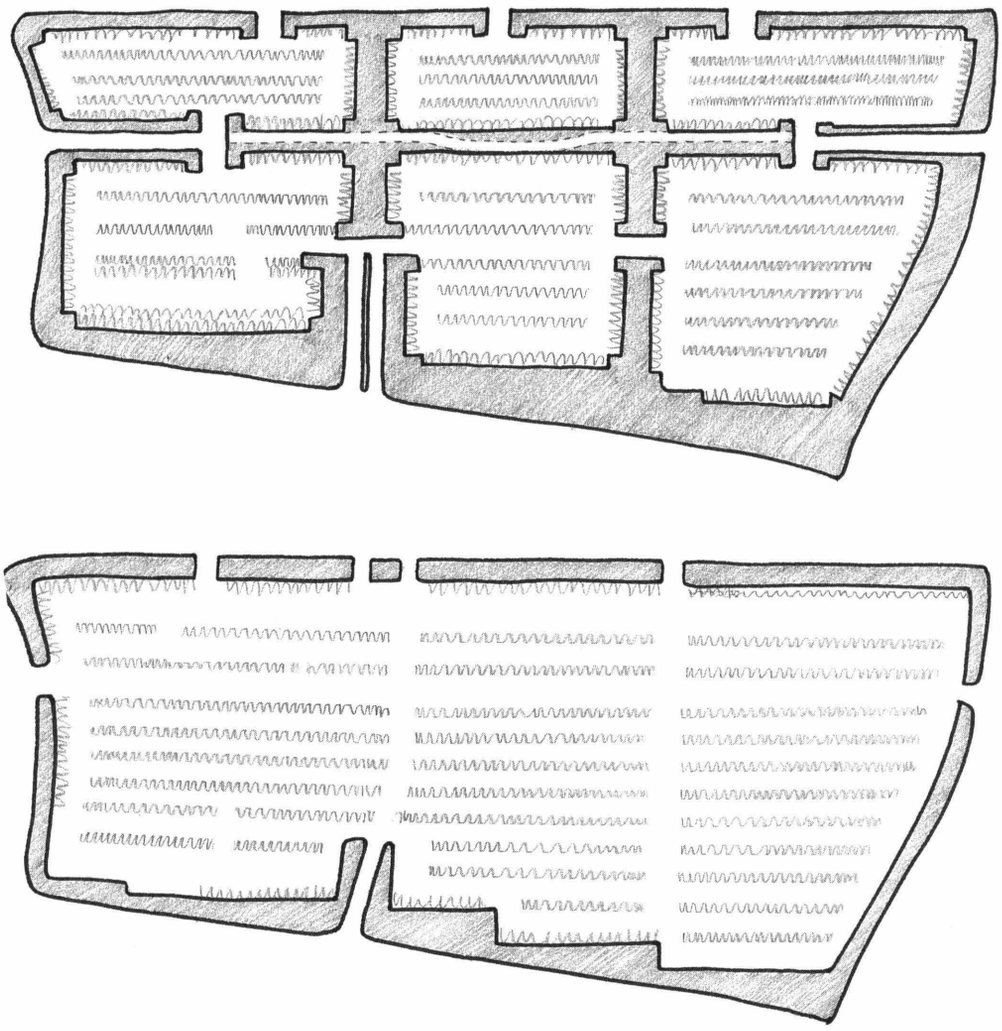
However, to its credit, it is easy to access, there is a large quantity of parking spaces, and it is easy to move around once inside the lot (all of these might be considered important characteristics of a parking lot). However, Virginia Tech decided that the lot needed renovation, so they hired the H.T. Bowling Construction company to renovate the parking lot.

Renovations were to start in May of 1992 but a new state regulation made that impossible. Instead, renovations began in late October. A little less than a fourth of the lot was fenced off when construction began. The project then encountered numerous weather delays. The February 2 issue of *The Collegiate Times* ran an article which quoted the superintendent of the construction company as saying, "The weather has been the biggest factor. We lose one day because it is raining and then the next two if we're doing earth work." Seeming as how Blacksburg is notorious for huge amounts of rain in the winter, it seems it would have made sense to wait until May of 1993 to begin construction.

The fenced off area does still not appear near completion. From multiple daily observations, it also seems to appear in a state of stagnation a lot more than a state of activity.

However, once the new parking lot is completed, it will be beautiful. There will be more grass, it will be paved, and there will be actual parking spaces. With all of these improvements, though, come sacrifices.

A project was recently done for a transportation class in the Civil Engineering Department comparing the proposed new lot with the existing one. They compared the capacities of the lots and found the new lot can hold about 500 less cars. The new lot is also divided into enclosed sectors, making it very difficult to access different sectors of the parking lot once inside it (which most people presently do as they search for a parking space). There are very few entrances and exits to the parking lot as a whole (meaning there will be horrendous bottlenecks in the breaks between classes). They are putting in sidewalks through the lot,



The design for the new parking lot (top), contrasted with the old lot (bottom). Note the closed-off design and limited accessibility of the new lot, which will cause traffic jams.

where grass or bushes could be planted. After parking their cars, students are going to take the shortest path to where they are going, regardless of where the sidewalks are. The drill field is a good example of this.

Basically, there are a lot of fundamental problems with the new parking lot that are not hard to spot. The sad thing is that they could have easily been avoided. Minor improvements or modifications to the plans could have improved the new lot greatly. The 500 lost parking spaces could have been recovered. The lot could have been designed to be easily accessible. Bottlenecking could have been reduced. The aesthetics even could have been improved.

The transportation department in Civil Engineering, whose staff should know a thing or two about parking lots, was never contacted about anything concerning the new lot. The faculty in that department would be an excellent resource for a project of this nature, yet they were untapped.

The College of Engineering, and Virginia Tech as a whole, are supposed to be top-notch institutions. However, projects such as this and the noted Squires debacle (delays, delays, delays) of a few years ago do not do much for a school's standing. While an independent company may be doing the construction, a poorly designed and executed parking lot will ultimately reflect on Virginia Tech. Virginia Tech and the College of Engineering should be able to back up their excellence in the classroom by their actions outside of the classroom.

John Cole
Editor-in-Chief

Toxic waste disposal:

Projects of an environmental engineering professor

by Seth Cox

In the United States today, environmental issues have become the number one issue. It seems America has finally realized the importance of the environment. Until the 1980's the environment took a back seat to other (supposedly more important) concerns. The government finally began to put tougher restrictions on waste disposal and encouraged recycling and better use of non-recyclable materials. The public also became more involved and concerned with maintaining a healthier environment. To accomplish such a feat takes the hard work and dedication of many people from a broad spectrum of disciplines. This includes quite a few people here at Virginia Tech. One in particular is Professor Greg Boardman.

Professor Boardman has been working on environmental projects since 1980. His main concern has been waste disposal. He has worked with waste disposal in the seafood industry, the textile industry, and the urban housing industry. Boardman has worked on about sixty different projects in these areas of environmental concern. The scale of each project varies between these three facets, the housing waste disposal project being the smallest and the textile industry project being the largest. All three are ongoing projects with continuous room for improvement. Each endeavor is very important to keep the environment as safe as it can be.

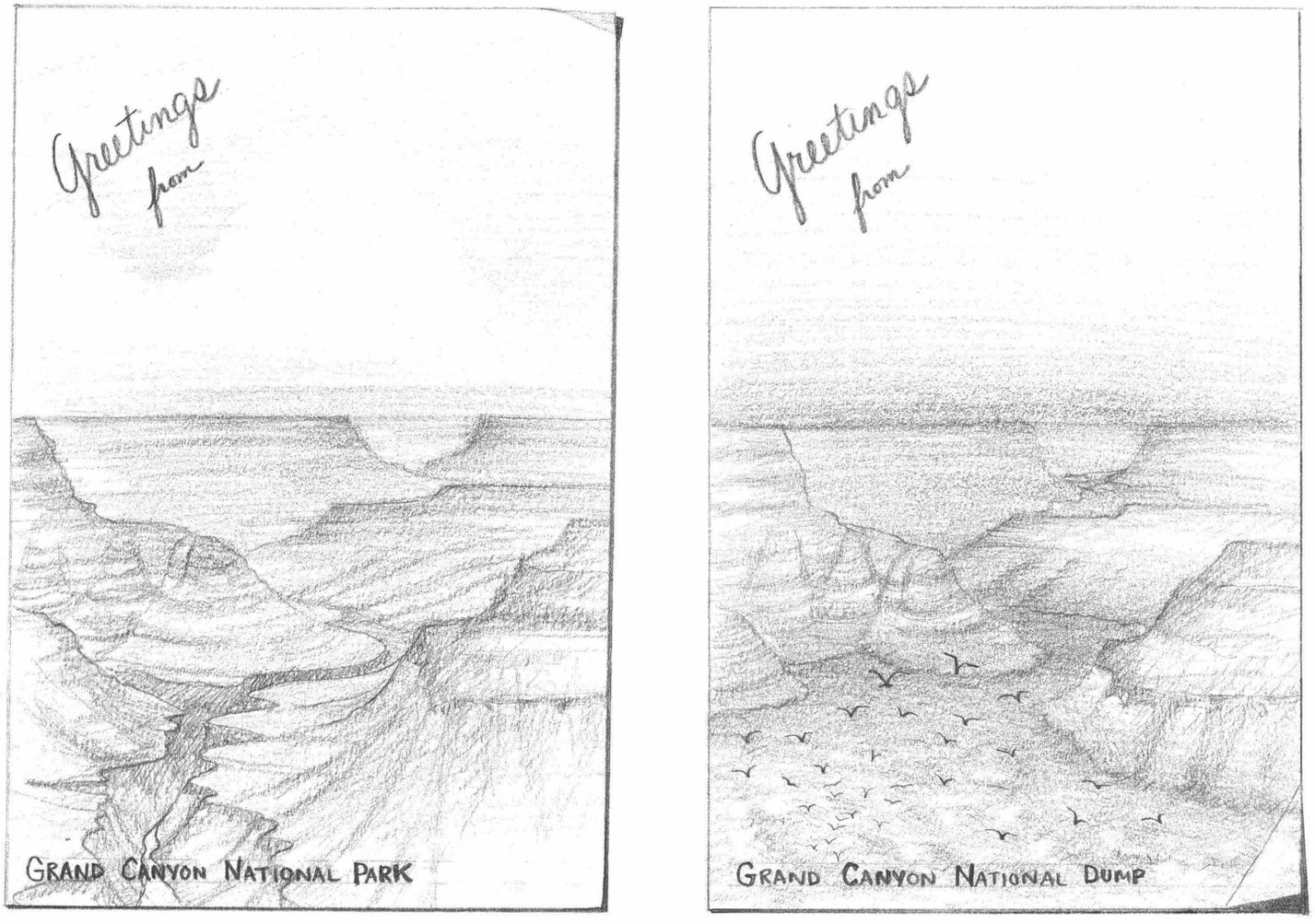
The housing project involves improving the treatment of urban waste. One proposed experiment is the installation of on-site treatment plants. This design would serve the same purpose as a large treatment plant, only on a much smaller scale. The waste is in a smaller quantity, presenting less of a risk than the risk from enormous treatment plants. There are some drawbacks, though. The smaller capacity of these on site plants does not allow much of a buffer for the mixture of household chemicals constantly being introduced into the waste tanks. This creates a greater difficulty in filtering these chemicals. Professor Boardman's task is to evaluate the performance of these on site treatment facilities. Then, using these evaluations, he tries to better the performance of the facilities. There are a myriad of variables to consider in this improvement process, which is what makes it so difficult.

The world of waste management and disposal may not have the perks of being a movie star or even a politician, but it is much more important to the future of this planet.

Professor Boardman's longest running project is the one concerning the treatment of waste in the seafood industry, which he has been involved with since 1980. He deals with both solid and liquid waste from this industry, mostly interacting with the clam, shrimp, and crab manufacturers from the Chesapeake Bay area. The Chesapeake Bay is one of the world's most plentiful, and profitable, resources. The waste from this industry is enormous and the disposal of this waste is a large scale problem, as hundreds of thousands of gallons of the waste are produced daily. The government has also recently put greater restrictions on the disposal of this waste.

Landfills are a popular place to put the seafood industry waste so it is out of the way. Even dumping the waste back into the ocean has been viewed as a viable option. However, the ridding of the waste is no longer that simple. Professor Boardman contributes possible ways to better and more safely dispose of this waste. Management of this waste is difficult as well. Sacrifices must be made on one side to improve the other. The same goes for his largest project, textile waste.

The textile industry is one of the largest industries in the country. It produces millions of gallons of waste everyday. This fact alone is reason enough to cause terrific concern. Much of the waste is very toxic, deadly to just about everything. Professor Boardman is involved in several aspects of making this waste more disposable. Reducing the toxicity is one way to decrease the harmfulness of this waste. This is a major concern because even lessening the toxicity does not eliminate the detrimental effects of the waste. Another area of his endeavors is risk assessment, and incineration of these wastes. There are almost too



Artwork by Aaron Golub

think about it. recycle.

many variables to consider for these wastes.

One specific plan Professor Boardman works with is the federal governments Superfund site arrangement. An area with extreme states of hazardous waste grounds can become a Superfund site. These sites are federally subsidized areas that are kept under very controlled conditions due to their excessive amount of toxic waste. There are about eleven to twelve hundred sites across the United States, twenty in Virginia alone. Proposals on how to better dispose of these hazardous wastes can be concluded by studying these areas and their effects on the surrounding land.

This work may not sound very glamorous, but it is crucial for a better tomorrow. Professor Boardman says he enjoys his work quite a bit. He finds it fascinating to see what goes on behind the doors of these factories. He has been to many different kinds of places to assess the hazards of waste disposal. He has visited slaughter houses, an alligator farm, food processing plants, leather tanning factories, and metal-plating plants, just to name a few. Some of his research does not require field study though. Sometimes, library work and analysis are all that is needed to produce a study or report on a certain project.

Professor Boardman cannot do everything himself. He often has his students help him with the research of his work. This allows the students to get 'hands on' experience for the future.

The world of waste management and disposal may not have the perks of being a movie star or even a politician, but it is much more important to the future of this planet. Professor Boardman and others like him are attempting to make the environment a safer place for all life. Without his work and the work of others the state of the environment would be more than a police state, it would be a war zone; it is the chemicals we produce and we who produce them. **EF**

WANTED: *MACHO's, W. for key roles*

by Jessica Smothers

Okay. So, you've heard it all before, how the universe was created in a massive explosion called the Big Bang and has been expanding ever since. What happens next is the big question now. Will the universe continue to expand forever, or will it eventually collapse in on itself in a great Cosmic Crunch?

The answer to this question depends on the mass of the universe. Scientists have calculated the "critical mass" of the universe, which is the amount of mass needed to create a strong enough gravitational force to stop the expansion of the universe. If the total mass of the universe is less than the critical mass, the universe will continue to expand forever. If the total mass is greater than the critical mass, the universe will eventually reverse the expansion. The total mass of the observed universe, including all of the galaxies and quasars, is, at most, ten percent of the critical mass.

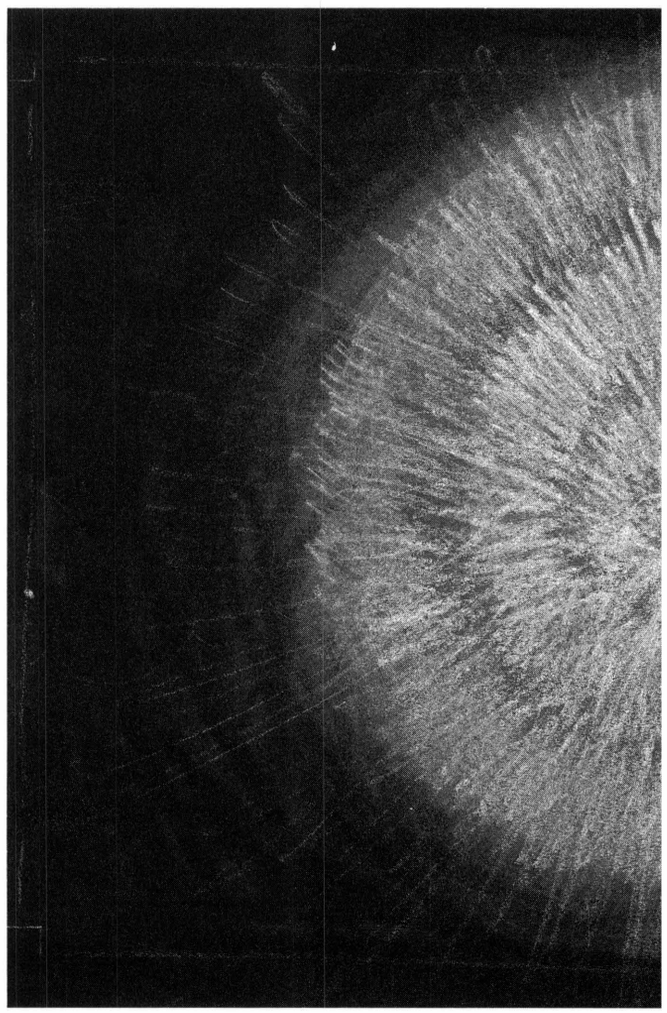
The problem is that the formation and behavior of the galaxies and the large galactic clusters cannot be explained with the amount of observed matter. The gravitational forces aren't strong enough to have formed such large structures as the Great Wall, a gigantic galactic cluster, in the amount of time since the Big Bang (approximately 10 to 20 billion years). This is where dark matter comes in.

Dark matter is a catch-all term used to describe any matter that cannot be detected in normal astronomical observations. It may make up to 99 percent of the mass in the universe. But dark matter is not a single type of matter. Scientists are looking for many types of particles and bodies that are all classified under the heading "dark matter."

Perhaps the most spectacular example of dark matter is a black hole. Black holes result when massive stars, at least 3.2 times as massive as our own sun, collapse in on themselves. What remains is a concentration of matter so dense, with a gravitational field so strong, that not even light can escape its pull. Black holes are believed to be at the centers of many galaxies, feeding on the dense concentrations of gas and dust located there.

There is no way to physically "see" a black hole since they don't emit any light, but the gas and dust being drawn toward the hole can be seen. That's just what the Hubble Space Telescope saw in a photo of galaxy NGC 4261 located in the Virgo Cluster. A black hole is believed to be sucking in the swirling cloud of gas and dust. Definitive proof of the black hole's existence won't be found until after the repairs to Hubble's main mirror. Opposing viewpoints are provided by astronomers who believe it is not a black hole but some other phenomenon, such as the remnant of a second galaxy swallowed by NGC 4261, that is causing the cloud.

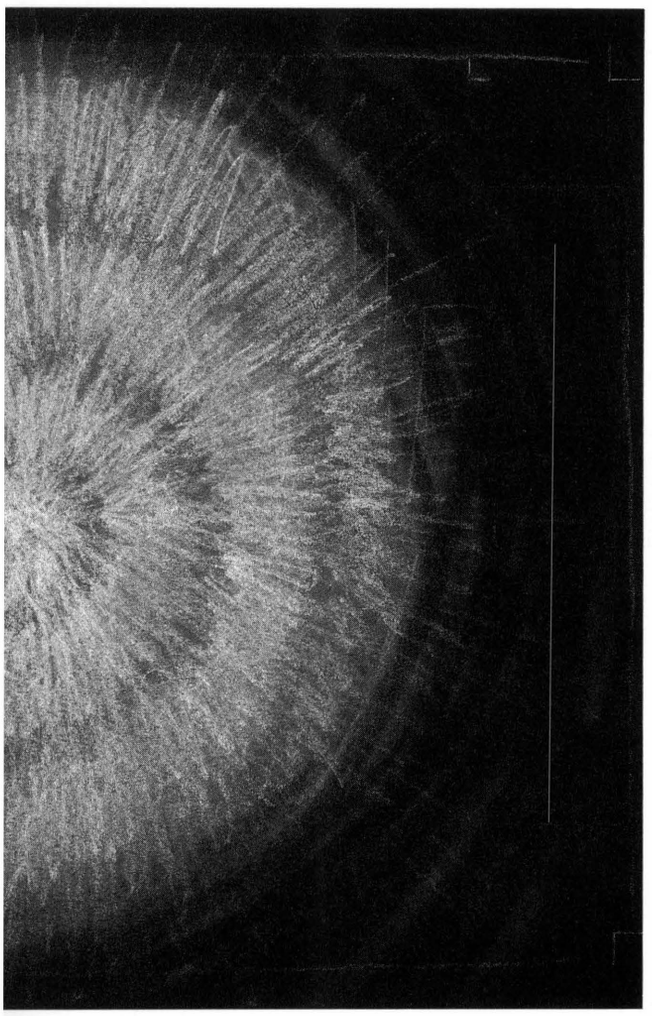
MACHO's are another class of large bodies that are believed to make up part of the missing matter. MACHO's (Massively Compact Halo Objects), also called brown dwarfs, are stars that didn't quite make it. Their mass is too small to ignite the nuclear fires that would make them shine. There could be millions of these in the Milky Way alone, but they would be so dim as to be nearly impossible to detect. Some scientists would say that we have a brown dwarf in our own solar system, the large gaseous planet Jupiter. Jupiter's composition is very similar to a star's, about 90



MP's, and other Massive Unseen Bodies in universal creation theory

percent hydrogen and 10 percent helium. It is much larger than all the other planets combined, and it produces about twice as much heat as it receives from the sun. If Jupiter was just sixty times more massive it would have ignited and our solar system would be a binary system.

Even including the MACHO's and black holes there would still be a lot of missing matter. Scientists believe most of the missing matter will be found in the vast reaches of "empty" space in the billions of subatomic particles, insignificant by themselves, but adding up to an enormous amount of mass. Scientists are looking for several types of this subatomic matter. The search is difficult because these particles have nearly no individual mass and give off no light or other radiation. They can only be detected when they collide with other particles or indirectly, by observing the effects of their combined mass and gravitational force.



art by Aaron Golub

Hot dark matter, its particles called neutrinos, is one type of this subatomic dark matter. Neutrinos travel at or near the speed of light. Most probably have no mass, but recent experiments suggest that one type does have some slight mass. Even if it has only one ten-thousandth of the mass of an electron, the combined mass would be considerable.

However the light, fast neutrinos would not form the dense clumps of matter necessary to form galaxies. So another type of dark matter, cold dark matter, is needed. These particles are called axions and WIMP's (Weakly Interacting Massive Particles). WIMP's should be roughly the size of a neutrino, but the axion should be much smaller, perhaps one-trillionth of the mass of an electron.

The cold dark matter theory suffered a serious setback with the discovery of the "great walls." It didn't seem possible for such large structures to have been built by cold dark matter in the time since the creation of the universe. Then came the discovery of density ripples in the background radiation, the radiation left over from the Big Bang, by COBE (Cosmic Background Explorer). These "ripples" are areas with a slightly larger mass, thus a larger gravitational field. This field could then attract the matter that would eventually form stars and galaxies. The cold dark matter theory was revived immediately.

A recent observation by ROSAT seems to offer definitive proof for the existence of cold dark matter. ROSAT is short for Roentgen Satellite, a joint U.S., British, and German X-ray satellite. When ROSAT took pictures of three small galaxies in the NGC 2300 group, located about 150 million miles from Earth, there appeared to be a slight distortion of the image. The distortion turned out to be caused by a huge, hot gas cloud about 8 trillion miles in diameter that surrounds the three galaxies. The mass needed to hold on to the gas cloud is about 25 times greater than the mass of the three galaxies. The only answer is the presence of large amounts of dark matter that hold the cloud together.

The stars and galaxies may be more spectacular, but dark matter is the true motivator in the universe. At the very beginning of time, it was dark matter that instigated the birth of the galaxies. Between the galaxies, in their great clusters, are vast amounts of dark matter that hold everything together. After years of theorizing and searching, scientists are finally getting a glimpse at the composition of the universe. **EF**

1992 Sporn Award Winner

Kander entertains while educating

by John Cole

The Sporn Award is a prestigious award presented to a professor in the College of Engineering. The award, which is voted on by students, is based on outstanding undergraduate teaching. Traditionally, the award has gone to a faculty member who has been here a relatively long time. The winner also usually comes out of one of the bigger departments, as they are able to garner more support for a candidate. This year's award was special in that it went to an underdog, someone who is a relative newcomer to one of the smaller departments.

One of Dr. Ron Kander's favorite sayings is that "the secret to good teaching is sincerity. As soon as you learn to fake that, you've got it made." Kander, a professor in the Materials Science and Engineering Department, hardly needs to fake it. Kander likes to boast that a testament to this is his high attendance rate for his 8:00 class, no small feat.

Kander places teaching as his number one priority, and is constantly striving for innovative methods to get information through to his students. "Teaching is like a performance. You have to package the information you are presenting, and it has to be entertaining," says Kander.

That's where his "toys" come into play. The "toys" start with the "ball of fun," which is a spherical light cover which was made by spinning a polyethylene being in a spherical mold. Out of the "ball of fun" come many examples of polymers and composites, such as Gumby and Pokey (two of Kander's favorites), rubber balls, and a rubber mask from a CPR dummy. On the day of this interview, Kander is showing off a $750 bicycle wheel from DuPont, which is made from a carbon fiber composite and is noticeably lighter than a standard spoked wheel.

photo by Lisa Traub

Dr. Ron Kander showing off one of his "toys," his $750 bicycle wheel from DuPont.

Kander is originally from the small steel mill town of Belle Vernon in western Pennsylvania. He attended Carnegie Mellon, where he majored in Chemical Engineering. He also met his wife Amy there, as she was his freshman lab partner. Kander then proceeded straight on to receive his Ph.D. from the University of Delaware. The nature of his doctoral work was the thermodynamics of small molecules.

After school, Kander went to work for DuPont for six years, working with composites and polymer physics. One of his major areas of involvement while at DuPont was analyzing the use of composites in automobiles. The work he was involved in has led to the use of composites for the leaf springs in numerous automobiles, and the use of composite bumper beams (the piece right behind the actual bumper which absorbs the shock). The composites used in those areas perform better and they are less expensive.

Kander is only in his third year of teaching here at Virginia Tech since leaving DuPont. However, in that time he has certainly made a name for him-

See Sporn, page 13

Payne Hall:

Integrating traditional styling with innovative technology

by Ann Steedly

Next fall, for the 270 upperclassmen who will move into Payne Hall, life in the "dorm" will be slightly different than before. In addition to many other amenities, the upperclassmen will look forward to life without freshmen.

From the outside, with its Hokie Stone face, Payne Hall looks like most other residence halls on campus. However, there are a lot of differences on the inside. There is an air conditioning system and a new type of communication linkup. The living structure is different from the present dorms, with suites existing in certain parts.

The new four-story residence hall consists of two wings connected by an archway in the middle. There are enclosed walkways and lounges connecting the second and third floors. There is an open breezeway between the wings of the first floor. To get from one wing of the fourth floor to the other, you must go down to the third floor. Elevators are located at the outside end of each wing.

The first three floors consist of suites and lounges. The suites are one, two, or three-bedroom and all share a bathroom. Some suites also share a living room. The fourth floor has the traditional, bunk-bed dorm rooms and community bathrooms. Single rooms are available on this floor.

One interesting feature in the new residence hall is the several one or two bedroom suites designed especially for the handicapped. These rooms, combined with elevators in each wing, should provide a significant advantage over the older dorms for handicapped students.

The most unique thing about the new residence hall is the use of ethernet in the east wing for communication networking. E-mail and other communications will run through this network, which will be able to hook directly into computers. The residents in this wing will have voice-only telephones, rather than the traditional data phones.

Payne Hall integrates a traditional Hokie Stone appearance with technological advances.

The main difference with the ethernet system is the speed with which computer communications can occur. Communication through the campus, such as Email, will occur directly between computers hooked into the network. All other communications will still run through the main computer.

The ethernet cable has also been laid in the west wing. Depending on the success of the network in the east wing, the cable in the west wing may be activated at later date.

Payne Hall was designed as an integral part of campus. The design is comparable to those of the Eggleston and Campbell residence halls, and it has, of course, the same Hokie Stone exterior. Payne was also limited to four floors, so as not to obstruct the mountain view off of the prairie quad.

The dorm is scheduled for occupancy this August. The target completion date is June 16. Construction is slightly ahead of schedule, according to Steve Chapman, Virginia Tech Project Engineer for the project.

According to Chapman, everything has run very smoothly. Rain did cause some delays on the exterior work, but the time has been made up. Most of the remaining work is on the interior, and Chapman expects the construction to be completed on time or early. **EF**

Engineers' Week: In the

by Scott Auer

If you were to ask the average person off the street, if he knew what engineering was really all about, he would probably find it difficult to answer. Unlike other professional occupations such as medicine or law, the field of engineering is not readily understood by the public. This is due in part to the lack of attention that engineers receive in the media. What can an aspiring young engineer do to get some attention? Well, thankfully Engineers' Week (E-Week), an observance established in 1951 by the National Society of Engineers, answers this question.

In this annual event, engineers across the nation come out of their labs, offices, and classrooms to show off their latest technological achievements and help clear up some of the mystery surrounding their profession. As they have in years past, the Virginia Tech College of Engineering and the Student Engineers' Council (SEC) participated in E-Week, allowing students from the university and local high schools to learn more about this exciting field.

During the E-Week celebration, students witnessed such oddities as golf ball catapults, miniature clay boats, and paper towers. While these things might seem more at home at the local miniature golf course, they were just a few of the many uncommon attractions present at this year's event, which included discussions, lab tours, displays, and sporting events.

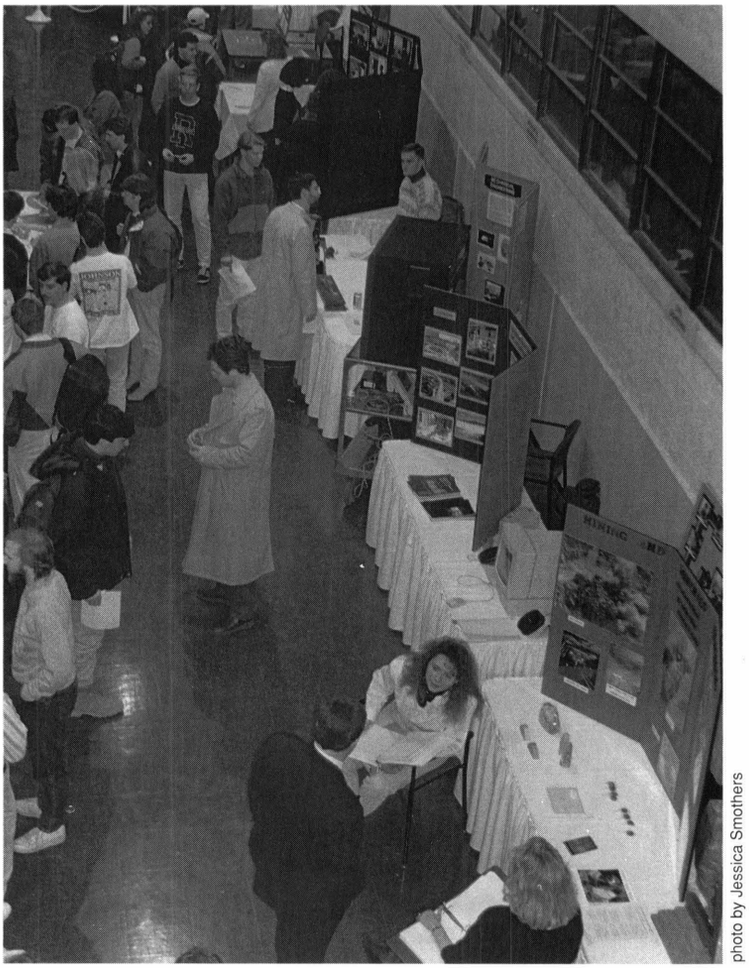


photo by Jessica Smothers

An overview of Engineers' Week activities in the Hancock Atrium.

One of the benefits of E-Week is the opportunity that it provides for practicing engineers to share their knowledge and talents with the rising generation of engineers. This was accomplished at this year's event with a panel discussion on "The Future of Science and Technology." A four member panel explored issues concerning the field on engineering.

Among the participants in this discussion was Dr. G. Wayne Clough, Dean of Engineering; Dr. Paul Torgerson, Dean Emeritus; Dr. Ron Kriz, Director of the Scientific Visualization Lab; and James Olin, former U.S. Congressman. The discussion included presentations on Scientific Visualization, Multimedia, Green Engineering, and The Recent Decline in U.S. Productivity. After the presentations, the audience participated in an open discussion with the panel members.

The importance of E-Week is especially noted by freshmen engineering students. E-Week marks the first formal introduction of freshmen students to the ten engineering departments at Virginia Tech. By providing an opportunity for freshmen to interact with their professors, E-Week lets students get their first look at the various departments and what each has to offer.

During E-Week, students attended nightly information sessions held by departments and learned of the opportunities and challenges that await them as upperclassmen. Not only did students learn about the broad range of engineering disciplines that the school has to offer, but they also got some much needed guidance from professors as they began choosing a particular field to study.

As part of E-Week, Tau Beta Pi, the National Engineering Honor Society, sponsored an open house in Hancock Atrium. The open house allowed students from the University, as well as visitors from area high schools, to get a glimpse into the world of engineering at Virginia Tech. Engineering students were on hand to answer questions as visitors viewed some of the tools used by the College of Engineering, such as robotic arms, computer controlled cutting machines, and infrared cameras.

Tours of several student labs gave visitors a first hand look at the academic lives of engineering students. Guests toured some of the normally unseen facilities at the college, such as the supersonic wind tunnel, an automated manufacturing sys-

spotlight

tem, and an aquaculture research facility.

Several student organizations provided interactive demonstrations, allowing visitors to discover their hidden engineering abilities. Members of the Society of Naval Architects and Marine Engineers invited visitors to construct small model boats out of clay. The boats were then tested to determine which boats could maintain the highest velocity through a tank of water. Winners of contests such as this one were awarded T-shirts or other prizes at the end of the day.

On hand to exhibit their projects were team members from several of Virginia Tech's design teams. Visitors viewed a variety of projects, including the solar car, mini-baja car, and concrete canoe. Members of the teams find the Engineers' Week to be a good opportunity to recruit new members from the engineering departments (and other majors).

As this year's E-Week activities drew to a close, students and faculty participated in the SEC Olympics, a day long event in which participants tested their athletic abilities and relaxed after a busy week. Fourteen teams competed in sporting events ranging from tug-o-war to a pie in the face relay in which participants had to retrieve a piece of chocolate out of a cream pie using only their mouths. Winning first place in this year's events was AIAA, with AICHE and the faculty team taking second and third, respectively.

With the events of E-Week finished for the year, engineers at Virginia Tech and across the country have returned to their work, waiting for the chance to once again shine in the spotlight and celebrate their achievements in technology. **EF**

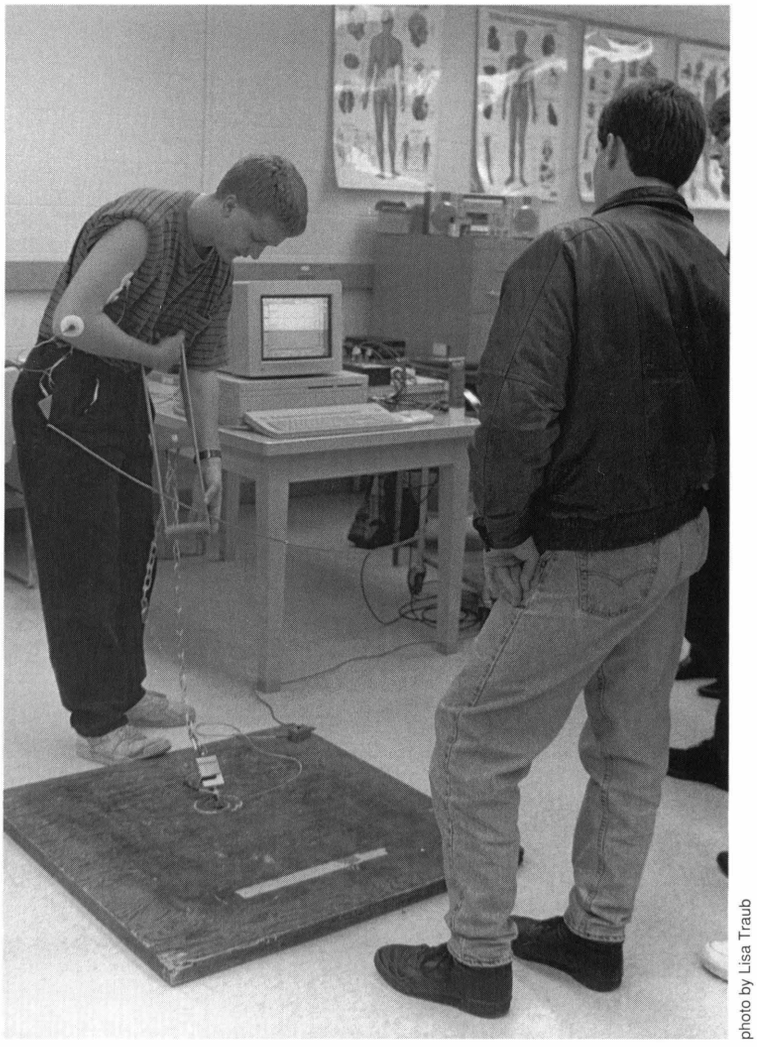


photo by Lisa Traub

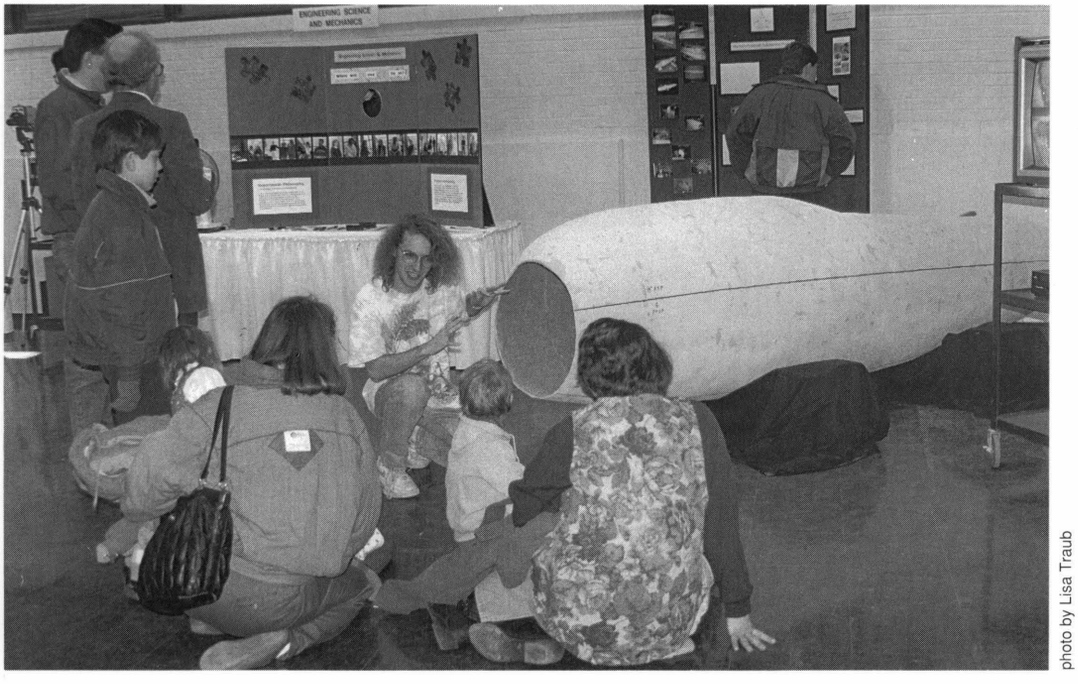
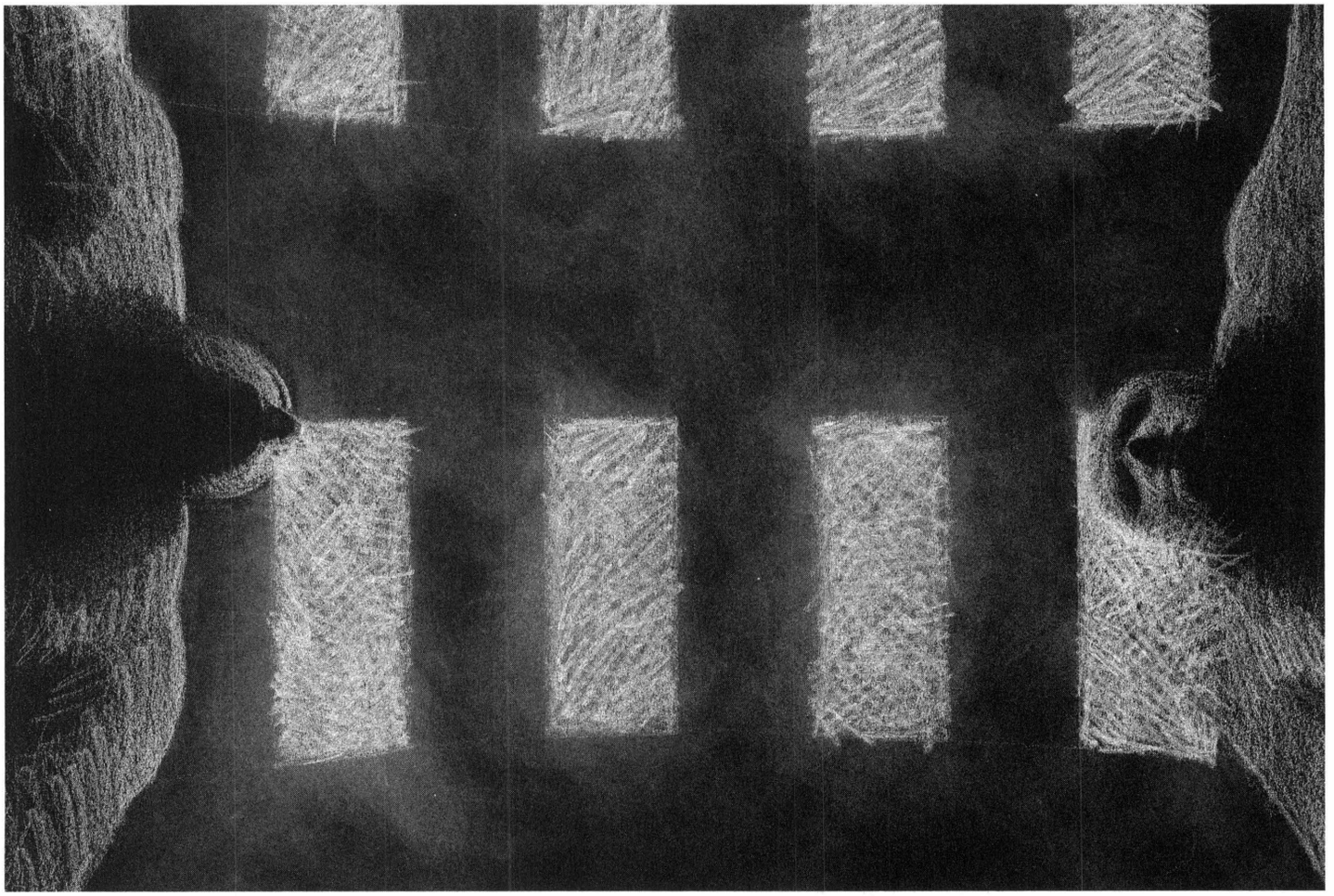


photo by Lisa Traub

(above) A student demonstrates how sensors monitor muscle activity and lifting force. The output from the sensors shows up on the computer behind him. (left) A student elaborates on the Phantom submarine project.

SCIENCE FICTION PAGE



artwork by Aaron Golub

A brief study of time

by Shane Crofts

The shadow of a man approached her from the side as Annie stared down at the floor in the hallway. She jumped up expecting to see a familiar face, but instead she found herself looking into the eyes of an old, stooped over man.

"Oh. I'm trying to find David Merchant," Annie said.

"I am David Merchant, but I never thought I'd ever see you again," the old man's eyes bulged out in shock, "I had forgotten about that experiment. That was Pete's brain child. Why don't you try to find him."

The old man started walking down the hall.

"Pete's dead," she ran after him, "I tried to find him, but I stopped when I discovered that he had become a drug dealer before he graduated from college and was shot a few years later."

David stopped, sighed, and gazed at the tiles on the floor.

"He got involved with that stuff about a week after we, uh, did what we did to you. He felt so guilty that he couldn't handle the pressure," David was now staring her straight in the face, "He didn't know what he was doing. You've got to believe that."

"Well, what exactly did you do to me?"

•••••

An hour later Annie found herself in David's kitchen brewing over a cup of tea.

"It was spring break of our senior year," David began, "Pete had been building a small device that could change matter into light; more precisely a laser beam. He had this idea to incorporate the laser beam into a form of time traveling. You see, if a person were sent away from the earth traveling at the speed of light for one earth year, and took another year to return they would come back having aged two years, while everyone else on earth would have aged 63 years. Obviously, it worked well," David mumbled.

"Well, the night we hired you we were both drunk," he continued, "and Pete kept talking about trying out the

"That would be too risky. If it didn't work her molecules would be traveling forever until she hit something and scattered."

device and that using a hooker was justifiable because they were a menace to society anyway. I still remember his words, 'Let's go to 14th Street and find our guinea pigs."

"You know the rest of course. We took you over to George Washington, sedated you, transformed your atoms into a laser beam, and sent you out into space to be reflected off an object that would take you a year to reach. Of course we kept the receiver in the same place in case you were to return. Actually, I made sure it stayed there."

"I guess it's a little late to ask for my $500," Annie said sarcastically, "All I want to do is go home. I know that I didn't have much of a home in 1993, but I certainly don't belong in 2056. Please, I need to get back."

"You don't understand Annie. You can't! You're stuck here. I'm too old to think up a way for you to return. I just assisted Pete. I'm not the creative dreamer like he was."

"But you have a million degrees in physics. You know more then Pete ever did."

"I'm sorry, but I don't think you can travel back in time, and I don't want to be responsible for the risk involved. Look, I'll help you assimilate as much as I can, but you have to accept the fact that you're not in the twentieth century anymore."

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Slowly, the days rolled by with Annie trying to learn about a changed society with different priorities and needs. She found David to be a very enlightening and humorous man, yet he always seemed to have an air of depression. That changed when he found out that his grandson was coming for a visit.

"He goes to Indiana University and is majoring in philosophy. It's quite a contrast from my chosen field, but he's a very intelligent boy; you'll like him."

And Annie did like him. Robert was a very emotional and sensitive man who spent hours listening to her talk about her old life and how she had hated being a prostitute. However, she still wanted to go back.

One night at dinner Robert addressed his grandfather, "I was wondering, in purely a hypothetical state, that in looking at the image of a star that took 2000 light years to get here, are we actually looking back in time. For all we know that star may be dead, but in our present time that star exists. If you went on the theory that all matter is simply made of light, then regardless of the fact that the star may be dead, that star exists right now. Maybe traveling back in time is simply the ability to catch up with the past image"

"That sounded very interesting, but I don't see how..." David began.

"But you have the technology to send some particles faster then the speed of light. Why send Annie out into space as a high speed form of light?"

"That would be too risky. If it didn't work her molecules would be traveling forever until she hit something and scattered."

"Hey," a voice interrupted, "I think I'm the one who makes the decision. I'm willing to try it, because I have no reason to stay here, so I may as well be out there running with the comets."

Finally, it was determined that David would modify the matter-to-light converter and try to send Annie back.

"Now Annie," David told her the morning they were to try their experiment, "if this works I want you to realize that you might age a few more years. Even time doesn't stop for you. One last thing, no one's future has been determined. This may not be the earth of your future."

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The bright lights caused Annie to open her eyes. All she could see were two blurry faces peering over her.

"I don't believe it David. Either something worked or she didn't travel far. At any rate, she's alive and well. I still can't believe that she was only gone for a few minutes." **EF**

Sporn *Continued from page 6*

self. He has taught courses ranging from Engineering Fundamentals, to the introductory materials class for Materials Engineering majors, and on up to senior level classes on polymers. Next year he will begin teaching a graduate level engineering mathematics class, utilizing his math minor he received at Delaware.

Kander says that with his involvement in school he hardly has time for any "free time." He does make time for the Friday night happy hour at Champs with the graduate students from the Materials Science and Engineering Department Materials department. He refers to the happy hour as consisting of "aerodynamics (throwing darts), fluid dynamics (drinking refreshments), and particle physics (shooting pool)." Kander is also a big country music fan.

Kander values the Sporn Award highly, appreciating the fact that it is voted on by students. He added, "The thing that is really gratifying (about the award) is the level of student support I received." Chip Young, a senior in Materials Engineering, summed up his feelings when he said, "Dr. Kander really enjoys his job and has a lot of fun teaching, which makes it a lot easier on the students." **EF**