



Engineers' Forum

Volume 30 No. 1 March 2010

LonMID

Autonomous Underwater Vehicle Team
Consumer Electronics Show
Football's Over. Now what?

U.S. Missile Defense Agency

MISSILE DEFENSE. IT'S NOT A GAME.
BUT YOU DO GET TO SAVE THE WORLD.

LEAD ONE OF THE GREATEST TECHNOLOGICAL ACHIEVEMENTS OF OUR TIME.



Join the Missile Defense Agency (MDA). Your mission will be to develop, test and field the integrated, layered ballistic missile defense system. You'll be protecting our homeland, deployed troops, allies and friends worldwide.

Are you ready for your next mission? It's a cutting edge career working with the most seasoned engineering and IT leaders at MDA in Huntsville, Alabama. You'll be joining a diverse staff of individuals whose strengths and abilities help to ensure the success of our mission.

You'll get excellent compensation, unparalleled benefits and the satisfying lifestyle available in the Tennessee Valley. Set your sights on a future with MDA.

We're currently seeking entry-level and experienced candidates for a variety of positions at MDA. For more information, and to apply, visit BeyondAGame.com. Text "MDAJobs" to 95495.

Missile Defense Agency is an Equal Opportunity Employer. U.S. Citizenship required.



MISSILE DEFENSE
AGENCY

FROM THE EDITOR

Editor-in-Chief

Julia Alspaugh

Managing Editor

Sumedha Mohan

Layout and Design

Darius Emrani, Michael Miracle

Business Manager

Alex Horner

Webmaster

Pranav Angara, Sarah Hendon,

Copy Editor

Laura Dicker

Writers

Z. Nathan Bales, Chris Dusold,
Katie Gloe, Christina Kazmer,
Allan Kirchhoff, Andrew Mussey

Editorial Adviser

Lynn Nystrom

Director of News and External
Relations for the College of
Engineering

Engineers' Forum is Virginia Tech's student-run engineering magazine. Engineers' Forum is published four times during the academic year. The editorial and business office is located at:

223 Femoyer Hall Virginia Tech
Blacksburg, VA 24061
Phone: 540-231-7738
Email: forum@vt.edu

URL: <http://www.ef.org.vt.edu/>

Member of Engineering College Magazine Associated. The opinions expressed in the Engineers' Forum do not necessarily reflect those of the administration, faculty or student body of Virginia Tech. Copyright 2009 Engineers' Forum. All rights reserved. Reproduction in whole or in part without permission is prohibited.
Printed in the USA.

Dear Readers,

With the turn of a new decade, it seems like everyone is focusing on the future. "New and improving!" could be the motto for 2010, and the Engineers' Forum is following suit. In this issue you will find articles about the future of textbooks, the Stroubles Creek restoration effort, the future of your weekend entertainment this semester, and more!

Of particular interest to our readers may be the cover article, written about and photographed by the EF's resident photographer, Andrew Mussey. Andrew attended the 2010 International Consumer Electronics Show (CES) in Las Vegas, Nevada. Along with the many photos he took and the summaries he wrote for the Engineers' Forum, Andrew kept a live blog during the event. Check it out here: <http://ces.ajama.org/>.

Another change I am proud to present is that, for the first time ever, the Engineers' Forum is being printed on FSC paper! The Forest Stewardship Council certifies and manages the timber and paper making process to ensure that the companies involved are acting in an environmentally responsible and sustainable manner. As a printed work, we at the Engineers' Forum feel that it is important for us to encourage forest sustainability and reduction of paper waste while still providing quality reading material. We believe that the best way for the EF to show our support and approval is to print on FSC certified paper whenever possible.

Lastly, the Engineers' Forum is continuing to accept entries into our "wackiest engineering incident" contest. Check out our website for details!

Have a good semester, and be careful in the (at the time of this writing) continuing waves of snow!

Julia Alspaugh



Editor-in-Chief



Printed using Toyo HyPlus ink, a petroleum-
solvent-free ink made from a vegetable oil
base including soy and linseed oils.

Cover photo courtesy of Andrew Mussey

March 2010

Volume 30 No. 1

Engineers' Forum

INSIDE



The newly renovated scenic area near Squires after a recent snow (page 18).

inside - 5

Stroubles Creek Restoration

-Katie Gloe

inside - 8

Digging into LDDI

-Z. Nathan Bales

cover - 10

The Consumer Electronics Show

-Andrew Mussey

inside- 14

**Textbook vs. E-Book:
Campus Edition**

-Christina Kazmer

inside - 15

**Autonomous Underwater
Vehicle Team**

-Chris Dusold

cover - 16

**SEC's Leadership
Conference 2009**

-Allan Kirchhoff

inside - 17

ABET is a Big Deal

-Christina Kazmer

cover - 18

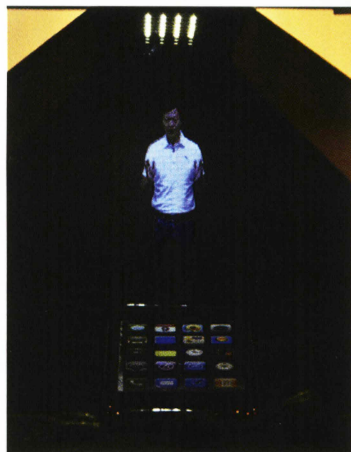
**Football's Over. Now
What?**

-Christina Kazmer

A company created a small device that allowed you to remotely control appliances inside your house.



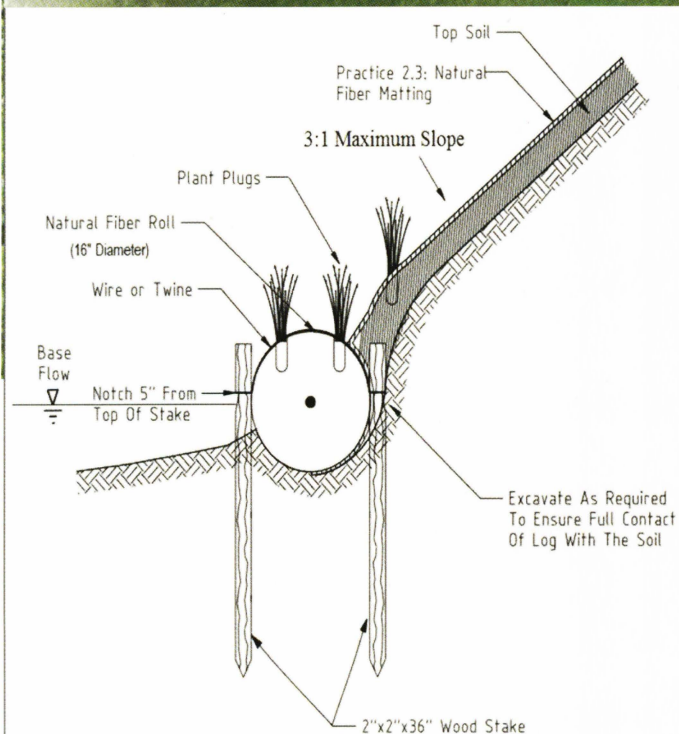
Flip a switch in the car on the way home from work, and the heat, lights, or oven would be on when you go back to greet you.



A company created a small, self contained hologram projector. It wasn't being generated by the iPhone, but had been set up to look as if it had been (page 10).

Stroubles Creek Restoration: A Project for All

Stroubles Creek is the current focus of many environmentally concerned groups on campus. The Biological Systems Engineering Department (BSE) is the most concerned about the welfare of the creek. BSE has taken on the mammoth task of restoring sections of the creek back to a healthy state. Stroubles Creek originates in Blacksburg itself, flowing all the way into the New River. Its watershed covers over 6,119 acres. The creek's watershed contains the urbanization of Blacksburg, the campus and rural land.



This figure displays the layout of the coconut logs and mats on the stream banks.



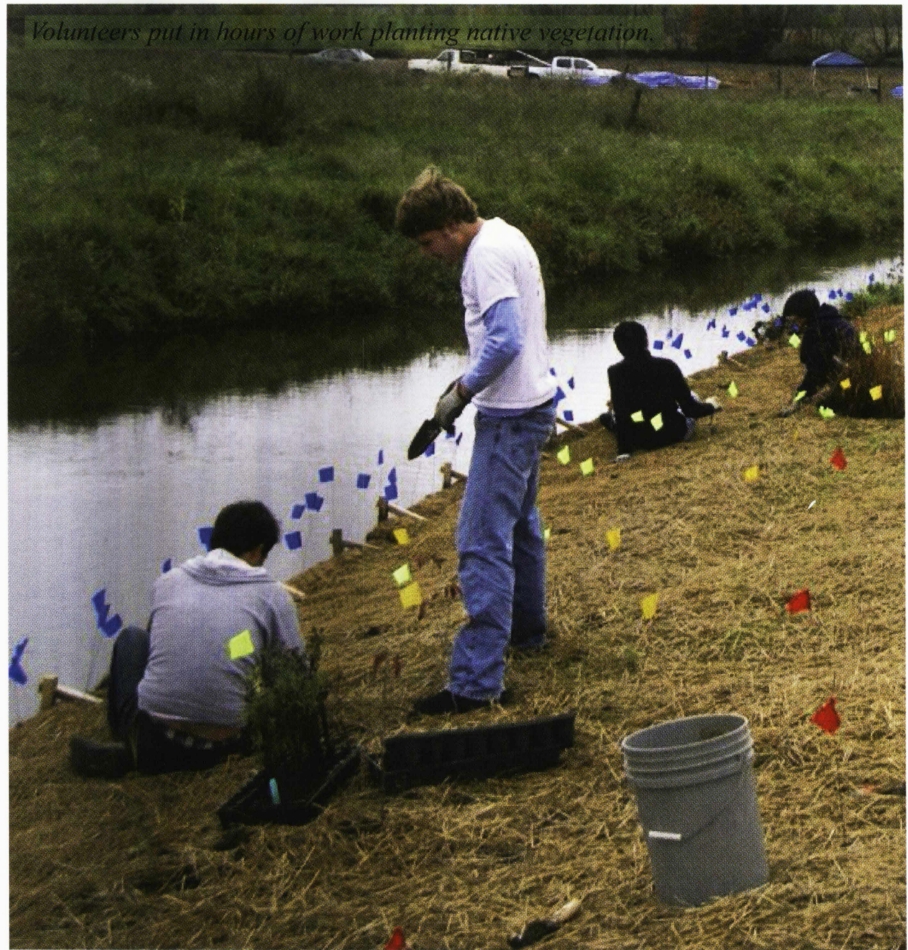
The lower section of Stroubles, just past the Duck Pond, has been found to "violate benthic standards." This section of the creek has been added in Virginia's Section 303(d) impaired list, first in 1998. In 2003 a Total Maximum Daily Load for the Aquatic Life Use Impairment of Stroubles Creek was filed, it has since been revised in 2006. A Total Maximum Daily Load defines the maximum amount of a pollutant that a body of water can receive and still meet quality standards set by the state. They also detail measures that could be taken to reduce and reverse damage done by these pollutants.

Continued on page 6

Continued from page 5

The TMDL expressed that the creek's macroinvertebrate community was suffering from some unknown stressor in the environment. Front contenders were low dissolved oxygen levels, sedimentation, habitat modification, nutrients and possible toxic pollutants. Upon further testing and observations, the stressor list was shortened to include nutrients, sediment and organic matter. Stroubles has been found to contain large amounts of sediment and bacteria, making sediment the most obvious problem. The bacterial impairment has been attributed to nonpoint source pollution, due to the relatively recent increase in urbanization and agriculture practices up stream. The excessive sediment present in the stream could be a direct result of the stream's geometry, land uses, weather and a number of other outside factors. The banks of the stream are very eroded and no longer support a network of vegetation. Both of these maladies are negatively affecting the fragile aquatic ecosystem.

The Stroubles Creek Restoration Project has already made a huge impact. Professors Cully Hession and Tess Wynn have jump-started the effort to nurse the stream back to health with a grant from the Virginia Department of



"My name is Jeffery Pace, come work with me at Aurora Flight Sciences."

At Aurora Flight Sciences, I work in a dynamic prototype aircraft development environment, which demands hands on engineering, leadership, and technical versatility. I work on the development of everything from primary composite aircraft structure, to mechanical systems and landing gear design. I get to use the knowledge and experience that I gained at Virginia Tech, as a student and a Formula SAE design team member, to develop cutting-edge unmanned aircraft.

Visit www.aurora.aero/careers or contact [Teresa Stegmaier, tstegmaier@aurora.aero](mailto:Teresa.Stegmaier@aurora.aero).

Aurora Flight Sciences is an Equal Opportunity Employer



Conservation and Recreation. Along with their graduate students, they have begun to improve the stream's conditions. The measures being taken to reduce the sediment load on the stream were discussed with BSE graduate student Matthew Gloe. He expressed that the improvements with the most impact include regrading the weathered and eroded banks of the stream back to a stable slope angle. After the slopes have been regraded, coconut fiber logs are installed along the bank and stream interface, and coconut fiber mats are unrolled and installed on the banks, as shown in the figure. This secures the soil banks until native vegetation can establish. The banks have been seeded with a wetland plant mix, seedlings have been planted and trees have been installed.

The volunteers contribute the most effort to the restoration. At the end of 2009 volunteers had clocked in over 500 hours of labor. This project is highly dependent on volunteer work. Anyone from the age of 14 can volunteer their time to plant vegetation and help with the regrading of stream banks. The project took a break over the winter months because of the dormant growth period and plant growth cycles, making it hard to plant vegetation. The inability to establish plants this time of year limits the work that can be done. The project will be resuming in the spring. Volunteers are welcome Monday through Saturday, groups and organizations are encouraged to volunteer. If you are interested in doing your part to restore Stroubles Creek, contact Tess Wynn by email (tesswynn@vt.edu) for details on the project.

Katie Gloe is a freshman in Chemical Engineering.

There is no substitute.

For over a century, Electric Boat has been the leading designer and builder of nuclear submarines, arguably the most complex machines made by man. You will have a hand in shaping the technology of the next generation of submarines as well as other advanced systems.

Engineering Opportunities

- Acoustics
- Civil/Structural
- Electric/Power
- Electronics
- Marine/Mechanical
- Shock & Vibration
- Software CM/QA
- Software Engineering

We require a Bachelor's or Master's degree in Civil, Electrical, Mechanical, Structural, Acoustics Engineering, or Computer Science/Engineering.

We offer competitive wages and benefits including:

- Medical/Dental/Life Insurance
- Excellent 401K Plan
- Relocation Assistance
- Paid Vacation
- Company Sponsored Technical Education Program

Applicants selected will be subject to a security investigation and must meet eligibility requirements for access to classified information.

GENERAL DYNAMICS

Electric Boat

75 Eastern Point Road
Groton, CT 06340-4989

- US Citizenship Required/Equal Opportunity/Affirmative Action Employer -



Apply online at www.gdeb.com



Peace Corps.

Life is calling.
How far will you go?

Peace Corps at Virginia Tech

Find out how you can
gain personal and
professional experience as
a Peace Corps Volunteer.

Volunteers work in over
70 countries in health,
business, education,
agriculture and environment
projects.

They also learn a new
language, develop career
and leadership skills and
contribute to societies
in need.

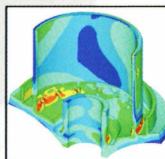
For more information,
contact your
campus recruiter at
540-231-4266 or
peacecor@vt.edu.

800.424.8580
www.peacecorps.gov



Excellence in
Engineering
Since 1964

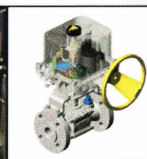
Nuclear Power - Fossil Power - Renewable Energy
Government - Military - Pharmaceutical - Medical



Analysis



Testing



Design

I now have experience in many
mechanical engineering disciplines.
I'm pleased to be applying my
acquired range of skills to the fossil
power generation industry.



Eric Ten Siethoff
(Virginia Tech, 1997)

**Mechanical, Chemical,
Electrical, Aerospace,
Biomedical, and ESM
Engineers**

MPR is an employee owned engineering firm
that relies on individual responsibility in a team
environment to deliver innovative and creative
solutions to challenging technical problems.

(703) 519-0200

www.mpr.com

Alexandria, VA

Digging into the Land Development Design Initiative

As a university, one of Virginia Tech's purposes is to prepare its students for their future careers. In the Department of Civil and Environmental Engineering this purpose takes form in the Land Development Design Initiative (LDDI). LDDI is a collaborative effort between Virginia Tech and professional engineers to educate students and prepare them to enter the land development industry. This initiative involves enhanced coursework as well as practitioner involvement to bring professionals and students together outside of the classroom. A land development curriculum is very rare at other universities, and this unique collaboration lead to LDDI winning a second place award from the National Council of Examiners for Engineers and Surveyors (NCEES) for connecting professional practice and education.

LDDI began as an advisory board in 2006 that recruited professionals in the industry to provide input for the developing curriculum. Soon, more than 150 practitioners donated time, money and resources to the initiative. There are two major roles of LDDI; the Curriculum and Course Enhancement

Committee (CCEC) and the Professional Involvement Committee (PIC). These two committees are composed of Virginia Tech faculty and practitioners from sponsoring companies who work together to further the mission of LDDI.

The land development design curriculum reflects the multidisciplinary nature of the industry. Several classes from other disciplines within the Department of Civil and Environmental Engineering, including construction management, water resources, and environmental engineering, are combined with several land development specific classes. This relatively broad curriculum is crucial in developing the necessary skills to succeed in the land development industry.

One of the classes, Land Development Design, has been a long-standing course in the standard civil engineering curriculum, now has an exciting mentoring program included. The program matches a team of students with a professional practitioner who mentors them through the design via weekly phone conferences, email and

meetings. Enrollment in this class has increased due to the popularity of the mentorship program; with nearly 40% of civil engineering graduates choosing to take the class.

LDDI has been working to expand the land development design curriculum at Virginia Tech. A single design class has grown to six land development specific courses. Funding and resources have been put together by the CEE Department, LDDI and its supporters. Some of these new classes are taught by practitioners, commuting from as far away as Fairfax, Richmond and Virginia Beach.

The Professional Involvement Committee (PIC) organizes social events associated with LDDI. Similar to the CCEC, the PIC consists of faculty and practitioners with the common goal to bring students and professionals together. The events range from social dinners and tailgates to volunteer work with local charities. The events allow students and practitioners to meet in a more casual situation than those seen at career fairs.

BIG-COMPANY REACH, SMALL-COMPANY ATTITUDE.

AAI Corporation's innovative technologies include unmanned aircraft, training systems, automated test and maintenance equipment, armament systems, aviation ground support equipment, and cutting-edge service solutions.

Headquartered in Hunt Valley, Md., AAI offers rewarding career opportunities for engineers and business professionals in all disciplines, including:

- Varied, employee-driven advancement tracks
- Full tuition reimbursement for continuing education
- In-house professional development courses

Voted one of Baltimore Business Journal's "Best Places to Work" for the last four years, AAI provides an exceptional benefits package for full-time employees.

Visit www.aacorp.com to apply. EOEM/F/D/V



TEXTRON Systems

INNOVATION THAT WORKS™

aacorp.com

INNOVATION

Innovation That Works is a registered trademark of AAI Corporation.

The Land Development Information Nights are major social events put on by LDDI. At these information sessions, a handful of practitioners from different companies present technically interesting or politically charged projects to students. Explaining the efforts used to complete the projects. After, students can meet with the professionals and network, perhaps opening doors to employment.

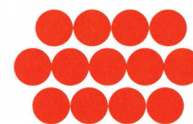
The Sustainable Land Development Club (SLDC) puts on many of the tailgates and other social events. This club is supported by the LDDI. Like the PIC, the Sustainable Land Development Club's goal is to bring practitioners together with students in social or charity situations. Much like the information nights, the SLDC provides networking opportunities as well as spreads the name and message of LDDI to the community.

The benefits of LDDI and its supporting committees continue after graduation. Besides being sought after by LDDI sponsor companies who know the skills developed in the curriculum, many companies find land development graduates to be better prepared to handle the responsibilities and

training of an entry level engineers. Due to the lower cost of training, many LDDI graduates find higher starting salaries.

The Land Development Design Initiative provides every aspect of professional development for the civil engineering students at Virginia Tech. Beginning in the classroom developing planning and visualization skills, the LDDI continues to provide opportunities for students to grow through mentorship programs and information nights. This initiative, supported by practitioners and Virginia Tech, prepares Hokies with a one-of-a-kind educational experience that gives students a competitive edge.

Z. Nathan Bales is a Junior in Civil Engineering



The Reinforced Earth Company

Headquartered in Vienna, VA, The Reinforced Earth Company is a leader in the design and supply of innovative retaining wall systems, reflective and absorptive sound walls, precast arches and slope stabilization systems for use in civil engineering applications including transportation, bridges, railways, industrial facilities and marine structures. We have more than 30 years of experience in product development, design, installation and customer service. We pride ourselves on the success of each project and the dedication of each member of our nationwide team.

The Reinforced Earth Company offers commensurate salaries and a strong Benefit Package including:

- Flextime
- Two Weeks Paid Vacation
- Eleven Holidays (including employee's birthday)
- 401k with Company Contribution
- Health Care Package
- Free Parking

The Reinforced Earth Company
 8614 Westwood Center Drive, Suite 1100
 Vienna VA 22182
www.reinforcedearth.com



LDDI members accept one of six 2009 awards from the National Council of Examiners for Engineering and Surveying (NCEES) for Connecting Professional Practice and Education

THE CONSUMER ELECT

The Consumer Electronics Show, featured in Las Vegas, Nevada, is one of the largest technology conventions in the world. Thousands of companies come from all over the world to show off their latest products and planned releases for the upcoming year.

The show started in New York City in 1967 as a spinoff of the Chicago Music show. In 1998, it was changed to a once-per-year show, and moved to Las Vegas. It currently takes place in the 3.2 million square-foot Las Vegas Convention Center, and has been the location of product introductions such as the Nintendo Entertainment system in 1985, the Blu-Ray Disc in 2004 and the Xbox in 2001.

I spent five days at the show, blogging and reporting on the various products. The sheer number of companies, new products and general innovation was incredible. Here are some of the biggest items and latest trends.

Top: The sign adorning the top of the South Hall of the Las Vegas Convention Center.

Left: Intel created a 2 sided multitouch wall which streamed live images from the internet. It could be switched to display news items, Flickr photos, or an array of other info. It served to show the computing power behind a single one of the company's new i7 processors, as only one computer controlled the entire array.

Bottom Left: Kohjinsha's dual screen netbook offers all of the utility of a netbook with the workspace of a dual-screened desktop.

3D TELEVIS

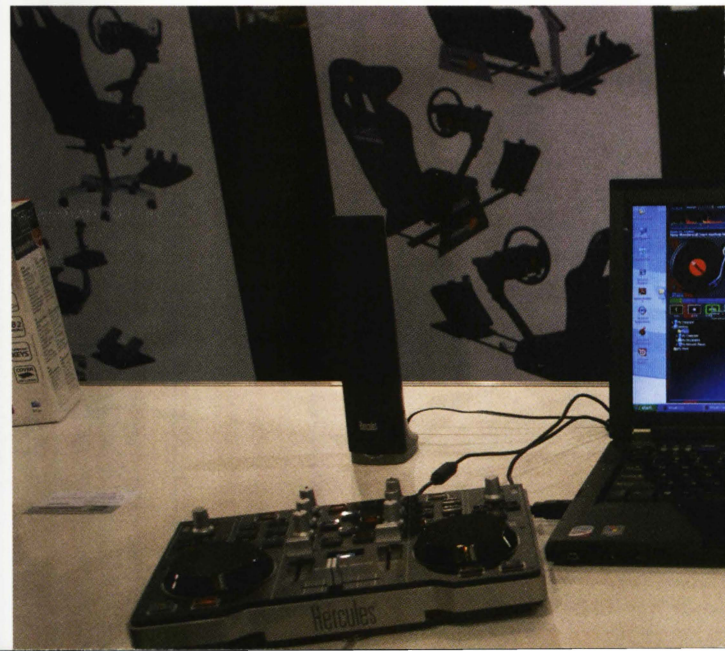
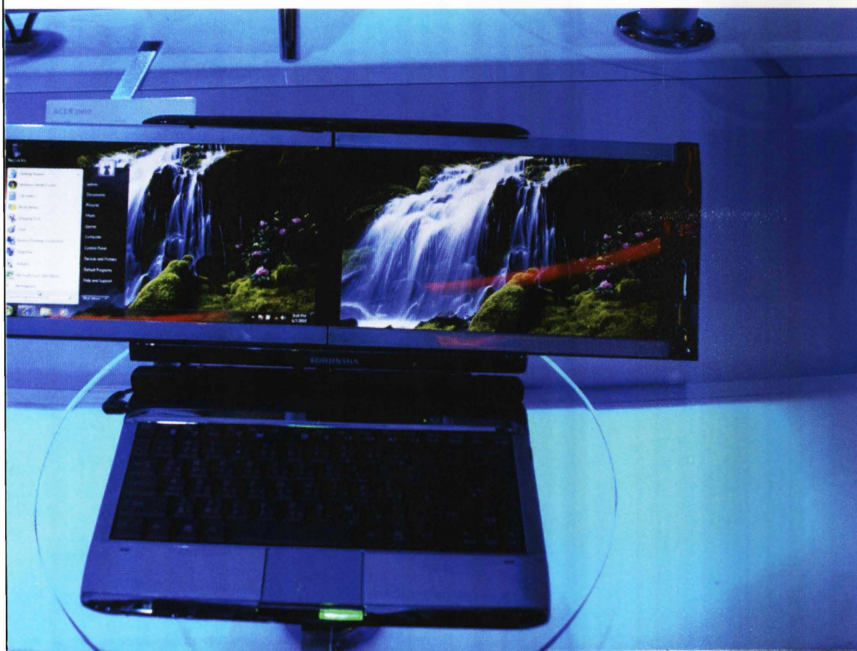
If you asked any tech before the show what they would see, this was at the top of the list. These were right. These were the winners. Every television vendor had their own model to show.

Most use the same system (some even offering 3D glasses as the local equivalent of polarized pictures). The biggest advantage of this system is that many people will replace their current television for the advantage of it.

Others used an active shutter system where the glasses were powered and, like a 3D movie, each eye that would be closed an extremely high frame rate per second. This was a better, and could be used for games and television.

The most interesting was a screen much like the ones you'd find in a movie theater. Depending on the angle you looked at it from, the image would change. The theory was reapplied to the pictures are offset to trick your eyes in to seeing a 3D image.

Below: Hercules' new US netbook offers an authentic DJ look and feel.



RONICS SHOW 2010

IONS

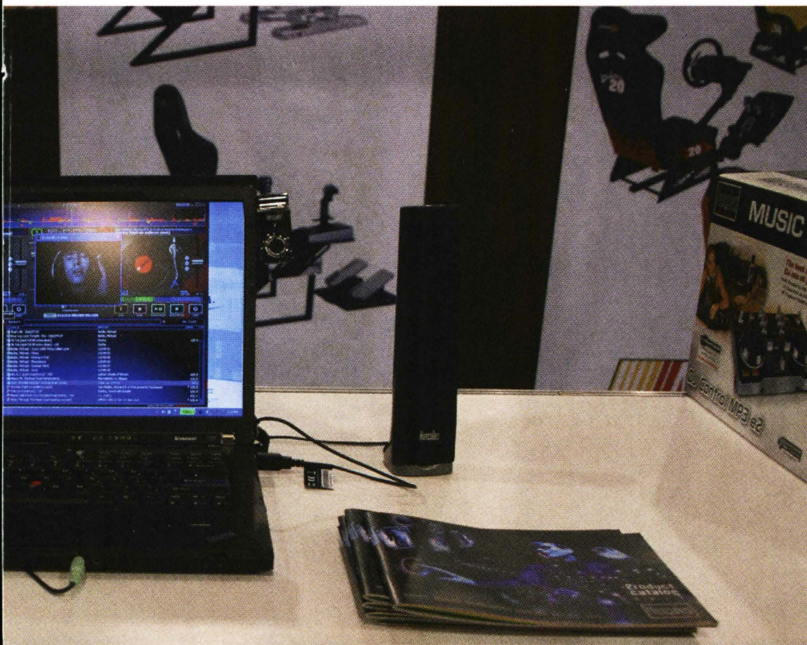
h analysts a week
t they thought they'd
op of every list. They
ere **everywhere**.
der had his or her
off.

ystem as the theaters
the same Real-D
(Regal), which use two
The downside of this
people would have to
TV's in order to take

e shutter system
ere actually battery
camera, have a shutter
ld snap open and
fast 60 to 120 times
ision seemed to work
used with existing
is.

model uses a
se small hologram
a Cracker Jack box.
gle you are looking
changes. The same
to televisions, except
t just enough as to
seeing it in 3D.

B DJ Controller linked with Atomix Virtual DJ on the computer to give
feel, allowing the user to mix their digital music library.



NETBOOKS

Netbooks are tiny, low powered laptops, usually used as a secondary machine for light word processing or browsing the web. Nearly every company came out with updated models. Some even included multitouch screens.

The biggest technological innovation with these machines is their lower power chips and longer battery life. The machines that featured multitouch screens, while interesting, felt more like an elaborate gimmick than an actual usable feature. The lack of palm rejection and pressure sensitivity made them relatively useless for students attempting to take notes, and the lack of precision made it difficult to navigate Windows 7's tiny menu system.

Continued on page 12

Top: A view of the display floor of the hundreds of exhibitors and the tens of thousands of visitors inside the South Hall.

Right: LG's new network monitor setup showed an inexpensive example of distributed computing, where 31 seats were running off of a single Intel Core i7. Unfortunately, each computer didn't operate at a speed that was usable for even the most basic of word processing.



★ Institute for Defense Analyses ★

For over half a century, the Institute for Defense Analyses has been successfully pursuing its mission to bring analytic objectivity and understanding to complex issues of national security. IDA is a not-for-profit corporation that provides scientific, technical and analytical studies to the Office of the Secretary of Defense, the Joint Chiefs of Staff, the Unified Commands and Defense Agencies as well as to the President's Office of Science and Technology Policy.

We provide training to scientists and engineers that helps them to become superb defense analysts. Additionally, IDA provides a solid and exciting foundation for career growth and an opportunity to contribute to the security of our nation through technical analysis.

How will you put your scientific and technical expertise to work every day?

IDA is seeking highly qualified individuals with PhD or MS degrees

- | Sciences & Math | Engineering | Other |
|------------------------------|-----------------|--------------------------|
| • Astronomy | • Aeronautical | • Bioinformatics |
| • Atmospheric | • Astronautical | • Computational Science |
| • Biology | • Biomedical | • Computer Science |
| • Chemistry | • Chemical | • Economics |
| • Environmental | • Electrical | • Information Technology |
| • Physics | • Materials | • Operations Research |
| • Pure & Applied Mathematics | • Mechanical | • Statistics |
| | • Systems | • Technology Policy |

Along with competitive salaries, IDA provides excellent benefits including comprehensive health insurance, paid holidays, 3 week vacations and more – all in a professional and technically vibrant environment.

Applicants will be subject to a security investigation and must meet eligibility requirements for access to classified information. U.S. citizenship is required. IDA is proud to be an equal opportunity employer.



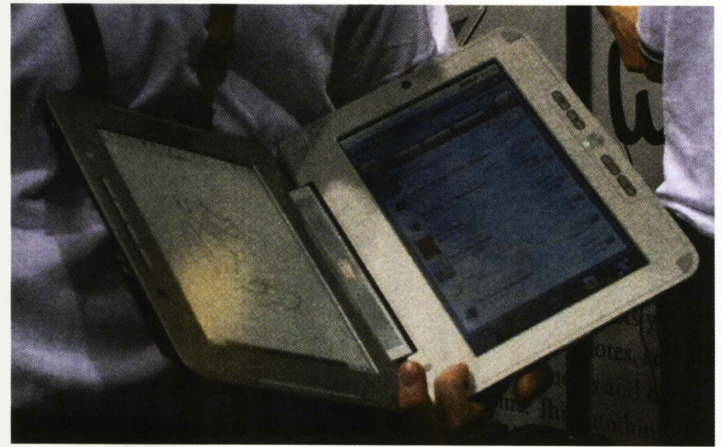
Please visit our website www.ida.org for more information on our opportunities. Apply to job for PhD Postdocs or to Recent Graduates. Please specify Pentagon Publishing as the source.

Continued from page 11

EBOOK READERS

A couple of new companies came out and introduced eBook readers in an attempt to compete with the market currently dominated by Amazon's Kindle. The most interesting of them was the enTourage eDGe, featuring dual screens, which folded open like a book. On the right is a full color touch screen, the user could browse the Internet and run apps. On the left was an eInk screen (such as on current eBook readers) that featured touch, which allows the user to annotate on top of a book or take notes like a notepad.

Below: The new enTourage eDGe has dual screens, allowing the user to browse the web or download books on one screen while taking notes or reading a book on the other.



ANDROID ON EVERYTHING

Google's Android operating system was released as a competitor to Apple's iPhone. Rather than being locked in to certain products, it's open source, meaning anyone can download it, change it and use it on a device.

For the most part, it has been used on smart phones, such as the HTC G1, the Motorola Droid, and the HTC Nexus One. However, there was a strong showing of prototype devices with the operating system on them. Everything from netbooks to picture frames was running it. With a growing app store of more than 16,000 apps, this is quickly becoming a strong competitor.



Our Coal Veins are "Maroon and Orange"

Alpha Natural Resources is an enthusiastic supporter of Virginia Tech.

Virginia Tech is the alma mater of more than 20 of our key management employees, including Alpha's CEO. It's no coincidence that we're known as the "Hokie Coal" company.

Alpha Natural Resources (NYSE: ANR) is one of the leading coal producers in the U.S., a \$2 Billion company with a track record of excellence, and an appetite for growth.

"Running Right." What does that mean to Alpha Natural Resources?

It means ... running safely.
We believe in fostering a safe and prosperous work environment for everyone.

It means ... running soundly.
Doing the right thing environmentally, such as promoting cutting edge mine reclamation and innovative environmental research.

It means ... running sensitively.
Supporting more than 500 different agencies and service groups to help less fortunate people in the communities where we're located.

Right now, Alpha has tremendous opportunities for new people to learn a broad range of skills outside of the mines, and advance quickly into positions of authority.

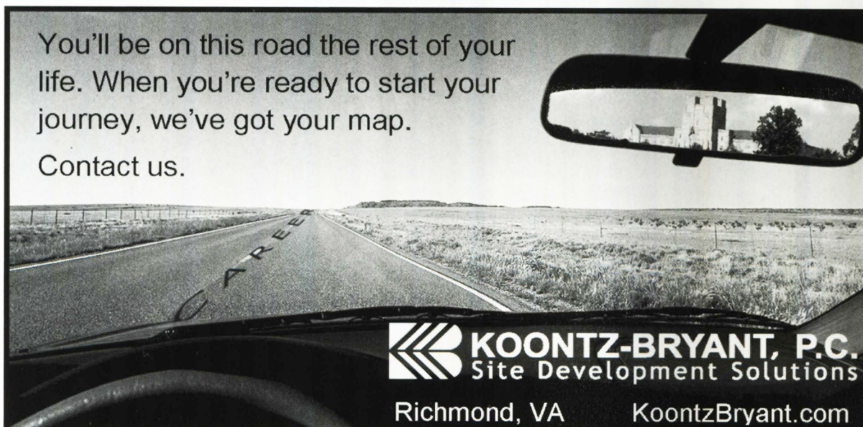
Would you like to work for a company that runs right? We're looking for the next generation to run Alpha Natural Resources right.


Are you **"Running Right"** material?

 Alpha Natural Resources One Alpha Place • P.O. Box 2345 • Abingdon, VA 24212 • alphanr.com

You'll be on this road the rest of your life. When you're ready to start your journey, we've got your map.

Contact us.



 **KOONTZ-BRYANT, P.C.**
Site Development Solutions

Richmond, VA KoontzBryant.com



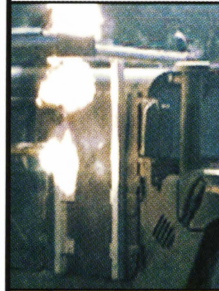
Above: The "Deep Screen" setup put a layer over top of a standard display to add depth to the application that was running. The demoed racing game felt far more immersive.

This was the first time I had ever been to a convention of this scale. The sheer quantity of items was really overwhelming. There was far too much to be able to see everything in three days.

The other thing I found interesting was the number of vendors and participants from outside of the United States. Huge sections of the convention center were dedicated to Chinese and Taiwanese vendors, who greatly outnumbered the United States participants. They came selling everything from knock-off iPods and USB hubs to transformers and microchips.

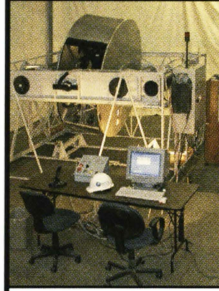
Andrew Mussey is a sophomore in Computer Science.

Join our team for real hands-on experience in developing cutting edge technologies.



Artis, LLC provides research and development services in the fields of health sciences, defense and security.

Our customers are among the most sophisticated and advanced in the world to include the **Defense Advanced Research Projects Agency, the Centers for Disease Control, the Office of Naval Research and the Robert Wood Johnson Foundation.**



In defense and security, our technology focus is in active protection systems, persistent sensing supporting urban operations, geospatial modeling and advanced simulation.

In the health sciences area, our focus is recording human motion for applications such as controlling motion sickness, sports medicine and population health status monitoring.

For further information, visit our web site at www.artisllc.com.

**Mechanical Engineer • Electrical Engineer
Computer Scientist • Computer Engineer
Material Scientist with knowledge of composites and polymers.**

480 Springpark Place Suite 1000, Herndon, VA 20170 703-964-0420



EXPLORE ENGINEERING OPPORTUNITIES

JOIN THE WORLD LEADER IN SERVING SCIENCE

APPLY ONLINE: <http://www.thermofisher.com>

For product information: www.fishersci.com

ThermoFisher SCIENTIFIC

8365 Valley Pike, P. O. Box 307
Middletown, VA 22645
Phone 540-869-3200

An Equal Opportunity Employer

M/F/V/D

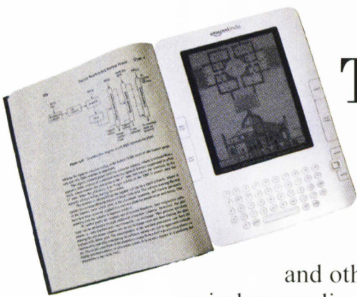


Vanasse Hangen Brustlin, Inc.

Vanasse Hangen Brustlin, Inc. (VHB) provides integrated transportation, land development and environmental services from 18 offices throughout the east coast. We are dedicated to providing a challenging and rewarding work environment and offer competitive salary and benefits, and outstanding professional and personal development programs. As a generational company, VHB operates on the belief that a key responsibility of ownership is to pass a healthy, growing company on to the next generation.

Co-op, internships, full and part-time positions available in Tysons Corner, Richmond, Williamsburg, Virginia Beach, VA and Silver Spring, MD. Please visit www.vhb.com for more information.

EEO/AA



Textbooks vs. E-books: Campus Edition

With the rise of the Kindle and other mobile and wireless reading devices, a question becomes evident: will these devices make physical books obsolete? In a college setting, there are a lot of positive aspects of e-readers, and those aspects include more than just saving your back from that ten-pound electronics book. However, buying and selling physical textbooks, and sometimes even holding a textbook in your hand, is very important to college life. Where will the university come down?

Electronic readers, or e-readers, allow the user to download, either by plugging into a computer or by using a wireless system, books to read on the device. Amazon's Kindle has brought this technology to the forefront of everyone's mind, as it combines an e-reader with the tremendous wealth of reading material found on amazon.com. Additionally, the Kindle has a wireless network that allows the user to download a book from many places in the US and all over the world. All these features have made e-readers a little more attractive to the general public.

Let's start with the points in the favor of an e-reader. For one, its portability is a huge draw. An e-reader is generally much slimmer and smaller, weighing much less than a traditional textbook. Secondly, this one device can hold up to 1500 books, depending on their length. Lastly, electronic versions of books, once well-established, would generally cost less than a hard copy would. To store 1500 traditional textbooks, you would need an extensive set of bookshelves. To have my Electronics textbook weigh 10.2 ounces, I would have to cut it up, leaving only a part of a chapter.

I would tell you about how much less my Electronics book would cost if I were to buy it as an e-book, but we run into one of the biggest issues with e-textbooks—availability. Because e-readers are still a novelty for those who can afford them, there have not been many textbooks made electronic for mobile reading devices. Another drawback to e-readers is the initial cost of the machines themselves. At the time of writing, a Kindle was selling for \$259, and a Kindle DX was a whopping \$489. Now, my Electronics book sells

(on Amazon, for irony's sake) for \$133. So I could buy almost two Electronics textbooks for the price of the Kindle. If a student were to use the Kindle for all his or her textbooks, I could imagine the cost would quickly be recovered. But the fact is, the textbook market is untapped for these mobile readers. Another drawback is the difficulty in taking notes on the actual textbook, if the student wanted to. I personally have an easier time picking up a highlighter than I do highlighting a section of words in the Kindle and typing my comments.

Arguments for traditional textbooks include the booming college market for the books themselves. If a student is resourceful, he or she can find the book needed for a steal, and then sell it back to the bookstore for a pretty decent turnaround. Another relatively new development in traditional textbooks is the advent of "renting" textbooks. In my foray into the bookstore in the beginning of the semester, I had to buy a \$140 Communication Systems textbook. I went into the store with a heavy heart and a heavier wad of cash. However, once there, I found that I could take the textbook home for half of that \$140 price tag. In return, I would return the book to the store at the end of the semester in reasonably good condition. I happily signed my life away at the chance to save \$70. "Renting" textbooks takes out this author's biggest fear: updating editions. My own horror story is one of a General Chemistry kind. I was never going to use chemistry again. Yet I could not sell my book back to the bookstore as, alas! General Chemistry was now using a new edition.

Cost effectiveness calculations dancing in my head, I hardly noticed the five pounds the book added to my bag. I knew that this would not be the case later in the semester, when I would have to trudge through snow and slush to get to class with

twenty pounds in my bag. The weight and physical size of textbooks can be a huge drawback. Some people genuinely prefer to have the physical book in their hands, able to mark up and leave under their pillow at night for some completely unbreakable osmosis learning.

Where does Tech fall in all this? To tell the truth, Tech already has more than five thousand e-books on file from Addison. Some of these books are textbooks, mostly for computer science and business majors. The books can be leased out just as though you were loaning a physical book from the library. The book has to be returned after a period of time, and no one can take the book out until it is brought back. The e-books can be used with Pocket PC or Palm OS devices.

That being said, there is simply not enough material to warrant Tech starting to use e-book readers for textbook requirements. The books are just not in the correct format yet. So for now, I am stuck lugging the ten-pound Electronics book to class with a sore neck from all that osmosis.

Christina Kazmer is a junior in Electrical Engineering. She has a love/hate relation-

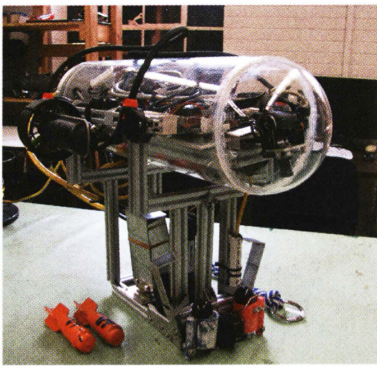
M.C. DEAN
BUILDING INTELLIGENCE

DESIGN

BUILD

- ✉ Information Technology Engineers
- ✉ Telecommunications Engineers
- ✉ Electrical Engineers
- ✉ Design-Build Engineers
- ✉ Software Engineers
- ✉ System Engineers
- ✉ Security Engineers
- ✉ Project Managers

22461 Shaw Road, Dulles, VA 20166
Telephone: 1-800-7-MCDEAN
E-mail: recruiting@mcdean.com
www.mcdean.com



Autonomous Underwater Vehicle Team at Virginia Tech

The Autonomous Underwater Vehicle Team is competing again this year. The competition is held on the every year in San Diego and is set up by the Association for Unmanned Vehicle Systems International. The autonomous vehicles are placed in a pool of water and set loose to complete a mission consisting of various tasks. The mission was still being developed as of January fifteenth, but some tasks are already announced. As per tradition, the first thing is to successfully go through a validation gate. From there, there are multiple paths, buoys, hedges, a grid of colored windows and several other obstacles. Tasks in the course include jumping over the hedges and shooting the windows with crossbows. These seem like simple tasks until you realize the entire process is autonomous. The machine follows the path, controls the depth, aims the projectile, accounts for distance and decides which task to pursue at any given time based on a code set before the robot hits the water. When attending this competition you can expect to see teams not finish the first task, getting through the gate. Points are awarded for the completion of these tasks and for the team's conduct and awards are given for other accomplishments. Previously, a team won an award for the most creative use of Tupperware, when they didn't have the resources to make casing for their equipment. It was unexpected and the fledgling team earned a scholarship. Updated competition rules can be found at the AUVSI website, www.auvsifoundation.org under the Autonomous Underwater Vehicle (AUV) competition.

Our team has been working on the vehicle, Barreleye. The name comes from a rather unusual fish whose clear skull contains the eyes of the fish completely encased. Like the fish, the cameras, or eyes, are located in the front of the vehicle on the bottom in the hemisphere that encloses the front. The entire outside of the Barreleye is clear except the cap used to make the compartment watertight and the external structure. One of the biggest problems is getting the vehicle to have appropriate

buoyancy, as the rules require that the vehicle floats when turned off. If it floats too much, it is much harder to make the vehicle submerge and navigate. The bullet case design was made for both simplicity and with hydrodynamics in mind. Improvements to the casing are in the works and are planned for next year's competition. Many improvements are planned for this year as well.

Many of the students working on Barreleye are doing so for credit in Independent Study. Some of these students are researching new methods of navigation or similar improvements on the vehicle. One of the improvements proposed is to incorporate a sonar system with four sensors so that the recorded data gives a three dimensional analysis of the surrounding environment. The successful application of this idea would lessen the reliance of the vehicle on its multiple cameras. The club has made a few leaps in design over the year to improve what this project would accomplish. There have been multiple designs and vehicles in the past, but all I've seen of them are the posters that were required by the competition planners. The on board computer has gone through major changes too. At one point, some years ago, the programmers changed the operating system in the vehicle from Windows to Linux.

The Ware Lab holds this team and quite a few others, all sharing tools, computers and other resources, but usually working in separate bays. The work done in here is incredible, from the Autonomous Underwater Vehicle, the blind driver car, planes in Design Build Fly and the hybrid being built in the back. The atmosphere is very focused, even on the occasions when there is a clash about which type of music to listen to. Good thing they have all earplugs. This is a rare occurrence, mostly because music is hard to hear over power tools. In all seriousness, the Ware Lab is a great place for any engineering students, as well as others who may be looking to get involved. You can read more about the Ware Lab at their page on the VT website.

Chris Dusold is a freshman in Computer Engineering



Platinum Solutions is an award-winning leader in software development and systems integration. Our employees write software that saves lives and helps the government monitor terrorist communications, arrest violent criminals, and improve the prescription drug approval process.

We are seeking IT professionals with the following expertise:

- Java /J2EE
- Requirements Analysis
- Test Analyst
- Oracle DBA
- Systems Admin (Unix)
- Info Security
- Configuration Management
- QA/Testing

We have locations in MD, DC, VA & WV.

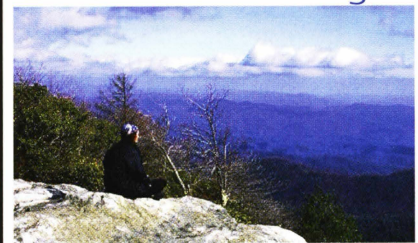
If you meet the above qualifications, please email your confidential resume to:

hr@platinumsolutions.com,

www.platinumsolutions.com

EEO

Engineering Solutions For Today's Environmental Challenges



Build a Career
that suits
your Lifestyle



www.olver.com

Blacksburg • Charlotte • Richmond • Cary



SEC's Leadership in Engineering Conference 2009

The Student Engineers' Council holds an annual Leadership in Engineering Conference (LEC), an event held in the fall where students come and discuss issues in engineering. This is an excellent opportunity for students of all departments to learn about new issues in engineering and develop professional skills. Speakers this year covered topics including diversity in engineering, intellectual property and the psychology of leadership. The 2009 LEC, organized and led by Caitlin Proctor, was very successful.

This year's LEC took place on Saturday, November 7, 2009. A motivated group of engineers dedicated their Saturday to hearing talks on emerging engineering issues. Dr. Theo Dillaha kicked the conference off with a presentation on the expanding borders of the engineering field. In recent years, the number of engineering fields has grown rapidly will continue to do so in the future. Dr. Dillaha focused on his own experience, having worked in more than twenty countries himself. Dr. Ishwar K. Puri, ESM Department Head, shared stories of leadership through

troubling times at Virginia Tech. He also covered the issues of leading through diversity, rather than sugar coating the benefits of a diverse team.

The afternoon session started with a talk from a civil engineer, Michael Proctor, who has over 25 years of professional experience. He emphasized the differences between large and small firms and how to find the correct fit for you. Mr. George Dickos, a patent lawyer and Virginia Tech mechanical engineering alumni, explained the differences between patents, trademarks and copyrights. He detailed the processes to protect individual intellectual property and cleared up several misconceptions. The final speaker for the day gave a motivating speech about the psychology of leadership. Dr. E. Scott Geller, an acclaimed psychology professor, presented his "Actively Caring" model for interpersonal relationships and leading. He included touching stories of people in bad situations being uplifted by acts of kindness. His inspiring talk concluded the conference on a positive note.

The Student Engineers' Council continues to produce quality events that are aimed to

improve all Virginia Tech has to offer for engineering students. Involved engineers may want to take a look at upcoming SEC events in the spring semester, especially Engineers' Week. Engineer's Week is a nation-wide celebration of engineering. Past years have included t-shirt design contests, exciting games and opportunities to learn more about engineering. The 2010 Engineers' Week runs from March 21st through the 27th for an entire week of events.

The SEC has more plans for this coming semester. Design Team grants and slush funds will be awarded to deserving Virginia Tech engineering organizations. Also the SEC will be partaking in Relay for Life, representing the College of Engineering on the Drillfield.

Overall, the spring of 2010 looks bright for the SEC and Virginia Tech's engineering student body. Involved and ambitious engineers are advised to snap up these upcoming opportunities and to look forward to another successful LEC this year.

Allan Kirchoff is a freshman in Mechanical Engineering.



EAGLE FIRE

Your Fire Protection Company

- Sprinkler Systems
- Testing & Inspection of Fire Protection Systems
- Fire Suppression Systems
- Fire Pump Testing
- Alarm & Detection Systems
- Access Control Systems

EAGLE FIRE INC.

7459 White Pine Road
Richmond, VA 23237

(804) 743-2500

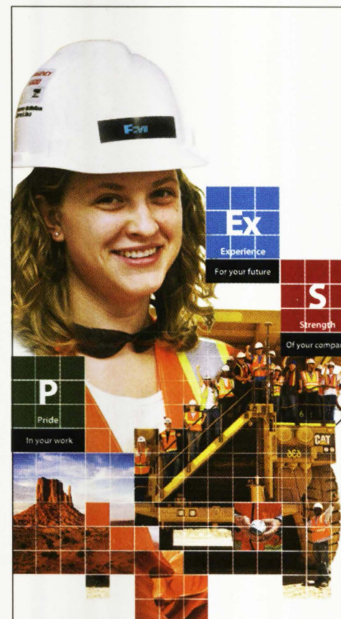
For career opportunities visit our website and fill out an on-line application!

www.eaglefire.com

DCJS VA-11-2841

NC-1210 CSA

SC-Q490



Elements

Essential for building a great career.

Starting your career at Freeport-McMoRan is the key to building a great future. As an industry leader in international mining, we offer enriching opportunities for new graduates and interns to work side-by-side with the top experts in the field.

By implementing the latest technologies and leading the way with cutting-edge production methods, Freeport-McMoRan Copper & Gold will challenge and reward you with unique opportunities in our Arizona and New Mexico locations. Candidates will gain professional experience working in a team environment while enjoying a beautiful climate with year-round activities. Prepare yourself for an international career in mining with Freeport-McMoRan Copper & Gold.

We're more than mining; we empower progress.

Global endeavor. Local pride.

**FREEPORT-McMoRAN
COPPER & GOLD**

www.fcx.com

www.fcx.com/careers/college.htm

ABET is a

A year ago, the Accreditation Board for Engineering and Technology evaluated the College of Engineering. You probably heard about the ABET evaluations through emails or through class. What is this mysterious evaluation, and how does it affect us?

I talked to Dr. Bevlee Watford, Dean of Engineering and Director for the Enhancement of Engineering Diversity, about the evaluations last year. The process is long and detailed, and not without difficulties.

The first thing is setting a date. The evaluation team often has only a few small windows in which they can work so that all of the aspects of the program get inspected properly. The evaluations come every seven years, and so every sixth year in the cycle, we arrange for the board of evaluators to pay us a visit. The evaluation team is comprised of a chair evaluator for each of our fourteen programs, as well as quite a few other professionals to help out. Scheduling for more than fourteen professionals can be a hassle. Not only that, we make sure that they can stay in Blacksburg, so we have to make sure we don't schedule on a football weekend. This problem provides additional difficulty in the fall.

After the visitors arrive, they go around campus talking to students about our programs here. They look at the process we use for teaching engineering and see if our curriculum matches the process, and how well it works. During the course of the evaluation, they look at the reports that our departments make up during the seven year cycle between evaluations. These reports can be hundreds of pages, the culmination of those years of work. The board looks over all of these things while considering whether or not a school should remain or become accredited.

What are the benefits to being an accredited school, you ask? For one thing, being an accredited school is like getting a stamp of approval from companies who are looking for employees. Accreditation means that our graduates will be up to the latest standards set by ABET. Another great perk of being accredited is that it allows our students to take the Fundamentals of Engineering (FE) exam. This test is really important when the engineers work on projects that affect the public. Without accreditation, our graduates couldn't take the FE exam.

So what happened? Did we pass? I am proud to report that we did pass the ABET evaluation. The college of Construction and Engineering Management had its first visit, as they had just completed a full graduating class, and they too passed.

What did we do? How has it changed us? No major changes were made. Mainly, the process was refined as a result of the evaluation. They refined the process of how information is collected for the next evaluation, how to continue looking at our progress and how to document that progress were the bigger changes. Another change is to move toward continuous improvement in the program content of the different engineering disciplines. As information is collected, Tech will continue to monitor and see what works in those programs and fix problems as they happen. All in all, the ABET evaluation is simply a tool for the college to use to monitor its own improvement. And I'm happy to report that we are on track.

Christina Kazmer is a junior in Electrical Engineering.



US ARMY TEST & EVALUATION COMMAND

ARMY EVALUATION CENTER

**Make a difference with your future.
Become part of the Army Test &
Evaluation Command's Civilian Workforce.**

Civilian Career Opportunities:

- **Engineering**
- **Mathematics**
- **Research**
- **Biology**
- **Chemistry**
- **Physics**
- **Information Technology**
- **Human Resources**
- **Resource Management**
- **Administrative**

Visit our website at www.atec.army.mil/aec
Email: tami.matts@us.army.mil or sarah.m.wheat@us.army.mil



The Army Evaluation Center, Developmental Test Command and Operational Test Command are integral elements of The US Army Test & Evaluation Command.

Football's Over... Now *What?*

Ah, the football season. The greasepaint. The parking troubles. The pre-gaming. The crazy stunts. The Metallica. The Marching Virginians. The road trips to the away games. The games! All, all over now. Whatever are we to do all semester long, with no football weekends? I'll tell you.

Take a Hike. No, really. You know how much you liked the Cascades in the early fall, with all the picturesque little trails marked with stones, the lovely little bridges, and the Cascades themselves? They're still there in the wintertime. And they're every bit as pretty. If you're feeling like an engineer, you might even try to figure out the exact trajectory of the falling water at different points, or the rate at which that volume of water would fill a hexagonal pool. Or you could just admire the view from the top of the Upper Trail. Your choice. All you need is about three dollars per car, and you could have yourself a day of winter hiking and perhaps nerdy engineering along some of the most scenic trails around.

Let it Snow. It's wintertime, which means you might as well make the best of all the white precipitation around. Blacksburg is hilly, why not make a remodeled, more aerodynamically efficient sled? I find that trays and garbage can lids don't do it for me.

Then have a race. My secret? Vegetable oil on the bottom of the sled surface. Or you could have a snowball fight. The Civilian versus Corps snowball fight is always lots of fun. Just make sure you stay away from the dorms, so you don't get into trouble. If there is enough snow around, you might even be able to engineer a strong and elegant snow structure to hide from snowballs in case of attack.

No Snow? No Problem. If you're missing the powdery substance, we have Liberty Mountain Snowflex Center right down the road beside Liberty University. They have a full set of slopes for skiing, snowboarding or tubing all year long. They accomplish snow-ness by using what has been equated to "Astroturf," but with snow. Snowflex is the name of the technology, which is sufficiently springy and yet still suitable for skiing and snowboarding. If you enter "Snowflex" in YouTube, you can find some excellent videos of how the material was created by Briton Engineering. Snowflex was created to replace material that had huge, almost hand-sized holes in a mesh pattern for skiing on. This material was alright for skiing, but terrible if you fell on it. Thank goodness for Snowflex! You can benefit by this wonder of technology by hitting up the slopes, no precipitation needed.



The pylons post snowmagedon.

Get Thee to a Theatre. The Department of Theatre and Cinema is doing some wonderful things this spring. The main stage productions are: "The Skin of Our Teeth" and "Our Town." The department will also be hosting special events and workshop productions (some of which are free) throughout the semester. Check out the department website for more details about the different shows and events.

Fork and Cork. Speaking of arts, Blacksburg's second annual Fork and Cork festival is taking place on May 1st, from noon to six pm on First and Main. There will be entertainment, artists, cooking exhibitions and local wineries visiting. Tickets are required to see the wineries, entertainment and cooking exhibitions, but visiting the artists and restaurants is free and open to the public. If you need a break around final exam time, this could be your lucky day!

For the Sports Fan. There are still plenty of things to watch on campus in the spring. Softball, tennis and baseball get going, and who can forget basketball season? There are still loads of sports events to celebrate during the spring. Even if it's not football, it sure beats staying in your room and pining away for football season! Hokie sports are plenty of reason for excitement this spring.

Just because football weekends are no more this semester doesn't mean there's nothing to do around Blacksburg. All it takes is a little digging and keeping an open ear to activities promoted on and around campus. Go forth and have fun this semester!

Christina Kazmer is a junior in Electrical Engineering.

WHAT DO YOU SEE?

- A. A cow
- B. A hippo coming out of the mist
- C. Hellboy
- D. Umm... an inkblot?



If you chose D, congratulations. You're Southland material!

Southland Industries provides mechanical engineering design, construction, fire protection systems, mechanical controls systems and maintenance services to clients in a variety of markets.

We offer unlimited possibilities for those who possess unlimited potential. Visit us online at www.southlandind.com and apply for the opportunity of a lifetime.



Be ambitious. Take high-tech to new heights. Just think about it.

Ever thought about joining an organization with a worldwide impact? Then think SWIFT.

Professional in IT or Customer Operations? We have a job for you!

We are always looking for talented people with a degree in Computer Science or Engineering. At SWIFT we are proud of what we do, how we do it and why we do it. We enjoy being part of the SWIFT community and the SWIFT organization. Why not join us? Just think about it.

To learn more about SWIFT and apply, please visit the "Careers at SWIFT" pages on www.swift.com



Believe. Be more. **Be Swift.**

SWIFT is an equal opportunity employer.



*Smart people
solving hard problems.*



The world's critical and intriguing problems demand solutions that are startlingly different. Where is this type of challenge and thinking to be found? At SAIC, the FORTUNE 500® scientific, engineering, and technology applications company that is working to solve problems of vital importance to the nation and the world.

If you are currently a student at Virginia Tech and seeking a full time, intern or co-op position, you are eligible to apply for the following areas:

- **Electrical Engineering** - Req ID 148944
- **Civil Engineering** - Req ID 148942
- **Chemical Engineering** - Req ID 148940
- **Computer Science** - Req ID 148939
- **Aerospace Engineering** - Req ID 148938
- **Biological Sciences** - Req ID 148950
- **Geospatial Sciences** - Req ID 148948
- **Environmental Engineering** - Req ID 148945
- **Mechanical Engineering** - Req ID 148966
- **Business Administration** - Req ID 148968

For immediate consideration, please submit your resume online at www.saic.com/career referencing the Req ID numbers listed above.



Energy | Environment | National Security | Health | Critical Infrastructure