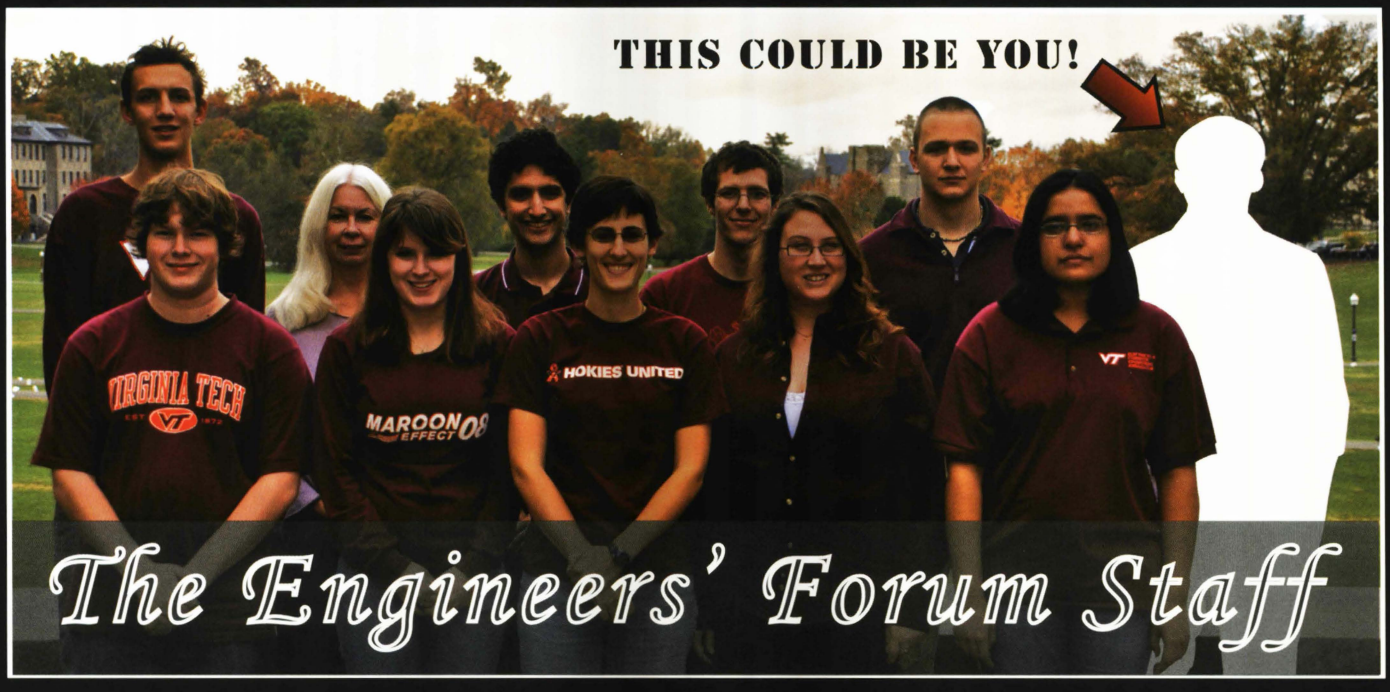
Engineers' Forum

Volume 30 No. 2 April 2010

Math Bridge Closes the Gap

New Technology in the World Cup

Japan, Singapore, Hong Kong and ME



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From The Editor

Dear Readers,

It's that time of year again; spring fever has set, graduation is just around the corner... as long as you can get past the final round of projects and exams, of course.

As my fourth and final year comes to a close, I've been reflecting on the things and activities that have made my Hokie experience fantastic. In addition to the friends I've made and mentors I've gained, there are a few experiences that significantly impacted my Virginia Tech career. In the "infinite wisdom" of a senior engineering student, below is a top five list (in no particular order) of things I think every Virginia Tech student should do before he or she graduates:

1. **Study abroad.** Traveling in itself is great – and of course fun – but studying abroad helps you gain a wider world view. Not everyone is like us, and that's okay. However, by traveling and living abroad you also gain insight in to what makes Blacksburg, and any other homes you may have, so special to you.
2. **Stay in Blacksburg over a summer.** Take classes, work, do research… anything to convince your parents that it's worthwhile! With fewer students around, particularly in Summer Session I, the culture of Blacksburg shows itself. The free Friday night music on the Drillfield is fun, and Steppin' Out (an annual arts festival in August) is awesome.
3. **Order a lobster from the Chop House in West End.** Because, come on, what other colleges offers lobster on a daily basis? As the #1 University dining service provider in the country, Virginia Tech students have access to good food with wide variety! I recommend using meal plan money, if you have extra.
4. **Complete research or a design project.** For most engineering majors some sort of design project is obligatory, but I recommend research or a more in depth project. While sometimes frustrating, research teaches you to think independently, which will be expected in the "real world." Plus, it looks great on a résumé.
5. **Hike the Cascades.** Located in Pembroke, this 69 foot waterfall is a great local destination any time of year. The four mile round trip is very doable, and if you haven't gotten out and seen some of the Appalachian Mountain's sights, you're missing out!

While I could spout off more activities, you're probably finding adventures around Virginia Tech to add to your own list. To all those seniors graduating (now or next semester), congratulations and good luck in whatever you do next! To the freshmen reading this, welcome! The time of your lives is about to begin. To everyone in between, have an enjoyable and productive summer, and make sure to look for the next Engineers' Forum in racks in September!

Go Hokies,
Julia Alspaugh

Editor-in-Chief

Cover photo courtesy of Katherine Cooke

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Engineers' Forum

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The Giant Buddha of Kamakura is one of many sights seen by 13 students on this past year's College of Engineering RSAP trip.

During the Earth Week trial in 2008, food and water waste was down 38%, which is around 1600 pounds of food in a single week.

Danny Boppe, a senior majoring in civil and environmental engineering from Stuart's Draft, Va., is a member of the Virginia Tech Steel Bridge Design Team, which also works in the Ware Lab.

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Internships: Could You Use the Experience?

Summer break is coming; do you have an internship lined up? Every semester, several career fairs target engineering students. Many undergraduates participate in these fairs to try and find an internship. Many valuable experiences can be taken from internships; here are a few things to keep in mind before entering the process.

Benefits of an Internship

An internship provides many experiences for students that can help them understand the industry they are preparing to enter. While submerged in the professional culture, students can begin establish career goals within their field. Internships are also useful to determine the specialization the student wants to pursue. The student will also gain career experience and develop a more competitive resume, a key element when searching for a job after graduation.

Employers also stand to gain from providing internship opportunities to students. When hiring an entry-level engineer, previous internship experience means that less money will be spent training the new employee. The employer also knows the new employee has been exposed to professional situations and has seen how to apply their skills and ideas to those situations.

Hokies and Internships

Virginia Tech and its related groups and departments provide many opportunities during the year for students to find employment. The Engineering Expo is held every fall and is one of the largest engineering career fairs in the country. The Connections Co-Op and Internship Job Fair sponsored by Career Services and the CAMEO CareerFest are also great opportunities. The most effective job fairs may be the ones held by the individual departments within the College of Engineering. Many of the departments, including Civil and Computer Science host individual fairs and many of the others schedule recruiting nights.

The salary for paid internships depends on many factors, but the average is around $15 per hour. A major factor is the size of the company offering the internship. Larger firms often have more funds available to invest into interns, and at some companies salaries are scaled according to academic class.

Things to Think About

When you decide you want to pursue an internship, you want to keep in mind several factors during the interview and negotiation process. Firstly, you must decide what sort of field you want to focus on during your career. The internship can help you determine if you want to keep these goals or search for new ones.

Another important component of internships is the size of the firm you want to work for. Both small and large firms offer their own advantages and disadvantages. Large companies have a lot of opportunities for specialization and promotion, but you may get pigeon-holed and perform repetitive tasks. In a smaller organization you may have fewer opportunities for promotion, but you will have more responsibility and get to work on a larger variety of projects.

When you meet a potential employer for the first time make sure that you have you resume prepared. A resume is a snapshot of your personal achievements and experiences and shows your qualifications for the position. A good resume is an important part of the employment process a takes a lot of time to create. Career Services under the Division of Student Affairs offers resume workshops and are available by appointment to help you edit your resume.

After you have a first-class resume and you have made contact with an employer, it is time to schedule an interview. Appearance plays a role in achieving a good first impression. You want to portray a neat and organized image as well as an appreciation for the formality of the situation, so dress formally. An interview is also a time for the employer to evaluate your communication skills. To help students prepare for the interview and hone their communication skills, Career Services holds mock interviews periodically throughout the year. The advisors can pose typical interview questions and critique your responses and deliveries.

Taking the time to think about these things before you pursue an internship can better your chances of impressing potential employer and getting that dream job. With the experience you can start your career off ahead of the curve and be more competitive. For more internship advice, go to the Career Services website. Good Luck!

Z. Nathan Bales is a Junior in Civil Engineering

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Japan, Singapore, Hong Kong and ME.

This past summer, I spent two weeks traveling through Japan, Singapore and Hong Kong with twelve of my fellow Hokies. My experiences on this trip, through the Rising Sophomore Abroad Program, are ones I will always remember and have forever opened my eyes to the world and all it has to offer. I am left with an overwhelming desire to go back to Asia and for the trip to have never ended. I had a wonderful experience with the Rising Sophomore Abroad Program and now only wish that I could be a rising sophomore next summer and participate in their trip to Europe.

The Rising Sophomore Abroad Program (RSAP) is an amazing opportunity; I can't stress enough how great I think it is. RSAP combines a three credit semester long course in the spring with a two week trip that begins only a few days after the last final exams are completed. The course focused on the intersection of Engineering, Art, and Cultural in an ever-globalizing world. We met once a week to explore Asian cultures, discuss sights to see in the countries we were traveling to, and begin planning some of our days abroad. Nothing could have prepared me for the excitement and anticipation that I felt on the thirteen hour flight to Tokyo or the back to back action that comes with such a short amount of time in such culturally different countries.

Before this trip, I had never been off the East Coast, let alone outside of the country. So when we arrived in Tokyo, with the flashing signs, the hustle and bustle of people coming and going, and the street signs written in Japanese, it was a bit overwhelming and confusing, to say the least. We spent our time in Japan seeing different shrines and temples and touring Fujitsu, Toshiba and Toyota. As an Industrial and Systems Engineer, it was truly fascinating to see the assembly line in action, the huge machinery moving cars around and the measly forty some workers it took to roll out almost 850 Toyotas in a single day. Overall, Japan was the most culturally unique place we traveled, but Hong Kong and Singapore did not disappoint.

Though we only spent two days in Singapore and it was unbearably hot, it was one of the most memorable parts of our trip, especially since some of my friends and I had to plan one of our days there; an experience in itself. We spent a good deal of time in a part of Singapore cleverly named Little India. While there, we had some delicious- make your eyes water and beg for something to drink- Indian cuisine and looked around a Hindu temple. It just so happened that while we were there, two men were participating in a ritual to give thanks to a god that had answered their prayers. The ritual consisted of walking around the temple with probably thirty or forty long pins that pierced their skin and held up a cage-looking object above their heads. It looked so painful, but the atmosphere was a site to see, with all of the men's family and friends walking around with them, singing and dancing and cheering them on. We were definitely at the right place at the right time, and I got to see something that many people don't and that I will never forget.

Hong Kong was probably my favorite place we traveled, with skyscrapers that we couldn't see the tops of, business men and woman coming and going from work, back alleys full of street vendors and bright Chinese signs as far as the eye could see. It was like New York City, but bigger, fancier and Chinese. While there, we visited the Hong Kong University of Science and Technology (HKUST), which was also a great experience on a beautiful campus. The dining halls and dorms overlooked the ocean and the campus was basically on the side of a mountain. I would definitely consider doing a semester at HKUST, especially since all of the classes are taught in English.

The worst part of the trip, hands down, was going home. As nice as it was to grab a burger with my dad on the drive home from the airport, I had gotten so used to jumping on a plane and starting a new adventure in a new country. Getting on a plane and coming home was unexpected. I had a great time on the RSAP trip, and it was a two weeks that I will always remember. One of the great things about traveling abroad: once you go, there is a constant desire to see more of the world. I have that desire and can't wait to catch that next flight to my next adventure.

Katherine Cooke is a sophomore in Industrial and Systems Engineering

Lightbulbs, Water Bottles, and Lunch Trays, *Oh My!*

Virginia Tech has been recently working to become more environmentally conscious. If you've been here for more than two years, you can remember the good old days when D2 had trays. You could just walk around the dining hall, piling food on your tray at will. Those were good times. In a stunning move, the trays in D2 and Shultz were banned to prevent food waste. The students were left to hold their plates themselves. So did it work? The short answer is yes.

Because engineers like numbers, here are a few: during the Earth Week trial in 2008, food and water waste was down 38%, which is around 1600 pounds of food in a single week. Obviously, taking the trays away was not the most convenient thing to do, but we can see it was environmentally the right thing to do.

A few other changes made to campus in the last few years have been: the traffic roundabout, greater prevalence of recycling bins, composting in the Southgate Center and sensors in classrooms to automatically turn out the lights when no one is in the room. Speaking of lighting, some of Virginia Tech's interior design students are switching light bulbs all over campus from incandescent to fluorescent, thereby saving energy.

These days, VT hasn't slowed up one bit in the progress toward greater sustainability. We participated in a competition called "RecycleMania" for the fourth year, from January to March. The goals were to increase recycled material by 10% while reducing trash by 5% campus-wide. Virginia Tech also established an Office of Sustainability for the purposes of monitoring energy usage and GHG emissions, running an internship program on campus, coordinate programs for sustainability and a lot more. To mention how well we've been doing, Virginia Tech was recently graded for its sustainability practices by the Sustainable Endowments Institute (SEI) in a rating called the "green report card." Tech received the highest grade in Virginia with a B for 2010.

More recently, you might have noticed a survey in your email about reusable stainless steel water bottles being used instead of plastic in the dining halls. This would be a huge step for reducing solid waste on campus. The Energy and Sustainability Committee talked about reusable bags and to-go containers to be used by the dining halls as well.

Putting all these reusable containers into use would be more inconvenient for students, but undoubtedly better for the environment. The real question is whether students are going to embrace these initiatives. On the negative side, carrying a water bottle or to-go box everywhere you wanted to use it would be inconvenient. It might be bulky, and implementation of the initiative may not go smoothly at first. It would certainly be harder to eat on the fly between classes. But think for a minute about how many plastic water bottles and Styrofoam to-go containers you've gone through this semester. If you were to carry around all the trash and recyclables you generated this past semester, it would likely be a lot bigger than a water bottle and a reusable to-to container. While that may be small comfort to those that really enjoy eating on the fly, perhaps giving the initiative a chance would not only benefit your back as you take out the trash, it would benefit the environment as well.

Christina Kazmer is a junior in Electrical Engineering

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Math Bridge Closes the Gap

As every Blacksburg resident now knows, the Blacksburg High School gym roof collapsed in February, and the entire school was closed to review its structural integrity. Many high school students fantasize of their school buildings being demolished; however, education does not come to a halt and students do not run free. The more than unfortunate high school students were relocated to the Blacksburg Middle School so that they may complete their semester. Like déjà vu, the students are back in middle school, except this time with a twist.

The high school students attend classes from 2 to 7pm, which presents a challenge for anyone participating in after-school activities. Especially challenged are those juniors and seniors studying for SATs and other college entrance exams. Previously held study sessions and tutoring no longer operate during the students' schedule. So the best and brightest high school students were high and dry when it came to learning outside of class. Despite the bleak outlook for students, the community has stepped up to help.

Virginia Tech offered math tutoring from college students for the high school students. Math Bridge, the organization planning the tutoring, has stepped up to organize the bussing and tutoring. The plan unfolded as follows. First, the high school students are bused to McBryde Hall after their classes end at 7pm. There they are given a delicious, free (SEC sponsored) dinner to fuel their brains while Tech students espouse wisdom upon various subjects within mathematics. The goal of Math Bridge is to provide extended learning to the unlucky high school students who are seeking high SAT scores and passing college entrance exams.

Virginia Tech's willingness to step up and help the community when it is in need is an attribute of Virginia Tech that inspires hope in the community. I believe this is just one example of Tech living up to the motto, "That We May Serve." I'm proud to say I'm from a school that genuinely cares about the community. Not only does Tech serve the community with the Big Event, Big Build and other supporting roles, but Tech is also able to step up when the unexpected strikes and help those in need. Various other groups on campus followed the lead and have also contributed to the displaced high school students.

Other student organizations have also been generously giving to Math Bridge. The Student Engineers' Council has stepped up to the plate by donating almost $3000 to Math Bridge, supplying all the food and bussing costs for the tutoring program. The funding comes from the SEC's Big Contribution fund, which is used to promote the engineering community. The engineering community cares about the city of Blacksburg and has become an excellent example to other campus organizations. As a personal aside, I would strongly encourage anyone in engineering to join the SEC since it is clearly an involved and active organization that gives back.

With luck the high school will soon be refurbished to prevent any danger of collapse so that Blacksburg High School students can go back to the usual routine. But until then Virginia Tech and the SEC will "bridge" the gap.

Allan Kirchhoff is a freshman in Mechanical Engineering

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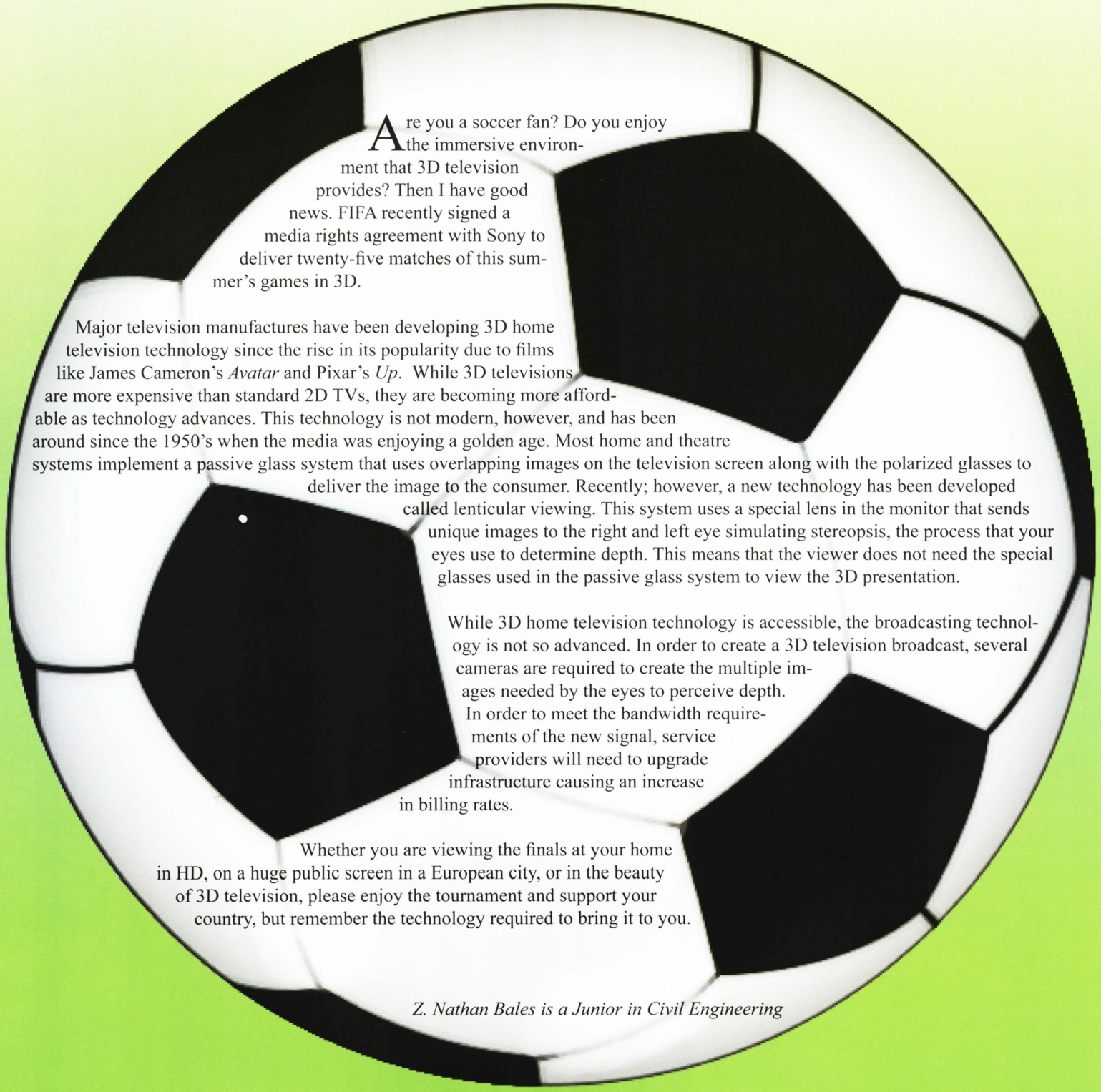


Are you a soccer fan? Do you enjoy the immersive environment that 3D television provides? Then I have good news. FIFA recently signed a media rights agreement with Sony to deliver twenty-five matches of this summer's games in 3D.

Major television manufactures have been developing 3D home television technology since the rise in its popularity due to films like James Cameron's *Avatar* and Pixar's *Up*. While 3D televisions are more expensive than standard 2D TVs, they are becoming more affordable as technology advances. This technology is not modern, however, and has been around since the 1950's when the media was enjoying a golden age. Most home and theatre systems implement a passive glass system that uses overlapping images on the television screen along with the polarized glasses to deliver the image to the consumer. Recently; however, a new technology has been developed called lenticular viewing. This system uses a special lens in the monitor that sends unique images to the right and left eye simulating stereopsis, the process that your eyes use to determine depth. This means that the viewer does not need the special glasses used in the passive glass system to view the 3D presentation.

While 3D home television technology is accessible, the broadcasting technology is not so advanced. In order to create a 3D television broadcast, several cameras are required to create the multiple images needed by the eyes to perceive depth. In order to meet the bandwidth requirements of the new signal, service providers will need to upgrade infrastructure causing an increase in billing rates.

Whether you are viewing the finals at your home in HD, on a huge public screen in a European city, or in the beauty of 3D television, please enjoy the tournament and support your country, but remember the technology required to bring it to you.

Z. Nathan Bales is a Junior in Civil Engineering

Ware Lab Gives Engineering Students a Chance to be *Creative*

In a nondescript building on the Virginia Tech campus, students don't just sit and learn about engineering through lecture. They do it.

They build engines and electronic components. Wings and propellers of miniature airplanes are created. Race cars, submersibles, and intricate miniature bridges all are at the center of brainstorming and hands-on work.

The students volunteer long hours, often at night after classrooms go dark, and get their hands dirty. And they say they love the work.

These are the opportunities offered at the Joseph F. Ware Jr. Advanced Engineering Laboratory, tucked away in a former laundry used by the corps of cadets and university faculty. The facility is the cornerstone of the Virginia Tech College of Engineering's efforts to provide undergraduate students with a hands-on experience that will better prepare them to enter the workforce.

Keith Van Houten (right) of General Motors (GM) speaks with engineering students Lynn Gantt (left) and Patrick Walsh (middle), members of the Hybrid Electric Vehicle Team.

A place to learn

"The Ware Lab is a place where I can be creative," said Kimberly Wenger, a senior in mechanical engineering from Ponte Vedra Beach, Fla., who serves as student leader of Virginia Tech's Blind Driver Challenge team. "It is a chance for all students to get their heads out of their books and apply all the ideas that professors teach us in a real-world application. It is a place where you can learn skills necessary for your future. You can make mistakes and learn from them."

Fellow senior Ben Langford, from Clarksville, Va., said the Ware Lab's Formula Society of Automotive Engineers team is what drew him to major in mechanical engineering at Virginia Tech. Langford had earned a bachelor's degree in agriculture and applied economics in 2003. Since 2007, he has been working on a bachelor's degree in mechanical engineering.

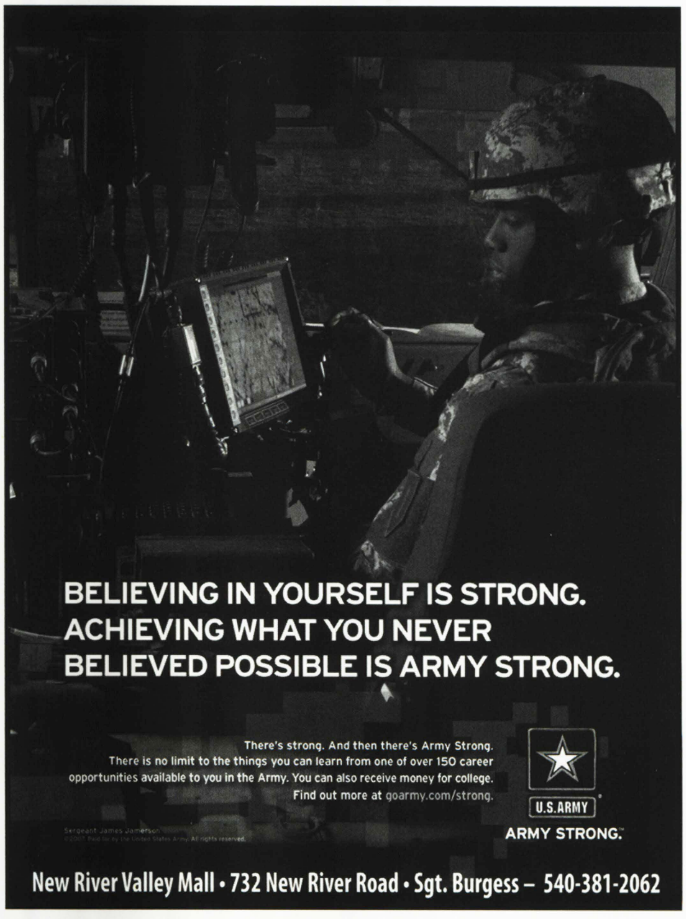
"The computer lab, machine shop and welding shop we have available to us rival the resources of almost every other school we compete with. The Ware Lab allows the undergraduate student to get out of theory mode and into real-life mode before actually leaving college for the real world," Langford said.

Reliance on team-based efforts helps drive the Ware Lab's success, said facility manager Dewey Spangler, himself a faculty member and part-time doctoral student.

"Students have to appreciate each other's abilities," he said. "Because of that, the Ware Lab emulates the real world of working engineers more so than probably any other activity or endeavor within their academic training."

Preparing for the future

Companies have taken note. Organizations such as MathWorks, National Instruments, Volvo, Siemens, and Lockheed Martin sponsor the Ware Lab. Many have donated money and equipment, sent representatives to tour the lab, and mentored students on such projects as the Hybrid Electric Vehicle Team (HEVT) and the Solar Decathlon Team.



Members of the Virginia Tech Blind Driver Challenge team, part of the Robotics and Mechanics Laboratory, have built a vehicle that one day could allow blind and low-vision people to drive. The vehicle was assembled and rigged with high-tech gear inside the Ware Lab. At far left is Kimberly Wenger, the student team's current leader.

"We try and get as many corporate people in here that are hiring our students," Spangler said. "They see the students working in the bays and … it really makes a big impression."

Software developer MathWorks is a regular Ware Lab supporter. Dan Lluch, a member of MathWorks educational technical marketing team, visits the lab often. Lluch earned his bachelor's and master's degrees in aerospace engineering from Virginia Tech in 1995 and 1998, respectively.

"Students being able to learn about the design process, from initial design to implementation, parallels what engineers do in industry to change the world every day," Lluch said, adding that holding such responsibility is a rare opportunity for university students.

Lynn Gantt, a graduate student from Yorktown, Va., said he has seen undergraduate HEVT team members take advantage of such opportunities as part of the EcoCAR Challenge, where team members are retrofitting a donated car by General Motors to operate with better fuel efficiency. "We have an audience that knows nothing about our vehicle and it gives us the chance to educate people about hybrid technologies," Gantt said, adding that many supportive companies have recruited students from his team upon graduation.

The recruitment works both ways.

Potential freshman repeatedly say the Ware Lab was their favorite part of the campus tour, Spangler said. For many, it's the deciding factor. One family told Spangler they were looking at 20 potential universities for their son. "They told me that we were No. 18, and that they had no need to go to 19 or 20."

Their son is now a mechanical engineering major who works in the Ware Lab.

Staff Reports

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