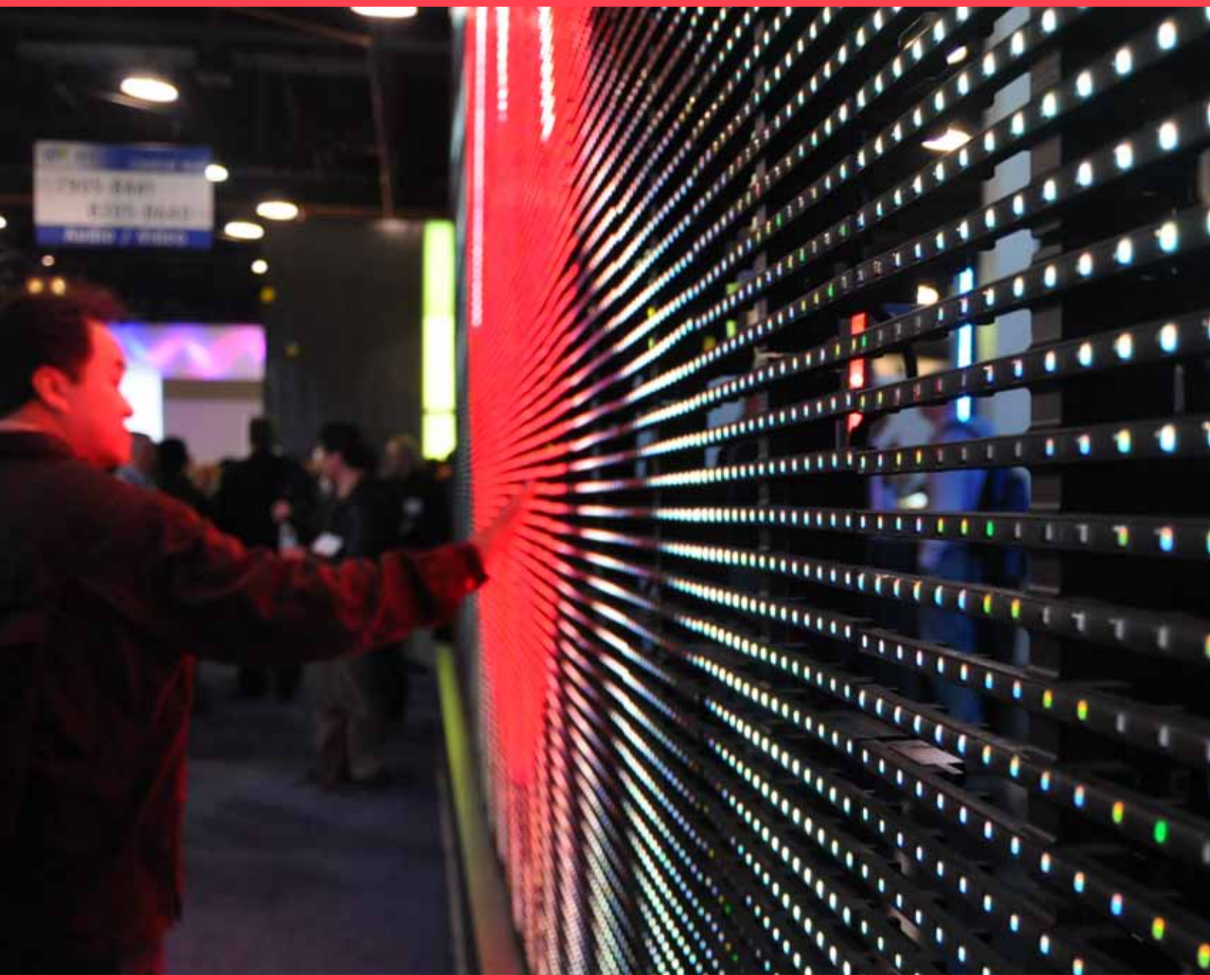
Engineers' Forum

Volume 31 No. 1 February 2011



Space Weather | The History of Lane Stadium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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:

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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.
Printed in the USA.

From The Editor

Dear Readers,

During this crucial time of late-night cramming, intensive studying, and stress, I'd like to give you something to take your mind off those things for just a little while.

I am so excited to present this issue of the Engineers' Forum to you. In this issue, you'll learn about plans for the new Signature Engineering building, what freshmen at Tech can get involved in, the RoMeLa team, and some helpful hints for interviews. There's a lot to be explored, so stick with us!

The Forum is completely student-run. So if you have talent, we want you! Maybe you'd like to get an article or a picture published in a magazine, maybe you'd like to help run a self-supporting business, or maybe you'd just like to be part of the wonderful process from start to finish. This is your chance! We always welcome anyone who would like to contribute, and we appreciate contributions so much that we pay you for them! If you'd like to be part of the process, come by Torgerson 3100 on Fridays at 3 pm and see what we're all about.

The Engineers' Forum is constantly changing and improving, and we welcome your opinions for those changes. If you have any feedback you'd like to share, improvements you'd like to see, or any topics you'd like covered in the Engineers' Forum, please email us at forum@vt.edu.

I'd like to wish you the best of luck on all your exams, a stress-free break, and a terrific end of the semester. Go Hokies!

Christina Kazmer

Editor-in-Chief

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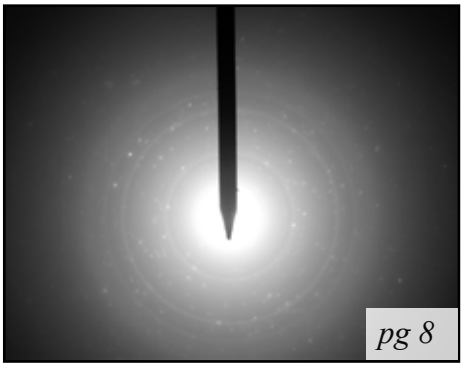

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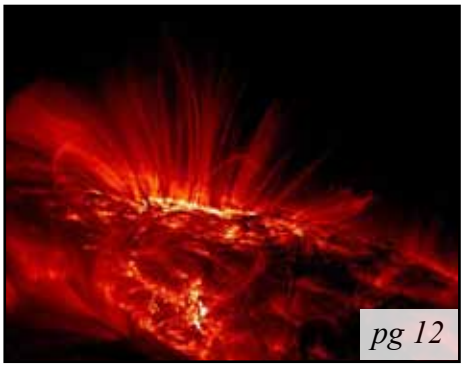

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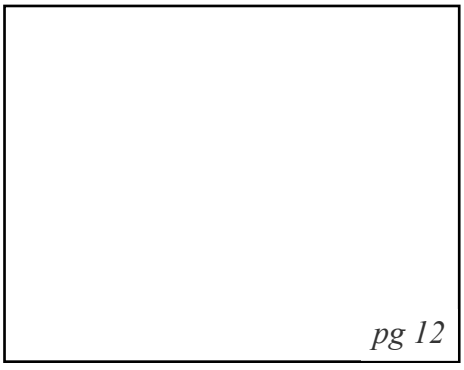

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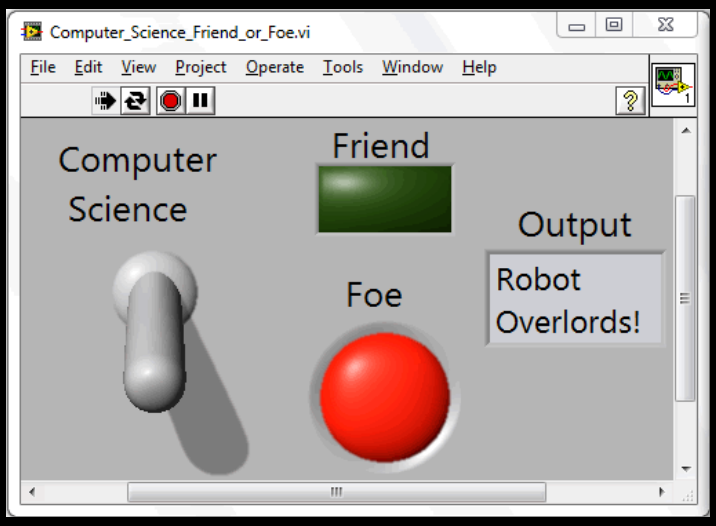
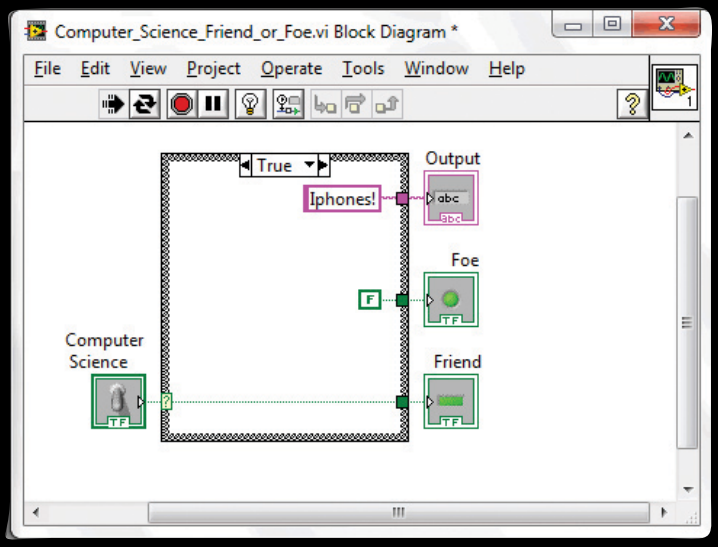
C:\Computer Science\ Friend or Foe?

The college of engineering has a lot of departments, fifteen to be precise. There's the Department of Chemical Engineering, the Department of Electrical Engineering, the Department of Engineering Education; I'm sure you get the idea. There is, however, one department whose presence in this college is somewhat of an enigma. Computer Science has somehow managed to get thrown into the mix of departmentsnunder the College of Engineering. I often wonder,H"howsdid that happened?" Is it a futuristic ploy by the computers to take over the school one department at a time? Are we going to be seeing some sort of'"History of Technology' course in the history department? A'"Writing for the Web' lecture in the English department? Have these courses actually already been offered for several years? The answer may surprise you.





Okay, so all over-dramatic fear mongering aside, what does computer science have to do with engineering? While computers are certainly important for engineers it doesn't mean that they need to be thrown into the same college. I mean computers are important to geologists as well, but we don't see them with their own CS department. Somewhere along the lines it was decided that we engineers had enough in common with these programmers that they should be part of the same college.

What is it that makes programmers similar to engineers? Well, how about we look at the curriculum for the department and figure it all out that way. The Virginia Tech department of Computer Science's website lists eleven goals for its curriculum. These include:

- An ability to apply knowledge of mathematics and science to carry out analysis of computer science problems and design appropriate solutions.
- An ability to use techniques, skills, and modern software development tools necessary for computing practice.
- An ability to identify, formulate, and solve computer science problems.
- An ability to design a computing system to meet desired needs.
- An ability to apply problem-solving strategies to new, unknown, or open-ended situations in computer science.
- Knowledge and understanding of the

impact of the many sub-disciplines of computer science.

• An ability to function on teams.

• An ability to use written and oral communication skills effectively.

• An understanding of professional and ethical responsibility.

• A recognition of the need for and ability to engage in lifelong learning.

• An ability to acquire and use the ever-changing technical knowledge required of computing professionals.

All right I know what you're all thinking: what does this list of things that I am in no way planning on actually reading mean? Well how about I just summarize it for you. The CS department wants its students to identify and solve problems using math, science, and technology, to be adaptable, to work on teams, to be able to communicate effectively, and to be professionally and ethically responsible. As it turns out that's what every single other department of Engineering wants to accomplish, go figure.

So maybe you're not convinced yet, that's wise. You'll do well during the next great robot rebellion. What other evidence can I find to prove that the computer science department has a legitimate claim to Engineering? Let's check out the four career paths available to Computer Science majors as stated by their website, I bet we can get some clues from there.

Career Path 1: Designing and implementing software.

Career Path 2: Devising new ways to use computers.

Career Path 3: Developing effective ways to solve computing problems.

Career Path 4: Planning and managing organizational technology infrastructure.

Career Path 5: Designing Artificial Intelligence to enslave the human race.

Okay so taking into account that I may have made that last one up, you can see some similarities between the jobs Computer Science Majors get and what most other departments can hope for. They design, they innovate, they problem solve, and they manage things. It's not so far off from what the rest of us engineers do, they just happen to be working with computers. So maybe we do have some things in common with the computer nerds, as hard as it may be to admit. wWe don't have to fear those who are computer literate. Maybe we can all just get along and be one happy science and technology based family. Who knows, we might even be able to disguise ourselves and hide among their number once the eventual technological rebellion has started. I know I at least am going to try to make friends with any Computer Science Majors I know just in case it might curry favor for me in the new world order.

Daniel 'Rapunzel' Bishop has seen both The Terminator and iRobot, and is pretty sure at least one of those was a book…

ESM 4984

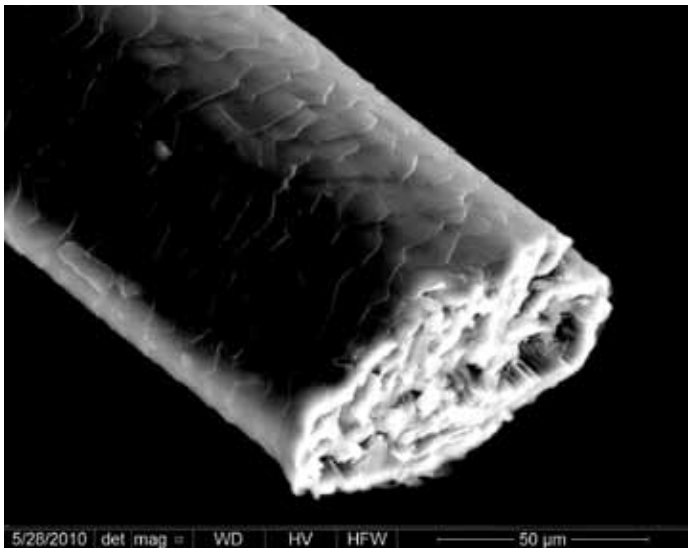
The Fundamentals of Nanoscale Characterization

ESM 4984, The Fundamentals of Nanoscale Characterization, held in the Nanoscale Characterization and Fabrication Laboratory (NCFL) at Virginia Tech, is a course taught by experts in their fields with years of experience in academic and industrial settings. Nanoscale characterization is a set of techniques that can be applied to almost any discipline in science and engineering. Obtaining clear images of bacteria, determining the likely composition of a material, and finding the orientation of a crystal are just a handful of the applications of nanoscale characterization.

The NCFL houses and grants students access to equipment such as a scanning electron microscope, an energy dispersive spectroscope, a transmission electron microscope, and an atomic force microscope to name a few. The fundamentals of each instrument will be taught in the course. A full list and short descriptions of each instrument can be found at http://www.ictas.vt.edu/facilities/ncfl.shtml.

Jerry Hunter and John McIntosh developed ESM 4984 with the help of Steve McCartney from the NCFL and James Schiffbauer from the department of Geosciences at Virginia Tech. The course is meant as an introduction to the Fundamentals of Nanoscale Characterization. It allows graduate and undergraduate students alike to gain hands on experience operating several commonly used pieces of characterization equipment in research today.

The goals of ESM 4984 include having students learn to identify the major materials characterization techniques, know the strengths and limitations of the major techniques, and have a knowledge of the different instruments and how they function. The course also allows students to get hands on experience with important characterization instruments, selecting which technique to apply in various analysis situations, and provides a base upon which to build future materials characterization experience. The



course focuses on the practical use of nanoscale characterization methods to aid researchers in solving materials development problems.

ESM 4984 is structured in small groups that cycle between each instrument, allowing learning to take place in a much more intimate setting than most lab classes held on campus. Not only are the basics of operation taught, but the science behind each function is explained and put to use in understanding how to best characterize a sample.

Having a basic understanding of characterization methods is an asset for any field. ESM 4984 serves to introduce students to another aspect of research that is usually done by instrument technicians. By having firsthand experience and absorbing knowledge about the process of gaining information from images, more valid conclusions can be drawn from data collected by these methods. If you are at all interested in adding important skills to your repertoire and advancing your research career, be urged to give this course serious consideration.

Katie Gloe is a sophomore in Chemical Engineering.

Happenings in the SEC

The Student Engineers' Council provides many exciting opportunities for engineering students at Virginia Tech. Recently, the SEC held the annual Leadership in Engineering Conference, or LEC, an annual fall event where students are invited to discuss issues in engineering and listen to a variety of experienced speakers in various concentrations within the field of engineering. For all engineers, undergraduates and graduates alike, the LEC is an excellent opportunity for students of all departments to learn about new issues in engineering and develop professional skills.

This year's LEC took place on Saturday, November 6th of 2010. A motivated group of engineers dedicated their Saturday to hearing talks on emerging engineering issues. The CTO of Boeing kicked off the event with an inspiring speech about the spirit of engineering and how Boeing owes much of it's success to the engineering community. System Engineers from the US Missile Defense System also spoke about the cutting edge technology used to shoot satellites out of orbit. Other speakers covered diversity in engineering, engineering ingenuity, and the psychology of leadership.

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 2011 Engineers' Week runs from March 20th to the 25th for an entire week of events.

In addition to Engineers' Week the SEC has even 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 participating in Relay for Life, representing the College of Engineering on the Drill Field.

Also to be noted is the long awaited completion of the $500,000 goal for the Design Team Endowment this past fall. The endowment will be used to fund the engineering design teams of Virginia Tech. With this long standing goal completed the SEC has wasted no time in setting two new and ambitious philanthropy goals. The first is a ten year long commitment to creating a $500,000 Slush Fund Endowment, which will act similarly to the Design Team Endowment except it will serve all engineering groups. In addition to the Slush Fund Endowment the SEC has

pledged $100,000 towards the completion of the highly anticipated Signature engineering Building. For those unfamiliar with the new building the College of Engineering Advisory Board Legislative Committee has this to say, “The Signature engineering Building envisioned for the College of Engineering will provide the modern tools required for instruction an environment that will help attract the best students and faculty.”

Overall, the spring of 2011 looks bright for the SEC and Virginia Tech’s engineering student body. Involved and ambitious engineers would be advised to snap up these upcoming opportunities and to look forward to another successful year.

Allan Kirchhoff is a sophomore in Mechanical Engineering.

space weather

Although the term 'space weather' will most likely evoke thoughts of jargon originating from science fiction, the various dynamics of the environment in localized areas of space around Earth present an interesting case where unheard of phenomena may be observed.

The primary source of such observable events as the aurora, or Northern Lights, is what is known as solar wind. As the sun undergoes constant nuclear fusion reactions, a stream of charged particles is continuously released, traveling at blindingly fast speeds. Normally, these are deflected by Earth's magnetic field and cause little significant effects. However, at the north and south poles, these charged particles spiral down 'holes' in the magnetosphere, exciting the particles in the upper atmosphere, resulting in the famously spectacular curtains of light across the sky.

On the other hand, the solar wind has potential to be rather damaging to orbiting satellites. A large solar flare, or sudden burst of extension on the sun's surface, has the ability

to damage or destroy orbiting electronics in a sudden burst of radiation. With this in mind, spacecraft and satellites are being designed to more efficiently resist these crippling effects.

Interestingly enough, almost like a comet forming a tail, there is a region just behind Earth where there are little, if any, occurrences of this sort of phenomena. When the solar wind strikes Earth's magnetic field, it is deflected in many directions, mostly spiraling off into space and some funneling down at the magnetic poles. With this in mind, it is possible for a satellite or a spacecraft to 'hide' from a sudden burst of solar energy that could otherwise prove damaging or life-threatening.

Of course, much of what is well-known in the phenomenon known as 'space weather' streams from sudden bursts in solar activity, called a 'flare' or a 'magnetic storm.' In addition to amplifying the solar wind, these can also shot out millions of joules' worth of energy in the form of high-frequency radiation, such as x-rays and a peak in ultraviolet output. These, in turn, stem from 11-year cycles, when sunspot activity tends to pick up, leading to more lapses in the sun's magnetic field.

Travis Roth

The History of LANE STADIUM

Now that football season is over, we should turn our attention to Lane Stadium, the building that makes Hokie football possible. The structure has attributes that makes one of the most intimidating places to play, most notably because of the often disruptive effect of the deafening noise of a sea of Maroon and Orange on a Saturday afternoon.

David Knachel, Director of Photography in Athletics, believes that the sawtooth walls on each side of the field reflect the crowd noise from the opposite side of the stands onto the field. The deafening noise can make it difficult for fans to communicate with each other. ESPN college football analyst Kirk Herbstreit mentioned that he was unsure if he has been to another venue that is louder than Lane Stadium. Lane's loudness is just one quirk of its construction.

I interviewed Bob Dobyns, 1951 Virginia Tech graduate in civil engineering, whose construction firm was involved in the original construction of Lane Stadium. According to Dobyns, he was one of the five bidders for the construction of Lane Stadium in March 1964, which he noted was an intensive bidding process.

Dobyns' firm was awarded the first phase of the contract, with the lowest bid of $15,000. At the time of the award, then Virginia Tech President Thomas Marshall Hahn, Jr. and Chief Business Officer Stuart K. Cassell assured Dobyns that while construction funds were not readily available for the project, the Virginia Polytechnic Institute (VPI) Foundation would make timely payments throughout the course of the project. VPI never missed a payment.

Dobyns owned one of the smaller construction firms competing for the project. He had good relations with the Virginia Tech administration for his prior construction of academic facilities. Dobyns worked closely with the administration, along with the Carneal and Johnson Architects as well as Smithey Boynton Architects, the two architectural firms who collaborated on the design of Lane Stadium.

Dobyns noted complications with obtaining the pre-stressed concrete used throughout the stadium. The Roanoke-based firm tapped for the project to provide pre-stressed concrete filed for bankruptcy. However, Mr. Cassell found a solution by asking the bankruptcy court to assure that funds would be paid through the bank and trustees. The judge approved that request, and the firm continued to produce the pre-stressed concrete and construction on the stadium resumed.

Lane Stadium continued to expand its seating capacity between the mid 1970's and early 1980's. The East Stands were expanded by adding additional seating rows on top. The design resulted in a steeper climb for fans to reach their assigned seating, but their view of the field would be closer than anticipated.

From the beginning in 1964 up to today, Lane Stadium has had a storied past. Even recently, press booths were added to the stadium. For years Lane has stood as an iconic symbol of Hokie football with a little known life of its own.

Fred Hussain

The Engineers' Forum Staff

Daniel "Rapunzel" Bishop, Pranav Angara- Webmaster, Fred Hussain - Writer
Christina Kazmer- Editor-in-chief, Travis Roth - Writer, Sarah Tanner - Layout

Not pictured: Sumedha Mohan - Managing Editor, Michael Miracle - Layout, Darius Emrani -Layout and Writer, Pranav Angara - Webmaster, Andrew Mussey - Chief Photographer,Jeff Craley - Copy Editor, Z. Nathan Bales - Writer, Valeriy Vislobokov - Writer, Katie Gloe - Writer, Allan Kirchhoff - Writer, Lynn Nystrom -Editorial Adviser

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Three reasons to join the EF:

1) You get paid!
2) You gain useful skills and experience that employers value
3) Oh yeah... It's fun too!

No need to be an engineer - we welcome all majors! If any of our positions interest you, email **forum@vt.edu** or visit our website (**ef.org.vt.edu**) for more information! In particular, we are looking for:

Writers - The backbone of the magazine, writing is a great way to explore exciting topics while getting your work published

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