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THE IRON WARRIOR

THE NEWSPAPER OF THE UNIVERSITY OF WATERLOO ENGINEERING SOCIETY

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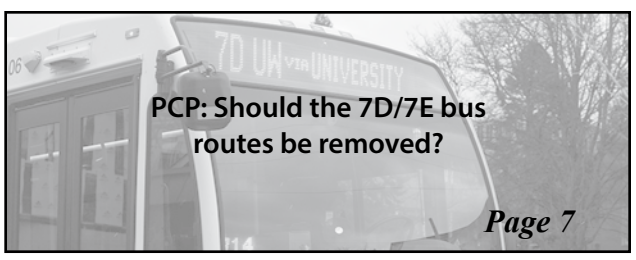

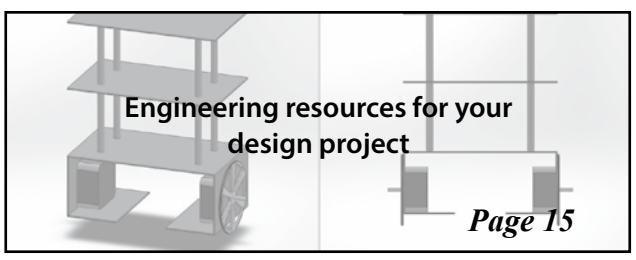

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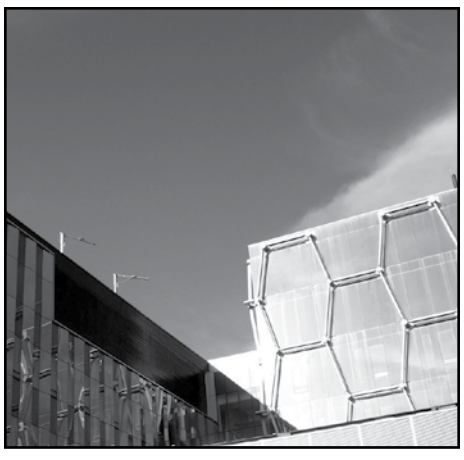
The Election Edition



ANDREW DAVIDSON
ELECTIONS COMMISSIONER

Hello Engineering Society "B"! I'm sure you've all noticed the election posters going up around the engineering buildings. It is now time to elect your new set of executives for the engineering society!

My name is Andrew Davidson, and I am the Chief Returning Officer (CRO) for the engineering society executive elections. The role of the CRO is to organize and promote the elections, set and enforce rules ensuring fair play amongst the candidates, and to ensure all candidates are equally represented. During this time I will be attempting to provide as much information as possible to you about the election and the candidates.

The positions available this election are President, VP Finance, VP External, VP Internal, VP Education and the WEEF director. For the next 16 months, the individuals elected to the executive team will have the task of representing you and the engineering society on matters such as student life and events, academics, inter-faculty and inter-school relations, waterloo community presence, and student support. The WEEF director will have the responsibility of running the Waterloo Engineering Endowment Fund.

It is now the campaigning period of the elections. During this time, the nominees will have the chance to present their platforms and tell you all about themselves.

Feel free to approach any of the candidates during this time to get to know them and learn about their goals. In addition, there will be an all candidates forum taking place on Thursday, January 29th at 12:00pm in CPH foyer. This will be an open question forum. At this time, you will have the opportunity to ask candidates questions about their platforms.

After campaigning closes at midnight on Friday January 30th, you will now have the chance to vote for the candidate of your choice. Voting opens at noon on Saturday January 31st, and closes at noon on Wednesday February 6th. The voting will be conducted online. In addition, there will be a voting booth located outside of POETS, in CPH foyer so students may place their votes and make further inquiries about a nominees platform.

I encourage you all to vote and get to know the candidates who will be running to represent you for the next 16 months. If you have any questions about the elections, feel free to email me at *cro.b@engsoc.uwaterloo.ca*. To help you get informed, the nominees have each written a summary of their platform and a blurb introducing themselves in the next section.

Now, let's meet your candidates!

Candidate coverage on page 12

Letter from the Editor

In Defence of Dumbphones

NANCY HUI
EDITIOR-IN-CHIEF

Congratulations! You are reading the very first edition of the Iron Warrior, the Engineering Society newspaper at the University of Waterloo, the culmination of several hundred persons' hours of work.

I am Nancy, and I was more excited to take the helm of the Iron Warrior as the Editor-in-Chief than I am to graduate - which is pretty dang exciting. Being the latest in a long line of Editors, one has a rich legacy to live up to. So far I have endeavoured not to screw up too badly.

Some things that I have learned already:

- File organization is important. Establish a strict hierarchy and stick to it

- Gmail has this feature where you can have nested tags. Use it. Love it.

- Don't be afraid - sometimes things happen, but sometimes they spontaneously resolve themselves. Sometimes, it's not as complicated as you think it is. Sometimes nobody notices and you can cover it up with a massive picture.

- Always, there is probably somebody out there willing to help.

And dang, there are a lot of people willing to help.

Thank you to Alex Toth for helping secure advertising this term.

Thank you to Nachiket, Bryan, and Elizabeth for coming in to copy edit and making the office seem less empty and creepy. Thanks to Nina and Leah for answering my InDesign noob questions. Thanks to Jessica and off-stream editor Cam for copy editing as well.

Thank you to Emmanuel for fixing some ads, the EngSoc candidate pictures, and learning to layout!

Thanks to Andrew Davidson, the elections commissioner for B-Soc, for delivering the candidate profiles and blurbs on time! Speaking of elections, VOTE online on Saturday, January 31st to Wednesday, February 4th! Even if there's only one candidate, you still need to vote YES or NO to accept them!

Thanks to Ashlyn for the prof interview - we might make it a regular thing! If you have a prof who you'd you like to see featured in the Iron Warrior, shoot an email to iwarrior@uwaterloo.ca.

And thanks to everybody else for writing, coming to meetings, and drawing comics.

We do have a lot of columns right now - Alex Toth's music column is back, as is Nina Feng's Leafy Thoughts, which concerns environmental issues. The Benchwarmer Report is back in jubilant form. On the Shoulder of Giants is returning from the A-Society and will be profiling inventors throughout history! Last but not least, Nachiket's column on startups is also returning from the A-Society and might prove to be an inspiration for all of you with entrepreneurial aspirations or a burning need for a 4th year design project idea!

Anyways, if you want to write for the Iron Warrior, it's not too late to start! We take submissions for all types of content - humour, news, science, campus life, comics... the possibilities are infinite.

So, moving on to the title of this editorial... what's that about dumbphones?

Dumbphones are any phone that is not a smartphone. They are usually known as feature phones.

Oxymoronically, feature phones are a class of low-end mobile phone characterized by having far fewer capabilities than a modern smartphone. They tend to have a 7+ day battery life, high durability, small size, and no touchscreens. You may recall them as the flipphones used by Walter White on Breaking Bad, or the titular device of the CollegeHumor short "She's Such a Butterphone". Feature phones have been in decline after Apple introduced the iPhone in 2007, particularly among the business and student markets, although they are still very common in the developing world, where electrical access may be limited and major longevity between charges is a selling point. Feature phones are referred to as "dumb phones".

I can't deny that smartphones have advantages over feature phones. There are useful apps available that smartphones can run, including Google Maps, Tinder/Grindr, Instagram, and Angry Birds: Star Wars. Speaking of Instagram, the hardware of smartphone cameras are actually pretty good for general-purpose consumer photography. And yeah, when travelling with someone who does have a smartphone, I sometimes ask them to check the traffic on a route, the best path to the restaurant, or the showtimes at a movie. Meanwhile, one can conduct business on smartphones and send emails to professional contacts or members of your Fourth Year Design Project group. You could get a lot of stuff done on a smartphone.

Yeah, ha ha. I literally sit at a desk in front of a screen for 6-12 hours a day, and using a small screen would worsen my eyesight even more.

And when travelling? There's nothing in a smartphone that I actually miss. I don't actually enjoy digitally documenting my diet, life, and friends in graphical formats - not to mention the risk of being featured on the "Asians Taking Pictures of Food" tumblr. I can plan my routes in advance instead of putting Google Maps on the spot. I can memorize addresses and intersections - or, you know, write it down. It's incrementally more difficult than having it available on-the-fly, but I trust the battery life of a Post-it more than a 2-year-old Galaxy.

And you know how much my monthly plan is? Trick question. Haven't actually got a monthly plan. I use roughly $70 worth of air minutes and texts per year. If I really wanted to, I'd get the $15/month plan for unlimited texts, since nobody really calls anymore. But as it is, compared to, oh, the $35 unlimited data/text/air plan from Wind, I'm still ahead $350/year. It's not worth the $1/day for me to be able to browse reddit on the bus and play Candy Crush on the subway.

I've dropped my phone multiple times but popped the pieces back into place right after.

My phone is four and a half years old, but still lasts a week per charge.

If ever I was to become a drug dealer, then I would use a pay-as-you-go feature phone with a massive battery life so that the po-po couldn't track me down while I was negotiating with buyers who couldn't tell their feet from a pair of ferrets.

My feature phone doesn't need time to load a keypad. The load time is nonexistent. There is no lag. I could call 911 in the time it takes for an iPhone to unlock itself.

My feature phone actually fits into the pocket of my jeans.

You may guess at this point that my passion for the dumbphone extends beyond the material benefits.

It's not just that I appreciate the minimalistic design and functions of a dumbphone, but also all the things it lacks. Internet connectivity, games, apps, Tinder - they're nice to have, but I don't need them, and more importantly, I don't ever want to feel like I need them.

Smartphones are addictively good fun. Having any type of device dependency is a weakness.

Sure, some of you can tear your eyes away from the smartphone from time to time, but so few of you! Statistically speaking, I don't trust myself to not become one with the smartphone. I'm practically one with the laptop already.

Those idle minutes walking outside, in the food court, or in the subway are valuable in gathering one's thoughts away from the pressing concerns of work or school or the Iron Warrior. They are also important in ensuring that one doesn't, oh, get hit by a car, get pickpocketed, or miss the stop entirely.

Cheesy as it is, it's important to live in the moment, and there's more to the moment than documenting it for your mom and your internet stalkers, and forgetting about it straight after a game of Plants vs. Zombies.

You made it to the end of this article. Still got a smartphone? Still feel you're the master of your own attention span? Still think you won't instinctively reach for the phone in the middle of a $40/hour lecture?

Then congratulations! We will call for you when Skynet becomes self-aware and humanity needs you to put down some genocidal robots.

For now, please enjoy your smartphone responsibly!

See you next issue --
Nancy Hui

Issue #2 Deadline: Friday, February 6th, 2015 for publication on Wednesday, February 11, 2015.
Send your submissions to *iwarrior@uwaterloo.ca*
Winter 2015 Publication Schedule: February 11, March 4, March 18, April 1.

THE IRON WARRIOR
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Editor-in-Chief
Nancy Hui

Assistant Editor
Nina Feng

Layout Editors
Emmanuel Utuama

Copy Editors
Nina Feng
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Elizabeth Salsberg
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The Iron Warrior is a forum for thought-provoking and informative articles published by the Engineering Society. Views expressed in *The Iron Warrior* are those of the authors and do not necessarily reflect the opinions of the Engineering Society.

The Iron Warrior encourages submissions from students, faculty and members of the university community. Submissions should reflect the concerns and intellectual standards of the university in general. The author's name and phone number should be included.

All submissions, unless otherwise stated, become the property of *The Iron Warrior*, which reserves the right to refuse publication of material which it deems unsuitable. *The Iron Warrior* also reserves the right to edit grammar, spelling and text that do not meet university standards. Authors will be notified of any major changes that may be required.

Mail should be addressed to *The Iron Warrior*, Engineering Society, E2 2347, University of Waterloo, Waterloo, Ontario, N2L 3G1. Our phone number is (519) 888-4567 x32693. E-mail can be sent to *iwarrior@.uwaterloo.ca*

Copyright Reform:

"Notice and Notice" System Now in Effect

SHERWIN KWAN
4B MECHANICAL

On the first day of this month, Canada officially adopted a new system for handling cases of copyright infringement. In this system, commonly referred to as "notice and notice", a copyright holder has the right to send a notice to an internet service provider (ISP) informing them that they believe there has been unauthorized access to their content. The ISP is to then forward the notice to their customers. The rationale is that the customer has a chance to voluntarily stop the infringing behaviour upon such notice and avoid penalty. With its implementation, the Copyright Modernization Act (Stat. of Canada, 2012, c. 20) is now fully in force.

Background

This is not the first time the issue of copyright has been covered in the Iron Warrior. This act of Parliament was the culmination of over a decade of attempted copyright reforms by the Martin and Harper governments. An earlier draft of this act was criticized in this publication by Savio Tsui (SE Class of '09). Tsui objected that it would be illegal to use any technology which could be used to break copy protections (DRM), even for something as innocuous as carrier-unlocking your phone or creating a backup of a legally-bought film for personal use, and that there was no cap on penalties for infringement. More recently, similar legislation in the USA (Stop Online Piracy Act) was the subject of a PCP in January 2012. Anish Bhutani (Chemical '12) defended the proposed copyright bill on the grounds that rampant piracy was removing incentive for people to innovate, perform music, or write books, while (now A-Soc exec) Josh Kalpin deemed it flawed, as it was unlikely that its stated goals could be achieved, while the U.S. government would gain the power to take websites down for infringements.

The proposed Copyright Modernization Act was amended several times in Parliament in response to public pressure. It was finally passed in 2012 to mixed reviews. On the one hand, it allowed otherwise infringing actions for the purposes of education, parody, and satire, so you would be allowed to post copyrighted assignment questions online for your classmates, and putting a "How it should have ended" video for your favourite movie online would also be legal. Some of Tsui's concerns were assuaged, as fines for infringement were capped at $5,000, provided you didn't try to sell pirated stuff for profit, and breaking a digital lock to unlock a cell phone was explicitly made legal. On the other hand, the digital lock provisions remained, with Industry Minister James Moore suggesting that the market would decide the fate of DRM (essentially, if Canadians really didn't like that provision, they could just put their money where their mouths are and boycott digitally locked products).

"Notice and Notice" System

While the other provisions of the Act had gone into force in 2012, the "notice and notice" system for handling copyright infringement was delayed until this January. In theory, it is fairly simple. Suppose a guy makes a copyrighted movie available on Bittorrent, which was produced by XYZ Studios. If XYZ Studios notices this, they can take the IP address of the person who shared the film, look up the ISP it belongs to, and ask them to pass along a warning notice to the user who has that IP address. However, XYZ Studios is not allowed to demand that the ISP shut off the user's Internet access or take down their website, if the infringing material is posted online. This contrasts with American law, which has a "notice and take down" provision. Also, the ISP is not allowed to tell XYZ, "The offending user is Mr. John Doe of 123 Front St, Waterloo". Furthermore, search engines are explicitly protected against lawsuits for merely revealing the location of copyright-infringing material.

When the user receives the notice, they can choose to remove the offending film voluntarily. If not, then further warnings can be sent. If XYZ Studios feels its warnings are getting ignored, then they can go to court. If they can convince a judge that the offender has been ignoring their warnings, then the judge can order the ISP to reveal who the offender is, and a civil lawsuit begins. So long as John Doe didn't try to make money off the illegally shared movie(s), the maximum fine is $5,000. Commercial infringement, on the other hand, carries penalties up to 5 years in jail and $1,000,000 in fines.

Early Scandals

On January 9, barely a week after the new rules came into effect, the Toronto Star published an article claiming that American IP firm Rightscorp had been abusing the new rules to send legal threats in their warning notices (which ISPs are now required to pass on to consumers). It was claimed that Rightscorp threatened to sue an offender for $150,000 and shut down their Internet service unless they agreed to pay $20 as an out-of-court settlement. This is merely a bluff, as the loss of Internet service or fines over $5,000 as penalties are not legal punishments under the Copyright Act, and in fact Rightscorp isn't even allowed to obtain the offender's name without a court order.

The government and ISPs have already taken notice. James Moore has announced that the government is taking action to ban these false warnings, which effectively amount to extortion. Some ISPs, including TekSavvy, have announced plans to warn their users about the bad warning notices.

Evaluation

According to Moore, the Copyright Modernization Act is a "made-in-Canada" (translation: not like those crazy Americans) law which will balance the rights of copyright holders and consumers. Certainly, if the law works as advertised, the nightmarish scenario Kalpin envisioned in 2012 will be avoided, since the wholesale taking down of websites is not a punishment. But not everyone is completely happy, such as Michael Geist, a law professor at the University of Ottawa who brought the alleged Rightscorp scandal to light. He opined that the law was better than similar laws in the USA, but remained worried that a trade agreement Canada is currently negotiating with the Americans might soon cause us to back down, and move towards an American-style takedown system.

Paris Attacks call Freedom of Speech, Liberty, Equality and Fraternity into Question

ELIZABETH SALSBERG
2T NANOTECHNOLOGY

On Friday January 7, twelve people at the offices of Charlie Hebdo, a satirical magazine based in Paris, France, were killed in what is the most brutal attack on freedom of speech in the history of the French press, as described by the Organization for Security and Co-operation in Europe.

Two masked gunmen raided the premises, threatening a building employee and her daughter to obtain the entrance code to the magazine's office. Shortly thereafter, they opened fire, killing eight journalists including Charlie Hebdo and editor Stéphane Charbonnier, as well as a maintenance worker and two police officers. Eleven more were wounded. On their way out, one of the gunmen was heard calling, "We avenged the Prophet Muhammad! We killed Charlie Hebdo!"

This is yet another peg in what has been a long line of extremist-linked terrorist attacks over the past few months. The two gunmen (brothers Saïd and Chérif Kouachi) claimed to be tied to the Islamic State (IS) and Al-Qaeda based in Yemen. Related violence would follow at a Kosher Market in east Paris, where another extremist, Amedy Coulibaly, held several people hostage in an attempt to get police to free the Kouachis.

Charlie Hebdo had frequently targeted Islamic extremism in their publications, including one cartoon in which the leader of the IS was shown smoking a cigar and wishing readers a happy new year. It is assumed that this was the motivation of this particular attack, though it is difficult to deny that the fundamental freedom of speech was also (albeit indirectly) a target.

Through the late afternoon and evening following the shooting, Parisians poured into Place de la République, about 1 km away from the site of the shooting, in an act to stand up to terrorism and defend freedom of speech. Vigils followed worldwide all through the week. Several world leaders, including German Chancellor Angela Merkel and Israeli Prime Minister Benjamin Netanyahu gathered at Place de la République for a special vigil. Prime Minister Stephen Harper did not attend, but was instead represented by a delegate.

These attacks provide yet another solemn reminder that terrorism and extremism has managed to challenge our fundamental rights and freedoms. It calls into question how well (or perhaps how poorly) we as a society work to defend and yes, understand, these rights and freedoms… which is far too well-demonstrated in the events following the attacks.

Over 50 anti-Islam incidents were reported to Parisian authorities through the aftermath, highlighting the struggle to understand the motivation behind these attacks. Though the terrorists cite the Prophet Muhammad and other religious symbols of Islam as their motivation, Islam is in fact a religion based on the same concepts as any other—love, freedom, treating others as one would like to be treated, etc, etc, etc. These anti-Islam acts of violence are a form of terrorism in themselves, grossly out of place and wholly inappropriate.

If we continue to react this way, how will there be an end to terrorism? These reactions add fuel to the fire. Perhaps some of the attacks would have happened anyway. Maybe. Probably. But in the future? One thing I can say for sure is that hate and violence are not the answer. Liberté, Égalité, Fraternité: These were the words that followed the end of the French Revolution in the late 1700s. Let's not let them be forgotten three centuries later.

Facts and information from cbc.ca and the National Post.

A Brief History of Student-Funded Buildings

MATT MCLEAN
4B MECHANICAL

On November 11th 2014, A-Society students voted in favour of a $1 million student donation for the construction of Engineering 7, with 76% of students in favour of an optional $25 fee to be collected termly until the total reaches $1 million. The fee would only take effect once the building is completed.

B-Society engineering students have an opportunity to vote in the referendum from March 11-14th. Since both societies are required to support the fee, the final result of the B-Soc vote will determine the fate of the entire referendum. More details on the proposal and the voting process will likely be released closer to the referendum date.

But this is not the first time that students have funded part of a building on campus. Most recently student money has been applied to Engineering 5, the Health Services Expansion, Tatham Centre, Fed Hall and the Student Life Centre. There have also been a few proposals for a new student building.

Originally built in 1968, the Student Life Centre, or the Campus Centre as it was known as back then, started out as a student project. In 1960, students agreed to pay $10 per term into a fund to build a student building on campus. A total of $29,000 ($225,656 in today's dollar) was collected by 1962, but little progress was made with university admin.

Fearing that students could begin poaching university fundraising efforts to pay for a building, the university stepped in and funded the remainder of the Campus Centre. The original building was completed in 1968, the university's 10th anniversary. The building has since undergone several additions and full management of the building was transferred to the Federation of Students on February 3, 2013.

The transfer of management of the Student Life Centre was a direct result of the negotiations over Fed Hall. Fed Hall was the first building funded mostly by students. In 1984 students voted in referendum to pay a total of $1.5 million over 20 years for the construction of a student nightclub. That fee was increased by $5 with a subsequent referendum in 1997 to pay for renovations to the space.

The building was paid off in 2004, and a new agreement needed to be signed with the University and Feds. The new agreement stipulated that the Federation of Students would pay a $1 yearly lease to the university for use of the space, and renewal of the agreement would not be unreasonably withheld.

In 2010, a clause was added to the agreement that the University Board of Governors could terminate the lease with 60 days' notice without a major breach of the agreement. On April 30, 2012 the university terminated the lease to Fed Hall. The building then underwent extensive renovations to expand the food offerings for a banquet hall, and is due to re-open this term under Food Services' control.

The Tatham Centre was also fully funded by students. A $25 per term fee was added to the co-op fee in 2003 through a memorandum of understanding between Feds and the university, not a referendum as is typically the case for student fees. The agreement includes a provision for use of the building as study space and recognition of the students' contribution.

Interestingly, the payments for the buildings were completed in 10 years instead of the expected 25 years. A 58% increase in the number of co-op students since 2003 was the primary reason for the fee being removed in Winter 2014.

A pair of new buildings was put to referendum in Fall 2009. The health services expansion passed with 59% of the votes. The expansion increased the footprint of Health Services from 10,000 square feet to 28,000 square feet. The total cost of the building was $10 million, with approximately $2.25 million funded by donors. Students pay a $10 fee per term beginning in 2014. Students will continue to pay the expansion fee for approximately 20 years until the building is paid off.

The second building put to a referendum in Fall 2009 was a student services building. The building was proposed by The Federation of Students, the Graduate Students Association, and the University to provide a centralized place for all student services.

Located in Lot H between Ring Road and University Ave. it would house the Visitors Centre, Retail Services, the Office of Organizational and Human Development (OHD), the Office for Persons with Disabilities (and Exam Centre), the Student Life Office, a Writing Clinic, Counselling Services, and a multi-faith prayer room. It would also have 24 hour study space, meeting space and social space. A portion of the building would also be dedicated to the Graduate Students Association.

The proposal for a new student services building failed the referendum, with only 40% of students voting in favour. The proposal was for a fee of $49.50 for 20 years to fund 65% of the undergraduate portion of the building. A 2012 Imprint article credits a lack of knowledge about the proposal and a lack of consultation on the design as key contributing factors to the failed referendum. Students also cited a poor location and confusion on whether they would pay for a building that won't be completed until they graduate. (For the record, the fee would only be applied when the building is open to students)

A redesigned proposal for a student building was created in 2012. Extensive student input was collected though conferences, committees, and online feedback surveys. This building would now be located between the Grad House and RCH. A report was created which outlined the feedback collected, and a detailed outline of all the space in the building. The four story building would feature a food and social hub, the second floor dedicated to Feds offices and services offices. The third floor features group and silent study, and a business centre. The top floor would be dedicated to clubs, with office space, bookable meeting space, and social space.

The proposal was brought forward by a Feds presidential candidate in 2013 and 2014, however both times he failed to gather the most votes. His opponents chose to focus on other areas, and there was little progress made towards addressing the student space crunch. This year, Feds president candidate Chris Lolas and Team Gold are proposing to put a new student building to a referendum to get a final word on if students want a new student building.

Student space has also been allocated in parts of buildings through a student fee. Most recently, Engineering 5 was partially funded by a $1 million donation from the Waterloo Engineering Endowment Fund (WEEF). That donation was matched by the Dean of Engineering, and again by the University for a total of $4 million. The total cost for the 176,000 square foot building was $55 million.

Being an endowment, WEEF usually only donates the funds generated by interest to student projects, but an exception was made for this Engineering 5. The WEEF principal is funded by an optional $75 fee for engineering students. The justification behind the WEEF donation was that Engineering 5 would feature the Sedra Student Design Centre. Prior to the creation of this space, engineering design teams were spread across very cramped rooms mostly in Engineering 3.

The Dean of Engineering is requesting a similar $1 million donation from students for the construction of Engineering 7. E7 will be connected to E5 at every floor, and be located between E5 and E6. Student space will include a second engineering C&D shop, lounge, large study space, an expanded student machine shop and a 2 story areal test space. Each floor will also feature storage space for capstone design projects. The key feature of Engineering 7 will be the Engineering Ideas Clinic™, an experimentation and re-engineering space where students can build and test new ideas. The building will also feature a large atrium and an event space with a stage for pitches or performances.

The $25 fee for the $88 million building will begin when the building is complete, and is expected to last 4-5 years until the $1 million contribution is fulfilled. More details on the building will likely be released in the upcoming weeks, and the B-Soc referendum on E7 will be held on March 11th to 14th.

The current proposals for E7 and a new student building are just the latest in a long history of students taking action to fund projects that benefit them. I encourage you to research the projects and determine if they will indeed benefit students, and are worth the investment of significant student funds.

Sources for more information:

Please refer to *http://iwarrior.uwaterloo.ca/2015/01/28/30337/* for citations.

Oil Plunge Bad News for Canadian Resource-Dependent Economy

ELIZABETH SALSBERG
2T NANOTECHNOLOGY

Been to the gas station recently? Notice anything funny? Maybe it's that gas prices haven't been below $0.90/L in the past, I don't know, 6 years. This looks good, as many of us purchase gas everyday and saving money is great. But the sudden fall in oil prices is not good for the Canadian economy as a whole as we try to climb out of what has now been several years of recession.

Alberta, Canada's most prosperous province of late, is struggling, and the rest of the country has been following suit. Oil has been the most precious commodity keeping us afloat and now prices have plunged.

Though there is unquestionably a large amount of oil in Northern Alberta, it is not of the same quality as that found in Middle Eastern countries. Overseas, the quality of oil is such that it is much cheaper to extract then most places in North America. In Northern Alberta, drilling projects cost companies a significant amount to put in place. The economic viability of these projects is thoroughly assessed before beginning the project, and in many cases extraction of the oil may simply not be worth it. Another problem with Alberta crude oil is that it is very bitumen-heavy, unlike most Middle Eastern oil. Extracted Alberta oil is more expensive to refine, which drives up the cost per barrel of oil even more. Nevertheless, the world's dependence on oil thus far has been such that our worse-quality crude was still extremely profitable.

Until now. The theory goes that the emergence of shale oil gas as an energy source has OPEC (Organization of the Petroleum Exporting Countries) oil producers, and in particular Saudi Arabia, a little worried. By wildly decreasing oil prices, shale projects and more expensive drilling projects in North America become economically unviable. How can they afford to do this? Yes, Middle Eastern oil is of higher quality and cheaper to extract. But they have other costs as well. It looks as though Saudi Arabia has conserved enough funds from when prices were high that they can afford to produce at such a low price, driving out other non-OPEC and North American players like Canada. The question now becomes, how long they can sustain producing at such low prices before their economy suffers too?

By this theory, high oil prices should come back. Maybe not for a while, but they should come back. Nevertheless, right now jobs are being lost—employees are being let go left and right. Alberta has taken a hit, and the Canadian economy is definitely suffering more then it has in the past few years.

Even if this is temporary, which it very likely is, the recent drop in oil prices highlights Canada's ridiculous dependence on natural resources. Stephen Harper, take the fluff out of your ears. Oil is not everything. We need to diversify our economy so that when one commodity suffers, the whole country isn't thrown overboard. The manufacturing sectors in Ontario and Quebec have been in decline since everything is now made in China. In addition, long, drawn-out battles on pipelines such as Keystone and Enbridge's Northern Gateway have not helped. We need to shift towards a service-based economy, which will create more jobs, and to invest more money in research and innovation. American companies like Facebook, Google, etc. may have offices in Canada, but their research and development offices are based in the United States. In the long run, clawing funding away from research is just clawing away jobs.

This is not to say that we should not continue to take advantage of the oil sands. It just means that we should explore other, more sustainable opportunities to create jobs and support our economy.

New York Bans Fracking Statewide

JESSICA KEUNG
2N CIVIL

In recent years, hydraulic shale fracturing, also known as fracking, has stimulated a boom in the American oil and gas drilling industry. Fracking is a well-stimulated technique in which rock is fractured by hydraulically pressurized liquid composed of water, proppants (usually sand) and chemicals. This slurry of fracking fluids and proppant is injected at high pressures into holes bored into the ground to create cracks in the deep-rock formation to allow the gas to flow.

Though this relatively new technology presents new energy resources for the ever growing population of the United states, many people are weary of fracking's effect on the environment and worried about the impact on the health of surrounding communities.

In December 2014, Governor Andrew M. Cuomo passed the ban on fracking in New York state. Many towns and cities within the state had already independently passed bans on fracking. The city of Dryden ruled it legal for towns to use zoning ordinances to ban fracking but with this state wide ban, fracking projects have to move to neighbouring Pennsylvania and West Virginia.

New York's ban on hydraulic fracturing practices started in a small upstate town called Dryden, with a population of 14 500. This small town was the target for many gas drilling projects even within town limits. The Dryden Resource Awareness Coalition was established in spring of 2009 by the residents of Dryden were worried about the effects of hydraulic fracturing on the community and neighbourhood. The following year, the DRAC collected signatures to petition for ordinances against the gas drilling projects. These projects require heavy industrial equipment such as heavy drill pads, miles of trucks and noisy equipment into the night. The volatile organic compounds from the fracking sites diminished the town's air quality by increasing the ozone levels. In September of 2011, Anschutz Exploration Corporation sued the Town of Dryden and tried to force the town to accept industrial gas drilling within town limits. But in February of 2012, the New York Supreme Court ruled in favour of Dryden and proved that courts would rule that localities can retain their ability to regulate land use, which also includes prohibiting industrial activities such as gas development in the communities.

Recently, the New York Department of Health released a report that covers the effects of high volume hydraulic fracturing exposure on humans through contaminants in air or water, naturally occurring radiological materials that result from fracking, and the effects of fracking operations such as traffic, noise and social changes in communities.

The New York Department of Health reports that fracking operations:

- Are impacting people's respiratory health due to the increased levels of particulate matter, diesel exhaust and volatile organic chemicals;

- Methane and other volatile organic chemicals are released into the atmosphere, affecting climate change;

- Drinking water is impacted from underground migration of methane and fracking chemicals associated with faulty well construction;

- Surface spills potentially resulting in soil and water contamination;

- Recent evidence from studies in Ohio and Oklahoma suggest that high volume hydraulic fracturing can contribute to the induction of earthquakes during fracturing;

- Increased vehicle traffic, road damage, noise, odor complaints;

- Increased demand for housing, medical care, and stress.

The first state to outlaw fracking was Vermont in 2012 and the practice is also banned in Hawaii. Even in Texas, a small town called Denton voted to ban fracking in November of 2014. Many other grassroots movements in Ohio, California, and other cities across America have been working to severely limit hydraulic fracturing in cities and towns. With fracking technology becoming more wide spread and the United States' growing demand for energy resources, more and more states have been implementing the hydraulic fracturing in order to meet their energy demands. Fracking is a relatively new technology and it is imperative that regulation on its practices and monitoring be increased, and to ensure proper installation of the equipment to reduce adverse environmental impact as much as possible.

Prof Personalities: Dr. Steven Forsey

Ashlyn Low

Professor Steven Forsey in his natural environment.

ASHLYN LOW
1B NANOTECHNOLOGY

Dr. Steven Forsey has been a member of the University of Waterloo family for many years. He began his career here in 1979 as an undergraduate student, and ultimately chose to pursue his Master's and PhD degrees here as well. He is now a lecturer for organic chemistry for both the science and engineering faculties.

This month, the Iron Warrior took some time to get to know our favourite organic chemistry professor a little more personally.

Here's what he had to say:

Why did you choose to study chemistry and pursue graduate studies?

Like everybody, I didn't know what I wanted to do. For my undergrad I majored in biology for two years, but then I switched into chemistry, because that's what I did best in, and I enjoyed it. During my undergrad I was only in the regular stream, but I started working for professors who were doing research for antibiotics. So when I graduated, I decided to do my masters in synthetic organic chemistry, which was natural product synthesis. The drug that I synthesized during my masters was an anti-cancer agent, and it is still used today, although not extensively. I then decided to do a PhD in Earth Sciences in groundwater contamination, using chemical oxidants to remediate ground water.

Why did you choose to become a professor?

It's kind of funny; for me, doors just opened at the right time. As I was finishing off my masters, a job came up to run the first year chemistry labs, and at that time my wife was expecting our first child, so I needed a job. I did that for a number of years, and at the same time I was also lecturing organic chemistry for chemical and systems design engineering, and CHEM 226. I remember I would come in during Christmas and weekends and summer to do research or take day courses as well. Then, as I was finishing off my PhD, the full time lecturing position became open for organic chemistry, so I was lucky to get that position as well. And I like teaching too of course; it fits my personality.

What would you be if you weren't a professor?

I was going to go into consulting, but if I did my whole lifestyle would have changed. I mean, who can beat riding to work every day, since I only live about 4 km away? If I went into consulting I would probably have had to move, but it would have been a lot of fun as well. I still work with people from civil engineering and earth sciences though, so when they have a subject or topic that has a lot of chemistry I go on their PhD committees and work with the grad students.

What's the best part about being a professor?

My research now is focused on educational research, and what's nice about that is I don't have to worry about publishing or writing grant proposals. So for me it's great because I can put all my efforts into teaching, and that's why you guys have gotten so much like your course notes and other online resources (i.e. Top Hat Monocle). Aside from being a lecturer, I'm also on undergraduate and curriculum committees, and I help the department run smoothly.

What is most challenging about being a professor?

I wouldn't say it is challenging, I would say it is interesting. You do have to deal with individual personalities and attitudes, but I don't find that too challenging, because I'm a very easy-go-lucky person so I can deal with that, and I think all the rules are set out clearly already. With the Nano class I've never experienced anything like that - they are always really good students.

The challenge right now, I would say, is trying to make the classroom a learning experience. At university, I would say 80% of the learning is done outside of the class, whereas in high school, not so much, and so that's the big transition. When I was younger, you went to class just to get notes, and now still, not much of that has changed. But the way that I lecture is I try to have more questions ready and try to get people to read ahead and come a little bit prepared, and actually think and learn during class, so that when they go home and do the majority of the learning they have a good base. So I would say that's the challenge, to make the classroom a learning experience as opposed to just writing notes down.

Can you describe your teaching philosophy and the reasoning behind it?

I used to teach the traditional way of just simply lecturing while the students took down notes, and it's boring for me! All you are doing is just repeating the same stuff, and you are not engaging with the students.

So by asking more questions and getting them to do more practice questions in class, you are engaging the students, and you are getting to know what they do know and what they don't know. Also, this way, the students themselves become more self-aware. If I ask a question and they don't know, well hopefully they say, "I better learn this." As opposed to if I was just up there explaining it, they go "Oh yeah, I get that," but when they go home and try to do a question, do they really know it? So hopefully in my class they are getting that feedback, whether or not they are keeping up with the course.

What strategies did you use to be successful in university?

For me, the big turning point was in 2A, because when you start getting into second and third year, you have no background in most of the courses you are taking. So you have to really become more efficient in your study.

What really worked for me was making study notes, and not really doing sample problems. I got really good at it in my 2B and 3A years, where you spend all your time trying to understand the concepts. So making study notes, condensing the whole course into two or three pages, and then once you understand the concepts, if you have time, and that's a big if, then do sample problems. Because if you do sample problems first, and then you have to look at the answer, you actually haven't learned anything. If you had to see if your answer was right, and you look at it and go, "Oh I wasn't quite right, but oh ok, now I understand," well you don't. You only know it if, the next day, or two days later, you try the same question and you get it right. So if you spend all your time trying to understand first, then you are much more efficient.

What do you like to do for fun?

Bike. For me, I'm busy; aside from lecturing I'm also involved with writing a textbook, and all the committees and that, so I have my dog, and my dog runs beside me while I go biking. And I bike all year round, even to work.

I used to play a lot of squash, but I just don't seem to have the time anymore. I also play guitar with a band every Friday night.

Do you have any advice for your students?

You will find that as you go through life, doors open, and if you are there at the right time you just slip through. With your first co-op, you may end up being dragged into a field that you may not have thought you would have liked, but as you get to learn more and more, it becomes more and more interesting. And then you start becoming more knowledgeable and becoming the expert in that field, and all of a sudden, you're here, wherever here is. Whereas when you started you never would have thought you would be doing this. That's basically what happened to me. So just know that sometimes life has a funny way of working itself out.

Point Vs. Counterpoint

Should the 7D/7E bus routes be removed?

POINT

YIGE TONG
3N PLANNING

Yes, the 7D/E buses to UW are being eliminated in September 2015. No, it won't be the end of the world.

The change is a part of a total overhaul of the GRT bus system, moving from a "hub-and-spoke" model to a connective grid network. This process involves deleting overlapping routes and straightening others to travel along the quickest path. Buses removed from redundant routes will be reallocated to make the redesigned network more frequent. In addition, iXpress service will be introduced along major corridors.

In the University area, routes 7D/E will be deleted in favour of more frequent service on the 200 iXpress and 7C Conestoga Mall (which will be renumbered to route 7). Other east-west routes along University Avenue and Columbia Street, such as the 92 University Loop, may also get more buses.

Sure, it's a tough pill to swallow for many riders. Some will have to transfer to get to class and the west side of Ring Road will lose the 7D service, its only regular bus route.

But the current design of route 7 no longer works – its long and complex route design of six branches (7A to F) is not only confusing for new and seasoned riders alike, but also present operational complications for GRT as well. Traffic delays on one end of the route can cause buses to "bunch up", causing significant delays and overcrowding on the other end.

The change will simplify route 7 into one branch along King (the current 7C), which will run every 7.5 minutes during weekdays. This change is designed to increase passenger legibility (make the route easier to understand for riders) and operational reliability (fewer late buses). It's a win-win for everyone. So what's the problem here?

The first concern is the loss of direct, "one-seat" ride between the King, University and Columbia corridors. Opponents of the service change claim that additional transfers will inconvenience riders and increase travel time. In reality, however, the opposite is true. More frequent service will reduce wait and transfer time – which means that rather than waiting for up to 30 minutes for the 7D to take you from Uptown to South Campus Hall (and it's always late), you would get home much faster by taking the first bus that arrives, get off at University and King and transferring to a different bus. Frequency also provides freedom – rather than scheduling daily errands around a half-hourly bus route, riders will have the liberty to leave any time of the day and a bus will come every 7.5 minutes, guaranteed.

Much resistance to the loss of one-seat rides is psychological. Riders don't feel comfortable waiting in the cold or are afraid of missing the connections. This may be a result of lack of proper information and poor physical surroundings at transfer points as well. However, things like better maps and signage, real-time information displays, heated shelters and a better pedestrian environment overall may significantly reduce those psychological stress for connecting passengers. Trip planning tools such as Google Maps and the EasyGO app, which uses GRT's GTFS and real-time GPS data, will further enhance the transferring experience.

The second concern is the loss of bus service on the west side of Ring Road. The majority of these riders are going to and from classes at Environment and Science buildings, the Student Life Centre, and University Colleges (the 7D also serves many first- and upper- year residences but those students are unlikely to be frequent users and therefore will not be impacted as much).

However, increase in ridership on routes like the 201 and 202 iXpress shows that students are willing to walk longer to take advantage of more frequent, reliable services. In fact, 7 out of 11 routes serving UW don't travel into the campus, and thousands of students already make those walks to and from Davis Centre, Seagram, or B.C. Matthews Hall. Reallocating buses from the 7D/E service to these east-west corridor routes will reduce wait times and provide a faster trip for a much larger portion of students.

Even if the 7D service is lost, most of the west side of campus is within 450m (a 5 min walk) to a bus stop and 600m (7 min walk) to an iXpress stop. There are also many indoor walking routes on campus, including bridges and underground passages, which may offer better walking experience during cold or rainy days. Late Night Loop and UW Campus Shuttle are also available after dark for those who feel uncomfortable walking on campus at night.

The bottom line? GRT is not making these changes to inconvenience us – nothing could be far from the truth. The new GRT network will allocate buses more efficiently throughout the city, reducing wait and transfer times, and improve overall travel experience for all riders. It will also integrate with the ION light rail transit service in 2017, making travelling around by transit more convenient than ever.

That is not to say, though, that riders shouldn't be concerned either. Many students have raised valid concerns over accessibility, overcrowding and unreliable bus connections. GRT needs to make sure (and convince riders) that transfer experience at University and King will as smooth as possible, and that parallel routes will have enough capacity to handle the increased ridership. And it is also the responsibility of riders to make sure their concerns are heard by GRT, by becoming involved in the public consultation process.

This is also a perfect opportunity for our school to reflect on the state of campus infrastructure. Both outdoor and indoor walking routes should be enhanced with clear wayfinding signs, proper lighting and better security. UW may want to explore the option of providing its own shuttle bus service on the west side of Ring Road and residences to connect with the ION light rail in 2017.

GRT is evolving to serve us better. Are you willing to give it a try?

Heather Davidson

COUNTERPOINT

CAITLIN MCLAREN
3A CHEMICAL

GRT is considering changing its service for 2015, to prepare for the new ION Light Rail that is currently under construction. GRT bills this as a "2015 Grand River Transit Service Improvement Plan." However, as it stands, the changes are not likely to improve service at all.

In the first place, this is the 2015 plan, to take effect on September 7, 2015. However, the ION Light Rail service is not scheduled to start until 2017; and of course, this is subject to delay. While GRT argues that certain routes are made redundant by the introduction of the Light Rail, eliminating certain bus routes for that reason before the Light Rail is completed makes no sense.

GRT also suggests that passengers affected by the cancellation of the 7D/E could use the 200 iXpress instead, which would also be made more frequent. However, the entire point of the iXpress is that it travels directly and does not stop often. This will not be good for University of Waterloo students who use the 7D/E to get to campus. The 7D/E stops frequently and is less direct, which is admittedly inefficient - for someone who wants to travel from one end to the other. However, most students who live in the affected areas will actually find themselves living further from the nearest bus stop if they are forced to rely on the iXpress. This will make total travel time longer.

GRT is also considering re-aligning Route 8 to run, in part, along the current route of the 7A, which in this option would be eliminated. Franklin St, which is currently served by the 8 would be picked up by the 23. The logic behind this change is that Route 8 would be more direct. However, this also means more connections. The change is also completely pointless, because it provides no new coverage and is not even more efficient, given that the "more direct" 8 would only replace the current 7A, and those previously served would need to transfer. Furthermore, there is already a fast and direct route that runs between Fairview Terminal and Charles Street Terminal - the 200 iXpress, which is not scheduled to be changed.

Buses are not highways. University of Waterloo students take the bus for the most part because the majority of us do not own cars. Streamlining the routes will maybe make travel more efficient for people who live near the streamlined routes, but others will be left without convenient service. Direct routing is for the iXpress. The other routes should cover a wide area. Passengers want to be picked up near their homes and deposited near their destination, without numerous transfers and long walks.

The ION Light Rail is a very good investment that will definitely improve transit in Kitchener-Waterloo and the Region in general. However, there is no reason to change the current, perfectly adequate bus service two years before the Light Rail is complete. Secondly, the proposed changes are unnecessary, redundant, and miss the entire point of having a widespread bus service.

When the Light Rail is complete, it will certainly render some bus routes redundant. Some routes should probably be eliminated, and others adjusted. But to anticipate the arrival of the rail by gratuitously shifting the bus routes so that they render each other redundant is just silly.

Leafy Thoughts:

Engineers Doing Awesome Things for the Environment

NINA FENG
3B ENVIRONMENTAL

LEAFY THOUGHTS

…And we're back! Welcome to the first Leafy Thoughts article in over two terms. Here's to hoping that I haven't yet run out of ideas. In any case, I'm back to beat the proverbial horse until it's more dead than the dodo bird, or else until graduation.

I'm going to take a break from environmental news this week to talk about something that's been a bit of a bothersome pet peeve of mine for years now, but more so since the start of 1A. This concerns the attitude of many of my engineering peers towards concepts like "protecting the environment" and "sustainability." Efforts will be taken to prevent the tone from delving beyond mildly infuriated.

Ever since my first term, an alarming number of my friends in other engineering disciplines have expressed an annoyance at the concept of environmental sustainability. They've scoffed at the topic, and have proudly admitted to not caring about the environment, AT ALL. I mean, I'm not asking for y'all to carry around reusable grocery bags, or install low-flow showerheads, or refrain from littering (though it'd be cool if you did). I just think that an attitude like that is a little bit alarming for people with responsibilities like ours. I lose a smidgen of trust in the work of everyone that says things like that. Now I know a lot of people are going to say #NotAllEngineers, and it's more than likely that I'm zeroing in on a small minority here, but it's time I address it anyway. This is for those that do happen to fall in that category.

We're studying engineering, which by (Google's) definition involves the use of science and technology in order to design, build and use engines, machines, and structures, among other things. Engineering is a sacred and important profession. In Ontario and elsewhere around the world, being an engineer is not a goal easily obtained, nor a title wielded by those who are unqualified. In fact, we as students are not legally allowed to call ourselves "engineers" until we've been licensed by the PEO or other jurisdictional regulating body. Like doctors and lawyers, our work can directly affect the safety, quality of life, and well-being of the public, and we are therefore held to a higher standard of conduct. The Professional Engineers Act of Ontario is a statutory mandate requiring us to follow a Code of Ethics in our work. We wear the Iron Ring as a constant reminder of our duty and responsibility to the public. It is for this reason that, in my very humble and possibly idealistic opinion, the ultimate goal of engineering is to ensure a better quality of life for present and future generations.

I can imagine where the nay-sayers are coming from though. It's easier to make cool shtuff if you don't have to think about the environment. More importantly: you make money faster making cool shtuff without thinking about the environment. There's no doubt that environmental stewardship costs time and money. I just think that it should be treated as something worth investing in, and not a necessary evil imposed upon us by the government, influenced by hippies. Furthermore, they can definitely argue that we have, in fact, been designing with sustainability in mind. Maybe we just haven't yet gotten to the point where it's perfect, but we've been trying. It's definitely true that we have certainly come a long way already, and I'm neither discrediting nor overlooking that fact. Our cars are many times more fuel efficient than those of previous decades, we've figured out how to get energy from much cleaner and more renewable sources, and there's been some great leaps with sustainable building design. It's pretty badass, and shouldn't be ignored. However, I can't help but wonder if, had our priorities been different, we'd already be much farther along. For example, the Sun is an indispensable, constant, and rich source of energy. It's not set to die for billions of years, and it's the source of all life and energy on Earth. Despite this, our ability to harness its power and convert to electricity is still inefficient and underdeveloped. This is largely due to the availability, cheapness, and convenience of dirtier, fossil fuels. The funding for research into other topics may be hard to come by. Why bother with sunlight if coal is so much easier to obtain?

By putting environmental protection low on the list of priorities in favour of monetary gain, our short-sighted, capitalist society is hindering the development of more sustainable and innovative technology. The electric vehicle has been in development since the early 1800s, yet the Tesla Roadster, in 2008, was the first highway-capable all-electric vehicle with a range of its class. For some perspective: the Wright brothers had their first flight in 1907, and less than 70 years later Neil Armstrong step foot on the Moon. Humans have proven more than capable of accomplishing seemingly impossible tasks if we are willing to spend the money and effort. The problem? Companies are comfortable where they are right now, and are still raking in the dough. While some steps have been taken to design for the future, it's not nearly at the top of the list. I fear that only with a catastrophic blow to the oil industry will companies scramble to design vehicles that use other types of fuel. Elon Musk himself expressed surprise that the rise of electric vehicles hadn't occurred sooner, especially since, 7 years after the Roadster's release, no other major automotive company has come out with a comparable vehicle. This was the driving force (pun intended) behind his decision to release their patents: to help pave the road (again, pun intended) towards a non-hydrocarbon-based transportation infrastructure. Without a present need and demand, initiatives like these are much less likely to succeed because fewer engineers will be working on them.

Engineers are the key to the future. It is our innovations that will define the next centuries or millennia, or as long as our species endures. What other group of people will bring the flying cars of sci-fi to life? If any Earthling ever wished to have a functional Millennium Falcon, look to future engineers to accomplish that feat. Why then, is the concept of environmental preservation oftentimes sneered at so derisively? Is sustainability not an important factor in the long-term feasibility of a project? We're creative, and always looking for the next direction to move. And when we design things, we're taught to look for every potential point of failure, and reinforce things until they're as safe as could practically be. We incorporate large factors of safety into our final designs. When the right components were unavailable to past engineers, they researched and developed solutions to suit their needs. Like Newton inventing Calculus to support theories, engineers have had a hand in creating new software, new tools, and new materials to make their craft easier. Hell, computers were huge hulking monstrosities that only performed basic calculations less than a century ago. Designing something with care taken to minimize environmental impact isn't all that different, but it's treated as a huge inconvenience. There is often so much hate for the "Environmental Division" of corporations, from the automotive industry to petroleum refinery, and even to government organizations. Responsibly using resources and not leaving messes are kindergarten concepts, yet there are too many who hate dealing with that kind of thing. This is simply not a healthy attitude to have in a profession like ours.

Tech Ethics

The Interview leaks, and Sony attempts to bring back SOPA

FILZAH NASIR
3B ENVIRONMENTAL

TECH ETHICS

Most of you have probably heard about the cyberattacks on Sony Entertainment and the controversy surrounding the release of the Sony film The Interview, about an assassination attempt on North Korean leader Kim Jong-Un. But while the controversial film has sparked debate and thus become the center of media attention, the cyberattacks leaked a significant amount of information about Sony, from emails of top executives, to salary information, and the personal information (such as passport numbers, credit card numbers, bank information, etc.) of Sony employees. When any major corporation faces a security breach of this level, shocking information about the company's involvement in activities which they intended to keep hidden from the public are to be expected. In Sony's case the (literal) Goliath of the leaks was Sony along with 5 other major entertainment companies (Fox, Universal, Paramount, Disney and Warner Bros.), and the Motion Picture Association of America (MPAA) have been engaged in a yearlong campaign to strengthen piracy laws and to justify many of the proposals made in the 2011 Stop Online Piracy Act (SOPA) under current law.

Most of us probably remember SOPA as an act which aimed to prevent online piracy through the limit of internet freedoms. The act caused a significant amount of controversy, and was eventually defeated at least in part by a coordinated grassroots public campaign. Despite SOPA's defeat, it's not exactly surprising that entertainment companies such as Sony and Disney would try to bring it back in some form or another, given the extensive lobbying they engaged in when SOPA was originally being discussed in Congress.

Although most of the resistance against measures such as SOPA seem to be grounded on the principles of internet freedoms, the goals of companies such as Sony and Hollywood as a whole through the MPAA have more to do with copyright rights than in limiting internet freedoms.

Copyright laws are a subset of intellectual property rights which were created with the intention of providing a balance between distributing content for public use and for public enjoyment, while ensuring that creators get fair compensation for that distribution. Despite their initial purpose, over the last 150 years or so, intellectual property laws have evolved away from protecting the rights of creators and towards protecting the right of multi-million dollar corporations such as Sony, in the case of the entertainment industry. These laws limit access to information and knowledge to only those who can afford to pay for said access, thereby hurting the poorest and most vulnerable members of society. This lack of access to information is a significant barrier to people seeking to change their lives.

In addition to adversely affecting the poorest people in society, intellectual property rights when applied to areas such as scientific research hurt progress by limiting access to previous knowledge. Innovation in any field or area requires previous work in that area to be readily available to those looking to innovate. By limiting this knowledge to a select group we limit the pool of people with the ability to innovate and thus, hamper human progress as a whole.

The evolution of intellectual property rights towards serving corporate interests does not seem to be slowing down. In 2013, the U.S. Supreme Court ruled that human genes could not be patented after a pharmaceutical company attempted to patent two isolated genes which have been linked to high risk of breast cancer for women. Had the company been successful in patenting the genes, they would have held the sole rights to testing for the genes and could have legally refused to test for the genes in anyone who was not able to pay for them. Although the Supreme Court ruled against this measure, the case paints a fair picture of how far intellectual property rights have evolved towards corporate interests. Already they can be used to patent human genes and impede people's access to potentially life-saving healthcare.

Efforts have been made to curb the strengthening of these laws, such as the massive resistance against SOPA in 2011 and finding alternative ways to distribute content. The most notable of which is Creative Commons, a license which can be used alongside existing copyright laws to make content part of the public domain while still allowing the creator to control certain aspects of how that content is used. But alternative licensing practices cannot fix the problems of a legal framework which within its current framework hampers creativity and hurts progress. Revising copyright laws and an overhaul of the legal framework which dictate intellectual property rights are essential to fixing a system that currently exists to serve corporate interests. Of course, first we have to stop Sony, Disney & co. from taking us back to 2011.

On the way to guilt-free eating?

BRYAN MAILLOUX
1B MECHATRONICS

This past month, scientists have made a medical breakthrough that could completely change the weight-loss industry. Researchers at the Salk Institute in California studied the effects of the molecule fexaramine on lab mice and found that it was successful not only in reducing obesity, but also in reducing insulin resistance. The molecule also promotes the conversion of unhealthy "white fat" into less harmful "brown fat". The scientists' findings were published in Nature Medicine on January 5.

Fexaramine triggers a specific chemical receptor in the gut that is normally activated when a person is eating. This receptor triggers automatic responses from the body that are meant to accommodate the intake of food. These responses include burning of calories and increasing liver function. The idea behind the use of this drug is that it could be used to simulate a meal, provoking the weight-loss benefits of eating a meal, without the person actually consuming calories.

Fexaramine also improves the responsiveness of insulin, which breaks down glucose in the blood. Based on this effect, the researchers hope this drug could also produce a breakthrough in the treatment of Type II diabetes, caused by insulin no longer having an effect in the body and a corresponding increase in the amount of blood glucose. Type II diabetes can lead to increased risk of heart disease, high blood pressure and kidney disease, and often is complementary to obesity. In Canada, about 9% of the population is diagnosed with the disease. As such, having a more effective way to treat diabetes is a top concern for researchers.

The most important benefit of fexaramine compared to other weight-loss drugs currently on the market is that it does not pass into the bloodstream. While the physiology of mice is similar enough to humans to use them as test animals, molecules proven to work in mice might still be ineffective in humans, so fexaramine might still not be the "miracle pill" companies seem to constantly be advertising. The Salk Institute says that human trials would likely not begin for another one to two years, and reaching a safe, commercially viable pill could take even longer, assuming the drug works at all in humans. Nevertheless, it remains a promising solution to the ever-growing problem of obesity.

An abundance of honestly sweet potatoes

JOANNA LIU
1B CHEMICAL ENGINEERING

Did you have fries yesterday, or poutine? Did you eat some form of the common potato, or see someone else eat it? Of course you have. If not, you wouldn't be in Canada, where 5lb of potatoes is nearly the cheapest thing in the supermarket.

"When it comes to potatoes, Canada has a well-earned reputation as a global leader," says Potato Canada. "With our harsh winters, temperate summers and fertile soils – it's easy to see why Canada is a world leader".

However, just across the Atlantic, in the Netherlands, it may come as a surprise that potatoes are not taken for granted as much as they are here. In the Netherlands, the ratio of fertile soil to sea water and dikes lowers considerably. Much of the soil is overwhelmed with salt, and farmers have found it hard to grow crops in them…that is, until recently.

On September 1, 2014, Dr Arjen Vos and farmer Marc van Rijsselberghe, won the international competition Securing Water for Food: A Grand Challenge for Development, chosen from 520 applications from over 90 countries.

Not too long ago, in July 2011, van Rijsselberghe and Vos harvested the first salt tolerant potatoes on Salt Farm Texel, a farm set up by the two, for the sole sake of growing salt-tolerant crops. Inspired by sea cabbage, a halophytic plant growing along the coasts of Europe, van Rijsselberghe was determined to yield similar results from potatoes. Using a natural, trial and error approach, aided by a local Dutch farmer with knowledge of thousands of potato varieties, and keeping from GM and laboratory settings, the two were successful in creating the World's first salt-tolerant potatoes.

It may come as a surprise then that these halophytic potatoes are remarkably not salty. As a matter of fact, they are remarkably sweet! "If you tease a plant with salt," said Vos, "it compensates with more sugar …. So nine times out of ten the salt is retained in the leaves of the plant."

The potatoes are now on their way to Pakistan "where thousands of hectares of what until now had been unproductive land because of sea water encroachment have been set aside for them," says Tracy McVeigh, reporter for the Guardian. "If the experiment works and the potatoes adapt to the Asian climate, it could transform the lives of not only small farmers in Pakistan and Bangladesh, where floods and sea water intrusion wipe out crops with increasing regularity, but also the 250 million people who live on salt-afflicted soil," said McVeigh.

Recently, Salt Farm Texel have also begun growing halophytic strawberries.

Among this potato craze, and Canada's seemingly endless supply of potatoes, it may come as a surprise then that the PEI Potato Board reports that "fresh potato consumption [in Canada] has tumbled about 48 per cent in the past 15 years". PEI encompasses a quarter of Canada's potato production, but abandoned farm buildings and "For Sale" signs can be found throughout the province. Over the past few years, industry officials estimate that 30 per cent of PEI farmers have left the profession.

According to Greg Donald of the PEI Potato board, "potatoes are misunderstood [in Canada]." Rather than an "obesity inducing carb," Donald hopes consumers will view them as a "low-cal, gluten-free, potassium-rich, fibre-heavy vegetable."

As Canadians, and proud supporters of Canada's own non-halophytic potatoes, we should increase our potato consumption; perhaps one day, potatoes will become the world's greatest food crop and it will be fortunate for us that Canada continues to be a world leader in potato production.

Tech Companies are Growing Lettuce in Clean Rooms

The New High-Tech Farms

DEVIKA KHOSLA
1B CHEMICAL

If climate change turns much of the arable land into desert, at least we'll still be able to have salad.

In Japan, a plant physiologist named Shigeharu Shimamura has created the world's largest indoor farm inside of a former Sony corporation semiconductor factory. The 25,000 square foot factory opened in July 2014, and is now producing 10,000 heads of lettuce per day.

Everything - temperature, humidity, irrigation - is highly controlled by computerized systems. Plants are not grown in soil, but instead given a special mixture of fertilizers and nutrients, and water directly. As a result water use is reduced to as much as 1% of the amount needed by outdoor farms. LED lights made by GE allow the farmer to regulate night-and-day cycles and to promote optimal plant growth by setting the specific wavelengths of light. LEDs last longer and are up to 40% more efficient than fluorescent lights, which helps reduce the cost of electricity. According to Shimamura, lettuce in the farm matures two and a half times faster than it would on a regular farm, and only has 10% food waste, a reduction from the 50% food waste of a conventional farm.

The indoor facility isn't unique though. Fujitsu, Toshiba, Panasonic, and Sharp have all opened factories of their own. Fujitsu grows lettuce in a former chip factory in Fukushima, Japan (60 miles from the site of the nuclear leak). Similarly, Toshiba has turned a former floppy disk factory 35 miles outside of Tokyo, into a farm growing a variety of leafy greens, including endive, spinach, and of course lettuce among other things. In Singapore, Panasonic has started growing Japanese vegetables that normally couldn't survive in Singapore's tropical climate inside of a factory, and in Dubai, Sharp has opened a strawberry plant.

While it may seem a leap to go from computer chips to lettuce, in effect the companies already produce much of the technology needed for the farms. For example, Toshiba makes the lighting, power generation equipment, water disinfection technology, and even the tablets that the workers use to control the systems. Likewise, Sharp produces the LED's, and equipment for monitoring air quality, temperature and humidity in its farm, and Fujitsu uses proprietary cloud computing software to manage the computerized control systems.

Even the clean room environment is beneficial, as it essentially eliminates the need for pesticides. The vegetables are free of bugs, contaminants, and even bacteria. Lettuce grown in a clean room can last up to two months with proper refrigeration.

With precise control of the systems, crops can be fine-tuned: Fujitsu specially grows lettuce to have low potassium; about 100 micrograms as opposed to the 490 micrograms that lettuce usually has, making it accessible to people with chronic kidney disease who cannot tolerate much potassium.

Currently, the vegetables are a little more expensive than the standard farmed vegetables; however with expansion they could become significantly cheaper. For instance, Fujitsu's lettuce costs about $1 more than standard lettuce. Essentially, the costs of opening a factory along with the costs associated with running it (including electricity and synthetic pollination) drive up the price.

While the industry is currently quite small, it is expanding rapidly. Panasonic set a goal of producing 5% of locally produced vegetables in Singapore by 2017. It may not be the end of the world's food supply problems, but it is definitely a step in the right direction, towards healthy, sustainable, and energy efficient food production. With climate change becoming an increasing concern, indoor farms may be the way of the future.

The Beginning of the End

What's Coming Up in my Last Term as President

ALLYSON FRANCIS
PRESIDENT

Welcome back everyone! The time has come for us to begin our final term as exec, and search for a new set of leaders to bring the Society forward for the rest of 2015! But before the term is over, I've revised my original work plan to ensure that I close out all my platform points before my time as president runs out.

As an exec team, we're continuing our initiative of reaching out directly to our diverse student members through dedicated face time with the entire exec team once a week at Fridays at 12:30 in the CPH Foyer. I strongly encourage anyone with concerns, ideas, criticisms, or questions to come chat with us! Even if you don't have anything specific to discuss, we will have questions and discussion topics prepared which are relevant to current student affairs, to help in connecting students to the decisions and discussions happening around them.

We are also continuing the push to make the Engineering Society more useful for the average student by increasing and improving meaningful services and events. Our workshop offerings have increased significantly since our last term, which is a great success indicator! We look forward to your feedback and opinions on what you like about the current offerings and what other areas we might explore in the future to help students gain useful skills outside of an academic setting. I also am looking into offering engineering-specific help sessions in collaboration with the Student Success Office's Success Coaches, to bring useful personal development tips and study skills to engineering students in the comfort of our own lecture halls. Sessions are expected to start as midterms approach, so keep an eye out!

Another area of my portfolio that I am hoping to dedicate lots of time to this term is advocacy. Last term I initiated a conversation with the SSO and Office of the Registrar regarding the process of petitioning an academic decision in the Faculty of Engineering. I did this in the hopes of streamlining the process between departments, so that all students have access to available resources and information to best prepare their petition cases. This initiative is progressing nicely, with updates to follow as things are finalized! I also have been closely following the issue of a new scheduling software that may impact the way engineering departments schedule their cohort times and locations. I have been meeting with all relevant parties to try to better understand how this new software compares to the old system and what issues may present themselves with a cohort-based program like engineering. A survey is likely to be sent out in the near future to gather information on what students think of the current availability of CSEs and options within the engineering course calendar, and to see how this feedback compares to the preference of having lectures in departments' home space and in tightly scheduled blocks of lectures, tutorials, and labs.

There is much more on the horizon, but that information will come in the next issue, as I've already run out of space! As always, I can be reached at *president.b@engsoc.uwaterloo.ca* anytime, and would love to hear from you. Also, if you're interested in becoming more involved in the discussion and decisions surrounding engineering students, make sure you come out to the next Engineering Society Council meeting on January 28th at 5:30pm in the E5 LiveLink Room (3101). All are welcome, and I look forward to seeing you there!

The Importance of Community Outreach

SARAH-ROSE LANCASTER
VP-EXTERNAL

Every term the Waterloo Engineering Society decides how to spend its member fees in a way that will best benefit Waterloo Engineering students. A budget is composed, and funds are allocated to social events such as a termly trivia competition and professional development events like resume critiques. Undoubtedly these professional and social events benefit our students in numerous ways; one provides essential stress relief, the other helps our members find a co-op job. However, there is one type of event whose benefits to our constituents are not as well defined: Community outreach events. Community outreach events do not directly benefit our members, as the Engineering Society is essentially providing a service for the community instead of its constituents. Outreach events, however, have a massive effect on how Waterloo Engineering is perceived by the local Kitchener-Waterloo community, which in turn has a major effect on each one of our students.

Running good Community Outreach events allows the Waterloo Engineering Society to build up a positive rapport with organizations in the Kitchener-Waterloo area. One of the major organizations that Waterloo students routinely volunteer for is The Museum, a children's' museum in downtown Kitchener. Over the years the Engineering Society has helped The Museum with their K'NEX bridge building days for elementary students, their Open House where young children were taught the basics of science, and their Discovery Days at Waterloo Square. Through these outreach events Waterloo Engineering was given exposure to hundreds of Kitchener-Waterloo residents, which all came away with a positive feeling about how Waterloo Engineering students impact the local community. THE MUSEUM also views Waterloo Engineering students in a positive light due to these events. Having good relationships with both the residents and community organizations surrounding Waterloo is essential to each one the Society's members as it allows the Engineering Society to be taken more professionally when it comes to advocating for the needs of students. If you were to look at recent news stories, there are many examples where an Engineering school's poor community reputation has done them harm.

Community Outreach events also allows Kitchener-Waterloo residents to come and explore what Waterloo Engineering can offer them. Our annual Rube Goldberg building event (taking place in March of this year), is open to the public and is targeted towards elementary and high school students interested in Engineering. Through the Rube Goldberg event, some talented students may be compelled to come and study at the University of Waterloo, making our student body stronger.

One of my goals as VP External this term is to increase the media coverage we receive at our Community Outreach events. I will be contacting local media outlets, both print and television, to get them to cover our events, further strengthening the Engineering Society's image.

The Winter 2015 term will feature numerous opportunities to get involved in Community Outreach. In March, National Engineering Month will feature our Rube Goldberg Building, CANstruction and Charity Bus Pull events. Throughout the term, Engineering a Difference will be volunteering at various organizations in the Kitchener-Waterloo area. If you are interested in helping out at any or all of these initiatives, please email me at *vpexternal.b@engsoc.uwaterloo.ca*

Upcoming Events Calendar

Wednesday January 28	Thursday January 29	Friday January 30	Saturday January 31	Sunday February 1	Monday February 2	Tuesday Februray 3
EngPlay Auditions 17:00-19:00, POETS EngSoc Meeting #2 17:30-19:30 E5 3101	MATLAB Workshop 16:30-18:30, WEEF Lab Board Game Night 18:00-21:00	Weekly Charity Grilled Cheese and Hot Chocolate 11:30-12:30, CPH Foyer GradComm Event 12:00-02:00 AutoCAD Workshop 18:30-20:00	Ski Trip League of Legends Winter Bash 13:00-18:00, M3 1006		Coverall Day 11:30-13:30	Coverall Day 11:30-13:30 Weekly Charity Grilled Cheese and Hot Chocolate 11:30-12:30, CPH Foyer Iron Warrior Meeting 18:00-19:00, E2 2347
Wednesday February 4	**Thursday February 5**	**Friday February 6**	**Saturday February 7**	**Sunday February 8**	**Monday February 9**	**Tuesday February 10**
EngSoc Meeting #3 17:30-19:30, CPH 3607	Excel Workshop 16:30-18:30, WEEF Lab	Weekly Charity Grilled Cheese and Hot Chocolate 11:30-12:30, CPH Foyer GradComm Event 12:00-02:00				Weekly Charity Grilled Cheese and Hot Chocolate 11:30-12:30, CPH Foyer AutoDesk Inventor Workshop 17:30-19:30 Iron Warrior Meeting 18:00-19:00, E2 2347

Check out up-to-the-day event postings on the EngSoc website at engsoc.uwaterloo.ca

VP FINE Reporting for Duty!

MELISSA FERGUSON
VP FINANCE

Hey friends!! To all first years – and some fourth years – I say welcome to B-soc, and welcome back to everybody else! My name is Melissa Ferguson and I am the Vice President of Finance (VPF) of the Engineering Society B. I am in charge of overseeing how your EngSoc student fees are spent this term. I allocate money to event directors, oversee capital improvement spending, and manage the sponsorship committee that gives money to student teams on campus.

Let's start with a bit of an update from last term!! The A-soc VPF, Kevin, did a lot of great work over the Fall term. He reallocated backlogged ECIF funds so EngSoc can buy more useful capital items. We also merged some of our bank accounts to reduce the amount of bank fees spent per term. Good job, Kevin!!

One of my top goals for this term is to keep expanding and improving RidgidWare. I plan on developing a transition manual to easily train volunteers so students who want to volunteer and get involved can learn the necessary technical background easily. I am also working on getting more hardware that students need on the shelves. Finally, I am working with a team towards implementing a better inventory management system.

As far as Novelties goes, I plan on getting 2 new department patches. I have been working on a Biomedical Engineering patch design, so if you have a design for your department send it my way and we might just make it into an official patch!! I also plan on doing another order of the Tool Bearer bobble heads. In order to know what the demand is like we will be doing a pre-order at some point later this term. If you have any new design ideas for Novelties swag send me an email at *vpfinance.b@engsoc.uwaterloo.ca*!!

Finally I plan on expanding the student deals program run through EngSoc. I want to approach more stores in the plaza as well as off campus locations that are frequently visited by students. Send me an email with the places you would like to see added to the growing list of stores with EngSoc student deals!!

Coverall day will be on February 2nd and 3rd in CPH foyer. The coveralls will be sold for $90 each and for an extra $10 you can receive 3 patches from Novelties ($15 value).

EngSoc B Winter 2015 Budget Proposal

Income				
Item	**Requested**	**Proposal**	**Approved**	**Running**
Student Fees				
Estimated Student Fees	$ 56,607.85	$ 56,607.85		
Orifice				
Estimated Orifice Sales	$ 1,400.00	$ 1,400.00		
Total Income	**$ 58,007.85**	**$ 58,007.85**	**$ -**	**$ -**
Expenses				
Item	**Requested**	**Proposal**	**Approved**	**Running**
Fixed Costs				
Photocopies	$ 2,500.00	$ 2,500.00		
Telephone	$ 420.00	$ 420.00		
Postage	$ 460.00	$ 460.00		
Supplies	$ 2,000.00	$ 2,000.00		
Cable	$ 75.00	$ 75.00		
Casual Payroll	$ 5,730.00	$ 5,730.00		
Monthly Payroll	$ 13,000.00	$ 13,000.00		
Bar Services	$ 500.00	$ 500.00		
Mailchimp	$ 100.00	$ 100.00		
Iron Warrior - 1% of Student Fees	$ 566.08	$ 566.08		
ECIF - 5% of Student Fees	$ 2,830.39	$ 2,830.39		
Total Fixed Costs	**$ 28,181.47**	**$ 28,181.47**	**$ -**	**$ -**
Executive				
Exec Discretionary	$ 1,000.00	$ 1,000.00		
President	$ 1,000.00	$ 1,000.00		
VP Education	$ 500.00	$ 500.00		
VP External	$ 500.00	$ 500.00		
VP Finance	$ 500.00	$ 500.00		
VP Internal	$ 500.00	$ 500.00		
CRO	$ 200.00	$ 200.00		
Candidate Campaigns	$ 500.00	$ 500.00		
Total Executive Costs	**$ 4,700.00**	**$ 4,700.00**	**$ -**	**$ -**
Directorships				
Academic Rep Advisor	$ 206.00	$ 206.00		
Alumni Speaker Director	$ -	$ 300.00		
Arts	$ 205.00	$ 205.00		
Athletics	$ 304.98	$ 304.00		
AutoCAD	$ 26.70	$ 50.70		
AutoDesk Inventor	$ 26.70	$ 50.70		
Board Games	$ 300.00	$ 300.00		
Bus Push	$ 1,425.00	$ 1,475.00		
CANstruction	$ 150.00	$ 190.00		
Charities	$ 150.00	$ 150.00		
Course Critiques	$ 12.00	$ 12.00		
Directorship Appreciation	$ 2,000.00	$ 2,000.00		
EngHockey	$ 130.00	$ 130.00		
Enginuity	$ 140.00	$ 140.00		
EngPlay	$ 1,303.75	$ 1,303.75		
Exam Bank	$ 100.00	$ 100.00		
Food Director	$ 2,218.02	$ 2,218.35		
Frosh Mentoring	$ 85.00	$ 85.00		
Genius Bowl	$ 292.00	$ 362.00		
Hackathon	$ 522.00	$ 522.00		
Jazz Band Director	$ 675.00	$ 675.00		
LAN Parties	$ 300.00	$ 500.00		
LaTeX	$ 2.00	$ 2.00		
MAC Eng Musical	$ 500.00	$ 500.00		
Marketing	$ 30.00	$ 30.00		
Music	$ 428.40	$ 428.40		
NEM - Rube goldberg	$ 180.00	$ 180.00		
P**5	$ 15.00	$ 965.00		
Pi Day	$ 194.50	$ 389.00		
POETS Managers	$ 600.00	$ 850.00		
Resume Critiques and Interview Skills	$ -	$ -		
Semi Formal	$ 300.00	$ 300.00		
Ski Trip	$ 651.75	$ 651.75		
Sleepover in POETS	$ 35.60	$ 35.60		
Solidworks	$ 1,451.10	$ 1,452.10		
Special Events	$ 106.35	$ 106.35		
TalEng	$ 201.80	$ 202.00		
WiE	$ 600.00	$ 600.00		
Year Spirit 2015	$ 2,893.90	$ 190.00		
Year Spirit 2016	$ 200.00	$ 200.00		
Year Spirit 2017	$ 106.00	$ 106.00		
Year Spirit 2018	$ 200.00	$ 200.00		
Year Spirit 2019	$ 230.00	$ 228.48		
Total Directorship Costs	**$ 19,498.55**	**$ 18,896.18**	**$ -**	**$ -**
Total Expenses	**$ 52,380.02**	**$ 51,777.65**	**$ -**	**$ -**
Sponsorship				
Sponsorship Meeting	$ 6,500.00	$ 6,500.00		$ -
Net	**-$ 872.17**	**-$ 269.80**	**$ -**	**$ -**

The Student Portal

PARMEG KENTH
VP EDUCATION

Hey!

Welcome back. Hope everyone is having a great term. In this week's issue, I would like to inform you about the Waterloo Student Portal, developed by the Student Success Office (SSO) and the Information and Systems Technology (IST). It is a communication tool for the students at the university that centralizes content from the various Waterloo websites and databases such as Learn, Quest Jobmine etc. Some information that can be found on the portal is listed below:

- List of textbooks and reserves required for courses
- Personal Class and Exam Schedule - That's right! No need to go through the entire university schedule to find your courses!
- Real-time data of space availability in computer labs and student parking lots
- Map of routes to the next class
- Real-time GRT (This is updated frequently when the bus is on route so now you will know when the bus is delayed)
- Lists of sublets and roommates through off-campus housing

The portal will also notify students about important dates such as course add/drop period, fee payment deadlines etc. You can customize the information on your portal so it better fits your day-to-day needs.

If there are things you would like to see on the portal feel free to give your feedback. The SSO is continuously taking student feedback to enhance the design to better fit the needs of the students. The portal is mobile friendly, so you can use it on the go.

All engineering students should have access to the portal by the end of January. If you have any questions feel free to contact me on *vpeducation.b@engsoc.uwaterloo.ca*

VP-WINternal Update

MATHIEU TREMBLEY
VP INTERNAL

Hello friends! I hope the beginning of the term has been going well so far, I know I've been keeping pretty busy over the last little while and I have some updates to share with you!

The technical workshops series I've been putting together is looking really solid this term, and a couple of them have already happened during the last couple weeks! Shoutout to the Solidworks workshop directors Jason Zeng and Rahul Mehta, the LaTeX workshop director Clarisse Schneider, and a special thank you to Christian Gould, the workshops manager who's been made all these workshops run wonderfully!

There are a bunch of cool events coming up in the next couple weeks to look out for, including Board Game Night, a Ski Trip to Blue Mountain, and the League of Legends Bash. On the workshop side of things, there will be an AutoCAD workshop on Friday Jan 30th, with the rest being in March after both hell week and reading week are over. The Board Game Night will be on Thursday Jan 29th, and will (most likely) be hosted with help from the Game Institute on campus, who have hinted at the possibility of letting us test out some prototype board games, so definitely keep an eye out for that!

Cheers until next time!

List of Candidates

President
Hannah Gautreau

VP-Internal
Pallavi Hukerikar
Teresa Lumini

VP-External
Kieran Broekhoven

VP-Finance
Don Tu

VP-Education
Anson Chen

WEEF Director
Wesley Sak

Note from the editor: Candidate statements have not been edited.

A description of each EngSoc executive position can be found at engsocwp.uwaterloo.ca/?page_id=487. A description of the WEEF director's responsibilities can be found at weef.uwaterloo.ca/about.php.

Candidates for President

Hannah Gautreau for President

HANNAH GAUTREAU
3A MANAGEMENT

Hi Everyone! My Name is Hannah, and I'm running to be your next Engineering Society President! My Primary goal as President will be to bring the two societies closer together. I want to improve communication and work toward setting and accomplishing goals that will benefit the society as a whole. I plan to do this through numerous initiatives.

I want to introduce new services into the society as well as improving existing ones. If I am elected, every student will have the opportunity to purchase business cards in the orifice at a discounted price. I will also develop new professional development workshops, and continue to expand the career fair. I also want to leverage the First Year Mentoring program by using the program to run more useful events, and to change the mentor/mentee structure to further benefit the first years. I will also continue to educate students about the services that are currently available to them. In addition to this, I hope to have an ATM installed centrally within the Engineering buildings before my term is over.

My goals for representing the society heavily revolve around improving communication between the two societies. I want to work with the A-Society Executive to develop standards for how the society should be running to ensure that students are getting the most benefit from the society that they can. I want to place a large emphasis on Director, Commissioner, and Executive transition between terms to ensure that there is minimal delay in getting services up and running at the beginning of every new term. In addition to increasing collaboration between the two societies, I want to improve communication with the student body. I want to hold more informal town halls before council meetings to give students a chance to discuss motions and ask any questions that they have. I want all engineering students to feel that their voice is being heard.

If I am elected as president, I will continue our partnership with FEDS and SSO to provide new events and services to engineering students. I will liaise with the SSO to develop new workshops for Engineering students, and to make their services more accessible to engineering students. I want to work to expand FENGSOC day to include all faculties to help foster Waterloo pride.

As president, one of my goals would be to communicate with less involved students to generate new directorship ideas. I want to give all students the opportunities to implement their new ideas. I feel that this would increase involvement in the Engineering Society because it would provide meaningful leadership opportunities to all students.

The final part of my campaign is to focus on improving internal processes. I will create proper timelines and documentation so that directors and commissioners are aware of their timelines and responsibilities during the term. I want to work toward standardizing internal communication to minimize confusion so that the society as a whole is more productive. In addition to this, I want to be always looking for continuous improvement opportunities within the society.

Thank you so much for reading about my platform, if you want to read it in more detail, head over to *hannahforpresident.wix.com/hannahforpresident*. Don't forget to vote!

Candidates for VP Internal

Teresa Lumini for VP Internal

TERESA LUMINI
3A MECHANICAL

Hi, my name is Teresa Lumini and I want to be your next VP Internal! I'm in 3A Mechanical and I have a lot of ideas on how to improve our events, services, and workshops as well as tons of experience with leadership roles and management. For starters, I would like to implement a Scholarship Bank. Much like how EngSoc has an exam bank for easy access to past exams, I would like to make a list of places to find and apply for scholarships for engineers offered by more than just the university. Secondly, I would like to continue running technical workshops and to expand on them from just how to use cadding software and programming to hardware skills like soldering. I would also like to start useful professional development workshops to help students with things like how to write a resume and cover letter as well as interviewing skills to name a few. As for events, I would like to continue running cross-faculty events but not just a semi-formal. I would like to branch out cross-faculty events to things like LAN parties, sports tournaments, and coffee houses. I would like to continue to run an AV Team to help keep costs for directors who require the use of projectors and sound boards. Although I have lots of ideas on how to improve engineering services and events, I also want to hear what you think needs to change and what directorships you want to start or services you want to see from EngSoc.

I am very outgoing and have been involved with EngSoc since my 1B term and would like to take on a position of more responsibility than an EngSoc rep. I have gotten involved in a variety of activities run and not run by EngSoc such as Coffee Houses, TalEng, EngPlay, UW NanoRobotics Group, and many others. I've also taken on a few directoships such as POETS Manager, Music Director, and WEC Director for the Senior Design Competition so I have a pretty good idea as to how things should run and what directors need. I've also been involved with student teams as a team lead for both the Mechanical Team and the research and development team for PAMELA (one of the teams microbots). In my involvement in EngSoc and student teams, I feel I have developed the necessary skills to take on the position of VP Internal.

I'm very open to hearing what you think needs to change and what you want to see from EngSoc and hope I can get your vote for VP Internal!

Pallavi Hukerikar for VP Internal

PALLAVI HUKERIKAR
1B MANAGEMENT

Hello Engineering Students!

My name is Pallavi Hukerikar and I am in 1B Management Engineering! I am currently the Student Life Commissioner so I have been working very closely with the VP Internal to help execute some great events. I strongly believe I have learned a lot from this experience, so I would like to be the next VP Internal with the Engineering Society to help make your student experience even better!

There are four main tasks I would like to accomplish should I be elected into this role.

Firstly, I would like to work on creating an Engineering Society mobile application to accomplish a few goals. Often times, students are unaware of when and where Engineering Society events are taking place. With the mobile application, I would like to create an effective notification system to alert students about upcoming events. I would also like to use this application to automate the process of collecting P**5 points, which would also allow there to be an up to date ranking of the classes.

Secondly, I would like to work on refining the events put on by the Engineering Society. I would like to remove some of the ineffective events, and focus on bigger events that appeal to a larger number of students. I am also interested in creating some new events such as a boat cruise and a hackathon with a focus on developing something that helps UWaterloo students.

Thirdly, I would like to restructure the VP Internal portfolio to help better manage the duties under the VP Internal and provide better support to the directors. To do this, I would like to create another commissionership focused on working with the logistics of the events, including booking rooms, and scheduling the events in the calendar. This would allow the Student Life Commissioner to focus on creating comprehensive manuals for each directorship, and having one on one meetings with every director to ensure that they have the support they need to run a spectacular event!

Lastly, I would like to continue providing opportunities to first year engineering students. Last term the Engineering Society ran the first ever First Year Engineering Society Leadership Conference which allowed new students to learn more about various clubs and student societies, listen to upper years speak about their coop experiences, and network with like minded students. I would like to continue expanding this event by inviting guest speakers from organizations such as Professional Engineering Ontario (PEO), and running more interactive activities for the students to apply their knowledge. As well, I would like to continue the first year directorship mentoring program in all terms, so that first year students have the opportunity to shadow a director in their 1A and 1B term. This will help first year students get involved with the Engineering Society without having to take on a huge responsibility.

I feel that I have gained a lot of great experiences that make me a very qualified candidate for this job. In the time I have been at the University of Waterloo I have gotten involved with:

- Engineering Society (Academic and Class Representative, Student Life Commissioner)
- Engineering Ambassadors (Student Experience Manager)
- Women in Engineering
- University of Waterloo Management Consulting Club (Executive)
- Midnight Sun Student Design Team

I am passionate about the Engineering Society and would love this opportunity to help improve your student experience. If you have any questions about me or my platform, please don't hesitate to contact me at pallavi.hukerikar@uwaterloo.ca or stop me in the halls!

Thank you for reading and don't forget to vote!

How do I vote?

The voting period opens at noon on Saturday January 31st, and closes at noon on Wednesday February 6th. Voting will be online and at the voting booth in the CPH foyer.

For more information, contact the elections commissioner at cro.b@engsoc.uwaterloo.ca.

Why should I vote?

Even if there is only one candidate, they need to receive more "yes" votes than "no" votes. These members of EngSoc and WEEF will represent you at the policy-making levels of the university, provide useful student services, and decide how your WEEF funds are allocated.

Candidates for VP Finance

Don Tu for VP Finance

DON TU
2A CHEMICAL

Hey everybody! My name is Don Tu and I am campaigning to be your next Vice President of Finance! Now, I am sure that it comes as no surprise when I say that being an undergraduate engineering student at the University of Waterloo is not cheap. Even with the rewards of co-op, it's no small thing to start every academic term off by opening up your wallet and sacrificing your hard-earned money to QUEST. If you look through the details of your promissory note, you'll see a fee labelled "ENG Student Society". This term, it carries a price tag of $15.45. This is the fee that every undergraduate engineering student pays to the Engineering Society, every term. This term, their total amounted to over $40,000 – and that figure is only growing as the number of engineering students continues increases every year. $40,000 is one pretty penny! And while $15.45 by itself is not a massive sum, every dollar counts - both for you as a student and for the student body as a whole. It is this money that goes towards improving student life in the form of the many events and services that the Engineering Society offers. Resume critiques, interview workshops, printing services, semi-formal – all of these great things and more are funded by our money!

When you really think about it, it's amazing how $15.45 can grow into so many fantastic services. The reason that I say "really think about it" is because I don't think it's something a lot of people put too much thought towards. Not only is being an engineering student expensive, but busy as well. Sometimes we just see price tags and fail to remember the things that those price tags get us. As VP Finance, I want to change that. Not only do I want to make sure that student money is being spent wisely, I want to make sure that students actually know what those wise expenses are! As VP Finance, I plan on:

· increasing financial transparency by keeping Engineering Society budgets up-to-date online so that everyone can see what their money is buying;

· expanding the student deals program so that engineering students can enjoy better pricings on foods and goods in the area;

· analyzing past budgets and developing financial guidelines for directors;

· expanding the Novelties and Ridgidware inventories;

· and communicating with students to gather ideas and feedback of how their money is being spent.

Those are my hopes as a VP Finance candidate in a nutshell! In the week of campaigning ahead, feel free to stop me in the halls and talk to me – I always love meeting new people! I hope that I've inspired you to take a moment to think about how you want your money to be utilized, and that I've convinced you that I am the man for the job of helping you do so.

Candidates for VP External

Kieran Broekhoven for VP External

KIERAN BROEKHOVEN
2A MECHATRONICS

Hi! My name's Kieran Broekhoven, and I'm running to be the Vice President External of EngSoc. My role as VPex would be to oversee anything relating to the society's interaction with the community around us. I have lots of plans for how I would like to help the society be run for the next 16 months and I hope you will agree with my ideas.

Firstly I would like to ensure the continuation of past success in this position. I would like to ensure that external events continue to be run effectively by strong directors who have access to everything they need. I intend to focus on the important past external matters such as Bus Push, Engineering a Difference and Canstruction. I would also like to continue to focus on properly representing EngSoc in the national engineering community. I highly prioritize selecting and preparing proper delegates for conferences such as the Engineering Student Societies' Council of Ontario and the Canadian Federation of Engineering Students.

I also have new ideas that I would like to bring in. Something I would like to implement is hosting a hackathon for high school students in the Waterloo area. This is a nice benefit to the community but also provides good experience to many potential UW Engineering applicants. After years of hackathons we have plenty of experience to ensure a fun and successful event. Another thing I would like to introduce is blood runs, which are definitely not as morbid as they sounds. Occasional large group trips to donate blood could be a fun activity as well as a great community outreach event. I would also like to welcome any new ideas that others bring to me about new or current outreach events, as I strongly believe that the ideas of the executive team should reflect the ideas of the society as a whole.

I believe that I am well qualified for this position. This is my third term at the university and I have gotten involved in different aspects of EngSoc. I have led as music co-director, TalEng director, sponsorship committee and a class rep. I have also gotten involved in events such as coffeehouses, Battle of the Bands, EngPlay and year spirit events. I have lots of leadership experience outside EngSoc as a martial arts instructor, play director, tutor and student council member. Please feel free to contact me if you have any questions about me or my platform! You can get me at 519 572 1785 or *kieran.broekhoven@gmail.com.*

Stay classy, UW.

Candidates for VP Education

Anson Chen for VP Education

ANSON CHEN
3A CIVIL

Hello, wonderful Waterloo engineering students!

I'm Anson Chen, from Civil 2017 and I'm running to be your next Vice-President Education. I'm going to get right to the point, and tell you that there are 3 things I want to get done in this role:

1. Ongoing Representation. The Engineering Society's VP-Education sits on no fewer than 6 university committees and councils. These groups are made up of faculty members, CECA representatives and elected students at the FEDS level. They meet on a bi-weekly to monthly basis to discuss and vote on decisions related to things like curriculum, courses, calendar, and co-operative education. It's actually a lot of decisive meetings. It is important that you have someone informed and reliable to represent the engineering undergraduate population at these meetings, because changes to curriculum, courses and co-op do affect YOU directly.

2. Active Communication. Did you know that Civil, Environmental and Geological Engineering are receiving brand new curriculums, starting in Fall 2015? If you answered "no" - don't worry, I did too, and I'm IN Civil. The important message is that engineering students can and should be informed about significant academic changes like these. As VP-Education I will actively communicate information regarding course, curriculum, schedule and co-op changes using the mailing list, EngSoc website and class rep system. Communication goes two ways: I will also use these methods as well as feedback surveys to gather your opinion on issues and decisions before representing you at meetings.

3. Improve Co-op and PD in whatever way I can. Two of the councils that the VP-Education sits on are the Feds Coop Students Council and the WatPD-Engineering Curriculum Committee. The co-op system, as I think we all agree on, is very important to undergraduate students and something that should be continually improved upon. As well, I don't think I am by any means alone among engineering undergraduates in having some mildly opinionated views on the current PD system. If there is anything I can do at these meetings to change PD for the better, and to make it more useful and valuable to engineering students, I will do it. This is something I will play by ear as I start attending the meetings, but you will hear more about it from me as I transition into the role.

Do those 3 points sound agreeable to you? They do? Great! Here's the experience I have to back up my candidacy:

- From 2013-2014, I was Vice-President Communications on the Engineering Student Societies' Council of Ontario (ESSCO). In this role I became familiar with social media, tools for mass-communication and feedback-gathering methods.

- I have been Commissioner twice for Waterloo EngSoc (Student Life and Communications) as well as director twice (TalEng and Canada Day)

- I am academic rep for my class, and am familiar with midterm-scheduling and facilitating professor-class feedback.

For more information on my campaign, go to *www.facebook.com/whyanson*

Thank you for reading this far. I truly appreciate it. In fact, this is the first Iron Warrior article I have ever written – I hope to see you again soon, as your new VP Education! Remember to vote online on Saturday, January 31st.

Candidates for WEEF Director

Wesley Sak for WEEF Director

WESLEY SAK
3A MANAGEMENT

Hey everyone, My name is Wesley Sak, I'm in 3A Management and I'm running for the position of WEEF director.

I've been involved with WEEF since the start of my university career in September of 2012 as a council class representative and was a member of the Board of Directors since the summer of 2013. In that time, we've had dedicated directors who have ensured the smooth operation of the endowment fund. I am aiming to build on their work to ensure the fund operates effectively. The key to that is the effective communication between the fund and the students. The students and faculty need to have the fund's resources easily accessible to them.

If elected as the WEEF Director, my goals are to improve the communications while maintaining the operation of the fund. We need to rebuild the website and revamp the proposal application procedure that currently causes so many complaints. The visibility of the fund around the Engineering buildings needs to reflect all the fund contributed to those buildings. The classrooms, labs, student design teams that benefited from WEEF need to be shown off.

WEEF is here to "continuously improve the educational environment for undergraduate engineering students, and maintain our outstanding reputation" and it does this by allowing the students to choose what gets funded. The only way this works is through a joint effort by the students and faculty. Vote for me to facilitate the continued cooperation of the student representatives and the faculty for a better learning environment.

On the Shoulders of Giants

Al-Khwarizmi and Abu Al-Wafa

SHERWIN KWAN
4B MECHANICAL

ON THE SHOULDERS OF GIANTS

Towards the end of Fall 2014, a series of articles on various pioneers of science and engineering appeared in the pages of Iron Warrior, written by Cameron Soltys, Jessica Keung, and yours truly. These were generally well received, and I am pleased to report that this will become a regular column in this newspaper. In each edition this term, there will be an article about someone whose work laid the foundations for what we study and practice today. Even Sir Isaac Newton recognized that he had been "standing on the shoulders of giants". (Just in case the point wasn't clear enough, Newton didn't come up with that saying; he actually got it from the medieval philosopher Bernard de Chartres).

So far, you may have noticed that all of the articles in this series have been about European men. It is, of course, undeniable that dudes from Europe have done a lot to advance our understanding of the world over the past centuries. As well, in recent years a number of deplorable acts of violence have caused some North Americans and Europeans to view the Islamic states of the Middle East as a cesspool of ignorance from which no good ever comes. It's important that we don't go too far the other way, proudly setting up Western civilization as some inherent source of good and calling out all other peoples for not doing their share.

So this week, I will introduce two Persians: the mathematician Muhammad bin Musa al-Khwarizmi (780-850) and the astronomer Muhammad Abu al-Wafa al-Buzjani (940-997). As I write this, I'm reminded of the scene from Superbad where Fogell realizes McLovin might not have been the best name to use on his fake ID, when "Muhammad is the most commonly used name on earth".

A thousand years before trains and cars, it was very hard for people in different parts of the world to communicate with each other. But the 9th century was an exciting time for Middle Eastern scholars; the books of Aryabhata and Brahmagupta – the guys who had come up with the sine and cosine functions and the previously unheard-of number 0 – as well as Euclid and Claudius Ptolemy, who had recorded many geometry theorems, had just been translated into Arabic. It was a time of East meeting West. With the greatest classics of Greece and India now available, the stage was set.

Al-Khwarizmi

Al-Khwarizmi wrote two books which would become classics of the Middle Ages: The Art of Adding and Subtracting with Indian Numbers, and the Compendium of Calculation by Restoring and Balancing.

In Indian Numbers, Al-Khwarizmi's recognized that the Indians were on to something with the whole zero thing. Up until that point, most people had used letters of the alphabet to represent numbers, because otherwise no one would be able to tell the difference between 10 and 100. But using the number zero, all we needed was ten symbols, and we could write any number. Arithmetic just got a whole lot easier.

The Compendium of Calculation introduced several rules of algebra which have become second nature to us. Al-Khwarizmi proposed that there were two basic rules: restoration (in Arabic, al-jabr), which means to turn a negative quantity on one side of an equation into a positive on the other side, such as reducing $5 - 6x = 4x$ to $5 = 10x$, and balancing (al-muqabala), which means to cancel common terms on both sides of an equation, so that $a + 6x = 6x$ becomes $a = 0$. This work was so influential that this entire field of mathematics eventually became known as al-jabr (algebra). By applying various versions of these two rules, Al-Khwarizmi developed the method of completing the square, and therefore was the first to come up with the general formula to solve quadratic equations that we all know and love today.

Abu Al-Wafa

About 150 years later, Abu al-Wafa would make major contributions to what we now call trigonometry. He gave the sine and cosine a new definition based on a unit circle, which we still use today. Next, by using addition and subtraction formulas (e.g. $\sin(a + b) = \sin a \cos b + \cos a \sin b$) on sines of "nice" angles (e.g. $\sin 30° = 0.5$) and linear interpolation, he created a table that could be used to calculate the sine or cosine of any angle – his value of sin 1° was accurate to within a ten-millionth of the true value. He also noticed that the ratio between the sine and the cosine was often very useful in its own right, and so he decided to make this a separate function of its own and write tables for it. He called it the shadow (which I shall explain below), but nowadays we call it the tangent. Abu al-Wafa would later count the reciprocals cotangent, secant, and cosecant as functions in their own right, and he would write a book describing all six trigonometric functions. He would also extend his functions to spherical trigonometry. Quite the modest guy, and imitating Ptolemy who had written a text called "The Great Treatise", he called his book "The Greatest Treatise" (Al-Kitab Al-Majisti).

As a Sunni Muslim, Abu al-Wafa applied his new functions to solve problems involving two of the five pillars of that faith. The tangent (shadow) function could be used on a sunny day to calculate the sun's altitude based on the length of shadows, which had implications for the daily prayer times. Also, the sun's altitude could itself be used to determine latitude, and times when eclipses happened could be used to determine longitude. Once the coordinates of a city were known, then finding the direction to Mecca is a simple spherical trigonometry problem. Another application of trigonometry was to forecast the positions of the Sun and Moon in the sky (their movement can be described with sinusoidals), and thus be able to determine the exact times of sunrise, sunset, and new moon – which is useful for observing the Ramadan fast.

Legacy

People like the Arab-educated Pope Sylvester II (946-1003), Leonardo Fibonacci (1170-1250), and Rabbi Levi ben Gershon (1288-1344) would bring knowledge of the decimal system, algebra, and trigonometry to Europe. Al-Khwarizmi's books would later become standard textbooks in medieval Europe. In fact, his name is the origin of the word "algorithm" for "set of operations to solve a problem". By the 17th century, all of these would become important building blocks of the emerging scientific revolution, which employed mathematics to describe and predict the behaviour of the world around us.

Marine Life May Be Key to Achieving Immortality

NINA FENG
3B ENVIRONMENTAL

The hunt for a literal or figurative Fountain of Youth has been explored for ages, with longevity being one of the most coveted goals by humans in mythology and reality alike. While many investigations have yielded results, the secret to long life still evades scientists. Perhaps the focus should shift away from lab mice, and towards the weird and wonderful creatures of the sea.

Recently, a team led by Joao Pedro de Magalhaes at the University of Liverpool succeeded in sequencing the genome of the bowhead whale, a species capable of living for up to 200 years. With such large bodies and therefore a huge quantity of cells, these whales should be as affected by cellular mutation and disease as humans are. However, that is often not the case, sparking an investigation as to why. The first of the large whales to be sequenced, their findings established several genetic sequences in the bowheads that may reveal the reason for their long life. These genes contribute to the repair of DNA and the multiplication of cells. The next step would be to modify human genes according to these findings, and test the longevity of these new cells.

Another long-living marine creature is the Turritopsis dohrnii, also known as the immortal jellyfish. It does not react to age, trauma, or illness by dying like a normal mortal. Instead, it reverts back to its early, sexually immature stage, and essentially gets reborn. Because of this, the lifespan of this species is unknown, but it is likely to be biologically immortal. Shin Kubota, with Kyoto University's Seto Marine Biological Laboratory, is currently the only scientist in the world conducting research on these tiny animals.

Jellyfish are simple creatures, thought to be a relic of ancient, more primitive life on Earth. However, they are genetically more similar to humans than many other creatures, such as the worm. For this reason, further study on the immortal jellyfish could possibly help to extend the human lifespan, or at least improve the quality of human life in the later years. Originally from the Caribbean, the Turritopsis dohrnii has since spread across the world's oceans. Their numbers are likely increasing very rapidly because, apart from being victims of predation, they do not naturally die.

The creature has two main stages. The first is the polyp stage, in which it reproduces asexually by anchoring to the ocean floor and creating stolons, interconnected colonies of identical clones of itself. When matured, these polyps break off, grow tentacles, and enter the medusa (jellyfish) stage, which is a stage of sexual reproduction. An adult specimen can grow to be 4.5 mm in diameter. Tests have shown that they can revert back to the polyp stage from any level of maturity in the medusa stage, a feat that is quite possibly unique within the animal kingdom. When severely damaged or after a time of aging, the tentacles retract, and the body becomes of blob of cells that Benjamin Buttons into a polyp once more, generating a new colony of polyps. It must be noted that their cells are also re-purposed (transdifferentiated) and may take on different roles after the transformation. This process could potentially go on for thousands of years.

The quest for the extension of human life has led us down many paths. Perhaps the answer lies with the creatures of the deep. For many of us, however, the thought of living forever might be just as alarming as the thought of dying.

Waterloo Engineering's Hidden Gems

ARJUN BALI
1B MECHATRONICS

First year is hard.

As 1A Mechatronics students, we found ourselves inundated with school work, theory, and the promise that by 3A, we'd be able to build something "cool." Although hands-on engineering excited us in high school, as first year students, we found it hard to further those skills in Waterloo. Granted, our knowledge of the available resources was limited, but this appears to be a common problem. Now having learned the ropes, we'd like to shed light on Waterloo Engineering's hidden gems, and how they helped us practice some real engineering in making an Arduino-based self-balancing robot.

The MESS

The first thing we needed was a proof of concept prototype. But after paying tuition fees, our meek financial situations couldn't afford paying full price for wheels, motors, sheet metal, a motor controller, an accelerometer, and a gyroscope.

That's when we found the MESS. The Mechatronics Equipment Surplus System is a free service based in E3 (room 3166) available to all MME students. It provides a wide selection of borrowable electrical and mechanical components, and is staffed with people who have years of industry experience. Within minutes, we found the perfect electrical components to prototype our design despite having only a vague idea of what we wanted. The folks at the MESS then directed us to the E3 machine shop where we picked up the sheet metal we needed for a subsidized price.

For those not in MME, there's rumours that similar surplus systems may be started within other departments in the coming terms.

Engineering Student Machine Shop (ESMS)

Although we had wheels and motors, we then needed to design and machine a coupler to connect the two. Unfortunately, like most first year students, we had no design or machine shop experience before coming to Waterloo. We entered the ESMS intimidated, but walked out three hours later with not only a coupler, but also professional machine shop training and the skills we needed to move forward independently.

Over the course of our project we developed an amazing relationship with the ESMS staff inside and outside the shop, and to date we consult them on design feasibility and machining techniques. We're three of the hundreds of students that they're happy to help on a daily basis, and they're a resource definitely worth leveraging.

Ridgidware

RidgidWare opened in 2014 with the mission of providing on-campus access to hardware components. In addition, they have regular merchandise giveaways where we happened to scored a free Arduino Uno. If you're desperate for a part and RidgidWare doesn't have it, DigiKey.com has next day delivery to Waterloo on most electrical components.

Upper Year Students

The Waterloo Engineering network is unexpectedly strong. Upper year students, especially those from your program, are outstanding sources of engineering wisdom. Many of the issues that we encountered while building our robot were solved by consulting an older student who had previously overcome a similar problem. Just don't forget to return the favour next year when that freshman ECE asks you if it's a good idea to hook 5V up to GND (it was an honest mistake)!

When all else fails: http://google.com

At this stage in your engineering careers, it is highly unlikely that any problem you're having hasn't already been solved by someone else. The proliferation of blogs and forums has become essential to troubleshooting. Instructables and other DIY sites are great places to get started, and can even help you source the right parts to make troubleshooting easier later on. Patient reading and a willingness to fail with some guess-and-check is literally all it takes.

At the beginning of 1A, a hedonistic pastime of engineering frosh is to share their academic schedules with their peers, complaining about all the hours they're spending in their 'professional' degree. But as important as class is, the time we spent after 4:30pm exploring campus resources added a crucial dimension to our growth as engineers that first year instruction is unlikely to foster.

And with that, it's our time to pay it forward. If you have an idea and need some help starting up, feel free to reach out to us and we'd be happy to do our best.

Special thanks goes out to Chris McClellan from MESS, Phill Laycock & Andrew Urschel from the ESMS, Jack Ye MTE 2B, Jason Zeng MTE 4B, and Joe Kinsella MTE 4B.

Don't forget to stop by RidgidWare Tuesdays & Thursdays from 11:30 - 1:30 in CPH!

Project video: *www.youtube.com/watch?v=7g7U8gHD9v4*

Arjun Bali

The completed self-balancing robot.

NASA Throws a Wrench into Things

CAITLIN MCLAREN
3A CHEMICAL

NASA has recently been doing experiments with 3D printing in space. In December 2014, they printed twenty objects on a printer in the International Space Station. Nineteen of them (13 different objects) were pre-programmed into the printer before launch, but one of them was special: it was sent into space electronically. This is the first time a tool has been sent to space in such a way, and its printing was a success.

The ratchet wrench that NASA sent to the station was designed by Noah Paul-Gin, and is 11.38 cm by 3.28 cm in size. It won't be used in space - it is a test to see if "e-mailing" usable tools into space is possible.

The wrench, along with the other objects 3D-printed in space, will be returned to Earth and tested. If it is sound, this may completely change the way space missions are equipped. If tools can be made in space rather than shipped - and these could also be recycled when no longer needed - it opens many possibilities for scientific experimentation, and might even save lives in an emergency.

Cofounders

MetricWire

NACHIKET SHERLEKAR
3N NANOTECHNOLOGY
CO-FOUNDERS

Waterloo has been a centre for ideas and entrepreneurship for many decades. The presence of an open collaborative culture and the emphasis on ownership of intellectual property has helped the University of Waterloo gain huge success in the creation of start-up companies. One such company to come out of uWaterloo's Velocity Garage is MetricWire, who have created a mobile application through which researchers can crowdsource data through custom-built surveys for various purposes. I recently interviewed Charles Desouza, one of MetricWire's co-founders, to hear the story behind the start-up and his perspective on the culture of entrepreneurship in Waterloo.

Charles Desouza shows up punctually at 6:30 pm at the Great Hall in the Student Life Centre where we agreed to meet, and greets me with an enthusiastic smile. Considering the various activities he has to balance, it seems like time management would be a necessity – in addition to being involved full-time in MetricWire, he is also an active member of uWaterloo's Dragonboat Club, as his build confirms.

Charles was a 3rd year undergraduate student in Systems Design Engineering in 2013 when he was introduced through a mutual friend to Brian Stewart, then a graduate student under economics professor Larry Smith. Brian was on the lookout for people with expertise in building mobile applications, and Charles' interest was piqued when he heard the concept behind Brian's product idea.

Brian is an expert in econometrics, which applies statistical methods to economic data in order to test hypotheses. For one of his projects, he felt the need to create a flexible tool that could be used to collect longitudinal data from a sample population in order to make predictions based on the observed trends. The idea of MetricWire was formed as a result – an online application for smartphones used to ask questions to participants tailored to their specific interests, and triggered at certain times of the day or at certain locations they visited.

Charles was on co-op at MappedIn when he first joined MetricWire, and as a result, had to balance the two duties – he worked at MappedIn during the day and MetricWire at night. Eventually, he decided to work full-time on MetricWire, as Brian had his own responsibilities that included providing for his family.

MetricWire is primarily targeted towards researchers who don't have the technical expertise to build their own online surveys. "The MetricWire application is designed mostly as a do-it-yourself tool", states Charles. "The sample size for past studies we have helped with have been as high as 2000, and can be further scaled up". In the past, MetricWire has helped researchers in the field of psychology, as well as those conducting clinical trials. In addition, consumer insight surveys for companies have also been created by them. An example of

Continued on page 18.

The Benchwarmer Report

Stacked Team Ends 5-Year World Junior Gold Medal Drought

ELIZABETH SALSBERG
2T NANOTECHNOLOGY

THE BENCHWARMER REPORT

Breathe Canadian hockey fans. Breathe. On the first night of this wonderful new term, the all-too-infamous World Junior Gold drought ended in dramatic fashion! In a rollercoaster of a game, Team Canada hung on to defeat Team Russia 5-4.

Canada got out to an early lead two minutes in with goals from New York Rangers' regular Anthony Duclair and Sens prospect Nick Paul, chasing the starting Russian goaltender from the net. The Russians did not give up though, adding a goal near the end of the first frame to pull within one heading into intermission. Unfortunately for the Russians, Alexander Sharov also took a silly roughing penalty, giving Canada a power play heading into the second.

Though no damage was done on the power play, Connor McDavid, expected to go first in the NHL draft this June, took a gorgeous pass from teammate Josh Morissey to pad the lead to 3-1. Soon after, it was 5-1 Canada. Pack your bags Russia, better luck next time!

Not so fast! The Russian coaching staff must have given his troops one hell of a 'pep talk' on the bench (unfortunately audio and translation were not available). Three goals and three minutes later, an awestruck team Canada had watched a four-goal lead evaporate into a mere 1-goal advantage.

Instead of taking the game to the Russians, the Canadians looked stunned through the rest of the second and much of the third; clinging to the small shred of lead they had left. This was the most adversity the Canadians had faced all tournament, having outscored their previous (and much weaker) opposition by a practically exponential margin. Now they were literally shaking in their skates.

Coach Benoit Groulx had his work cut out for him calming the simmering pot of anxiety that Russians had suddenly brought to a boil. He must have done something right, as a combination of tight defense and timely saves by returnee Zach Fucale helped the clock tick down (a little) faster.

The nail biting back-and-forth play continued. The Russians pulled their goaltender. All to no avail. Exceptional defense by Team Canada, in particular Darnell Nurse-who had what was by far his best game of the tournament and would be recognized with player of the game honours—put Canada back on top of the hockey world!

This Canadian World Junior team was much better than other rosters throughout the 5-year drought because of their experience, depth and most importantly, skill. This team had all the experience it needed from last year: Connor McDavid, Sam Reinhart, Nic Petan, Josh Morissey, and captain Curtis Lazar… with added depth from would-be IIHF World Junior best forward (unbelievably a snub for the 2014 tournament) Max Domi, the Rangers' Anthony Duclair, along with Junior phenoms Robby Fabbri, Brayden Point, Darnell Nurse and Shea Theodore, to name a few. Jake Virtanen, on loan from the Florida Panthers, was also a valuable asset through the tournament.

It was about time this stacked hockey powerhouse ended the unthinkable. And they did. The real challenge will be next year in Finland; for most of the Canadian players 2015 was their last tournament, certainly for the 19-year-olds who made up much of the roster. It is also unlikely that we will see Connor McDavid back on the World Junior stage after being drafted by a basement-dwelling NHL team. 2016 will be a whole new battle. But for now, we can breathe.

Claus Andersen / Getty Images

Team Canada celebrates their championship on ice.

Album of the Week

Viet Cong: *Viet Cong*

ALEX TOTH
4B MECHANICAL

ALBUM OF THE WEEK

I got into post-punk all backwards growing up, probably because I wasn't even close to born when the first wave of post-punk bands started releasing music in the 70s. The first song that I enjoyed that could justly be classified as post-punk, with its chilly atmosphere, prominent basslines, and stately vocals, was probably Franz Ferdinand's hit "Take Me Out." From there, it took me until the beginning of university to truly understand Interpol, and even longer to come around to the Cure and Joy Division, both of whom are considered grandfathers of the entire genre. And now, in early 2015, I've finally found a post-punk album that immediately clicked for me, courtesy of a young Calgary band called Viet Cong.

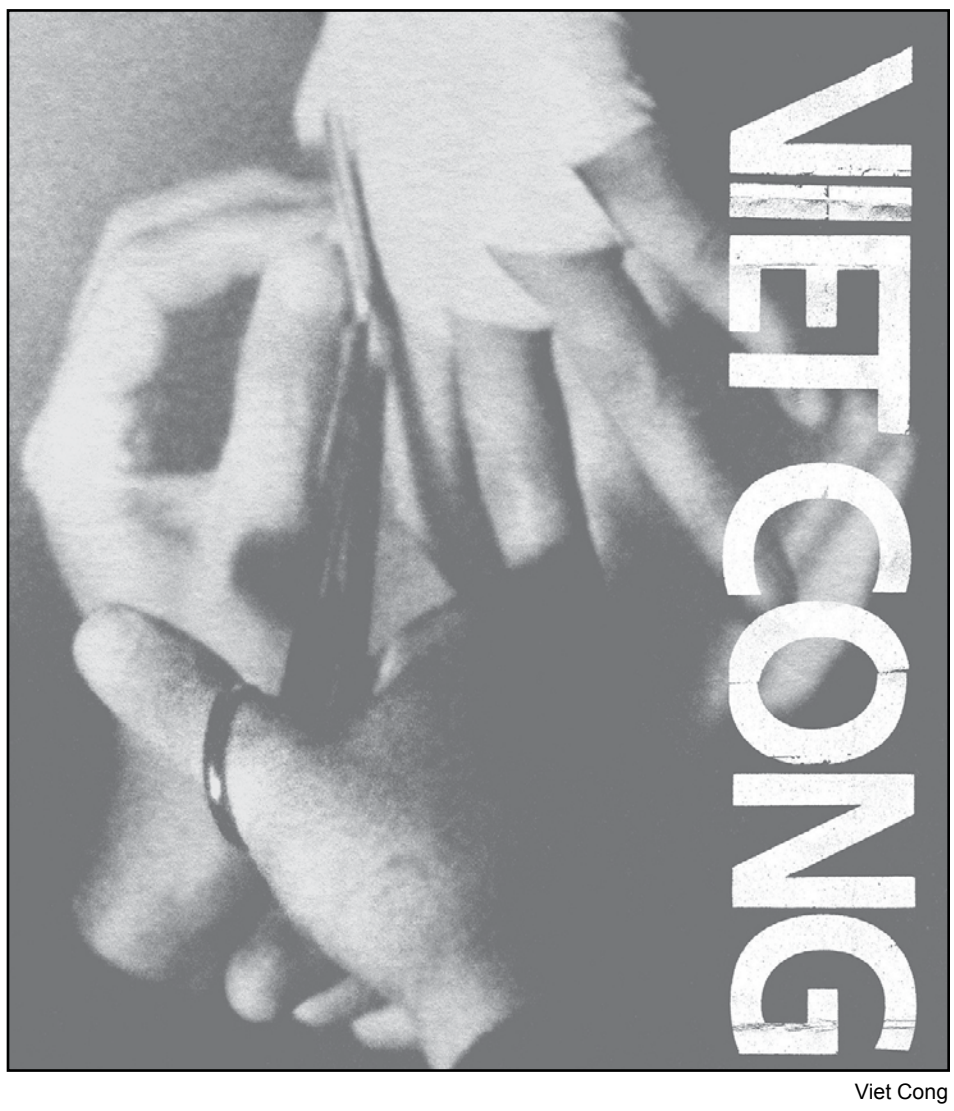
Viet Cong formed from the ashes of Women, another Calgary band that favoured interlocking guitar grooves and complex rhythms. Women broke up acrimoniously in 2010 via onstage fistfight, and the two members of the rhythm section went on to form Viet Cong. Last year they released their debut, Cassette, to much critical acclaim. With their self-titled sophomore effort, they've refined their sound further, with icy synths, murky guitars, and drums that sound like they've been recorded in a cathedral. The album runs only seven songs and 36 minutes, almost a third of which is taken up by the 11-minute closer "Death." The short run time, however, should not trick you into thinking that the album is slight. Every minute of *Viet Cong* is dense, cold, and biting.

The album opens with the pummeling "Newspaper Spoons," where the drums don't sound like drums as much as they sound like someone repeatedly punching a metal baking tray; they're all tinny reverb and cavernous noise. The vocals are half-sung, half-chanted, and are immediately drawing Joy Division comparisons. The guitars buzz atonally around the edges of the song. And then, miraculously, the curtain drops to reveal an extended synth outro that could almost be described as pretty.

Elsewhere on the album, "Bunker Buster" has piercing guitar stabs and oblique lyrics that evoke early-period Interpol, and "Silhouettes," contains the same tense beauty that was once common in Bloc Party songs. However, it's unfair to say that they're merely an amalgamation of their forbearers. Viet Cong is much more aggressive and cerebral than Interpol ever was, piling up layers of guitar noise and letting it meld transform throughout the song. Instead of being a facsimile, they've infused elements of many other bands in order to create something equally unique and consuming.

The lead single for the album, "Continental Shelf," proves that although Viet Cong will probably never write an honest-to-goodness pop song, they could if they wanted to. There's a true verse-chorus structure, melodic lyrics, and even some backing vocals. The vocals are catchy, and I've caught myself humming the song many times since I first heard it. However, much of the shinier elements of the song are undercut by the incessant bassline and fuzz that bleeds through the song, not to mention the general sense of unease that the vocals are able to project.

Lastly, Viet Cong ends with "Death," the 11-minute behemoth that was mentioned above. The song is a towering piece of music, with guitars that meld and chime and ring, and it really has to be experienced to be fully appreciated. But it shows that Viet Cong aren't afraid of working outside of their genre constraints to craft something different and rewarding. "Death" signals a progression for Viet Cong, a springboard that they can use to reach greater heights. Even though their sound will always be rooted in post-punk, they've created a piece of work that attempts to defy genre and stand on its own, and I hope that they continue this trend in the future.



Viet Cong

***Viet Cong*, by Viet Cong**

Take Five

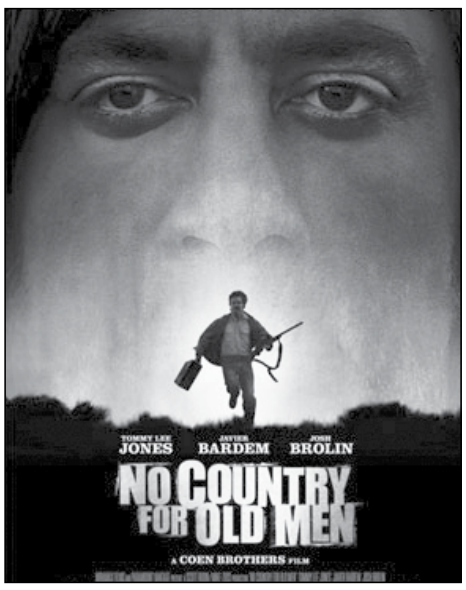
Bad Men

NANCY HUI
4B CIVIL

TAKE FIVE

When the criminals drive the story and the heroes react it is way easier to root for the bad guys instead. Even better is a movie in which the protagonist is straight-up villainous. Villains don't always get a happy ending, whereas heroes usually do, increasing the uncertainty in the plot. Villains can get away with gutsy, downright disgusting actions that heroes can't without losing audience respect.

In these five movies, the bad guys aren't always the protagonists, but they are definitely the most interesting parts of their movies.

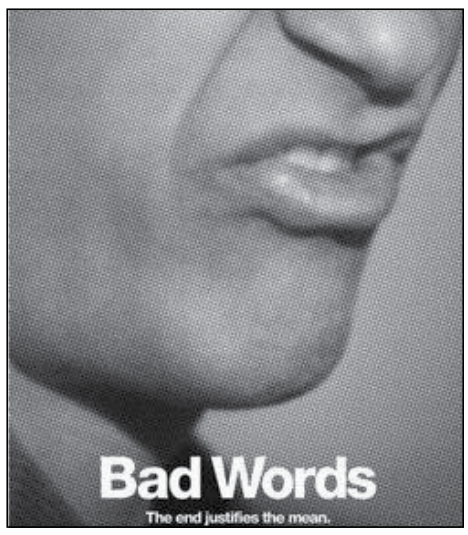


No Country for Old Men (2007)

Llewelyn Moss (Josh Brolin) finds two million dollars in the aftermath of a drug deal gone bad, but is pursued by Anton Chigurh (Javier Bardem), a psychopathic hitman who would like the money back. Also features Tommy Lee Jones as a sheriff.

I guess, technically speaking, No Country for Old Men is an accomplished film. Each scene is tense and arresting, and each line is delivered with perfect nuance. Of note is Javier Bardem's performance of the dead-eyed, merciless killer with an alien moral code. He asks a gas station attendant to flip a coin. They never say outright what's at stake, but we know it's not for a free tank of gas.

We know this because this is a bleak, bleak film about looking into the face of evil, and the characters go about their business largely without any hope at all. Like 1980s Texas, it is flat, hard, and desolate. That makes No Country for Old Men very difficult to watch. I found it riveting, and would not want to watch this again.



Bad Words (2013)

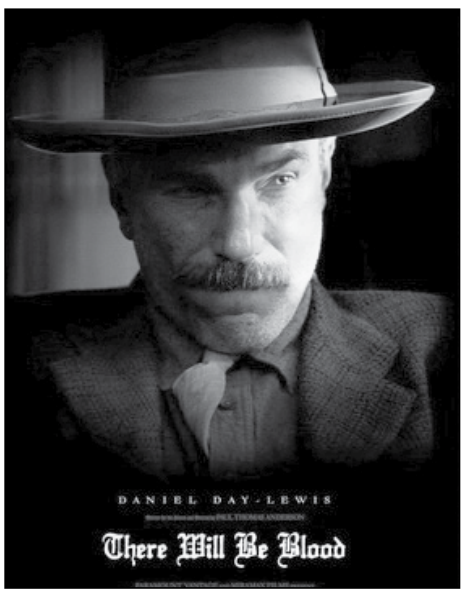
Jason Bateman is a 40-year old man who exploits a loophole to enter the national children's spelling bee.

If you don't mind that Jason Bateman plays an individual with unresolved issues expressing themselves as a vicious lack of sportsmanship, callousness towards his associates, and casual racism, Bad Words is bratty fun in the vein of Bad Santa. However, the protagonist is much more laconic, so much of the humour generation is relegated to his designated sidekick, the big-mouthed ingenue Chaitanya Chopra (Rohan Chand), whose parents leave him bereft of supervision under the pretense of building character and self-sufficiency. Oh, he builds character and self-sufficiency, all right. You can see the ending of Bad Words from a mile away.

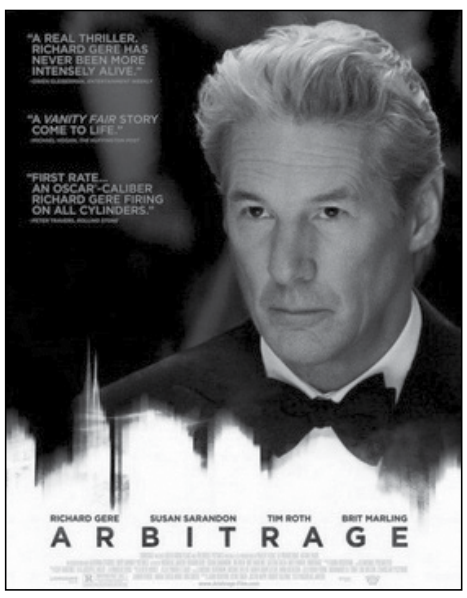
There Will Be Blood (2007)

Daniel Plainview (Daniel Day-Lewis) is an oil tycoon who pits himself against preacher Eli Sunday (Paul Dano) while building an empire.

No Country for Old Men might have taken the Best Picture Oscar, but I feel that There Will Be Blood is infinitely more watchable. Where watching No Country for Old Men is like sitting in a flooded basement and watching a bare bulb on the ceiling flicker, There Will Be Blood is like watching a train veer off the rails towards a trailer park. And just as the media could not take their cameras off Britney Spears in 2007, I could not stop watching Plainview and Sunday as they escalated their conflict over the decades.



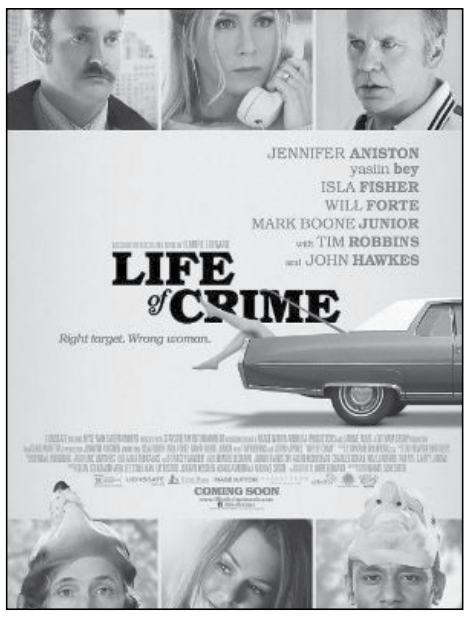
By the way - if you watch There Will Be Blood, Eli Sunday is the twin brother of Paul Sunday, and they are both played by Paul Dano.



Arbitrage (2012)

Robert Miller (Richard Gere) is trying to sell his hedge fund while concealing a $400 million hole in the books, but he accidentally kills his mistress in a car crash, complicating business proceedings somewhat.

There Will Be Blood was riveting because I wanted to watch Daniel Plainview and Eli Sunday utterly destroy each other, but Arbitrage commands attention through Robert Miller's willingness to throw anyone and everyone under the bus while he escapes the law and closes the deal - and because he might pull it off. It helps that Robert is played by Richard Gere, he of Pretty Woman and Runaway Bride and the eternally trustworthy face that ages incredibly well. *swoon*



Life of Crime (2013)

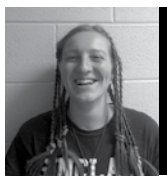
A socialite (Jennifer Aniston) is kidnapped by a pair of bumbling conmen (Mos Def and John Hawkes) for ransom. Unfortunately, her husband (Tim Robbins) doesn't give a damn, since he's on the verge of divorcing her in favour of his mistress (Isla Fisher). The conmen struggle to recoup their losses. Also features Mark Boone Junior as a paranoid, gun-loving Nazi fanboy

Life of Crime features Jennifer Aniston in her best role since, oh, I don't know. Her performance is careful, low-key, but inspires empathy for the aged socialite without being syrupy. The rest of the cast is reliably excellent.

Unfortunately, Life of Crime moves slowly. It can be frustrating to watch criminals bumble to and fro when their street smarts look more like Sesame Street. They can sling snide remarks and knowing glances all they want, but when your target's husband's mistress can hold you up on the phone, it's time to consider a change of career.

5 Things You Really Don't Want To Know:

Disgusting things people have done in history



CAITLIN MCLAREN
3A CHEMICAL

Living in a more-or-less clean, hygienic society as we do, sometimes we forget that our ancestors didn't have any of our modern conveniences. Or the concept of germs. Or self-respect. Because sometimes, people in history did some really, really, disgusting things. Here are some things that our ancestors did (and if they aren't listed here, don't get cocky - I will get to them eventually):

Drinking reindeer pee (and human pee too)

Everybody knows someone who loves to get high. Some stoners will do a lot of things to get their buzz. This includes the peoples who lived in ancient Scandinavia and Northern Eurasia. Fortunately for them, hallucinogenic mushrooms grew a-plenty. Unfortunately, the mushrooms were poisonous, and humans can't digest them. Eating them can make someone violently ill. Many of these people were reindeer-herders, and soon they noticed that reindeer can eat dodgy mushrooms without any ill-effects.

I cannot imagine who first discovered this, and under what circumstances, but the psychedelic compounds in the mushrooms pass mostly unchanged through the reindeer's body and concentrate in a purer form in the urine. Drinking the urine can give you all the benefits of being high, without the vomiting - at least until you realize what you are drinking. What's more, often the urine would need to be concentrated by drying or freezing in order to be effectual. In these cases, a shaman would drink all of the reindeer pee, trip for a while, then tell everyone in the tribe what they had seen in the spirit world. The shaman would then collect his or her pee, and everyone else would drink it to get high themselves. Not that there aren't other uses for pee. For example:

Pee also makes a good hair dye

Much like today, the ancient Celts admired blonde hair. Unlike today, they did not have peroxide to bleach it blonde. You know what they did have? Ammonia. You know what their source of ammonia was? Cow pee. Cow pee is actually a perfectly viable way to bleach your hair - it wasn't even limited to the Celts. Some cow-herding tribes in Africa also did this, and some people do to this day. In fact, pee can be used to dye more that hair. It can be used to bleach clothes, or to fix a dye into cloth. The Roman emperor Vespasian introduced a tax on pee, which was used a good deal in the cloth industry (He wasn't taxing people who had to pee, he was taxing the dyers who wanted the pee). When his son complained about how disgusting this was, Vespasian answered, "Money doesn't stink." Of course, the Romans weren't very clean in other ways:

Sauce made out of rotten fish

Garum was an extremely popular sauce eaten in ancient Rome. It was made by throwing a bunch of fish into a vat and letting it "ferment," and by ferment I mean rot. In fact, they wouldn't even use the nicer meat of the fish - garum was made of the guts and other un-appetizing parts. For some reason, this was one of the Roman's favourite foods. It must be really delicious, considering that there is still a version of it eaten today: surströmming, a dish made of fermented Baltic herring, is still eaten in Sweden. Of course, it is mostly eaten outdoors, and is illegal on airplanes. (No, really. Surströmming is banned by major airlines, who claim pressurized cans of the stuff are potentially explosive.) Meanwhile, back to pee...

Pee can be used in medicine

Some ancient Roman doctors had the absolutely correct idea that a patient's pee can be used to help diagnose their illness. Unfortunately, they didn't have chemical tests, and some doctors decided to do a more primitive urine test. By this, I mean they drank it. Again, they weren't wrong - some conditions, such as diabetes, do change the taste of a patient's urine. However, some doctors took their practice a step further and began prescribing urine to their patients as a treatment. More sensibly, some Chinese doctors used to use urine for treating minor wounds. Urine is actually pretty clean, so … you know what? Blech. Forget it. This is just too much. Let's talk about something that isn't pee.

Necropants

Remember what I said about people who will do almost anything for drugs? Well, they will do absolutely anything for money. Case in point: Icelandic witchcraft. Possibly the most horrifying thing about necropants was that their making had to be consensual, or it wouldn't work. You had to get the dude's permission before he died… Necropants were trousers made of the lower half of a human skin. When your friend was dying (and it had to be a man, for reasons that will be clear in a minute), you first had to ask him: "When you die, is it okay if I take the skin from your legs and wear it as pants?" I cannot imagine any scenario where this ends well, but apparently it happened at least once, as the Icelandic Museum of Sorcery and Witchcraft has a pair dating from the 17th century.

So, when your friend dies, you bury him first. Then you dig him up, skin the entire lower half of the body (including the genitals, because at this point you are pretty much going for the creepiness record), tan the skin, and put the pants on. If you ever take them off again, they will lose their power, so if you want to give them to someone else, you should take them off at the same time as he climbs in, one leg at a time. So where does money come into this? Well, your work is only half over. Next, you need to steal a gold coin from a poor widow. Then you draw a certain magical sign on a piece of paper. Take both of these things and - remember how the friend had to be a dude? - you put them inside the scrotum. If you follow all of these steps correctly, the scrotum will be filled with magical money that will never run out. Say what you want, but this would have made Harry Potter so much better.

MetricWire

continued from p. 15

one of their surveys is one designed to determine stress levels – by asking specific questions at different times of the day, researchers were able to gauge how stressed participants were, and the reasons for the same.

Researchers from Waterloo and Vancouver, as well as those from other countries such as Australia and the Netherlands have found the application invaluable. "Around the time we first started, we realized that a lot of people wanted the product we were pitching but we had not completed building the tool yet", says Charles. The team required funding and investments in order to kick-start the app-development process, and decided to apply to the Velocity Fund Finals as a result.

MetricWire was successful in winning $25 000 at the VFF event in November 2013, and used the money to hire three co-op students in order to quickly expand their product and implement additional features. In June the following year, they applied to and joined the Y Combinator program at San Francisco. While there, they were able to obtain mentorship and funding from Silicon Valley's top tech leaders. "While our experience in San Francisco was great, we decided to base our company in Waterloo since there is such a great talent pool in the region, and there is much more competition in SF", says Charles. "The start-up culture here is really thriving and growing at a fast pace. A few years ago it was just Kik and a few others, but more recently there have been success stories such as Thalmic Labs and Vidyard".

MetricWire currently has twelve people on the team, and are always looking to hire more skilled people. With such a versatile and important research tool to offer, MetricWire seems guaranteed to grow and expand in order to cater to a large number of customers.

Peter & Zed's Excellent Advice

How to have a gr8 party

PETER SANTOS & ZED HERRING
1B POTATO POTATO

EXCELLENT ADVICE

If you're reading this, chances are you're an engineer – and if you're an engineer, chances are you have zero social skills and have never been to a party. Don't worry. We're Peter and Zed, and we're here to help. The following is an article full of poetry, insight, and the kind of advice that will get you into more than just your mom's yearly Christmas party.

Step 1: Picking a Party

Experience has taught us that to have a great night out, you've got to pick the party that minimizes any exposure to naked old men. On that note…

Step 2: Bring Backup

Like tumours, parties come in all shapes and sizes — some are bad (costume, pizza) and others are worse (lemon, Nazi). A sure way to have a great time at any party is to invite friends. If you're like us and remembered to block your mom, your Facebook event invitations can get you up to nine people. But if you're a real social animal and want to bring more people than that, you can always try making friends on Craig's List. Quantity over quality, we guess.

Step 3: ↑ ↑ ↓ ↓ ← → ← → B A Start

If we're as good at making sweeping generalizations as we think we are, then you, dear reader, are a socially awkward engineering student whose only experience with parties involves a LAN connection. Fear not! Many of the skills you learned playing League of StarCraft are transferable and apply to social gatherings when used correctly. Is the line for the bathroom too long? Zerg rush through there. Want to impress your friends at beer pong? 360 no scope that shit. If all else fails, just do what we do when we lose a game of Mario Kart at a friend's house – throw a tantrum and ask your mom to bring you home.

Step 4: Go to Laurier

If you're wandering around town at midnight and you still haven't found a party, you can always try Brad's house – he goes to Laurier and I hear his parents are out of town this weekend. If you're worried about getting in, don't: there's no way Brad's gonna stop your army of 300 Craig's List pals from having a good time. Also he goes to Laurier, so fuck Brad.

Step 5: Dress to Impress

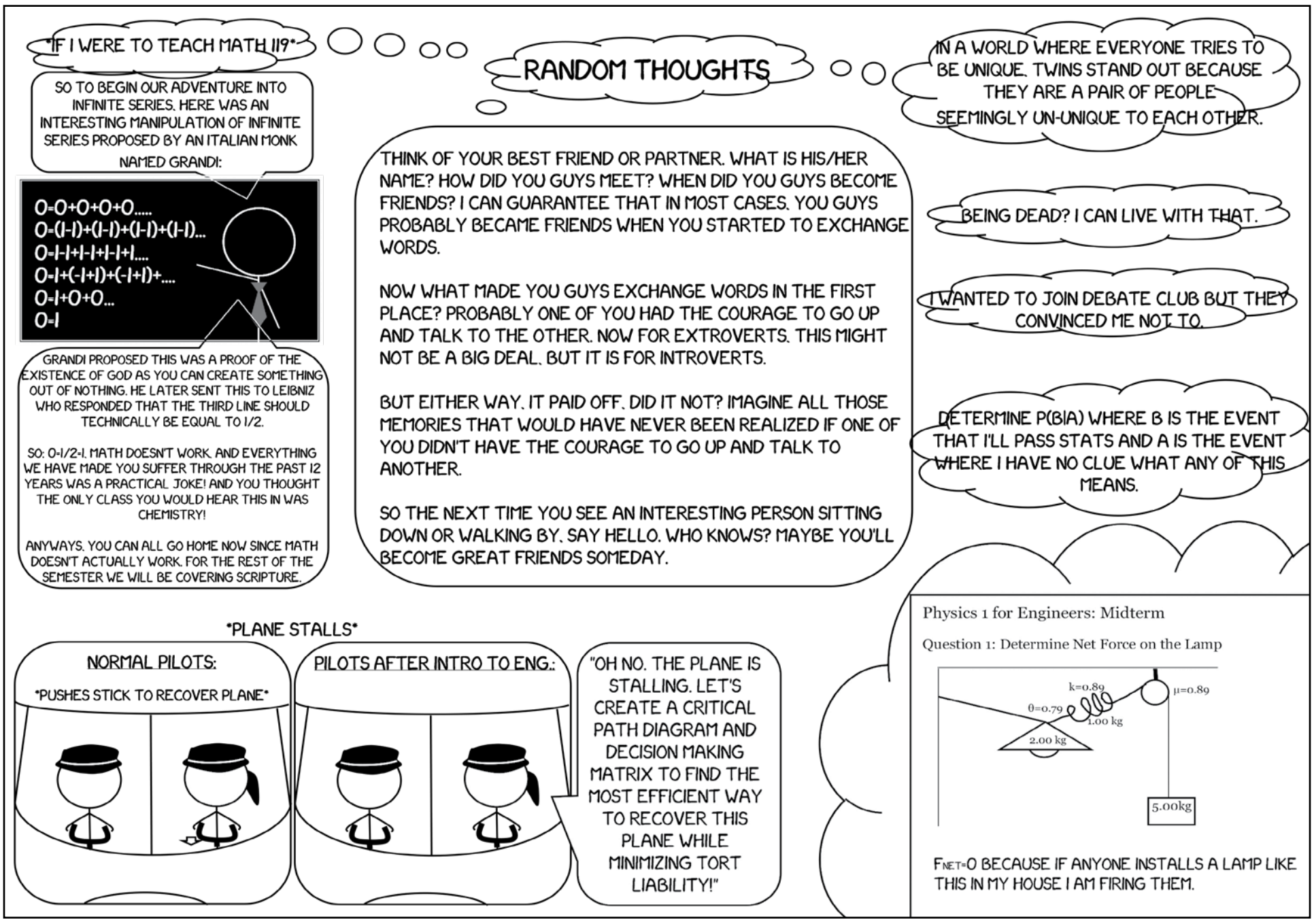
They say you can't judge a book by its cover, but they also say not to go outside wearing your sweaty, Cheeto-stained Barney the Dinosaur Halloween costume. Point is, if you're going to a party, you're gonna have to dress up. When it comes to cool threads, we recommend the fashionable Canada goose – everyone keeps talking about them and there are tons on campus. (We're not quite sure how you're supposed to wear a goose as a jacket, but fashion over function, we guess). If you can't wrangle a goose into submission in time for the party, just make sure you leave your house wearing more than just a pair of boxers – and please, try to clean the Cheetos crumbs off your face.

Bonus Tip: Don't Make it a Sausage Fest

Get pizza instead. No one likes sausages. They're gross.

In summary, use Facebook to get shitfaced and don't host the party at your own home: your mom's gonna be pissed when she finds out she wasn't invited.

Cups of indeterminate colour filled with mysterious liquid.



by David Rousso, 1B Nanotechnology

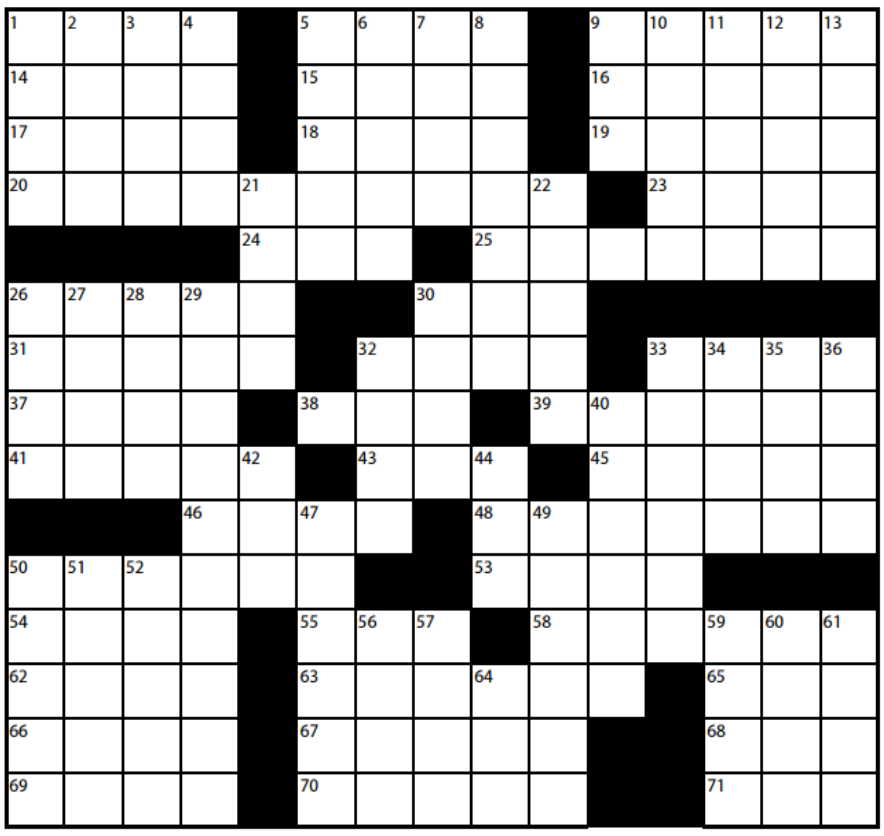
Dating an Engineer

by Joanna Liu, 1B Chemical

The Iron Crossword

The Final Frontier

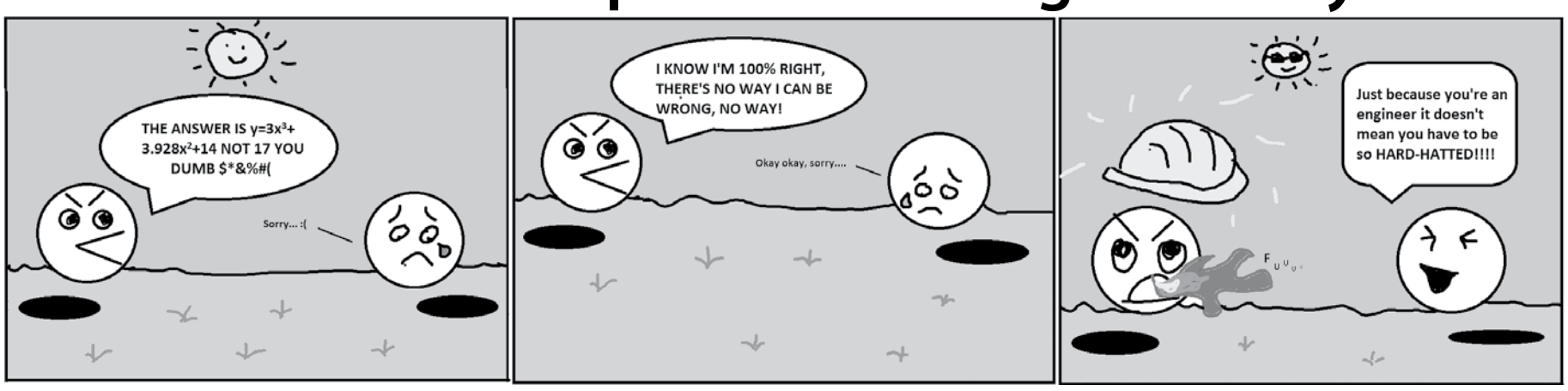
KATHY HUI
4B ENVIRONMENTAL



ACROSS
1. Set aflame
5. Inclined to
9. "Olde" city?
14. In the ocean
15. Compound in urine
16. The hunter constellation
17. Leafy drinks
18. Cyber Drone
19. Lukewarm
20. Michael Bay's 1998 space hit
23. The bubbly chocolate
24. A poetic song
25. Large rock
26. Half of Nolan's latest box hit?
30. Tibetan mountain animal
31. Accompanies tea
32. Hawaiian double named fish
33. Strong ray of light
37. Dark clothing problem
38. Watched
39. "Houston, we have a problem…" ship
41. Curvy roads or figures
43. Genetic code
45. Joining together
46. Thorny flower
48. At-home phone
50. Supermarket tasting
53. Melodic song in opera
54. Level
55. Advanced
58. Jesus's country
62. Indian flatbread
63. Indonesian tofu
65. Apple name
66. "What a pity!"
67. Perfect
68. Low lighting
69. Stack
70. Powerful blows
71. Summer (Fr.)

DOWN
1. ____ Shoe Museum
2. Graphical ___ Interface
3. Large unit of paper
4. US Space Agency
5. Went sledding
6. Diminish slowly
7. Geek
8. Yoda's swampy planet
9. 2-3 year old
10. Hair brand: L'___ Paris
11. Cleaned
12. Black (Fr. Fem.)
13. Ewok's moon
21. Bloodshed
22. Lumia's maker
26. Island (Fr.)
27. CBS Navy police drama (abbr.)
28. Lots
29. Trekky ship: *USS* _____
30. Expression of fatigue
32. Created
33. Canadian female astronaut
34. Frodo actor and The Book of ___
35. ___ vera
36. Tremblant or Blanc
40. Penalize
42. The Sun
44. Eureka moment
47. Water gone bad
49. Mermaid and gazelle
50. Boot or belt suffix
51. Garlic or chipotle sauce
52. Conductive material
56. Begin again
57. Bad sign
59. Assistant
60. Correct
61. Horse that cannot race?
64. Tetra ___

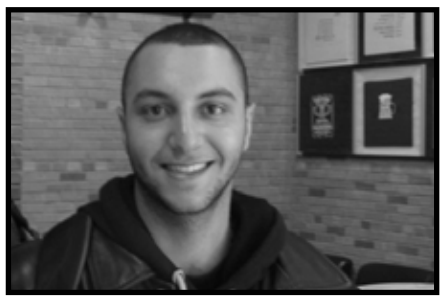
Hard Hat: Bad puns that lack good body



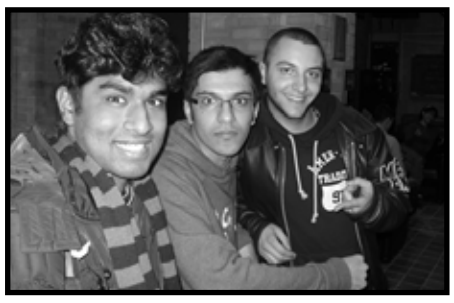
by Tim Cheung, 1B Chemical

THE IRON INQUISITION
Bryan Mailloux, 1B Mechatronics

"What is your favourite C&D food?"



"The cookies are amazing and everyone will agree!"
Abdullah Dolla Bills, 2A Hustling



"Lemon danish"
Abhirup Das, 1B Mech

"Lahme bi ajeen... Why are they 2 dollars?"
Hassan Mulla, 1B Mgmt

"Samosas... specifically the small vegetarian ones on the bottom shelf for 85 cents each.*"
Katie Chin, 3A Mech

"Zzzz... curry's pretty good... zzzz..."
Kenneth Wong, 1BTron

"Donuts!"
Mathias Koukal, 4A ECE