The California Tech

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Caltech Robotics Team gets its feet wet

MONICA ENLOW
Editor-in-Cheif

This past summer, the Caltech Robotics Team traveled to San Diego to participate in the 17th annual Internation AUVSI RoboSub Competition from July 28-August 3, 2014. The general objective of this particular competition was for each team to construct a fully autonomous underwater vehicle. The team took the past two years to work toward this competition, and placed seventh overall. This made them the highest ranked first-year team in the competition.

The first competition that the team participated in was the NASA RASC-AL Exploration Robo-ops Competition in 2011, where they placed second. After this success, why not participate in the same competition again? In the typical Techer way, they needed to up the level of difficulty. Junior Edward Fouad said, "[T]he team decided that we wanted a new challenge. Building a completely autonomous vehicle presents numerous difficulties for the programmers, and the water element requires that the mechanical design be robust against leaks to avoid losing thousands of dollars of electronics." The team rose to try and tackle every challenge that this new competition presented, and plans to return to this competition next year.

I had the chance to ask Edward Fouad some questions about the team and the competition, and he was gracious enough to answer on behalf of the team.

Monica Enlow: *What competition does the team participate in?*

Edward Fouad: This past year, we constructed a fully autonomous underwater vehicle named "Bruce" to compete in the International AUVSI RoboSub Competition. We plan to participate in the same competition again this year with a completely redesigned, second-generation vehicle.

ME: *Where is the competition held? Who hosts it?*

EF: The competition is held in San Diego in the TRANSDEC Anechoic Pool at the U.S. Navy Space and Naval Warfare Systems Center. The pool has a specially crafted geometry designed to mask all echos, and is used by the Navy to test sonar systems in an environment that mimics that of the open ocean.

ME: *Who were you competing against?*

EF: Our main rivals are Cornell and the University of Florida, who have been doing this competition for years and know how to build great vehicles. However, competitors come from all around the world. This past year included teams from Canada, Iceland, Sweden, Russia, India, Singapore, Japan, Thailand, Turkey, and Egypt.

ME: *What were the rules of the competition?*

EF: The rules change slightly from year to year, but the fundamentals usually stay about the same. The vehicles must be completely autonomous -- that means there's no human interaction after letting them go. In the pool, they must navigate to and complete eight different tasks. These tasks include bumping into buoys, maneuvering around an obstacle, firing torpedoes at a target, and picking up an object and bringing it to the surface.

ME: *What were the main objectives your team focused on when designing your sub?*

EF: Since the past year was our first entry into the competition, we used a very modular design approach. The frame of our submarine is constructed from 80-20 structural channel, which makes it very easy for us to reposition the thrusters, as well as other components that affect buoyancy. The sub contains four sealed compartments: a main pressure hull for our computer and main electronics, a compartment for the batteries, a camera housing, and a sensor module that contains an Attitude Heading Reference System and a Doppler Velocity Log. This approach allowed us to start testing early after assembling the key components, then add functionality over the course of the year with cameras, sensors, etc.

ME: *Tell us how you made your sub (materials, testing, machining, etc.). And give us some numbers (like the weight, power, pressure it can withstand) because Techers love numbers.*

EF: All of the components were machined ourselves, using equipment in the Mechanical Engineering shop on campus. Most of the structural components are made of aluminum, which we were able to have anodized a golden orange by a local shop in Pasadena. The final vehicle weighs 80 lbs and is powered by two 22.2V 10 Amp-hour LiPo batteries.

ME: *Tell us about the team itself (i.e., number of people on the team, breakdown of the classes, breakdown of the majors, who the leaders are, etc.).*

EF: The team currently has about 20 active members, but we are looking to expand this year. Most of our members are engineering or computer science majors, but we also have a fair number of applied physics, physics and math majors as well. We have five student leaders who manage the team and coordinate

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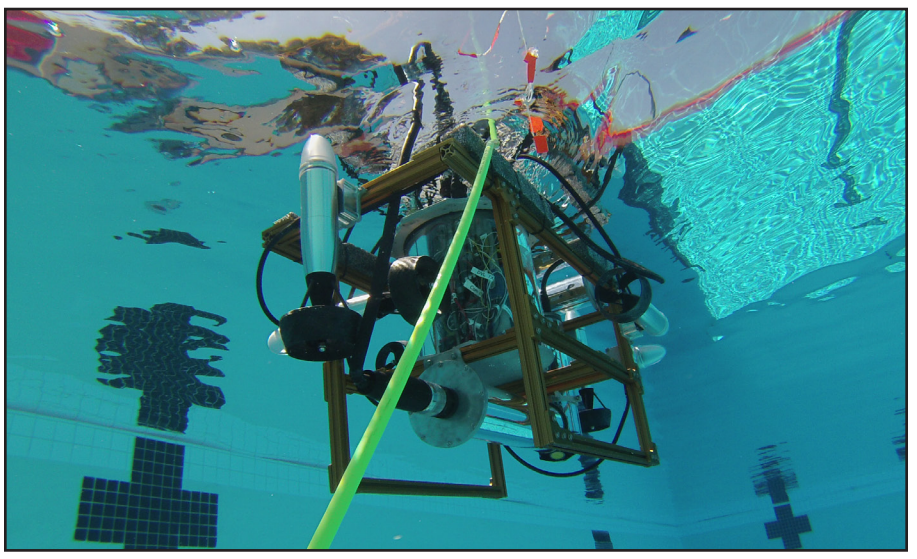
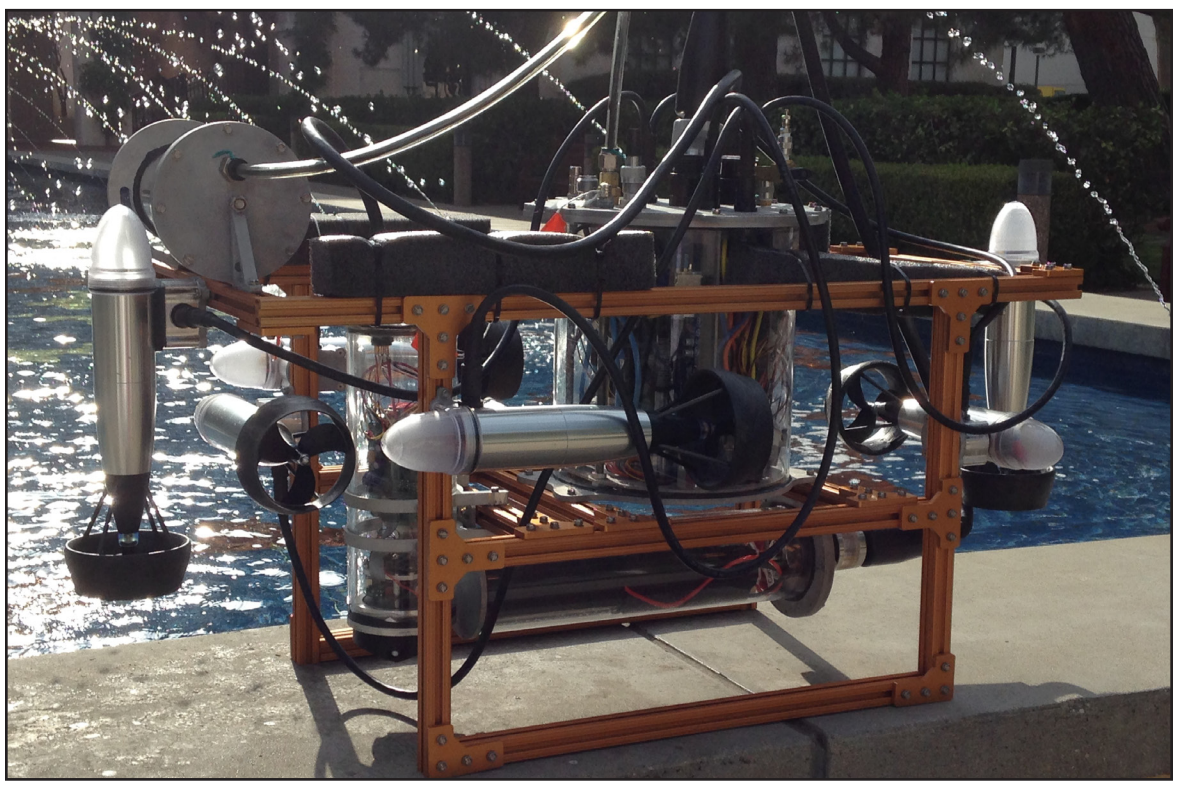


Bruce sports a nice shade of blue in the Caltech pool during some routine testing.
-Photo Courtesy of the Caltech Robotics Team



The submarine, Bruce, catches the brilliance of the California sun and the brilliance of Caltech's undergraduates.
-Photo Courtesy of the Caltech Robotics Team

Students should keep in mind DMCA policy

Student Contributor

In college campuses across the nation, DMCA policy violations are becoming more serious issues. Caltech has not remained immune to this trend. A techer writes on the gravity of this issue and its broader implications for Caltech.

The shift from life at home to life in a university is not just a social or academic transition, but is also a transition in legal responsibility as well. When we think of the Honor Code as Caltech students, we often associate this with academic integrity. However, the Honor Code also encompasses how members of the community share and use campus Internet resources. A common risk that poses harm to students downloading or sharing certain files through Caltech Internet is receiving DMCA complaints or notices. In this article, we will systematically highlight the DMCA process, the legal and IMSS penalties, why this also constitutes as a breach of the Honor Code and how to minimize the chances of this violation.

What is the DMCA? How can someone be implicated?

In our ever-increasingly connected world, online copyright infringement is getting easier and more common every day. As more content is moved to digital platforms, new laws have been passed to deter the copying and distribution of these contents without permission. A major legislation is known as the Digital Millennium Copyright Act (DMCA), which is a United States copyright law aimed to comply with two treaties with the World Intellectual Property Organization (WIPO).

Predictably, it outlaws the production or spreading of any technology, devices, or services through circumventing measures (sometimes called digital right management) created to control access to that product after it was initially sold. The key notion to take away from this piece of legislation is this: not only is it illegal for the transmitter to distribute the product once they acquire it, but it is also illegal for the receiver to download the product.

To best understand how to avoid such a violation, it is beneficial to

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IN THIS ISSUE

Caltech Y Column

CALTECH Y

The Caltech Y Column serves to inform students of upcoming events and volunteer opportunities. The list is compiled by Neera Shah from information given by the Caltech Y and its student leaders.

Founded by students in 1916, the Y was organized to provide extracurricular activities planned and implemented by students as an opportunity to learn leadership skills and discover themselves. More information about the Caltech Y and its programs can be found at https://caltechy.org. The office is located at 505 S. Wilson Avenue.

Upcoming Events:

1. Hathaway Sycamores Tutoring

Thursday | October 9th | 5:30 - 8:30 PM | Highland Park

Volunteer at Hathaway-Sycamores, a group that supports local underprivileged but motivated high school students. There are a variety of ages and subjects being tutored. The service trip includes about an hour of travel time and 2 hours of tutoring. Transportation is included. For more info and to RSVP email Sherwood Richers at srichers@tapir.caltech.edu.

2. Caltech Y - Grand Canyon Camping & Hiking Trip

October 10th - 12th | Sign up at the Y on Monday or Tuesday (Sorry we are closed Friday)

Looking for a great way to kick off the year and make some new friends? Why not join us on a camping and hiking trip to the Grand Canyon. The Grand Canyon is one of the most spectacular natural places in the world and with some great hiking and camping this trip is a great get away.

The trip departs Friday, October 10th at 7 AM and returns on Sunday, October 12th by 10 PM. Transportation, campsites, and most meals are all included. No camping experience is necessary. For more information on the trip contact the Caltech Y. For more information on Grand Canyon National Park visit the National Park web site at www.nps.gov/grca and check it out for yourself.

Last chance to sign up at the Caltech Y on Monday, October 6th or Tuesday, October 7th. Payment ($120) is due on signup and spaces are limited.

3. Mt. Waterman Hike

Sunday | October 12th | 8:30 AM - 3:00 PM

Attention new students! Are you a fan of the outdoors and hiking, but don't know about local trails and hikes? The Caltech Y Outdoors group has a hike that is perfect for you. On Sunday, October 12, we will hike on the Mt. Waterman trail in the center of the San Gabriel mountains. This easy to moderate hike is six miles long with about 1200 feet of elevation gain. The Mt. Waterman trail offers views of the entire San Gabriel mountain range, the Mojave Desert, and Downtown LA and the Pacific Ocean on especially clear days. This is also a great hike for beating the heat of the valleys and getting some clean air high in the mountains. The entire Caltech community is welcome on this hike, but priority will be given to new students and people with cars to help get us to the trail. If you are interested in the hike, sign up at the link https://docs.google.com/forms/d/1qaZ2QYwN-G_v8ky8dl_Fn7ntJSeUqOEmL8bxkGjnsi4/viewform?usp=send_form.

If you have any questions, email Jeremy Sandler at jsandler@caltech.edu.

Techer advises students to avoid violating national DMCA policy

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understand how the underlying process works.

This is generalized in the follow steps:

1) An Internet host provider ("Host") receives a Notice of Copyright Infringement ("Notice") as delineated by the DMCA. The Host will search and confirm that the Internet address of the suspect in the Notice is indeed a customer of the Host provider.

2) If it is confirmed, the Host will notify its customer of the Notice.

3) The suspect has three options to proceed:

a) Remove the alleged content.

b) Settle directly with the complaining party.

c) File a counter-claim challenging the initial Notice.

4) If option 'a' is taken, the Host notifies the complaining party and the case is closed.

5) If option 'b' is taken, the suspect and the complaining party resolve the matter and the Host takes no action.

6) If option 'c' is taken, the Host is required to disable Internet access for a period of 10 to 14 business days and send the counter notification to the complaining party; this is known as the challenge period. It is at this time that the originator of the DMCA notice can initiate litigation. If no litigation is filed within this period, then the case is considered dropped and the Internet is reactivated by the Host. Else the complaining party must either withdraw the complaint or file legal action seeking a court order to restrain the customer.

The DMCA legislation is applied to anyone who is active on the Internet, even before entering onto a university campus. However, unlike a Host provider for a private residence, universities such as Caltech effectively shield all the students' Internet identities with a virtual wall, where all Internet activity seen from the outside is tied to one main university address. Thus, regardless of who engaged in illicit activity, Caltech is the main receiver of all the DMCA complaints.

What are the possible legal and IMSS penalties?

In principle, the DMCA legislation permits registered copyright owners to file a lawsuit in a federal district court. Besides having the power to place injunctions, these federal courts also have the power to force the defendant to pay actual damages up to $2,500 per violation, or "statutory damages" up to $25,000. For "willful" infringement, the courts could award up to $150,000 per work infringed. If the material was used for financial gain, the accuser may also claim any profits the defendant made.

Even though these risks may seem small compared to the budget of a university, factors such as the sheer Internet traffic of the student body and the host of unaccounted legal fees make this a potentially massive problem. Also, while cases may only result in a few hundred dollars in fines, being fined at astronomical values is more common and easier than one might think. To better comprehend how this law can affect everyday people, it is helpful to review some real-world cases.

In the case of *Sony BMG Music Entertainment et al. v. Tenenbaum*, which lasted from 2009 to 2013, a federal appeals court ultimately upheld a $675,000 fine issued against a former Boston University student for both downloading and distributing music in violation of the DMCA. The reason for this fine was for downloading 30 music albums online over a span of a few years. By evading tens of dollars for each album, the former Boston University student was forced to compensate $22,500 per album. As highlighted in court, this individual regularly ignored numerous warnings of the illicit activity from numerous recording companies. Now a postdoctoral scholar in physics, this former Boston University student has to face the prospects of a heavy financial burden as the Supreme Court denies his appeal.

In the even more severe case of *Capitol Records Inc. v. Thomas-Rasset*, which began in 2009, a 32-year-old Minnesota woman was eventually found guilty of downloading music illegally. In exchange for just 24 songs, this woman was fined $80,000 per song, adding up to $1.9 million dollars total. This is especially shocking when considering that each of the songs would only cost 99 cents in retail price. The battle between the plaintiff and the defendant went through multiple appeals for many years until 2012. At that time the award was finally fixed at a total of $222,000, still a massive value relative to the original price of the songs.

> "Even without debating the moral and ethical reasons to avoid copyright infringement, the legal punishments alone can be very daunting and real."

Even without debating the moral and ethical reasons to avoid copyright infringement, the legal punishments alone can be very daunting and real. When individuals violate these laws, there is a valid chance of finding themselves in court cases with a huge imbalance. Often these complaining companies are represented by powerful law firms with substantial resources, with legislation that is on their side.

Additionally, Caltech IMSS policy has in place a system of increasing severe sanctions against students who are found to violate DMCA policy.

In the first offense, access to the Caltech network by the computer referenced in the complaint remains blocked until the student has spoken with the appropriate Dean or Human Resources representative. This meeting is important for future prevention since the required copyright tutorial helps analyze why the alleged act is not legal or permitted at Caltech.

In the second offense, student network access is blocked for 5 days and the student must see the Deans and an attorney at the Office of the Intellectual Property Counsel. Any future infringement activity will be considered an Honor Code violation and will be reviewed by a disciplinary committee.

In the third offense, the student network access is terminated until the Dean of Students or the Conduct Review Committee determines the proper disciplinary action. Consequences could involve separation from the Institute for the term and fines of up to $500.

Why is this a violation of the Honor Code? How can I share files safely?

While file sharing software programs are not illegal, they can be used illegally to violate United States DMCA laws depending on the content and how it is shared. It is safe to say that many millions of Internet users are sharing files online every day legally. From textbooks to software programs, file sharing can have its place in education as well as entertainment. However, modern peer-to-peer (P2P) file sharing programs can also pose a big risk when uploading or downloading any type of media potentially with a copyright protection. Because of P2P file sharing's incredibly high speeds, lack of publish-subscribe model, and open-source code, this form of file sharing is easily targeted and very unpopular with many copyright authorities.

Whether it is the Internet at Caltech, Starbucks, your home, or the public library, this danger is always present regardless of which computer network. By using the Internet at Caltech, all students are sharing a joint resource provided to help enrich our academic and personal lives. Unlike individual household Internet services, where each customer is effectively designated by a unique address, Caltech's Internet service protects the identities of each student. So while each student enjoys anonymity, this access also requires conscious responsibility of students to use this resource safely. Any abuse or violation of these laws, whether intentional or not, puts the individuals involved at risk and is an unfair advantage at the expense of the whole Caltech community.

In an institution heavily associated with its honor code system, Caltech students need to recognize and respect intellectual property of all sources, whether internal or external to our community. This is core to our university mission statement to expand human knowledge through research, and not to purloin other people's works. The easiest way to avoid these risks is to avoid P2P file sharing systems completely. Particularly troublesome are systems based on the "torrent" technology, as they are most often implicated in DMCA violations. Certainly there can be legitimate uses of P2P file sharing such as through legal BitTorrent networks or files that are covered by the Creative Commons License (CCL). However, the wisest approach when facing ambiguity is to simply reach out to ask questions. Caltech provides many resources and options to provide answers on safe Internet practices such as the IMSS's online guidelines, campus IMSS representatives, and even the Deans' Office, to name a few. As we progress further down the digital age, the complexity of intellectual property infringement will only get deeper and claiming ignorance cannot be an excuse to overlook these dangers.

Aphex Twin releases new album after 13-year break

NAILEN MATSCHKE
Contributing Writer

Aphex Twin, alias of British electronic musician Richard D. James, is a member of an elite category of artists whose work, while not enjoyed by all listeners, is universally respected amongst fans, critics, and peers alike for its obsessive attention to detail, comprehensive understanding of its predecessors and contemporaries, and undeniable influence it has had on not just Aphex Twin's fellow experimental artists in the domain of electronic music, but also the field as a whole. Albums like *Selected Ambient Works 85-92*, Aphex Twin's now 22-year-old debut LP, still hold their own in the midst of a genre that has transformed in unimaginable ways, with each pushing James' sonic repertoire in new directions, breaking new ground in its use of elements from just about every relevant electronic genre from the '90s, and demonstrating a technical mastery rivaled by at best a handful of producers.

Elevating Aphex Twin's image even further was the enigmatic, frustrating, and generally one-of-a-kind personality of the man behind the music. Between secretly releasing music under several pseudonyms, odd stylistic choices such as 2001's *Drukqs* (Aphex Twin's last LP before *Syro*) with its mix of abrasive breakbeats and calm minimalistic piano, and quotes such as "my music's my favorite music ever," James has played the part of the genius artist to a T, and after a 13-year gap between albums, it would be hard to overstate the anticipation that fans have had for *Syro*. Fortunately, it's pretty much exactly what you would predict if asked a few years ago what Aphex Twin would sound like in 2014, and I would be surprised by anyone disappointed by the release; on the other hand, I can't help but feel as though I wanted more.

Syro opens up with "minipops 67 [120.2] [source field mix]" and its clean, precise beat with just the right amount of swing and funk to make it eminently danceablewithout sacrificing casual listenability. James wastes no time adding a few staccato, echo-laden synths, and then some wispy sustained notes in the background, building up the track for its first minute with some indecipherable (but clean) vocal samples, and an ever-more-complex beat topped with a narrow but deep stack of shifting sonic textures. The song continues on with several cycles of buildup, plateau, and deconstruction back to the original beat and smattering of synth notes, never once reaching the sort of climax prevalent in modern electronic dance music, but consistently flowing smoothly between rich sounds that seem to change constantly but only draw attention to this fact at key moments. It is immediately apparent that James is nothing short of a technical master of producing, and while this is (very) far from the first time anyone has noticed, the sheer fidelity and freedom that 2014's technology affords Aphex Twin's sound is jaw-dropping. Every time I've listened to it I've just been blown away by not only how compositionally dense this record is, but also by how incredibly good it sounds. As far as I'm concerned, *Syro* demonstrates that James is the most skilled electronic music producer in the world, bar none.

-https://ifoundmusic.com/

The second track, "XMAS_EVET10 [120] [thanaton3 mix]," is a hulking 10.5 minutes long, and again is primarily comprised of variations on, additions to, and re-incorporations of the same beat and synth patterns. With any other artist this would likely be a red flag, but somehow Aphex Twin makes it work, and does it well. At various points the beat become faintly shadowed by what seems to be a tabla drum, while the ethereal synths in the background swirl around together and glide in and out of the sound's forefront, sometimes reacting to the sharp cadence of the drums and other times relegating the beat to the sole purpose of keeping steady time. The fact that it is possible to make it through a song two to three times the length of typical works in its genre and not even notice this is a tribute to how well James is able to keep his music's momentum. Even more impressive is that he is able to continue to do this for the rest of the album. While someone could play any two of the first eleven tracks and be able to tell that they were from the same album, the attention to small details never fades.

Eventually the album's energy level gets kicked up a few notches, giving us tracks such as "180db_ [130]" with its wall of sharp synthesizers sliding from one pitch to another with shimmering, warped notes filling in the gaps and "CIRCLONT14 [152.97] [shrymoming mix]" with its distorted vocal samples, breakbeats, and relatively large assortment of strange noises. Even though electronic music has changed greatly, James still shows the same lack of fear to go where others tread lightly.

However, this does not equate to innovation, and ultimately I feel as though this album is held back from really making an impact to the genre by its adherence to Aphex Twin's own tropes. The meaty analog synths, the mix of breakbeats with funky dance grooves, and the mix of expertly arranged music with grating noise that still manages to sound great are all there, and listening to *Syro* is like a study in Aphex Twin's discography. Unfortunately, all of this fails to introduce anything new, and I worry that once the awe at a new Aphex Twin album wears off, *Syro* will be mostly forgotten in the current musical landscape. It seems as though James' preference of his own music has, perhaps unintentionally, led him to ignore many of the innovations in electronic music within the past few years. While including them would probably have resulted in a rougher album that simply could not have been so finely tuned as it is, I think listening to it would have been a more interesting experience.

That said, I don't plan on taking *Syro* out of my everyday listening rotation until I find all of the little secrets James has hidden in it, and I highly recommend it to anyone with more than a passing interest in electronic music.

CRT anticipates a hopeful and exciting new year

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the various logistical aspects: Justin Koch (Project Manager), Solomon Chang (Programming Team Lead), David Flicker (Electrical Team Lead), Edward Fouad (Mechanical Team Lead), and Erin Evans (Fundraising / Outreach Team Lead).

ME: *What is each sub-team responsible for?*

EF: The mechanical team is in charge of the physical design of the robot, component placement, buoyancy calculations, and pressure analysis, as well as overseeing the machining of all necessary components. The electrical team designs both the power distribution system from the batteries to the thrusters, and the computer-side electronics for interfacing with various sensors. The programming team manages the software framework that allows the robot to take in sensor data, process camera images, drive the thrusters & other actuators, and manages the higher level mission planning / decision making algorithms. Finally, the fundraising / outreach team reaches out to new sponsors, organizes fundraising events, and plans engineering outreach activities with local schools and robotics teams.

ME: *How well did your robot do during the competition?*

EF: Our robot was able to complete the first two tasks of the competition: driving straight through the entrance gate and hitting colored buoys in the right order. We placed 7th out of 38 teams and were the highest ranked first-year team.

ME: *Did anything particularly exciting or unexpected happen at the competition?*

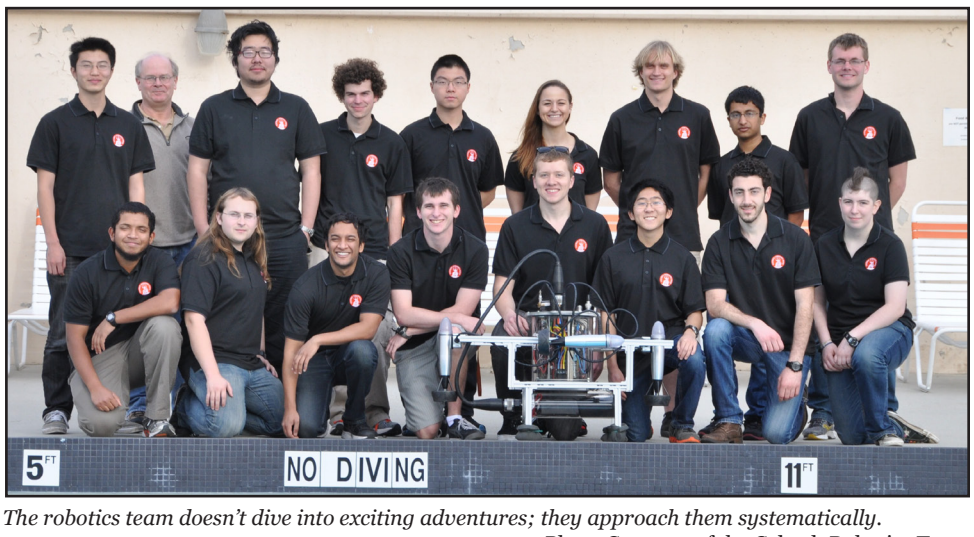
EF: It was very exciting to see our robot searching for a buoy, lock onto one, then drive straight forward and hit it dead on. While it may sound easy in principle, successfully executing this simple routine required processing data from multiple sensors, advanced vision algorithms, and months of testing in the Caltech pool.

ME: *Did the team win any awards?*

EF: We won the best new entry award. The judges were very impressed with how far we had gotten as a first-year team.

ME: *Tell us your favorite part about being on the team.*

EF: I love the opportunity to work with a large group of people in tackling a complex engineering problem. Since most of the schoolwork we do at Caltech tends to be theoretical in nature, the robotics team offers a unique opportunity to develop real-world technical knowledge, design experience, and teamwork skills.



The robotics team doesn't dive into exciting adventures; they approach them systematically.
-Photo Courtesy of the Caltech Robotics Team

ME: *Tell us a memorable moment you have from either the competition or the building process.*

EF: The most memorable moment of the past year was when we put the robot in the water for the first time. No one really knew for sure whether it would sink or float, or whether the pressure hull or battery compartments would leak. Fortunately, nothing leaked -- but the robot did flip upside-down! That prompted us to do a better job of maintaining our center of mass and center of buoyancy calculations as the design continued to develop.

ME: *What should students do who are interested in joining the team?*

EF: We will have a booth at the club fair on Thursday 9 October, so come stop by to see our vehicle and learn about the team! We'll have information about our meeting schedule for the year. Also, visit our website at crt.caltech.edu to learn more about the team and our vehicle.

ME: *Who are your sponsors that you'd like to thank for their support?*

EF: We are very fortunate to have the support of Professor Joel Burdick for advising the team and giving us work space in his lab, as well as the Caltech Athletics department for allowing us to test weekly in the Caltech pool. Additionally, the team has many corporate sponsors who donate funds, parts, and engineering expertise. We would like to thank L3 Ocean Systems, Thales Avionics, Cooper Interconnect, VideoRay, HSMWorks, Impresa Aerospace, Western Digital, Teledyne Impulse, and VectorNav.

Research Spotlight

The Tech is starting a new feature, and would like YOU to submit your research! If you would like your research featured, submit part of your research paper, your abstract, pictures of your lab, and/or pictures of your cool science to be featured in the paper. Email: tech@caltech.edu

There were no cross-country pictures last week

GOCALTECH.COM
Actual Sports Content Editor

CLAREMONT, Calif. - After spending the last three weeks training, the men's and women's cross country teams made the most of the opportunity to race at the Pomona-Pitzer Invitational.

The men took to the course first in the 8km race. Aditya Bhagavathi '16 led the way again with a big personal-best time of 26:06.8 to place 21st overall. The time was a 39-second career-best and moved him to No. 2 on the Beaver's all-time 8k performance list. Following him through the chute was Ian Koss '15 in a time of 27:28 for 93rd overall. Koss's time was a 23-second seasonal-best. The next three Beavers across the line were seniors Jared Forte, Eric Martin and Juan Adame, all making their season debuts. The trio ran 27:56.8, 27:57.4 and 28:48.1, respectively. Alexander Anemogiannis '17 and Elliot Simon '16 rounded out the varsity performers for the Beavers. Anemogiannis crossed in 29:01.7 with Simon next in 30:14.9. Also racing were Joel Kosmatka '17 (31:13.7), Rishabh Pipada '17 (32:03.5) Gene Vaughan '18 (32:15.4), Mason MacDougall '18 (36:34.8), and Alex Port '15 (37:43.0). Apart from Pipada who was making his season-debut, all of them ran large season-bests.

"It was the most complete squad we've raced this season so far. For three of our top five runners it was their first race," said Adame, the co-captain. "Although we're pleased with our performances, I think we just see these as starting points and I believe we have a lot of room for improvement."

The men placed 13th overall with a score of 434 points. That placed them fifth among six SCIAC teams that ran full squads, just 18 points behind Whittier and 42 points behind Redlands.

The women took to the course for their first 6km race of the season. Women's captain Stephanie Reynolds '15 led the way, covering the course in 24:07.0 to finish 55th overall. The next three finishers for Caltech were all running the first 6km race of their careers. Caroline Atyeo '18 ran 26:28.3, a time which ranks her 14th in Caltech history. Next were Gauri Shastri '17 (28:02.8) and Gillian Kopp '18 (29:30.7). Emily Jensen '16 rounded out the team scoring as the fifth finisher across the line in 30:24.7. The group of Carla Watson '15, Sheila Lo '16, and Kate Evans '17 worked together throughout the race and saw nice improvements over their performance from three weeks ago. The trio crossed the line in 31:44.2, 32:13.7 and 32:21.9, respectively.

"I'm excited to see how we're improving. A lot of women ran a faster pace today than they did at Riverside, which was a shorter race. I can't wait to see who we can beat at Multi-Duals," said Reynolds.

The women placed 14th overall, taking down SCIAC foe Whittier in the process.

"Both teams have been working very hard and stringing together some great training," said coach Ben Raphelson. "I was glad that they got to see that their hard work is paying off. Mason MacDougall and Alex Port had tremendous drops of nearly 3:00 and 8:00 respectively, but even without them factored in, on the men's side we saw an average improvement of 43 seconds per person over our times at Riverside. For the women who had raced previously, each maintained or improved their pace for a longer distance, which shows we're on the right track. We're looking forward to the championship portion of our season to begin."

The women's team gets ready to rumble.
-Sheila Lo's Father

Here is a cute picture of Sheila Lo and Carla Watson. A special thanks to Sheila's dad for taking these pictures! We greatly appreciate being able to use them.
-Sheila Lo's Father

This Oxy dude is clearly not as cool as we are.
-Sheila Lo's Father

Alex Anemogiannis is so majestic.
-gocaltech.com

"No, Ane! Come back! I didn't mean it like that," Juan Adame yelled as Alex Anemogiannis ran off into the sunset.
-Sheila Lo's Father

Upcoming Games

Women's Volleyball
Sat. Oct. 11 @ 1p, 6p - Mills College
Tues. Oct. 14 @ 7:30p - CMS
Men's Water Polo
Sat. Oct. 11 @ 12p - Alumni Game
Men's Soccer
Sat. Oct. 11 @ 4p - Occidental
Wed. Oct. 15 @ 4p - Redlands

Kevin Gao uses his feet to play soccer, not football...just in case anyone was confused.
-gocaltech.com

Scoreboard

Women's Volleyball
Tues. Sept. 30 vs.
Whittier - L, 3-0
Fri. Oct. 3 vs.
Cal Luteran - L, 3-0
Sat. Oct. 4 vs.
Pomona-Pitzer - L, 3-0

Men's Water Polo
Thurs. Oct. 2 vs. Washington & Jefferson - L, 14-8
Fri. Oct. 3 vs.
Penn St. Behrend - L, 12-11
Fri. Oct. 3 vs. MIT - L, 16-4
Sat. Oct. 4 vs. Penn St. Behrend - W, 11-4

Men's Soccer
Wed. Oct. 1 vs.
Pomona-Pitzer - L, 1-0
Sat. Oct. 4 vs.
Chapman - T, 1-1

Cross Country
(out of 16 total teams)
Men's - 13th place
(out of 17 total teams)
Women's - 14th place

The game we didn't tie

GOCALTECH.COM
Actual Sports Content Editor

PASADENA, Calif. - Following a narrow one goal defeat last time out, Caltech was again the unlucky one on Wednesday. Pomona-Pitzer came to town and, in a nail-biting contest, scored a 1-0 victory.

In a game between the two longest serving coaches in the conference, Caltech's Rolo Uribe and Pomona-Pitzer's Bill Swartz, the Sagehens (8-2-1 overall) entered play as conference leaders and strong favorites. However, a tactical game of chess emerged with the visitors trying to dominate the wings and the Beavers trying to take hold of the middle. The result was a game that was close from start to finish.

The Sagehens passing was on-point from the off, but strong play in the middle of the pitch from Caltech freshman duo Bobby Sanchez and Masaharu Ono meant that the Beavers were always a threat to counter through speedy wingers Kevin Gao and Evren Gokcen. A tight first half resulted in only one good chance apiece. First. P-P's Peter Rentzepis hesitated in front of goal allowing Jared Schaeffer Reed to make a goal-saving tackle. Shortly afterwards, a cross from Caltech's Marec Serlin found Gao free and unmarked eight yards out but, facing the sun, the sophomore midfielder miscued his header high and wide with the goal gaping. The halftime whistle went with 0-0 representing an accurate representation of the action.

The first goal was always going to be key and, seven minutes into the second half, the Sagehens were the ones to get it. Caltech failed to fully clear a corner and P-P's Jake Merkle was there to slip the ball past goalkeeper JD Feist (six total saves). Pomona-Pitzer began to exert a stronger grip on possession after the goal but was restricted to long range strikes that were either off-target or easily handled by Feist.

Caltech sent numbers forward in the last 20 minutes in search of an equalizer but, even with goalkeeper JD Feist joining the attack in the opposition penalty area, P-P defended their goal with poise.

It was an impressive performance from the whole Caltech team. Special mention goes to the Beavers back-four of Teo Wilkening, Adam Ball, Jared Reed and Valentin Skoutnev. They operated as a strong unit that afforded the visiting frontline very little space, and helped launch numerous Caltech attacks.

Announcements

Announcement from the Counseling Center:

MEDITATION MOB STARTS TUES. OCT. 14

Do you have trouble paying attention to what you're doing because you're already thinking about what's coming next? Want to feel less overwhelmed when you have strong emotions? Want to improve your concentration? Come learn some more about mindfulness meditation – it's just about being fully present in the moment and being aware of your thoughts, emotions, and experiences without getting caught up in them.

The Meditation Mob is a weekly drop-in mindfulness meditation group facilitated by Lee Coleman from the Counseling Center. In the group, we'll talk about mindfulness meditation from a secular, evidence-based perspective, and will practice the tools you need to get to know yourself better. We'll meet from 12:00 until 12:50 on Tuesdays, starting on October 14th. We'll meet on the bottom floor of Winnett in the side room where the Wired computer store used to be. Come as you are, and we'll be done in time for you to get to your 1:00 class. All grads and undergrads are welcome. For more information, you can mail the facilitator at meditate@caltech.edu. See you there!

News briefs from around the globe

Need to know <100 words about the world this week

US to send help for Ebola containment

4000 troops approved for deployment to Liberia to help fight the spread of Ebola [TIME]

Woman with transplanted womb gives birth

1st baby born to a woman with a transplanted womb, seven other womb transplants reported successful [ABC]

US and India sign space agreement

2020 decided as target for joint radar spacecraft to study the Earth [TIME]

Winter Olympics host bids decrease

4th city to do so, Oslo withdrew its bid to host the 2022 Winter Olympics [TIME]

Protestors remain in Hong Kong

165 injured since protests began last week [CNN]

Typhoon Phanfone hits Japan

2 US airmen confirmed missing, one dead in Japan due to typhoon [CNN]

Polio spreads in Pakistan

202 cases marks 15-year record high for Polio outbreak [BBC]

Presidential Inauguration

On October 24th, the Provost has declared an institute holiday to celebrate the inauguration of Caltech's 9th President Dr. Thomas F. Rosenbaum. The inauguration ceremony will begin streaming at 2 pm and there will be an all-campus reception to follow.

Dr. Rosenbaum and his wife, Dr. Katherine Faber, Simon Ramo Professor of Materials Science, have joined the Caltech Family and we wish them all the best!

NOMINATE YOUR FAVORITE PROFESSOR FOR THE FEYNMAN TEACHING PRIZE!!!

Here's your chance to nominate your favorite professor for the 2014-15 Richard P. Feynman Prize for Excellence in Teaching! You have from now until January 5, 2015 to submit your nomination package to the Provost's Office to honor a professor who demonstrates, in the broadest sense, unusual ability, creativity, and innovation in undergraduate and graduate classroom or laboratory teaching.

The Feynman Prize is made possible through the generosity of Ione and Robert E. Paradise, with additional contributions from an anonymous local couple. Nominations for the Feynman Teaching Prize are welcome from faculty, students, postdoctoral scholars, staff, and alumni.

All professorial faculty of the Institute are eligible. The prize consists of a cash award of $3,500, matched by an equivalent raise in the annual salary of the awardee. A letter of nomination and detailed supporting material, including, but not limited to, a curriculum vitae, course syllabus or description, and supporting recommendation letters

should be emailed to kkerbs@caltech.edu or directed to the Feynman Prize Selection Committee, Office of the Provost, Mail Code 206-31, at the California Institute of Technology, Pasadena, California, 91125. Nomination packages are due by January 5, 2015.

Additional information including guidelines for the prize and FAQ may be found at http://provost.caltech.edu/FeynmanTeachingPrize. Further information can also be obtained from Karen Kerbs (626-395-6039; kkerbs@caltech.edu) in the Provost's Office.

The California Tech

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The advertising deadline is 5 PM Friday; all advertising should be submitted electronically or as camera-ready art, but *The Tech* can also do simple typesetting and arrangement. All advertising inquiries should be directed to the business manager at *tech@caltech.edu*. For subscription information, please send mail to "Subscriptions."

Get Fit with Brad/Chad

BRAD CHATTERGOON
Contributing Writer

Fitness Myths Part 1

Hey, Techers. Rotation is finally over! Can I get a "whoop whoop"? I hope that all you frosh are settling into your houses well and especially a big welcome to the new Page House frosh class. One of the positives to the end of rotation is that you get a few more hours into your day and might I suggest that you take one of those hours and invest it in yourself by getting some exercise. The freshman 15 is a real and ever-present danger, and from my years here so is the senior 60. To kick off this term's column here are some fitness myths that could really do with serious debunking.

Photo courtesy of Brad Chattergoon

"You need to drink protein shakes to see results." While protein shakes do have their uses and can help to meet your protein requirements if you are unable to get them from your food, they are not necessary. One of the most important parts of getting fit is rooted in your diet. Eating right is critical, but "right" here does not mean "organic" or "natural." Those are personal choices. There will be a following article on this topic soon.

"If you want to be strong you need to be huge." While there is a direct correlation between muscle size and strength, this does not paint the entire picture. Our muscles can be trained to do different things. Absolute strength is a function of how dense our muscles are in the sense of how many muscle fibers we have. The ability to do sustained (high volume) lifting is a function of how well our bodies can supply oxygen and respiratory materials to our muscles, which can be more of a function of how much blood exists in our muscles at any given time. Strength often comes from training with the first in mind and size from the latter. Regardless of this, "strong" is a personal standard. If you can squat 225 lbs I'd say you're pretty strong but if you said you squat two times your body weight I'd also say that you're strong. It is what you define it as.

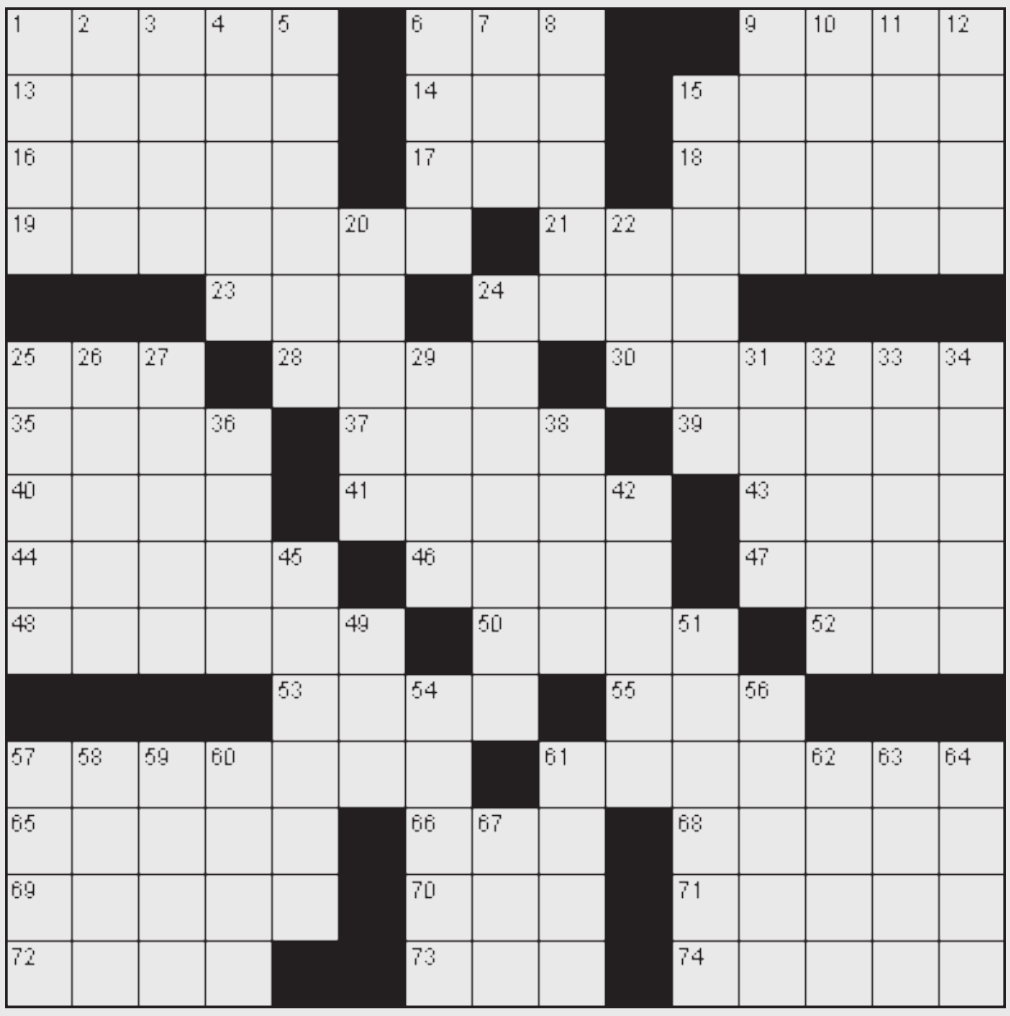
Relatedly, "women shouldn't lift weights because it'll make them bulky." One of the big factors that determine how sizeable one's muscles become is testosterone, and I'm sorry for you ladies who want to be female mountains but you just don't have enough of it to get huge. Men from 25 to34 years have an average around 617 ng/dL while women in the same range have an average around 50 ng/dL. In short, lifting weights won't get you big. It will, however, encourage fat loss and lean muscle gain.

"You can get a six pack/flat tummy by doing crunches." If only. The appearance of your mid section is primarily a function of your body fat percentage. This is a measure of how much of your body mass is derived from fat. For a male to have a six pack or keep it flat you're going to need to get this number down to around 10-12%; for women it is around 20-22%. Ab exercises also have their place though. A strong core is essential for exercising well and doing these exercises also develop the ab muscles for when your BFP gets down enough to show it.

Thanks for reading! Hope it's helped change your perspective on exercise for the better. I'll continue next week with the second part of myths to debunk.

Brad/Chad

Crossword



-puzzlechoice.com

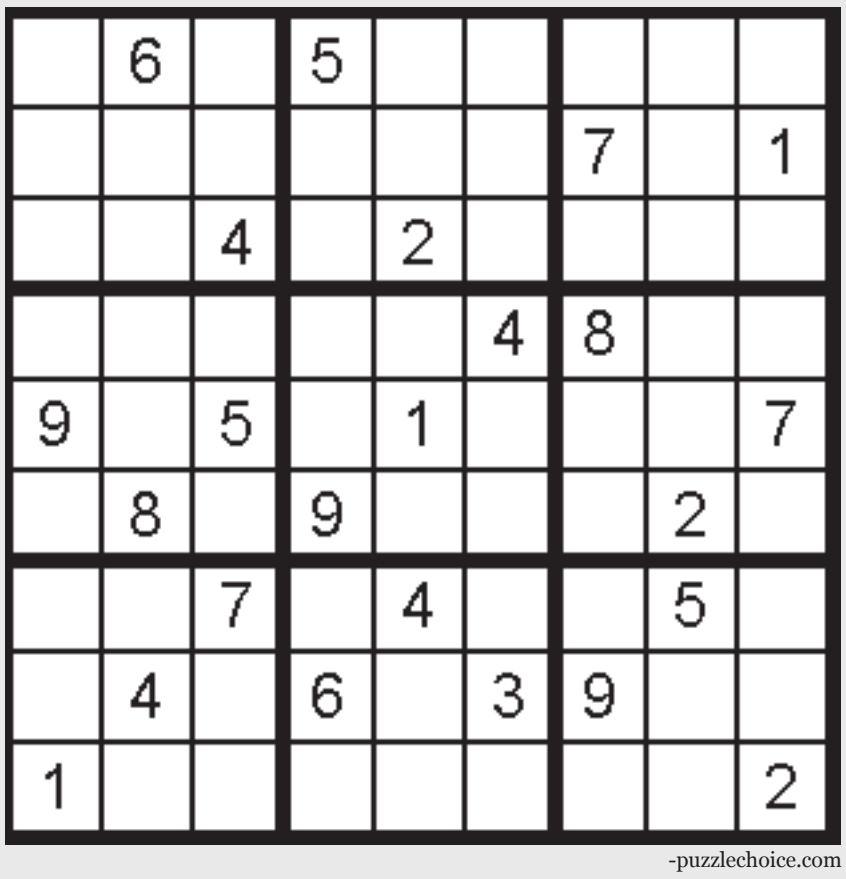
Across

1. Aromatic substance
6. Crib
9. Pleased
13. Behemoth
14. Wonderment
15. Short prayer before a meal
16. Torpid
17. Precious stone
18. Supple
19. Feeling of deep regret
21. Trailblazer
23. Jurisprudence
24. Rooster's crest
25. Metal container
28. Plant tissue
30. Straw hat
35. Elliptical
37. Necessitate
39. Tied
40. Remake
41. Spooky
43. Merchandising transaction
44. Optical device
46. Process grain by grinding
47. Grade
48. Move quickly in a straight line
50. Block
52. Allow
53. Directional antenna
55. Restaurant bill
57. Vivacious
61. Reversion
65. Dialect
66. Poem
68. Warhorse
69. Term of a contract
70. On the sheltered side
71. In front
72. Alleviate
73. Conclude
74. Jovial

Down

1. Disturbance
2. Coniferous tree
3. Detail
4. Religious song
5. Ensnare
6. Coop
7. Be indebted to
8. Speed of a piece of music
9. Smile
10. Tardy
11. Dull pain
12. Cervid
15. Worldwide
20. Short-legged omnivorous animals
22. Mischievous fairy
24. Hold dear
25. Army unit
26. Obviate
27. The lowest point of anything
29. Swarm
31. Bird shelter
32. Be of use to
33. Noisy riotous fight
34. Warning signal
36. Fail to win
38. Aromatic herb
42. Fill with optimism
45. Title for a married Frenchwoman
49. Family
51. Unguent
54. Moved stealthily
56. Cleanse by immersion
57. Despicable
58. Notion
59. Preconception
60. Dusty pink color
61. Part of a woodwind instrument
62. Look searchingly
63. Scorch
64. Small whirlpool
67. Lair

Sudoku



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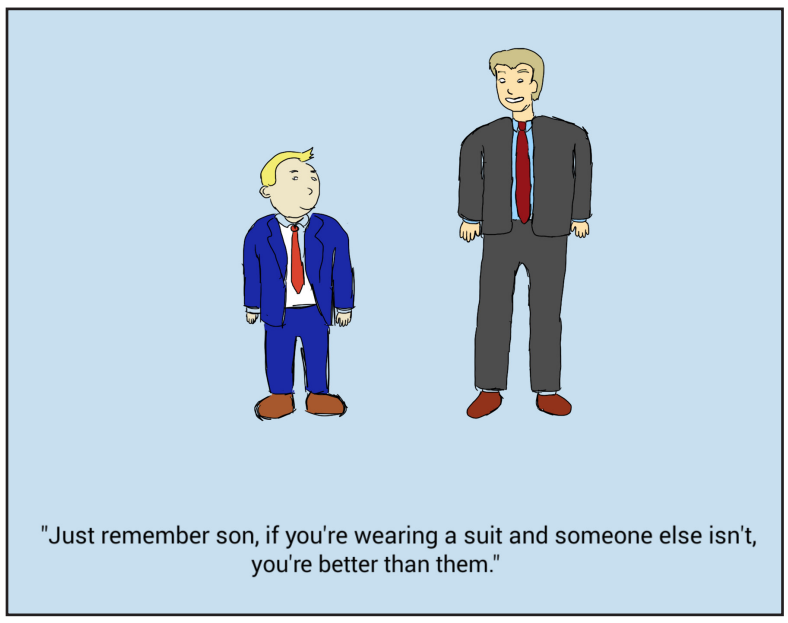
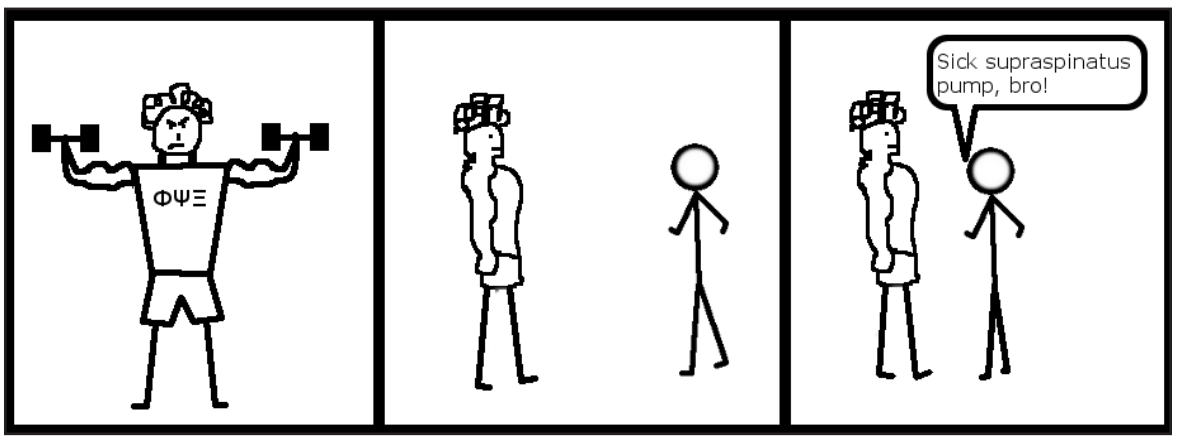
Acquired Taste

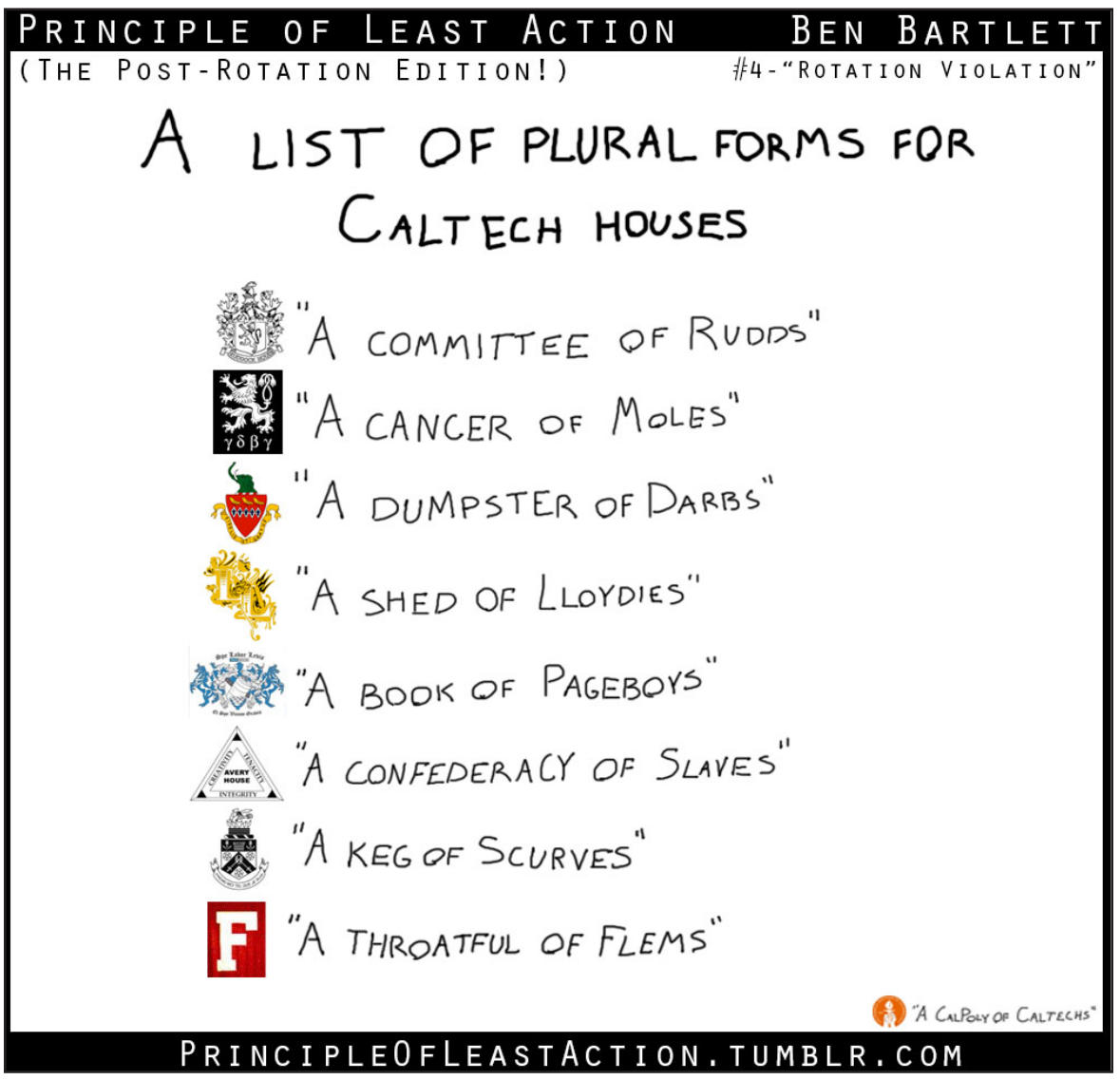
Dr. Z



This is Why We Lift

Georgio Kraggman





Caltech adopts new "Policy on Policies"

TIM SINCLAIR
Contributing Writer

The views expressed in this column are not the views or opinions of The California Tech *Editors. This column is meant as satire and any possible resemblance of those quoted in this column to real people is purely coincidental.*

Caltech has one more policy to add to growing list of the Institute's official stances on anything from active shooters to "striv[ing] for excellence." On Friday, October 3rd, the official "Policy on Policies" was announced by Caltech President Jon Rosenburg as the newest guidelines for all members of the Caltech community to follow. "When I first took the job," Rosenburg told the *Tech*, "I didn't know that this would be one of my first official actions. But according to the Office of the General Counsel, this policy is very similar to those already in place in many other US universities and is legally necessary for Caltech to exist at this point."

For those who aren't familiar with Caltech's various policies, *policies.caltech.edu* gives a short primer. In just a few clicks, a visitor to this online compendium of bureaucratic delight can find information on topics such as "uniforms and special clothing" (unfortunately unavailable at this time due to revision: now how will anyone know if their clothing is truly "special"?). Of particular interest to undergraduates are the policies that cover general student life, such as the Honor Code Handbook, the Code of Conduct, the Statement of Community, and the General Words of Behaving. Some students might have found these personal directives confusing and overlapping, but the new Policy on Policies attempts to clear this up. "I was really interested in the new Policy," an undergraduate student who wishes to remain anonymous wrote us. "It was promised to tie all the Institute policies together, bringing them from a nebulous collection of hidden statements somewhere on an un-navigable website to a living, breathing document with complete social media integration." True to their word, Caltech administrators now compel students to follow the official Caltech Policy account on twitter ("@CaltechPolicyOfficial" of course; we advise avoiding the banal "@JunkCaltechSays" MIT-run mockery).

A few snafus with such an extensive new system are bound to occur. "I don't think the Caltech servers are fast enough to distribute the daily policy updates," our anonymous source griped. "In order to stay up to date with all the new policies I need to follow, I had to find a download link on my favorite torrent website. Luckily, other students seem be having the same problem, and the latest policy documents are always online within 30 minutes of being released."

We asked Associate Dean of Undergraduate Students Lisa Nyley what she thought of the Policy on Policies. "I think it's wonderful. We plan on introducing the new Policy to all future students as the core document governing life at Caltech. On the ride to frosh camp, we used to give prefrosh the Fire Policy to read, but we found the majority finished reading it by the time they got to Ventura. With this mammoth document, we expect most students to fall asleep somewhere between the Policy on Student Social Interaction and the Policy on Because The Deans Said So. Techers are notoriously sleep-deprived, so this has the additional benefit of helping to enforce the new It's Totally Possible to Stay Healthy at Caltech (No, Really!) Initiative, or ITPSHC(NR)I, for short."

For those who have not yet reviewed the Policy on Policies as part of the Caltech Original Regulatory Notice, it can be found at POPCORN.caltech.edu.

The Iterated Manifold is a weekly column by Timothy Sinclair, who wasted four years of his life learning to solve a Rubik's Cube in under 30 seconds.

Answers to previous crossword

S	U	G	A	R	■	B	O	A	■	■	S	I	C	K
P	R	O	V	E	■	O	D	D	■	S	P	O	O	N
A	G	A	I	N	■	L	E	D	■	T	I	T	L	E
R	E	L	A	T	E	D	■	E	M	A	N	A	T	E
■	■	■	N	A	P	■	F	R	E	T	■	■	■	■
S	P	A	■	L	O	S	E	■	N	I	M	B	U	S
P	I	L	L	■	C	O	R	N	■	C	O	U	N	T
A	N	T	I	■	H	A	V	O	C	■	S	I	D	E
S	T	A	F	F	■	P	E	S	O	■	S	L	U	R
M	O	R	T	A	R	■	N	E	W	S	■	D	E	N
■	■	■	■	S	U	E	T	■	E	E	L	■	■	■
D	R	I	F	T	E	R	■	C	R	E	A	T	O	R
E	E	R	I	E	■	A	D	O	■	S	U	A	V	E
A	D	O	R	N	■	S	A	P	■	A	G	R	E	E
N	O	N	E	■	■	E	Y	E	■	W	H	O	R	L

Answers to crossword from 6-2-14

T	R	A	C	E	■	W	A	S	P	■	P	A	C	T
B	O	G	E	Y	■	E	C	H	O	■	A	C	H	E
A	D	O	R	E	■	F	R	E	E	■	Y	U	A	N
R	E	G	A	L	■	T	E	E	T	H	■	T	I	E
■	■	■	M	E	N	■	■	P	R	E	S	E	N	T
S	O	L	I	T	A	R	Y	■	Y	A	K	■	■	■
E	P	I	C	■	V	I	E	W	■	T	I	G	H	T
R	A	N	■	■	E	M	A	I	L	■	■	L	E	I
F	L	E	S	H	■	E	S	P	Y	■	S	I	L	L
■	■	■	E	A	T	■	T	E	R	R	I	B	L	E
C	A	P	T	U	R	E	■	■	E	E	L	■	■	■
A	G	E	■	L	O	T	U	S	■	L	I	N	G	O
D	I	C	E	■	P	U	P	A	■	A	C	O	R	N
E	L	A	N	■	I	D	O	L	■	T	O	T	A	L
T	E	N	D	■	C	E	N	T	■	E	N	E	M	Y

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