Caltech and Disney Engineers Collaborate on Robotics

This article is adapted from a story that was originally published online at caltech.edu.

New research agreement could yield robots better able to interact smoothly with humans.

Caltech and Caltech Research have entered into a joint research agreement to pioneer robotic control systems and further explore artificial intelligence technologies.

The agreement creates a framework that will allow researchers and engineers at Caltech and Disney Research to easily collaborate on projects of mutual interest. The three-year agreement officially began in August 2017 with projects focused on developing robots with new autonomous movement capabilities and improving machine learning for robots on the move. The goal is to help smooth future human-machine interactions.

Caltech’s Pietro Peronna will work with Disney roboticist Martin Buehler to create navigation and perception tools that can allow robotic characters to safely move through dense crowds and interact with people. The goal is to design these robots to perceive and understand their surroundings, distinguishing objects from people. They should also be able to make assessments about the people they meet—determining whether someone is looking for directions, for example.

Peronna, Allen E. Puckett Professor of Electrical Engineering in the Division of Engineering and Applied Science (EAS), is the cofounder of Vistpida, a Google-funded project that is using advances in machine learning and computer vision to help classify objects in photographs. Together with colleagues at Cornell University, his team has created a smartphone app that can distinguish among more than 500 bird species in North America.

Meanwhile, Caltech’s Aaron Ames, Bren Professor of Mechanical and Civil Engineering and Control and Dynamical Systems in EAS, will work with Disney Research’s Lanny Smoot to further explore robot autonomy and machine learning by creating objects that can self-navigate and perform stunts. For example, the engineers hope to create autonomous robotic balls that will have unique bouncing patterns and teach them how to interact with each other.

Ames, who studies robotic walking, arrived at Caltech at the beginning of 2017.

Caltech and Disney Research have a fruitful history of collaboration. Yisong Yue, assistant professor of computing and mathematical sciences, recently worked with engineers from Disney Research on the use of machine learning to analyze the behavior of soccer players and to measure audience engagement.

Scientists Discover Unexpected Side Effect to Cleaning Up Urban Air

This article is adapted from a story that was originally published online at caltech.edu.

Sinking levels of an air pollutant may trigger an increase in another potentially harmful class of chemical compounds.

A balance between the trends in two common air pollutants is unexpectedly triggering the creation of a class of airborne organic compounds not usually found in the atmosphere over urban areas of North America, according to a new study from Caltech.

For decades, efforts to reduce air pollution have led to cleaner air in U.S. cities like Los Angeles, with subsequent improvements in public health. Those efforts have targeted both nitric oxides and hydrocarbons. Nitric oxide is a component of nitrogen and oxygen emitted from engines (especially those powered by diesel fuel) and from coal power plants. Hydrocarbons, meanwhile, are the family of molecules made from chaining together hydrogen and carbon. These molecules are emitted from many sources including gasoline-powered cars, trucks, solvents, cleaners used both at home and in industrial settings, and even trees.

One way researchers track the changing rates of nitric oxide emissions and hydrocarbon emissions is by examining the ratio of the levels of non-methane atmospheric hydrocarbons to those of nitric oxide (methane, a powerful greenhouse gas, is tracked separately). From 1987 and 1997, that ratio dropped by a factor of two.

Regulations aimed at improving air quality in urban areas like Los Angeles have made rapid progress on reducing nitric oxide and hydrocarbon emissions. As old cars have been taken off the street in favor of cleaner new cars and diesel trucks have been retrofitted or replaced, nitric oxide emissions have dropped rapidly. Compared to 1970 models, new cars and trucks produce about 90 percent fewer common pollutants, according to the Environmental Protection Agency. During the last decade, for example, the amount of nitric oxide from Los Angeles’s air has dropped by half.

Air pollution regulations have also led to reductions in hydrocarbon emissions, but these decreases are slowing. Hydrocarbons come from a variety of sources, making it tougher to crack down on them. For example, these compounds are released by the two-cycle engines used in leaf blowers and lawn mowers—equipment that tends to stay in service longer than cars and is subject to fewer regulations.

The sharp drop in nitric oxide levels compared to the slower decline in hydrocarbons is important: according to a new study led by Caltech’s Paul Wennberg and the University of Copenhagen’s Henrik Kjærgaard, this disparity can lead to the production of chemicals called organic hydroperoxides.

Organic hydroperoxides already exist in nature. In rural areas and other regions that lack large amounts of engine exhaust—and therefore places where nitric oxide levels are exceedingly low—the molecules can form when trees off-gas volatile organic compounds that then interact with sunlight.

The team led by Wennberg found, however, that there is another chemical pathway for forming organic hydroperoxides—one that occurs at nitric oxide levels substantially higher than can be found in the atmosphere over unpopulated regions. This is chemistry that does not exist in any of the models of how nitric oxide and hydrocarbons interact,” says Wennberg, who chairs Caltech’s R. Stanton Avery Professor of Atmospheric Chemistry and Environmental Science and Engineering and director of the Ronald and Maxine Linde Center for Global Environmental Science.

Significantly, the atmospheric nitric oxide concentrations over Los Angeles and in urban regions across the country are now dropping to the levels at which this process—called gas-phase autodissociation—occurs.

Gas-phase autodissociation takes place when there are not enough nitric oxide molecules to react with hydrocarbons to react with. As a result, hydrocarbon molecules react with themselves. Gas-phase autodissociation has been observed in other settings—for example, the process can form skin-irritating organic hydroperoxides in certain cosmetic products that have gone bad and causes butter to go rancid and wine to spoil. But researchers had thought that it could not occur in the atmosphere, given current urban nitric oxide concentrations. Wennberg and colleagues have found otherwise.

“As these nitric oxide concentrations go down by another factor of two over the next five to seven years, we’re going to start making more and more organic hydroperoxides in urban areas,” Wennberg says. In the air, these hydroperoxides are known to form particulates— aerosols. “The organic hydroperoxides can self-navigate and form organic hydroperoxides in heavily populated areas, so we don’t know how the formation of gas and aerosol hydroperoxides will impact public health. But we do know that breathing in particles tends to be bad for you,” he says.

Wennberg and Kjærgaard’s findings will be published online by the Proceedings of the National Academy of Sciences during the week of December 18. The study is titled “Atmospheric autodissociation is increasingly important in urban and suburban North America.” Wennberg’s co-authors from Caltech include Brian M. Stoltz, professor of chemistry; graduate student Eric Praske; postdoctoral scholar J. Caleb Hetcous; and graduate student John D. Crounse (PhD ’12). Other authors of the paper include Rasmus V. Ortker of the University of Copenhagen. This research was supported by the National Science Foundation and the University of Copenhagen.
The Caltech Y Column

An Observations

The Caltech Y Column serves to inform students of upcoming events and provide opportunities. The list is compiled by Katherine Guo 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 extension of our planet and leadership skills and discoveries. The mission of today’s Y remains the same—to provide opportunities that students can be engaged, responsible citizens of the world. The Y seeks to broaden students’ worldviews, raise social, ethical, and cultural awareness through teamwork, community engagement, activism, and leadership. 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

Costa Rica Alternative Spring Break Trip
Saturday, March 17th through Sunday, March 25th (9 days) | Cost: $950

Applications Due: by Noon on November 22nd

The Caltech Y is excited to seek applicants for our 2017 Alternative Spring Break trip to Costa Rica. Join other Caltech students for a conservation focused spring break trip this year. On the Costa Rica trip we will be working with a host organization OSA Conservation www.osacorervation.org – which is dedicated to protecting the globally significant biodiversity of Costa Rica’s Osa Peninsula. Don’t miss out on this fantastic opportunity to explore another part of our planet and make a tangible difference in the world.

Trips fees include transportation, lodging, and most food. The Costa Rica Alternative Spring Break trip is coordinated by the Caltech Y and has been made possible thanks to generous funding from the Frank and Elsie Fund, Caltech Student Affairs, and the Ongoing Fund. Caltech Y Explore LA Series: The Broad Museum
Sunday | December 3rd | 2:30 PM | Cost: $5 | Transportation Included

Sign-up starting Thursday, 11/16 at the Caltech Y

Join us on a visit to The Broad with the Caltech Y. The Broad is a contemporary art museum founded by philanthropists Eli and Edythe Broad. Designed by Diller Scofidio + Renfro in collaboration with Gensler, the museum is home to 2,000 works of art from the Broad collection, which is among the most prominent holdings of postwar and contemporary art worldwide, and presents an active program of rotating temporary exhibitions and innovative audience engagement. The 120,000-square-foot building features two floors of gallery space and is the headquarters of The Broad Art Foundation’s worldwide lending library, which has actively loaned collection works to museums and 50 other Caltech students for a conservation focused spring break trip this year.

The Broad Museum has 180 seconds, you can watch this presentation online at the museum’s website and coordinate rides. We have a timed entry of 3:30 pm. We will be staying for two hours, then ubering back to the Caltech Y. Although tickets are free, we are offering transportation for $5.

Pasadena LEARNS
Every Friday | 3:00 - 5:00 PM | Pasadena

Come volunteer at Washington Middle and Elementary STEAM School! We are partnered with the Pasadena LEARNS program and work with their Science Olympiad team or do regular tutoring along with occasional bands-on-science experiments. Transportation is provided.

For more information and to RSVP, contact azhai@caltech.edu. Eligible for Federal Work Study.

Hathaway Sycamores
Every Monday | 5:30 - 8:00 PM | Highland Park

Volunteer at Hathaway Sycamores, a group that supports local underprivileged but motivated high school students. However, there are a variety of ages and subjects being tutored. The service trip includes about 40 minutes of travel time and 1.5 hours of tutoring. Transportation is included.

For more information and to RSVP email Elisabeth at egallmei@caltech.edu. Eligible for Federal Work Study.

Solving Climate Change: From Policy to Personal
Thursday | November 30th | 4:00 to 6:00 PM | Location: TBD

The Caltech Y Social Activism Speaker Series presents:

Solving Climate Change: From Policy to Personal

Introducing the extraordinary things animals and plants must do in order to survive and reproduce. Key animals include brown-tufted capuchins, dolphins, cheetahs, chameleons and killer whales.

Free Park

For more info and to RSVP email Elisabeth at egallmei@caltech.edu. Eligible for Federal Work Study.

Caltechlive!

Science Saturdays
Saturday, January 27, 2018 • 4 PM

Beckman Auditorium • $10 (general admission)
Recommended for all ages

Life: Challenges of Life
A BBC/Discovery/SSAI/Open University co-production in association with RTI Spa.

Discussion Leader: Christopher Spalding
Caltech Geological & Planetary Sciences Ph.D. Student

Introducing the extraordinary things animals and plants must do in order to survive and reproduce. Key animals include brown-tufted capuchins, dolphins, cheetahs, chameleons and killer whales.

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Free Park

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Caltechlive!

Science Sundays
Sunday, January 28, 2018 • 4 PM

Beckman Auditorium • $10 (general admission)
Recommended for all ages

Life: Challenges of Life
A BBC/Discovery/SSAI/Open University co-production in association with RTI Spa.

Discussion Leader: Christopher Spalding
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New Technology Will Create Brain Wiring Diagrams

LORI DAJOVE
Caltech Strategic Communications

This article is adapted from a story that was originally published online at caltech.edu.

Technique allows for maps of the wiring of the nervous system in insect brains, which was previously not possible with other methods.

The human brain is composed of billions of neurons, working together in intricate webs and communicating through electrical pulses and chemical signals. Although neuroscientists have made progress in understanding the brain’s many functions—such as regulating sleep, storing memories, and making decisions—visualizing the entire “wiring diagram” of neural connections throughout a brain is not possible using currently available methods. But now, using Drosophila fruit flies, Caltech researchers have developed a method to easily see neural connections and the flow of communications in real time within living flies. The work could lead to new insights into creating a map of the entire brain’s many connections, which could help neuroscientists understand the neural circuits within human brains as well.

A paper describing the work appears online in the December issue of *Elife*. The research was done in the laboratory of Caltech research professor Carlos Lois.

“If an electrical engineer wants to understand how a computer works, the first thing that he or she would want to know is how the electrical signals are communicated between components,” says Lois. “Similarly, we must know how neurons communicate—where they send them, where they receive them, and how they understand each other,” says Lois. “Thankfully, we now know how neurons communicate in a fly brain.”

When two neurons connect, they link together with a structure called a synapse, a space through which electrical and chemical signals pass. Even if multiple neurons are very close together, they need synapses to communicate.

The Lois laboratory has developed a method for tracing the flow of information across synapses, called TRACT (Technoiogy for Research on the Control of Transcription). Using genetically engineered Drosophila fruit flies, TRACT allows researchers to observe which neurons are “talking” and which neurons are listening by prompting the connected neurons to produce glowing proteins.

With TRACT, when a neuron “speaks,” it emits an electrical signal across a synapse—called a “neuronal impulse.” That signal lights up both the talking neuron and its synapses with a particular wavelength of light. The tiny light sent to the signal receive this protein, which binds to a co-receptor molecule genetically built-in by the researchers—the on the receiving neuron’s synapse. The binding of the signal protein activates the receptor and triggers the neuron it’s attached to in order to produce its own, differently colored fluorescent protein. In doing so, the network of neurons becomes visible. Using a type of microscope that can peer inside living fruit flies, the fly’s head, the researchers can observe the colorful glow of neural connections and see which neurons grow, move, and experiences changes in its environment.

Many neuronal and chemical synaptic connections are thought to be caused by altered connections between neurons. Using TRACT, scientists can monitor the neuronal connections in the brains of hundreds of flies each day, allowing them to make complete and detailed stages of development, between the sexes, and in flies that have genetic mutations. Thus, TRACT could be used to determine how different diseases perturb the connections if made within brain circuits. Additionally, because neuronal synapses change over time, TRACT allows the study of how those changes and destruction from day to day. In addition, by creating Drosophila neurons form or break synapses will be critical to understanding how the nervous system can influence the animal’s behavior, as the animals grow, and how they fall apart with age or disease.

TRACT can be localized to focus on the wiring of any particular neural circuit of interest, such as those that control movement, vision, or learning. A new approach that the group tested their method by examining neurons within the well-understood olfactory circuit, the neurons responsible for the sense of smell. Their results confirmed that understanding the connectivity of this particular circuit’s wiring diagram. In addition, they examined the neuronal connections that are responsible for the wakening and sleeping cycle, where they detected new possible-synaptic connections.

“Because the TRACT method is completely genetically encoded, it is ideal for use in laboratory animals such as Drosophila and zebrafish; ultimately, Lois hopes to implement the technique in mice to enable the neural tracing of a mammalian brain.”

The paper is titled “Tracing neuronal circuits in transgenic animals by transneuronal expression of transcription (TRACT).” Other Caltech coauthors include graduate students Ting-Hao Huang and Antuca Callejas; AMGEN undergraduate visiting scholar Peter Nieman; Khorana graduate student Khorana graduate student Laura Antuca Callejas; Assistant Professor of Neuroscience. Funding was provided by an NIH R01 MH09147 from the National Institutes of Health.
DON'T PUT IT OFF!

Coping with procrastination

A free workshop for all Caltech students

Friday, October 13 and Friday, November 3rd

4:00 - 5:00, 326 Sherman Fairchild Library

EMOTIONAL INTELLIGENCE TOOLKIT

3 modules / 2 weeks each / 1 awesome skillset

Emotional Awareness  Get better at knowing what you’re feeling, and see how your thoughts and feelings affect each other.
October 9th and 16th

Open-Mindedness  Learn how to be more flexible in the way you see the world!  October 23rd and 30th

Face The Fear  Learn how to hang in there with difficult situations and emotions without having to avoid them.
November 6th and 13th

Just show up!  Mondays 4:00 - 5:00, 326 Sherman Fairchild Library

TACKLE THE TERM

Monday, January 8th @ 12:00
And again on Friday, January 12th @ 12:00
Annenberg 105 Lecture Hall

• Learn how to make a study plan • Set smart goals •
• Get started even when you’re overwhelmed •
• Cut your losses when you fall behind •
Free lunch on a first-come basis

HOSTED BY CALTECH COUNSELING SERVICES
COUNSELING.CALTECH.EDU
Men’s basketball inches away from historic Cal Lu comeback

GOCALTECH.COM  Actual Sports Content Editor

PASADENA (Jan. 17, 2018) – The Caltech men’s basketball team played its part in a historic game that saw several firsts, milestones reached and the Beavers on the positive side of a buzzer-beater Wednesday evening against visiting California Lutheran University.

Aided by an extra 10 points in the overtime frame, the Beavers hit triple figures for the first time since a 2004-05 game against the University of Redlands, while also breaking their own record from just one game ago and combined with three other Beavers in the 200 medley relay, the first event of the day and an event in which Caltech took the second spot. Alongside freshman Andy Rothstein and juniors Jonathan Willett and Henry Stein, Gallup and his teammates swam 1:35.52 to finish one and-a-half seconds off the school record set by three Beavers just one year ago.

Willett, meanwhile came away with two third-place finishes in the 50 and 100 free and twice came within just one second of winning an event in 21.60 before clocking in for the latter event at 47.91. Freshman Alex Janosi came in half a second off of Willet in the crowded 100 free field. Meanwhile, fellow freshman Adam Kogan earned himself a fifth-place finish in the 200 freestyle.

Gallup breaks pool CMS record

GOCALTECH.COM  Actual Sports Content Editor

CLAREMONT, Calif. (Jan. 20, 2018) – Sophomore men’s swimmer Thomas Gallup added one more to his impressive sophomore resume by swimming an Axelrod Aquatics Center pool record at Claremont-Mudd Scripps Colleges on Saturday morning. The Beavers took on the Stags in addition to Occidental College in a double-dual meet.

Gallup dominated the event, conquering the field of ten by over multiple heats. He swam a speedy 56.99 to finish nearly two seconds off Caltech’s record time for the event, which he holds, though he will have multiple opportunities going forward to pad his record before the season concludes. Gallup also participated in the 200 breast where he finished fourth, a fifth-place finish in the 200 freestyle.

Sun takes another program record at CMS

GOCALTECH.COM  Actual Sports Content Editor

CLAREMONT, Calif. (Jan. 20, 2018) – Freshman swimmer Jessica Sun added another Caltech breast stroke record to her fantastic rookie season at Saturday’s Claremont-Mudd-Scripps-hosted double-dual meet with CMS and Occidental College.

The freshman, who came into Saturday owning records in the women’s 100 breast, 400 IM and 200 medley relay, added one more when she set a new program record in the 200 breast previously set by Diane Plummer in 2008 (2:36.49). Sun shattered the record by nearly five seconds to secure her fourth record with the Beavers with two regular season meets still to contest in SCIAC preliminary rounds.

Sun was not the only Beaver to secure a top time finish. Junior Teresa Tran and freshman Stella Wang also set best times for themselves throughout the day. Freshman diver Krystin Brown, meanwhile, improved her time in the 3-meter competition by nearly 10 points from one week ago (190.5) en route to fourth-place finishes in both the 3-meter and 1-meter contests.

Diana practicing her commercial for a Neutrogena face wash.

Men’s basketball inches away from historic Cal Lu comeback

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ANNOUNCEMENT:

VICE PROVOST, CHIEF DIVERSITY OFFICER, AND PROFESSOR OF ENGLISH CINDY WEINSTEIN HOLDS
REGULAR OFFICE HOURS AS AN OPPORTUNITY FOR UNDERGRADUATE STUDENTS, GRADUATE
STUDENTS, AND POSTDOCS TO MEET FOR DISCUSSIONS PERTAINING TO THE COUNCIL ON
UNDERGRADUATE EDUCATION; CALTECH ACCREDITATION; THE STAFF AND FACULTY CONSULTATION
CENTER; STUDENT-FACULTY PROGRAMS; THE CENTER FOR TEACHING, LEARNING, AND OUTREACH; THE
CALTECH DIVERSITY CENTER; AND THE CALTECH LIBRARIES.

THERE ARE FOUR 15-MINUTE APPOINTMENTS AVAILABLE PER OFFICE HOUR. SIGN UP AT THE OFFICE
OF THE VICE PROVOST IN PARSONS-GATES ROOM 104, BY PHONE AT 626-395-6339, OR BY EMAIL TO DLEWIS@
CALTECH.EDU. WE LOOK FORWARD TO HEARING FROM YOU!

STUDENT OFFICE HOURS FOR WINTER TERM 2018:

1/23/18 TUESDAY 9:00 A.M.-10:00 A.M.
2/15/18 THURSDAY 9:00-10:00 A.M.
2/21/18 WEDNESDAY 11:00 A.M.-12:00 P.M.
2/27/18 TUESDAY 10:00-11:00 A.M.
3/8/18 THURSDAY 11:00 A.M.-12:00 P.M.
3/12/18 MONDAY 10:00-11:00 A.M.
3/19/18 MONDAY 10:00 A.M.-11:00 A.M.
Minutes for January 18, 2017. Taken by Dana He.

Presentation’s Report (Sakthi):

- Nothing to report.

President’s Report (Sakthi):

- Nothing to report.

Secretary (Dana):

- Nothing to report.

If anyone has any questions or concerns about a section of the minutes please email the appropriate officer. We are happy to answer any questions.

Meeting Adjourned: 12:38 pm

ASCIT Minutes
Meetings are every week in SAC 13

ASCIT Board of Directors Meeting: VPSA
Minutes for January 18, 2017. Taken by Dana He.

Officers Present: Sakthi Venkata, Kavya Sreedhar, Rachael Morton, Sarah Crucilla, Alice Zhai, Dana He

Guests: Kevin Gilmartin, Joe Shepherd, Tom Mannion

Call to Order: 12:11 pm

V.P. of Academic Affairs (Kavya):

- Thinking of introducing course complements to recognize the good in courses. Students can submit recommendations for courses and could possibly tie this to Take a Prof. out to Lunch. Thinking of starting this on a monthly basis to try it out.
- Course capture has begun. Trying it on CS 21.
- Software seminar will be soon to teach Mathematics.
- Trying to bring back research list for professors looking for students during the school year.
- Looking to introduce undergraduate and graduate student research seminars.
- Math 13 course created to teach students multi-variable calculus for Physics 1b analytical. 50 students enrolled. Positive feedback.
- Creating committee for core curriculum revision.

V.P. of Non-Academic Affairs (Rachael):

- COUCH met with Joos last night about Polaris report. Will meet with faculty and staff groups soon.

Director of Operations (Sara):

- Not in attendance.

Treasurer (Sarah):

- Nothing to report.

Social Director (Alice):

- Saturday is a Six Flags Magic Mountain Trip. Used Marsh fund to subsidize tickets for 75 students. Sign-ups filled up in under 5 minutes. Tickets were $40 each for group tickets. Students will take students at 10 am and leave at 6 pm. Could talk to Dean’s Office to try to get more tickets.
- Would like to use Marsh fund to subsidize tickets for Cirque du Soleil.
- A kid again day will be Sunday, February 25.
- ASCIT formal will be at Hotel Alexandria in downtown LA.

Minutes submitted by: Allison Tang and Shreya Ramachandran

Minutes for January 18, 2017. Taken by Dana He.

Presentation’s Report (Sakthi):

- Nothing to report.

President’s Report (Sakthi):

- Nothing to report.

Secretary (Dana):

- Nothing to report.

If anyone has any questions or concerns about a section of the minutes please email the appropriate officer. We are happy to answer any questions.

Meeting Adjourned: 12:38 pm

ARC Minutes 1.21.2018

Minutes submitted by: Allison Tang and Shreya Ramachandran

1. Programming
   a. Student Faculty Lunches (SFLx): 2 SFLx this term, need to finalize dates.
   b. Course Complements: workload, can be anonymous, responses moderated before posting, funded lunch with Prof of the Month. Addressed in a Tech article.
   c. Software Seminars: Mathematics, 3/4, Wednesday 4-6pm in Arts 135.
   d. Research Lab 1st release after SURF deadline, email ready to be sent to profs.
   e. USG-Q Grade Student Research Seminars: talk to OCS Academic Chair.
   f. Ombuds Training: email core profs to gauge interest for another training.
   g. Course Concerns: none recently.

2. Projects
   a. TQFR Improvement: focus on guide to filling TQFRs this week.

3. Miscellaneous
   a. Add Day – the Wednesday 10/24, 3pm.
   b. ARC turnover – happening soon.

The ARC website at arc.caltech.edu has more information about what the ARC does if you are interested. We meet every Sunday at 11am in SAC13 and our meetings are open to everyone. If you have any questions, please feel free to email arc@caltech.edu.
TRUE CRIMEZ

OUR HOUSE HAS BEEN ROBBED!

OH NO!

THIS IS ALL WE HAVE LEFT!

THAT’S UNDIE-LEAVE-A-BOUL!

Answers to current crossword (pg 7)

HTTP://PUZZLECHOICE.COM