



DECADES

THE BIG T
VOLUME 99

CALIFORNIA INSTITUTE
OF TECHNOLOGY

2020

1990s

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Ridgecrest Earthquakes
Memes at Caltech
Dabney Pinheads
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A decade

Each decade, from the past to the present, has been enveloped with distinct qualities. From the 1990s to the 2000s and 2010s in particular, we have witnessed enduring tenacity, ambition, empathy, and kindness in moments from global events to everyday life.

These traits are not foreign to Techers; they resonate in all that we do.



TARINI SINGH



NOELLE DAVIS

See how new things begin at Caltech and how Techers define their unique Caltech experience with diverse personalities.

As we embrace hard work, where each sleepless night yields a triumphant day, year after year;

Framed in the themes of the 1990s, 2000s, 2010s, and finally, what we will make of the 2020s, see how much Techers have accomplished even in this incredible year.



KRITI DEVASENAPATHY



SHU FAY UNG





NOELLE DAVIS

As we discover and shatter limits, where temporary frustration is a necessary gauntlet for the jubilant time to come;



NOELLE DAVIS

As we find comfort in the empathy of others during difficult times, and as we celebrate everyone's good fortune when opportunity knocks;

That was time well spent.

NOELLE DAVIS

NOELLE DAVIS

Here, we create memories.

One day, we will look back at our shenanigans and hopefully think

ANDREW CHAN

JEROME SEEBECK

VERY RAMEN-YA

One week before the start of fall term, **FRANCES YOKOTA**, along with the rest of Caltech Dining Services, is in a race against time. The new year brings with it an increase of students on the board plan, ready to stampede into Chandler and Red Door between the hours of 12 p.m. and 1 p.m. Before the students arrive, Yokota must create an alternate lunchtime option to the two already available. The goal is simple: to alleviate Chandler's iconic lunchtime rush and long lines.

This means that this new food solution must be fast, minimize labor in the kitchen, and most importantly, remain appealing to students in the long-term. But with these requirements comes a new set of challenges. The number of ingredients, and thus the amount of variety in the food offered, are limited by speed and labor. With more variety comes more complexity, which means more time to make the food and more work needed to close down the line.

The first piece of the puzzle came easily: this new food option would be located at Avery House, due to its available kitchen facilities. After that, brainstorming sessions between Yokota and the executive chef eventually birthed the concept: ramen. Ramen was perfect: it was quick to implement and required a minimal number of workers, grabbing only two staff from Chandler to operate the Avery kitchen. And so, the Avery Ramen-Ya was born.

"I did it in five days," says Yokota, describing the time crunch around the situ-

A SLICE OF SEAWEED is added on top of each bowl of ramen for some salt and crunch.

NOODLES (they're hiding under all the other ingredients!)

BAMBOO adds a unique texture to the ramen.

CORN-Y these kernels can easily get lost in the broth!

HALF AN EGG

THE BROTH Tonkotsu is made with a salty pork broth!

WHAT GOES INTO A BOWL OF RAMEN? Tonkotsu ramen is by far the most popular ramen option in the Avery Ramen-Ya menu, and is a specialty dish in the Fukuoka Prefecture of Japan. The three options (tonkotsu, shoyu, and veggie) were selected due to their popularity in the "outside world" and form a simple but varied selection.

MUSHROOMS are added on top of each bowl of ramen for some sweetness and chewiness.



SPRINKLING OF GREEN ONION

SLICES OF PORK conveniently sized and perfectly slightly fatty, customers can also request extra meat!

WHAT GOES INTO A BOWL OF BIBIMBAP? Bibimbap was introduced to Avery's lunch options in the beginning of second term. Bibimbap is a Korean rice dish that can be served with a variety of other ingredients, such as kimchi and gochujang sauce. See below for what's in Caltech Dining Services' bibimbap!

SPRINKLING OF SESAME SEEDS

ASSORTED VEGETABLES include carrots, cucumber, and mushrooms.

GOT BEEF? For vegetarian options, this is replaced with tofu!



FRIED EGG

GOCHUJANG SAUCE is a Korean red chili paste.

FORBIDDEN RICE BLEND underneath all the ingredients, rice forms the base for bibimbap.

ation. In that time, she thought of a menu, created recipes, bought the necessary equipment and bowls, and set up the cashier and checkout system. Yokota spent the remaining time assembling these pieces to form the complete Ramen-Ya.

The food is authentic, too: "Most of the ingredients are purchased from our Japanese food vendor," says Yokota. "The products are from Japan and imported here." The variety in the Ramen-Ya came from the different types of ramen available, which were chosen by Yokota based on outside popularity. These options include tonkotsu, shoyu, and curry, with a veggie ramen available for vegetarians.

Now, students can walk up to the Avery Ramen-Ya anytime between 11:30

p.m. and 1 p.m. to receive a fresh bowl of ramen, depending on the day of the week and ramen of the day. The most popular days are Monday, Wednesday, and Friday with tonkotsu ramen. Above the doorway hangs a *noren*, a traditional Japanese curtain. "When we're open for business, we put that out, and it sort of signifies the opening of our Ramen-Ya," explains Yokota.

In the future, Caltech's dining options will continue to expand as the Avery Ramen-Ya changes and grows. On Tuesdays and Thursdays, Avery's kitchen will offer different foods along the theme of Asian cuisine. However, based on its popularity among the community, at least one thing is here to stay: Avery Ramen-Ya's tonkotsu ramen.



(ABOVE) **JORGE MERCADO** from CDS showing a completed bowl of bibimbap in a short break between hungry Techers. (BELOW) **EUGENE SHAO** [22] and most other Techers opt to eat their food in Avery's outer courtyard to enjoy the year-round good weather.



VERY'S ROTATING LUNCH CALENDAR

MONDAY

RAMEN SPOTLIGHT:

SHOYU RAMEN! FEATURES A LIGHTER BROTH COMPARED TO THE TONKOTSU RAMEN. A RELATIVELY POPULAR CHOICE.

TUESDAY

BIBIMBAP DAY I:

A HEALTHY AND NUTRITIOUS RICE BOWL WITH A VARIED MIXTURE OF VEGETABLES. BIBIMBAP WAS INTRODUCED DURING 2ND TERM.

WEDNESDAY

RAMEN SPOTLIGHT:

TONKOTSU RAMEN! LINES AT AVERY RAMEN-YA ARE ALWAYS LONG ON WEDNESDAYS DUE TO THE POPULARITY OF TONKOTSU RAMEN.

THURSDAY

RAMEN SPOTLIGHT:

TIP, PEOPLE LIKE EATING BIBIMBAP DIFFERENTLY. TRY ASKING FOR EXTRA SAUCE OR EXTRA CARROTS! TO GO VEGETARIAN, JUST REMOVE THE EGG AND MEAT.

FRIDAY

RAMEN SPOTLIGHT:

VEGGIE RAMEN! THE VEGETARIAN OPTION AT AVERY RAMEN-YA USES A MISO GINGER STOCK, AND REPLACES PORK WITH TOFU.

FAULT LINES

PHOTOS
Eric Chen

WORDS
Eric Chen

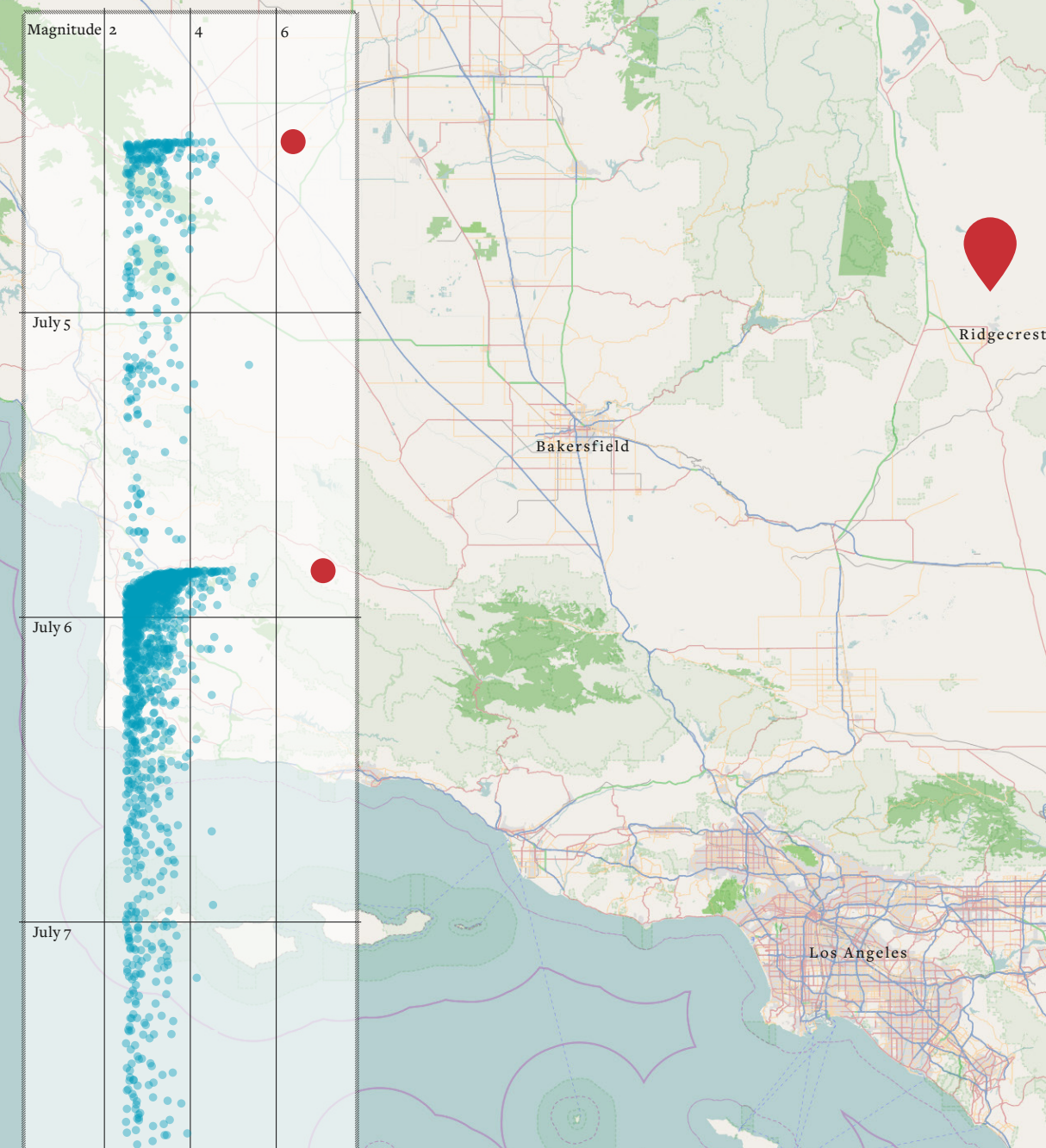
DESIGN
Eric Chen

July 4th, 2019, while most people were looking forward to a relaxing holiday weekend, the Caltech Seismological Lab was alive with activity. Two earthquakes, a magnitude 6.4 and 7.1, were registered in the Ridgecrest region, causing shaking felt as far as the Bay area and Sacramento. As a member of the Southern California Seismic Network (SCSN), Caltech is among the first to receive and analyze the data, and is constantly finding new ways to gather and process it.

Within minutes of the first shaking, data from seismometers is automatically analyzed and pushed to public alert systems. The seismology lab verifies the information, and over the following hours, communicates with state representatives and the public. The earthquakes drew attention not only because they were the largest in two decades, but also due to their location not on any particularly large or well-known fault.

In the days following the quake, **DR. ZHONGWEN ZHAN**, a Caltech assistant professor of geophysics, led efforts to track aftershocks from the quake using unused, "dark" fiber optic cables. The fiber optic cables used to carry our modern communications contain thousands of tiny imperfections in their kilometers of length. Normally, these imperfections just cause undesirable noise in the signals being sent over the fibers. However, as all problems are also solutions, light reflected from these imperfections can be used to track their position. This allows otherwise unused fibers to act as tiny seismometers, delivering terabytes of data per month about surface movements in an area. This new system complemented the data gathered from temporary seismometers deployed to the Ridgecrest area, helping produce a clearer picture of the aftershocks that followed.

This project, while first prominently applied in Ridgecrest, has been under development for months, and has continued to expand. Later in November, Caltech partnered with the city of Pasadena to use two dark fibers in a loop around Pasadena to monitor earthquakes in this way. This additional data will inform more detailed earthquake models, which are essential to understanding and predicting quakes. As fiber networks already exist everywhere, Zhan hopes this system will be easily expanded across the region and beyond.



SHAKING OUT A magnitude 6.4 foreshock struck first just after 10 a.m. on July 4, followed by the magnitude 7.1 mainshock around 10:30 p.m. on July 5. Both were followed by hundreds of aftershocks that continued for week. (Data from the United States Geological Survey.)

MAP TILES-OPENSTREETMAP

MEMES AT CALTECH

WORDS
Eileen Zhang

DESIGN
Eileen Zhang

Map Legend

Welcome, traveler! Navigating memes in the modern age can require a particular sense of humor and a keen eye. At Caltech, these memes are spread across a wide variety of pages and platforms. Follow along this map to see the various meme pages of Caltech, and end your journey with some of the memes that Techers consider to be "memes of the decade".



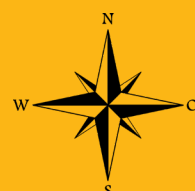
POST



REACTIONS



PAGE



AKSHAY GOWRISHANKAR [23] Amidst the events of early 2020, Techers still had at least one positive thing to hold on to.



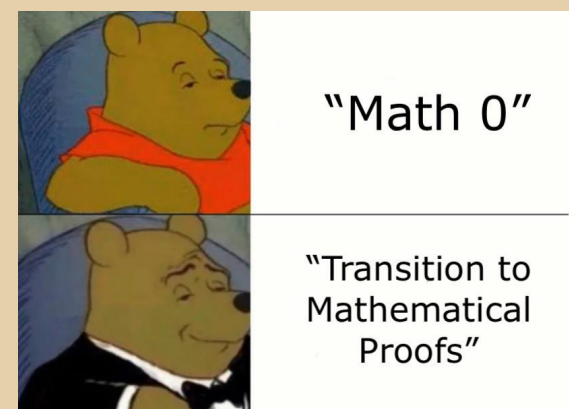
133 REACTIONS



JUSTIN HYON [23] on the topic of Moodle going down during the on-line term in Spring 2020.



106 REACTIONS



CHASE BLANCHETTE [23] on the topic of the formal name for the Math 0 pre-frosh course.



15 REACTIONS



CALTECH MEMES FOR LOW SELF ESTEEM

- Caltech's general-purpose meme page for all memes from the Caltech community.
- 2,200+ members



CALTECH PREFROSH MEMES FOR ROTATION RULES COMPLIANT TEENS

- Established as a meme page for prefrosh since the main page publishes memes that may contain rotation violations.
- 670+ members



CALTECH CONFESSIONS

@CALTECHCONFESSIONS

- This page periodically publishes anonymous confession submissions from the Caltech community.
- 2,000+ followers



Caltech Confessions

June 4 · 🌐

Confession #5758: Quarantine sucks, having online classes suck and I can't wait to get back on campus but if there's one thing this quarantine showed me, it's that I've made some damn good friends in Caltech. After high school I pretty much stopped talking/lost contact with a lot of friends and I was afraid the same would happen once everyone left, but I've been keeping in touch with a lot of friends daily and they've helped me through so much this term. I can't explain how much that means to me and I love those people with my entire heart.



CALTECH CONFESSIONSBOT 5000

@CALTECHCONFESSIONSBOT

- This page generates artificial Caltech confessions using OpenAI's GPT-2 language model. Sometimes, the confessions here are more realistic than the real ones...
- 370+ followers



Caltech ConfessionsBot 5000

June 14 · 🌐

Confession #917: Im jealous of the undergrads because they're so much happier than the overgrads



Memes of the Decade



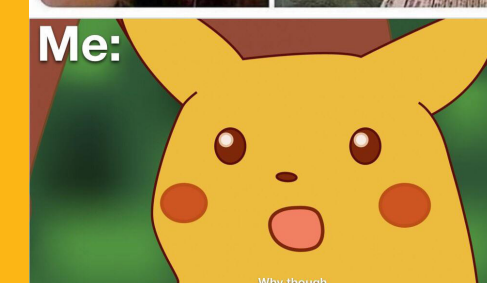
You've reached our destination! Here are memes submitted by Techers as "memes of the decade".

"2020 VISION", DANIEL NEAMATI [21]

I hate when people ask me what I'll be doing in 1 year, come on guys I don't have 2020 vision.



"SHOCKED PIKACHU FACE", MADELEINE SWINT [23]



"LOSS", DKDK



"THIS IS FINE", SARA ADAMS [21]



DABNEY PINHEADS

WORDS
Shu Fay Ung
Arlindo Chan Borges

DESIGN
Shu Fay Ung

PHOTOS
Shu Fay Ung

“Wait, today is Thursday, so—”
“Goddammit!”

Suddenly, the grind of metal against the ground breaks the momentary silence that follows the usual lapse in dinner announcements. Donning a colorful jester’s hat, the Pinhead stands tall on a chair and begins a dinner tradition that originated decades ago. At this point, Darbs are all ears, and you should be, too.

Pinheads are Dabney’s storytellers. Traditionally, during dinner on Thursdays, they tell a story that ends with a terrible pun. Some find the story hilarious, a few find it cringe-worthy, and others find it downright terrible. It’s a mixed bag of reactions as laughter or thumbs-downs fill the dining hall. The pun elicits a collective “Goddammit!” from fellow Darbs, followed by a thunderous bang as fists slam uniformly onto the dining table. Although the Pinhead’s act has undergone changes over the years, the exclamation and table-banging remain as part of the ritual.

ARLINDO CHAN BORGES [20] and **NICHOLAS JASINSKI [22]** took reign of the position for the 2018-2019 academic year. It is perhaps amusing that neither of them planned to seriously contend for the position—“A funny story came to mind, and I decided to tell it,” recalled Chan Borges, “It happened to be well-received enough for me to win me the election.” As for Jasinski, he demonstrated his trademark affection for the *Bee Movie* (a huge meme in Dabney) by reciting the film script during elections.

Both Pinheads bring unique styles and experiences to the table. For Chan Borges, a good idea might spon-

taneously materialize out of nowhere, or be stimulated by topical events such as the Ber-rygate scandal of 2019. Expanding beyond the traditional format of storytelling, he has experimented with other possibilities for a Pinhead act, including an edited video (*Berry Song*, Caltech Confessions), a drag performance, and an interactive Caltech Confessions based Mad Libs experience. Among his favorite gigs are *Berry Song*, a parody on *The Duck Song* which was edited to ride along the berry meme hype; the Caltech Confessions Mad Libs that ended with the phrase “internalizing a chair”; and the enactment of Nurselindo, a stunt that involved dressing up as a nurse and urging Darbs to get their flu shots.

Jasinski, on the other hand, claims that his style of Pinhead is actually making people dread the Pinhead happening. “They know it’ll be some odd form of the *Bee Movie*,” he says. One of his favorite gigs involved trapping dinner attendees in the dining hall as he read the *Bee Movie* script until someone correctly guessed a number in his head. What number was it? 69420.

The various gimmicks of the Pinheads bring unexpected fun amidst the usual academic intensity here at Caltech. Everyone gets to relax and enjoy the performance, and maybe even get a good laugh out of it. As elections roll around the corner in January, the jester’s hat awaits a new heir. It seems that Pinheads would stick around as a mark of Dabney culture for some time—

oh, goddammit!

LEGENDS SAY THAT AT HALLOWEEN’S
EVE, RIGHT WHEN THE CLOCK STRIKES
MIDNIGHT, FROSH ARE WARNED FROM
FACING THE WALL AT THE END OF THE
CORRIDOR OF UPPER SEVEN.



1. STORY TO TELL Arlindo Chan Borges [20] puts on a Pinhead performance during the Fall dress dinner.

2. TO LAUGH OR NOT TO LAUGH Some find it hilarious, a few find it cringe-worthy, and others find it downright terrible. There is never a uniform reaction to Pinhead performances.



Sometimes the longer you stay at Caltech, the more apathetic, the more annoyed, and the more bitter you become. As a senior, it’s possible you’ve become one bitter nut whose only attempt at coping is yelling at unsuspecting high school kids to not come here during Prefrosh Weekend. However, not all hope is lost. There is one thing that never fails to give any upperclassmen incredible joy. That thing is Caltech Confessions.

JENNIFER WU: STORY of my LIFE

PHOTOS Abigail Jiang
WORDS & DESIGN Noelle Davis
MAKEUP Maitreyi Nair

As incoming freshmen, **JENNIFER WU [21]** and the rest of her class read a book by Angela Duckworth called *Grit*. Most people at Caltech are pretty gritty. It takes some mental toughness to slog through set after Caltech set, week after week, to study Schrodinger's Equation as freshman, to prove algorithm correctness and run-times, to build an amphibious ball-shooting robot, or to debug some thousand lines of assembly code. But there's tough, and then there's Jennifer.

November 1, 2018. One night derailed everything. Jennifer spent the evening fiercely studying for the first round of junior year midterms and trick-or-treating around campus. By the time she returned to her Bechtel suite, she was ready to get some rest. Around 4 a.m., however, she was woken up by nausea and an excruciating headache. It wasn't the first time this had happened—once during high school, she went to the emergency room with similar symptoms, but received no diagnosis. This time, however, it was worse. "Something is wrong," she thought, "I'm going to die."

"Something is wrong," thought **CHIEF VICTOR CLAY** of Caltech Security. Working late into the first morning of November, he heard about a strange call received by his dispatcher. The dispatcher could barely make out the words "Bechtel" and a suite number from the mumbling voice on the other side. It could have been a prank call, but a few officers went to check on the suite. Since officers typically do not enter a student's living quarters unaccompanied, they waited for an RA or RLC to join them. When he heard about the delay, Chief Clay was indignant. To the campus chief of security, an officer with twenty-eight years of experience in the LA County Sheriff's Department and a father of two daughters, the situation demanded urgency. "What the f*** are you waiting for?" he asked. He ordered them into the suite.

The last thing Jennifer remembers is someone banging on the door of her room. She doesn't remember throwing up on her bed, the ambulance ride to Huntington Memorial Hospital, or the emergency craniotomy performed by Dr. Ian Ross to relieve the pressure from her bleeding brain and save her life. She had experienced the rupture of an arteriovenous malformation (AVM), a tangle of blood vessels

in her brain. An AVM is usually present from birth, but its rupture can be triggered by high blood pressure, which Jennifer links to the stress of midterms and many sleepless nights.

The operation that morning successfully resuscitated her from respiratory failure but left her in a coma. A coma from thalamus damage can last a year or longer, but three days after the surgery, Jennifer woke up. Never one to take herself too seriously, Jennifer would later write about that time as "the longest beauty sleep of [her] life." She reports that "it's a wonder what seventy-two hours of sleep can do for your skin. There aren't many benefits of being in a coma that immediately come to mind, but one was that all of my acne disappeared." However, she woke up paralyzed on her left side with other loss of motor control. It would be a while before she could write again—let alone speak. She spent the next month relearning to speak and sit upright. Many tears were shed, but by the time she moved to the Rancho Los Amigos National Rehabilitation Center for more intensive therapy, she could even walk through the hall using handrails. There, working with therapists for three hours a day, six days a week, she progressed to walking with a four-legged cane. As she braved feeding tubes, electrotherapy, and countless medi-

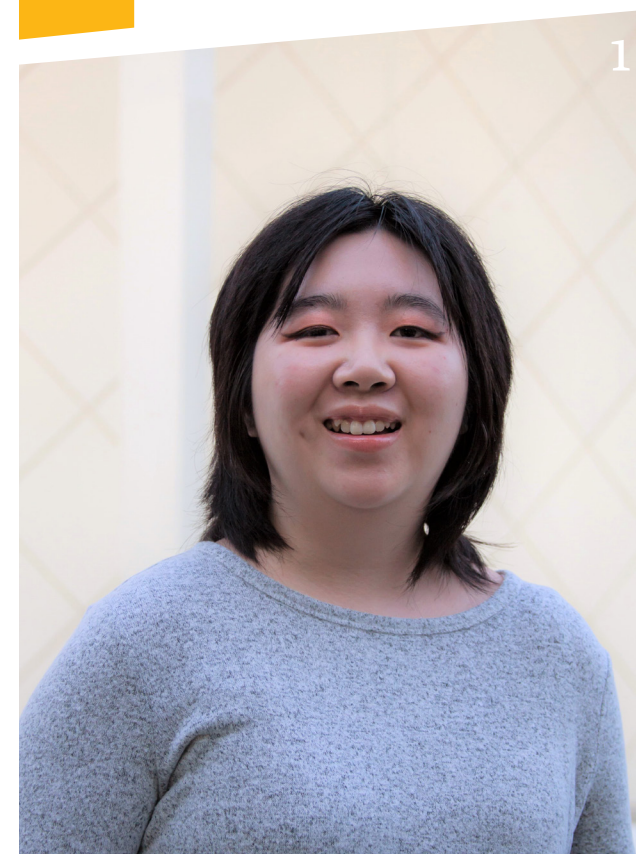
cations, she maintained her Caltech curiosity, never running out of questions for her rehab doctor. "I had so many that she almost would be afraid of checking up on me," says Jennifer. Finally, seventy-five days after being rushed to the Huntington that November night, she got to go home. Rehab would continue, but now she could sleep in her own bed and curl up on the couch with her cat.

When would she return to Caltech? "You can come back whenever you want," **DEAN LESLEY NYE** told Jennifer that summer. "We're not going anywhere." Starting in the fall would be unrealistic, but Jennifer still wanted to return this school year.

This winter has been her first term back: she comes to campus for classes twice a week. Although now she walks with only a single-point cane, she also has a chauffeured golf cart, provided by the deans, to drive her from building to building. Sitting at a round table with her mom and brother in the middle of a sleepy Chandler Cafeteria one January afternoon, Jennifer reflects on the challenges she's faced over the last year and a half. She posits, "Emotionally, I think I'm harder than most people. At least I try to be, for my mom." Her physical impairments have been difficult for her family too. While her mother

is known for her generous smile and savory cooking, Jennifer says that she cries a lot now, especially when she sees photos of friends' healthy kids on social media. "I'm like, I'm not dead, Mom!" Jennifer laughs.

In spite of everything, Jennifer has steadily maintained her vision for the future. An LA County native, she is studying chemical engineering in the environmental track and hopes to use science to bring the world clearer skies and brighter days. She has researched air pollution in two SURFs, working on aerosols with **PROFESSOR RICHARD FLAGAN** and spectrometry with Dr. Stanley Sander at JPL. Before the incident, she was a newly-minted TA and an a cappella singer, and she hopes to return to these in the future. Recently, she also began a memoir, five thousand words so far, entitled "No Pain, No Brain." She has a big fan base among Caltech Security, who have implemented EMT certification for all officers since her emergency. Jennifer's ambition and determination are reflected in all of her accomplishments, but the last year and a half may have been the biggest fight of her life. With the unshakeable spirit she has had through it all, after overcoming this, surely she can overcome anything.



1. **SHOW ME THAT DIMPLE** Jennifer smiles for the camera in front of the wedding cake after a day of classes.
2. **MILDLY AMUSED** No one thought that Jennifer's golf cart escort would notice her makeover. We underestimated him.
3. **YEA BOIII** This one never fails to win a grin from Jennifer.

NEVER DITCHING DITCH DAY.

PHOTOS Various
WORDS Shu Fay Ung
DESIGN Shu Fay Ung

Ditch Day has always been a quintessential part of the Caltech undergraduate experience, but as students were forced to leave campus and courses moved online, a great deal of uncertainty was cast on whether this decades-old tradition would take place at all. Nevertheless, the impossibility of an in-person Ditch Day did not stop some seniors from keeping the tradition alive—hence the first-ever virtual Ditch Day was born.

“Students here don’t let something like a global pandemic ruin their plans, and we can adapt whenever problems arise to come up with something great,” comments **ALEXA LAUINGER [20]**. As with many other stackers, she recalls the countless planning meetings conducted over video conferencing applications such as Zoom. Initial plans had to be scratched and seniors scrambled to redesign stacks for an online platform, often having to implement completely new stack ideas. There were concerns as to whether online activities could be made as engaging and fun as previous Ditch Days, but this was where the creativity of the seniors truly shined. Stacks incorporated games played over Zoom or hosted on custom websites; some built replicas of the houses in Minecraft, which was also used to host an escape room; others experimented with online interactive storytelling via Twine. A particularly popular tool was Discord, which was used for communication in stacks. “The system of roles and permissions that Discord uses allows seniors to set up voice chat rooms for private communications within individual teams of stackees or distribute specific documents to stackees with specific roles in the stack,” explains **RAY SUN [20]**.

Of course, the unusual circumstances posed unique challenges for the stackers. For

one, time zone differences had to be considered, which prompted some stacks to start at a later time rather than the traditional 8:00 a.m. Some found it difficult to come up with interesting activities while physical activities were limited to what everyone had at home. Others were frustrated with the many technical complications that came with moving things online. Furthermore, as the online term took its toll on students, seniors also experienced difficulty finding time and motivation to work on stacks.

Nevertheless, few advantages are to be reaped from the virtual experience. There was more flexibility in being able to accommodate more people in stacks and fewer logistical considerations such as providing food for stackees. A good degree of novelty was also introduced as seniors had to think of new ways of telling stories and interacting with people online. “It gave us the chance to create a Ditch Day unlike any of the previous ones,” said Lauinger.

The biggest hope of the seniors was that the Frosh had fun. “Really, I just hope it was a refreshing bit of fun and positivity for everyone,” said **MORGAIN MANDIGO-STOBA [20]**. Will we see more virtual Ditch Days in the future? “I definitely don’t think that future classes will be willing to switch to a completely online Ditch Day...but I could see a Frosh being introduced to a virtual stack element and being inspired to incorporate that into their own stack,” she remarks. It would be interesting to see how this year’s experience might influence Ditch Day planning for future classes. For the Class of 2021, let us hope that we may return Ditch Day to campus.



STUDENT INVESTMENT FUND

WORDS
Adrian Huang

DESIGN
Eilleen Zhang

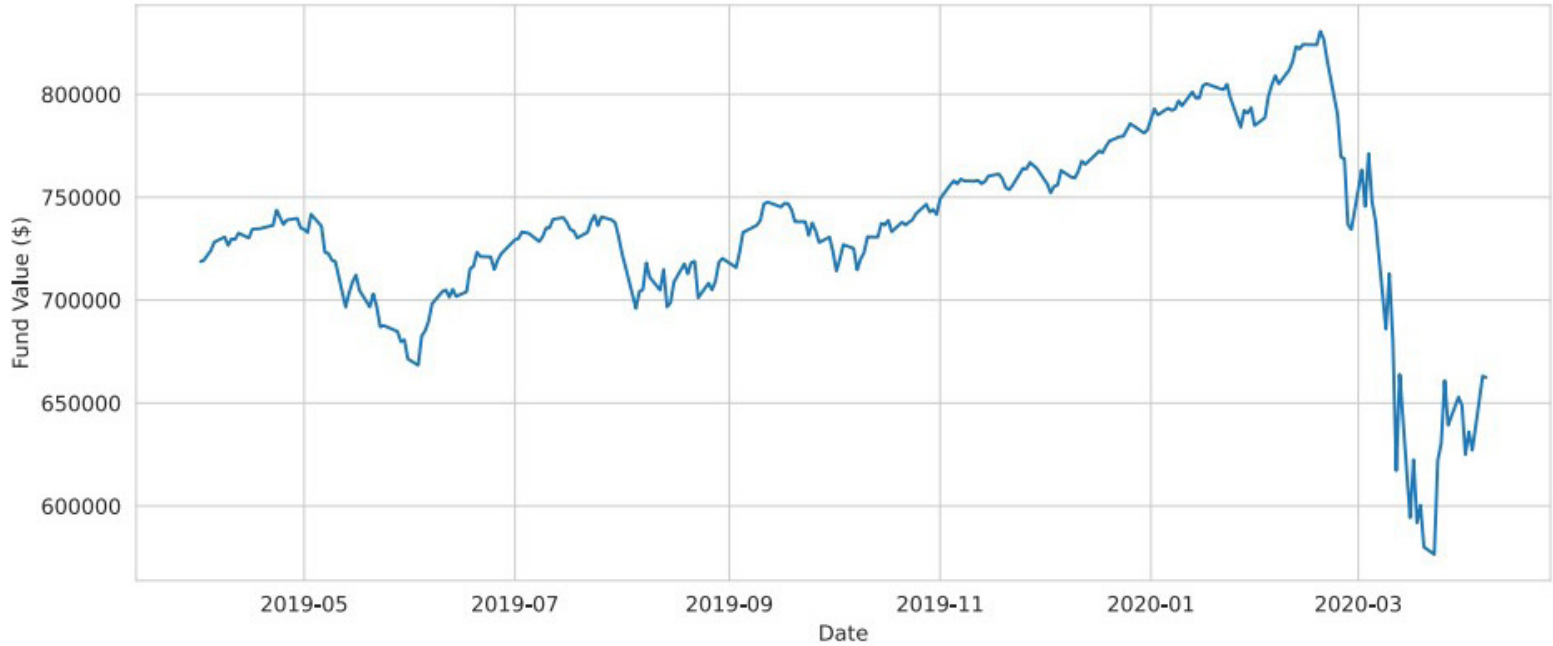
While finance and portfolios might make not make sense nor cents at first, the Student Investment Fund (SIF) at Caltech gives students risk-free opportunities to get into fund management. As volatile as the market can be, SIF has routinely made a profit on their investments, seeing their holdings grow by 22% in the last year! More important than making wealth is to share it, as the club distributes a portion of its earnings to clubs annually.

The biweekly meetings held by SIF are open to everyone and relaxed, yet the air is always filled with discussions on statistics and proposals, passing ideas from one person to the next. Co-presidents **ETHAN JASZEWSKI [21]** and **ALDEN ROGERS [20]** explain their strategy for student investors that can't keep constant watch on the market: "Rather than looking at short-term fluctuations in the market, we seek companies that have a good long-term outlook. We also only invest a small amount of the total value of the fund in any one company to limit risk. By focusing on companies that have a solid future and diversifying across numerous stocks, we don't have to worry about trading on daily price movements." Recently, the club has investigated quantitative trading to take their finances to the next level by combining data analytics with market activity.

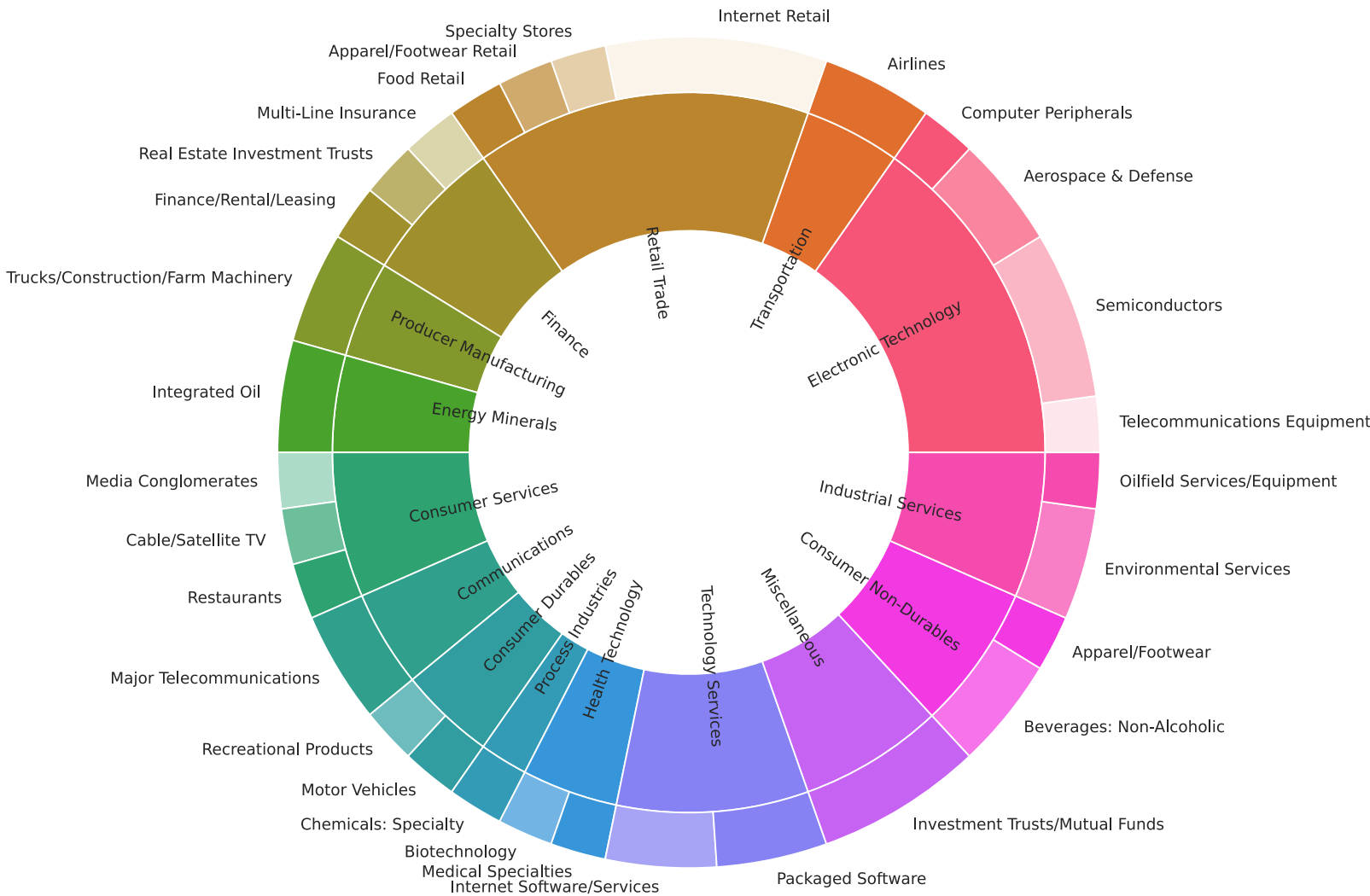
THE HOLDINGS These four companies are the highest overall value holdings that SIF has (last updated: March 2020).



Fund performance: April 2019 to April 2020

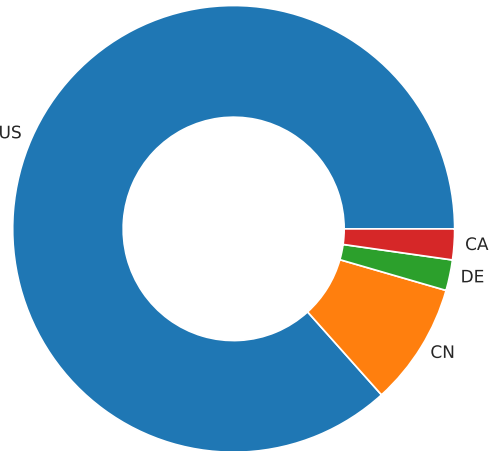


Sector Breakdown



BY THE NUMBERS SIF regularly sends out reports of the fund's performance to club members, along with various other information. Credit: SIF.

Country Breakdown



The activities in SIF extend beyond Caltech, as the club also tackles statistics problems often encountered in job interviews. Likewise, companies are also paying attention to the success of SIF, reaching out to the club with national events and competitions.

Investment can be tricky, but who wouldn't want more money in their life? SIF brings future entrepreneurs at Caltech together to take a large step into a greater world of finances.



Pale Frosh

— Ricketts Hovse —



BLACKER HOVSE WORK FROSH

BELL FROSH



Page House

PALE FROSH — RICKETTS — AUDREY DEVAULT [23]

“So we all showed up on the first day when [Ricketts] initiates all the frosh, and when they were assigning frosh jobs they had us all come up and stick out our arms to compare skin colors, and we went until we found the palest person...and it was me. My job is to be the palest person which is super fun. [There aren’t any traditions involving pale frosh], just avoiding sunlight, you know, try not to get sunburnt. It was pretty close though [when choosing pale frosh]; I had some competition.”

WORK FROSH — BLACKER — ESMIR MESIC [23]

“So [being work frosh] hasn’t really started much yet, but I’ve heard a lot of things from past Moles. It’s a lot of work to build Blacker interhouse because it’s one of the more mechanically intensive interhouses [and] it’s all going to start soon. I took on a very slight workload next term just so I can accommodate for this. There are a lot of late nights and you kind of lose your sleep way more than a regular Caltech student. Your whole goal is to get the entire house together and organize them to build the interhouse, but a lot of the time it just falls on you to build the entire interhouse. I’m dedicated to making a pretty good interhouse, so it’ll be fun...maybe...hopefully.”

FROSH JOBS

Whether as a means to task the freshmen with duties or merely as a novelty, frosh jobs have been a long running tradition in many houses. We’ve interviewed some of the frosh who have been put to hard work by their upperclassmen about their jobs.

BELL FROSH — PAGE — MOHINI MISRA [23]

“Basically, I was given the bell at the beginning of the year and I just have to bring it to dinner every night, keep it in my room, and don’t lose it. In the house it’s kind of a competition to steal the bell, so it’s gotten stolen from me a lot and hidden. Currently, someone stole it and put it in the laundry room somewhere, I don’t really know where it is. I usually am not in possession of it, so I usually don’t bring it to dinner. There’s a joke that I get put in the ice machine [if I don’t have the bell]. Historically Page chooses the smallest freshman to be bell frosh...because you can put them in the ice machine. But, I’ve so far not been put in the ice machine, so we’ll see.”



work frosh

fleming house



Lloyd House GONG FROSH

GONG FROSH — LLOYD — MELCHOR HERRERA & STEVEN YEE [23]

“[Being gong frosh is] always very tedious because Blacker keeps stealing our gong. We just protect the gong from other houses...and protect the mallet from ourselves, which could be comparable to almost as much of a pain as protecting the gong from Blacker and other houses. But overall, it’s a very unfortunate job...important but unfortunate. Don’t trust anyone, and unless you’re really dedicated to tying and untying the gong all the time to protect it, you’re never going to get it protected, frankly. [For success in protecting the gong], define protected. If you’re considering keeping it in one spot, I’d say we have a 90% success rate in one spot for a prolonged period of time... Yeah, we have a 95% success rate of keeping it in Blacker.”

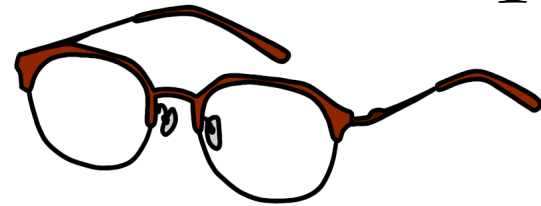
WORK FROSH — FLEMING — LEAH GRIFFITH [23]

“Work frosh means that I was elected by my peers to plan the Fosh party...and then I represent the Fleming frosh class in Excomm. I make sure that the students are happy and relaying any concerns that the students have to the house positions. [Being work frosh] brought me closer to the students, like being told to talk with them and that kind of stuff, and I guess just become closer to Fleming as a whole. It was nice to become part of the house officials.”

2020 VISION

WORDS
Eric Chen

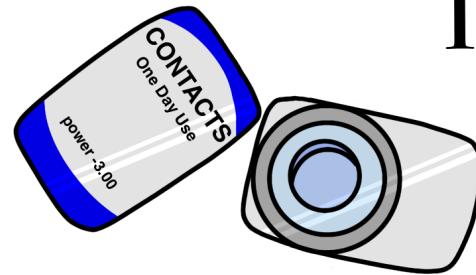
DESIGN
Katherine Chang



I

CORRECTIVE

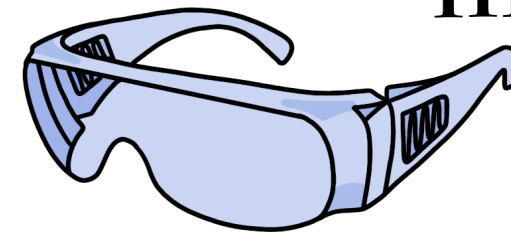
While evidence exists suggesting that lenses have been around since ancient Greek and Roman times, the first glasses are considered to have been invented in 13th century Italy. Since then, glasses have evolved in function and style as new lens geometries reduced aberrations and new materials made frames thinner and more customizable. More recently, they have started to come with lens coatings to reduce glare and resist scratches.



II

CONTACTS

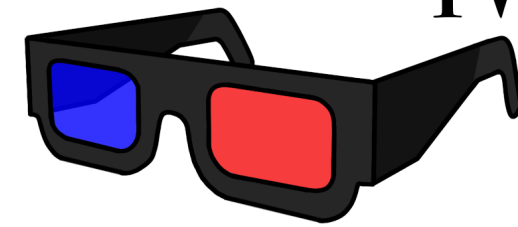
The next major step in corrective lenses was the contact lens. While understanding the optics to correct vision is one thing, understanding the biochemistry to safely rest a lens directly on an eye is another. Besides being clean, smooth and non-irritating, it is critical that contact lenses allow the diffusion of oxygen to the cornea below.



III

SAFETY

Lenses aren't just used to correct our vision, but also protect it. As we have discovered and engaged in activities increasingly hazardous to our eyes and health, we have found it wise to shield our eyes from the resulting splatters, debris, and radiation. The variety of safety glasses that exist is confirmation of how much we have expanded our scientific and engineering capabilities.



IV

3D

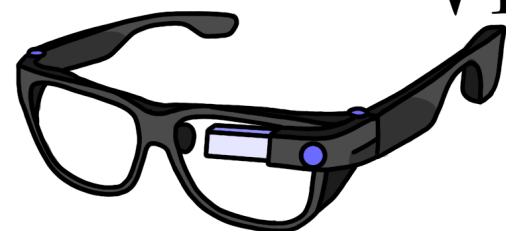
With the rise of computing came the ability to process graphics in more dimensions than ever before. To generate the effect of depth, 3D glasses either relied on polarizing filters or electronic shutters to show a different image to each eye. Unfortunately, glasses-based 3D failed to properly take shape, but some success was found with 3D displays and heads-up displays (HUDs).



V

COMPUTATIONAL

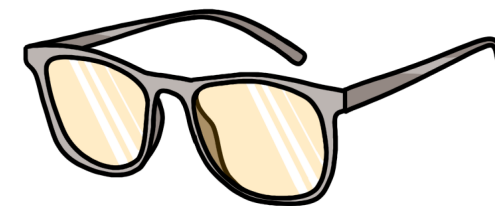
As our understanding of computation and information theory deepened, we realized that there was no reason lenses had to be physical. Computational photography eschews the lens, and instead funnels all the data straight into piles of linear algebra. These efforts have culminated in the sharpest, most detailed Instagram stories and black hole pictures ever.



VI

SMART

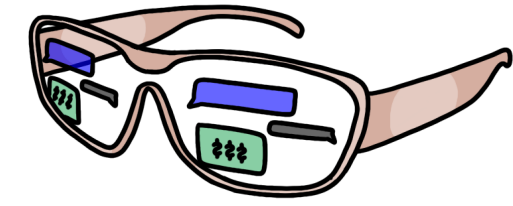
As the information age got properly under way, we began to seek ways to beam more data more continuously into our eyeballs. The natural product was smart glasses—with built in cameras, microphones, and displays to create and display more juicy information. Earlier efforts by Google were a bit far ahead of privacy and etiquette norms at the time, though the technology lives on in spirit in Google Lens and Google Assistant.



VII

BLUE LIGHT

As the reach of technology spread, its impact on our lives has become more apparent. Leading the new effort to integrate technology more naturally into our habits and cycles was the push to filter its light. Blue light filtering was first done with physical glasses, before being adopted as a software feature that could vary in intensity and automatically follow the sun throughout the year.



VIII

AR

After years of hiatus, smart glasses are poised to return—but in a different form. Instead of simply supplementing some information in your periphery, they intend to overlay your entire view. Advances in low-power processors and more compact optics promise to make the new generation of smart glasses not much bulkier than non-smart counterparts, while still transforming the way we see both real and virtual worlds.

It is said that seeing is believing, but over the decades, the way we see has undergone many changes. The development of glasses over time has been driven by ad-

vances in optics, materials, and ambitions. In contrast to early lenses that temporarily modified or corrected our sight, today's lenses expand and augment our view. With

a history spanning from ancient times to the modern day, the evolution of lenses is clearest in hindsight.



About This Divider

Narrowly avoiding the Y2K bug, this decade put in the work. The ISS receives its first crew, and people everywhere get the revolutionary iPod. Shortly thereafter, the nation mourns 9/11 and the disintegration of the Space Shuttle Columbia. YouTube debuts, while Pluto is demoted. Obama is historically elected president and given the Nobel Peace Prize for his leadership. However, as all these developments unfold, various natural, political, and economic disasters plague the world. This decade showed us the reward in tackling problems head-on.

Welcome to a New Millenium



The trip was truly a once-in-a-lifetime experience, one that allowed me to see the world focusing not on our cultural differences but rather the similarities we share as humanity.

Sent by Saehui Hwang [22]

In search of India

PHOTOS
Tara Porter
Saehui Hwang

WORDS
Selina Zhou

DESIGN
Shu Fay Ung

Towards the end of 2019 (and before all that is 2020), a group of 10 female undergraduate students embarked on the Caltech Y's India Ki Khoj Trip over winter break. This annual trip is a nine-day program where Caltech students visit the Indian Institute of Technology (IIT) Gandhinagar and experience different aspects of India. Techers live on the IIT campus with local students, attend lectures, and visit surrounding areas, usually at night and to cultural or historical locations.

We interviewed one of the participating students, **SERENA YAN [22]**, about her experience in India. It was her first time visiting the country and traveling with the Caltech Y.

Upon arriving at Gandhinagar, Yan took a cold shower with a bucket. The first thing she noticed was how environmentally aware the students were, compared to Techers. Students at IIT Gandhinagar use buckets to shower, which saves water on top of allowing one to recycle it for water-

ing plants. The campus also does not utilize any paper or plastic utensils. "[It] is very eco-friendly. They have their version of Red Door with really good hot chai," recounts Yan, "I started using reusable plates myself after the trip."

The Techers spent half of their visit on campus, where they attended lectures and participated in various activities that introduced them to Indian culture as well as present-day politics and current events. Of note, they had the opportunity to listen to a lecture given by Rajmohan Gandhi, grandson of the historical figure Mahatma Gandhi.

Outside the classroom, the group went on various off-campus excursions to places such as Gandhi Ashram, Akshardham, and various museums. A highlight for Yan was a visit to a local village; IIT has many outreach programs for the residents of Gandhinagar, such as providing training for local village women to learn to sew. The group also visited a local elementary school where

the kids were initially shy but very friendly. "[They] were shy but curious—they've never seen foreigners before," says Yan.

The Techers learned a lot and established new friendships through their interaction with IIT students. Yan recalls meeting someone involved in electronics trading who gave her suggestions on study materials. All classes in IIT are taught in English, where among all majors, computer science was known to be the most competitive. Outside their very intensive studies, IIT students also participate in their variety of intercollegiate sports which includes basketball, cricket, and dance.

We asked Yan for any advice she would give to those considering applying to the Ki Khoj Trip in the future. The trip costs \$900 per person, which is a fair bargain for international travel, especially during the winter break season. She thinks the application process was not difficult at all, so you should definitely go for it when the program resumes, hopefully soon.

1. NEW FRIENDSHIPS Techers take a group photo together with students from IIT Gandhinagar in front of the Jama Masjid in Ahmedabad, India. **2. STREET-SMART** The students embark on a heritage walk in the streets of Ahmedabad. **3. CHA-CHA FOR CHAI** Malia Rebollo [21] enjoys a cup of chai.

WHERE THE HEAVENS AND EARTH MEET The Jama Masjid (Friday Mosque), built in 1423, features an elegant fusion of Hindu, Islamic, and Jain architectural elements.



Sent by Tara Porter [21]



SERVING IT UP!

PHOTOS
Noelle Davis
Chris Wang

WORDS
LC Chen

DESIGN
Chris Wang



OORAH! The women's volleyball team gather together to get hyped for the next rally.



Twenty-nineteen was a big year for the Caltech Beavers, especially in volleyball. The season saw records and huge achievements for the team. In particular, for the first time, the team collected eleven wins in a season; for the first time, the Beavers triumphed over Occidental College, which was incidentally also the first time the Beavers won a SCIAC game as guests. They made history when the team defeated Occidental not once—but twice—and dominated the SCIAC opponent. Given that the women had defeated Pomona-Pitzer College the Tuesday before their second Occidental victory on a Friday, this year's roster also had the honor of being the first to win back-to-back SCIAC games. The year's big titles and extensive records are the results of gradual but obvious growth in the volleyball team. One of Caltech's final news articles for the season



praises 2019 as “a season where the Beavers statistically raised the bar in nearly every team category.” The victorious season was led by game-changers in Caltech athletics. **LAUREN LI [20]** was named Caltech's first volleyball All-SCIAC this year. Her total of 702 kills is a top Caltech record, and she is the only player to claim more than 200 kills in a season in the entire program history. **KRISTYNA MARUSZKO [21]** set the single-season assists record with 727 despite an injury and accompanying surgery taking her out last season. Moreover, **MEGAN WANG [22]** has been dominating in sin-

gle-season digs and has topped the record books. For the seniors, the volleyball team has come a long way in the four years they have known it. Three out of the four seniors were the only ones to have played in all their freshman year sets. Their precedent of hard work and improvement from the beginning has been dutifully reflected in their underclassmen teammates. With the Beavers historically out-doing themselves every year, the seniors will be remembered and missed while anticipation builds for what lofty heights the team will reach next.

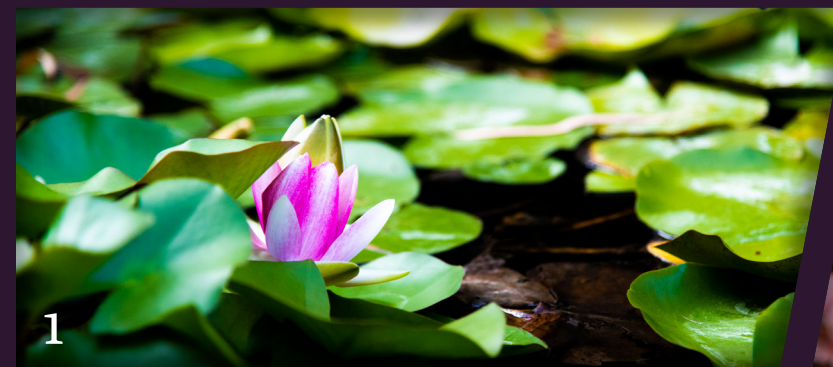
1. SPIKE ONE Hannah Fan [22] attempts to penetrate the opponent's defense. **2. SPIKE TWO** Keeping her eyes firecly on the ball, Krystyna Maruszko [21] prepares to slam it down on the opponent. **3. SPIKE THREE** Alexa Lauinger [20] gracefully elevates into the air as she prepares to deliver a spike.

plants of campus

DESIGN PHOTOS WORDS
Noelle Davis Justin Hyon

Campus is quieter than usual. The bustle of students hurrying to their next lecture, the lively chatter and rock music emerging from Red Door, replaced by a blanket of silence, punctuated by the occasional whirring of a security golf cart. But in silence, as they always have, the violet inflorescences of Egyptian lilies burst up around Beckman Mall. Yellow bundles of flowers hang from the golden medallion trees, and new ivy climbs up the walls

of Caltech's oldest buildings. The Olive Walk's namesake residents bloom, fruit, and drop. Spring, though in some ways altered, in others goes on. Even as the world changes around them, the greens, reds, and purples of campus, ever present in the perpetual warmth of the Southern California sun, bloom on.



1



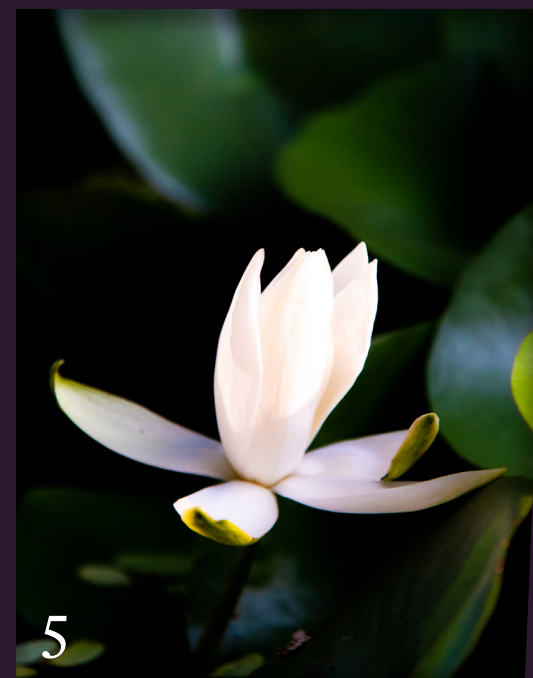
2



3



4



5



6



7

(OPPOSITE) **SPRING!** A roof of wisteria in the Church-Kerchoff courtyard.
1. STARBURST A water lily peeks out from under the lily pads on Beckman Mall.
2. COTTON CANDY A cloud of pink Indian Hawthorne lines the Bridge-Sloan walkway.
3. TREEHOUSE VIBES Millikan Library's middle floors look out into wispy Jacaranda leaves.

4. LEMON DROP Flowering golden medallion trees brighten campus walkways.
5. SNOW WHITE A white lily emerges from the Baxter pond.
6. ORANGE OUT California poppies spring up by the orange doors of Brown Gym.
7. PURPLE SWIRL Periwinkle fills the raised beds in the Church-Kerchoff courtyard.



THE 2010S REPRESENT THE MOST FORMATIVE YEARS OF OUR LIVES. SCIENCE AND TECHNOLOGY DEVELOPED AT A BREAKNECK PACE ALONGSIDE OUR PHYSICAL GROWTH SPURTS. THE IPAD WAS FIRST ANNOUNCED IN 2010 AND IS NOW A FIXTURE IN CLASSROOMS AND LIVING ROOMS EVERYWHERE. THE FIRST UBER RIDE WAS TAKEN IN 2010 AND HAS SINCE DRIVEN MANY OF OUR OFF-CAMPUS EXPERIENCES. THE TAIL END OF THE 2010S HAD US MOVE AWAY FROM THE FAMILIARITY OF HOME TO CALTECH, WHERE WE CREATED OUR OWN FAMILIES WITH FRIENDS FROM ALL OVER THE WORLD. AT THE SAME TIME, THE RESPONSIBILITY OF SOLVING EXIGENT GLOBAL DISASTERS AND CONFLICTS GREW UPON OUR SHOULDERS.

THE DECADE IN REVIEW 2010 | 2019

WORDS
Shu Fay Ung
DESIGN
Shu Fay Ung

The past decade has been a whirlwind of growth and revolution speckled with conflict and misfortune. As time morphed into the 2010s, the world was emerging from the 2000s that Time dubbed as “the Decade from Hell”. We were recovering from the 2008 financial crisis, unemployment in the U.S. had peaked at 10% in 2009, and the 9/11 attacks still haunted many. Let’s be honest—all of us were a little wary of what the next 10 years might bring.

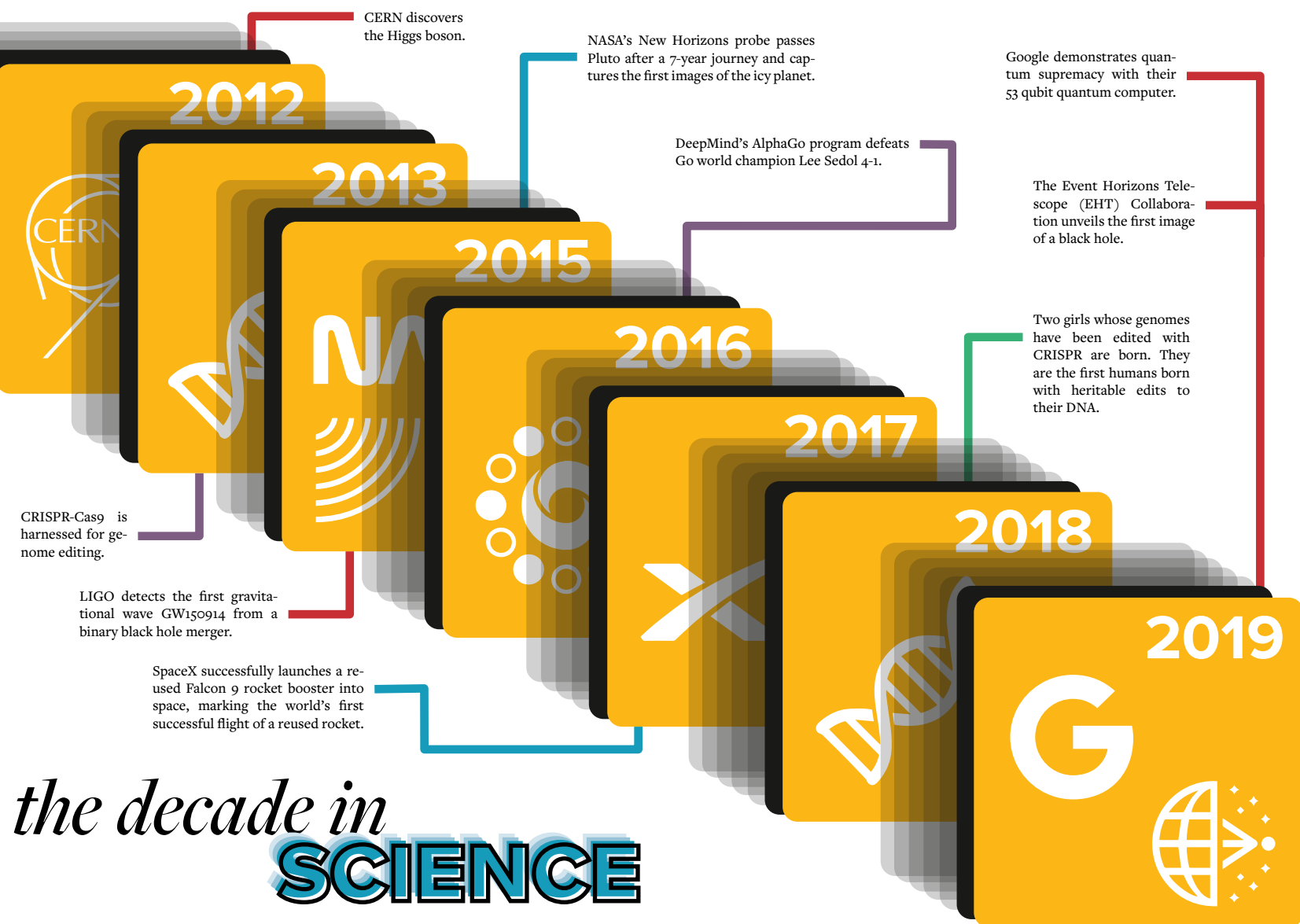
On one side of the coin, the decade brought a world divided with tragedy. In the dawn of 2010, the earth split in Haiti as a 7.0 magnitude earthquake devastated the capital Port-au-Prince, burying roughly 250,000 lives. Syria plunges into a civil war between President Bashar al-Assad’s government and rebel groups that has lasted from 2011 to the present day. Violence also spread in the form

of terror attacks around the globe—explosions blasted near the finish line of the 2013 Boston Marathon; a 19-tonne cargo truck plowed through unsuspecting crowds at a celebration of Bastille Day in Nice, France; while terrorist organizations massacred the innocent in the Middle East and Africa. As if things couldn’t get worse on the African continent, the deadly Ebola virus ravaged through its west coast, claiming approximately 11,000 lives.

On the other side, the decade united people together in the fight for change. 2015 saw the legalization of same-sex marriage in the United States, which was a major step for LG-BTQ+ rights and marked the culmination of the shift in public opinion towards gay marriage. The push for action addressing climate change was stronger than ever before as major countries came together and signed the

Paris Agreement, a landmark environmental accord that charted a new course in the global climate effort. #MeToo blazed through our social media feeds and brought a shocking revelation to the prevalence and pestilent impact of sexual violence. The ‘10s also saw the birth of the Black Lives Matter movement in 2013, which has since amassed international support and empowered communities in the fight against racial injustice.

The 2010s left us in a world hardened with an odd admixture of division and unity. With COVID-19 defining the beginning of the 2020s, however, the world seems to be more divisive than ever before. Nevertheless, let us remain optimistic that we are weathering the worst of the decade, and that better times lay just beyond our reach. Let us emerge from the adversity of present times with the resilience to ameliorate ourselves and our society.



The Big T has surveyed the undergraduate student body on their opinions of the 2010-2019 decade. Here are some of the responses.

WE ASKED, YOU ANSWERED

the [] of the decade.

most historical moment

- Colin Kaepernick kneeling for the national anthem
- 2012 end-of-the-world scare
- Migrant crisis in the Mediterranean
- The Cleveland Cavaliers coming back down 3-1 against the Golden State Warriors in the 2016 NBA finals
- Death of Harambe and the birth of meme culture
- When the Defense of Marriage Act was repealed
- Legalizing gay marriage
- Donald Trump's election and impeachment

most influential figure

- Barack Obama
- Malala Yousafzai
- Justin Bieber
- Donald Trump
- LeBron James
- Bernie Sanders
- Mark Zuckerberg

biggest fails

- Donald Trump's election and impeachment
- Brexit
- IBM Watson
- Google+ and Google Glass
- The final season of *Game of Thrones*
- DashCon

how would you summarize the decade?

INTERESTING COVFEFE CHANGE OOF


HOPE WILD PROGRESS INNOVATIVE DISASTROUS BILDUNGSROMAN TRANSFORMATIVE MILLENIAL TAKEOVER

playlist for the decade

films & tv shows of the 2010s

- Birdman*
- BlackKkKlansman*
- Black Mirror*
- BoJack Horseman*
- Brooklyn Nine-Nine*
- Chernobyl*
- Coco*
- Diners, Drive-Ins and Dives*
- Gravity Falls*
- Hannibal*
- Harry Potter*
- Inception*
- Inside Out*
- Kubo and the Two Strings*
- Love It or List It*
- Lucifer*
- Mad Max: Fury Road*
- Mob Psycho 100*
- Orange is the New Black*
- Parks and Recreation*
- Rick and Morty*
- RuPaul's Drag Race*
- Sharp Objects*
- Spider-Man: Into the Spider-Verse*
- The Avengers*
- The Good Place*
- The Grand Budapest Hotel*
- The Handmaid's Tale*
- The Hunger Games*
- The Martian*
- Whiplash*
- You*
- Your Name*

TITLE	ARTIST
+ All the Kids are Depressed	Jeremy Zucker
+ Any	Taylor Swift
+ Any	Ariana Grande
+ Bad Guy	Billie Eilish
+ Car Radio	Twenty One Pilots
+ Closer	The Chainsmokers
+ Despacito	Luis Fonsi ft. Daddy Yankee
+ Dig Down	Muse
+ Friday	Rebecca Black
+ Here's to Never Growing Up	Avril Lavigne
+ Hotline Bling	Drake
+ Los Ageless	St. Vincent
+ Revenge	CaptainSparklez
+ Royals	Lorde
+ San Francisco	The Mowgli's
+ Shine	Pentagon
+ This is America	Childish Gambino
+ Thrift Shop	Macklemore and Ryan Lewis ft. Wanz

44

🔗 1414 commits

🌿 17 branches

📦 0 packages

🔑 0 releases

👤 18 contributors

🏠 MIT

● Python 60.2%

● HTML 25.9%

● JavaScript 8.1%

● CSS 3.6%

● TSQL 2.1%

● Makefile 0.1%

📄 Ziyan Updated Readme

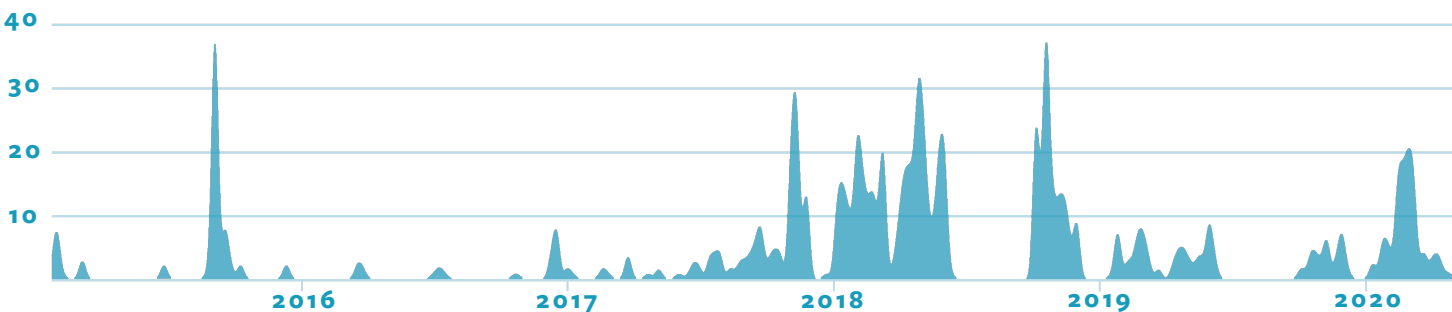
Latest commit aabbcc 13 days ago

📄 README.md

13 days ago

📄 README.md

[ASCIT Donut] New Site!



COMMITTED? This graph shows all of the commits to GitHub during the creation of new Donut. The project—spanning more than half of a decade—finally saw the light of day. From slow beginnings to the final push for release, the Donut Dev Team put in an enormous amount of effort to ensure that new Donut could last for decades.

WORDS
Ziyan Mo

DESIGN
Ziyan Mo

The easiest way to stalk undergrads at Caltech is to go on Donut—the overwhelmingly orange website hasn’t changed in nearly 10 years. This year, however, Donut received a massive update, six years in the coming.

For the past decade, Donut chugged along in the depths of Avery’s computer lab. The original Donut was first developed by a group of Caltech undergrads in the early 2000s, predating even Git. Remnants of past designs and screenshots can still be seen floating around in the plethora of pages on the site. Since then, the Donut Dev Team—the crew responsible for developing and maintaining the website—was formed.

By 2014, Donut-legacy was becoming a bloated mess with incomprehensible code. It was written with PHP, and there were fewer and fewer people at Caltech who knew this language as time went on. It was becoming increasingly difficult to maintain and update. **ALLISON KONG [15]** and **ERIC PELZ [15]** took the initiative to begin the rewrite in 2014. Over the years, people joined and left, either because they graduated or just because other commitments grew.

The rewrite was a huge undertaking. Donut-legacy was used heavily in its earlier days and was inflated with

features, as seen from the myriad of pages about other schools, places to eat, option recommendations, etc. Although some of them were eventually cut from the new Donut, there were still quite a few tricky elements remaining. On top of that, people first joining the team were inexperienced, and therefore even in the rewrite, some design choices may have seemed puzzling.

“It brings tears to my eyes to see a child go off into the world on its own,” said **ROBERT ENG [18]**, the tech lead from 2017 to 2018, “but actually, I’m so proud of everyone who worked on Donut since its inception and the state of the new site. More importantly, I think it’s awesome how through the rewrite each member has grown and learned something from [it].”

The new Donut, written in the much more readable Python, opened beta in early March. Originally, there was going to be a transitional process before shutting down Donut-legacy for good, but due to the COVID-19 situation, Caltech banned students from entering Avery House. In early April, Donut-legacy’s computer became unconnectable. The data on it will hopefully be recovered in the future, but for now, it is no more. R.I.P., Donut!

CodeIssuesPull requestsActionsProjectsWikiSecurity

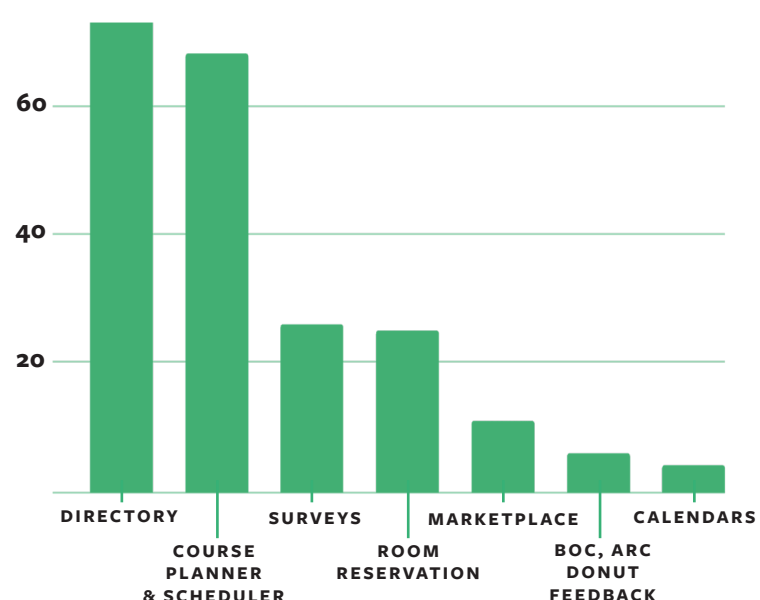
📊 InsightsSettings

Jan 31, 2015 – May 10, 2020

Period: All

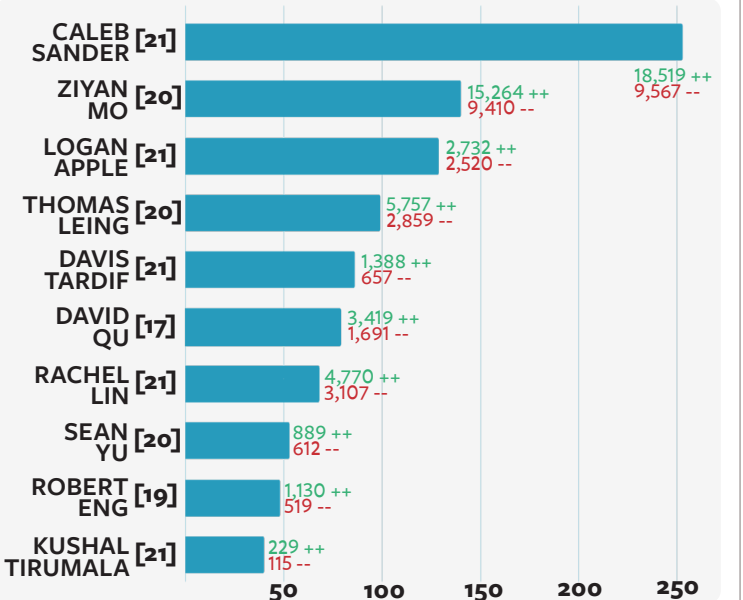
Overview

Most popular features on donut




Feature	Count
DIRECTORY	65
COURSE PLANNER & SCHEDULER	65
SURVEYS	25
ROOM RESERVATION	25
MARKETPLACE	15
BOC, ARC DONUT FEEDBACK	10
CALENDARS	10

Contributions & commits to master, excluding merges




Team Member	Count
CALEB SANDER [21]	18,519 ++
ZIYAN MO [20]	15,264 ++
LOGAN APPLE [21]	2,732 ++
THOMAS LEING [20]	5,757 ++
DAVIS TARDIF [21]	1,388 ++
DAVID QU [17]	3,419 ++
RACHEL LIN [21]	4,770 ++
SEAN YU [20]	889 ++
ROBERT ENG [19]	1,130 ++
KUSHAL TIRUMALA [21]	229 ++




ROBERT ENG [18] commented

It brings tears to my eyes to see a child go off into the world on its own. But actually, I’m so proud of everyone who worked on donut since its inception and the state of the new site. More importantly, I think it’s awesome how through the re-write each member has grown and learned something from donut.



JOSHUA CHEN [18] commented

I have no idea how it (old donut) still works



RACHEL LIN [21] commented

I’m relieved that I got to see it live before I graduate because every year we aim to make it live that year but it never happened lmao

NEW DONUT

45


```
import event horizon
public class international collaboration
private static black hole
    if !(familiar with astronomy) {
        develop familiarity
        make new connections
        visit telescopes
    }
    work on project for 3 years
    develop algorithm
```

WHERE NEXT?

BLACKHOLE IMAGE POLARIZATION TO VISUALIZE MAGNETIC FIELDS

VIDEO OF THE BLACK HOLE IN THE CENTER OF OUR OWN GALAXY

Earthquake imaging

Climate science and cloud imaging

METHODS ON DATA COLLECTION PROCESS

“You never know what you’ll enjoy working on. If you’re really excited, you’ll get past the challenges and figure it out. Don’t be afraid. Try to push yourself to the limits. You’re not going to learn if you just stay in the safe zone.”

SEEING THE INVISIBLE

Sometimes, stepping outside of one’s comfort zone may require traversing a distance of 54 million light-years. For **DR. KATIE BOUMAN**, this was certainly the case when she decided to take on the Event Horizon Telescope (EHT) project. During her six-and-a-half-year journey to help piece together the first image of a black hole, she embraced the unknown.

When Dr. Bouman was first introduced to the EHT, she had been working in the field of computer vision, and apart from “black hole” and “telescope,” she was largely unfamiliar with the astrophysics lingo. Nonetheless, that didn’t stop her from immediately deciding that she wanted to be involved.

“Even though I didn’t know the details, you could see it fit into the same mold of problems I had been working on: the sparse noisy data that you want to recover hidden information from by understanding the phenomena around us and is captured by our instruments,” she recalls.

In contrast to traditional telescopes, the EHT is a computational one, comprising of a global array of eight independent telescopes and drawing together data from each to construct a more comprehensive image. Dr. Bouman’s challenge lied with contributing to an algorithm that could piece together all of the individual data points.

“When you have a tiny signal riding on huge amounts of noise, you really have to dive deep into the problem to understand the structure and to pull out hidden information where it doesn’t look like anything but noise,” she said. “Every day was solving a new challenge.”

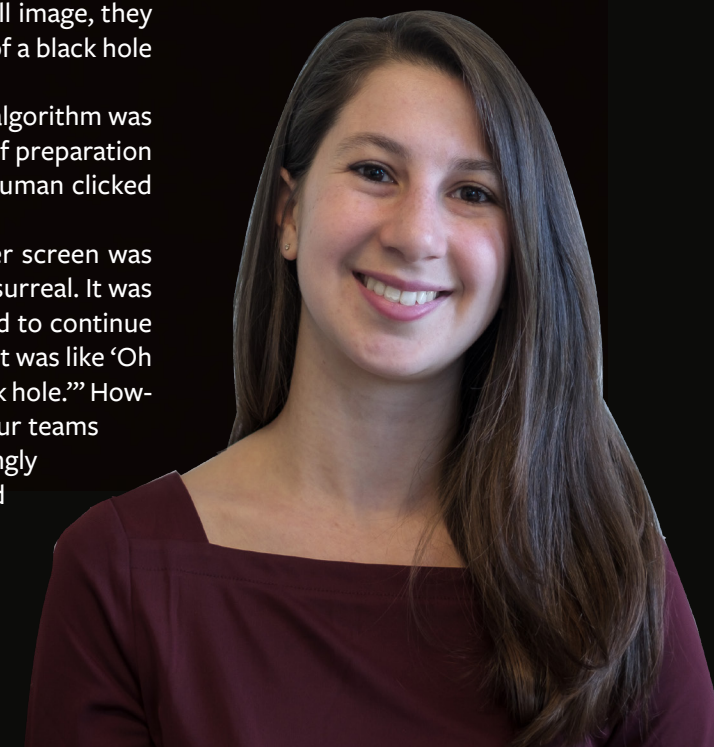
She joined one of four teams to develop independent algorithms for the challenge—to produce an image of a black hole. When they were given the data of the Messier 87 (M87) black hole, it was clear—if all four teams independently synthesized the same overall image, they would have the first image of a black hole in history.

At the split moment the algorithm was to execute, all of her years of preparation were put to the test. Dr. Bouman clicked the button.

The ring structure on her screen was all too clear. “It was almost surreal. It was too good to be true. We had to continue to pinch ourselves because it was like ‘Oh my gosh, we’re seeing a black hole.’” However, it was only when all four teams reconvened after a seemingly endless seven weeks, and the four screens all displayed the same defining ring structure, that their discovery was set in stone. The EHT project that Dr. Bouman and so many others poured

their hearts into had made history. When the image, a combination of the features from all four teams, went viral, Dr. Bouman and her colleagues knew that it was just the start of a whole new adventure.

“You never know what you’ll enjoy working on. If you’re really excited, you’ll get past the challenges and figure it out. Don’t be afraid. Try to push yourself to the limits.” She smiled. “You’re not going to learn if you just stay in the safe zone.”



(LEFT) **ATACAMA** Image of ALMA, the Atacama Large Millimeter/submillimeter Array in Chile, one of the telescopes in the Event Horizon telescope array. Data from it and other telescopes were used to piece together the first ever image of a black hole (image courtesy of LUC NOVOVITCH/ALAMY STOCK PHOTO). (BACKGROUND) **RING OF FIRE** The image of the M87 black hole that Dr. Bouman had worked on. Published on April 10, 2019, this computer-synthesized image broke headlines (image courtesy of eventhorizontelescope.org). (RIGHT) **DR. BOUMAN** One of the scientists who took this challenge to heart and ultimately helped make history.

G^{ING} GREEN

SUSTAINABILITY FUNDING

Sustainability research at Caltech's Resnick Sustainability Institute (RSI) has its roots in a \$30 million joint donation from Stewart and Laura Resnick and the Gordon and Betty Moore Foundation in 2009. This September, after witnessing the Institute's rapid progression in environmental research, the Resnicks pledged again. Their \$750 million donation is the second largest gift ever received by an American institution.

With this grant, a new committee co-chaired by professors **JESS ADKINS** and **THEODOR AGAPIE** are looking to make sustainability research more accessible to the entire campus, but especially towards undergraduates. Jess mentions that a complete overhaul of the chemistry labs is one possible approach: "One aspect of this is to rehabilitate the undergraduate chemistry labs as part of a new building to be financed from the Resnick gift. We are talking about how to get sustainability into existing classes, including the core, as well as the creation of new, cross-disciplinary classes and lecture series." The goal is to not just to understand how greenhouse gas emissions are affecting climate conditions, but also to make learning about environmental studies more approachable and engaging in undergraduate classes.

Beyond potential changes to courses, big ideas are being tossed around in many research labs. With CO₂ emissions from

the last century stockpiling the atmosphere, research has been looking beyond removing all CO₂ emissions (carbon-neutral) and towards eliminating CO₂ emissions of the past (carbon-negative). Ongoing research includes designing catalysts that can sequester CO₂ into the ocean and soil. Enriching soils with CO₂ leads to faster plant growth, which scientists are also looking at for uses in reforestation.

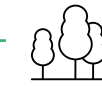
Jess is determined to harness the Resnick fund to find modern solutions to modern problems: "Caltech is committed to solving the hardest problems in science and engineering but especially those that affect a wide swath of society. Climate change is the problem of our generation and this gift gives us the resources to take it on in a serious way." The Resnick grant is not only a massive boon to sustainability research at Caltech, but also shines light on possible solutions to reverse the carbon crisis. Why Caltech? The Resnicks have reinvested in Caltech "so that all of the talents of this place can be brought to bear on how to get off of fossil fuels and how to mitigate the problems we have already created." The carbon crisis is truly a problem meant for the current generation to solve, as the increasing rate of CO₂ emissions must be snuffed.



1. **JORGENSEN** The Resnick Sustainability Institute (RSI) is co-located with the Joint Center for Artificial Photosynthesis (JCAP) in the Earle M. Jorgensen Laboratory. 2, 3. **CATALYZER** As an undergraduate researcher in the Lewis Group at Caltech, Jillian Reed [22] worked to create a catalyst to evolve hydrogen fuel from water using Earth-abundant materials. The Lewis Group focuses on developing solar fuels technologies.



SUNLIGHT TO EVERYTHING



CLIMATE SCIENCE



WATER RESOURCES



GLOBAL ECOLOGY & BIOSPHERE



THE \$750 MILLION RESNICK PLEDGE IS:

THE LARGEST EVER FOR
SUSTAINABILITY RESEARCH

THE LARGEST IN
CALTECH'S HISTORY

THE 2ND-LARGEST GIFT
TO A U.S. ACADEMIC
INSTITUTION

Afterlife

PHOTOS
Various

WORDS
Nivedita Kanrar

DESIGN
Eric Chen

This year, 207 Techers completed their undergraduate degrees, taking with them knowledge, memories, and friends that will have an impact throughout their lives. Though we were not able to celebrate seniors as they deserved, we honor Caltech's Class of 2020 by taking a look at four students who reflect the potential and drive of this year's graduates.



Geology major **KAREN PHAM [20]** is one of two Caltech recipients of the Fulbright Fellowship. Though the pandemic has postponed her Fulbright plans, Pham hopes to begin her project modeling speciation and extinction of bryozoans at the Natural History Museum in Oslo, Norway, in 2021. In the meantime, she's made a cross-country move to start graduate school in Geology at the University of Pennsylvania. What she'll miss most about Caltech is the idyllic campus. "It maybe masks a lot of suffering but there's something about the jacarandas and the Turtle Pond that gives campus a quiet calm."



ANANT KALE [20] graduated with a degree in Physics. Motivated by his strong interest in experimental physics, Kale conducted research in alkaline-earth based quantum computing with **PROFESSOR MANUEL ENDRES**. He'll begin his Ph.D. in Experimental Physics with the Greiner group at Harvard in the fall. During his time at Caltech, Kale helped establish the Caltech Physics Club to build a community between research groups and physics undergraduates. He's also passionate about the performing arts, and participated in dance and music groups on campus. He'll look back fondly on his performances, especially the Open Mic Nights with his bandmates from the hard-rock group Szechuan Sauce.



GEORGE DAGHLIAH [20] majored in Biology and plans to pursue an M.D./Ph.D. beginning in 2021. "I enjoy clinical work, but cannot see myself devoid from the lab," said Daghliah, "so an M.D./Ph.D. is the perfect fit." He's particularly interested in solving "mechanical problems" and aims to be a surgeon. During his gap year, Daghliah will continue his work with the **MAZMANIAN** lab at Caltech and the Hong lab at USC studying interactions between the gut microbiome and the lymphatic system. His best memories of Caltech are his friends' elaborate pranks. His favorite? When they faked a wound and called on his Health Ad expertise—all as a birthday surprise.



Senior **IMAN WAHLE [20]** graduated with a degree in Computer Science. She's particularly fascinated by the human brain and conducted research in computational neuroscience with the **ANDERSON** and **O'DOHERTY** labs at Caltech. Wahle will pursue her Ph.D. in Neuroscience at Princeton in 2021. She was disappointed that her senior year was cut short by the pandemic, but she has returned to Pasadena to participate in Caltech's Schmidt Academy, which focuses on improving software-engineering practices in campus labs. Wahle is excited by this renewed opportunity to be a part of the Caltech community.

DO DARE TO DISTURB *the universe*

one hundred twenty-sixth
commencement

PHOTOS Caltech
WORDS Nivedita Kanrar
DESIGN Shu Fay Ung

Though commencement is the crowning milestone of the Caltech student journey, the COVID-19 pandemic drastically altered plans for this year's celebrations. In lieu of an in-person ceremony—and for the first time in history—commencement for the Class of 2020 was celebrated online.

The ceremony was restructured to leverage the virtual platform and hopefully make commencement more meaningful for graduates and their families in this difficult time. During the conferral of diplomas, instead of only having their names read aloud, each graduate was honored with a presentation slide detailing their accomplishments throughout their time at Caltech.

The ceremony also featured several alumni as speakers, deviating from the tradition of hosting only a single commencement orator. They provided a diverserange of perspectives and advice for the newly minted graduates enter-

ing an increasingly challenging and uncertain world.

As a Techer who graduated amidst war and domestic political upheaval, presiding speaker **DR. DAVID LEE [PH.D. 74]**, Chair of the Caltech Board of Trustees, emphasized that scientific integrity is critical during polarized times. Alluding to Caltech's spirit of collaboration, he argued that the "vigorous and open exchange of ideas" is precisely what promotes commitment to the truth. Yet, he urged students to not lose sight of what brought them to Caltech in the first place—their intellectual curiosity—and to take time to celebrate the simple joys of discovery.

Other alumni speakers reminded graduates of the merits and responsibilities that come with a Caltech diploma. **EMERITUS PROFESSOR KIP THORNE [B.S. 62]** focused on the technical prowess of Caltech graduates. "You've learned to scope out problems and think through solutions ra-

tionally," he praised. Equipped with strong principles and a solid foundation, Thorne and his fellow alumni agreed that the new graduates have the tools to work toward a "better, and more equitable, America and world." Alumnus **DR. FRANCES CORDOVA [PH.D. 79]** stressed the urgency of this task and the courage and strength of conviction required to complete it. She summarized these sentiments in her poetic call to action: "Use your minutes well, graduates. Do dare to disturb the universe."

This year, Caltech graduated 454 students—207 earning bachelor's degrees, 101 earning master's degrees, and 146 earning Ph.D. degrees. In his send-off to graduates, **PRESIDENT THOMAS ROSENBAUM** assured graduates of their ability to face formidable challenges; similar to Odysseus in his hero's journey, the Class of 2020 possesses the resolve "to strive, to seek, to find, and not to yield."

- 1. BACK IN 2016** The Class of 2020 group photo taken in front of the Parsons-Gates Hall of Administration during freshman orientation.
- 2. UNUSUAL ENDING** Beckman Mall was unusually empty during this year's commencement ceremony, save for a lawn sign congratulating graduates.
- 3. LEVERAGING THE DIGITAL PLATFORM** Instead of only having their names read aloud, each graduate was honored with a presentation slide detailing their affiliations at Caltech.
- 4. SPEAKING TURTLES** The secret is out—who knew the Turtle Pond inhabitants could actually speak?!
- 5. LITTLE ANN** Ann Johnson [B.S. 99, M.S. 00] passionately gives the advice that she would tell her younger self to the graduates.
- 6. WALL OF MEMORIES** The commencement website featured a virtual memory wall that displayed posts tagged with #Caltech2020 on Instagram and Twitter.
- 7. VIRTUALLY THERE** President Thomas Rosenbaum speaks to the graduates from a podium in an unknown location.

PAUL ASIMOW
Eleanor & John R. McMillan Professor of Geology & Geochemistry

FRANCES ARNOLD
Linus Pauling Professor of Chemical Engineering, Bioengineering, & Biochemistry
Nobel Prize in Chemistry, 2018

MAYIM BIALIK
"Caltech Postdoc" Amy Farrah Fowler
The Big Bang Theory

those friends
that you've
made? hold
on to them

HARRY GRAY
Arnold O. Beckman Professor of Chemistry

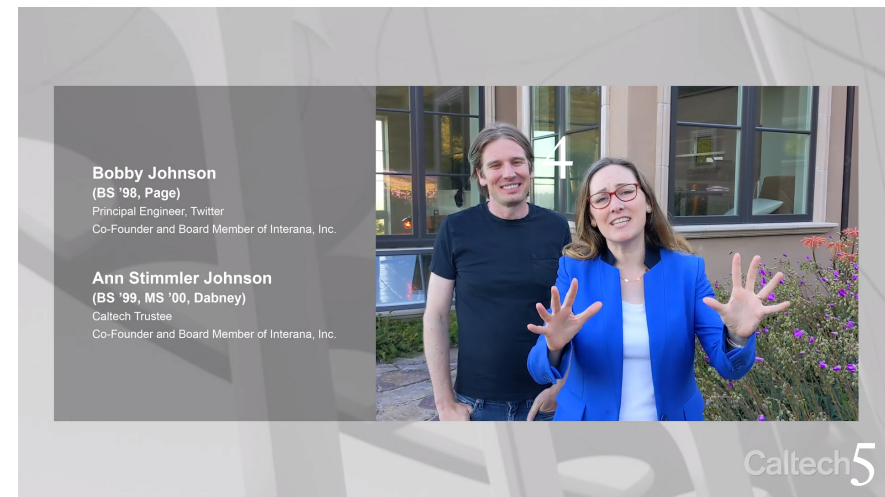
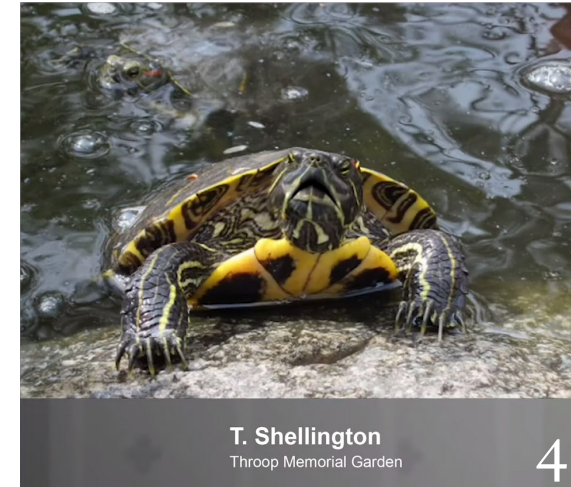
WILL HELTSLEY [04, BLACKER]
Vice President of Propulsion Engineering, SpaceX

ANTHONY CHONG [10, RUDDOCK]
CEO, IKASI



the *proof*
does not
stand on
its own

you have to
convince
people of
your ideas



featured
speakers

BARBARA GREEN
Associate Dean of Undergraduate Students, Retired

KIP THORNE [62, BLACKER]
Richard P. Feynman Professor of Theoretical Physics, Emeritus
Nobel Prize in Physics, 2017

KATIE BOUMAN
Assistant Professor of Computing & Mathematical Sciences & Electrical Engineering

have a little
fun along
the way



Closing a page on the 2010s filled people across the globe with hope and anticipation for the next chapter. However, the ghosts of the past are forever present—residual problems from the years prior will not simply disappear on their own. Humanity is being forced to reckon with old decisions before being allowed to move forward into a better future. The stories our grandparents told us about their youth now sound more like an instruction manual than a fairy tale book; everything comes full circle. Nevertheless, as they have pushed for change in their time, it is our turn to step up and lead ours.

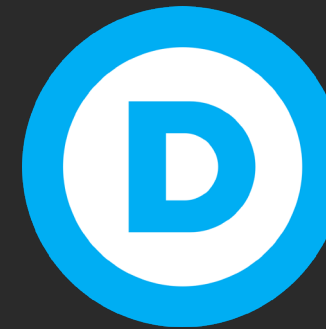
A New Decade



Crew Dragon 2



LFC Win Premier League



RISC Returns to Mac

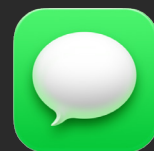
20 20



Hardware
Raytracing



Impeachment



Neumorphism



Loon Goes Live



Parasite Wins Best Picture



Social Movements



New OWL



Champions



COVID-19

Image Descriptions

DESERTED CAMPUS
The pathways have been devoid of the usual hustle to classes, labs, or Red Door for the much-needed dose of caffeine.



PHOTOS Shu Fay Ung
WORDS Shu Fay Ung
DESIGN Katherine Chang

“I will certainly be missing the food catered by CDS. The food quality was superb, much better than usual.” - **TONY LIU**

As an international student from a country with travel restrictions, Liu could not return home. Thus, he remained in Bechtel where he had one suitemate. Social interactions for him usually took place online, although occasionally he enjoyed meals with friends in the Bechtel courtyard. He liked the fact that there was no pressure to attend social events at Caltech and found the online class experience pleasant. “I ended up going to more lectures than usual due to the flexible nature of online courses,” says Liu, “Plus, I could enjoy the peaceful environment on campus.”

Image

1. PRISON PROPHECY FULFILLED? The Bechtel Residence was the only undergraduate housing that remained occupied on campus. It housed students that were unable to return home for the Spring term, Residential Associates (RAs), Residential Life Coordinators (RLCs), and Faculty in Residence (FIRs).

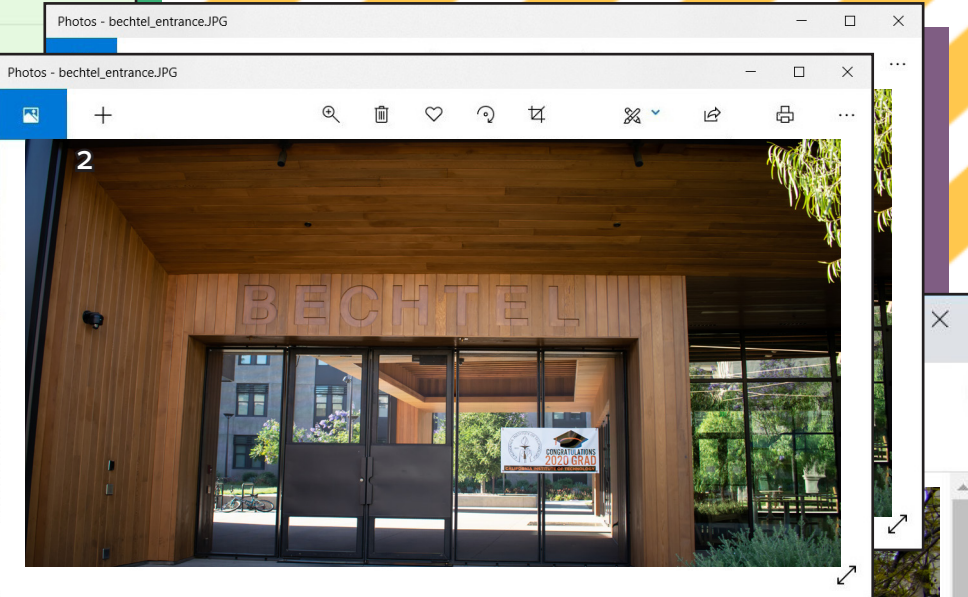
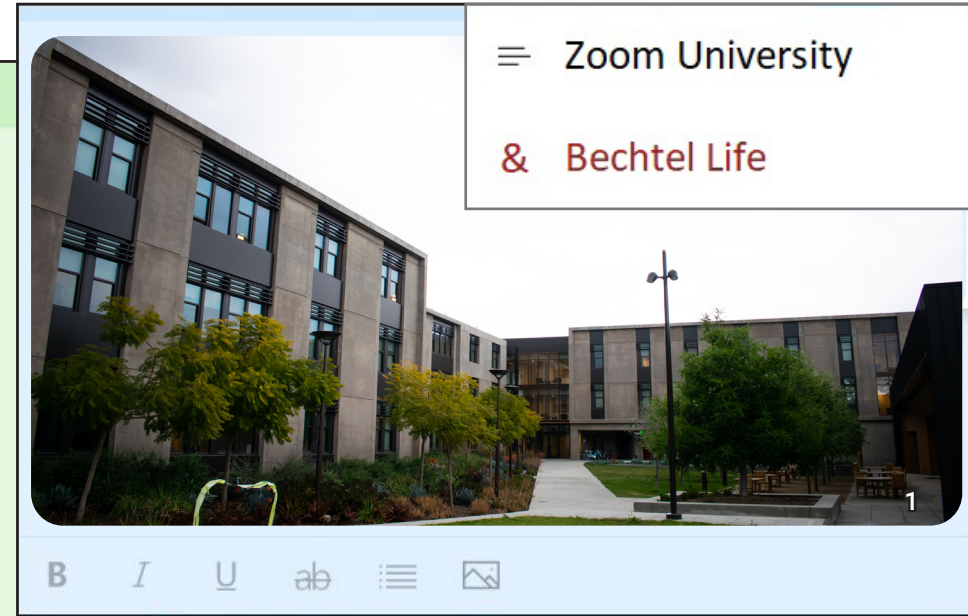
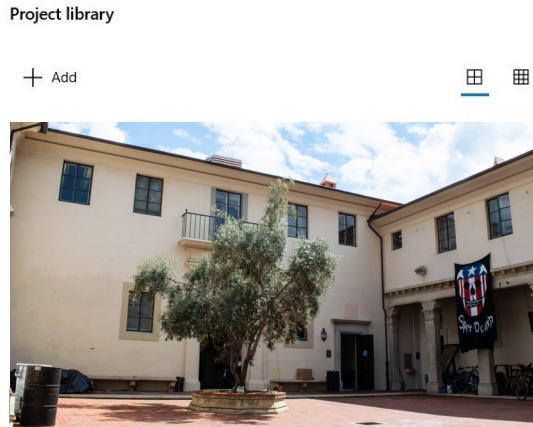


Image Descriptions

2. GRADUATES OF ZOOM UNIVERSITY A banner congratulating the Class of 2020 hangs outside the Bechtel Residence.

3. LESS OF MOORE WALK Students who lived in Bechtel or Avery no longer cross this familiar path to Annenberg, Moore, or the central areas of campus.

4. THE WEDDING CAKE This year, the Beckman Auditorium did not host Caltech's 126th commencement ceremony. Nevertheless, it remained a necessary spot for graduates to take graduation photos.



Storyboard



Image Descriptions

THEY'RE ALL EMPTY HOUSES
Since Spring term was held remotely, the houses have fallen eerily silent and lifeless. Let us hope we may return soon.



“I think the boba the FIRs bought occasionally on the weekends...was one of my favourite parts of staying!” - **ALEX CUI**

Cui stayed in Bechtel because he was worried about actions President Trump may take to limit students from re-entering the U.S. Initially, he shared a suite with three other students, but two of them left later in the term. His social interactions involved enjoying dinners in the Bechtel courtyard, or cooking and playing table tennis--all in a socially-distanced manner. During his stay, he liked that there was a concerted effort to keep the premises clean and enforce masks in the kitchen; that the food varied throughout the week; and that the lounges were open with a limited capacity. “The ability to use the kitchens was fantastic,” adds Cui. However, he did not welcome the loneliness and the lack of House dinners.



Virtual Social Life

PHOTOS
Various

WORDS
Shu Fay Ung

DESIGN
Eric Chen

These days, virtually all forms of social interactions are taking place online. As the spring term went remote, the houses' social teams faced a unique challenge: helping house members stay connected. They got creative by leveraging familiar platforms such as Zoom and Discord to organize events. In addition to the annual Ditch Day moving online (kudos to the seniors and others involved!), Here's a glimpse of what's been going on over the internet.

RUDDOCK

Although Rudds could no longer share house dinners in person, weekly dinner announcements were still made over Zoom. Some other activities included a Jackbox game night and a virtual scavenger hunt. The social team also created the opportunity for Rudds to talk with interested prefrosh through video chats or email.

BLACKER

On Fridays, Moles got together for a Zoom dinner, where they gathered in a "Lounge" channel on Discord before dinner time and entered into a call to eat and catch up. The Hell Ride also saw its first virtual debut. Traditionally, it involved frosh playing "Ride of the Valkyries" in Blacker's all-frosh alley "Hell" for as long as possible before the upperclassmen silenced it. This year, instead of placing physical obstacles between the upperclassmen and the music source, the frosh set up a website where a series of puzzles had to be completed before the music stopped.

1. **ONE YEAR OLDER** Averites on a birthday Zoom call. 2. **SETS HURT** Unfortunately, Akshay Gowrishankar [23] is Most Likely to Injure Themselves Turning in a Set. 3. **IMPOSTER SYNDROME** Averites play the online multiplayer party game Among Us on Discord. 4. **HEART 2 HEART** Lloydies form a heart pose on Social Director Regina Lee [21]'s Zoom screen during Lloyd's Virtual Alley Olympics.

AVERY

Throughout the term, the social team revived a more traditional form of socializing by pairing Averites as pen pals. Avery Teatime became a weekly occurrence where Averites could virtually hang out and play games together. For the casual moviegoer, they established Avery Cinema, a venue on Discord that hosted virtual movie nights. Averites also joined the Avery Game Shows, where contestants participated in points-based games such as Jeopardy! for a chance to win prizes. Moreover, traditions such as birthday celebrations and the Avery House Gag Awards, an annual gag awards ceremony, shifted onto Zoom.

LLOYD

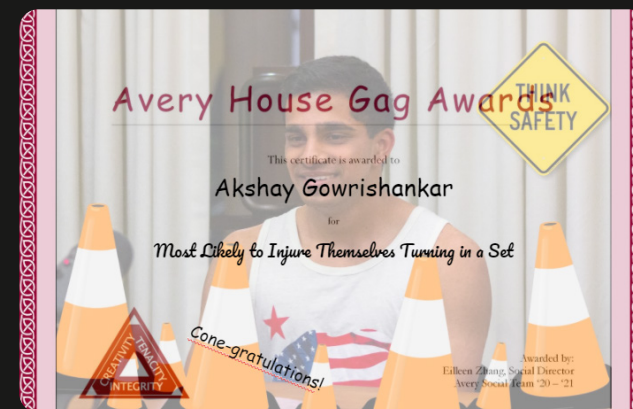
In keeping the competitive spirit alive, the social team held a virtual Alley Olympics where participants competed in a TikTok dance competition, a bake-off, Caltech/Lloyd trivia, and Zoom window posing sessions. They also helped plan a fake Ditch Day with the rest of the rising seniors. Since Lloyd's virtual Ditch Day featured Netflix: The Stack, the fake was aptly themed Hulu: The Stack and starred incoming "Hulu interns" that had to perform various tasks to earn a full-time offer—and yes, ads interrupted the event every so often.

DABNEY

Skribbl.io and Jackbox games became a common Darb pastime. All-time favorites such as Darb Talks—where Darbs give short presentations about literally any topic that interests them—and PowerPoint Karaoke—where Darbs are tasked to present slides that they've never seen before—transitioned online as well. Other coordinated social events included an Online Games Tournament, RPG Night, and Online Middle School Dance, where participants enjoyed music popular during their middle-school days, socialized, and danced over Zoom.



1



2



3



4



Though his courses are based on strong in-person components, **PROFESSOR JEFFREY MENDEZ** still held his Chem 3A/X and Chem 4/9 courses virtually. Dr. Mendez pre-recorded videos of himself conducting labs, and “students watched these and recorded the procedures and observations as if they did the lab.” Preparing virtual labs, lectures and recitations took intense work from Dr. Mendez and his T.A.s, but it’s easy for us to forget instructors’ other responsibilities which have been amplified by the pandemic. Among these is child-care: Dr. Mendez recalls pulling eight all-nighters filming labs because he home-schooled his children during the day and worked at night. As many professors are parents, Dr. Mendez is perhaps not alone in his experience.



Professor Jeffrey Mendez

Normally, Spring term would begin with attending classes and catching up with friends—in-person. But not this year. Instead, Caltech students found themselves navigating their Spring term remotely as classes made their debuts online. This major pedagogical shift, triggered by the COVID-19 pandemic, posed challenges for both students and instructors. Instructors faced the daunting task of transitioning their well-planned in-person courses to an online platform—all within two weeks. Some courses could not be adapted to a virtual format, but many instructors managed to do so on such short notice. Overall, only 18 academic and 17

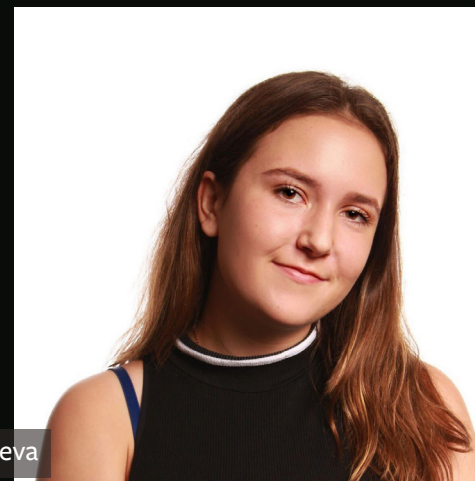


Saskia van Nieuwstadt

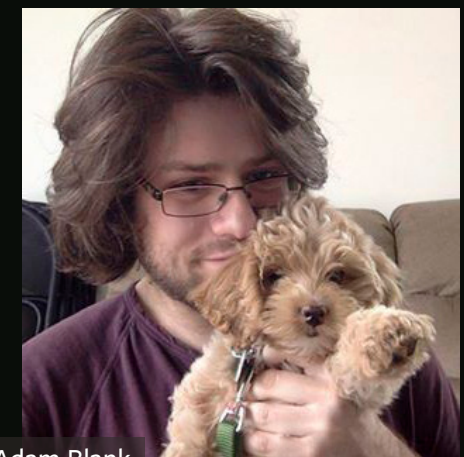
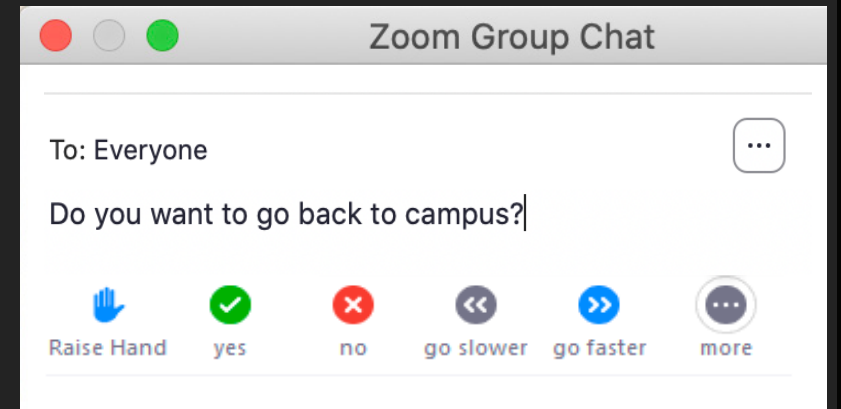
Among her core MechE curriculum in the third term, **SASKIA VAN NIEUWSTADT [22]** was enrolled in the “ME 14: Design and Fabrication” course, an important stepping stone for junior-year robotics. She appreciated the virtual course’s focus on theory and design in mechatronics but looks forward to a time when she can start building again. Her approach to lectures hadn’t changed. “I had the same attendance habits and the same style of note-taking,” she said. But van Nieuwstadt felt that group virtual office hours were unstructured. “[The Zoom meetings] were all one conversation. There could also be a long wait to ask your question(s),” she explains. A Michigander and an early riser, van Nieuwstadt found that the time difference compounded issues with collaboration and lengthy office hours. Outside of classes, she was planning to play collegiate soccer but instead worked through a training packet independently.

non-academic undergraduate courses, out of more than 250 initially offered for the third term, were canceled. We spoke to two students and two instructors to learn more about their academic and personal experiences during these unusual times. Students and instructors alike did not find the virtual term ideal, but they acknowledge that the health and safety of everyone mandated it. We can only hope that increased familiarity with online teaching and learning improves the virtual educational experience, and that we may resume in-person activities as soon as it is safe to do so.

Bioengineering student **ANNA LAPTEVA [23]** felt bittersweet about the online learning experience. She found the digital organization of courses particularly convenient and appreciated that all her course content could be found in once place—Moodle. “Digitally, things are a lot more focused and concentrated,” she notes. This initially fueled productivity, but Lapteva found her motivation waning as she began to miss the excitement and inspiration her peers provided. The informal social environment on-campus facilitated an organic exchange of ideas. “At school, you can just visit someone directly, and bounce ideas off each other,” she says. With remote-learning, she found collaboration to be much more structured, with Zoom calls at fixed times, and limited since technology confined methods of sharing information. But Lapteva acknowledges, “In the end, we just got it done.”



Anna Lapteva



Professor Adam Blank

PROFESSOR ADAM BLANK also taught virtually. He canceled his outreach class “CS 42: Computer Science Education in K-14 Settings” but still held his course on software design, CS 3. In his in-person lectures, Dr. Blank tries to engage students by including demos and interactive Q&A sessions. On-line learning challenged this teaching philosophy, and he admits that “active learning does not transfer to Zoom at all.” Many of his students had their cameras off, making it difficult to interact with them. “It felt like talking into a void,” says Dr. Blank. Yet, he did note a positive effect: course office hours became more streamlined and efficient due to a combination of one-on-one Zoom sessions and the usage of Slack.

Clubs & Orgs

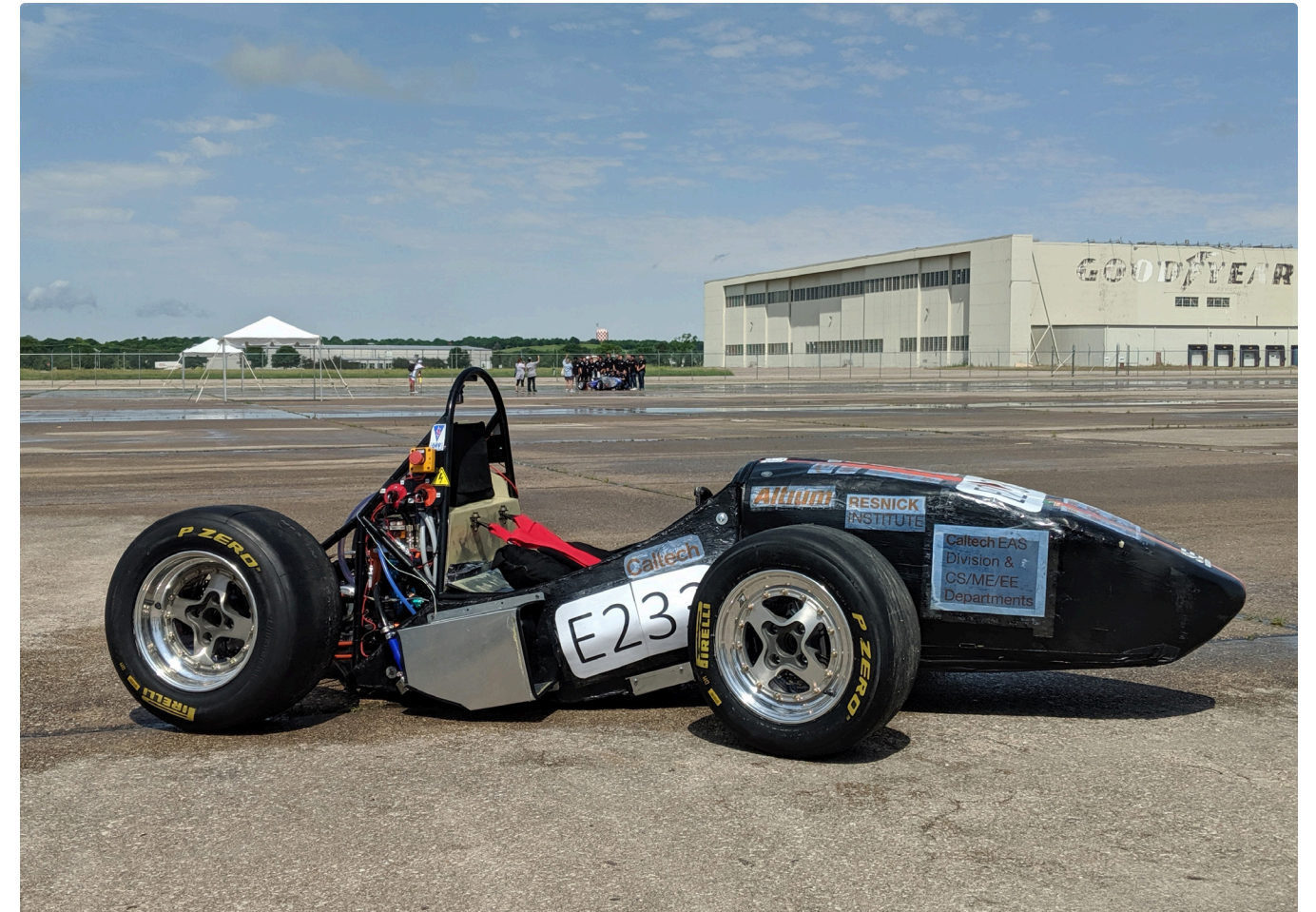
Caltech Robotics Team



BACK Nicholas Currault [21], Alexander Cui [21], Megan Tjandrasuwita [22], Cormac O'Neill [19], Elaine Lowinger [21], Alden Rogers [20], Zane Taylor [22]. **MIDDLE** Elise Liu [22], Grace Lu [22], Allie Cheng [22], Becca Mikofsky [21], Paromita Mitchell [22], Myra Cheng [22], Ali Cataltepe [22]. **FRONT** Yasmin Veys [22], Eric Smith [22], Moya Ly [22], Madison Brady [20], Irene Crowell [21], Brendan Hollaway [20], Ryan White [21], Nicholas Ardavin [21], Kristin Chelakkat [21], Aaron Feldman [22]

NOT PICTURED Mohith Manohara [21], Basel Mostafa [23], Chase Blagden [23], Chase Blanchette [23], David Melisso [23], Eileen Zhang [23], Iris Lee [23], Joshua Rosenberg [23], Laura Lewis [23], Lorenzo Shaikewitz [23], Sandra Chea [23], Tyler Colenbrander [23]

Caltech Racing



MEMBERS Alex Moraru [20], Brendan Berrigan [21], Aaron Tran [22], Arushi Agarwal [22], Craig Worley [20], David Kornfeld [20], David Melisso [23], Eric Chen [21], Hamza Abdul-Ghani [22], Jennifer Sun [22], Luka Valencic [22], Meena Hari [22], Michael Brown [21], Rashi Jeeda [22], Sabrina Rui [22], Zhong Huang [20]

Chess Club



MEMBERS Michael Bregar [23], Luis Camargo [22], Duncan Chadly [G3], Ryan Clark [22], David Fager [20], Dillon Holder [21], Karthik Karnik [20], Anthony Kukavica [21], Pranav Kulkarni [G1], Ananth Malladi [22], Limbert Palomino [22], Henry Peterson [G1], Daniel Rostovtsev [21], Matteo Ronchi [G7], Jason Shi [22], Gianmarco Terrones [20], Adriano Testa [GS], Alexandros Tsamopoulos [G1], Mykhaylo Tyomkyn [Postdoc], Vignesh Varadarajan [21], Matthew Zeitlin [21]

Engineers Without Borders



FRONT Schuyler Dick [22], Ramya Deshpande [20], Jillian Reed [22], Noelle Davis [20], Jack Nguyen [22], Rona Yu [20], Anjali Patil [21], Isabella Zhang [21]

NOT PICTURED Arjun Zutshi [20], Kevin Yu [20], Sherry Liang [21], Camila Buitrago [22], Jocelyn Kho [22], Saskia van Nieuwstadt [22], Abigail Jiang [23], Anna Li [23], Catherine Kauber [23], Gabrielle Dituri [23]

Math Club



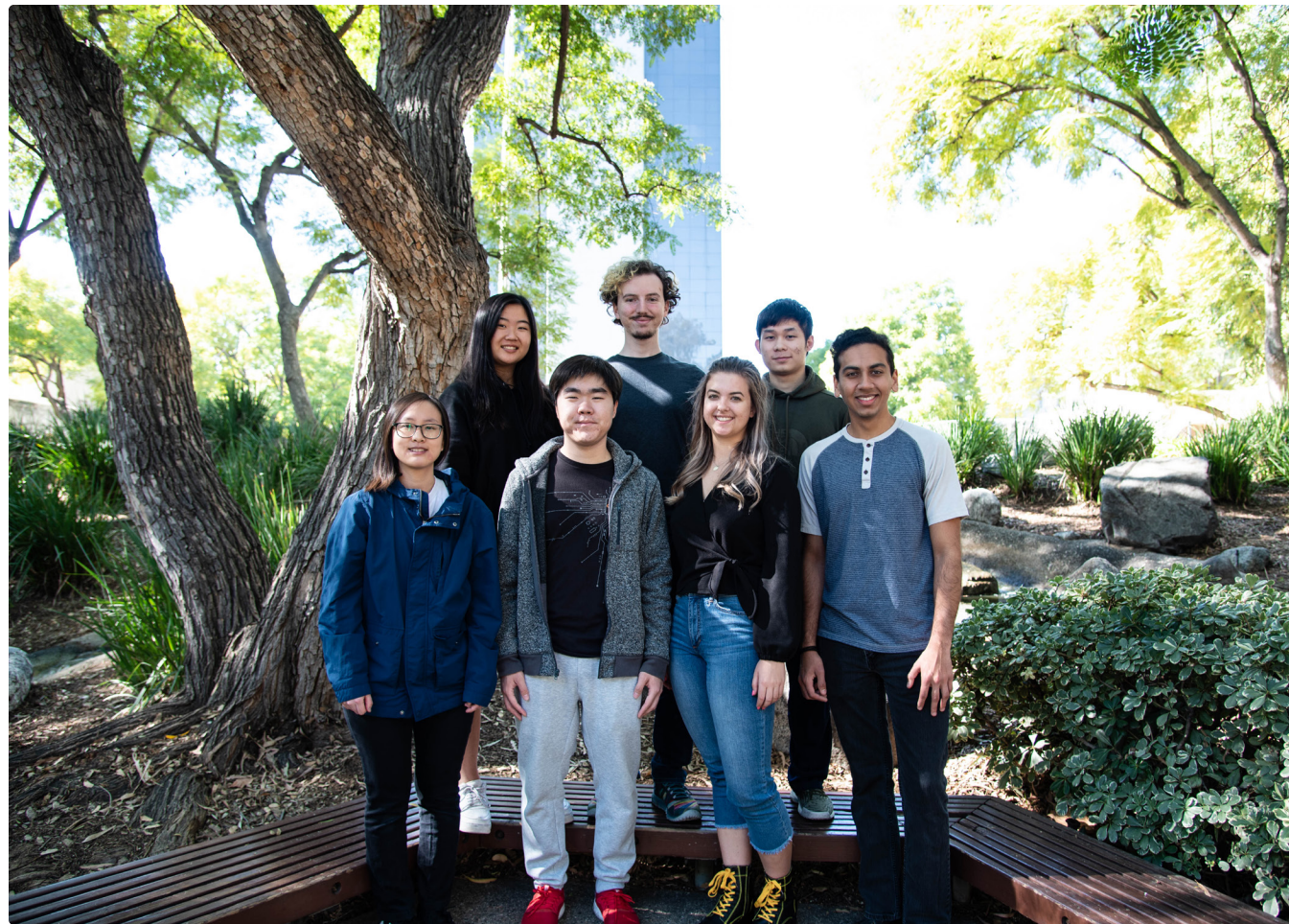
MEMBERS Aditi Venkatesh [19], Alexander Pan [22], Allison Wang [20], Amy Pham [23], Anthony Kukavica [21], Antonio Caceres [23], Aru Mukherjea [21], Arushi Gupta [21], Cynthia Chen [23], Diego Chavez [23], Elia Gorokhovsky [23], Elsa Palumbo [23], Erik Herrera [20], Haoyuan Sun [21], Harel Dor [20], Jason Shi [21], Juliette Koval [23], Justin Toyota [23], Kevin Gottlieb [23], Laura Lewis [23], Mark Xu [21], Mayank Pandey [23], Michael Rose [23], Mihir Borkar [23], Milan Roberson [20], Miles Cua [23], Noah Ortiz [22], Sara Fish [21], Serena Delgadillo [22], Shalini Kurinchi-Vendhan [23], Stephanie Ding [20], Surya Mathialagan [20], Yvette Lin [23]

SFFC



MEMBERS Rita Aksenfeld [20], Antonio Caceres [23], Kiran Hamkins [22], Ulrich Herget [Postdoc], Robin McDonald [23], Elsa Palumbo [23], Zane Taylor [22]

Caltech SmallSats



BACK Ruoyun Zheng [21], Harel Dor [20], Timothy Chen [20]. **FRONT** Shu Fay Ung [21], Ray Sun [20], Polina Verkhovodova [22], Harsh Bhundiya [20]

NOT PICTURED Lewis Jones [20]

Student Investment Fund



BACK Charles Kuan [N/A], Alden Rogers [20], David Kong [20], Luis Costa [20], Eric Han [21], Max Bricken [23], James Bowden [23], Matthew Hajjar [23], Wenjun Chang [22], Grace Lu [22], Kevin Yu [20], Kevin Huang [22], Anish Shenoy [22]. **FRONT** Alycia Lee [21], Emma Qian [21], Amy Wang [21], Jim Zhang [20], Rafael Santiago [22], Sophie Chan [23], Robin McDonald [23], Aikaterini Gorou [22], Serena Yan [22], Vanna Woo [22], Olivia Lee [21], Alexander Cui [21], Ethan Jaszewski [21]

NOT PICTURED Ian MacMillan [G1], Craig Worley [20], Geoffrey Pomraning [23], Siqiao Mu [20], Yongkyun Lee [21], Sabrina Rui [22]

snapshots

PHOTOS
Chris Wang
Noelle Davis
Anthony Kukavica
Shu Fay Ung

Society of Women Engineers



BACK Saskia van Nieuwstadt [22], Sunny Cui [20], Rashida Hakim [22], Jillian Reed [22], Regina Lee [21], Melba Nuzen [22], Liana Merk [21], Ruoyun Zheng [21], Nerys Huffman [21]. **FRONT** Amanda Li [21], Cindy Cao [21], Carol Sun [22], Hannah Hu [22], Grace Lu [22], Sarah Barrett [22], Brit Wylie [21]

NOT PICTURED Sarah Barrett [22], Cindy Cao [21], Isha Chakraborty [23], Anjini Chandra [22], Hannah L. Chen [23], Hannah X. Chen [23], Allie Cheng [22], Myra Cheng [22], Katie Chiu [22], Ellie Cho [23], Kaila Coimbra [23], Sunny Cui [20], Noelle Davis [20], Lily DeBell [23], Gabrielle Dituri [23], Hannah Fan [22], Hannah Fisher [23], Shir Goldfinger [23], Hannah Grauer [23], Karen Guo [20], Tanvi Gupta [20], Kiran Hamkins [22], Alexandra Haraszti [23], Meena Hari [22], Hannah Hu [22], Ishani Karmarkar [21], Catherine Kauber [23], Nora Koe [21], Sanjana Kulkarni [21], Sofia Kwok [22], Iris Lee [23], Lin Lin Lee [22], Laura Lewis [23], Amanda Li [21], Anna Li [23], Shenyi Li [23], Jamie Littman [22], Moya Ly [22], Amritavarshini Mayavaram [23], Mohini Misra [23], Melba Nuzen [22], Emma Qian [21], Jillian Reed [22], Sydney Richardson [22], Kristina Stoyanova [23], Alexandra Stutt [21], Margaret Sui [23], Carol Sun [22], Jessica Sun [21], Megan Tjandrasuwita [22], Saskia van Nieuwstadt [22], Vibha Vijayakumar [20], Galilea von Ruden [21], Amy Wang [21], Tina Wang [20], Iris Xiang [23], Elizabeth Yam [22], Elaine Yang [22], Christine Yu [21], Shuyue Yu [21], Eileen Zhang [23], Pamela Zhang [20], Emily Zheng [23], Ruoyun Zheng [21]



1. **SERIOUSLY IN TUNE** The Caltech Pippettes get serious as they put on a sharp performance in the 2019 A Cappella Winter Concert.
2. **CHECKMATE** The Caltech Chess Team won 1st place in its division at the 2019 Pan-American Intercollegiate Chess Championship in Charlotte, N.C. The team was represented by Vignesh Varadarajan [21], Anthony Kukavica [21], Jason Shi [22], and Michael Bregar [23] in its first ever appearance the event.
3. **HURLING IN GRACE** Alexa Lauinger [20] nails the follow through to her hammer throw.
4. **MAKING A MESS FROM 144 FEET HIGH** Exchange students Albert Sneppen [21] and Rasmus Nielsen [21] from the University of Copenhagen pose for a photo amidst the squashy mess after Dabney House's Pumpkin Drop.
5. **WMW** The Women Mentoring Women (WMW) program kicks off with its orientation event, where mentors and mentees

meet for the first time to set goals and expectations. Pictured is Lin Lin Lee [22] engaged in conversation.
6. **THE FINAL KICK** Seniors Arjun Zutshi [20], Kevin Yu [20], Maxwell Shen-Molesky [20], Richard Shim [20], and Theodore Yang [20] were celebrated during the men's soccer's Senior Day game. The Beavers tied the Pomona-Pitzer Sagehens 2-2 that day.
7. **CLUTCH** In the last 16 seconds of the game, the women's basketball team was desperately fighting to close the three point gap against Life Pacific. Although the Beavers lost 60-67, they put on a solid performance.
8. **SCIENCE OLYMPIANS** The Science Olympiad planning team gather for a photo during their holiday lunch. It is a pity that the Southern California State Tournament was cancelled due to the COVID-19 pandemic; the team puts in an incredible amount of effort to make sure the annual competition runs smoothly.

Athletics

Women's Basketball



BACK Assistant Coach Chelsea Stocks, Assistant Coach Dennis Ko, Alexa Lauinger [20], Charley Lafayette [23], Sahana Saikumar [23], Kaliden Drango [21], Head Coach Bridgette Reyes. **FRONT** Elaine Lin [22], Lauren Suezaki [21], Helen Siavelis [23], Grace Peng [20], Faith Pinney [23]

Cross Country



BACK Assistant Coach Antwain Morgan, Head Coach Ben Raphelson, Marcos Perez [23], Patrick Martinez [23], Julen Lujambio [23], August Chen [22], Tiger Lu [20], Simon Ricci [20], Kellen Rodriguez [20], Kyle Piper [23], Spencer Morgenfeld [21], Matthew Earney [21], Tanner Moore [20], Assistant Coach Gina Sereno, Assistant Coach Bijan Mazaheri. **MIDDLE** Pippa Richter [23], David Fager [20], Emile Timothy Anand [23], Gaurav Phanse [22], Bhairav Chidambaram [20], Haoyuan Sun [21], Skye Reese [20], Nicole Feng [20], Claire Hu [21], Lauren Garriques [23]. **FRONT** Jessica Ye [21], Tea Freedman-Susskind [21], Jamie Littman [22], Natalie Lelieur [22], Sirisha Gudavalli [21], Alexandra Bardon [22], Molly Crotteau [21]

Men's Soccer



BACK Assistant Coach William Denman, Andrew Larson [21], Daniel Israel [22], Samir Johnson [22], Mohamed Soufi [22], Head Coach Phil Murray, Joshua Finnerty [23], Maxwell Shen-Molesky [20], Joon Park [23], Gianfranco de Castro [21], Travis Xiang [23], Assistant Coach Paul Hennessey. **FRONT** Arjun Zutshi [20], Rohan Mirchandani [21], Chad Thut [21], Kevin Yu [20], Joseph Como [21], Theodore Yang [20], Sam Klauer [23], Velissarios Christodolou [22], JD Walker [21]

NOT PICTURED Jacob Syder [21], Max Popken [22], Richard Shim [20]

Women's Soccer



BACK Noelle Davis [20], Rachel Sun [21], Amanda Gawlowicz [23], Isabella Hurvitz [23], Logan Hayes [23], Zoe Rock [22], Netra Ravishankar [21], Schuyler Dick [22], Saskia van Nieuwstadt [22], Nayla Abney [21], Catherine Kauber [23], Jackie Wang [23], Head Coach Ellery Gould. **FRONT** Jocelyn Kho [22], Moya Ly [22], Reeya Chenanda [23], Amelia Whitworth [23], Eve Fine [23], Valerie Hetherington [23], Kaliden Drango [21], Krystin Brown [21], Zoe Beatty [22], Maquella Tiffany [21], Helen Siavelis [23]

NOT PICTURED Gabriella Chan [20], Nivedita Kanrar [22]

Men's Water Polo



BACK Matthew Hajar [23], Alexander Wang [23], Maximus Bricken [23], Wei Foo [23], James Bowden [23], Alex Janosi [21], Bradley Justice [20], Neil Sanderson [21], Rahul Arun [21]. **FRONT** Steven Csaposs [21], John Wang [21], Nicholas Clausen [21], Austin Harvard [22], Juan Arvelo [23]

Women's Water Polo



BACK Assistant Coach Lindsay Garcia, Olivia Grobowsky [22], Polina Verkhovodova [22], Zoe Rock [22], Isabella Dula [22], Mackenzie Wooten [22], Michelle Zhao [20], Head Coach Jon Bonafede. **FRONT** Amanda Piyapanee [23], Sunny Cui [20], Yuying Lin [22], Sarah Zou [22], Sophie Devoe [22]



Avery



House







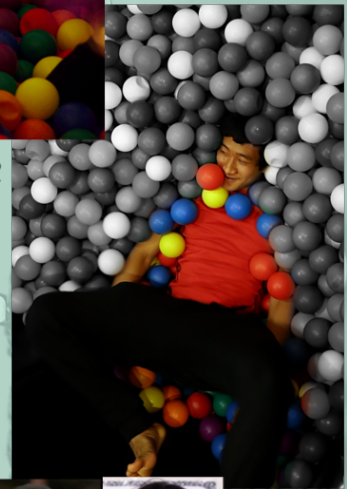
Rotation



Douse



Interhouse



Class of 2023



Pumpkin Drop



2022



Dress Dinner



Premature Farewells



2021



2020

Excomm



Logan Apple
President

Matt Alex
VP

Danny Wendt
Secretary



Vanna Woo Social VPs
& Simon Lequar

Andrea Steward
Hands Arocha

Fleming House



seniors



juniors



sophomores



freshman

Flexcomm

President: Eli Pinkus

VP: Anuj Chadha

Secretary: Ariel Steiber

Treasurer: Roshan Bal

Soc 1: Rachel Sun

Sch 1: Mitchell Watson

Soc 2: Jacob Snyder

Sch 2: JD Walker



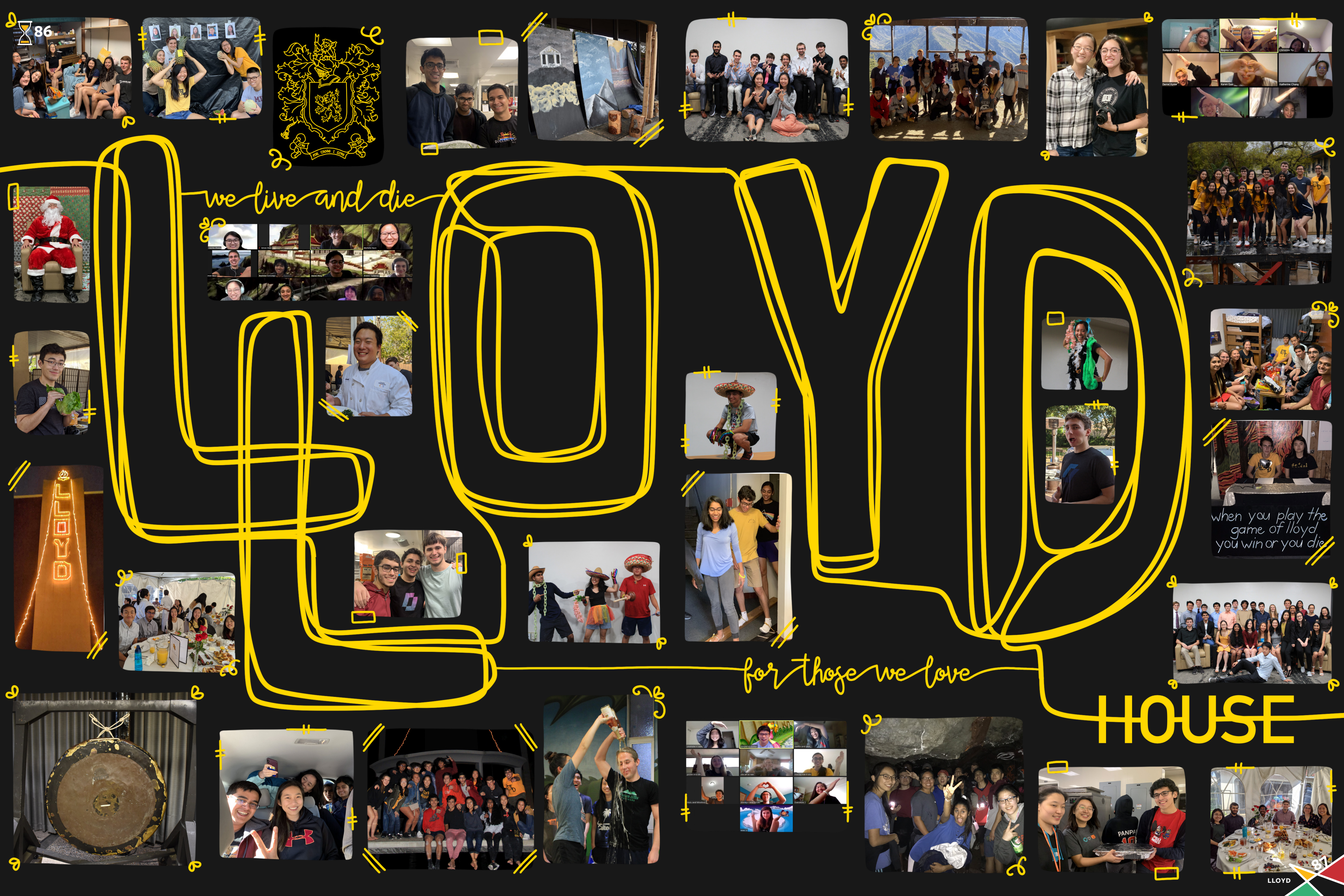
2019



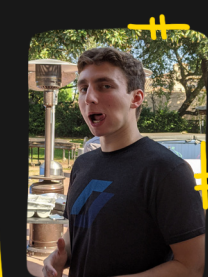
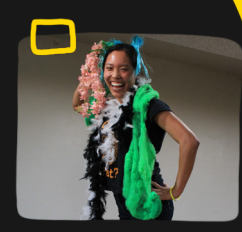
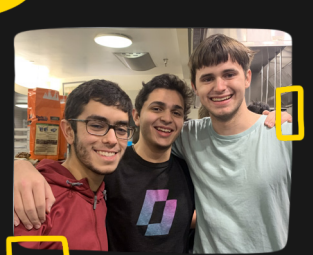
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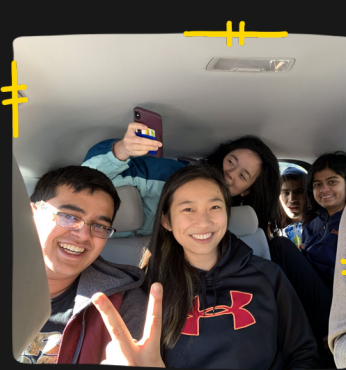


we live and die



for those we love

HOUSE



PAGE HOUSE

SPE LABOR LEVIS, ET SPE VINUM GRAVIS







Ruddock House



Alley 0

Alley 1

Alley 2

Alley 3

Alley 4

Alley 5

Alley 6

Excomm

President: Paulina Ridland
 Vice President: Tarini Singh
 Secretary: Eman Elsheikh & Moya Ly
 Treasurer: Saskia van Nieuwstadt
 Librarian: Chase Blanchette
 Social Chairman: Charlotte Park
 Athletic Manager: Tomas Grossmark & Tyrone McNichols
 Sophomore Rep: Aditi Seetharaman
 Off-Campus Rep: Claire Hu

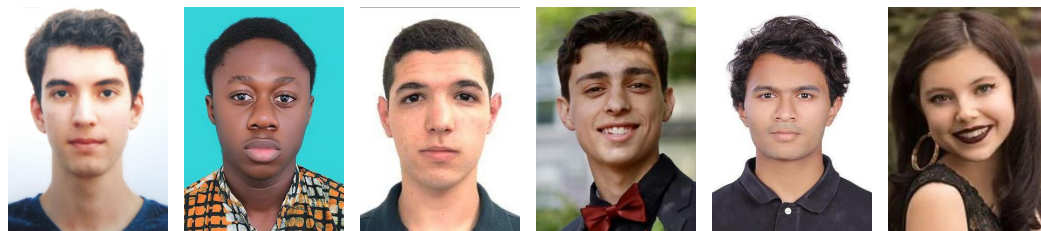
UCCs

Alley 0: Alexander Bouman & Ashima Agarwal
 Alley 1: Iman Wahle
 Alley 2: Elaine Lowinger
 Alley 3: Mahi Gokuli
 Alley 4: Vivienne Patwardhan
 Alley 5: Rona Yu
 Alley 6: David Fager

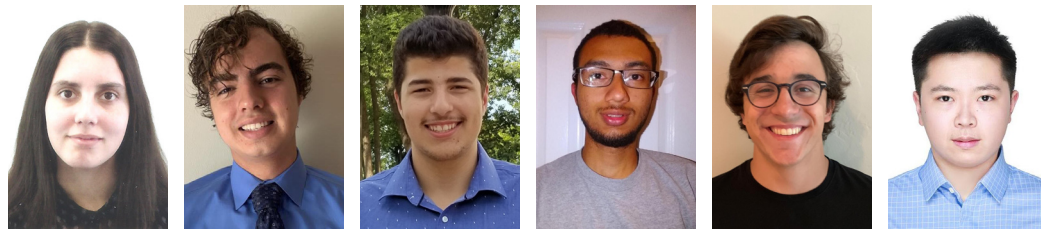
Freshmen

Class of 2023

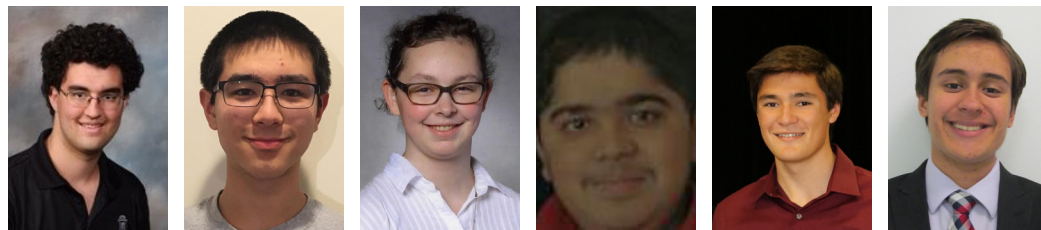
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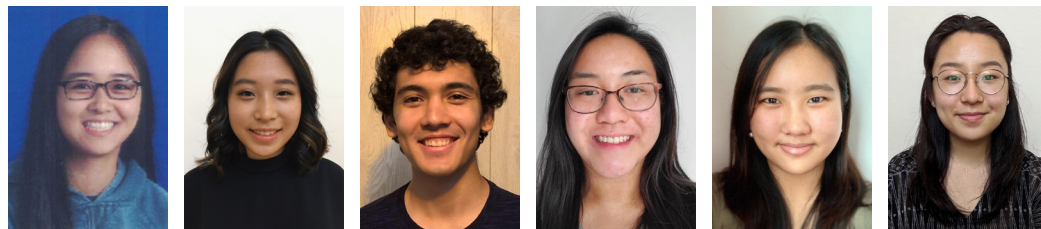
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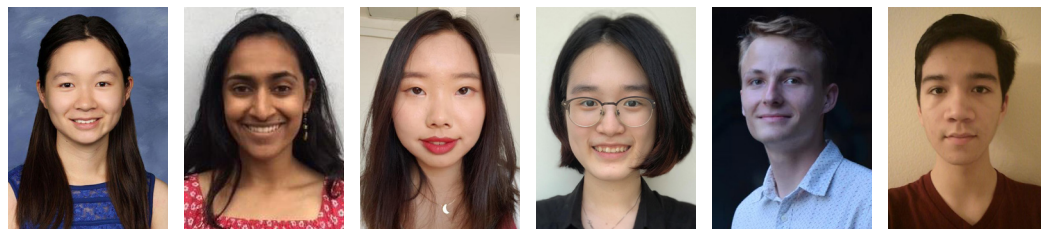
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Chen, Hannah



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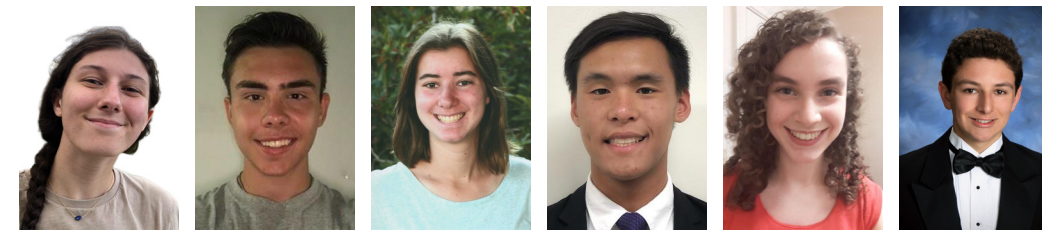
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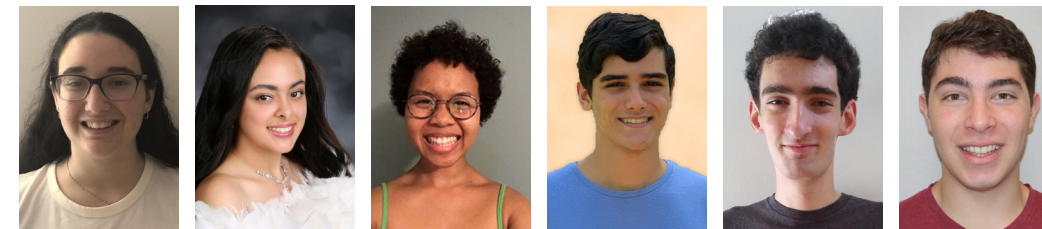
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Fisher, Hannah
Foo, Wei
Freedman-Susskind, Tea
Freeman, Bruno



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Gao, Anita
Garriques, Lauren
Gawlowicz, Amanda
Gessesse, Mahider
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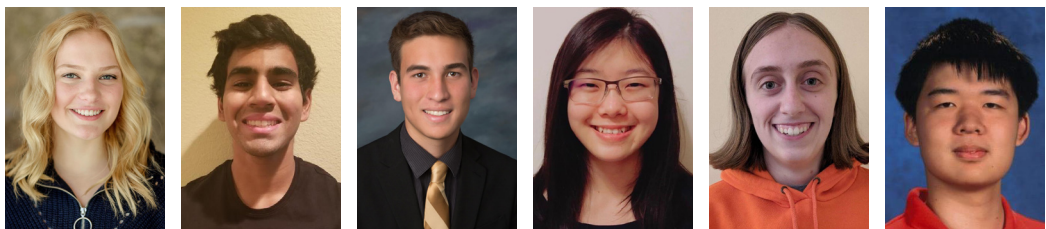


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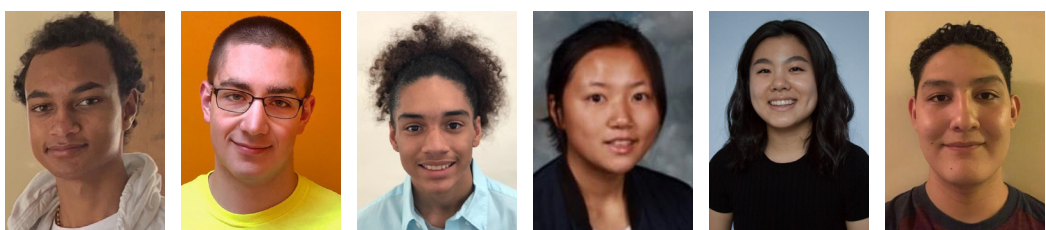
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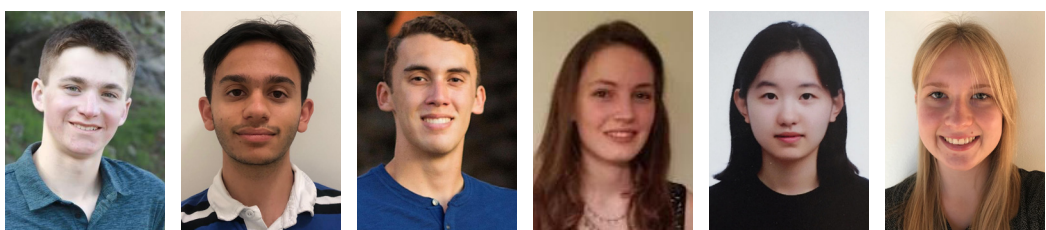
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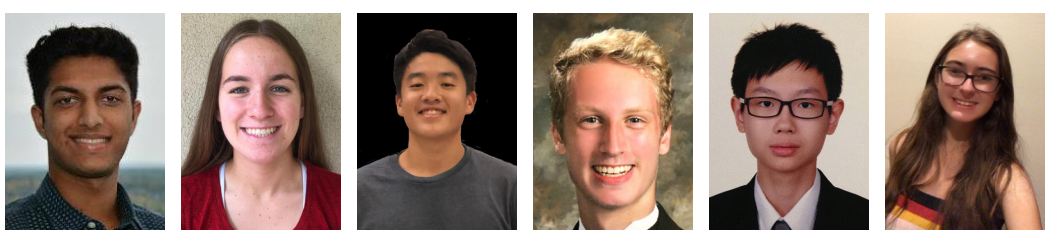
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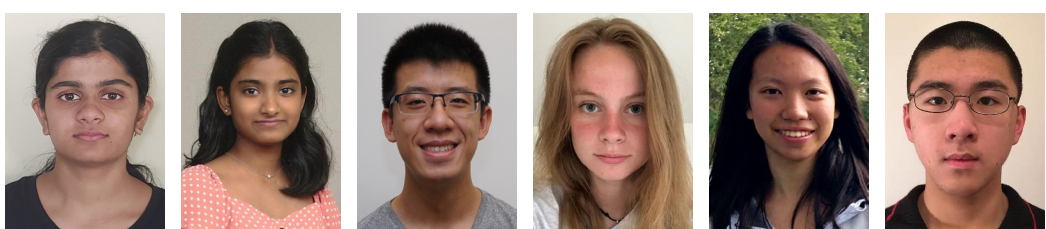
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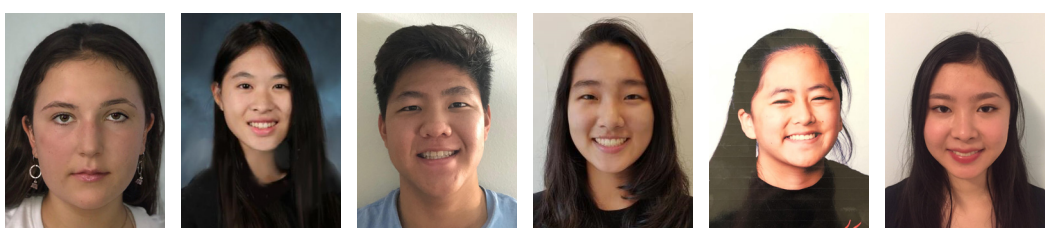
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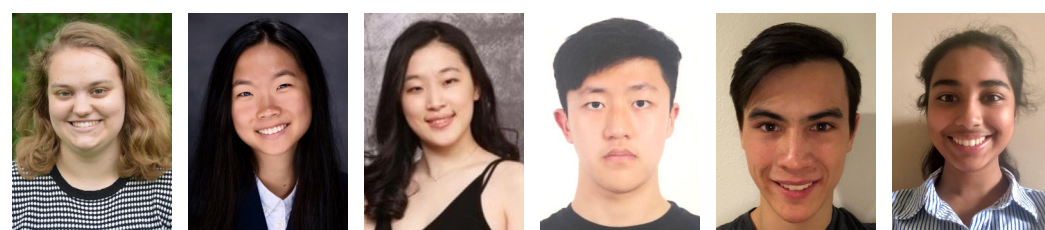
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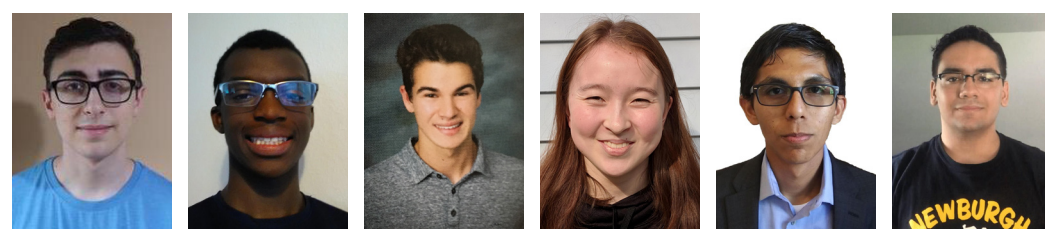
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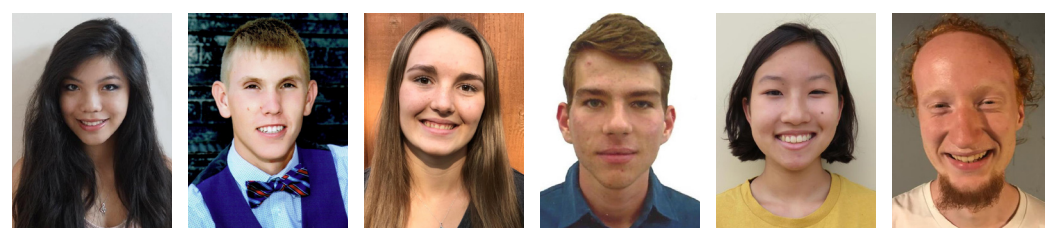
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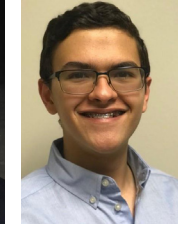
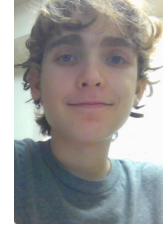
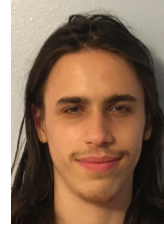


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Rapaport, Eitan
Rhodes, Darren



Richter, Pippa
Rodriguez, Makena
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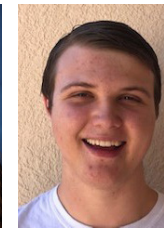
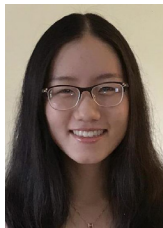
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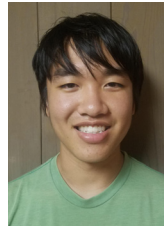
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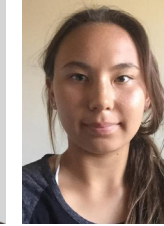
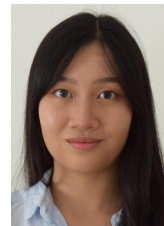
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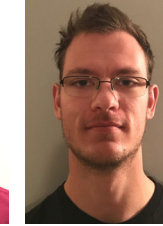
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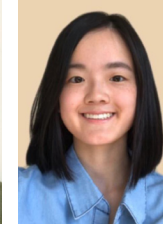
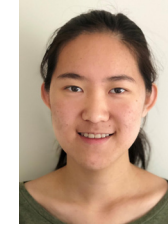
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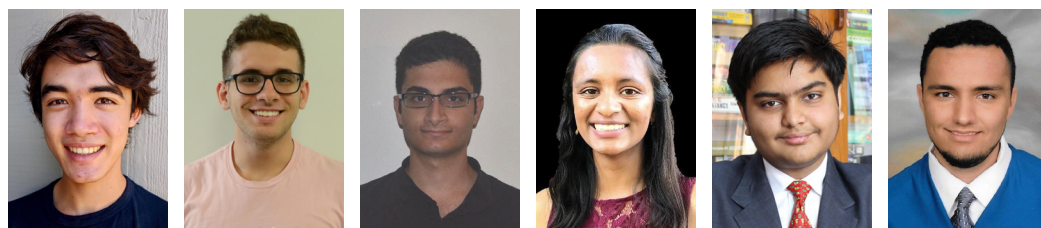


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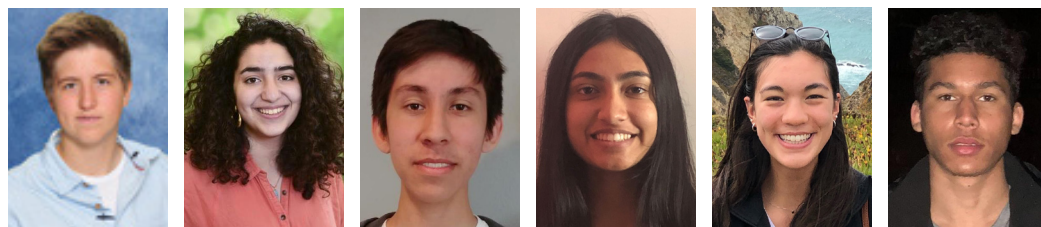
Sophomores

Class of 2022

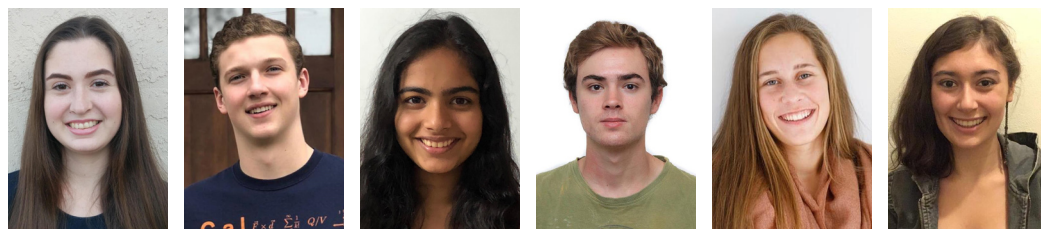
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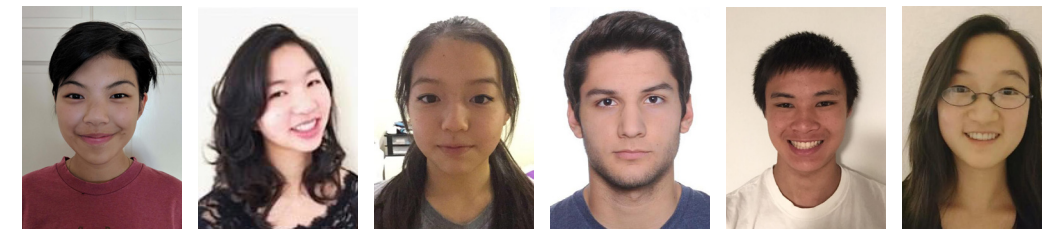
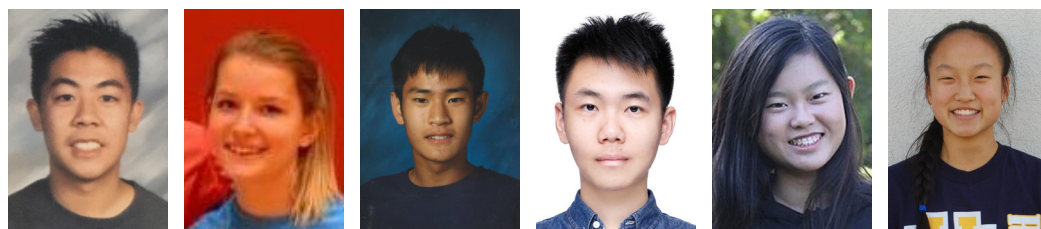
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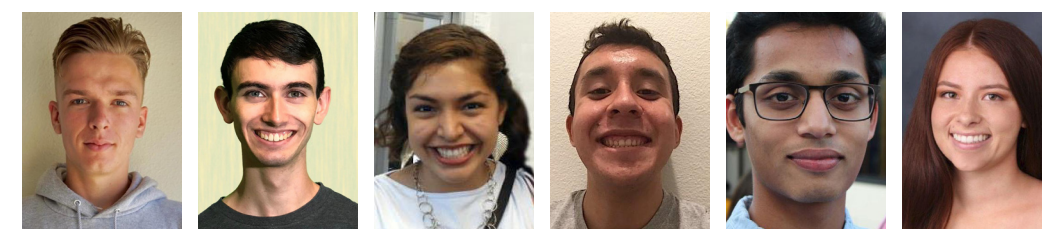
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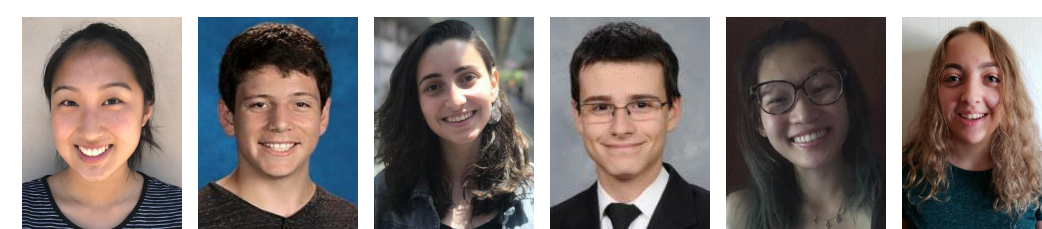
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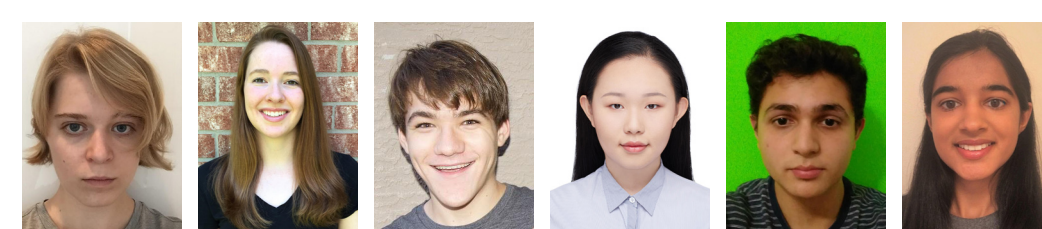
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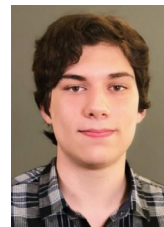


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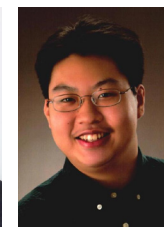
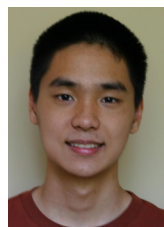
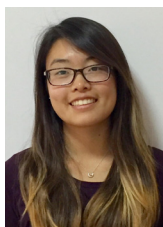


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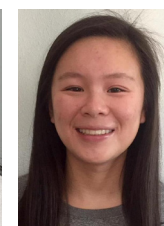
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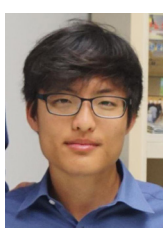
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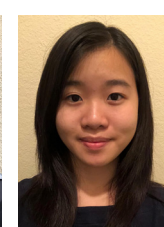
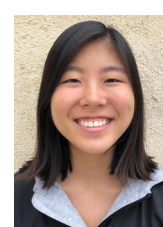
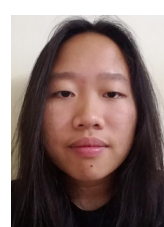
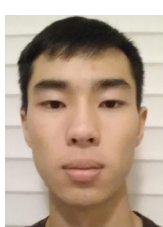
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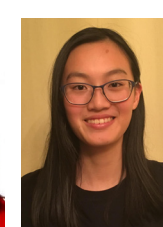
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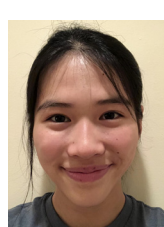
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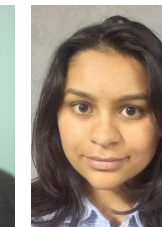
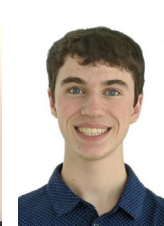
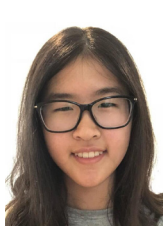
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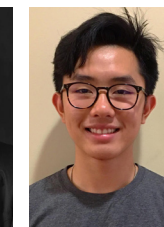
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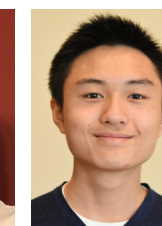
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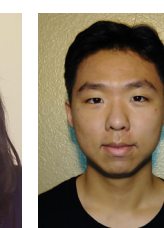
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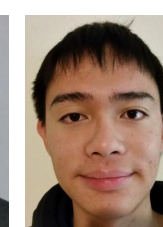
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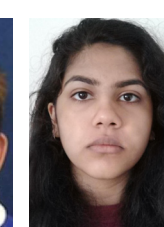
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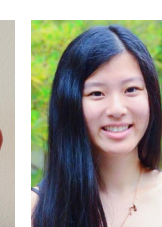
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Park, Charlotte
Park, Emily
Park, James



Pegues, Toussaint
Peng, Daniel
Perrin, Isaac
Phanse, Gaurav
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Popken, Max
Pulido, Randall
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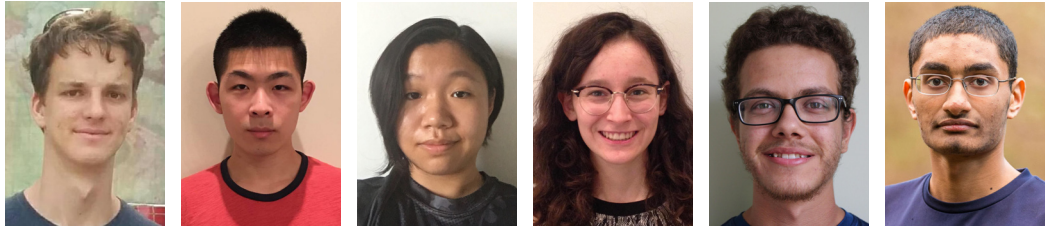


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Rock, Zoe
Rodriguez, Kellen
Rui, Sabrina
Ruiz, Mario
Ruscansky, Ryan



Santiago, Raffy
Seebeck, Johnny
Senapati, Anish
Shahidullah, Archie
Shao, Eugene
Shenoy, Anish

Sherstyuk, Ilya
Shi, Jason
Shi, Rachel
Silier, Olivine
Silvera, Liam
Sivakumar, Aditya



Sloan, Julia
Smith, Eric
Soufi, Mohamed
Stameson, Spiro
Stevenson, Miles
Su, Victoria



Suenram, Gracie
Sun, Carol
Sun, Jennifer
Suri Jr, Nathan
Swafford, Isabel
Szedlock, Matthew



Tang, Ivy
Taylor, Zane
Terrones, Jasmine
Tieu, Vincent
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Tjandrasuwita, Megan
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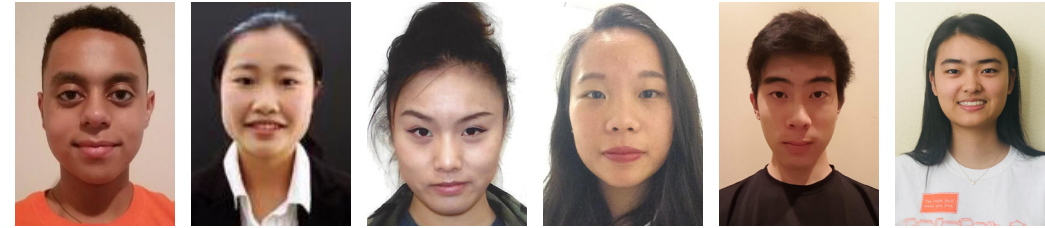
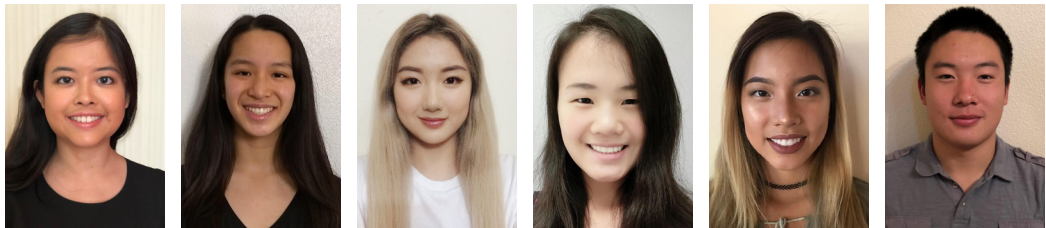
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Wan, Jenny
Wang, Chris



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Weng, Kyle
Wichterman, Remy
Will, Jake



Woo, Vanna
Yam, Elizabeth
Yan, Serena
Yang, Elaine
Yang, Isabell
Yao, Timothy



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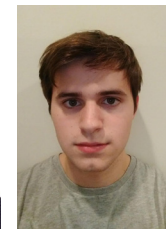
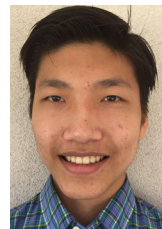
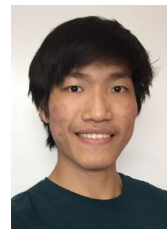
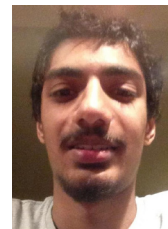
Juniors

Class of 2021

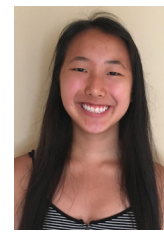
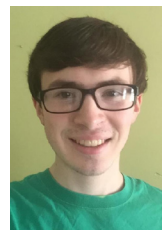
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Agarwal, Ashima
Amaolo, Alessio
Apple, Logan



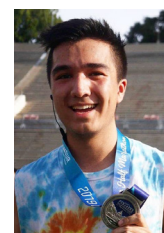
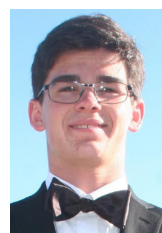
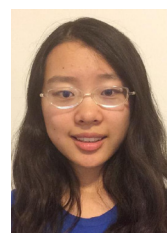
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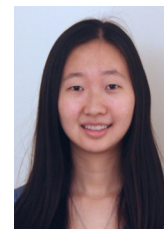
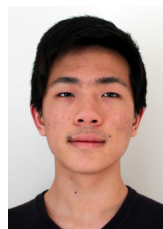
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Boubezari, Ali
Brabec, Cole
Briones, Jack
Brotsky, Krystal
Brown, Krystin



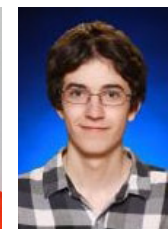
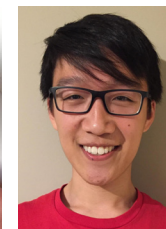
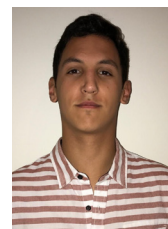
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Catanzaro, Dominic
Chan, Andrew
Chelakkat, Kristine



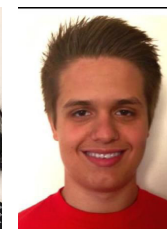
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Chung, Terry



Clausen, Nick
Como, Joe
Corado, Alex
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Cui, Alex
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Dargan, Richard
de Castro, Gianfranco
Delgado, Daniel



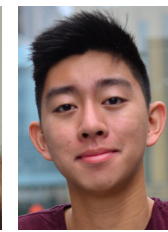
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Dominguez-Kuhne, Marcus
Drango, Kali



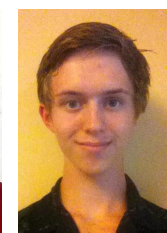
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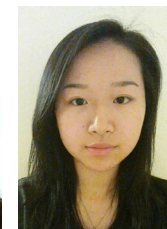
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Gowda, Jethin
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Griffith, Nora



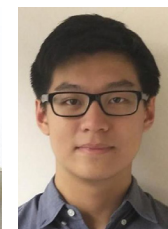
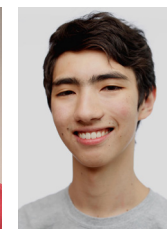
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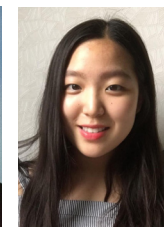
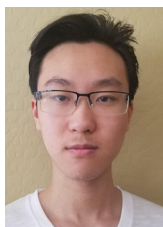


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Huh, Calvin

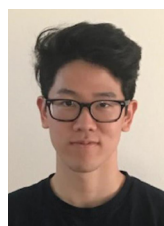


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Jin, Alice
Jusuf, James

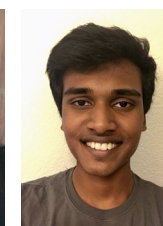
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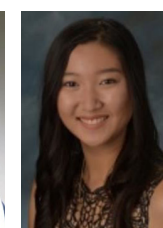
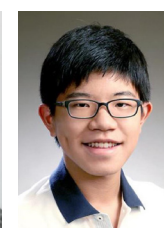
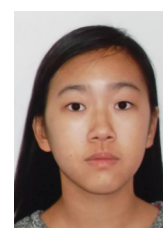
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Koe, Nora



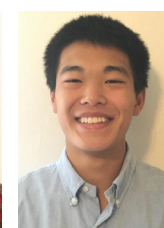
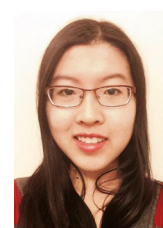
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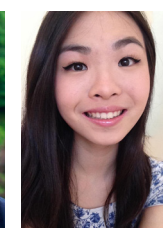
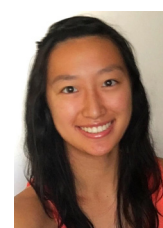
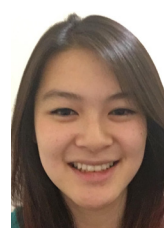
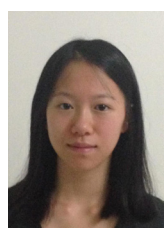
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Lee, Regina



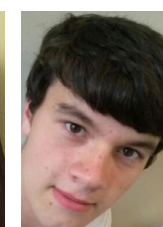
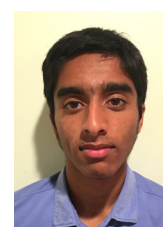
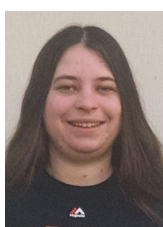
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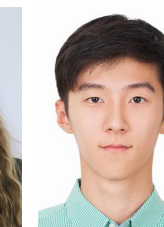
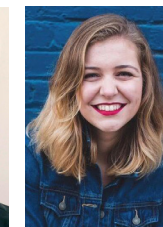
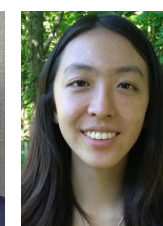
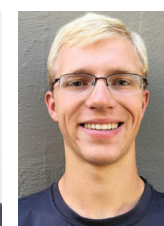
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Liu, Tony
Liu, Victoria



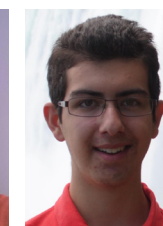
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Manohara, Mohith
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Maxfield, Jack



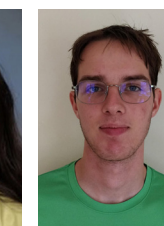
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Mondello, Allessandra
Moreno, Eric
Morgenfeld, Spencer
Mu, Qiaoqiao



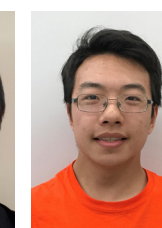
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Mukherjea, Aru
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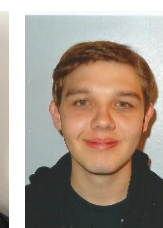
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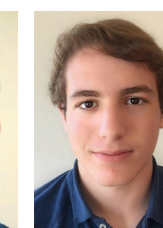
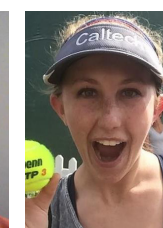
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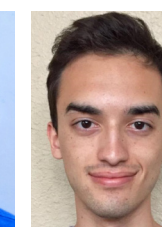
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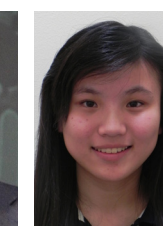
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Sanderson, Neil
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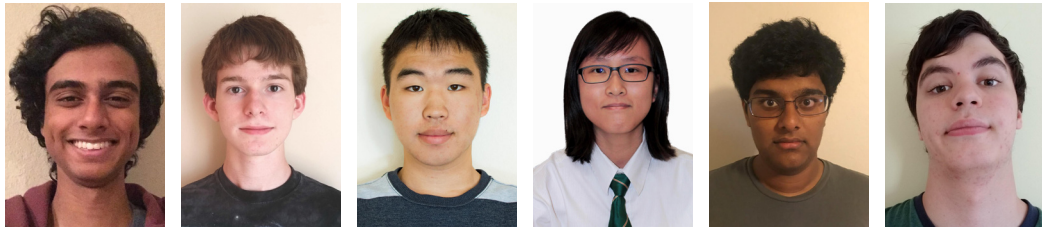
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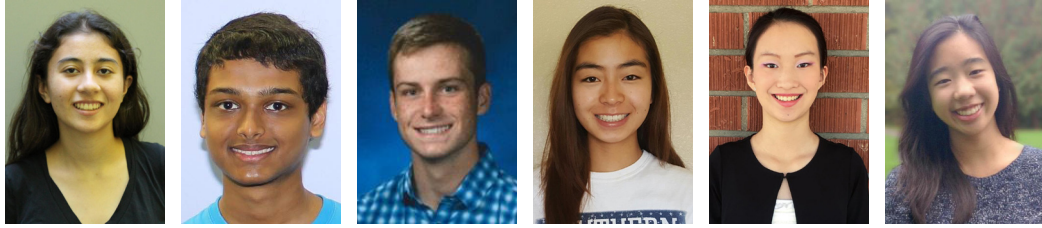
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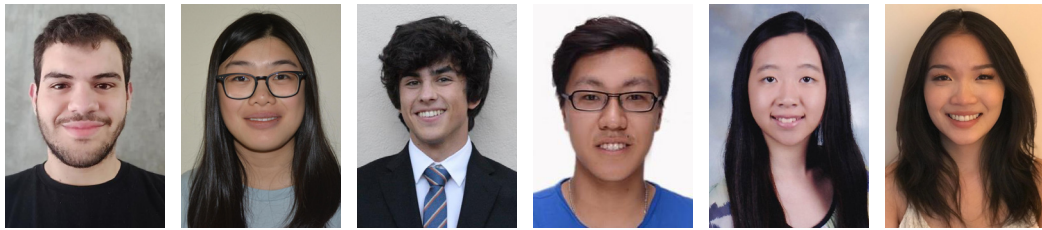
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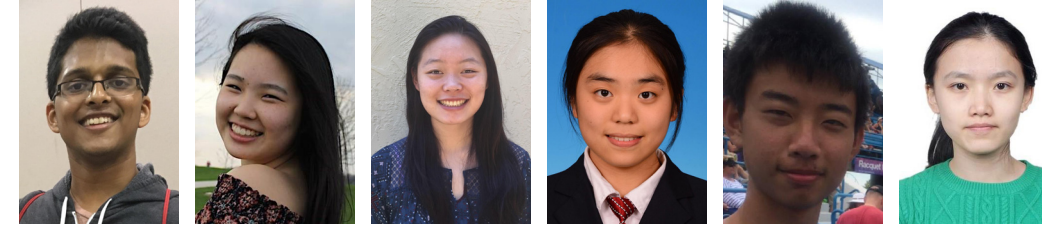
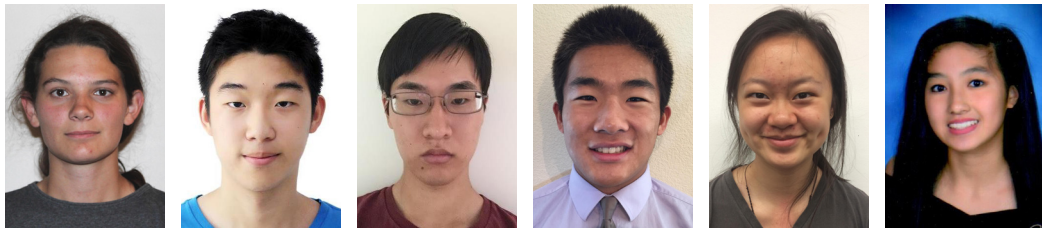
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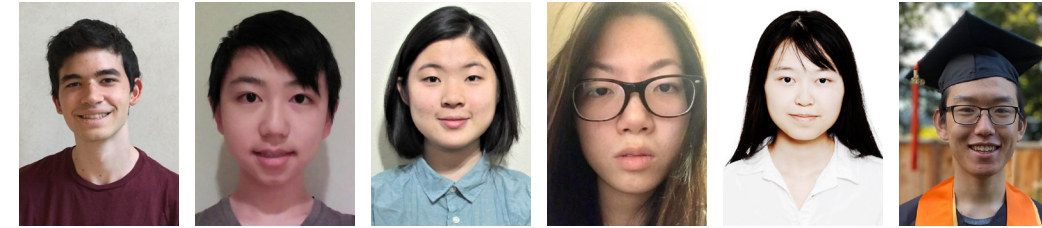
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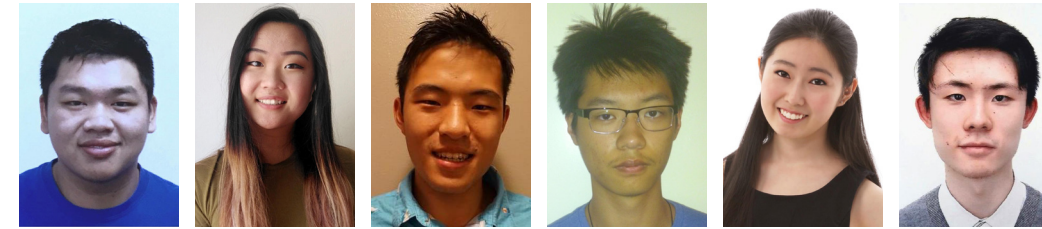
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Zeitlin, Matt
Zhai, Albert
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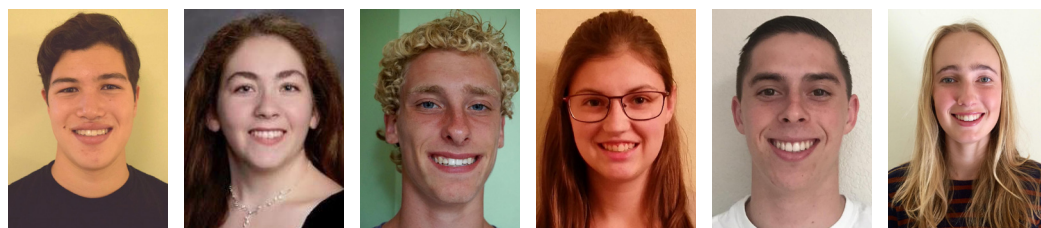


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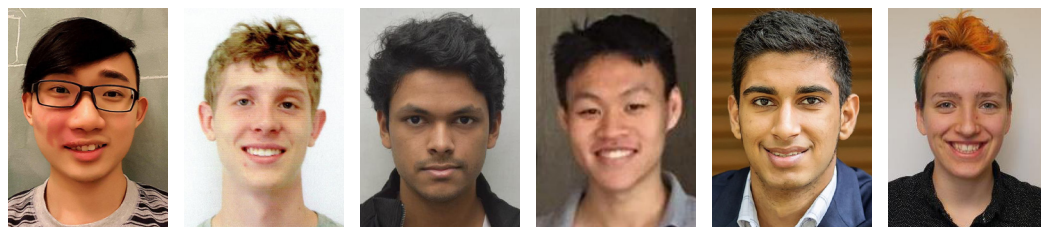
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Class of 2020

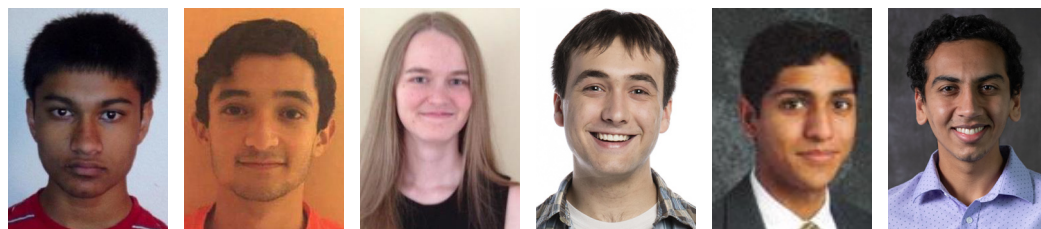
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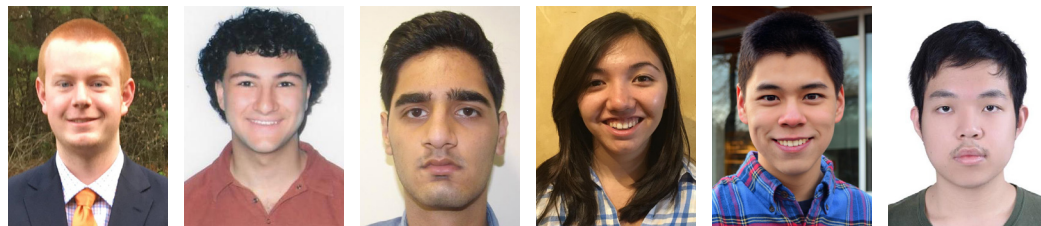
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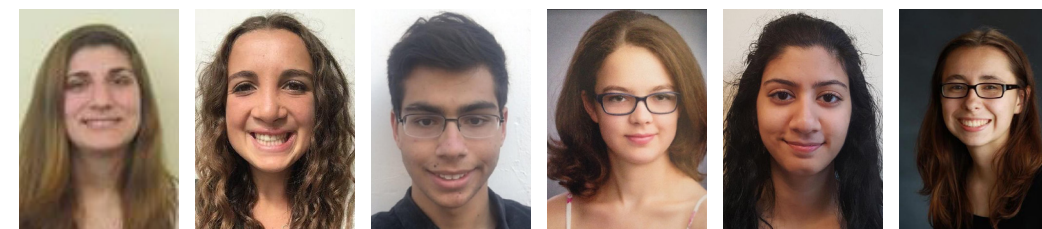
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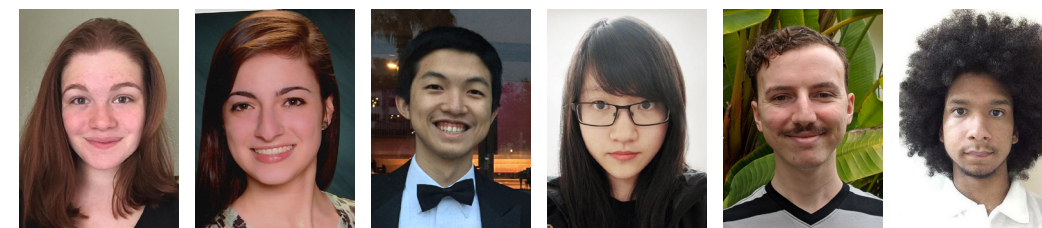
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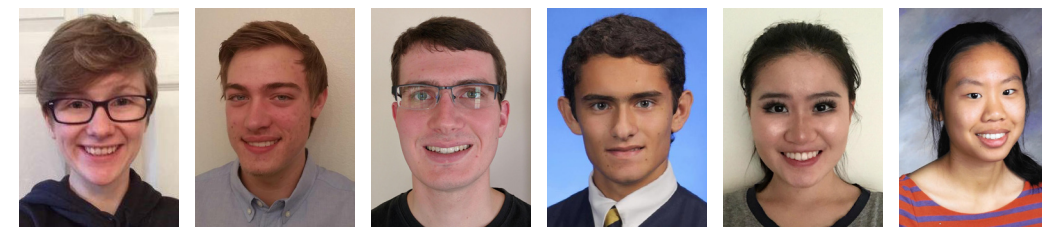
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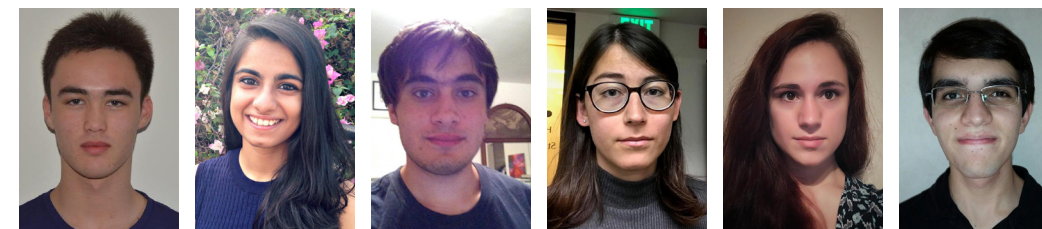
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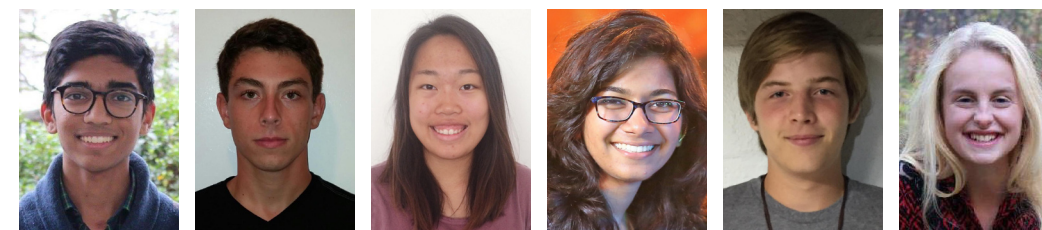
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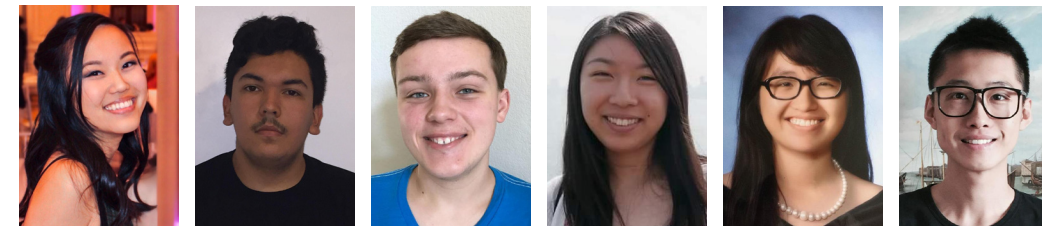
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Gephart, Dana
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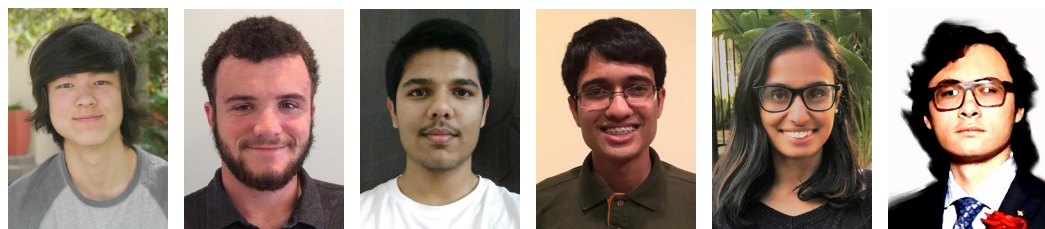


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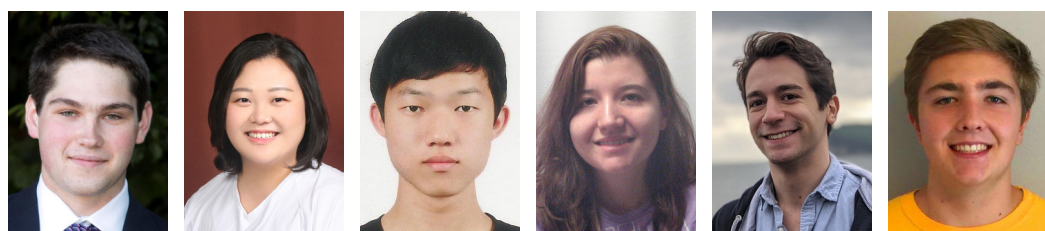


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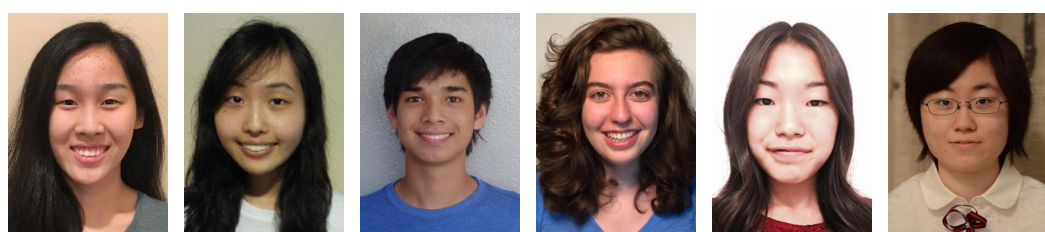
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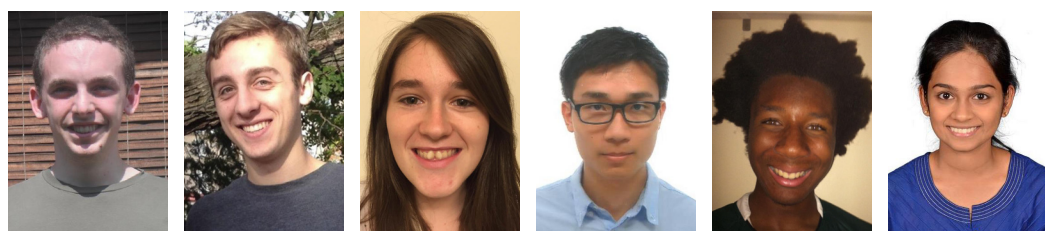
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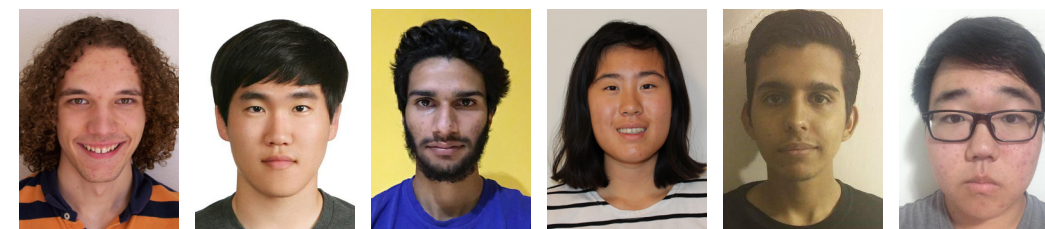
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Messner, Grant
Miao, Cathy
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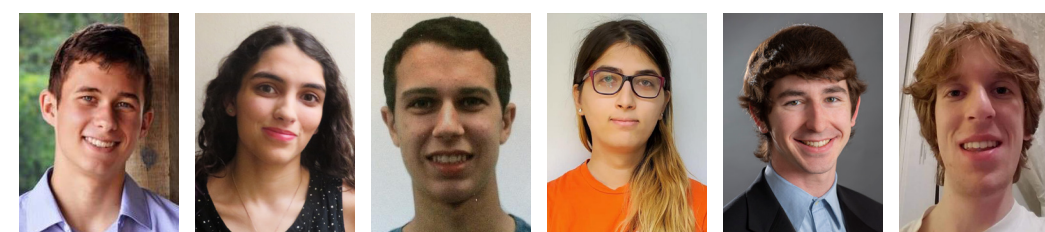
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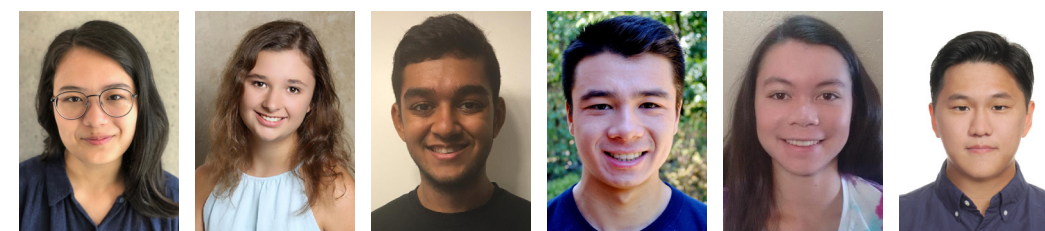
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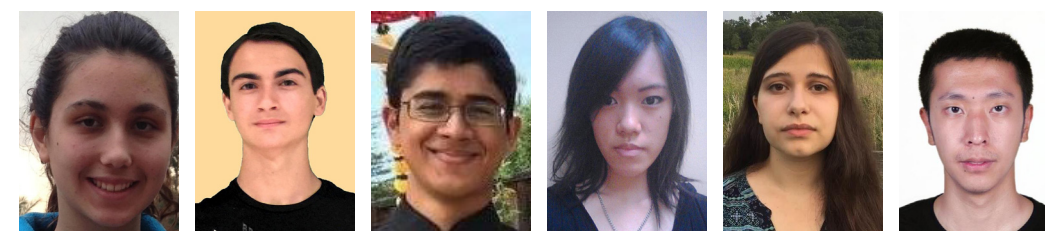
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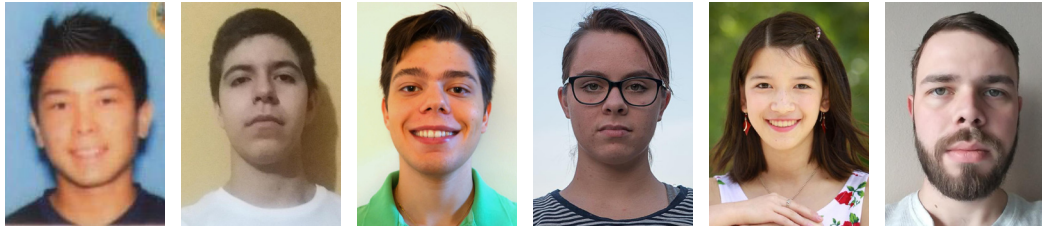


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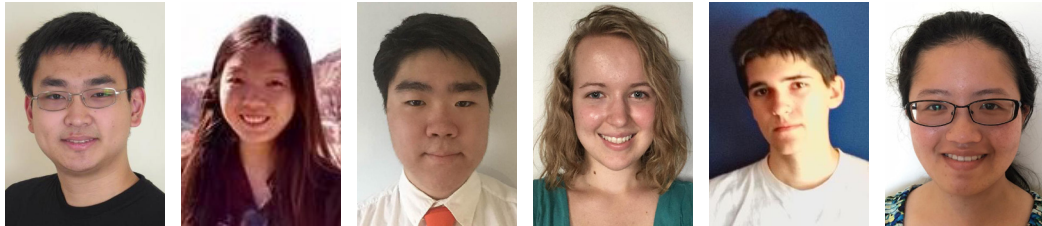


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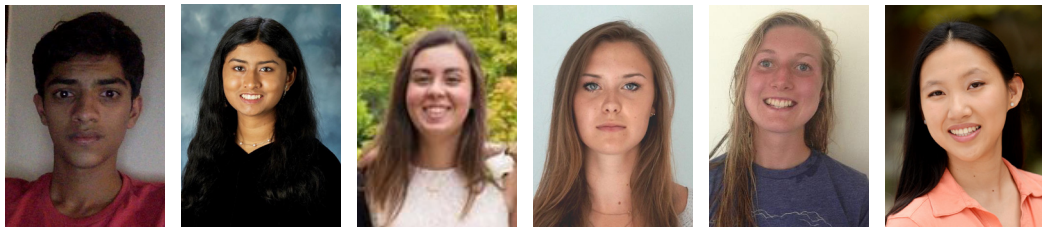
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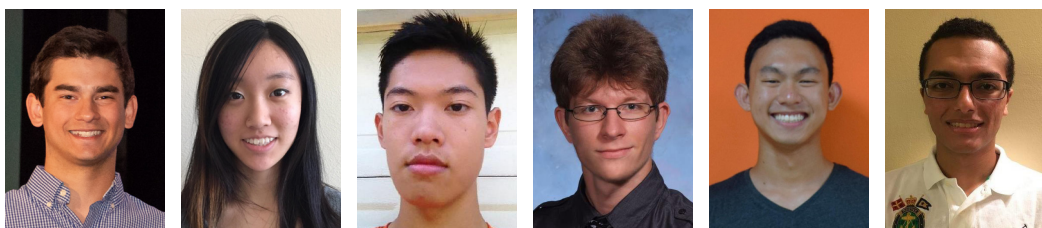
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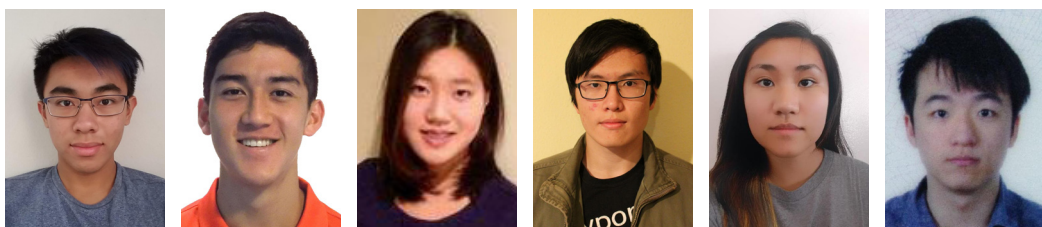
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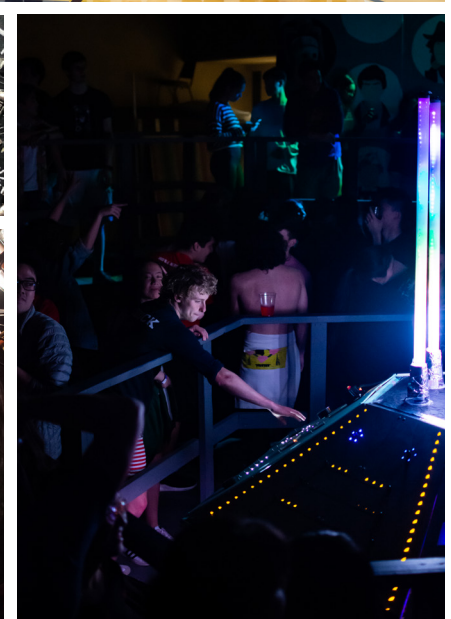
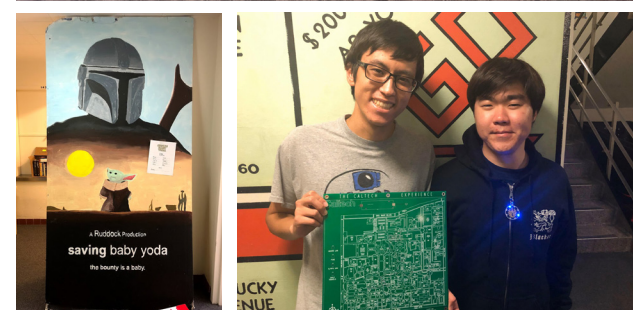
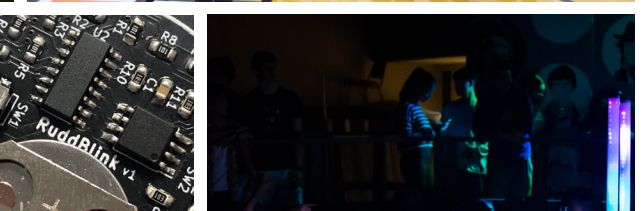
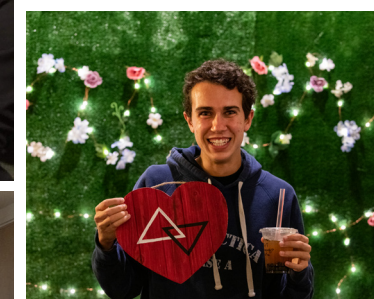
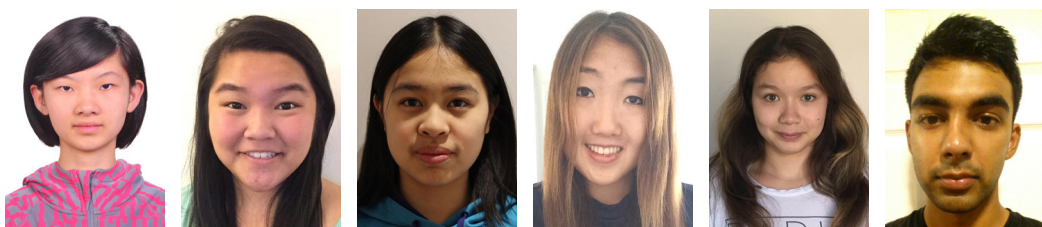
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YEARBOOK



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LETTERS FROM THE EDITORS

Let's start at the beginning. As the summer heat begins to dissipate, Frosh camp annexes campus. Fireworks erupt over Beckman Mall, Rotation rushes by, and the cannon fires. Frosh settle in, s'mores and juniors are submerged in the grind, and seniors plan their escape.

The term draws to a close with the Lloyd Holiday Cone towering over campus. Midnight Madness transforms the cafeteria into a microcosm of the Star Wars galaxy. One would never know that this would be Chandler's only Interhouse of the year. Students leave campus excited for the turn of the decade. Some fly home, some travel. Others plan adventures for the spring: to Europe or Southeast Asia with friends; to Guatemala to survey a water pipeline route; to Costa Rica, Switzerland, and the Galapagos to study ecology, policy, evolution.

Instead, three months later, they find themselves back at home. Little by little, events are slashed, dates are pushed back, hopes are let down. Each new announcement is like a bad joke. First it's just one week. Then all of spring term. Then graduation, SURF, the upcoming fall quarter. Back in March, who knew this was the last time we'd be together for the rest of 2020? Outside our bubble, things are worse: triage in Italy, mass graves in Brazil.

No more international travel, or really much travel at all. No more finding our seats in lecture halls; now we find ourselves dropped into breakout rooms on Zoom. No more idling in House alleys; now we log into on Discord channels and queue up for League matches. No more weekend runs with friends; now we give each other kudos on Strava. These little things keep us connected amidst the Literal Pandemic.

The mission of the Big T is to carry snapshots of Caltech into the future—our adventures, accomplishments and camaraderie, from the everyday to the heroic. This year, the execution was different, but our goal was the same. This book is the product of many Sunday meetings, patiently persistent emails and conversations, inspired copywriting, a long sequence of stylistic revisions, and cameras carried everywhere, but it did not involve nearly enough boba, another misfortune for which COVID-19 is to blame. Much credit to the creative and multitalented Big T Staff for uncovering the beauty in this school year and reimagining it on these pages. Special thanks to Shu Fay Ung and Eric Chen for taking the helm this summer, as we can never seem to finish the book by June no matter how hard we try. But now, finally, it's done. I hope you all enjoy it as much as I will!

Noelle Davis

What an unpredictable year 2020 has been. Just in March all of us were struggling to finish our winter term final exams and looking forward to the spring break that lay ahead. Since then, the world has turned upside-down—many of us were forced to return home to finish off the academic year remotely. Those of us who were left at Caltech had to follow strict social distancing protocols, while also taking classes fully online. The yearbook staff was especially affected by these changes, as the purpose of the publication itself is to record noteworthy events and acknowledge accomplishments related to the Caltech student body. You could imagine how much more challenging this became once all Caltech events were cancelled and students were scattered across the country and the world.

We all had to adapt—one way or another—to make lemonade from the lemons 2020 threw at us. We learned to work with what we had. This book is a culmination of hundreds of hours writing, photography, and interviews done by a very talented and dedicated staff. Despite all the challenges this year brought us, I am very grateful that our staff rose up and above to the occasion to make this book possible. I hope you enjoy this yearbook as much as we did making it, and that it can serve as a memorandum of all the things that happened at Caltech this academic year. Good luck to next year's co-editors and staff!

Joseph Min





As each of our worldlines diverge

MEI YI YOU



SHU FAY UNG

from the intersection at Caltech,



EMILY MIAOU

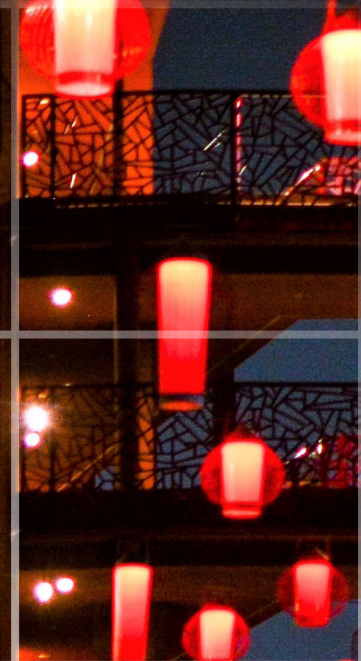
converges down on us.



SHU FAY UNG



SHU FAY UNG



SHU FAY UNG



MEI YI YOU



TARINI SINGH

No matter what has transpired in the past, we are given a chance to recalibrate our trajectory.



“Our greatest glory is not in never falling, but in rising every time we fall.”

Confucius



The 1990s, 2000s, 2010s, and now, the 2020s.

As 2020 proves to be our greatest test of tenacity, ambition, empathy, and kindness yet,

we will dust off setbacks, listen to advice, and blaze ahead to
see what the decades have in store.



