COSMOS UC San Diego

California State Summer School for Mathematics and Science

UCSD Jacobs School of Engineering

A RESIDENTIAL ACADEMIC EXPERIENCE FOR TALENTED HIGH SCHOOL STUDENTS AT UC SAN DIEGO

Week 4 Newsletter

In this issue:

CLOSING DAY AND BEYOND…

The four weeks of COSMOS seem to have flown by this summer. Faculty, teacher fellows, cluster assistants, residential life staff and office staff have worked hard all year to provide a unique opportunity for students to grow and excel both academically and socially. Over half of our students this summer will be entering their senior year of high school this fall and will have a much better idea of what's ahead as they complete their college applications. Hopefully some of our students from this summer will return to UCSD for their college experience. If you do, stop by our office and say hi! Many of our cluster assistants and residential life advisors were COSMOS students within the last two to three years and are now undergraduates at UCSD. For most of these COSMOS alum, their time at COSMOS remains a special memory and time, one that they are excited to give back to. Perhaps that will be you!

COSMOS ALUMNI **Yes…that's YOU!!!**

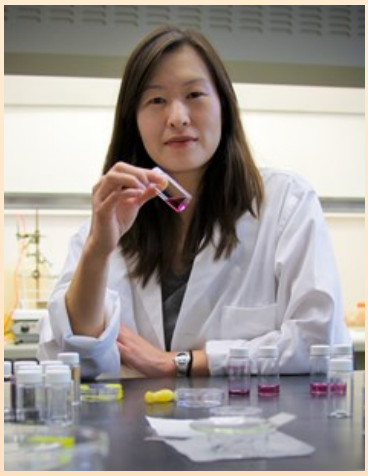
Now that you're a COSMOS Alum, please stay in touch and check back regularly for information about alumni events and internships: http://www.jacobsschool.ucsd.edu/cosmos/alumni.shtml

Continue to support COSMOS by donating!

Please visit: http://cosmos-ucop.ucdavis.edu/

COSMOS RECRUITMENT

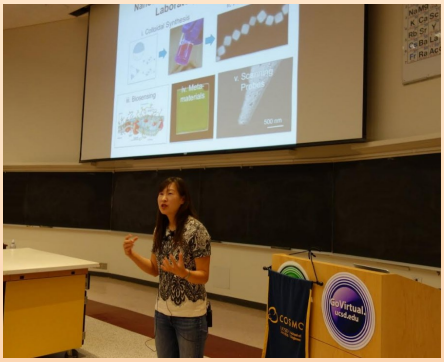
COSMOS alum are our best ambassadors. If you would like to help promote the COSMOS program in your area, contact us at cosmos@ucsd.edu.



DISCOVERY LECTURE SERIES

"Through the Nanoscale Looking Glass"

Dr. Andrea Tao gave a great lecture on the fundamental principles of nanoengineering. She did a great job of showing everyone what they could expect as juniors in one of her nanoengineering courses at UCSD. She started of by providing the definition of nanotechnology and then gave two really great examples of where we can find nanotechnology in real life. She described how geckos are good examples of nanotechnology in nature. They are known for their ability to climb all surfaces due to a capillary adhesion mechanism. In the end, Dr. Tao gave some really great advice to our students about furthering their education in STEM by pursuing internships and attending science fairs. Her interest in materials chemistry piqued in high school while volunteering in the chemistry lab of Michael Sailor and she encouraged the students to seek out similar opportunities.



RESIDENTIAL LIFE

The contrast of smiles and laughter with hugs and tears during the last days of programming as students ready themselves to depart from their journey here at COSMOS leaves us also with a mixture of emotions at Residential life. From a staff standpoint, these four weeks of sports, dancing, crafts, art, movies, and more has left each and every student with new friends, new experiences, and new knowledge on how to maintain a balanced and healthy life. Of course, we had to end with a bang during Week 4. Over the weekend, students took community to the next level by conducting community service in various parts of San Diego. There was also a talent show, a Carnival, a walk through campus notable history, as well as a last dance. Although all of COSMOS was extremely busy trying to finish and perfect their final projects and presentations during the week, there were still plenty of activities to help them balance out all that hard work. Students enjoyed learning sign language, participating in graffiti, painting more with Bob Ross and a large variety of physical activities. The Talent Show was amazing with dance performances, instrumentals, singers, and more smiles than could be contained in a two hour show. We also had the last of the birthday parties, last run, and last meal. Joshua and Mitchelle had a great conversation on perspective, Kiran had the last laugh with some shaving cream, Alina is always luk'ing out for everyone, and everyone became Angela's biggest fan over her talent. Each time the word "last" was used, sighs could be heard abounding. All in all, fun was had, hugs were abundant and memories were created. We hope as students move on from COSMOS that they will look back fondly on their time at the UC San Diego. They clearly will recall the amazing lessons learned in the classroom and we hope we have given them a positive insight as to what their college experience can be outside of the classroom. Thank you to families for entrusting your children in our care and thank you students for participating, growing, and living with us. We had a great month with you!

To see more photos from COSMOS 2016, go to:
https://drive.google.com/open?id=0B9bdHheZ2k6TZGtLQUd0TVZ3Uzg

WEEK FOUR

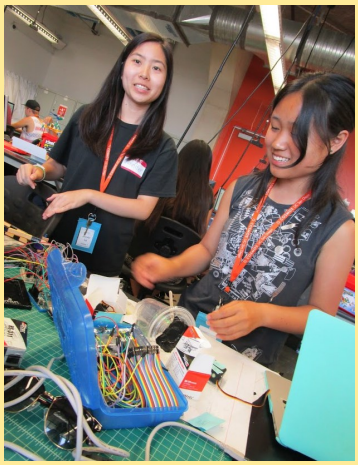
CLUSTER 1: COMPUTERS IN EVERYDAY LIFE

Cluster 1: http://ucsdcosmoscluster1-2016.blogspot.com/

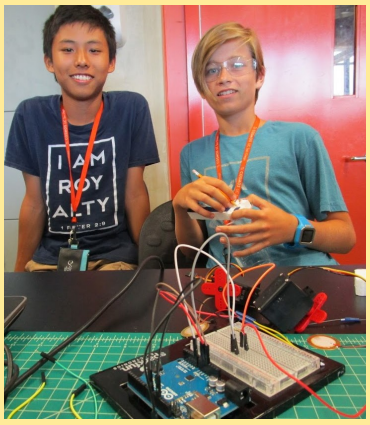
A lot happened at the end of last week. Last Thursday, we spent more time working with Arduinos to get a walking robot built using servos. By the end of Friday, we had varying levels of success – moving fast/slow, small steps, sliding, and some propelled itself!

Last Friday we learned about two's complement. Did you know that: 1+1 = 0, 1+1 = 1, 1+ 1 = 2 and 1+1 = 10? We do now.

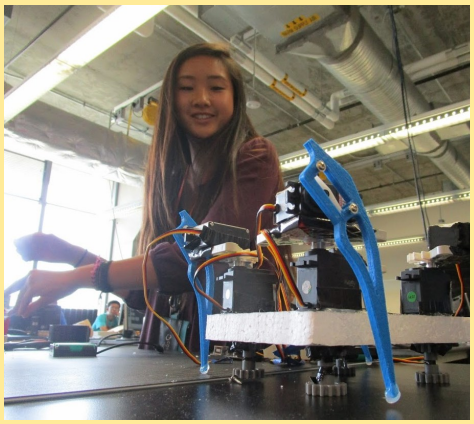
The majority of this week, we focused on our final projects. We got to propose our own final project and get it approved. It had to involve AppInventor, Scribbler Robots or Arduinos. After many hours of hard work and some laughs at the weird things our programs would do, we are just about done with many of the milestones in our projects. One project involves creating a mobile app with AppInventor to implement ideas from needs they saw around them.

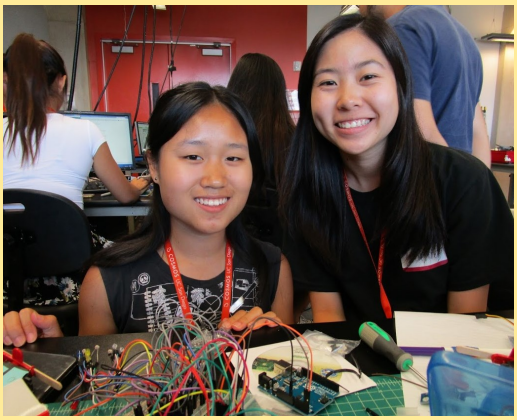


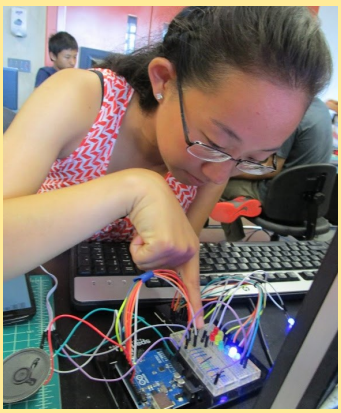
Many teams will be using their mobile phones (with an app they created) to control their Ardinos with various sensors and many servos! We have projects that mimic insect behavior, turbidity sensor, remote controlled vehicles and robots, just to name a few! One team decided to work with the Scribbler Robot implementing image processing, Arduinos and AppInventor . They used components on both technologies to interact with each other. There are many ways to apply the engineering and science from our final projects to larger robots. Some of us hope to continue to work on our projects after COSMOS and submit it to a science competition this coming school year, such as a science fair. These projects have a lot of work and heart in them and having great potential to do well in research project competitions. We look forward to sharing our projects with everyone on closing day. Our faculty was thoroughly impressed with our projects and it was difficult for them to select the Gordon Award winners for our cluster. The videos of our final presentations will be available on our blog.



We would really like to thank all those that helped make our cluster and COSMOS experience one we'll never forget. From faculty (Professor Curt Schurgers and Professor Diba Mirza) to our TAs (Lucerito and Luis) to our RAs (Luzanne and Carlos), you helped us learn a lot and have a great time in the process! You can view our pictures on our Cluster's Blog (UCSD COSMOS Cluster 1 2016) http://ucsdcosmoscluster1-2016.blogspot.com/ to see all the fun we had in class and on field trips!







CLUSTER 2: ENGINEERING DESIGN AND CONTROL OF KINETIC SCULPTURES

Cluster 2: https://sites.google.com/a/eng.ucsd.edu/kinetic-sculpt/home/teams

Can you believe it Week 4 already? This week has been absolutely wonderful as we watch the final projects and presentations come together. This week can be summed up eloquently with Dr. Nathan Delson's paraphrase of Tom Cargill's words: **The first 90 percent of a project accounts for the first 90 percent of the development time. The remaining 10 percent of the project accounts for the other 90 percent of the development time.**

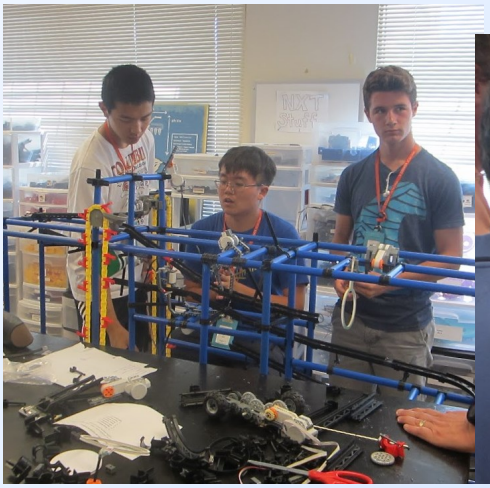
The past few days have been, truthfully, a little hectic. Along with a Discovery Lecture, the final week has also become the final stretch of building, fixing, and beautifying our final projects, our kinetic sculptures. Each team manages differently. One has finalized the implementation of their Pokemon concept on their sculpture. Another is experimenting with structure placement for safety purposes and ease of movement. Mine is busy coding for two of our three main points to perfect the user interface and embellish our sculpture. While some are busy doing one thing, other members are helping out in another area. At the same time, we are creating presentation materials to officially finalize the sculptures. One of which is a poster. Another is the presentation slides. As a grand finale, we will soon begin to prepare for oral presentations for our best chance to display the fruits of our efforts these past few days (and week, considering everyone included our mini sculptures in our full structures). **This is the full demonstration of the software, engineering, creativity, design, and teamwork skills we've learned and accumulated from day one of our COSMOS experience. And I can proudly say, it was worth it.** **-Zhifei (Kary)**

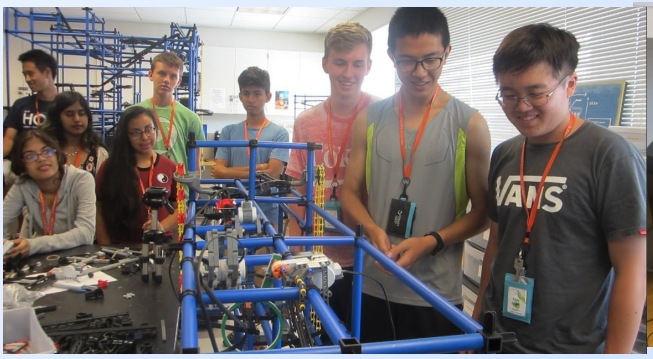
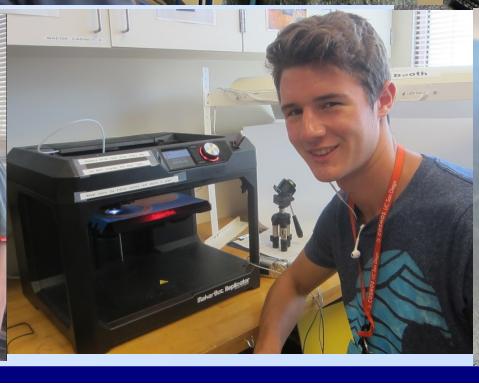
This week at COSMOS our cluster is finishing up our final projects. Our final project will consist of our working sculpture a poster board and an oral presentation with google slides.We have been working on the final project for nearly two weeks and many of the groups are on the final stretch. We are learning a lot of new programs and skills in this project such as teamwork that will help us in the real world. **-Paul**

This week in design and control of kinetic sculptures we worked in our groups on building our final projects. My team, the Grape Team, 3D printed and laser cut parts, coded Lego NXT Robots and installed our mechanical parts and tracks. As we go into the final stretch, my team looks to finish our oral and visual presentation and fine-tune our sculpture to limit error. **-Owen**

Wednesday, August 3. Three days until we present our final projects. I got up early at 6 45 to run around the green. Most of the teams got up early, too, to eat and get to class early to work in the design studio. My team now consists of only me, Tiffany, and Vittal, because Matthew left for medical reasons. With one less person, we had to rush to finish our motor arrangements and the interactive portions. We had already coded most of the RobotC programs we needed, but we still had to troubleshoot with different colored balls and their different thicknesses. A funny problem several teams ran into today while testing their tracks was not having enough balls to put on the tracks, so multiple people ended up running around the design studio looking under chairs and behind doors. Of course, there were more, but we just forgot to ask the professor. **Lesson of the day: ask for help.** In the afternoon, we had cookie decoration, basketball, human chess, and painting for programming activities. My suite ended with baking cookies together for a yummy late-night snack. **-Zhixue (Mary)**

We are looking forward to showing you all that we have accomplished these past four weeks! Thank you for your support!




CLUSTER 3: LIVING OCEANS AND GLOBAL CLIMATE CHANGE

With our final week drawing to a close, Cluster 3 put in the extra effort to make their projects as awesome as possible. I'll turn it over to them for the final word, but before that, I just want to thank all the staff, parents, and students that made the 2016 Cluster 3 such a great experience for everyone!

"In the morning, we had a discovery lecture on clusters 5, 7, 8, and 9. It was really interesting to see what activities and projects other clusters were doing. Afterwards, our teacher fellow Matt held a short seminar regarding our personal feelings. It was really nice of him to take on the role of not only academic leader, but personal mentor as well. We then worked in our groups to gather research for our final projects. In the afternoon, 8 of us drove down to Scripps to work with professor Lai and his assistant, Sam, on our temperature-respiration project. Visiting Scripps is always one of my favorite parts of the day because I love working with marine organisms." – *Alison Chou*

"On Friday we drove down to Scripps Institute of Oceanography to work with Dr. Lai. First we conducted a salinity experiment on crabs using different percentages of seawater and freshwater. Afterwards, we headed down to La Jolla Shores to collect seawater samples to analyze at the lab. Following lunch at 64 Degrees, we went to the Natural Sciences Building to work on our final projects, mine being the Brown Carbon Counter project." – *Shifali Kerudi*

"On Monday we headed down to SIO and visited a marine vertebrate collection. Dr. Lai brought us to a fish collection where we were able to examine a myriad of fish species suspended in alcohol for preservation. In the larger jars, we studied a goblin shark. We were told about the fish preservation process. Afterwards, we dissected a frog in class. Although gruesome at first, learning about the anatomy of the frog was fascinating and hands-on. In the afternoon at NSB, we worked on our scientific posters." – Gabriel Macias

"My group project is really coming together now that we've finished our experiment in crab respiration in different salinity levels. We're almost done with the digital poster and power point thanks to the time in class today and yesterday to work on them. Today we got some helpful tips from our teacher fellow, Matt, on how to present our project. He told us to practice presenting beforehand (to avoid reading off the slides word for word), to speak clearly and to summarize what our power point is stating. This way the presentation is clear and to the point. Overall I'm excited about sharing our experiment and results to the students of clusters 3 & 6 and parents! " – *Rosalinda Barcellona*

"Wednesday was our last day at UCSD's Scripps Institution of Oceanography (SIO). Dr. Lai started the day with a lecture on the dynamic, high-energy environment of the sandy shore marine ecosystem. We then headed to the La Jolla shores to experience the ecosystem up close. As we swam and waded in the clear water, were able to observe schools of fish, a seal and a couple of sharks. Back at SIO, Dr. Lai covered a myriad of topics that included the west-coast sardine fishery collapse, controversy behind tuna fishing methods and the piracy of Chilean Sea Bass. After lunch, we went to the Natural Sciences Building (NSB) and split into our project groups to continue working on our final projects." – *Ping Hsieh*

CLUSTER 4: WHEN DISASTER STRIKES: EARTHQUAKE ENGINEERING

The awesome students of mighty Cluster 4 concluded a productive week with their amazing presentations showcasing all of their hard work and dedicated efforts! Many students have mentioned their appreciation of the richness that the COSMOS experience offered as project groups edited and finalized their posters and presentations. They look forward to showcasing the posters and models to parents and families on Saturday, and to the exciting awards ceremony that follows.

Another captivating Discovery Lecture earlier this week got us off to a great start, as students learned the history of nanotechnology. Students also engaged in a question and answer period about college life with graduate students Elide, Melissa, and Sandra. Then it was back to work, with last-minute testing of structures and analysis of data. This lengthy process involves huddling with the instructors and teaching assistants, group brainstorming, followed by further huddling and more brainstorming. Actually it is the raw scientific process of personal growth! Not always pretty, but the final result for our Cosmopolitans is the precious self-knowledge of discovery. They 'did' science, and now possess the confidence to lead their future high school science lab groups to superstardom!

Following the testing and analysis phase, our students went to work on outlining exactly how to communicate their results to the public, or in our case, our friends in Cluster 5. They created an electronic poster formatted on PowerPoint, and are extremely excited to show it off and explain it to you on Saturday. They followed professional research presentation guidelines, and included abstracts, objectives, procedures, conclusions, and their data both tabled and graphic. Then it was time to produce several slides for the bulk of their presentation.

In four short weeks, our students proceeded from project idea, to objective and testing, and analysis and conclusion. Finally, they presented their findings, and were encouraged to continue their research in the context of a science fair competition. All this while experiencing college life in the dorms, in the dining halls, in the lecture halls and labs, and across this beautiful campus with kindred spirits from all over the state. COSMOS is a one-of-a-kind opportunity for personal growth, for a unique exposure to the STEM fields, for a chance to interact with undergrads and graduate assistants, and bond with their instructors in a welcoming environment. Your kids are so fortunate, and we thank you for allowing and encouraging them to experience COSMOS!

As we reach the conclusion of COSMOS 2016, Cluster 4 students wish to thank Professor Lelli and Dr. Ingrid, and Cluster 4 Assistants Elide and Robert for all their efforts in guiding their detailed exploration of structural engineering and geotechnical principles. Thanks also to the wonderful COSMOS staff, especially RAs Lizzie and Joshua! Parents, another thank you for supporting these 24 students in their STEM endeavors here at UCSD. We found them to be an extremely engaging group, warm, insightful, and we will miss them!

https://sites.google.com/a/eng.ucsd.edu/ucsd-cosmos-cluster-4-2016/

CLUSTER 5: FROM LASERS TO LCDS: LIGHT AT WORK

Our final week of COSMOS has passed and what a week it was!

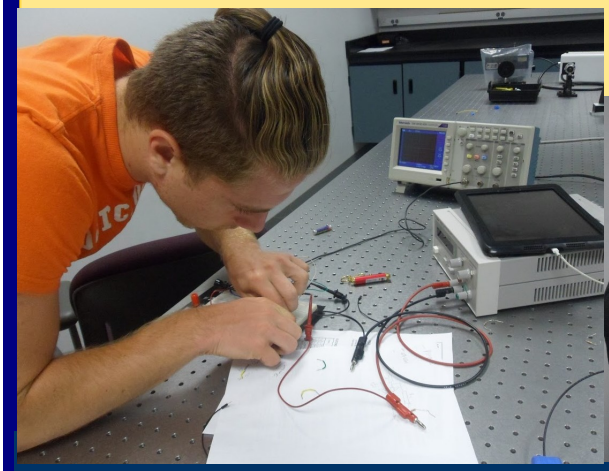
Our last Discovery Lecturer, Professor Andrea Tao, gave all the clusters an overview of her work in the light-matter interaction field of nanotechnology and how her work found nano-scaled features on the toe-pads of gecko's that explained how geckos stick very strongly to surfaces without using mucus.

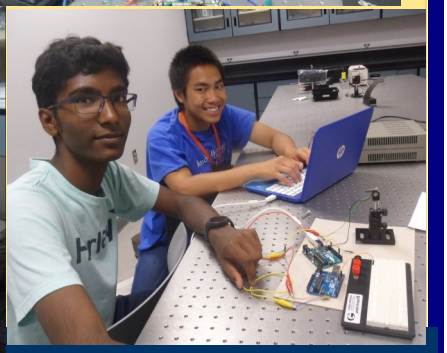
Early in the week, all five teams brought their projects to a proof-of-concept stage. The Laser Seismometer team field-tested their device with the help of Cluster 4's (Earthquake Engineering) shake-table. The Cell-Phone Microscope group utilized the Qualcomm Center: Nano3 facility's Axio Fluorescence Microscope to compare the difference in quality to their own designed elastipolymer lens. The Organic Solar Cell team tested various natural substances for their ability to boost light-to-energy conversion, including spinach to investigate chlorophyll's capacity as a photosensitizer.

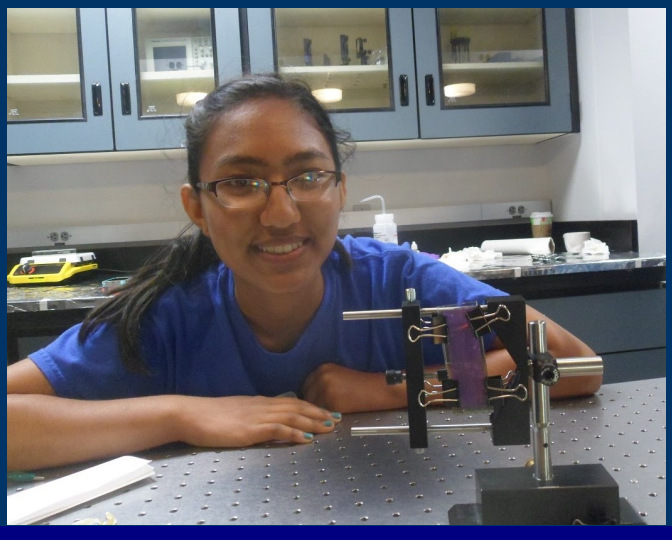
The Free Space Optical Communications group was assisted in quantifying various simulated atmospheric conditions by the donation of photo-resister's from Cluster 9: Music and Technology. The Laser Harp team brought their Photonic/Phononic musical instrument to prototype stage with the combined construction and electrical engineering skills of Dr. Peter and his staff.

On Friday, research teams from Clusters 4 and 5 met together to peer-review each other's presentations before the Research Expo on the last day.

The week culminated with the presentation of the research projects. Each team delivered their findings to an audience of family and friends. The Awards Ceremony followed with the presentation of the winners for the following categories: The Ethics in Science winners, the Gordon Center Best Project Award and the Dr. Joe Watson (former Vice Chancellor of Student Affairs, UC San Diego) Award for best team player (per cluster). At the end of our month here at COSMOS 2016, we realized that this program was one of the best experiences of our lives. We got to work with professors and made good friends and memories at the University of California at San Diego.







CLUSTER 6: BIODIESEL FROM RENEWABLE SOURCES

Our third Thursday began with cluster exploration lectures from the professors of Clusters 5, 7, 8, and 9. Each of these professors explained what their clusters have spent their time doing, what their students have been learning, and the final projects they will present in a little over a week. After that, we received a very unfortunate announcement: in light of somebody setting off a fire alarm last night and other disciplinary issues, the boundaries where students could go were massively restricted, reverting back to how they were on the first week of the program. On a brighter note, in Cluster 6 we had a bit of time to work on our final projects; my group managed to write a storyboard for our PowerPoint presentation and plan out most of the contents of our poster. After lunch we all went to York lab to work on our final projects. Many groups are close to finished collecting data, and ready to analyze their findings. After class every student returned to ERC by 4:30. Programming included swimming and having a brief discussion about consent.- **Matthew Alexander**

For our Friday Lecture, we learned about the ideas and instruments of Mass Spectrometry and Spectroscopy. It was an important thing to learn because we will be using these machines in college, if we decide to go into the field of chemistry. Learning about these machines give us head-start in the long-run. After our long lunch, we went to Chem research lab at York Hall where we continued to test our biodiesel. My group worked with the FTIR which helps identify compounds and determine compound concentration in the solution. We compared our biodiesels to other fuels, both with diluted biodiesel and regular diesel. These tests also help us with our experience in these instruments and experiments.—**Nikolas Aquino**

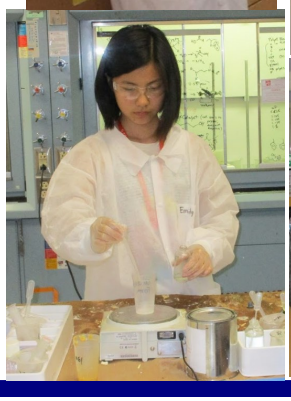
Starting the week off, we took the shuttle around 9 am Monday to the biofuel algae field station. There, we met Dr. Pomeroy, and he gave us a tour of the facilities. Dr. Pomeroy explained how field stations allow projects to run at a greater scale and in more realistic conditions than a laboratory. The greenhouses, ponds, and piping were all put together by UCSD students. Dr. Pomeroy emphasized the importance of interdisciplinary skills when conducting research, as everything from construction to computing is needed in the setup. The algae are cultivated in stages, starting from the greenhouse, and they are moved around once they achieve high enough population density. Back at NSB, we sat for our final Cluster 6 lecture, and after lunch we visited York Hall as usual to finish our biodiesel testing.- **Russell Tran**

Tuesday we went to our last discovery lecture of COSMOS. Dr. Tao taught us about how nanotechnology applies to everyday life. After lunch, we finally got to test our polyols to create soft foam. Our group decided to vary the amount of catalyst to assess the differences in the physical qualities. It was stressful in the beginning to make foam, since the procedure was very time sensitive. However, after several tries, we got used to the procedure and we were able to conduct it with efficiency and precision. Best news for everyone: Boundaries were lifted! Everyone cheered and our cluster celebrated with boba. Brian took a lot of artsy pictures around campus and we were being supportive by being his buddies. Overall, we had a great day, and we are all excited for the rest of the week, since we can finally explore around the campus! - **Saehui Hwang**

COSMOS is nearly coming to a close. Everyone is hard at work on their final project presentations and posters. We spent the whole day in the lab wrapping up experiments and working on presenting. Now we take what we have learned about renewable resources, organic chemistry, and economics and boiled it down to something we can communicate. Time flies and we have all learned so much. We have a deeper understanding of reaction mechanisms and data collection techniques. It seems like yesterday when we were struck in awe that we made biodiesel on the first day. Now, we have to savor the short sweet time we have with the people we've met and just enjoy these last three. **Tristan Yoo**

Time is flying. This is the last Thursday we have in COSMOS; we only have three days left. It goes without saying that everyone has spent so many unforgettable days here that we are loath to leave. In this morning, all of us went to the Natural Science Building by shuttle as usual. Since all the groups finished the experimental part of the final project, we began to focus on our presentation and poster in order to finish off today. Even though Room 2311 was filled with an atmosphere of both tenseness and sadness, we all enjoying the last a few hours to work with each other and trying our best to perfect our presentations. I am so glad that I chose Cluster 6 to meet with you all. I hope all of us will do a great job on Friday and Saturday so that our effort in COSMOS will culminate in a faultless stop. Looking forward to see you all again! **Julia Chen**

We've had a great four weeks in COSMOS Cluster 6. We'll be finishing up presentations on Friday and presenting to the Faculty. We look forward to presenting all the accomplishments of our work to families on Saturday. I've enjoyed working with all the members of Cluster 6 this year.—**Mr. T**

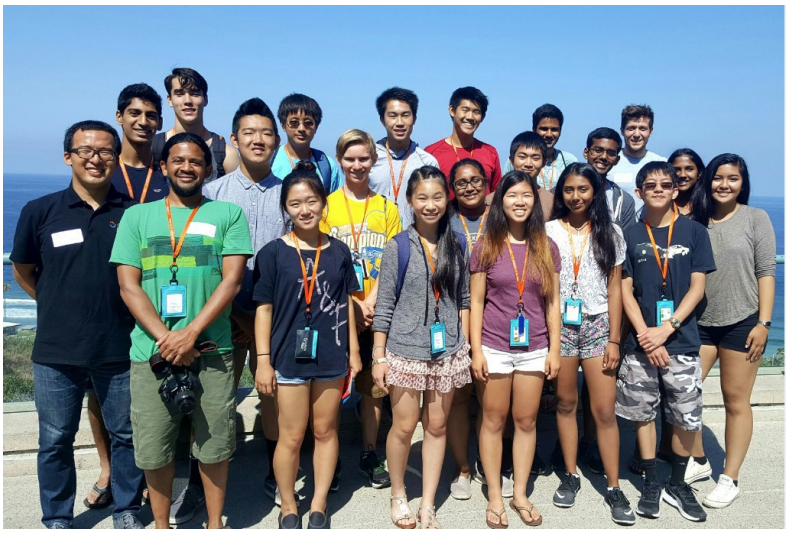


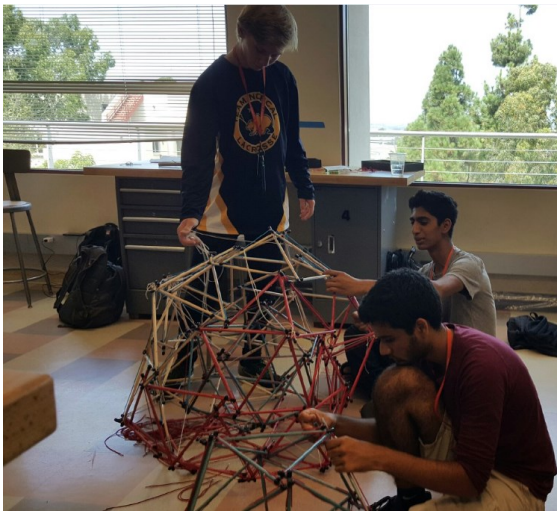
CLUSTER 7: BIOENGINEERING/MECHANICAL ENGINEERING: THE AMAZING RED BLOOD CELL

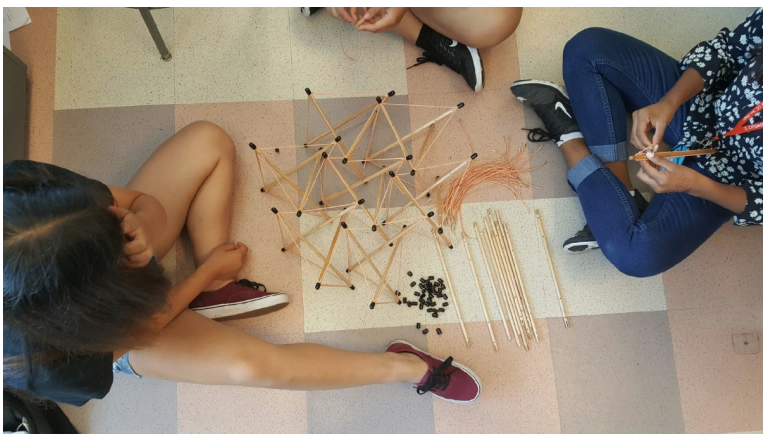
As we wind down our final week of COSMOS the sentiment is bitter-sweet. We have been working hard on our projects and are excited to share them with parents and family this Saturday! We are sad at the prospect of saying good-bye to the many friends that we've made this summer. We've all learned a lot and are certain you'll be amazed this weekend!!!

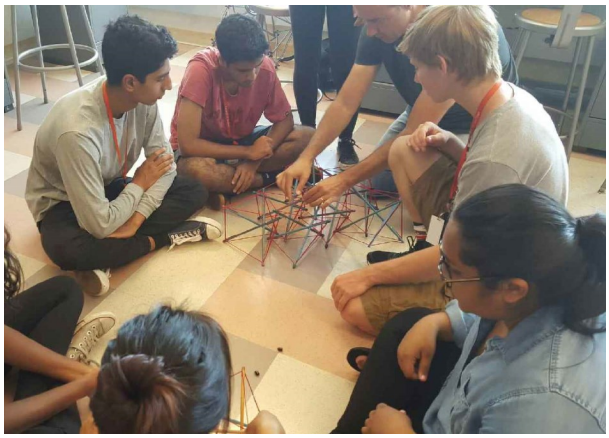
The end of last week found us learning about " tensegrity" to model physical and biological systems. On, Monday, Paul gave a fascinating talk on Duct Climbing Tetrahedral Tensegrity robots (DUCTT) and advancements in robotics using non-linear dynamics modeled from nature. He discussed his work with NASA building the braking systems for the Superball and shared his academic journey as an undergraduate at UCSD as well as career advice for those interested in research. In lab, students used short python scripts to control motors remotely and learned the essentials of PLM (pulse-width modulation) and "open loop controls." Students were able to modulate the voltage output of the motors and graph the relationships in Python. These skills are essential for understanding how to control machines with small scripts.

Tuesdays Discovery Lecture: Through the Nanoscale Looking Glass by Andrea Tao gave us insight into the dynamics of the nano-world. From the bio-physics of geko hands to designing nano-structures that emit varying frequencies of light due to surface plasmon resonance…the talk had something interesting for everyone. Wednesday found us and working on our Final Project Presentation and building models in class. We did some peer critiques of our presentations to refine our proposals. Today we're off to Birch Aquarium for some well deserved R&R before our final presentations tomorrow! Wish us luck and we'll see you Saturday!!









CLUSTER 8: TISSUE ENGINEERING AND REGENERATIVE MEDICINE

At the end of last week we took a well-deserved break and visited Do Ho Suh's *Fallen Star* which is part of UCSD's Stuart Collection. It is a house perched at an angle off the edge of the main Jacobs School of Engineering building. It shows Suh's perception of society and our surroundings. Inside the house we all appeared out of proportion and outside we delighted in spending time to enjoy the garden.

Week 4 began and ended with an enormous amount of exciting and challenging work. It was overwhelming to us just how much planning and preparing was necessary to complete our projects and how much thinking was required to problem solve and analyze our data. As the week progressed all of the data was collected as our projects were completed, posters were created, power points put together, and our research paper ultimately finalized.

Each group worked with a professor and TA in order to complete their projects. With the expert guidance of Dr. Sah and Erica; Arjun, Pio and Nandini studied the effects of cartilage matrix on the compaction of collagen hydrogels and Austin, Aly and Michael investigated the effects of compaction on the properties of cell-seeded collagen hydrogels. Dr. Sah also worked with Rebecca to guide Matthews', Bhavanas' and Jessicas' research into the effects of hyluronan and cartilage particles in cartilage tissue engineering. Under the skilled leadership of Dr. Gaetani and Rebecca; Brando, Danielle and Winifred studied hydrogel compaction as a mechanism to mimic mechanical properties of cardiac tissue. Dr. Gaetani also worked with Neha to lead; Emilys', Sanjeets' and Alinas' research into the effects of varying Me-HA gel stiffness on cardiac progenitor cell phenotype and Ikrans', Joys' and Dylans' investigation into the effect of cardiac extracellular matrix hydrogel on cardiac spheroid formation and phenotype.

In our last Discovery Lecture, Dr. Andrea Tao spoke about nanoparticle assembly from the basics to applications in nature. Our cluster thought that her presentation was, "highly informative, interesting and relatable…definitely the best speaker this summer".

The end of this week will bring COSMOS to a close. The students have become proficient in their lab skills, refined their technical writing, and developed and implemented their leading edge projects. They presented their work within cluster on Thursday, to Cluster 7 on Friday, and are eagerly anticipating their final poster presentations to their families and friends on Saturday. A titanic thank you to our brilliant leaders, Dr.Sah and Dr. Gaetani, and our extraordinary Teaching Assistant's Erica Cacasan, Rebecca Drake, and Neha Srikumar for all of their leadership and guidance this summer. **Cluster 8 has had a Gr8 summer at COSMOS!**

What I will always remember about COSMOS 2016 is…

- the people I met. **Arjun Singh**
- friends. It is really fun to do something you like and then having your friends with you. It is amazing to see everyone working towards a common goal. It is really fulfilling. **Pio Blanco**
- one of the best experiences I have ever had, both academically and environmentally, and I will never forget all of the people. **Nandini Rajgopal**
- the skit about Sanjeet and Brando. I like how close we are as a cluster and being in the lab and failing and coming back up together. A shout out to my roommates Brian and Nick. **Austin Hwang**
- struggling with the ethics essay and how much fun COSMOlympics was. **Aly Ung**
- Ethanol. **Matthew Wang**
- the new knowledge I learned in the lab and that I can always get help from my mentors, Dr. Sah, Erica, Rebecca, Neha and Mrs. Fowler. A shout out to my roommate Araceli. **Bhavana Kunisetty**
- the people here and just having everyone be interested in the same thing as you. **Jessica Yang**
- Patty Fowler in all her glory! **Michael DaRodda**
- our bonfire night when the entire cluster went to the beach and we all enjoyed the sunset. **Brando Sipin**
- was when we immediately bonded in front of the bear and we made our own sign for our cluster! **Danielle Rodriguez**
- just hanging out with my cluster during every programing event and our GR8 skit. **Winifred Chung**
- how our cluster gets so genuinely excited about the nerdiest things, like free collagen. **Emily Pham**
- the relationships I made with everyone around me. It was nice to meet such a diverse group of individuals who had the same intent and goal when it came to COSMOS. **Sanjeet Paluru**
- all the friendships I have made here that I am hoping will last for a long time. **Alina Luk**
- when I first made my COSMOS babies (cells). **Ikran Ibrahim**
- the first live assay when I saw those big green jiggily spheroids and they were so cute! **Joy Jung**
- all of the lab experiences and all the people I met, and Ms. Patty telling me not to touch my face with gloves on. **Dylan Tan**

CLUSTER 9: MUSIC AND TECHNOLOGY

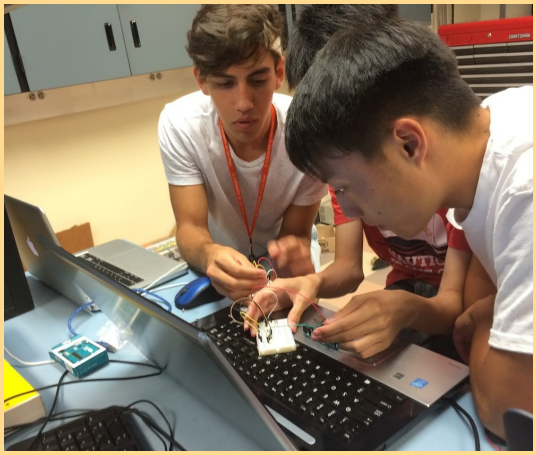
Our time at COSMOS has been leading up to this final week and our final projects. We have been working on our projects since week 3, and the experiences of most groups has been a rollercoaster of successes and subsequent issues regarding those successes. Most groups have had to utilize every member's ingenuity and problem solving ability to their fullest extents in order to deliver a functional product at the end of this week. The process has been strenuous, but with the help of our professors, teachers and assistants, we have undoubtedly grown in our ability to troubleshoot, work as a team, and solve problems wherever they arise. We are all proud of the work that we have done, even if the result of our projects wasn't what we had originally expected. The point of our projects was not to create a new invention to sell on Amazon but rather to display what we have learned in the short span of these four weeks. If in the end our project is much simpler than we had hoped, it is still more than what we had with us on July 10th.

Similarly, I can see that our cluster has grown in the "residential life" aspect as well. At this point in COSMOS, the nervous, guarded trepidation many entered the program with is nowhere to be found. There's something unique about the way you form relationships when you live and work with a group in such a close environment. The amount of time spent bonding with suite-mates is entertaining and enjoyable, whether it be at dinner, during suite time, or programming. Inside jokes are made nearly every day, tying us all together into a huge family. It's never a dull moment with our suitemates! Being able to experience residential life first-hand takes away a lot of the anxiety around living in a college-like setting in the future.

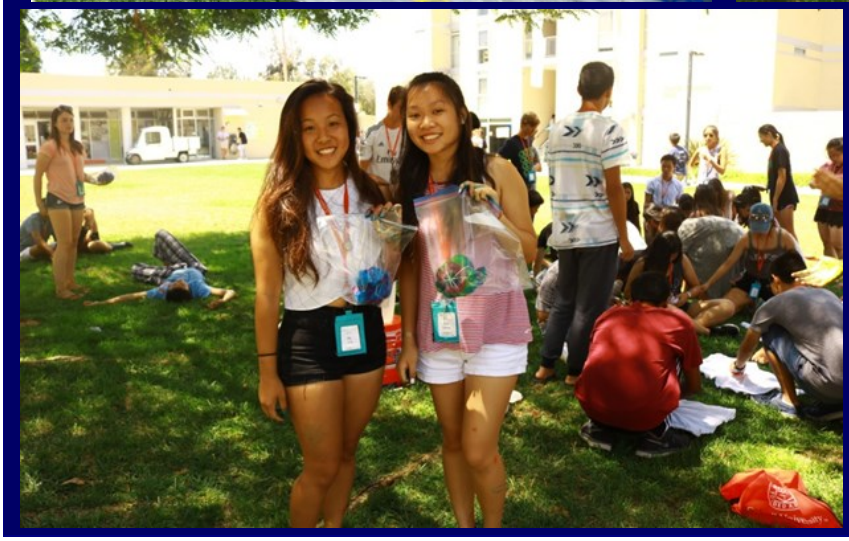
Continuing the theme of preparation for college, we have learned much about the college experience as a whole. These aren't necessarily things that can be taught in a classroom setting, so we are incredibly grateful that we had the opportunity to understand them now, as opposed to learning them in freshman year of college. These skills are things like; understanding how to manage time, making sure we arrive to the right place on campus each morning, stashing a banana from breakfast in our backpacks because we know that we need a snack to avoid falling asleep around ten o'clock. Also, learning how to have a balanced and nutritious diet has proved beneficial, especially since there is a vast selection of junk foods to choose from in an endless buffet for breakfast, lunch, and dinner.

Of course, COSMOS is (unfortunately) drawing to a close. As stereotypical as it sounds, time does fly. There was so much going on over the past month, so many new experiences and concepts, that at some points it almost feels like our brains don't have enough RAM to process all of our experiences while they occurred. Looking back, however, we can all identify the differences between the kids that showed up on this campus four weeks ago, and the young-adults that will step out of it this saturday. We may not know where we will be going to college, what we will be majoring in, or really much of anything else about the future beyond the next six months. But we can unironically say that, due in large part to this program, we are prepared for whatever comes next.

Thinking about the final days of COSMOS makes us sad. Our cluster has grown a lot together since the very first day where we didn't speak at all; to now where we can't even stand being apart! We hope to see some of our very close COSMOS friends in college (maybe even UCSD).Though our time at COSMOS is coming to a close, we look forward to keeping in touch with the friends we have made and continuing to strive to learn more about what interests us. We appreciate the lessons we learned here and are excited to experience college in the future where we will continue to pursue all of our interests!



At the CARNIVAL



DANCE

TALENT SHOW

CONGRATULATIONS!!!

….To Ethics Essay Awardees

1st Place—Brian Nguyen (Cluster 6)

Nuclear Power: Energy of the Future

2nd Place—Zhixue Wang (Cluster 2)

The Duty of an Engineer: Weighing Progress Against Safety

3rd Place—Shifali Kerudi (Cluster 3)

The Sustainability of the Animal Agribusiness Industry

…. and Gordon Engineering Leadership Center High School Fellows.

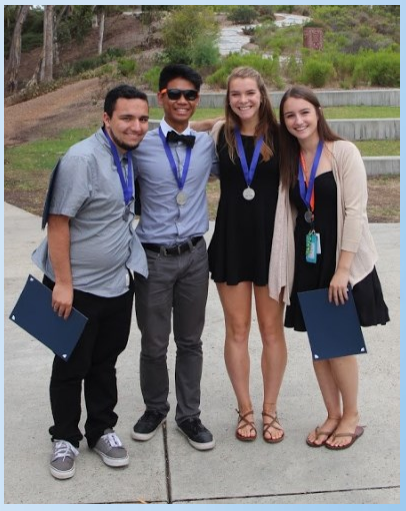
Cluster 1

Cluster 2

Cluster 3

Cluster 4

Cluster 5



Cluster 6

Cluster 7

Cluster 8

Cluster 9

….And Dr. Joseph Watson Awardees

COSMOS 2016


CLUSTER 1


CLUSTER 2


CLUSTER 3


CLUSTER 4


CLUSTER 5

CLOSING CEREMONY