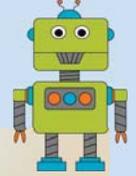
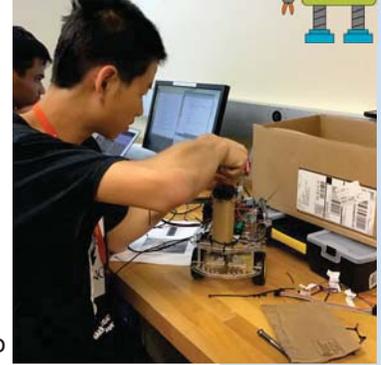


# CLUSTER 10: ROBOT INVENTORS



Cluster 10 is facing their first challenge - the battle of the bots!

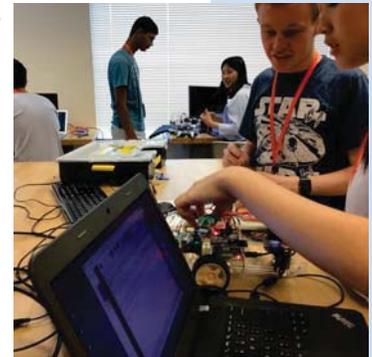
**Day 1:** Today students met the faculty in charge of their cluster and learned about this history of robotics and had an introduction (from our amazing faculty Curt Schurgers; Nick Gravish is out of town this week, so they will meet him next week) to python and raspberry pi. With this knowledge in hand, in the afternoon students began building their first robot of the cluster, which involved assembling a laser cut chassis, wiring and programming their raspberry pi, and wiring their wheel motors.



**Day 2:** Students began today with their first Discovery Lecture, which was all about nanotechnology and using plant viruses to trick the immune system into taking action. Students were then introduced to the concept of finite state machines, and challenged to use this idea in their robot designs later in the afternoon.

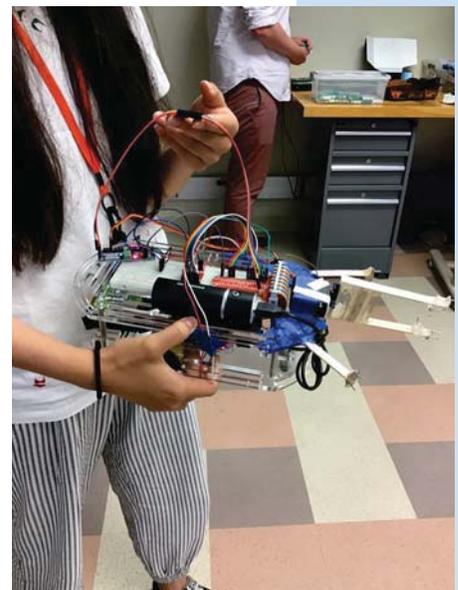
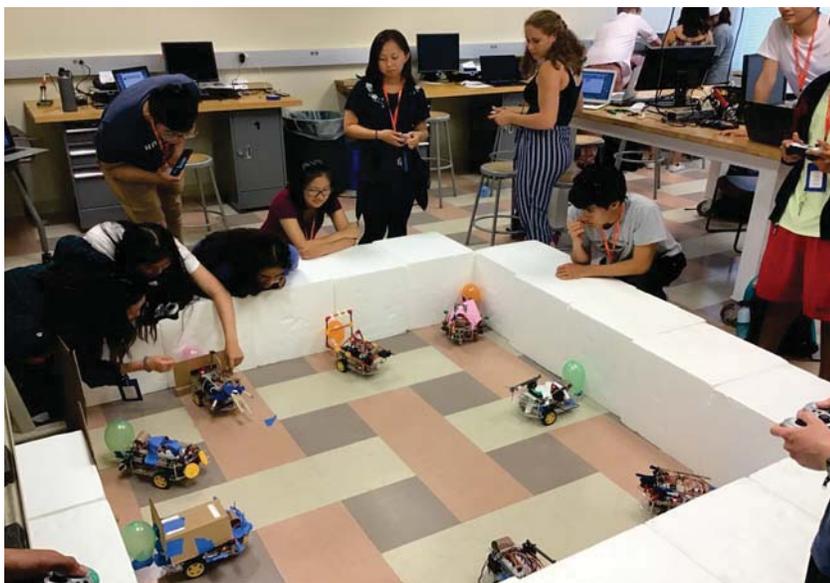


**Day 3:** Today began with an introduction to the ethics essay that students will be writing as part of their science communication course. Students were introduced to some ethical dilemmas in robotics and read some literature around those topics. They will choose one area of robotics and investigate its ethical dilemmas. Students then got introduced to picobot, a finite state machine practice tool, which proved an excellent challenge! This afternoon students continued building, designing, and testing their battle robots!



**Day 4:** Battle day! This morning students learned how to use the university's library to its fullest extent, gathering resources for their essays and learning how to cite sources. Students then prepped for their final robot battle in the afternoon. Check next week's newsletter for winners! Finally, students continued to develop their ethics essay drafts, and prepared for COSMOS olympics on Friday.

**Day 5:** Today students face a new challenge - they will navigate a maze autonomously using cameras attached to their robots to interpret the colors. This morning they will be introduced to a whole new level of challenge as they learn about how computers interpret images. This competition will take place at the end of Week 2!



# CLUSTER 10: ROBOT INVENTORS



Day 6: The students met professor Nick Gravish this week, and the cluster is now in new teams for a new challenge - navigating a maze using a camera operated through a raspberry pi. Nick introduced design to the students and they got to try out CAD to prepare for next week's competition.

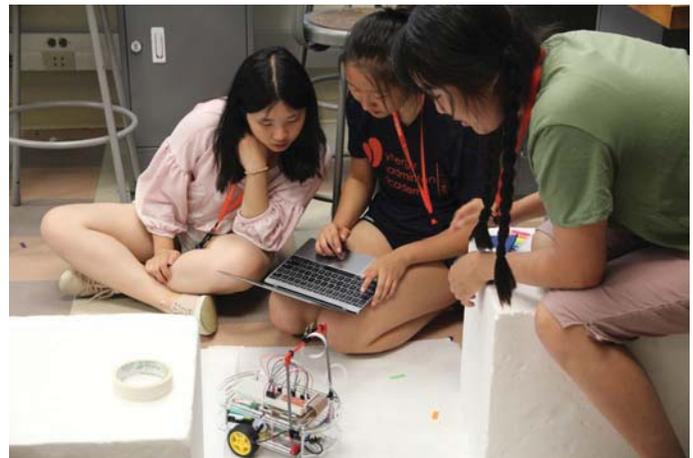
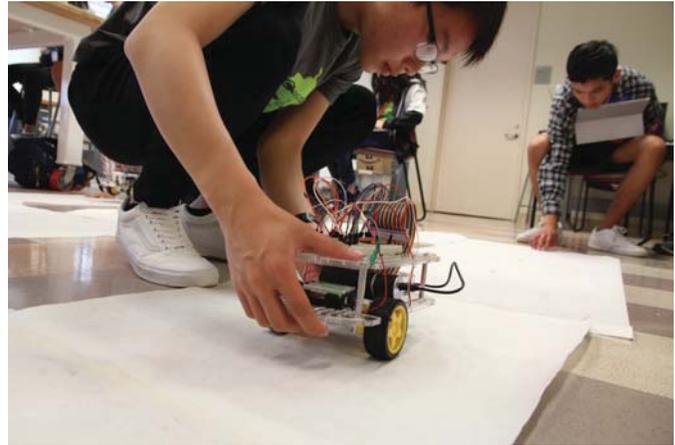
Day 7: Students began the day with the second discovery lecture, this time by Dr. Rob Knight who works with an incredible mix of human genetics and computational power to create giant datasets to help us understand how our microbiota affect our world. Students then worked on their ethics essays before moving to the lab for the afternoon to continue programming their maze navigation.

Day 8: Today began with Curt teaching the students about electronics and how different electronic components work. He also introduced different types of sensors and how they work so students can prepare for their final projects. After working on their ethics essay drafts once more, we moved back to the lab to continue the maze navigation challenge!

Day 9: Cluster exploration sessions started our day, so students got to learn about what many of the other clusters are doing and a bit of the science behind them. We went to the lab to show students their final maze and allow for code adjustments for battle Friday morning. This afternoon we had a field trip to General Atomics (no photos allowed inside unfortunately!), touring their drone facility as well as meeting with employees to find out about how they got into engineering and related fields.

Day 10: Competition Day! Today began with students navigating the maze autonomously using their robot's visual systems. They also learned more CAD today to prepare for their walking robot challenge for next week, and were also introduced to their final project constraints so they can begin to prepare!

Congratulations to our Week 1 competition winners: Naama and Stefan!



# CLUSTER 10: ROBOT INVENTORS

**Day 11:** Walking robots are the theme of the week, and we began with a lecture from professor Nick Gravish on walking robots, PID, and the math behind controlling robots. We then had a guest lecture from Dr. Tania Morimoto on flexible robots for surgical applications. The students had a chance to check out some haptic feedback devices and learn how growing robots and continuum robots work. In the afternoon walking robot design continued with an introduction to laser cutting, and more design work.

**Day 12:** Our discovery lecture this morning was by Dr. V. Ram Ramanathan, a world renowned climate scientist from Scripps Institution of Oceanography, who spoke to the students about the reality of climate change and what can be done now to curb the effects. Students then made their project pitches for their final week projects, and did some refining with the help of the professors and staff. This afternoon saw students working on their walking robots once again, getting ready for Thursday's competition - whose robot can walk a distance of ten feet the fastest?

**Day 13:** We had two excellent guest speakers this morning, both students who are currently in a PhD program here at UCSD and work on soft robotics - Paul Glick is working in the area of robots in extreme environments, and Emily Lathrop is working on robots moving over challenging terrain. Both shared their stories from high school to graduate school as well. We then transitioned to the lab for the remainder of the day so students could work on their walking robots!

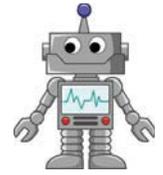
**Day 14:** Cluster Exploration Sessions finished up this morning with the remaining clusters. We then moved to Science Communication, where students chose final project titles and began working on their digital portfolios and final project posters. After lunch we headed back to lab and had our walking robot competition! Congratulations to winners Stefan and Valentina!

**Day 15:** Today will be work on final projects all day in the lab!

Congratulations to our Week 2 competition winners: Stefan and Sonali!



# CLUSTER 10: ROBOT INVENTORS



We have made it to the final week of COSMOS, and students are taking on their greatest challenges: custom robots!

**Day 16:** Our final week in COSMOS kicked off in the lab with individual robot designs. Today was completely focused on working in the lab and getting ready for Friday's cluster showcase.

**Day 17:** Today's discovery lecture was all about China's Great Firewall, presented by Dr. Margaret Roberts. She talked about the challenges of censorship in China and how people are getting around it. We then worked on the students' final posters for their projects (ask them to show you their posters!). We then transitioned to the lab for the remainder of the day for everyone to work on their final projects!

**Day 18:** We began with a panel of undergraduate students sharing their college experiences and high school choices with the cluster. The students were able to ask many questions and hear about college life and college choices. We then spent the rest of the day in the lab preparing final robots!

**Day 19:** Today was the last day to work on robots in the lab, and it was exciting to watch ideas come together and robots to work!

**Day 20:** Our final day in COSMOS! We had the opportunity to see Cluster 1 and Cluster 11 in action this morning, then we got to present our final projects to both clusters in the afternoon. This was a chance to see if everything is working before families arrive on Saturday morning!

We have had a fantastic time getting to see your student's creativity, drive, and capability to learn new things! We are always excited to see what students are capable of when given support at a university level, and we hope they let us know what they accomplish in the remainder of high school and beyond!

