Cluster 10 is off and running this week with a set of programming and design challenges. Students have been tasked with using a "scribbler" robot to design an image on a piece of paper. The robot has a pen in the center, and using their coding skills (students are learning Python), they must guide their robot to a creative picture design. The drawings were fantastic, and students presented challenges they faced in the design and implementation process.

Once students were comfortable programming their scribblers, they were introduced to image processing, and are currently working on programming optical systems to guide their scribbler through a maze. The shape of the final maze will be created on their competition day, so their scribbler must be able to navigate an unknown path. Alternatively, students can take on the challenge of showing their robot a single image, and letting it self-navigate through a maze based on that image. The fastest robot wins!

In the mornings, students have spent time learning from their amazing professors, Dr. Schurgers and Dr. Yip, about programming in Python, image processing, the history of robotics, and how to use SolidWorks to design their own 3-D printed parts. Additionally, students are learning from their teacher fellow, Johnnie Lyman, about ethical challenges in robotics and how to communicate information effectively with a broad audience. Students have gathered and presented data on one another, created a quick pitch for a novel robot design, and are writing for an essay contest on ethics in science in engineering around the topic of robotics. Overall, they are working hard and meeting the challenges!
Cluster 10 has jumped into the world of robotic design this week. While last week students focused on programming pre-made robots, this week they have been tasked with designing their own. The task: design a car (with an onboard arduino) that can compete against others in a MarioKart-style melee. Cars will have a balloon attached to the back which they must protect, and toothpicks attached to their vehicle with which to pop the other cars' balloons. The car with the last balloon to be popped wins! Students will use cell phones with a steering app to control their vehicles. This challenge incorporates programming arduinos, using SolidWorks to design parts for laser cutting, 3D design thinking, and strategy.

Students have also learned a variety of new techniques this week, with guest lectures from several roboticists. These topics include weather balloon design for analysis of hurricanes, toy design for robots based on an inverted pendulum, and automation of robots, including the development of sensors, localization and mapping tools. Students have also had faculty lectures on the principles of finite state machines (using the online tool Picobot), a review of general electronics, and an introduction to arduinos.

Finally, students have completed an essay on ethical challenges faced by the field of robotics. The students addressed many complex issues, including robotic surgery, military drones, and potential job loss as a result of increased use of robotics. Final selections will be made this week to determine whose essays will go on to the final competition for best ethics essay. Stay tuned for potential winners!
This past week has been very exciting in Cluster 10! We finished last week with our first field trip, to company called 5D Robotics. The students saw robots in action, including a tracking robot, drones, and a self-driving golf cart (which they got to ride on!). Students got to speak to experts in robotics from the company and ask many questions about how these robots were developed.

Week 3 kicked off with a fierce competition between robots. The students designed "Mario Kart" inspired robots, with balloons attached to back. Programming an arduino, students had to design and build a car that could defend itself from attack while trying to pop balloons on other vehicles. We had three rounds of competition: last robot to have its balloon popped, largest number of balloons popped (the TAs participated in this one as well!), and a capture the flag team competition. Both strategy and design were in play, as well as driving technique (using an app on a cell phone).

The week continued with a new design challenge - build a walking robot! The robot may not roll, but must instead take individual steps. This challenge will push their physics understanding, as well as continuing to expose them to new techniques using servos (they are only allowed standard servos this week; no continuous motion!). We will end this week with a competition between walking robots - who can cover distance the fastest! This week students also developed project proposals for their final robots, and had them reviewed by faculty for feasibility. Next week they will finalize designs and build their own robots!

Students also had the opportunity to tour UCSD's robotics and visualization facilities at Calit2 and the labs of both Dr. Schurgers and Dr. Yip. They heard from both professors and graduate students about their work. We also had guest speaker in the fields of robotic use in oceanography, engineering industry (the world's largest plane and the James Webb Space Telescope), and the field of soft robotics. Finally, this week we also have a field trip to General Atomics. Students will tour one of the largest developers of drones, surveillance equipment, and radar technology. Look for updates next week!
Cluster 10 has had an amazing final week here at COSMOS! Students are all working in pairs to create their own robot. These are designed fully by the students, and they will demonstrate them on Saturday for the families to see. Robots range widely in what they can do and how they are programmed. We cannot wait for you to see them in person!

Our field trip to General Atomics last week was fantastic. Students toured their facilities in Poway (the company's headquarters), and they also spoke with engineers, designers, and managers there as part of a career panel. Students had the chance to ask many questions and see different systems and parts designed at General Atomics.

Last week wrapped up with a battle of the walking robots, with the fastest robot being the winner. Many different styles of robots were created and everyone achieved at least some walking motion! Students also finalized their robot designs for this week and have begun programming and development.

Overall, this has been a fantastic cluster - the students have worked very hard, challenged themselves, developed teamwork, and designed and programmed several robots! Curt, Mike, and Johnnie (along with the TAs) are very proud of the work the students have done, and of the skills they have developed. As the first ever UCSD COSMOS Cluster 10, thank you!