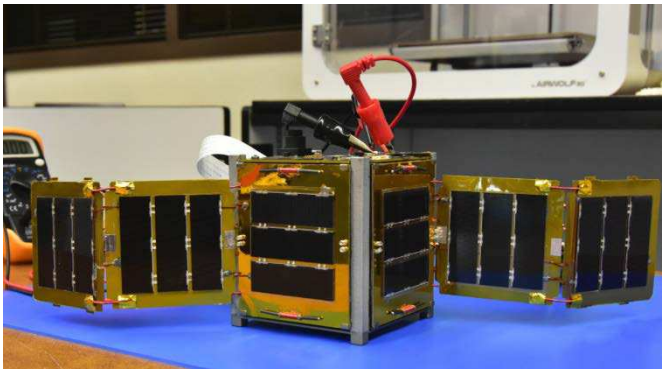
IRVINE CUBESAT STEM PROGRAM UPDATE - Winter 2017

Over 150 Students, eight teachers, two co-founders, and corporate mentors currently make up the Irvine CubeSat STEM Program (ICSP). Supported by Irvine and Tustin Unified School Districts and powered by Irvine Pubic Schools Foundation, this Career Technical Education (CTE) program is preparing students for careers in engineering, aerospace, and beyond. While IRVINE01 awaits launch, the student teams from the six high schools in Irvine are working towards completing IRVINE02, and in the design and planning phase for IRVINE03 and IRVINE04. Below are updates from each mission.

IRVINE01

On July 26, 2017, IRVINE01 was delivered to Irvine launch integrator, Tyvak Nano-Satellite Systems. Students successfully conducted final testing and integrated the CubeSat into the P-Pod in preparation for launch. Due to unforeseen repairs needed to the Indian Space Research Organization launch vehicle, the launch has been delayed until 2018. Students continue to make periodic trips to Tyvak to ensure the battery is fully charged and prepared for delivery to India.



IRVINE02

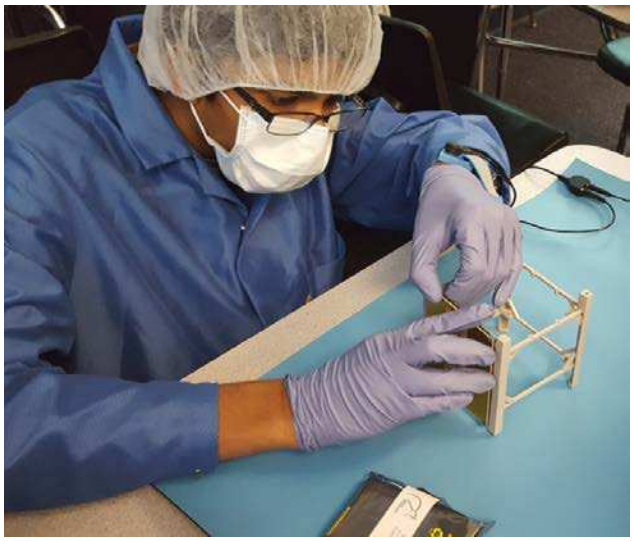
IRVINE02 is reaching completion, and was one of 34 small satellites nationwide selected to participate in NASA's CubeSat Launch Initiative and fly on their 2018 mission. Irvine CubeSat is one of only two high schools chosen by NASA to participate in this prestigious program, alongside renowned universities and research centers.

Irvine02 is designed to teach optical communications, transferring data at a faster rate than radio from orbit to Irvine. Irvine CubeSat is currently collaborating with Irvine Valley College to procure and install a new set of electronics for their large satellite dish atop the IVC library. If successful, the dish will be able to receive the beacon from 01 and 02, leading to full command and control of 03 and later CubeSats, providing students with additional opportunities to be involved in every aspect of the mission.

An optics bench is being setup at IVC ATEP test site to attempt short-range transit tests of the optical communication system emitter on IRVINE02, as well as the optical receiver destined to be installed at the IVC main campus next year. These are the actual parts going into space and into the local ground

station, which, once properly operating, can download more data than our radio. Having this equipment at IVC rather than Cal Poly will allow students the opportunity to be more interactive with this portion of the mission.

Team Power will be conducting a DSA deployment test in early December with supervision being provided by Cosmonaut, Ronnie Nader, via skype from the Ecuadorian Space Agency.



Team Communication and **Team Avionics** conducted a radio transmit test in early December. All ground test antennas were tested to ensure that no stray hardware cause damage to the UHF card. They are also conducting an LED and GPS tests.

Team Prime and **Team Propulsion** are continuing preparation of parts for IRVINE02. They completed the frame machining, wiring, and are delivering to **TEAM Power** in late-December. At this meetup, students will start mounting the side walls on the frame, and IRVINE02 will begin to take shape.

Team Avionics is in the final design stages for the C-card. Its Printed Circuit Board is the final board needed for IRVINE02 and will be ordered soon. Students and parent mentors spent extra time double checking every circuit as this is the last C-card ICSP will make. Students on Team Avionics have also been working on cable assembly for IRVINE02.

IRVINE03

The primary science instrument for IRVINE03 will be an X-Ray CZT 64-Pixel Sensor. The sensor will point with precision at the Crab Nebula Pulsar which is over 6,523 light years away from Earth. Teams are currently collecting estimates for the main instrument and parts of the next propulsion module, and forming the beginning of a bill of materials for next fiscal year. Plan scheduled to be completed by February 2018.

A design review is a required milestone for each CubeSat. The IRVINE03 design review took place in October 2017 with three highly respected judges, specifically selected for their expertise in their

field. Students are now gathering their responses to the judges' Request for Action list; 14 enumerated items that are important to fix for IRVINE03 to maximize its chance for success.

In mid-November 2017, **Team Prime** submitted the ELaNa proposal for IRVINE03 to fly on a NASA sponsored launch. They will announce grant selectees in February 2018. Irvine CubeSat STEM Program is working towards IRVINE03 launch, targeted for the second half of 2019, but will be determined based on the outcome of this proposal.

IRVINE04

Team Bio Tech is learning how to grow and review their analysis of bacteria in preparation of IRVINE04 launch in 2020. They are currently reviewing an unidentified Sulfurovum bacteria that dominates the sample they have been growing and testing. This could be the candidate microbe for IRVINE04. Additional bacteria samples are being supplied by CSULB and will be delivered, so that students can continue their research.

CUBESAT PARTNERS

With IPSF's program support of STEM in all grades through Afterschool Classroom Enrichment (ACE), Summer Enrichment Academy (SEA), and Innovative Grant Program, as well as providing funding for the IUSD Science Fair, Ask a Scientist Night, and 21st Century Middle School Career Conference, CubeSat has been the logical next step in the progression in IPSF's support of STEM education. We are proud to power the Irvine CubeSat STEM Program in partnership with IUSD, teachers, and corporate partners. The program is a true collaboration, and an inspiring example of what can be accomplished when communities come together in support of public education.

Irvine CubeSat Program is funded by Irvine Public Schools Foundation, thanks to sponsorships and donations from our sponsors.