

WINTER 24 NEWSLETTER



Colossus is Back!

On November 18th, 2023 the Colossus team successfully performed the first hotfire of Colossus since its renovation, following an engine failure in 2019. Since its last test for USC LPL, Colossus had been out of commission, and the team had been hard at work bringing it back to life, while also upgrading the stand to be compatible with our dual-cryo engine Nephias. The renovations on the stand were verified with a hotfire of the legacy Ignus 2 engine.

Since this test, the system has already undergone a cold flow in January using LNG to test the cryogenic upgrades to the fuel side. The team was able to verify their new turbine flowmeters, which will be critical to throttling Nephias in the upcoming quarters. The team also integrated a fire suppression system to limit the damage to the stand in case of another engine failure.

The next static fire of Colossus is planned for the first week of Spring quarter.



Future of Colossus

Colossus team will be actively testing all of next quarter, starting with the Battleship hot-fire of Nephias, where the new injector design will be validated on a machined chamber. After this fire, Colossus is lined up for multiple trips to the Mojave desert to test Nephias with its flight chamber. The team is also aiming for an actively throttled fire of the engine to compete in the Collegiate Propulsive Lander Challenge (CPLC) competition. While the Colossus team remains busy, UCSD's Rocket Propulsion Lab (RPL) is also hoping to use the stand for a cold flow of their new engine.



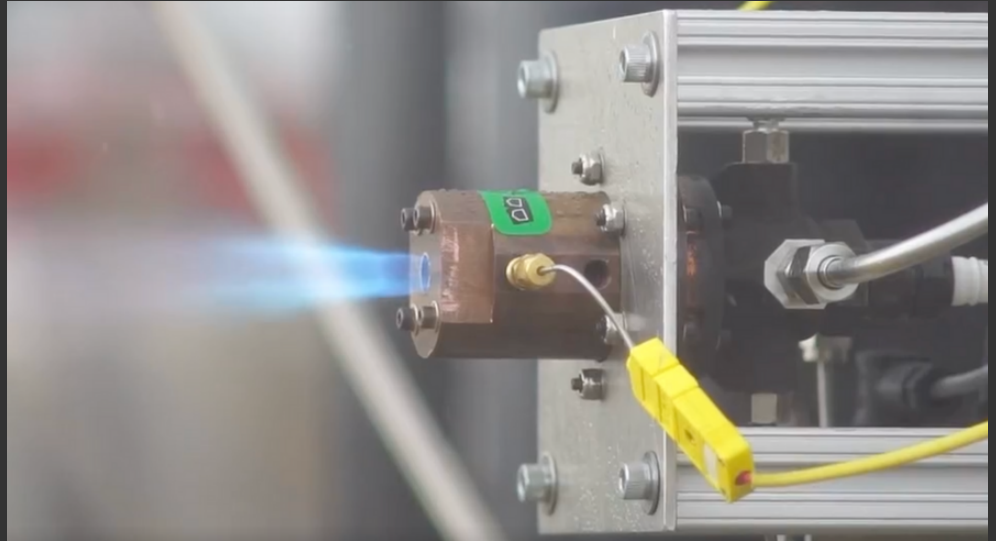
PROJECT UPDATES

NEPHAS

Our propulsion team has completed the design of our newest engine Nephias (Block 0). Nephias is a 2000 lbf throttleable and reusable LOX/LNG engine with a coaxial swirl injector and a regeneratively cooled chamber printed out of GRCop-42. It will power both of our new vehicles Halya and Riptide.

The first tests of the engine will be conducted using a battleship heat-sink chamber, which was designed and machined over the last summer. This chamber will allow us to verify the injector design without putting a printed chamber at risk. The coaxial swirl injector itself is currently in manufacturing, and will be ready for a hotfire next quarter.

The propulsion team has also been testing the plasma-assisted torch igniter, designed to reignite Nephias during flight. A total of four igniter tests have been performed, and the team has achieved supersonic flow conditions.



(Above) The plasma assisted torch igniter, designed and tested by our propulsion team

COLOSSUS

Colossus team is looking forward to testing Nephias throughout next quarter at both Friends of Amateur Rocketry and at the MTA site managed by Reaction Research Society. The first hot-fire for Colossus after Ignus 2 will be the battleship test using Nephias' machined copper chamber and inconel injector.

RIPTIDE

Our Rocket Lander Testbed (RLT) team has been working on the development of a next-generation self-landing rocket, Riptide to compete in the Lander Challenge (CPLC). The team has already wrapped up design, and is now testing their control algorithm on a scaled prototype called Lander Jr.



(Above) Halya's common bulkhead fuel and oxidizer tanks

HALYA

Designed to compete in the FAR-MARS competition, Halya ("Hesh-lah") is a supersonic high altitude rocket which uses Liquid Natural Gas and Liquid Oxygen as its propellants. Featuring a common bulkhead tank design and a carbon-fiber outer shell, the rocket will experience loads up to 8Gs during its flight to 30,000 feet. The team has spent the last quarter assembling and testing the most critical components, including the ground support equipment and the parachute deployment system. Now the team is preparing for a cold flow at the beginning of next quarter, followed by a static fire at the Friends of Amateur Rocketry site in the Mojave desert.

EVENTS

SpaceVision 2023

After a four year break, SEDS UCSD members attended the annual SEDS USA conference in Washington D.C. and came back with three awards!

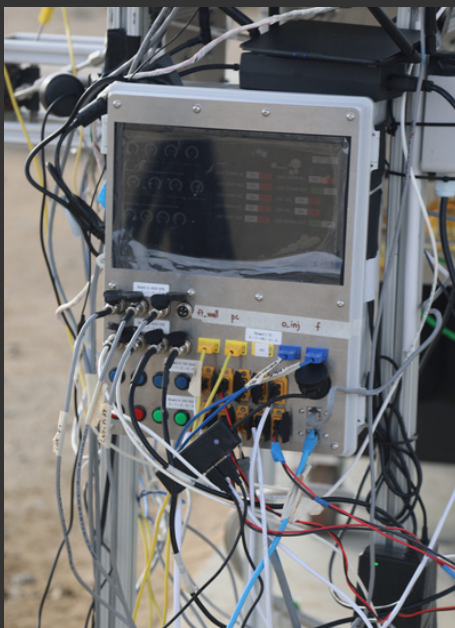
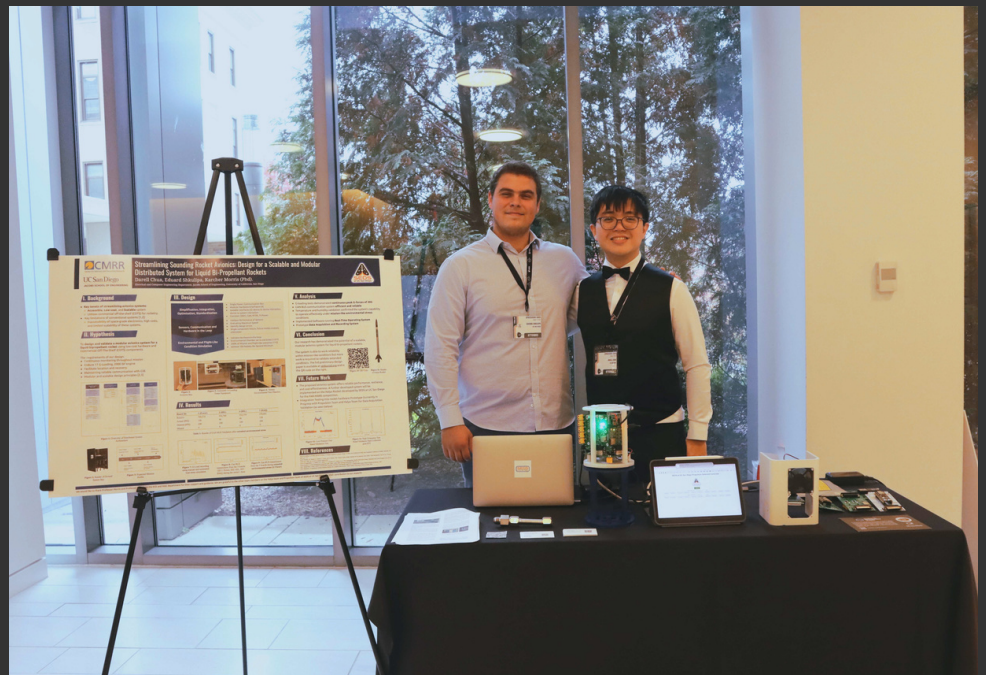
This year, the conference was hosted in American University, in the same city where the first SEDS USA conference was held, to celebrate the 20th anniversary of SpaceVision. Our chapter participated in the research symposium, as well as attending presentations by various aerospace industry leaders. Our members also had the opportunity to take a private guided tour of the Smithsonian Museum as part of the conference.

Members of SEDS UCSD presented two research papers in the research symposium, "Development of a LOX/LCH4 Augmented Spark Igniter" by Antoni Ostrowski and "Streamlining Sounding Rocket Avionics: Design for a Scalable and Modular Distributed System" by Darell Chua and Eduard Shkulipa. The latter group won the second place award for their research.

At the Closing Gala, we were presented with the Interdisciplinary Chapter Award for boasting a diverse group of students across 19 majors and 12 minors, including members studying Physics, History, and Business Economics. Our president was also presented with the Todd B. Hawley award for leadership, an award named after one of the three founders of SEDS USA.

Student Space Congress Winner

Our members Darell Chua and Ethan Foss also represented us at NewSpace Chicago's Student Space Congress. Chua won the first place prize for his presentation on the scalable electronics module, which will be used on Halya.



SE San Diego Science and Art Expo

Last quarter, our outreach team attended the Southeast San Diego Science and Art Expo along with Dr. Kramer's research group from the MAE Department at the Malcolm X Branch Library. SEDS at UCSD members had the opportunity to engage with our local community, and inspire K-12 youth to pursue STEM and rocketry.



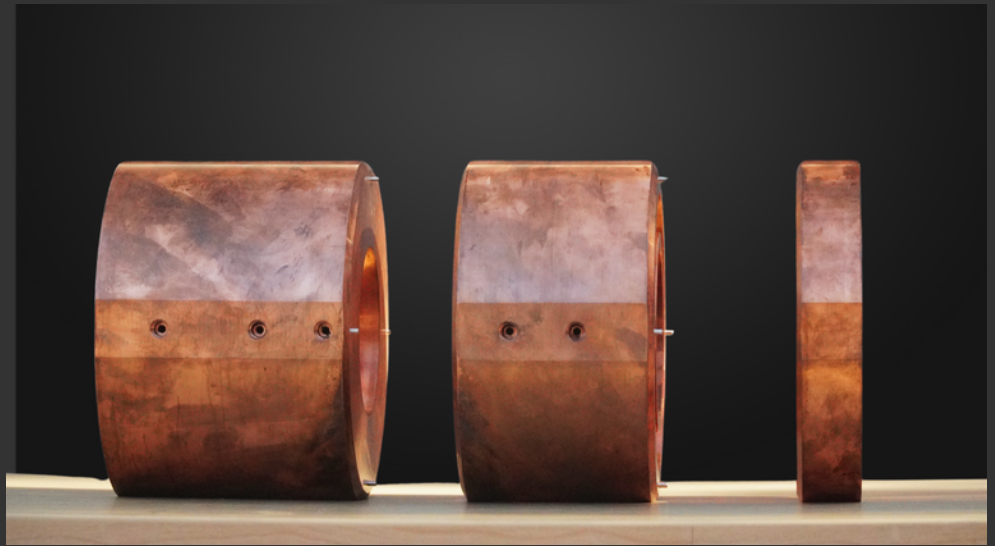
COMING UP

NEPHAS

We are very excited for the first tests of our Nephias engine, starting with a battleship fire on April 6th. This will be the first new engine test for SEDS since 2018, and a crucial step towards launching Halya at the end of this Spring.

After the battleship test, the injector will be mounted to the regeneratively cooled flight chamber, which was printed out of GRCop-42 by AME in Alabama. The torch igniter that the propulsion team has been testing over the last quarter will be used for ignition. The first hotfire will be performed at 40% thrust, and the team will build up to the maximum thrust capacity of 2000 lbf. This test is currently scheduled for April 20th at the Mojave Test Area owned by RRS.

Finally, Nephias will be able to show off its full throttle capabilities with an actively throttled fire, going down from 100% to 40% and back to 100%, as it competes for the \$15,000 CPLC milestone next quarter.



(Above) The machined "battleship" heat-sink chamber for Nephias

HALYA LAUNCH

Our methalox supersonic rocket is slated for a launch at the end of this academic year. This will mark the first successful rocket launch for SEDS since the flight of Vulcan 1 in 2016. If the team achieves the target altitude of 30,000 feet and recovers successfully with a two-stage chute, they will be eligible to win the FAR-MARS award of \$100,000.

RIPTIDE

The Riptide lander team is at work building the structural modules for the 18 foot rocket, and testing their custom designed venturi flowmeters, which will be used to throttle Nephias during landing. The first propulsive flight tests of Riptide will take place next winter, and it will be the first collegiate lander of this size to fly to 1000 feet.

HOW YOU CAN CONTRIBUTE

We have many exciting opportunities to make history in the coming quarters, but we can't do it without the help of our generous sponsors. As a registered 501(c)(3), SEDS at UCSD depends on donations and grants to continue funding the education of students in the field of aerospace.

Our fundraiser to support the testing of Nephias is still accepting donations and can be found on our website and LinkedIn (or [on this link](#)).

The field of collegiate liquid rocketry is growing faster than ever before, which means we need to build more complex systems every year to provide our members with the same experience as their peers in other schools. Especially since SEDS has not launched a rocket in many years, it is difficult to prove our value to sponsors until we are already successful with testing and launching Nephias and Halya.

After our current fundraiser wraps up, we are hoping to build more avenues of continued support for our projects, both through the university and directly through our non-profit.

In the meantime, if you can connect us with any potential sponsors or mentors, or you would like to learn more about our projects or how you can contribute to our mission, we would love to hear from you!

CONTACT INFO

Email: seeds.ucsd@gmail.com

Website: seedsucsd.org

Instagram: [seeds_ucsd](https://www.instagram.com/seeds_ucsd)

Please reach out to us if you would like to attend any of our events, talk to our members, or would like to learn more about what we are working on. We love hearing from our alumni and mentors!

SPONSORS

PLATINUM SPONSORS

edgertronic



Altium



GOLD SPONSORS



SILVER SPONSORS



Ansys



Aqua Environment



Gantner



