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TRIPOLI Rocketry Association, Inc. Prefecture No. 23

AEROPAC Spring 2021 Newsletter

Photo by Phoenix 4, courtesy of Curt Von Delius

President's Pad Jim Green

Greetings, fellow AEROPAC members!

Launch season is looking good this year. The playa is dry except for some spots on the edges. Be careful when driving on the playa. Look for color changes and look at your tracks in the rearview mirror. If you see that your tracks are dark turn around and get back on dry playa.

BLM approved our request for a 5 year permit. They like the job that we are doing leaving the launch site clean and following their rules.

Nevada has lifted its restrictions to allow 250 people in a gathering so we won't need to have pre-registration limits this year.

Burning Man has been canceled for this year so we will not need access passes for Aeronaut or ARLISS/XPRS.

We have a new launch added this year called SEDS on July 9 - 11 for students who would normally go to Spaceport America. This launch is open to all rocketeers.

See you on the playa!

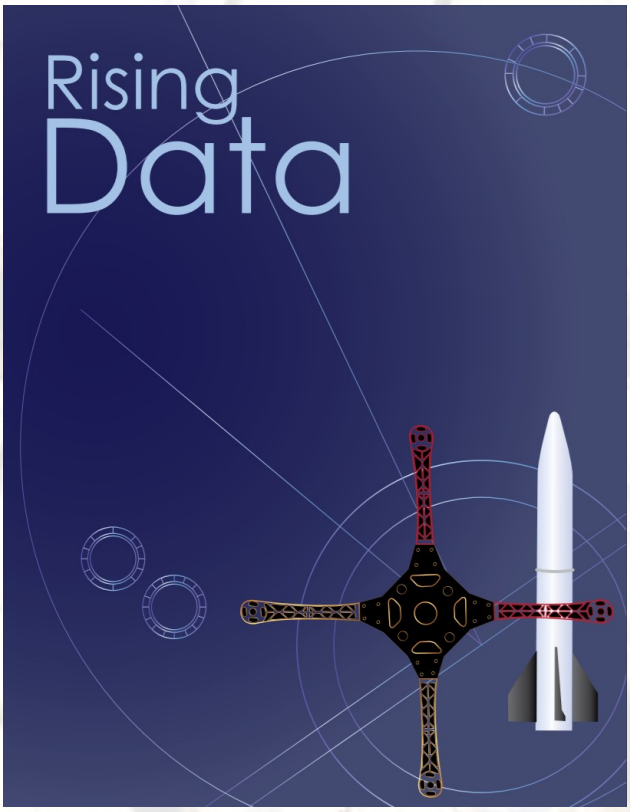
What's Inside

Sonoma State's New Program Includes Rocketry! Lynn Comminsky

Sonoma State University has been awarded $4.96 million from NASA to design and implement a program that will engage students on the autism spectrum in informal STEM learning.

NASA's Neurodiversity Network (N3) aims to broaden participation in NASA programs to include autistic and other learners with neurological differences. As part of NASA's Science Activation Program, which is composed of teams across the nation to help learners of all ages and abilities do science, N3 will use specific learning modules to support autistic learners with the social and technical skills needed for successful STEM careers.

"I really got inspired to pursue this opportunity because everywhere I turn there seems to be autism," said Professor Cominsky, who authored the cooperative agreement application and is also the director of EdEon STEM Learning at SSU – a center meant to inspire students to pursue STEM careers. "NASA has done so much for every other demographic group, but this award is very important because research has shown how autistic learners can be so talented in STEM fields."



Each year, the program pairs autistic high school interns with NASA Subject Matter Experts (people who have been paid by NASA in the past) to do individual projects. This summer Tony Alcocer will serve as a mentor to two interns who will build the rocket and Arduino payload developed during Cominsky's last rocketry program, Rising Data (RD). And next year, students at N3's four participating high schools will learn how to build the RD rockets and payloads. N3 will be redeveloping the original RD activities with input from the interns who will help to ensure that the procedures work well for autistic learners. And finally, the New York Hall of Science will be modifying the activities further for a younger audience during the third year of the N3 program. Cominsky and her team are excited to be doing rocketry again, even though the biggest challenge may be finding places to launch rockets in New York City!

Astrophysicist and educator is currently the Chair of Astronomy and Physics at Sonoma State University. In addition to many accomplishments, has led a number of rocketry- related projects.

About the Aeropac SEDS Launch

Overview

The SEDS Launch is a new and exciting addition to the Aeropac launch schedule.

The Students for the Exploration and Development of Space (SEDS-USA), in a joint venture with the Experimental Sounding Rocket Association (ESRA) and the Tripoli Rocketry Association, sought TRA prefectures to host Regional Rocketry Competitions. Aeropac jumped at the chance to help out and scheduled the SEDS Launch as a fourth launch each year. This launch is in addition to Mudroc, Aeronaut and ARLISS/XPRS.

All fliers are welcome but, as with ARLISS, priority will be given to Student Launch teams.

Background Information

Each year, the Spaceport America Cup had to turn away more than 50 university rocketry teams due to unavailable competition slots. These teams have a very limited number of options to safely compete and launch their rocketry projects. Many of these teams also struggle to fund the expense of traveling across the country for a week to attend the Cup.

SEDS decided to create a new series of regional rocketry competitions that will fill this need and provide potential winners with automatic bids to attend the following year's Spaceport America Cup.

Competition Requirements

These regional rocketry competitions will be based on the Spaceport America Cup's Commercial Off The Shelf (COTS) Solid Propulsion 10K event with some scaled-down requirements. The student teams will be

required to build, test, launch and recover a rocket with a 1-kg payload to ten thousand feet on a commercially available L motor or smaller. The Tripoli Safety Code will be followed. One of the students (or a designated and certified mentor) must be the Level 2 authorized flyer of record and all team members who work on the rocket's energetics or travel with the rocket to the pads must be a Tripoli member.

Aeropac Partner Duties

AEROPAC will only be required to provide typical Range Safety and Launch Operations for the student teams.

SEDS Partner Duties

SEDS USA volunteers will be onsite to run the competition activities such as coordinating and communicating with the student teams, judging the design reports, gathering post flight data, and finally, the awards ceremony.

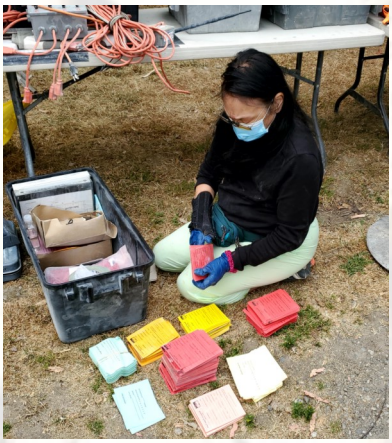
For more information on SEDS see: https://seds.org/

For more information see: https://www.soundingrocket.org/

Equipment Maintenance / Cleaning Party

AEROPAC stalwarts showed up at Lynn and Garret's beautiful ranch in Sonoma for the annual equipment maintenance party. The equipment got cleaned the sound and launch systems checked, the flight cards sorted, and everyone got caught up on everyone else. Thanks to all those folks who spent their Saturday getting AEROPAC ready for the launch season.

Special mention to Peter who organized things and to Tony who created a tool to prey open the "jaws" on launch pads. It will come in very handy.



Build Light, Fly High – Part I

A Project Report by Wilson Allness
TRA #13848, L3 / AeroPac #918, Portland OR

Over the years of building minimum-diameter rockets, I've had a tendency to gravitate toward more minimalistic construction so as to reap the benefits of getting more altitude (which is of course often the objective with flying minimum-diameter). I've always been a firm believer that overbuilding any rocket adds extra weight, not strength. While these construction techniques have evolved slightly over time, I've yet to experience any sort of shred or other structural failure.

My early test of this theory involved building a 75mm x 48" fiberglass rocket with electronics in the nosecone coupler using nothing but big epoxy fillets (without additives). No layups, tip-to-tip, vacuum bagging, peel ply, carbon tape, or anything like that. I made a 75/7600 M2200 for it using a slow propellent with just enough space above the motor for some drogue harness, and a main chute housed inside the nosecone. Flew to 33,828', Mach 2.25 and the fins didn't budge – got it all back without hardly a scratch. The following year I flew a similar configuration on a hotter propellant, and while the altitude was about 1,500' lower I logged Mach 2.56.

On the other end of the scale, I have a late-release Mongoose 75 that I ended up building much like a tank. While all-carbon fiber, the fins are 3/16" plate with a layer of 12K carbon layup – not to mention configured for standard dual deploy with an upper section, aluminum av-bay bulkheads, and so on. Point being, this bird has yet to see north of 30,000' simply by nature of its construction.

With the above in mind, I decided it was time to try pushing the envelope a bit more. For the next iteration I wanted to build a 75mm carbon fiber project but with a few tweaks – I started with a 67.75" x 3" airframe (the longest Curtis could make) and a Profusion/black fiberglass Von Karman nosecone. The airframe will fit up to a 75/10000 or 75/13000 motor, or so.

All prior builds have been with either 1/8" or 3/16" G10 fins, but again in wanting to keep things as light as possible I went with 1/8" carbon from DragonPlate. This is their "EconomyPlate" line of product as I

just couldn't convince myself of the necessity (and expense) for Quasi-Isotropic.

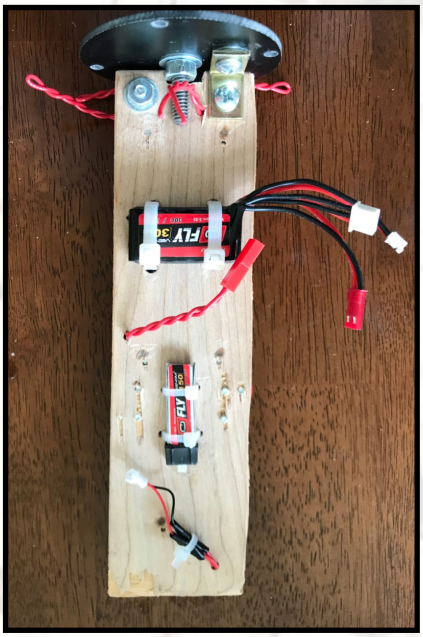
Fins cut/beveled on a table saw, then notched with a jigsaw for "glue rivets." Not something I usually add, but I figure a little extra bite for the epoxy never hurts especially on a rocket like this.

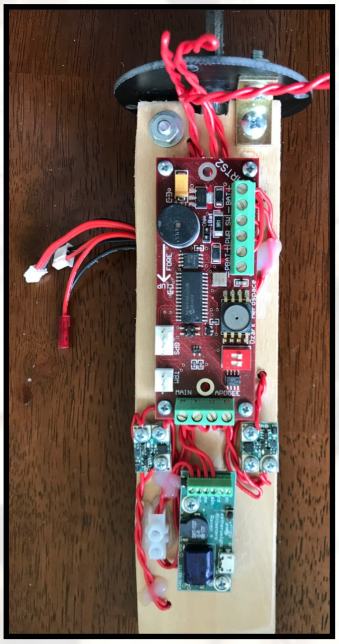
The recovery system uses a single-separation point, and all known techniques used in prior AeroPac projects. The nosecone is deployed at apogee via 3/8" surgical tubing/nylon rod charges as seen in the 100K writeup, then the main chute is unfurled at 1,000' using cable cutters made out of spent 9mm shell casings (pioneered by Tony A.).

With electronics housed in the nosecone, I determined relying on baro-only could lead to problems going mostly off the experience of others. So, I opted for a Raven4 backed up by an ARTS2 which should do the job – both have been flown before and contain known-good accelerometers from reviewing said flight data. (Especially the Raven, since it's set to apogee accel-only.)

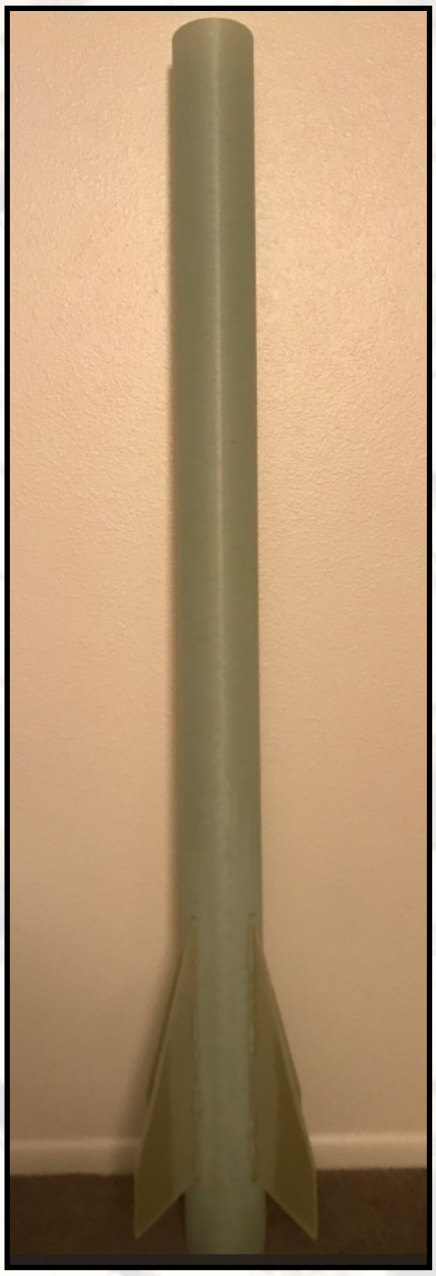
Note LiPo batteries and plywood sled bolted directly to the nosecone bulkhead. By eliminating all-thread rods, nuts, U-bolts, etc., further weight is saved. It attaches to the nosecone via machine screws.

The completed airframe weighs just 2.5 lbs. by itself and the nosecone/av-bay 1.75 lbs. With recovery gear and a GPS transmitter, the pad weight of this entire project (except the motor) is only about 5 lbs. maximum.





While this waits to fly, I built a 98mm rocket using many similar principles. Its 1st iteration used a 60" x 4" fiberglass airframe, 1/8" G10 fins, and a single layer of 12K carbon fiber layup. This held together on an N4300 flight to Mach 2.75. So, my next project was a near-exact duplicate (all the way down to the motor) except for the lack of layups. It even uses the same recovery



setup as before, with the coupler serving as an av-bay and main chute housed inside the nosecone.

Some photos of the bird in various stages of construction. It has a dry weight of about 6-7 lbs.

Part II will follow just as soon as I continue this misadventure, and dare to launch these!