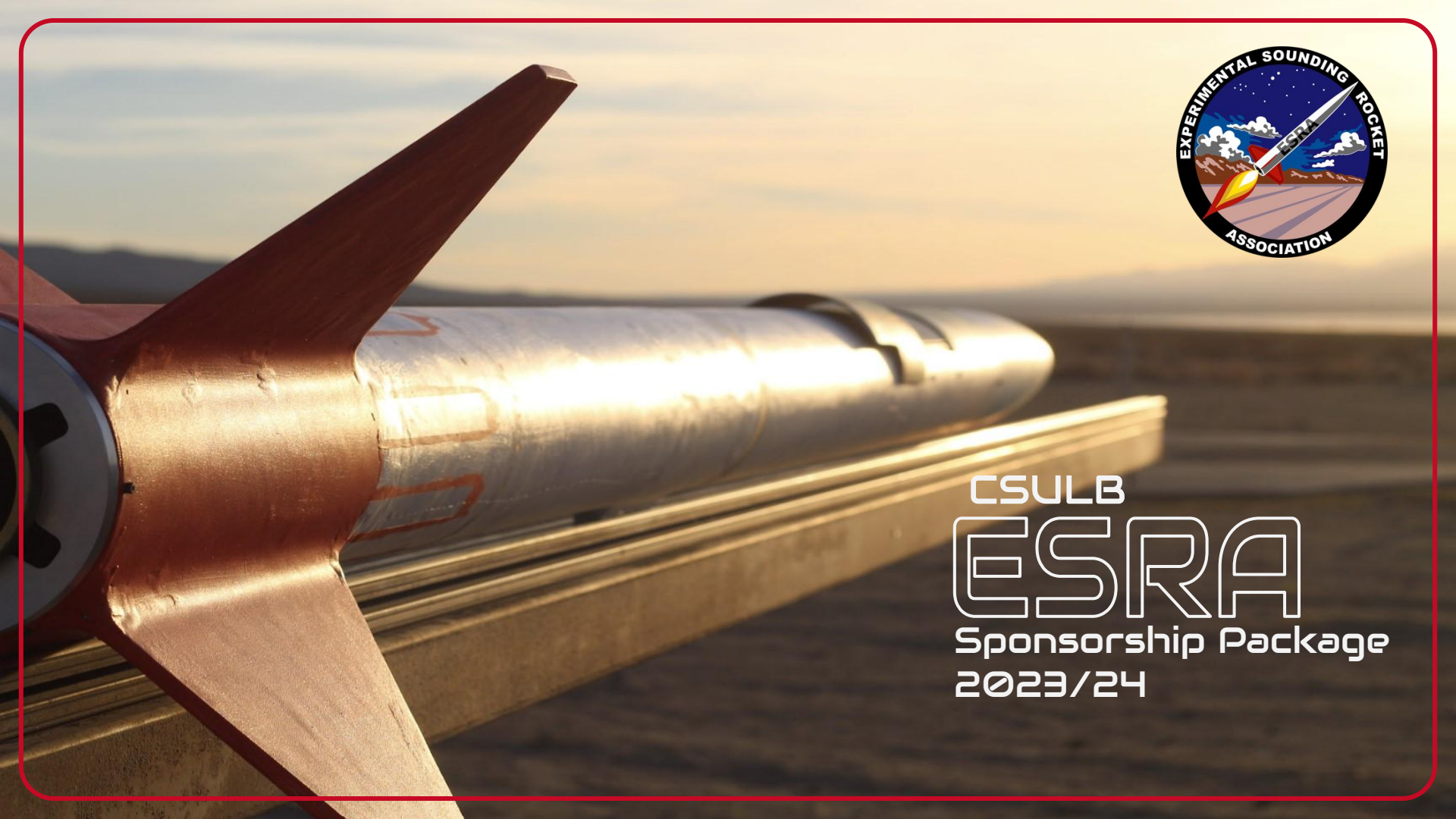

CSULB

ESRA

Sponsorship Package 2023/24

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About Us

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Our Mission

ESRA is a small scale student rocketry club underneath the CSULB branch of AIAA(American Institute of Aeronautics and Astronautics) that focuses on experimental concepts and intensive engineering projects. Our club intends to enter competitive competitions such as Spaceport America in the near future.

We aim to provide more opportunities for women on campus through club events. Our current membership base is 50% female.

ESRA Personnel

ESRA has a unique organizational structure

No Subsystems

There are only two roles in ESRA: Council and Members

Deliverable Oriented

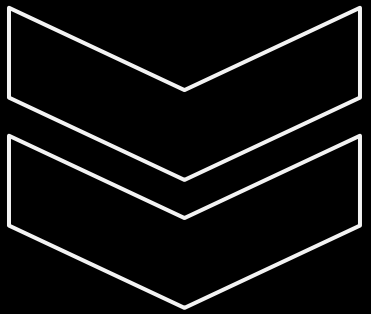
Proper documentation is mandated and a final report on the project is written once complete

Small Scale Projects

ESRA focuses on projects that can be completed within the academic year

Collaboration Oriented

ESRA members all work together and are not tied to only one task

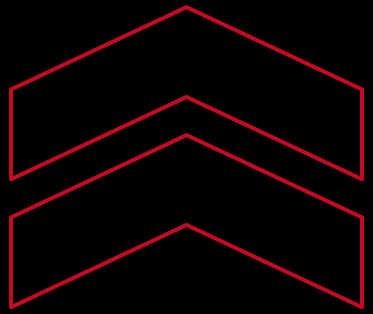


Council

A 3 person team that manages the administrative aspects of ESRA.
Just like other ESRA members, the council participates in on the hands-on work, however, they take on the extra responsibilities of organization and management

Members

The heart and soul of ESRA. All ESRA members work on the same project, taking on whatever work suits their interests. Members are expected to dedicate time, energy, and expertise to create all project deliverables



Limited Member Count

At minimum:
8 members

At maximum:
15 members

Since the member count is limited, admittance into ESRA requires an *interview process*.

ESRA members are expected to be highly skilled, dedicated, and motivated!

What makes ESRA different?

- Unique Project Structure
- Project Scope
- Limited member count
- Documentation Driven Work

Project Scope

“Limited“ Scope

Project will end after one year

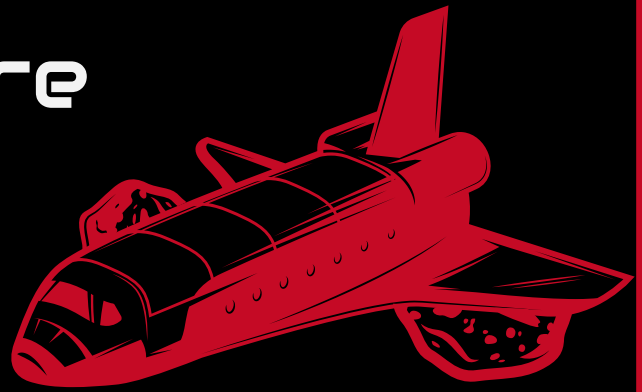
Project scope cannot be expanded halfway through year

Regardless of success of project, it must end after the year is over.

Next year’s team can vote to continue the project the following year

Unique Project Structure

ESRA has no long term project goal. The club is defined by its organizational structure, its work process, and its member makeup.



ESRA Selects a new project each year

- The project must be related to rocketry
- Project must be challenging
- Project must be experimental

Project Proposal

Pitch Season

Will take place 2nd, 3rd, and 4th week of the Fall semester

Upper year members pitch

Individual or group pitches, must meet the proposal requirements

Score Voting

Presented on a ballot; proposals will be ranked on a point scale; scored summer, highest score wins

Document Driven Work

An ESRA project is defined by a series of documentations delivered on specific deadlines

Project Plan

- The first document generated by **The Council** for a project
- Approved by ESRA members
- Contains all expected deliverables and deadlines for the year

Work

- The project is broken into several tasks
- Members choose tasks to work on
- As work is completed, members generate the specified deliverables

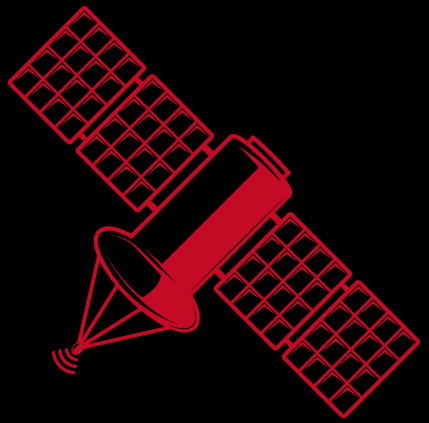
Final Report

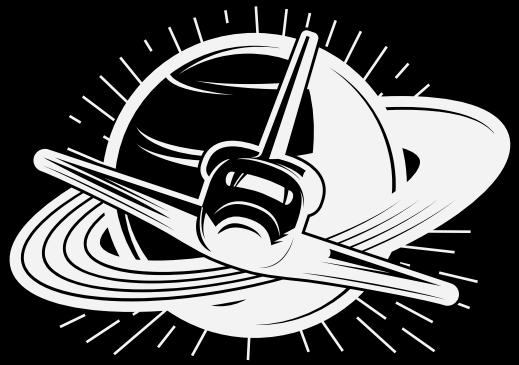
- Despite the progress on the project, all work halts at the end of Spring
- All ESRA members begin writing a Comprehensive Report, detailing what was accomplished during the year

Accountability

Accountability will be managed through several means:

- **Deadlines -** deadlines are strictly followed
- **Documentation -** will be standardized for ease of completion
- **All Hands Meetings -** meetings will take place with all members present





Calendar

Recruitment season:
2 weeks

Aug 17th - Sept 3rd

Pitch Season:
3 weeks

Sept 3rd - Sept 23rd

Work Season:
37 weeks

Sept 23rd - May 3rd

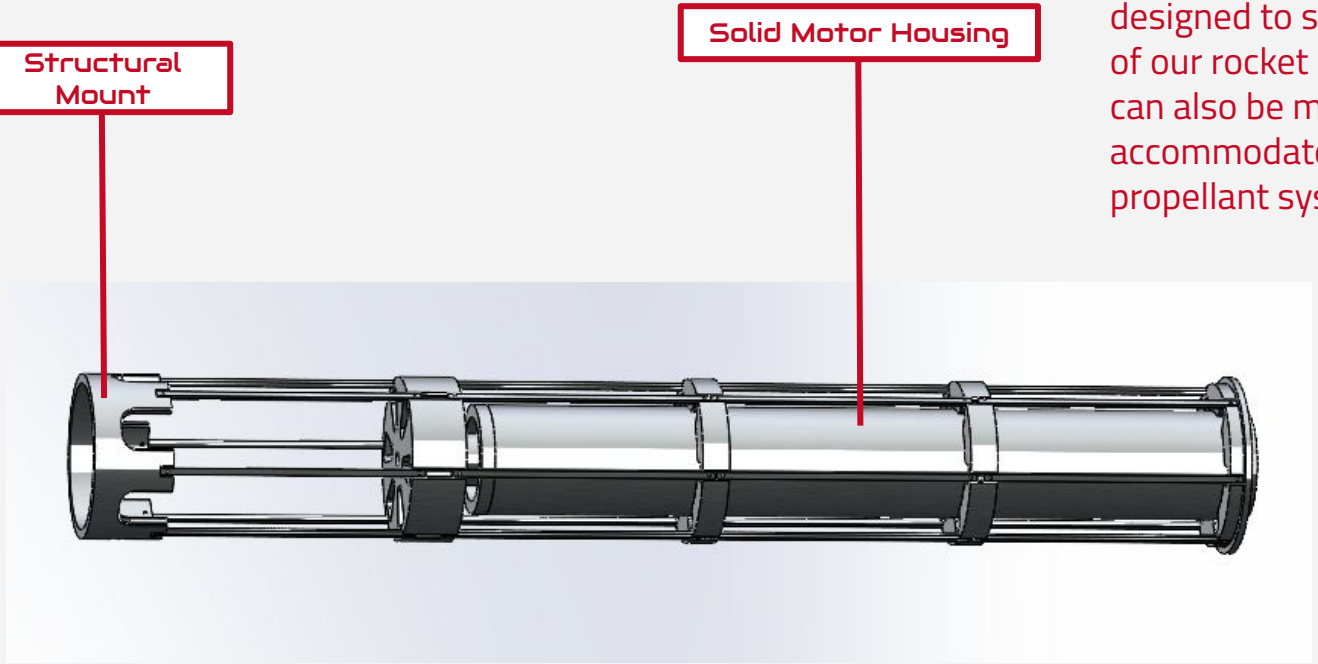
Final Report Season:
2 weeks

May 19th - June 1st

Past project: Persephone

A modular flight vehicle

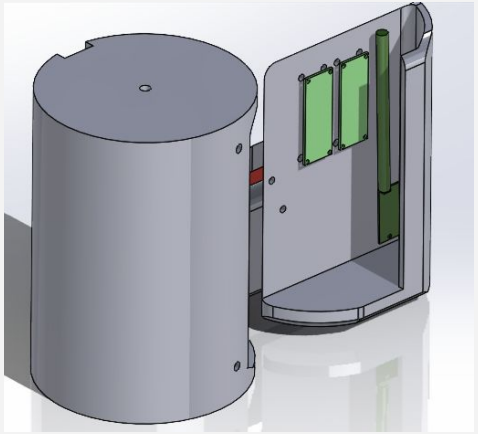
Solid Propellant Sled Structure

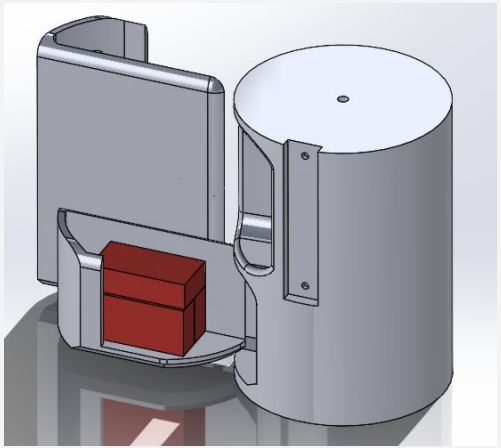


This is our aluminum sled that houses a solid rocket motor. This sled was designed to slide in and out of our rocket body. The sled can also be modified to accommodate a liquid propellant system.

Electronics Bay/Recovery Module

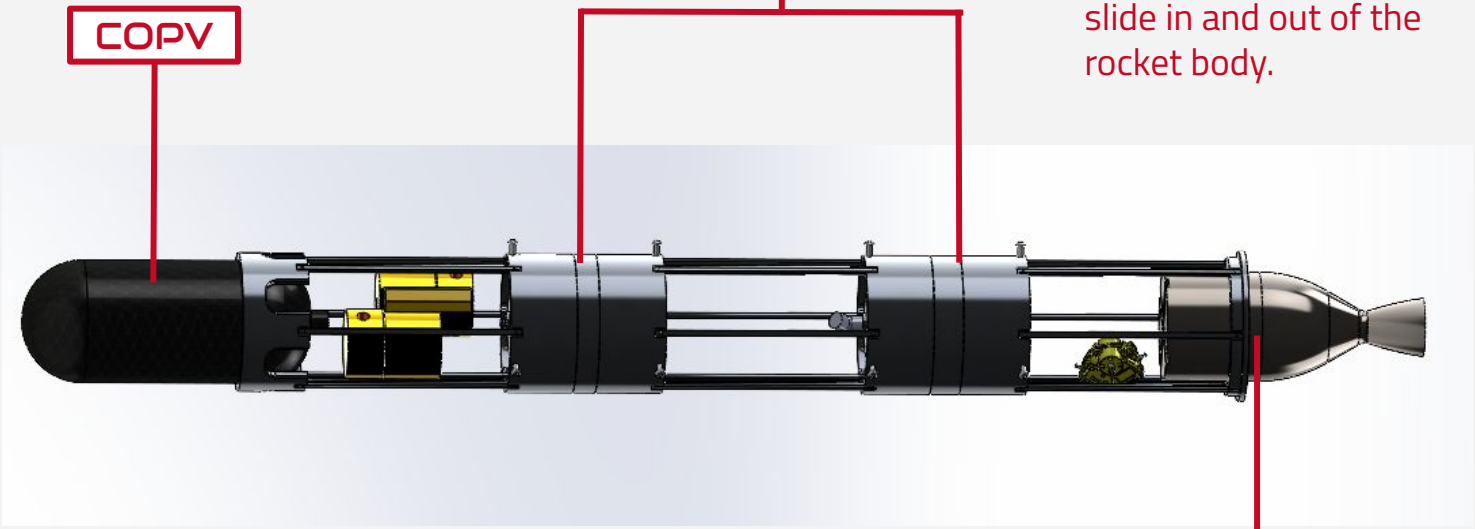
Housed within our rocket body is our electronics bay. The electronics bay was 3D printed and made to allow easy access to our rockets electronic components while maintaining a sleek look.





Current Project:
Engine Development

Liquid Bipropellant Sled Structure



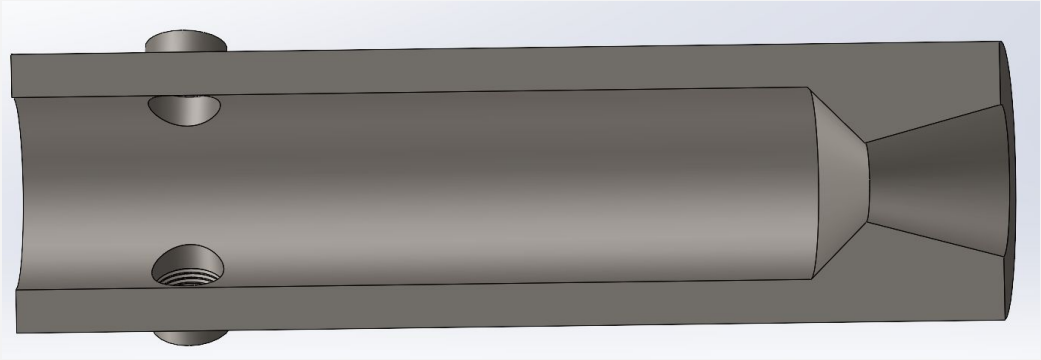
This is our liquid propellant system. The system utilizes the same aluminum sled, allowing for easy access to the entire system as it can slide in and out of the rocket body.

Liquid Bipropellant Vehicle Specifications

Flight Characteristics	
Apogee	~10,418 ft
ISP	250 s
O/F	1.75
Burn time	6.5 s
Propellants	Nitrous Oxide & 75% Ethanol
Total mdot	1.60 lb/s
Fuel mdot	0.58 lb/s
Oxidizer mdot	1.018 lb/s
Max Q	780 psi

Tank Dimensions	
OD	5 in
Wall thickness	⅛ in
Fuel tank length	8.5 in
Ox tank length	13.5 in
Fuel tank pres	377 psi
Ox tank pres	403 psi

Liquid Bipropellant Vehicle Specifications



Engine Dimensions	
Chamber Diameter	2”
Chamber Length	8.3 ”
Convergent Angle	45 °
Divergent Angle	15 °
Throat Diameter	.82 “
Exit Diameter	1.58 “
Overall Length	10.3 “

What *we* want to build

Moving forward from what was done in the past, **Regenerative engines** are the next milestone we need to develop.

This route will expand the scope of what CSULB rocket clubs are capable of

Developing a student liquid rocket engine will launch our members into their desired field in the Aerospace Industry

How *we* will build an engine

Through **ESRA**, we are creating a dedicated team to trailblaze the process of designing and building a **regenerative engine**, thus requiring a diverse team of specialists.

Current Project Roadmap

Liquid Vehicle Sizer(Completed)

- Development of an open source vehicle sizer code base to output various liquid system configurations
  - Fluids Piping length, Regulator Cv, Engine Geometry
  - Apogee/thrust Achieved, isp, OF, etc.
- Utilize methods of multidisciplinary optimization

Heat Sink Engine Development(In Progress)

- Manufacture hybrid test bed/launch vehicle fluids sled
- Hot fire testing of heat sink engine
- Characterize engine from collected thrust and wall temperature data

Regeneratively Cooled Engine

- Size engine cooling channels from heat sink engine data
- Regen engine hot fire
- Persephone liquid system launch

$1000+

- Tax Benefits
- Social Media promotion
- Invitation to speak at CSULB
- Invitation to watch tests and launch
- ESRA sticker pack
- Logo on rocket
- CSULB Lab tour
- Resume packet

Sponsorship Benefits

Contact Us At

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