

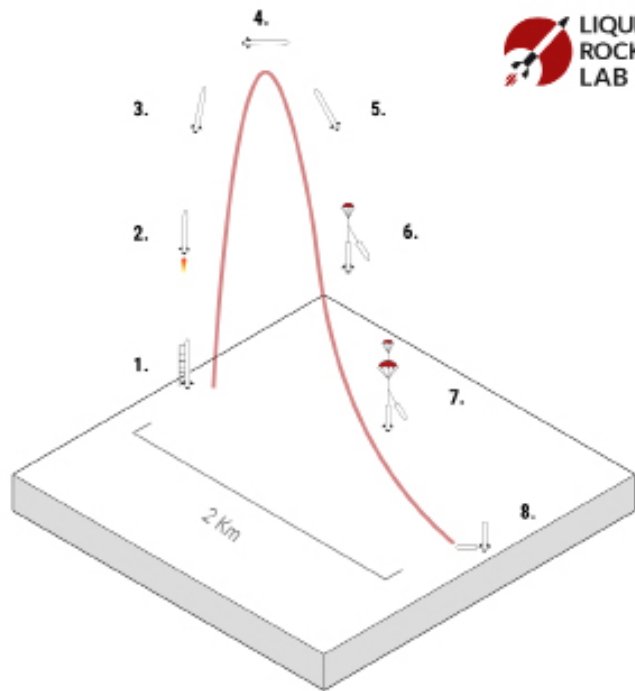


LIQUID ROCKETRY LAB

All Systems Go!

The Mission

1. Rocket Launches
2. Engine Accelerates to Supersonic Speeds
3. Engine Cutoff
4. Edge of Space
5. Rocket Reorients for Re-entry
6. Drogue Chute Deploys
7. Main Chute Deploys
8. Landing



Why Are We Doing This?

Our organization's mission as a nonprofit is to give back as much of the knowledge we gain through our endeavors to the space community as it takes 'its next giant leap for mankind.'

- Rocketry and spaceflight have been a dormant industry for the last 40 decades and, we strive to change that with our projects.
- We're working hard to bridge the gap between the industry and the research community and make information and opportunity more accessible
- Long term goal: build a research center based on the CalTech - JPL model which would profoundly impact both the state of North Carolina and the country as a whole.
- The local aerospace talent pool would have a place to call home to work on rocketry projects.
- The the center would become a hub for engineering excellence that could serve researchers, the commercial space industry, and NASA itself.

Leadership

Faculty Advisor



Dr. Srinath Ekkad

MAE Department Head, NCSU

Former Dean of Engineering, VA Tech
Editor in Chief, ASME Thermal Apps.



Renzo Benavides

Chief Executive Officer



Alexander Allen

Chief Executive Engineer



Hassan Polani

Chief of Staff



Mark Funderburk

Chief Safety Officer



Dario Mueller

Vice President of Avionics



Will Hitchcock

Vice President of Propulsion



Travis Walter

Chief Financial Officer



Josh Mitchell

Vice President of Structures



Sagnik Nayak

Vice President of Business



Keith Mellendorf

Vice President of Programming

Why Partner With Us?



Support Education

We are a nonprofit supporting education in North Carolina and the field of aerospace. All of our winnings will go towards the development of the aerospace engineering program at NC State University.



Access

Anyone affiliated with your company will be welcome to attend our launch and static fire events as well as tours of our lab.



Exposure

Your logo will be placed on our rocket, trailer, banners, and other materials. A biography will be placed on our website. We will also be attending career and education outreach events.



Collaboration

We will work directly with your company and representative to promote your company, products, and values.

What Are We Looking For?



Financial Support

We are a student run, non-profit organization that is working on the cutting edge of liquid propulsion. Your support would help us achieve our advanced propulsion research and lab equipment requirements.



Mentorship

The years of expertise that industry professionals from your organization have can help guide the next generation of aerospace professionals.



In Kind Donations

Showcase your organization's industry role by providing the parts or software for a team looking to break the boundaries of what is possible.



Anything Else!

If you see another way that your company can contribute to our cause, we are happy to chat and help work towards it.

Our Current Partners

GeorgianPartners 

NC STATE UNIVERSITY

 **ATLASSIAN**

 **BLUE FORCE**

WAVE THERM 

SIEMENS

ANSYS[®]

Thank You!



Thank you for your time. We appreciate any help your company can provide, no matter the medium or the amount!

If you have not met with us yet we would really appreciate a on-phone or in-person meeting to get to know your team.

Ready for liftoff?
Contact us at:
business@liquidrocketry.com

Follow Us!



linkedin.com/company/liquidrocketry



[@liquidrocketry](https://www.instagram.com/liquidrocketry)



facebook.com/liquidrocketry

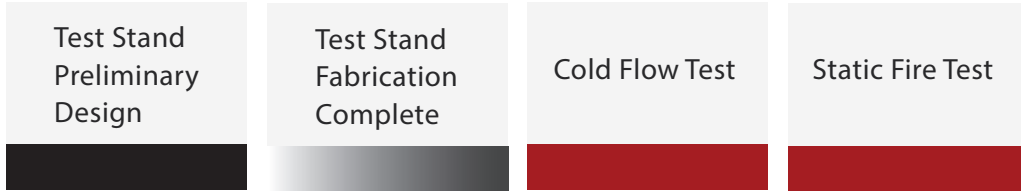


[@liquidrocketry](https://www.twitter.com/liquidrocketry)

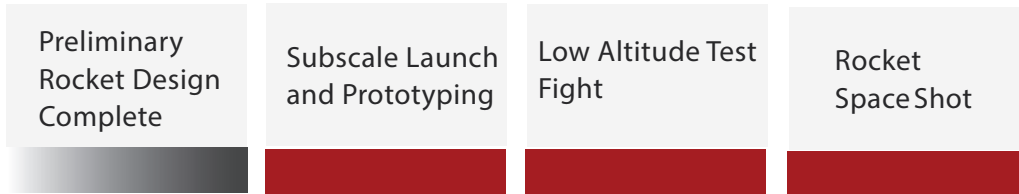
Appendix

Overall Project Timeline

Engine Development

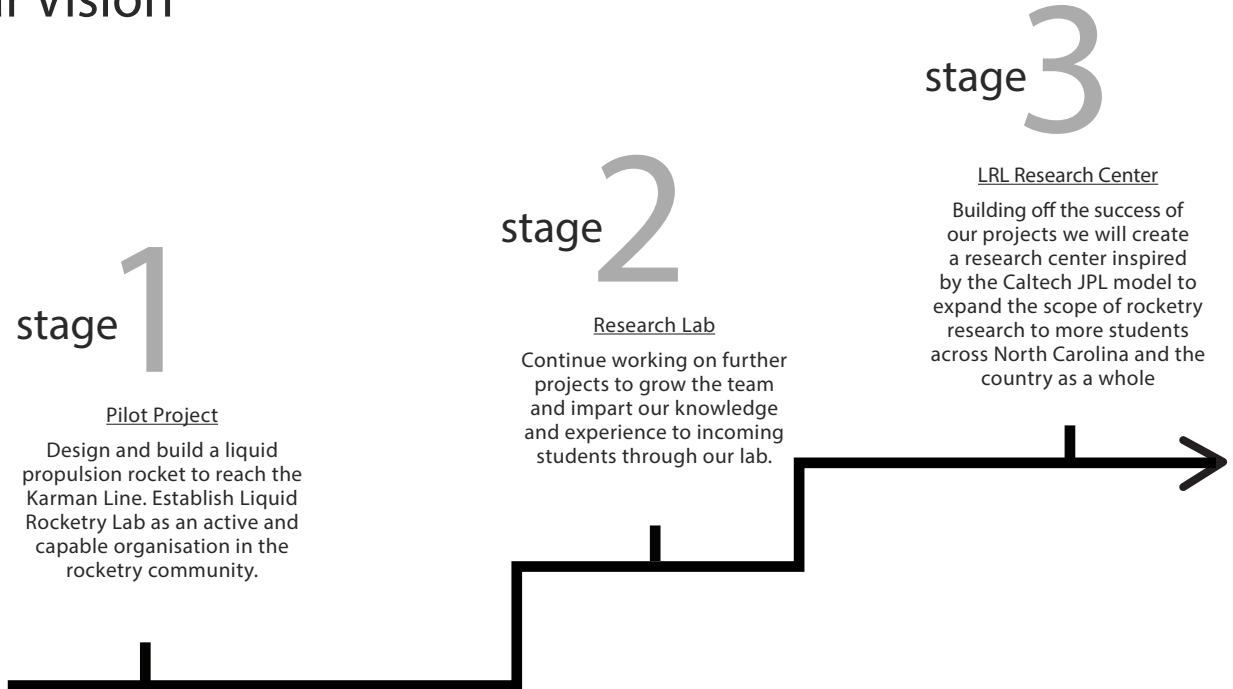


Launch Vehicle Development



Overall Questions

Our Vision



Technical Questions

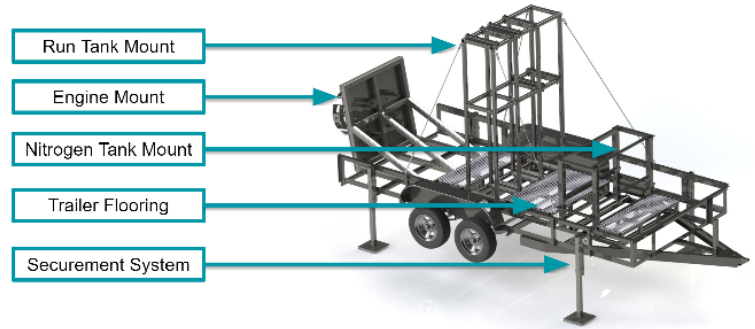
Pilot Project - Liquid Propulsion Sub-Orbital Class Rocket

We are one of the first student organizations in the country to set out on our goal to be the first amateur team to launch a liquid propulsion rocket designed to reach the Karman line 100km above sea level.

- The Launch Vehicle and Test Stand is designed and developed completely from scratch by our student team and the support of our esteemed mentors.
- We are one of the few teams to have developed our own test stand and are currently working on launch vehicle design and static fire tests.
- Launch vehicle development will go into full phase after the static fire with a tentative launch date in 2023.

Test Stand Project

Structures

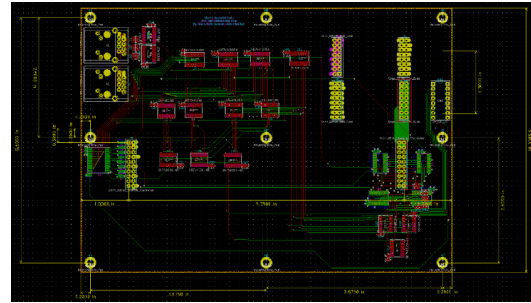


- The structures team has designed a supporting structure for the engine, propellant tank mounts, non-slip flooring, pressurant mounting, and a securement system to constrain movement at full thrust.
- The engine mount can accommodate many different configurations and is designed to operate at a thrust of 3000 lbf.
- The mobile capacity of the test stand is primarily to provide flexibility for testing location.

Test Stand Project

Avionics - Data Acquisition

- The Avionics team developed a custom automated and remotely monitored test stand control system, capable of controlling all aspects of a test fire.
- The data acquisition system collects thousands of measurements per second from up to 1024 sensors which monitor engine health and performance.
- This data is streamed to mission control where it is visualized for test monitoring and later processed and analyzed to improve engine performance

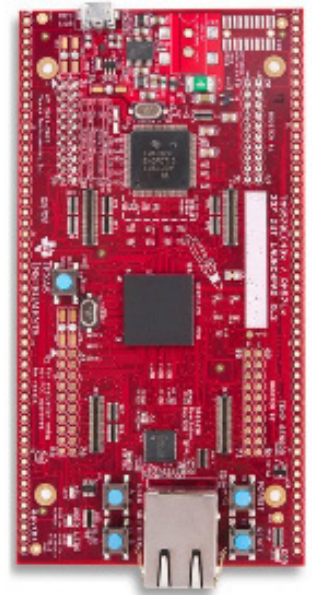


The data board serves as an attachment point to the primary data bus on the test stand for any relay or sensor boards and allows them to communicate with the processor using a custom, high-reliability data protocol.

Test Stand Project

Avionics - Automatic Control System

- The control system uses feedback from the sensor channels to monitor the state of the test stand and be sure everything is within safe operating parameters.
- All test procedures are pre-written and verified through several layers of both automatic and manual review. These are executed by the test stand computer to reduce human error.
- Building and programming these custom systems gain the team experience for work on the Launch Vehicle's avionics systems.

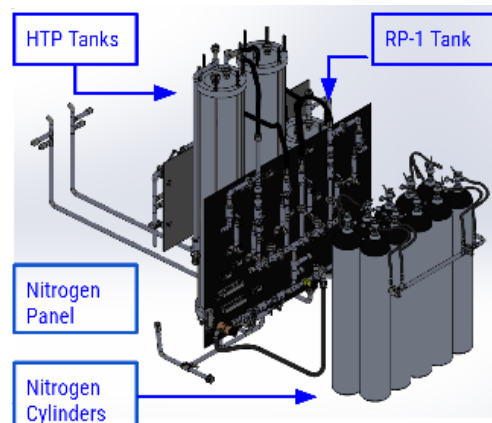


We'll be using the Ti Hercules micro-controller for our systems

Test Stand Project

Plumbing Systems - Propulsion Team

- The propulsion system is composed of the pressure system, the fuel feed system, and the rocket engine itself.
- The pressure system uses 10 nitrogen cylinders at 2000 psi and is used to force fuels through the system safely and consistently.
- The fuel feed system keeps the propellants in a controlled environment and controls the rate they flow into the rocket engine.
- The propulsion system is completely automated for safety and precision.



The Launch Vehicle

- The launch vehicle is currently in the very early research and design stages.
- Our launch vehicle will be powered off RP-1 (Rocket Propellant 1) which is refined kerosene and HTP (High Test Peroxide) which is a strong oxidizer.
- Right now we expect the launch vehicle to :-
 - Be around 30 feet tall
 - Have a maximum apogee of 120km
 - Reach a maximum speed of ~Mach 5
 - Have a thrust capacity of ~3000 lbf
- The test stand will be used to safely develop our engine until it is ready to be tested on the launch vehicle.



