

THE YELLOW JACKET SPACE PROGRAM

2024 SPONSORSHIP PACKET



The Yellow Jacket Space Program (YJSP) is a student organization at Georgia Tech working hard to develop liquid-propellant rocket systems. Our mission is to design, construct, and fly a liquid-fueled rocket to the edge of space, the Karman Line, 100 km above the Earth. With 200+ members spread across 5 disciplinary teams, YJSP is one of the largest student-run engineering projects in the country.

We create the opportunity for students at Georgia Tech to work with cutting edge technology. Almost everything we do is student-designed, built, and tested - from our engines, in-house valves, and tanks to custom avionics, mission control software, and data acquisition electronics. Our members learn advanced, industry-ready skills and gain experience collaborating on large-scale aerospace projects.

Building upon our recent successful launches, we have an exciting future ahead of us as we continue redefining the field of collegiate rocketry in our push to space.

- **2016**
YJSP is officially established as a group of students begins designing a heatsink rocket engine.
- **November 24th, 2019**
First heatsink engine hot fire.
- **April 22nd, 2021**
Second heatsink engine hot fire.
- **November 13th, 2021**
First static fire of *GoldiLOX*, YJSP's first liquid oxygen and kerosene rocket.
- **April 23rd, 2022**
Second static fire of *GoldiLOX*.
- **July 16th, 2022**
Darcy I, a nitrous oxide and isopropyl alcohol rocket, launches from the Mojave Desert.
- **November 5th, 2022**
Third static fire of *GoldiLOX*.
- **January 6th, 2023**
GoldiLOX launches to a 5,000 foot apogee and is successfully recovered.
- **December 16th, 2023**
Darcy II, a larger iteration of *Darcy I*, launches to a 30,000 foot apogee and is successfully recovered.
- **2024+**
Work is underway for *HETS* (Helluva Engine Test Stand); 4 new engines; *Vespula*, a larger iteration of *GoldiLOX* targeting 100,000 feet; and *Felicette*, a larger iteration of *Darcy II* targeting space at 100 km, or 330,000 feet.



GOLDILOX

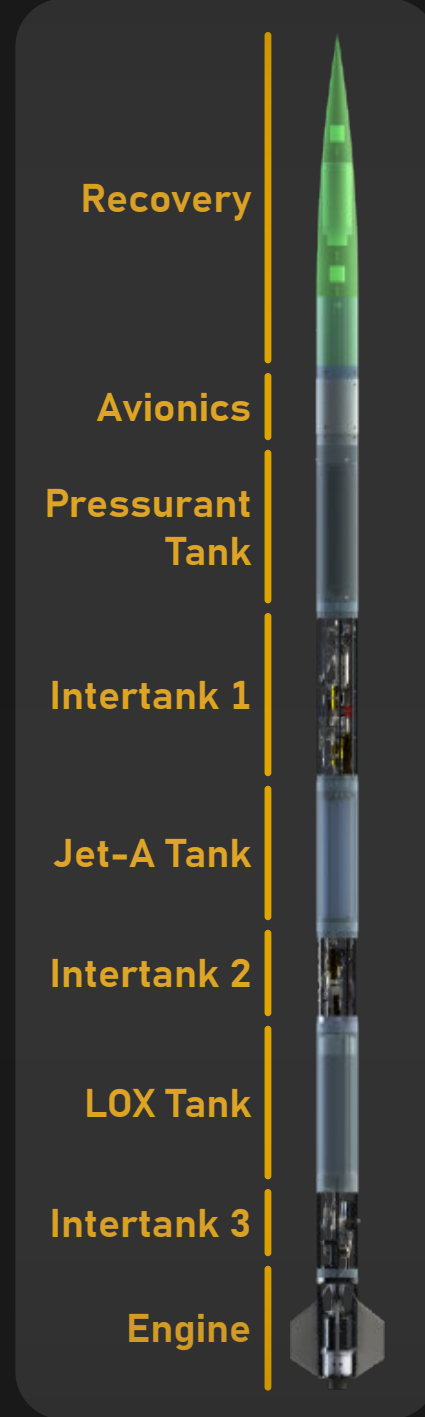
GoldiLOX was Georgia Tech's first successfully launched and recovered liquid-propelled vehicle, a proof of concept liquid propulsion system integrated onto a launch vehicle.

It was a strategic intermediate step, implementing complex systems on a small scale before use in larger future vehicles. It incorporated one of the most complex and sophisticated electronics systems ever created by a collegiate rocketry team. Full integration of the recovery system, propellant feed system, and avionics was completed in Spring 2021, and the vehicle was successfully static fired several times throughout 2021 and 2022. On January 6th, 2023, *GoldiLOX* lifted off at the Friends of Amateur Rocketry site in the Mojave Desert, reaching an apogee of nearly 5,000 feet before touching down without a scratch.

With student-designed circuit boards and C++ firmware, in-house flight valves, and hundreds of intricate mechanical interfaces between the rocket airframe, fuel tanks, and avionics stack, *GoldiLOX* served as a testimate to our determination and engineering capabilities.



VEHICLE LENGTH:
18 FT




THRUST:
900 LBS



APOGEE:
5K FEET



 **PROPELLANTS:**
Liquid Oxygen & Jet-A

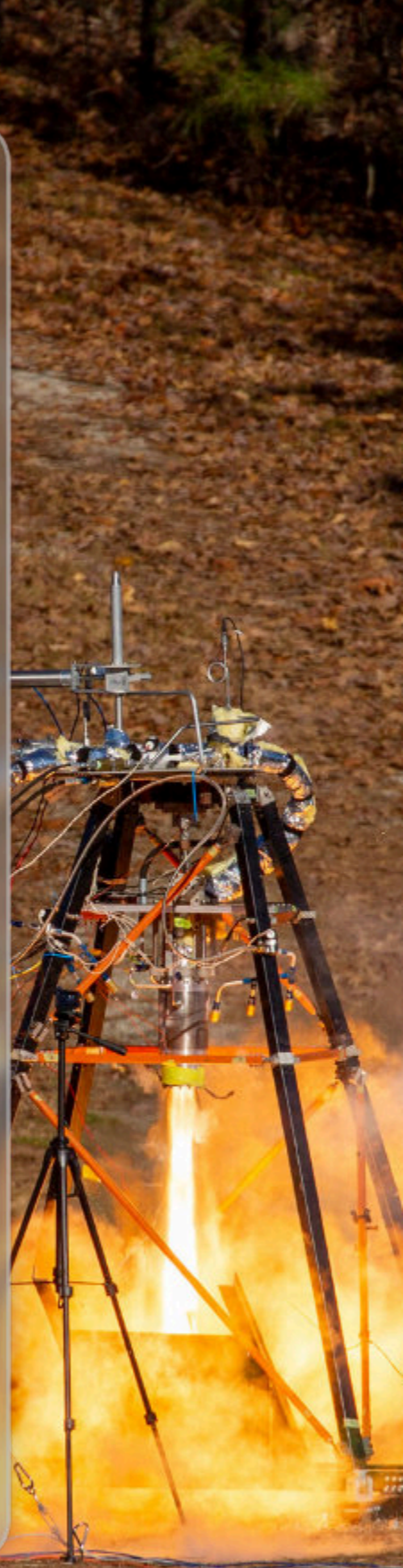


HELLUVA

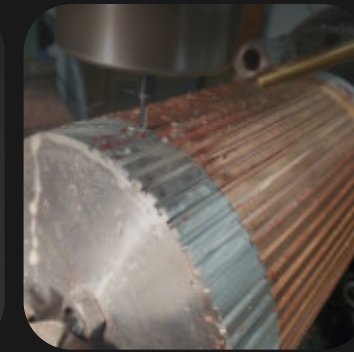
YJSP's engine development and testing team continuously innovates and develops more powerful and efficient kerosene-liquid oxygen engines and injectors for the team. In the last four years, the club has completed eight engine tests and with the team's new engine test system, the *Helluva Engine Test Stand (HETS)*, the team will be able to achieve a cadence of four engine tests per week.

HETS is a significant step forward for the team's engine development program in terms of capability, ease of operation, and safety. Once completed in February of 2024, the team will be able to test engines with thrusts of up to 5500 lbf for durations of 35 seconds.

The engine development team is also developing new engines for the *Vespula* vehicle, such as a regeneratively cooled and an ablative engine which will each deliver 2500 pounds of thrust, a clear improvement over the heatsink engine on the *GoldiLOX* vehicle. Also in development is an improved pintle injector, as well as new designs for the team in the form of impinging and coaxial swirl injectors. The design and vast majority of manufacturing of all engine development projects are done in-house by members of the team.



HETS: MOBILE ENGINE TEST STAND



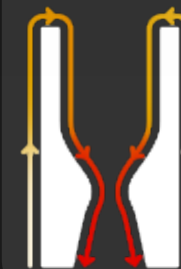
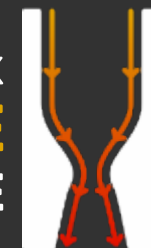
CURRENT WORK:



2x
**HEATSINK
ENGINES**

1x

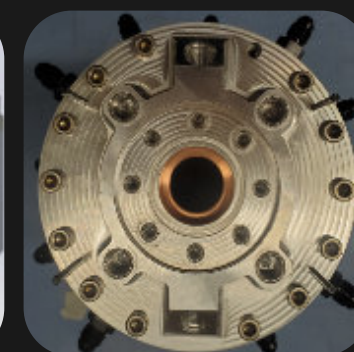
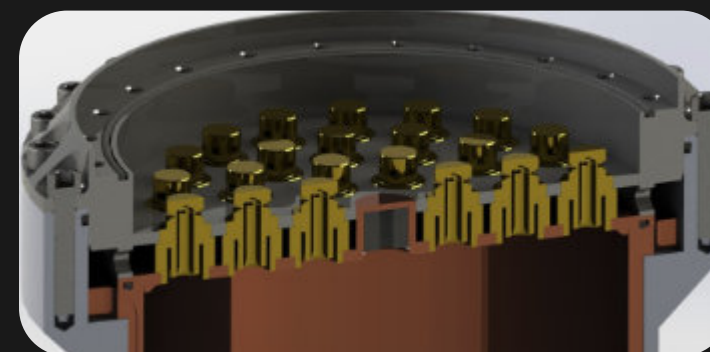
**ABLATIVE
ENGINE**



1x

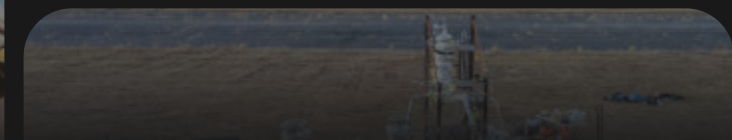
**REGEN
ENGINE**

ENGINE
THRUST:
**2500
LBS**



HETS THRUST CAPACITY:

5,500 LBS



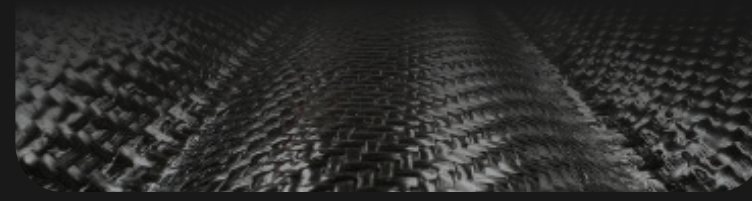
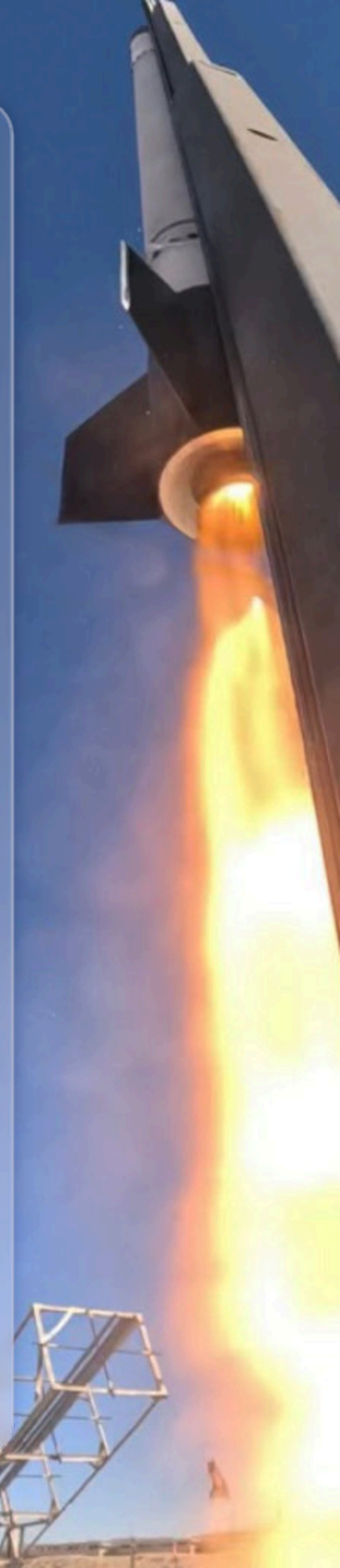
DARCY

Started in the summer of 2022, the Darcy program intends to accelerate YJSP's launch cadence by focusing on small, simple architectures. Each of the three vehicles under this program consist of self-pressurizing concentric nitrous oxide (N2O) and isopropyl alcohol (IPA) tanks that make up the majority of the rocket structure, as well as two pneumatically-actuated valves.

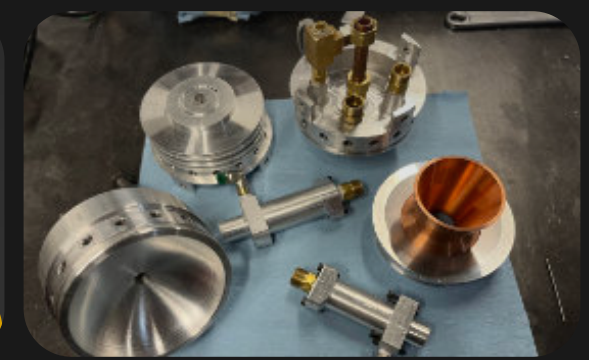
Darcy I, a 3" diameter rocket, and *Darcy II*, up-sized to 4" with the goal of improving on every aspect of *Darcy I*'s design, both went from the drawing board to the launch rail in six months. *Darcy II* underwent design and manufacturing improvements and two subsequent launches over the next year.

On December 16th, 2023, it achieved an apogee of 30,178 feet and successfully landed under parachute, earning the title of the highest recovered amateur liquid rocket.

The current project under the Darcy program is *Felicette*, an 8" diameter vehicle incorporating all of the lessons learned from *Darcy I* and *II* into a space shot rocket. Pairing the program's simple architecture with a fully custom avionics package, a novel mass-efficient recovery layout, and a carbon fiber boat-tail fin can manufactured entirely in-house, *Felicette* pioneers technologies that will help future rockets succeed.



PROPELLANTS:
**N2O &
IPA**



APOGEE:
**30K
FEET**



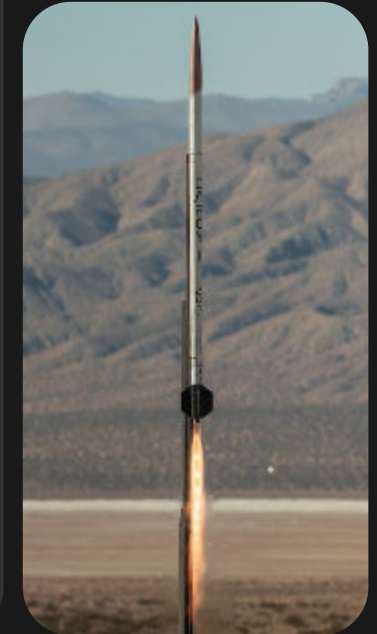
Recovery

Avionics

N2O &
IPA Tanks

Intertank
Engine

THRUST:
**500
LBS**



**VEHICLE
LENGTH:**
**12
FT**

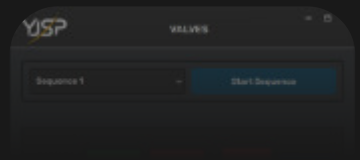
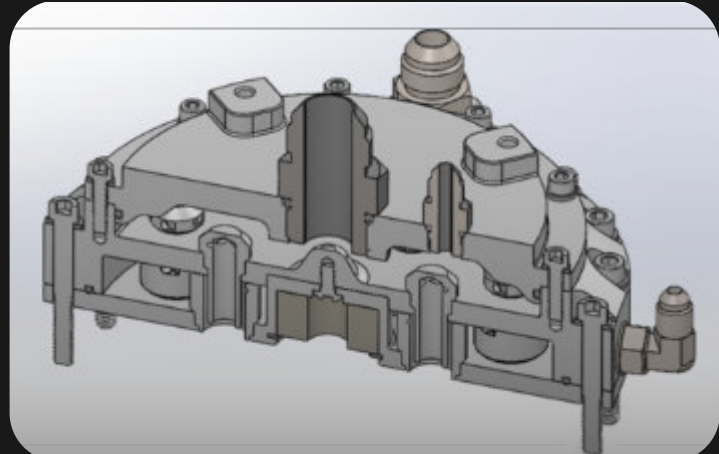
VESPU

Designed in Fall 2022, *Vespula* is YJSP's flagship project and the latest KeroLOX vehicle designed by the team. Our team of over 80 engineers is incorporating cutting edge and industry standard technologies into a student designed, built, and tested rocket. Building upon the successful development and launch of *GoldiLOX*, *Vespula* is focused on improving the capabilities of our KeroLOX systems and testing the technologies needed for a spaceshot vehicle.

With a diameter of 9.5" and a length of over 24ft *Vespula* will be the largest rocket YJSP has ever built. *Vespula* is also fully custom, with a complete suite of avionics and active control algorithms designed to maximize its performance as a pressure fed rocket. It uses highly optimized welded aluminum tanks along with custom composite aerostructures and custom main valves. *Vespula* is also capable of flying with a variety of engine configurations to maximize reusability and mission flexibility.



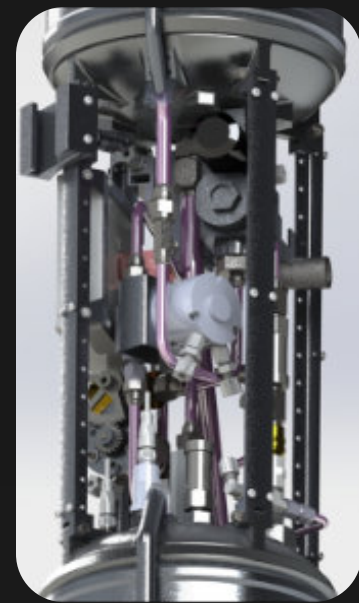
APOGEE:
100K FEET



- Recovery
- Avionics
- Pressurant Tank
- Intertank 1
- Jet-A Tank
- Intertank 2
- LOX Tank
- Intertank 3
- Engine



THRUST:
2500 LBS



PROPELLANTS:
Liquid Oxygen & Jet-A



VEHICLE LENGTH:
23 FT



SPONSORS

Building liquid-propelled rockets safely and sustainably requires a significant investment of time and resources. To attempt ambitious projects and continue to provide a valuable learning experience for Georgia Tech students, we rely on support from generous corporate and personal sponsors.

If you wish to make a one-time or recurring donation or provide another form of support, please see the instructions on the last page of this pamphlet. Be sure to reach out to us at yjsp@aerospace.gatech.edu so we can send you a thank-you!

Contributions are tax-deductible and can be made to the Georgia Tech Foundation in the name of the Yellow Jacket Space Program either online or by check.



	Bronze (<\$1k)	Silver (\$1k-10k)	Gold (\$10k-30k)	Diamond (>\$30k)
Logo on website, Mission Control trailer, and rockets	Small	Medium	Large	Large
Logo on merch and banners	✓	✓	✓	✓
YJSP Newsletter	✓	✓	✓	✓
Priority booking for info sessions	✓	✓	✓	✓
Social media shoutout	✓	✓	✓	✓
Solo social media post	-	✓	✓	✓
Access to YJSP resume book	-	-	✓	✓
Invitation to test events	-	-	✓	✓
Facility tour	-	-	✓	✓
Website company description	-	-	-	✓
Invitation to launch events	-	-	-	✓

LEADERSHIP TEAM

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Vice President: **Will Miller** (wmiller70@gatech.edu)

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Donation Instructions

Below are instructions for making direct monetary donations to the Yellow Jacket Space Program via the [Georgia Tech Foundation \(link\)](https://mygeorgiatech.gatech.edu/giving/make-a-gift).

Navigate to
mygeorgiatech.gatech.edu/giving/make-a-gift

Enter Donation
Amount


Enter "Yellow Jacket
Space Program" in
Special Purpose

Complete Donation

Georgia Tech

Give with Crypto

Make a Gift to Georgia Tech



Philanthropy at Work

Whether you support qualified students through need-based scholarships, research that leads to life-saving cancer treatments, or the construction of world-class facilities like the G. Wayne Clough Undergraduate Learning Commons, your gift is making a real difference in the lives of real people.

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1/1/2024

Select your gift frequency:
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