WARR rocketry

Why a Toaster Makes all the Difference – Problem Solving in Stressful Situations

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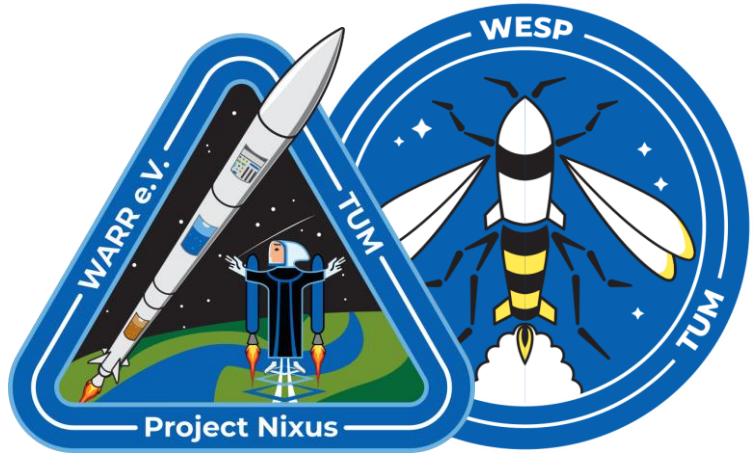


WARR
rocketry

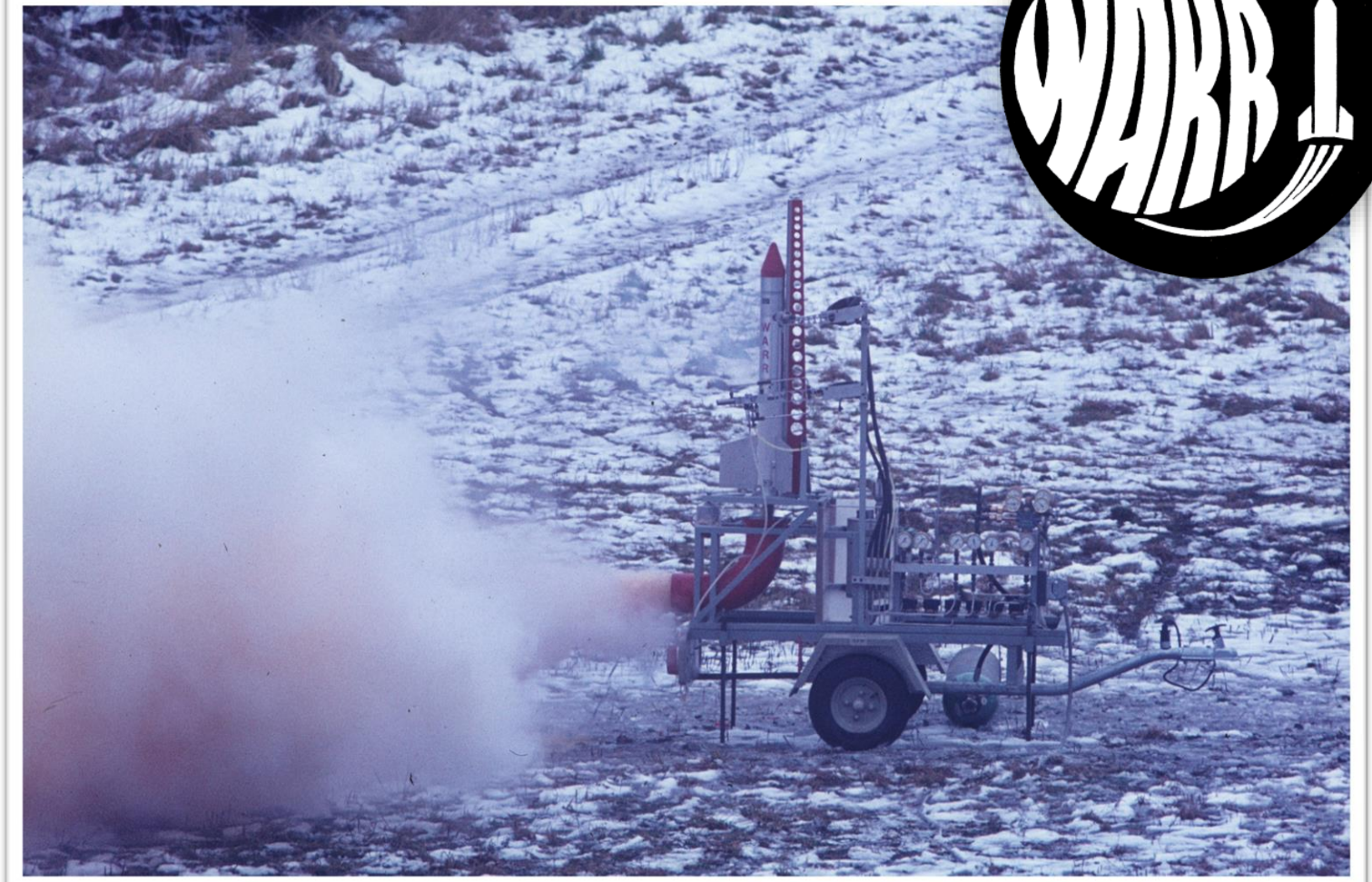
About me

- 22 years old
- Born in Düsseldorf, Germany
- Studying mechanical engineering at TUM
- Built a sailing yacht after school
- Building rockets since 2021

My journey in WARR rocketry

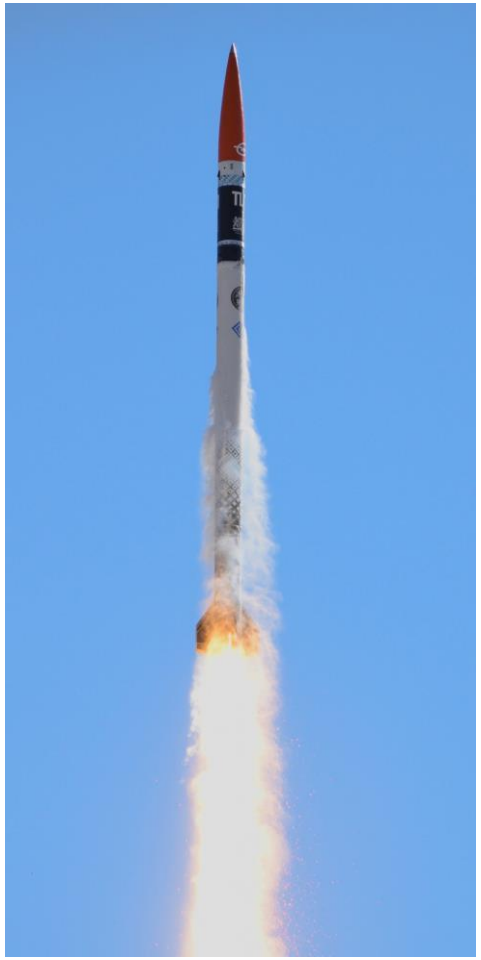
2021 – 2023:	Ground support equipment engineer in project Nixus
2023:	Launch Crew of project Nixus at SAC 2023 and EuRoC 2023
2023 – ongoing:	Founder and lead of project WESP
2024:	Successfully launched and recovered at SAC 2024

The history of WARR - Babarella



The history of WARR - Babarella

The history of WARR - Hyper



Recent WARR Alumni

founded by WARR Alumni | in 2018

founded by WARR Alumni | in 2018

about to be founded by WARR Alumni

Many more to follow...

Project Cryosphere

The Team

- Over 150 members
- More than 11 different disciplines
- The future of aerospace in Munich

The Team

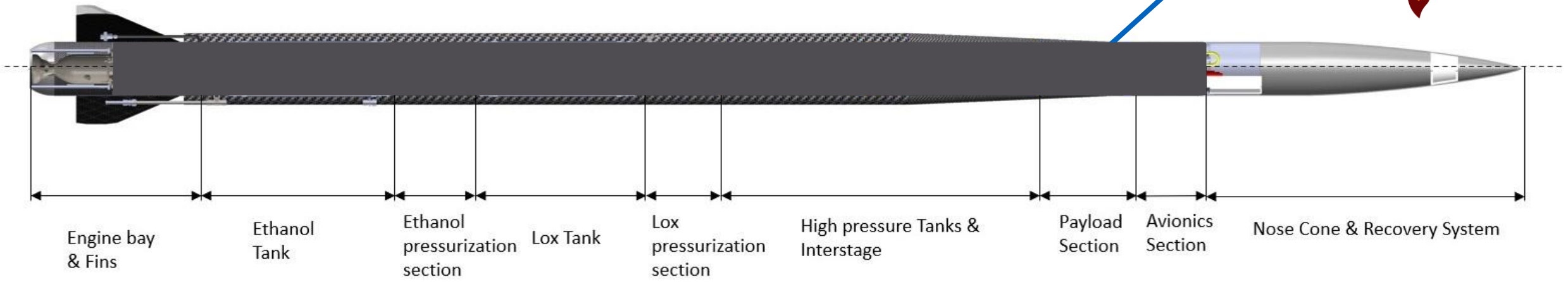
Launch Crew - Constancia | Portugal - EuRoC 2023

Launch Crew - Mojave Desert | USA – July 2023

Launch Crew - Camino Real | USA – SAC 2024

Project Nixus

EX-4b Bi-liquid Sounding Rocket



~ 85 KG LAUNCH MASS

~5.0 KM APOGEE

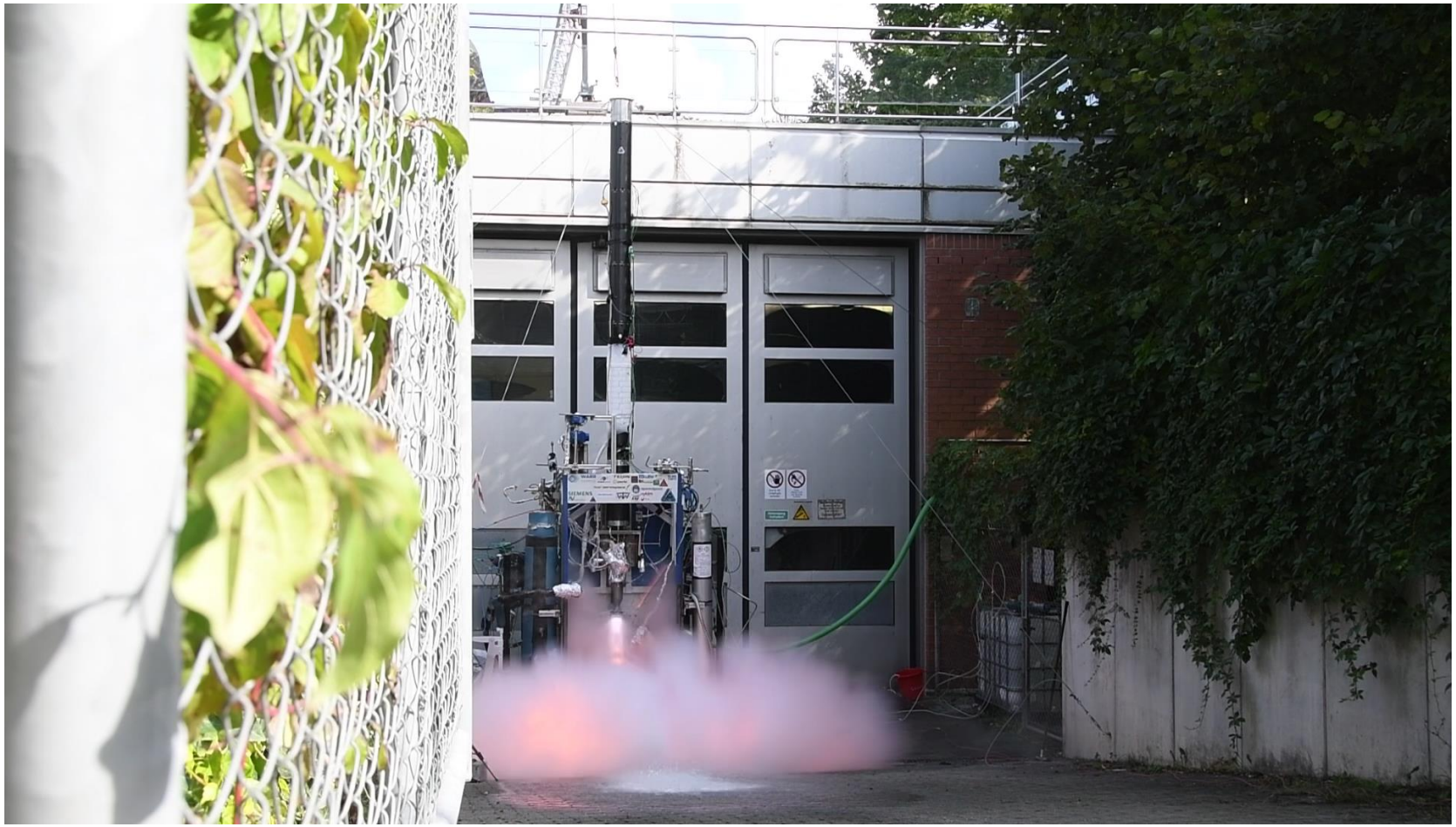
~ 65 KG DRY MASS

~ Mach 1.0

~ 3500 N max THRUST

~11 s BURN TIME

Project Nixus



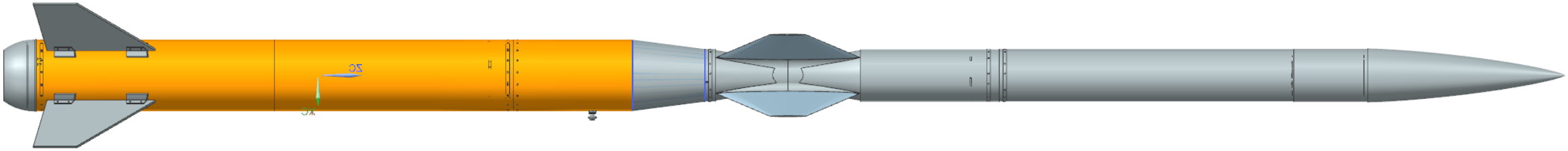
Project WESP

EX-1E Solid two-staged rocket launched at SAC 2024

Payload based on an ISS experiment developed by SpaceLabs

8km Apogee

In-flight ignition



Mach 1.5

>13 g acceleration

Self developed flight computer

Recent WESP Launches:

➡ 21.04.2024:

- **Where:** Straubing
- **Apogee:** 130m
- **Stages:** One

➡ 20.06.2024:

- **Where:** Spaceport America – New Mexico
- **Apogee:** 7800m
- **Stages:** Two

Launch day | Delft – 2023

Launch day | Spaceport America – 2024

Spaceport America Cup 2024

- Largest Intercollegiate Rocketry Competition
- Global participation from top universities

→ Over 150 institutions

- Has been initiated in 2017
- First SRAD High power two staged launch from a European team

European Rocketry Challenge 2024

- Largest Intercollegiate Rocketry Competition in Europe
- Over 600 Students participating
- Has been initiated in 2020
- Second participation of Project Nixus at the competition

Daily schedule – Launch day

2.00am:	Get up
2.30am:	Payload integration
4.00am:	Departure to launch site
5.30am:	Control room and pad setup
6.30am:	Final integration on rail
7.00am:	Vehicle health checks
7.48am:	Launch readiness

... waiting for GO from weather and FAA ...

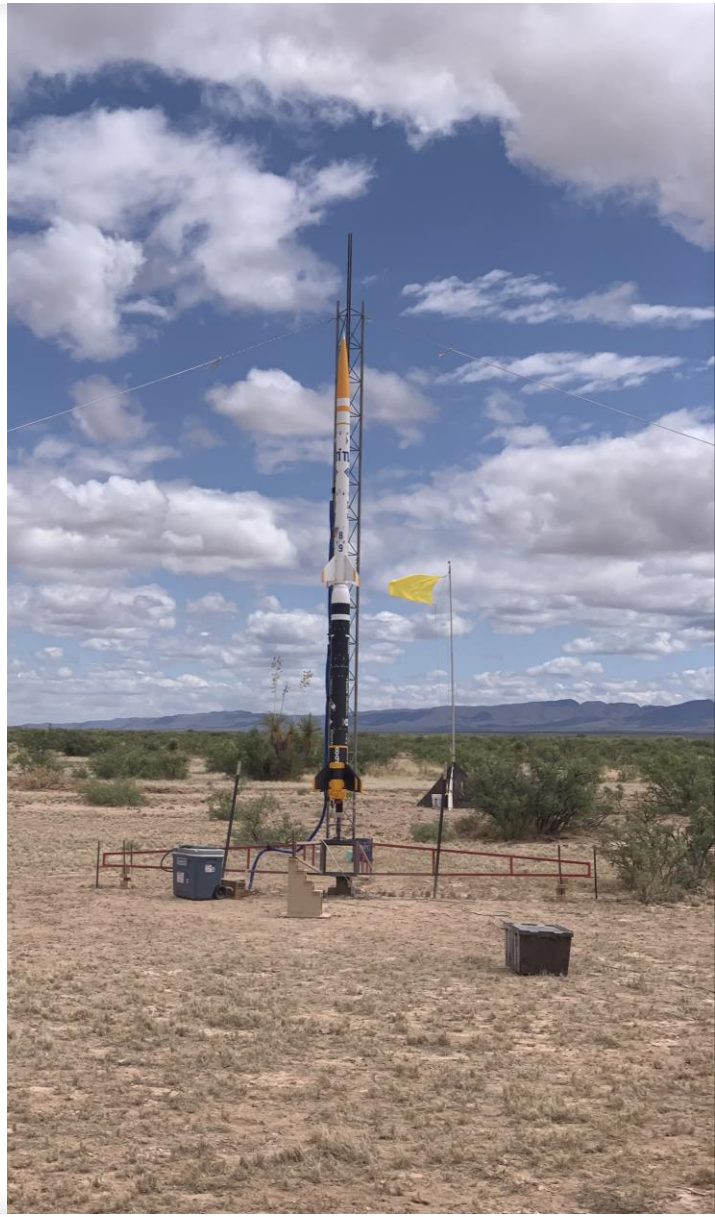
11.11am:	Range and Sky are clear for launch
11.14am:	Igniter installation
11.33am:	Liftoff
11.39am:	Both stages had successful touchdown
1.12pm:	Range is clear for vehicle recovery
1.26pm:	Visual on lower stage
1.42pm:	Visual on upper stage
2.34pm:	Both stages recovered successfully
3.00pm:	Post-launch vehicle check
3.45pm:	Leaving Spaceport America
5.15pm:	Arrival at rented house

Daily schedule – Days before launch

2.00am:	Get up
2.30am:	Payload integration
4.00am:	Departure to launch site
5.30am:	Control room and pad setup
6.30am:	Final integration on rail
7.00am:	Vehicle health checks
7.48am:	Launch readiness

4.00pm:	Airspace closed
4.45pm:	Leaving Spaceport America
6.15pm:	Arrival, payload disintegration
8.00pm:	Dinner
9.30pm:	EOD

... waiting for GO from weather and FAA ...



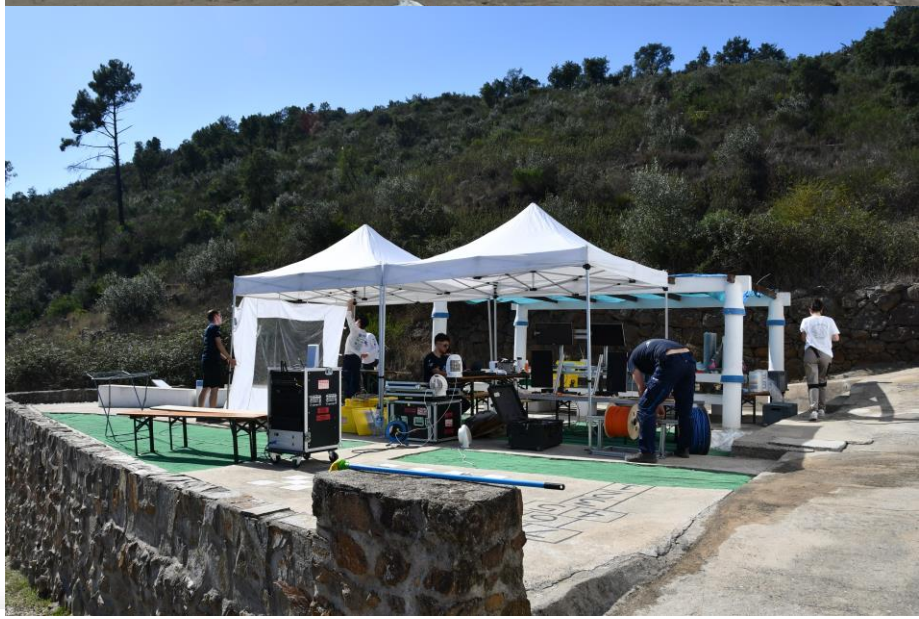
EuRoC 2023

General facts

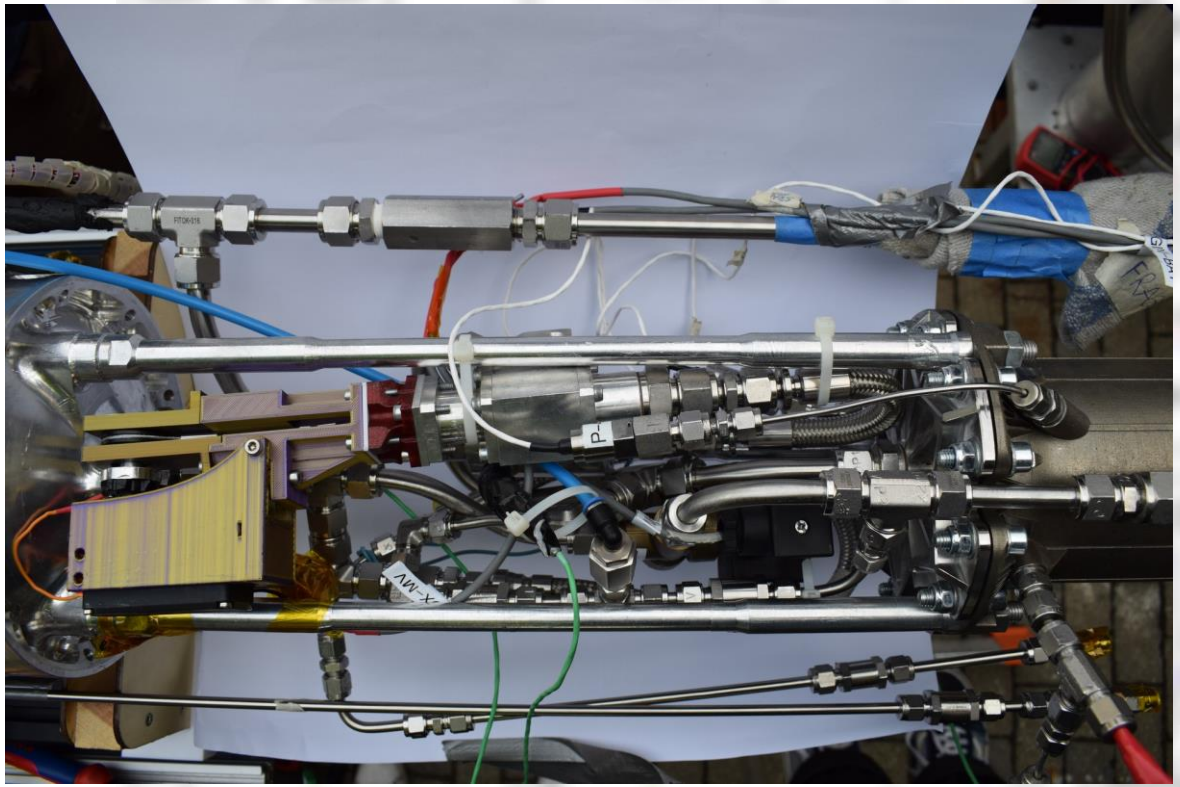
- 23 people involved in launch operations, 21 came as supporters
- Most advanced system at the competition
- 10t of support equipment
- Nearly 150 people involved
- Biggest student rocketry convention & competition in europe
- Constancia, Portugal

Logistics

- Launch rail:
  - 23m high
  - 3,5t heavy
- Several server racks for live communication with the vehicle
- Fueling equipment
- Emergency tools



Toaster story



Timeline

3.45am: Get up

4.00am: Departur[illegible]aunch site

5.00a[illegible]d pad setup

8.30am: [illegible]ation on rail

9.00[illegible]hecks

10.00am Laun[illegible]eadiness

3.55am: Francesco: Get me a spring
4.00am: Andrea gets up
4.05am: Andrea starts having breakfast
4.06am: Toaster gets disassembled
4.10am: Spring gets tested
4.30am: Valve works again

European Rocketry Challenge 2023

→ Winner of the EUROC 2023 design award
October 2023

Honors the overall **best design implementation**, which displays a high **competency in all its characteristics**, is based on stringent strategic decisions, provided an exceptional challenge to realize, and might even go **beyond pure rocketry** to put special attention towards its innovation and/or payload.

Where are we going?

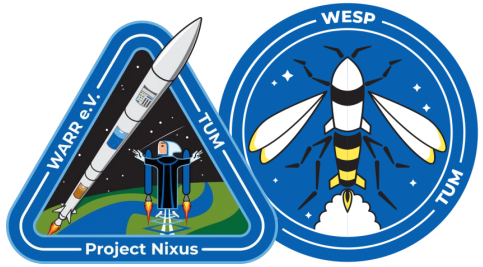
Breaking Barriers of student rocketry

- First student developed pump-fed liquid rocket engine
- Maiden flight in October 2025
- Fully in-house developed by students
- **Enable** practical **learning** within several areas
  - Controll algorithms
  - Fluid dynamics
  - Testing experiences

Summary

- Yearly competition launches
- Launches with apogee ~ 9 km
- Transonic flight regime
- Driven by industry standard tech
- In-house propulsion system development and testing

Contacts



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