Team Name	Aerospace Team Graz
Rocket Name	AVES II
Category	S3 (3 km solid SRAD)
University	Technical University Graz
Country	Austria
Team ID	01

Introduction and Project Goals

Since its founding on late 2019, the Aerospace Team Graz grew to an interdisciplinary team of about 80 students from 15 different fields of study. After the launch of ASTG's first rocket, called AVES, last year at EuRoC 2021, the team introduces the brand new successor model, **AVES II.**

The main **project goals** are to
- design & build as much possible in-house (SRAD)
- successfully launch our rocket,
- reach the target apogee of 3000 m AGL as accurate as possible
- safely land and recover AVES II

Additionally, this mission and the European Rocketry Challenge itself will help the team members to gain experience, to expand their knowledge and to make new friends and colleagues from all over Europe.

Mission Objectives

CubeSats create & build a sustainable launch platform to reach 3000 m for a 4 kg payload

NewSpace dynamic team capable of fast iterations & collaborations with young companies

Reliability advance sustainable solid propulsion for sounding rockets

Space4All easy entry into space sector for all levels of education

Hard Facts

diameter	152.4 mm
wall thickness	1.3 mm
mass	33 kg
max. velocity	Mach 0.9
max. acc.	10 g
payload	4 kg
total flight time	200 sec
length	3530 mm
total impulse	11000 Ns
burn time	4 sec
airbrake actuation	0.2 sec
single RC fuel grain	9.5 kg

Aerostructure Subsystem

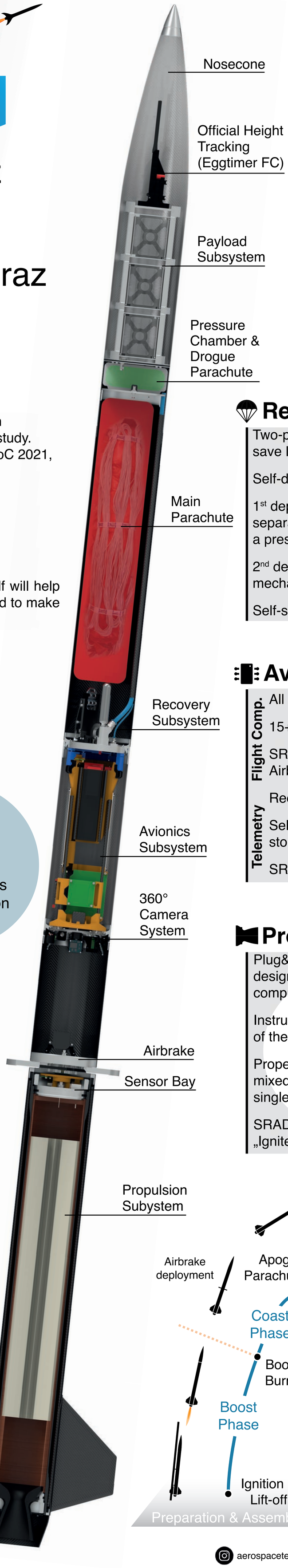
Materials: Carbon Fibre Reinforced Polymer (CFRP) and glass fibre (RF-transparent sections) sections with a wall thickness of ~1.3 mm connected by RADAX joints

Airbrake: two plates driven by a servo can create additional aerodynamic drag with an actuation time under 200 ms

Fins: made of CFRP Prepreg, each fin has a thickness of 4 mm and is filled with foam to add stiffness

Retractable Rail Buttons:
spring-loaded rail buttons coated in PTFE retract into the hull after leaving the launch rail

Riblet Foil: most of the rocket's hull is covered with a shark-skin-like riblet foil to reduce the total drag by 2%



AVES II 01

Payload Subsystem

Compartment for three 1U CubeSats designed for up to 4 kg payload mass total

- easily interchangeable
- telemetry possible

EuRoC 2022 Payload:

Project **Buffalo** (HTL Neufelden school, jm_space): Rocket Flight Computer

Project **Accipiter** (HTL Pinkafeld school): Rocket Flight Computer

Bachelor Thesis project **Hawfinch** (ASTG): Cosmic Ray Detector and Camera

Recovery Subsystem

Two-parachute dual-deployment recovery ensures save landing

Self-designed & redundant deployment mechanisms:

1st deployment: cold gas cartridges used for nose cone separation and drogue parachute deployment at apogee; a pressure chamber is used to minimize gas usage

2nd deployment: redundant linear actuator releasing mechanism used to deploy the main parachute

Self-sewn drogue & main parachute with deployment bag

Avionics Subsystem

Flight Comp.
- All 13 different PCBs were designed and soldered in-house
- 15+ Sensors spread throughout the rocket (excl. payload)
- SRAD Real-Time-Operating-System with Airbrake Control System in Coast Phase

Telemetry
- Redundant wireless links with high sending power (2W & 7W)
- Self-developed package protocol with visualization and storage on ground
- SRAD Ignition System with high safety

Propulsion Subsystem

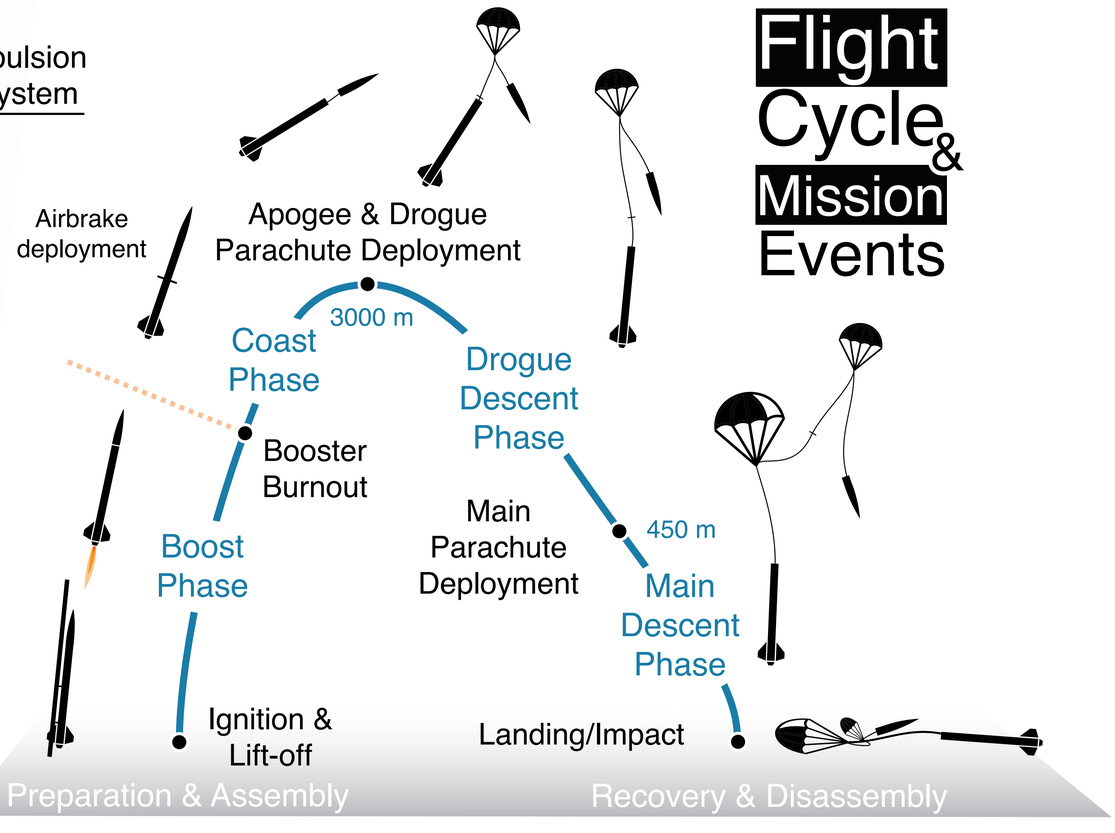
Plug&Fly: reusable hardware, easy and self-centering design allows quick rocket integration and ensures flight computer connection

Instrumentation: pressure and temperature measurements of the combustion chamber during flight

Propellant: potassium nitrate + sorbitol (Rocket Candy) mixed, melted and casted directly into the insulation in a single „finocyl" shaped fuel grain

SRAD Ignition: „Dome Sprayer" igniter inserted with „Igniter Lift"

Flight Cycle & Mission Events



aerospaceteamgrazofficial aerospaceteamgraz Aerospace Team Graz