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Andrew Barloon  
President 2022-2023

# MESSAGE FROM THE PRESIDENT:

To Community Members,

Welcome to another year of Cyclone Rocketry! We are grateful to be back on campus this fall. Last year we took a big step as a club as we continued to build on the progress we made during the 2020-2021 academic year. At the 2022 Spaceport America Cup, our rocket, Imperator, had a successful flight with a successful recovery. With our showing at the Spaceport America Cup, we placed second in the 10,000 ft SRAD division and fourteenth in the overall competition. We are extremely proud of our achievements during the 2021-2022 year and are eager to continue building upon them this year.

We have set exciting goals to push ourselves to new heights this year. Our primary focus is designing and building an exceptional rocket to win the 30,000 ft SRAD category at Spaceport America Cup 2023. This will be a six-inch diameter carbon fiber vehicle powered by a student researched and developed solid rocket motor. In addition to our main project, we are looking to expand our testing capabilities by constructing a modular test rocket capable of flight testing our team's ambitious projects. We are also continuing to value personal High Powered Rocketry (HPR) certifications, and seek to increase access for club members to earn these achievements.

Every year we grow and change, yet our mission remains the same: *"To educate, challenge, and inspire Iowa State students, the community, and future generations about rocketry, science and engineering, and space exploration"*. Cyclone Rocketry offers valuable technical and teamwork experiences to develop our members' skills and prepare students for careers in engineering. We require funding to continue our programs and produce club hardware. With your help, Cyclone Rocketry will have an extraordinary year. Thank you for considering sponsorship.

Andrew Barloon  
President, Cyclone Rocketry



# WHO ARE WE?

Cyclone Rocketry develops, manufactures, tests, and operates high power rockets. We promote the personal and professional development of our members by offering unique engineering experiences not available through classwork or other organizations. Our members range in background, with over three colleges and nine departments represented in the club. Through hands-on, practical, technical, and teamwork learning, we are preparing the next generation of engineers and leaders for industry. Since the founding of Cyclone Rocketry in 2017, a multitude of our alumni have contributed to the leading edge of aerospace within prestigious companies and organizations.

We participate annually in the Spaceport America Cup (SAC), an international rocketry competition. Our vehicle for the 2023 SAC will be a six-inch diameter rocket constructed primarily of carbon fiber, machined aluminum, and fiberglass. Our six subteams are each researching and developing functional subsystems to ensure success at the SAC.

## OUR MISSION:

*“To educate, challenge, and inspire Iowa State students, the community, and future generations about rocketry, science and engineering, and space exploration”*



# THE TEAMS

Here are the summaries of our six subteams, and the exciting projects and ambitious goals they have set for themselves for the 2022-2023 academic year.

The logo for the Avionics team is a circular emblem. It features a purple outer ring with the word "AVIONICS" at the top and "IOWA STATE UNIVERSITY" at the bottom. Inside the ring is a stylized circuit board with various electronic components.

## AVIONICS

Avionics is tasked with tracking and recording the rocket's position and other important parameters throughout all mission phases. This provides an insight into how the rocket and various subsystems are performing. Aspirations for this year include implementing a new software testing environment, upgrading printed circuit board designs, implementing a Kalman filter to better control airbrake deployment, and continuing to refine pre-flight system verifications when the rocket is fully assembled and on the launch tower.

The logo for the Aerostructures team is a circular emblem. It features a purple outer ring with the word "AEROSTRUCTURES" at the top and "IOWA STATE UNIVERSITY" at the bottom. Inside the ring is a stylized rocket engine or nozzle.

## AEROSTRUCTURES

Aerostructures designs, manufactures and tests airframe components such as fins, body tubes, and the nosecone. The primary materials used are carbon fiber and fiberglass due to their physical and mechanical properties. The team has invested in advanced tooling to enable more in-house manufacturing capabilities. Utilizing new technologies and processes, the team's goal is to manufacture all aerostructures components at Iowa State University. This will reduce cost, increase customizability, and most importantly give members a wide experience with different composite manufacturing techniques and structural design and simulation tools that will benefit their engineering careers.

The logo for the Mechanical team is a circular emblem. It features a purple outer ring with the word "MECHANICAL" at the top and "IOWA STATE UNIVERSITY" at the bottom. Inside the ring is a stylized mechanical component, possibly a piston or a valve.

## MECHANICAL

Mechanical is responsible for the design and manufacture of mechanical systems for the rocket. This year the mechanical team is focused on designing a piston ejection system to aid recovery systems ejection during rocket separation. In addition, the mechanical team designs, optimizes, and manufactures the various metal rocket components, including aluminum bulkheads, centering rings, and nose tip.



# PAYLOAD

Payload designs a particular static or dynamic experiment to be launched on the competition rocket. Previous experiments include the utilization of piezo electrics to generate electricity from flight vibrations, the deployment of medical polymers for disaster or first aid applications, the use of magnets for internal component stabilization, and integrating thermocouples into our nosecone to observe temperature differences throughout the flight. The high altitudes, force loading, and vibrations of the rocket flight profile allow for highly unique experiments to be conducted. The payload subteam undergoes a one-year design/build cycle and is a critical component in the Spaceport America Cup.



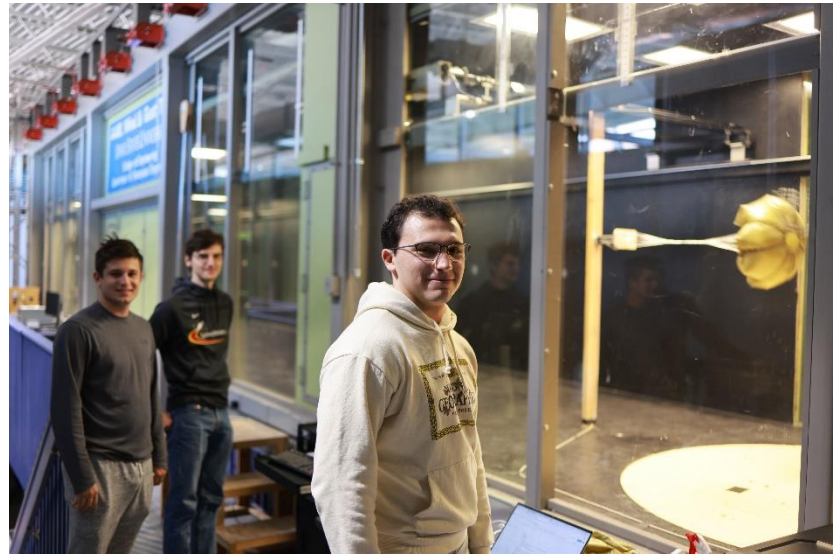
# RECOVERY

Recovery is responsible for getting the rocket down safely. Our advisor quotes: "Up is easy, down is hard". The recovery team designs parachute geometries, separation methods and ejection processes. The team also manufactures parachutes, which are integrated with shock cord and other hardware to complete the system. Goals for this year include the design of a reefed-main recovery system, and the design and testing of an updated main parachute geometry.



# PROPULSION

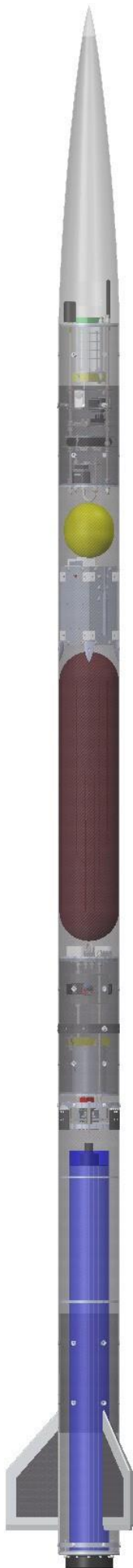
Propulsion is tasked with researching, designing, fabricating, and testing rocket motors to lift the club rocket to a desired altitude. Through the years, the propulsion team has developed motors ranging from 29 to 98 mm in diameter and is now developing a 152 mm motor. This design will undergo extensive testing and analysis. This leads to the ultimate goal of powering the SAC club rocket on a student researched and developed motor.



## OTHER FOCUSES

Cyclone Rocketry is involved in other projects in addition to Spaceport America Cup. As an organization, we are focused on offering the best member experience possible, which requires continuous club development. For a rocketry organization, this means the development of capabilities for higher and faster flight, leading to the successful launch and recovery of a vehicle over the Karman Line. To this end, we are researching and developing higher altitude projects and investigating the technologies needed for such projects.

While subteam experience leads to depth of knowledge in a particular domain, our personal High Powered Rocketry (HPR) certification program aims to give members an overall understanding of rocketry by building and flying their own rockets. The club offers end-to-end knowledge and logistical support for certification through Tripoli Rocketry Association by providing students access to subsidized level one and level two HPR kits. Certified members earn a sense of pride for their accomplishments and better contribute to club projects with their increased design, manufacturing, test, and operation skills.



# WAYS TO GIVE

Monetary donations for rocket and propulsion hardware development

Material Donations including -

- 6061/7075 aluminum
- PCB printing services
- Carbon fiber tow or cloth (dry or pre-impregnated)
- Composite sandwich panel cores (Amrid Nomex)
- Related composite layup material (peel ply, vacuum bag sheets, and breather materials)
- Pressure transducers, strain gages, cameras, and other hardware integrated directly into the rocket and test equipment

Design Reviews from experts in industry to help with development of solid rocket motors and flight vehicles



# DONOR BENEFITS

BY TIER

Name listed on website

Receive our Shop Talk newsletter

Visibility on t-shirt

Personalized thank you from our team

Paragraph on our website highlighting our sponsorship

Visibility on our rocket and banner

Promotion on team media (LinkedIn, Facebook, Instagram)

Access to team media for company promotion

Significant visibility on our rocket, t-shirt, and banner

Logo flown on a separate flag at Spaceport America

Prominent visibility on our rocket, t-shirt, and banner

Community <\$500

Ignition \$500+

Boost \$1,000+

Apogee \$2,500+

Premier \$10,000+

# THANK YOU!

Cyclone Rocketry requires financial support to achieve our mission. We offer promotion and media benefits to our sponsorship partners. We are happy to tailor partnerships options if requested. The club, our mission, and our outcomes are not viable without sponsor support. We are immensely grateful for those who invest in us.

For further sponsorship inquiries please contact [cyclonerocketry@gmail.com](mailto:cyclonerocketry@gmail.com). Checks may be mailed to the Iowa State University Foundation (2505 University Blvd, P.O. Box 2230, Ames, 50010) designated to Rocket Shop (our student organization designation). All donations are eligible for tax benefits.

Feel welcome to reach out with any questions. On behalf of the Cyclone Rocketry team, thank you!