



SPONSORSHIP INFORMATION
2016 - 2017

THANK YOU
FOR YOUR INTEREST
IN CORNELL UNIVERSITY'S
UNMANNED AIR SYSTEMS TEAM

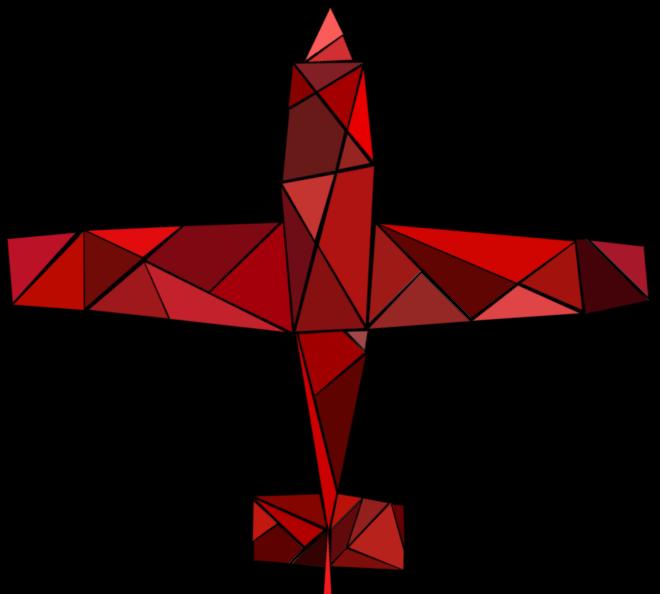


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ABOUT THE TEAM

CUAir is a diverse group of highly motivated and dedicated students who aim to stimulate and foster interest in unmanned air systems, technologies, and careers. We combine our individual areas of expertise— computer science, electrical and computer engineering, mechanical engineering, and business—to design, fabricate, and demonstrate a system capable of completing various autonomous aerial operations including waypoint navigation, image processing, and target recognition.



The team's focus is to compete in the Association for Unmanned Vehicle Systems International (AUVSI) annual Student Unmanned Air Systems (SUAS) Competition. The competition is held each summer at Patuxent River Naval Base in Maryland and brings together the top unmanned air teams from around the world.

To continue competing at the highest level, we stay up-to-date with the latest technology, design new and original control systems, and incessantly test subsystems onboard the aircraft. We heavily rely on external sources to further our research and success.

Subteams

Our Infrastructure

The CUAir team is broken down into subteams: Airframe, Autopilot, Business, Electrical, Mechanical, and Software (Distributed Systems and Vision). These teams must work together through the design, implementation, and competition phases of the year in order to achieve our goal of a victory at the AUVSI SUAS

Airframe

The **Airframe subteam** designs, builds, and tests all of the aerodynamic components of our custom airframe, including the wings, tail, motor mount, etc. We design our plane in SolidWorks and then build it using composite materials such as fiberglass, carbon fiber, polystyrene foam, and wood. Each year we create a light-weight, yet powerful and efficient aircraft that achieves the requirements of the mission.



Autopilot

The **Autopilot subteam** is responsible for ensuring that the aircraft can perform all necessary maneuvers to fulfill the mission requirements. This involves configuring and tuning the autopilot for our aircrafts and developing obstacle avoidance algorithms. Additionally, the team builds a custom ground station capable of configuring all of the parameters necessary for stable waypoint navigation.



Business

The **Business subteam** is responsible for managing non-technical operations on CUAir. Members of the business team work at the intersection of business and technology on the level of a tech start-up. Tasks include fostering relationships with companies, managing sponsorship, marketing and branding, interacting with the community through outreach events, heading alumni relations, managing the website, and promotion through social media.



Subteams

Electrical

The **Electrical subteam** is responsible for radio frequency (RF) communications, networking, power systems, on-aircraft computing, and custom electronics design. Last year this subteam developed custom power distribution and micro-controller printed circuit boards (PCB), a high-data-rate long-range RF communications link, and an advanced automated on-aircraft networking system.



Mechanical

The **Mechanical subteam** designs, builds and tests a full modular custom fuselage capable of carrying and protecting our mission payloads. We utilize rapid prototyping technologies and composites to create weight optimized structures capable of protecting the payloads during landing while remaining extremely light. Other projects include an antenna tracker, a pneumatic catapult system, and a brushless camera gimbal.



Distributed Systems

The **Distributed Systems** subteam is responsible for designing, building, and running the ground control station (with a manual target recognition UI) and the on-aircraft camera and gimbal control software as well as handling communications between the two.



Vision

The **Vision subteam** is responsible for developing an algorithm that accurately locates targets and identifies their characteristics. To accomplish this the team leverages cutting edge computer vision and machine learning techniques such as convolutional neural networks.

THE COMPETITION



WHAT:

16th Annual
AUVSI/ONR
SUAS Competition

WHERE:

Patuxent River
Naval Air Station:
Webster Field
Annex, Lexington
Park, MD

WHO:

~50 Teams from
around the world

WHEN:

June 2017

WHY:

Competition Mission Statement- "The SUAS Competition, aimed at stimulating and fostering interest in unmanned air systems, technologies and careers, is focused on engaging students in a challenging mission. It requires the design, integration and demonstration of a system capable of conducting air operations to include autonomous flight, navigation of a specified course and use of onboard payload sensors. Additionally, students are required to submit technical journal papers and make oral presentations."



THE MISSION:

The AUVSI Unmanned Air System (UAS) Competition is broken down into three parts. First there is a journal paper where teams are judged on overall system engineering design, proven test data, and safety procedures. Second there is a presentation where teams demonstrate the capabilities of their airframe, why they designed particular components a certain way to meet mission requirements, and how the team plans to execute a safe and professional mission. The last component of the competition is the mission itself.



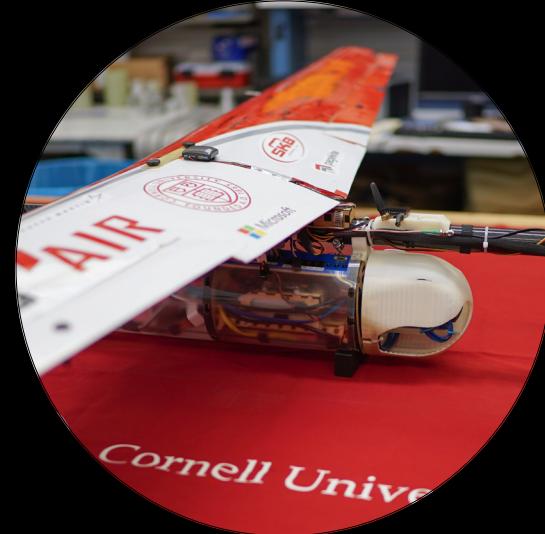
The mission consists of taking off, navigating GPS waypoints, searching a grid of a specific shape defined by GPS points, flying another set of waypoints, performing the Simulated Remote Intelligence Center (SRIC) task, and finally landing. The goal of the mission is to spot targets placed on the ground, classify them (Color, Shape, GPS position, etc.), and fly the mission as fast as possible. Key to winning are autonomous takeoff and landing, automatic target recognition, autonomous mission planning and flight, and autonomous data handling.

THESEUS

2015 - 2016

SPECIFICATIONS:

- Fully composite, battery-powered, puller aircraft with fully autonomous control
- Wing area: 1002 square inches
- Gross weight: 21 pounds
- Minimum Speed: 15 m/s
- Maximum flight duration: 30 minutes



MOTOR:

Theseus is powered by an AXI Gold 5320/20 Outrunner Brushless Motor running on a 9s Lithium Polymer Batteries.

AVIONICS:

Theseus is autonomously controlled using a 3DR Pixhawk running highly customized Arduplane firmware.

CAMERA:

A Point Grey Flea3 USB3 Vision camera with a Tamron M118FM08 lens is mounted on a dual axis gimbal system for image reconnaissance. The gimbal system is stabilized to point at the ground regardless of how the plane is rolled/ pitched.

OUR ACCOMPLISHMENTS

2016

2ND
PLACE
Finish Overall

2nd
in . Mission
• Presentation
• Flight
Readiness
Review

“Just Joe”
Sportsman-
ship Award
for assisting
13- year ri-
val NC State
during their
mission

2015

2014

2ND
PLACE
Finish Overall

1st
in Mission
for the 3rd
consecutive
year!

1ST
PLACE
World
Champions

1st
in . Mission
• Journal
Paper

2013

2012

2ND
PLACE
Finish Overall

1st in Mission

6th
in Oral
Presentation

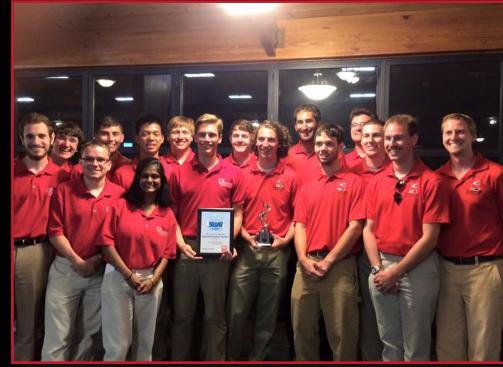
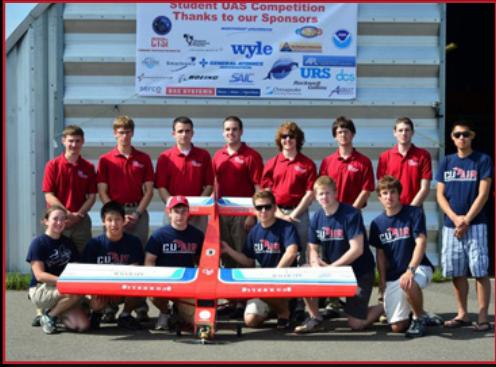
7th
in Journal
Paper

1ST
PLACE
Overall

CUAir enters
the AUVSI SUAS
competition for
the first time
and takes home
first place!

2003

CUAIR THROUGH THE YEARS



2003

2012

2013

2014

2015

2016



Aeolus II



Hyperion



Helios



Eos



Theseus

Outreach

Throughout the year, the Business team hosts events to spread STEM awareness and to promote the team's message. CUAir also attends events and collaborates with other organizations to maximize audience reach. In the past, CUAir has collaborated with other project teams to host workshops for young students, presented demonstrations at the Sciencenter, attended start-up and technology conferences, and presented on autonomous robotics at the Smithsonian National Air and Space museum



—Why Contribute—



BY CONTRIBUTING, YOU WILL:

- Bring students together from across multiple departments and interests to achieve a common goal
- Research and continue to advance the field of autonomous unmanned systems
- Continue our education through real world, practical endeavors outside of the classroom

THERE ARE ALSO ADVANTAGES FOR YOU:

- Increased recruiting presence on campus, with direct access to all members of the team, each of whom have practical experience in unmanned air systems and engineering
- Exclusive CUAir resume book
- Increased PR through corporate logos on the aircraft
- Increased PR through grateful acknowledgment on the team website
- Tax deductible contributions
- Knowledge that your help allows CUAir members to continue to grow and explore the expanding industry for unmanned air systems!

Diamond Sponsors:

Over \$4,999 in money, parts, or discounts

- Placement of one large corporate logo on the aircraft
 - Placement of one large corporate logo on the competition poster
 - A prominent acknowledgement of your contribution on our team website complete with a corporate logo

Platinum Sponsors:

\$2,500 to \$4,999 in money,
parts, or discounts

- Placement of one medium corporate logo on the aircraft
 - Placement of one medium corporate logo on the competition poster
 - A prominent acknowledgement of your contribution on our team website complete with a corporate logo

Gold Sponsors:

\$500 to \$2,499 in money, parts,
or discounts

- Placement of one small corporate logo on the aircraft
 - Placement of one small corporate logo on the competition poster
 - A prominent acknowledgement of your contribution on our team website complete with a corporate logo

Silver Sponsors:

\$250 to \$499 in money, parts,
or discounts

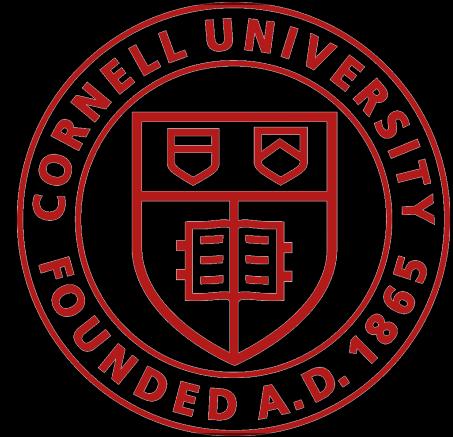
- An acknowledgement of your contribution on our team website complete with a corporate logo

Bronze Sponsors:

Up to \$250 in money, parts, or discounts

- Personal thank you letter from the CUAir team

2015-2016 SPONSORS



 Portwell
SEQUOIA 

 SOLIDWORKS



 BOEING

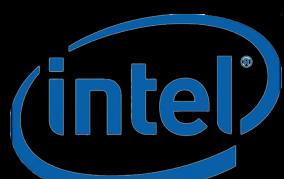


 Hivemapper  Procurify

 Microsoft  Travis CI  BROADWAY TECHNOLOGY

 THUNDER POWER

 LOCKHEED MARTIN



 WINGS Over Ithaca



Thank You Sponsors

CONTACT US

We know for many, the easiest means to contribute is through gifts "in kind". This would include anything dealing with physical components, software programs, or travel related expenses. Some examples include wireless antennas/routers, motors, and lodging/travel for the competition. We would be glad to discuss any potential opportunities for this type of sponsorship.

The most helpful sponsorship to CUAir is a financial donation. These funds make it possible for CUAir to improve our current technology and keep advancing. All checks should be made out to "Cornell University-CUAir" and sent to Brendan Quinn, information below. If you have any questions or would like more information please feel free to visit our website at cuair.org or contact our Business Team Lead. We are happy to work with you in any capacity or just discuss the team.

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THANK
YOU