UCI Samueli School of Engineering

Winter Design Review 2019

UAV FORGE

Faculty Advisors: Natascha Buswell, Quoc-Viet Dang & Ian G. Harris

Project Email:
uavforge.uci.sdp@gmail.com
Follow this project!
https://sites.uci.edu/uavforge/

COMPETITION

UAV Forge is a multidisciplinary engineering senior design project dedicated towards creating a fully autonomous, competitive, mission-based UAV. Since Fall 2017, UAV Forge has begun pursuing a competition called Student Unmanned Aerial Systems (SUAS) by the Association for Unmanned Vehicle Systems International (AUVSI) Seafarer Chapter.

Where: **Webster Naval Air Station, in Patuxent River, MD**

When: **June 12th to 15th, 2019**

AUVSI SEAFARER

OBJECTIVES

Determine the most optimal UAV design that satisfies the AUVSI SUAS requirements and must complete the following:

1. Mission Demonstration tasks
   a) Autonomous Flight and Waypoint Capture
   b) Object Detection, Classification, and Localization
   c) Air Delivery: Drop UGV (Unmanned Ground Vehicle)
   d) Interoperability: Real-time data transfer to and from judges
2. Technical Design Paper
3. Flight Readiness Review

DESIGN REQUIREMENTS

To accomplish the Mission Demonstration tasks, the design specifications for our UAV are the following:

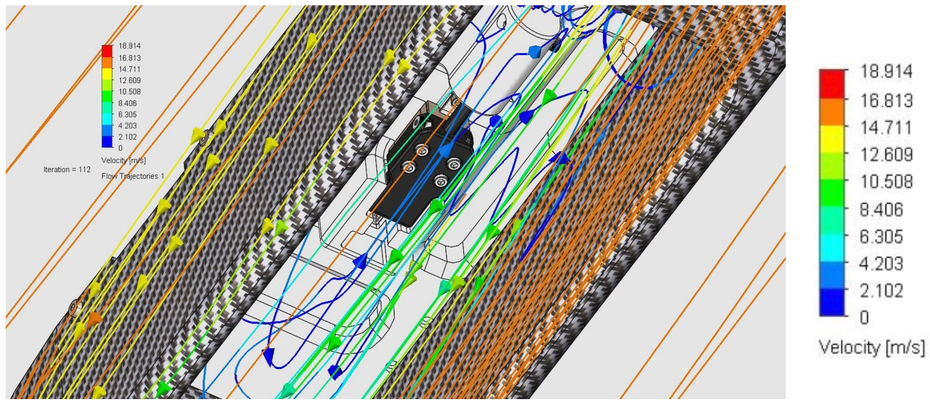
- Max takeoff weight is 55 lbs
- Aircraft must be able to operate in 15 to 20 knot winds
- Must fly autonomously for at least 3 minutes
- Operate at 1 Hz for aircraft telemetry
- Flight time: 30 minutes maximum
- Avoid cylindrical objects with radius between 30 ft and 300 ft and height between 30 ft and 750 ft
- Teams must be able to operate without competition provided electrical power for up to 10 minutes

ENGINEERING APPROACH

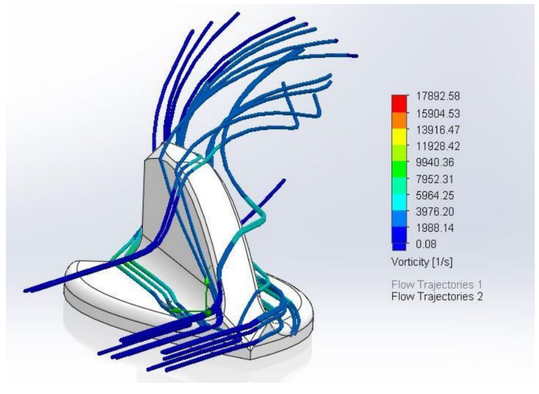
Competition Aircraft: Avistar Sport

- A high wing aircraft configuration allows for a more stable flight
- Wing Area: 1448 in^2
- Wing Loading: ~2 lb/ft^2
- Wingspan: 90.5 in
- Motor: SUNNYSKY X5320
- Max Static Thrust: 80.41 N

Unmanned Ground Vehicle Dispatch Mechanism SolidWorks Flow Simulation:

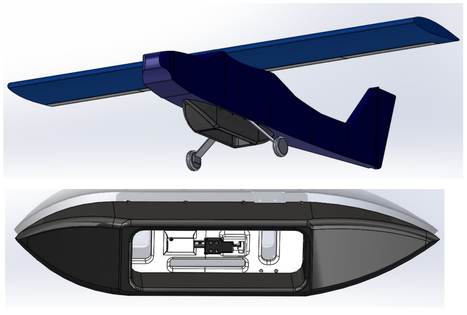


Vortex Generators:



Visual data for the CFD Simulations; Resulting vorticity: 2000-4000 [1/s]

Drop Mechanism for Unmanned Ground Vehicle:



TIMELINE

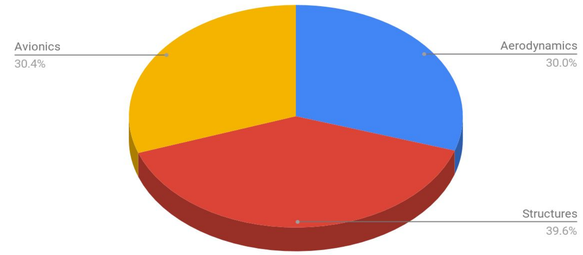
Winter Quarter Goals:

- Complete a weighted remote control flight test
- Complete an autonomous flight test

Spring Quarter Goals:

- Successfully deploy the UGV mid-flight
- Perform trial runs of competition flights

WINTER QUARTER BUDGET



Total: $1,400

TEAM STRUCTURE