

About GW Design/Build/Fly

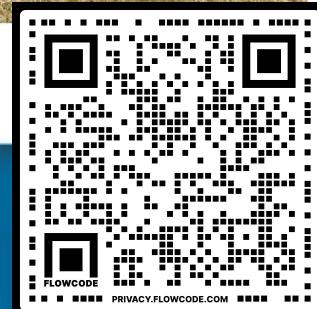
GW Design/Build/Fly (DBF) is a student-run organization in which members design, build, fly, and optimize a radio-controlled aircraft to compete in the international DBF competition.

The GW DBF team started in 2016 as an engineering capstone project, and over time has evolved into a group of over 20 active participants that include underclassmen and students outside of engineering.



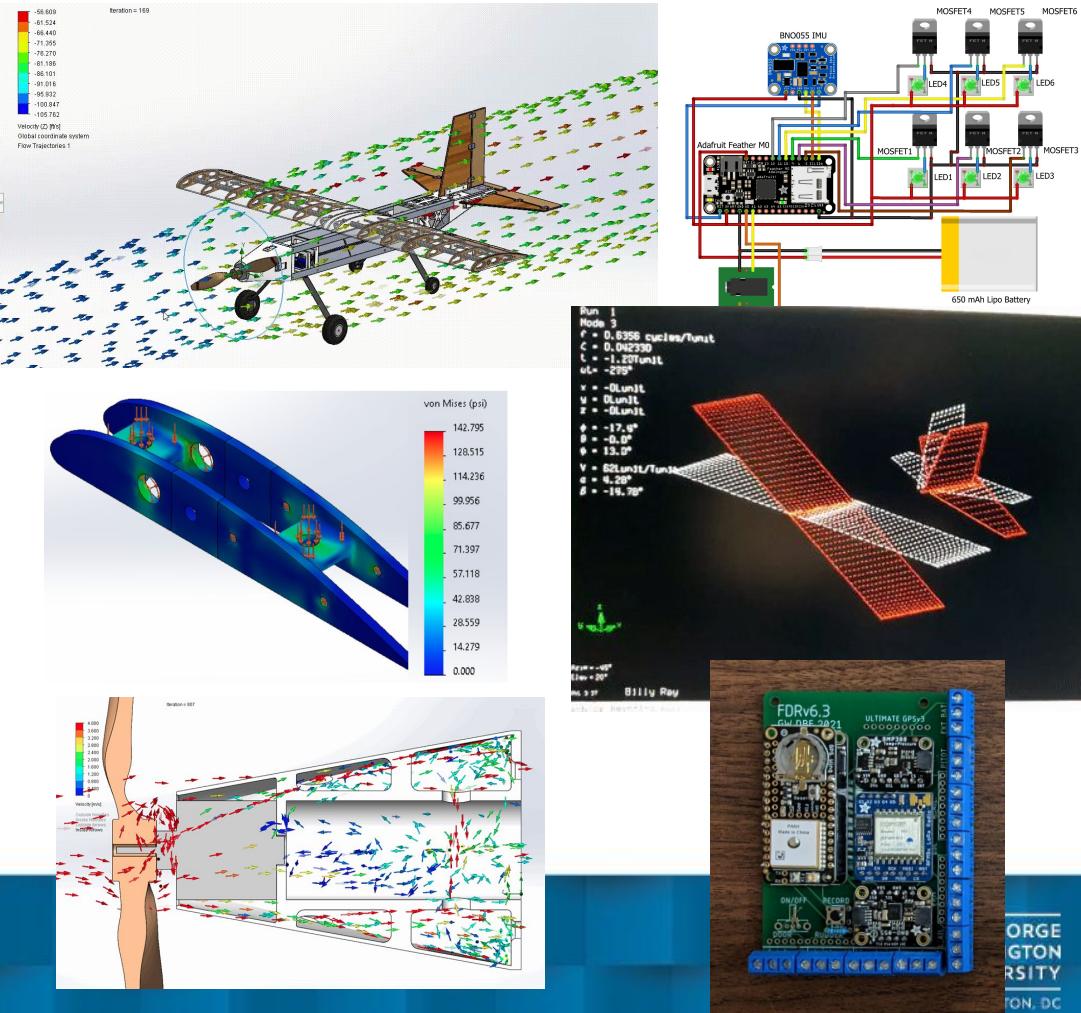
<https://bit.ly/dbf2023interest>

Interest form →



Design

- CAD
- Computational Fluid Dynamics
- Finite Element Structural Analysis
- Stability Analysis with AVL
- Circuit Design and Prototyping
- Python Programming



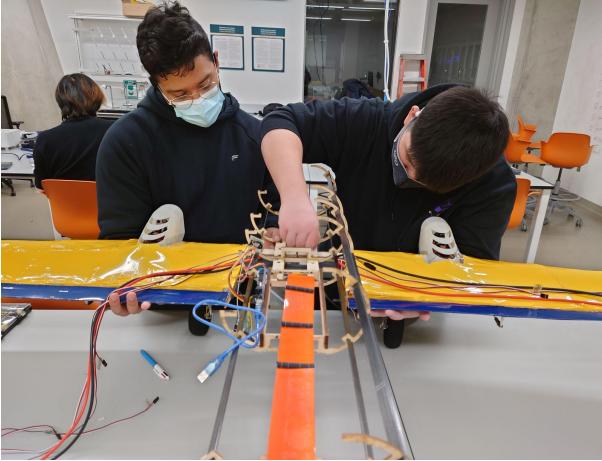
Build

Manufacturing Methods:

- Laser Cutting
- 3D Printing
- Machining
- Sanding, drilling, gluing, etc.

Materials:

- Balsa, plywood
- Monokote
- PLA, nylon
- Carbon fiber



Fly

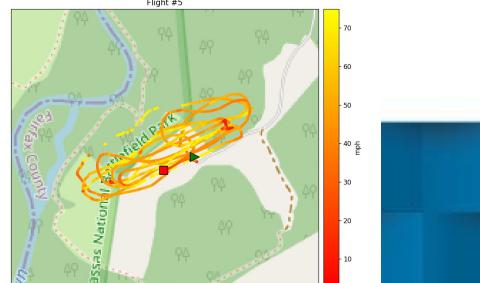
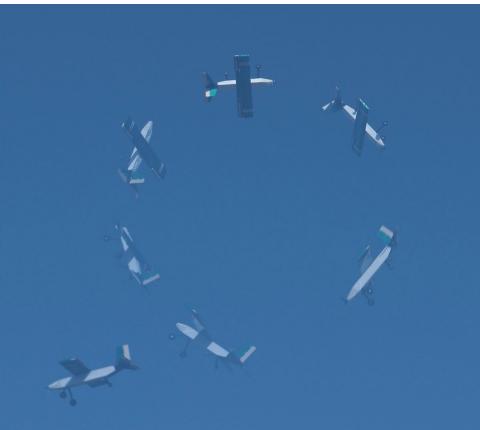
Testing Process:

Testing plan, performance criteria

Test Flights

- Air-worthiness Flights
- Mission Flights
- Aerobatic Flights
- Data Collection

Data Analysis

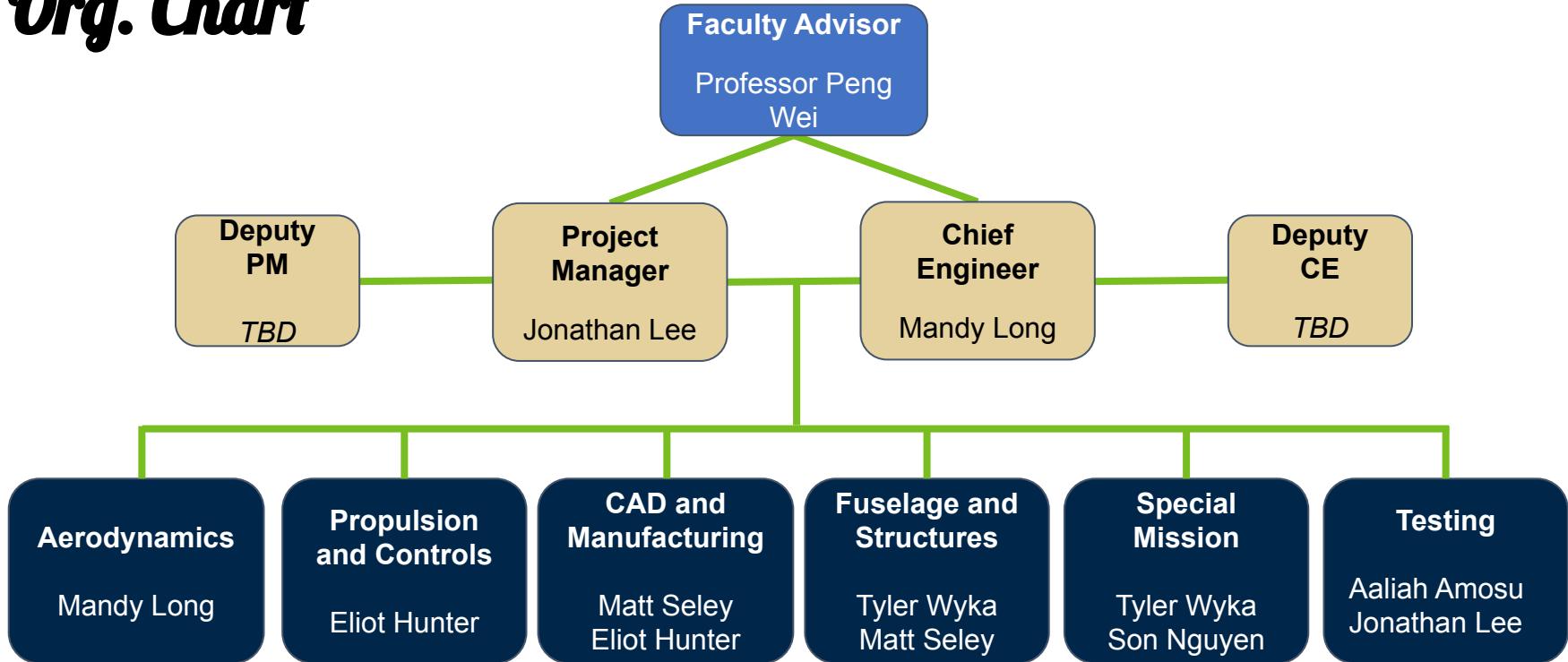


Our Brief History

6th place overall out of 92 team in the 2021 AIAA DBF Competition



Org. Chart

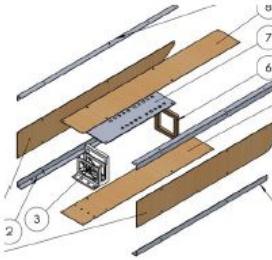


Team Composition



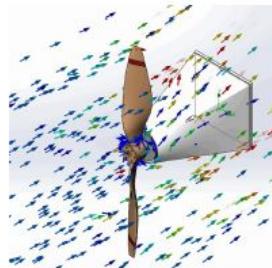
Aerodynamics

Designs the wing and empennage. Conducts CDF simulations and stability analyses on the plane.



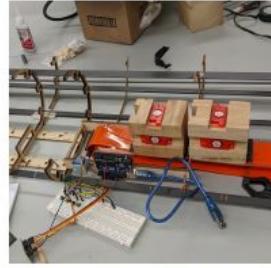
Fuselage & Structures

Designs the fuselage and landing gear. Evaluates structures using FEA.



Propulsion & Controls

Configures the optimal propulsion configuration. Works with avionics systems within the plane.



Special Mission

Designs the systems needed to complete the special mission including payload operations.



CAD & Manufacturing

Creates the CAD design of the plane. Manufactures components and assembles the plane.



Testing

Collects flight data using a custom flight data recorder. Assesses the aircraft's competitive advantage and viability.

Timeline

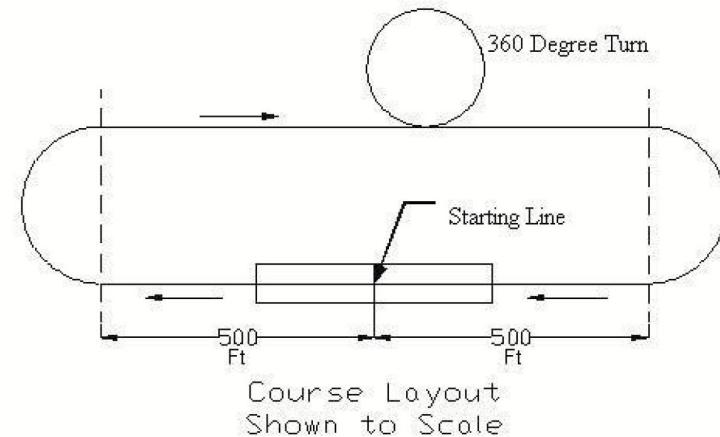
Previous Missions: Bomber, banner towing, sensor deployment, vaccine delivery, electronic warfare

1. **September** - Request for proposal
2. **October** - Design proposal. Conceptual design, team, project management
3. **November, December** - Sizing and detailed design
4. **January** - Build prototype and fly
5. **February** - 60 page design report
6. **March** - Flight testing - Build competition aircraft
7. **April** - Competition. Tucson, Arizona.

2023 Competition Overview

Electronic warfare mission to simulate surveillance and jamming flights.

- Mission 1: empty flight
- Mission 2: electronics payload flight
- Mission 3: jamming antenna flight
- Ground Mission: structural test: supported by wingtips, load fuselage



2023 Missions

- M3: Fly with antenna mounted on one wing. 5 minutes to fly 3 laps
 - Allowed a counterweight on opposite wing
 - Score is function of antenna length / lap time

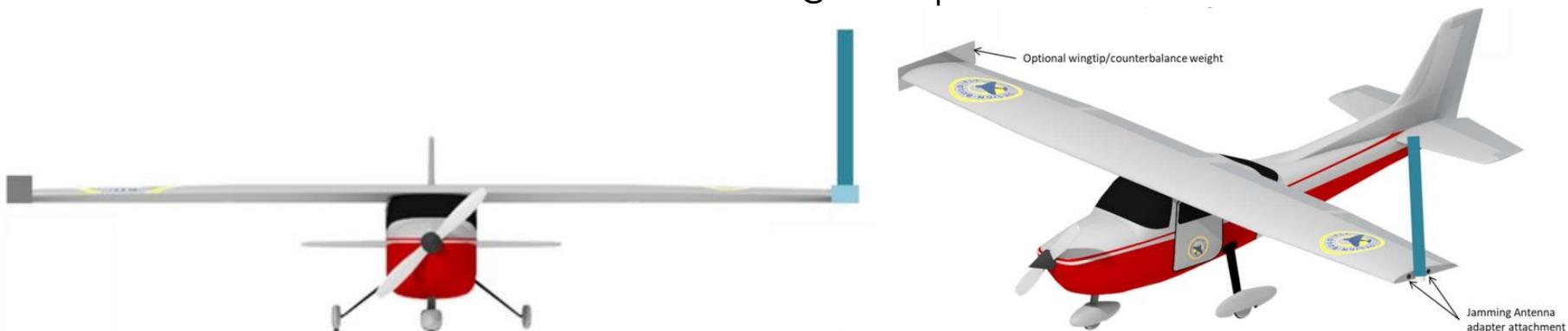


Figure 1: Jamming Antenna Attachment and Orientation



2023 Missions

- GM: Apply test weights to fuselage on ground test fixture.
 - Aircraft must not touch ground
 - If structural failure or deformation occurs - test is a failure
 - Score is function of total test weight / max aircraft weight



Constraints

- Shipping box size
 - $L+W+H \leq 62"$
- Pelican case
 - Interior: $29.6 \times 15.5 \times 9.4"$
 - Exterior: $32.6 \times 18.4 \times 11.0" = 62"$
- Or build our own case



Conceptual Design & Proposal

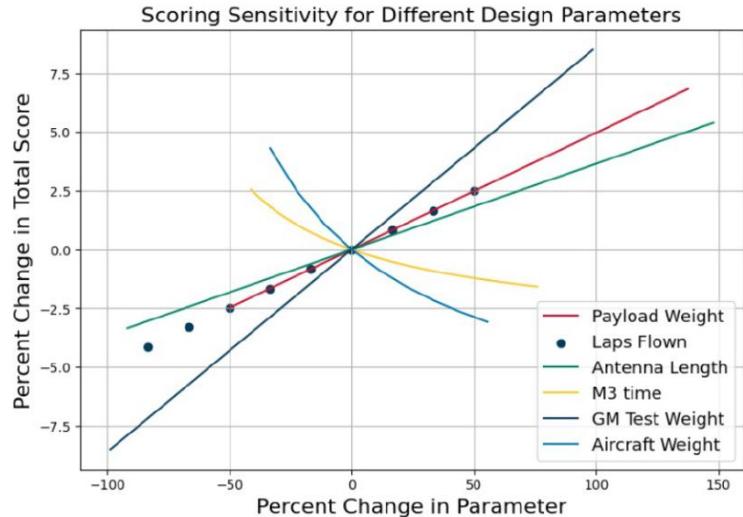


Figure 3 - Scoring Sensitivity

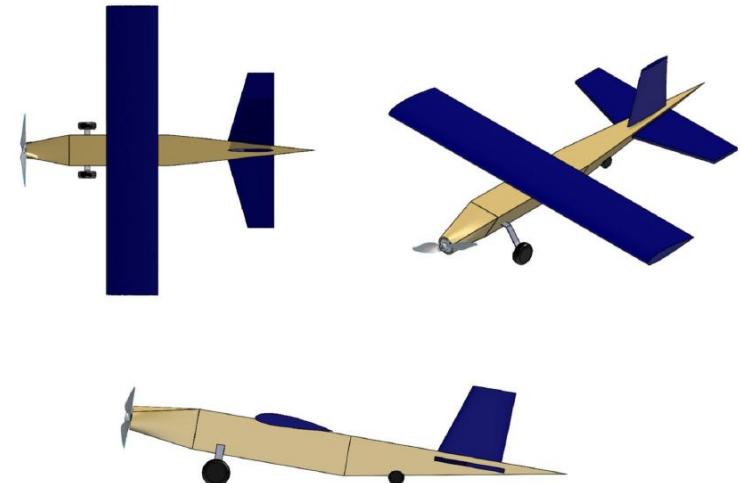


Figure 4 - Conceptual CAD

Conceptual Design

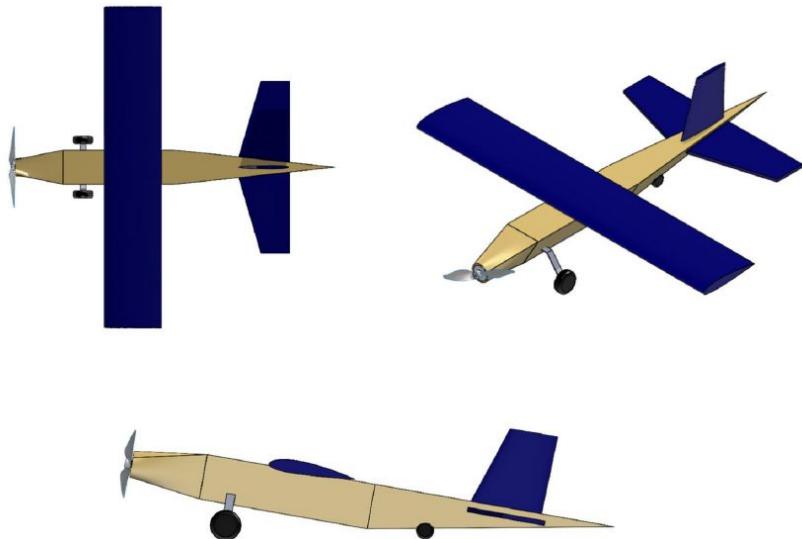


Figure 4 - Conceptual CAD

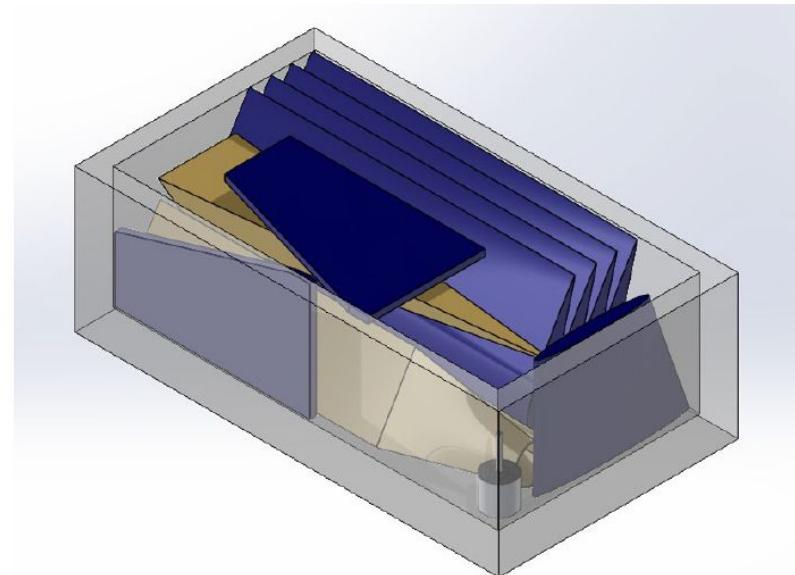


Figure 5 - Aircraft Stowage in Shipping Container

GW DBF 2021/22 Season Recap

<https://youtu.be/SOV6cqjPZa4>



Want to Join Us?

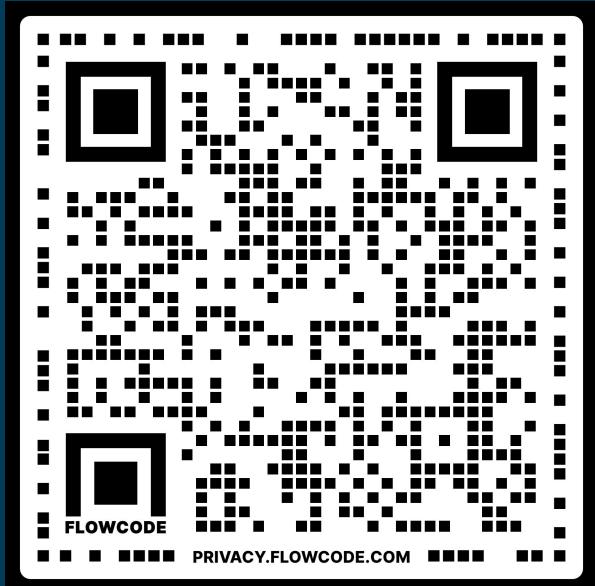
Fill out the interest form!



<https://bit.ly/dbf2023interest>

Check out our flight videos:

<https://bit.ly/GWAIAAYoutube>



Department of Mechanical and
Aerospace Engineering
School of Engineering & Applied Science



Thanks for listening!

