Liam Murphy

Project Portfolio

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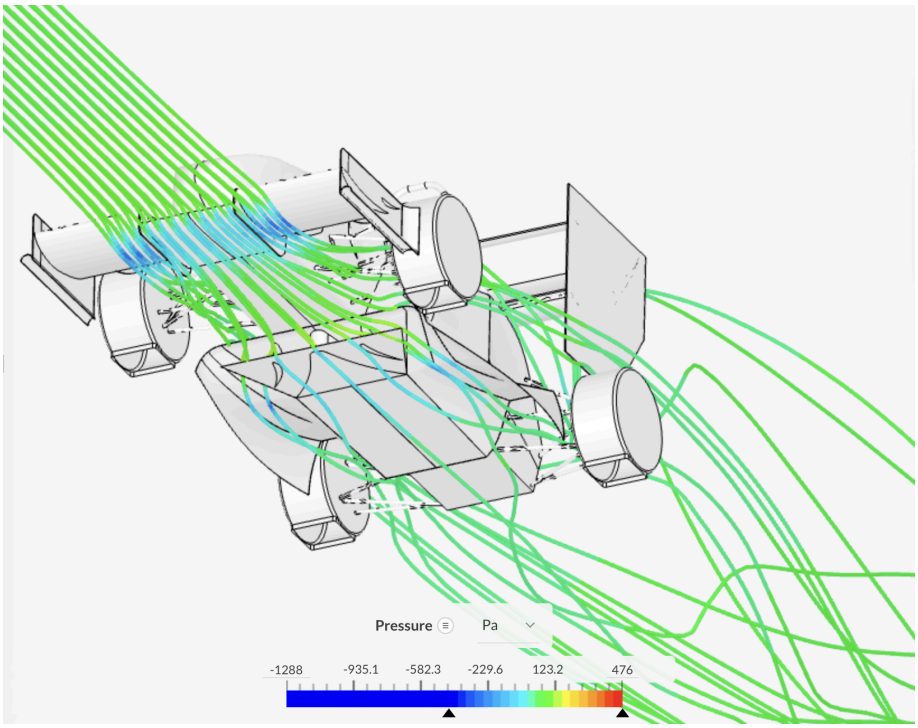
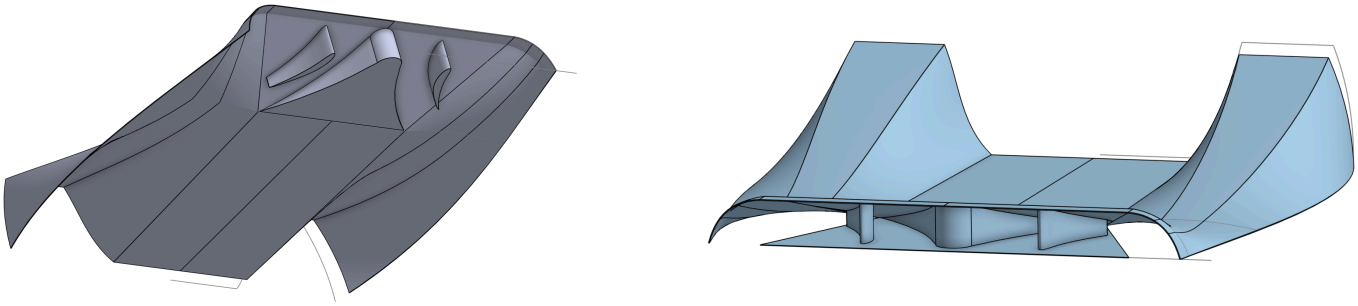
FSAE Undertray & Diffuser Development



CFD Pressure Field

Objectives & Constraints

Design and validate an undertray inlet geometry that increases vehicle downforce and cornering velocity while maintaining aerodynamic efficiency and rules compliance.



Two CFD tested inlet designs

Design & Analysis

- Inlet and throat geometry constrained by suspension design and FSAE rules.
- Aerodynamic surfaces modeled in CAD and evaluated with CFD pressure and velocity fields/plots.
- Geometry iterated to decrease underbody pressure and increase mass air flow through either diffuser tunnel.

FSAE Carbon Coupon Testing

Carbon coupons ready for testing

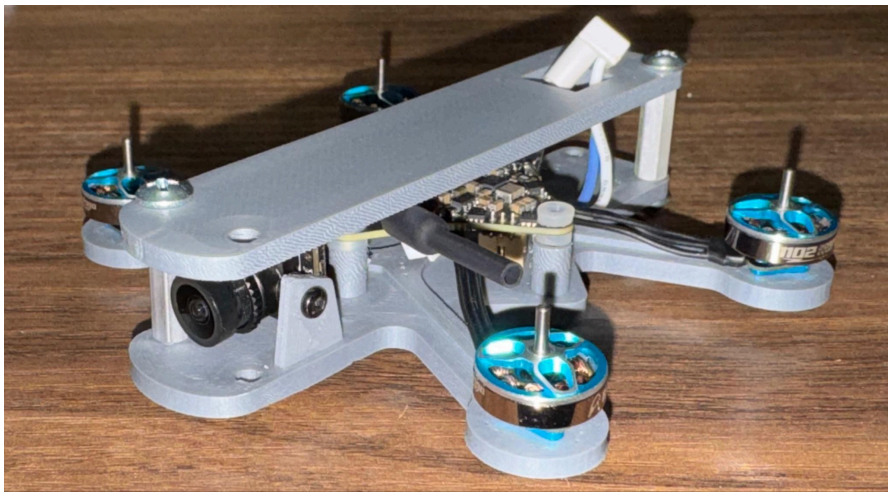
Objectives

Determine effective mechanical properties of the carbon fiber laminate used on the car, and compile results into a validated material dataset for structural FEA and future component design.

Testing & Analysis

- Manufactured carbon fiber coupons with controlled epoxy content to evaluate variability in laminate properties.
- Performed tensile and compressive testing using a universal testing machine to extract strength and modulus values.
- Iterated coupon geometry and layup procedure to reduce data inaccuracies and improve repeatability of test results.

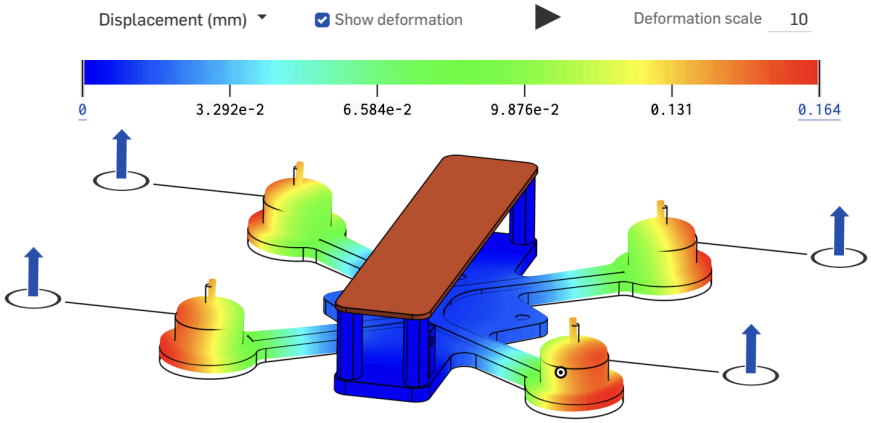
Personal Project: FPV Drone (Work in progress)



Functional Prototype

Objectives

Design and build a small/midsize class First-Person-View racing quadcopter using 3d printing and off the shelf electronic components. The drone must be capable of performing quick and precise aerobatic maneuvers, and must have a power to weight ratio of 3 or higher.



FEA on frame

Design & Analysis

- Selected and packaged lightweight electronic components to meet mass, power, and dimensional constraints
- Motor arms designed with spars for resisting displacement from motor loads, validated with FEA
- Theoretical maximum velocity and maximum angular rates calculated using quadcopter rigid-body equations of motion