

Design Portfolio

Vanu Rao



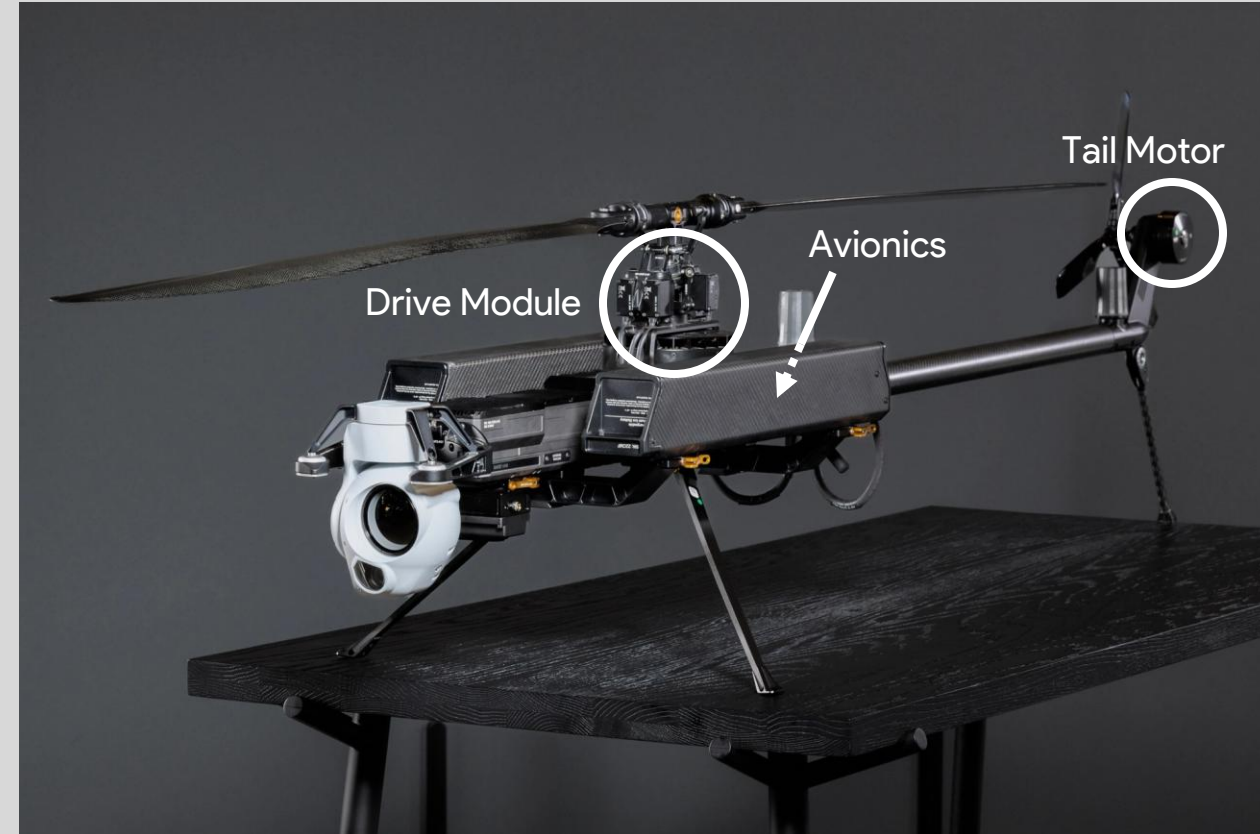
Anduril Ghost X2

Objectives:

- Avionics thermal management
- Design for production scalability

Outcome:

- Heat pipe + heatsink cooling
- Multiple injection molded parts
- Designed avionics thermal solution using a 1D model, FEM, and prototype flight testing to validate heat pipe and heatsink geometry
- Developed injection molded IP4X EMI shield for tail motor in accordance with MIL-STD-461
- Simplified drive module servo mounting & cable routing into injection molded cage
- Prototyped airframe for fit and mechanism checks & general concept green-light



The Ghost X platform, architecturally similar to X2

Further details confidential

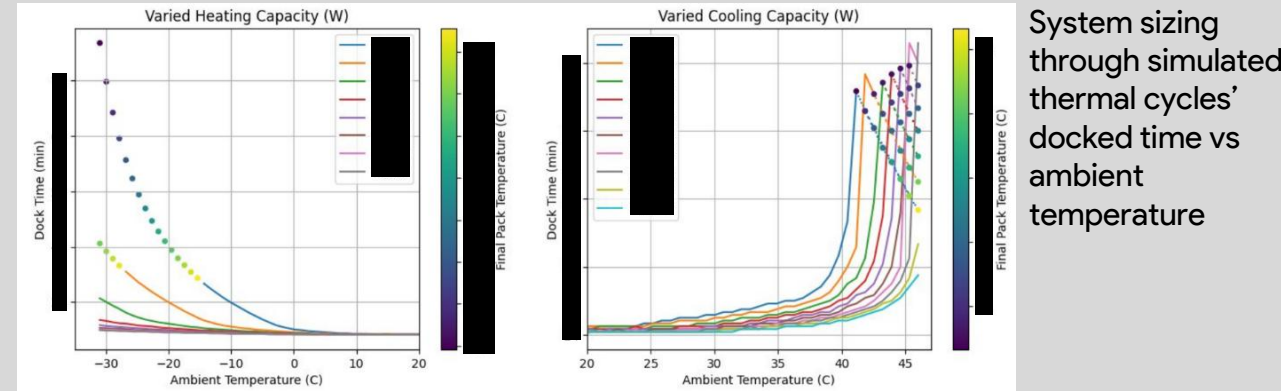
Zipline Thermal System

Objectives:

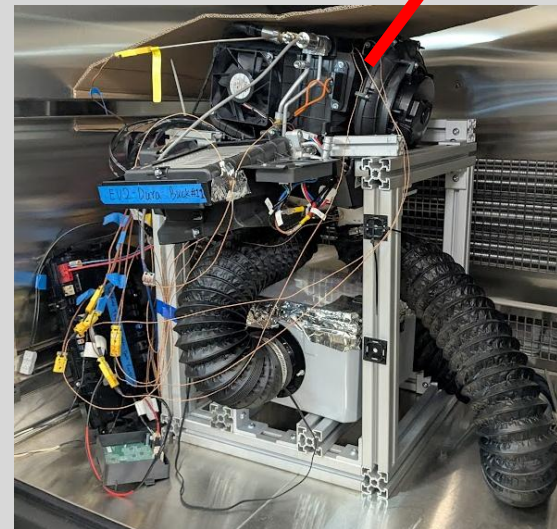
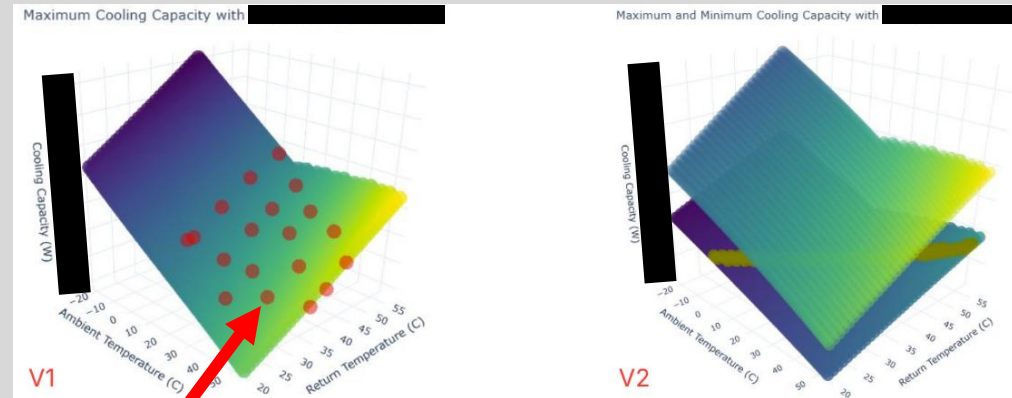
- Improve cooling capacity
- Reduce system cost

Outcome:

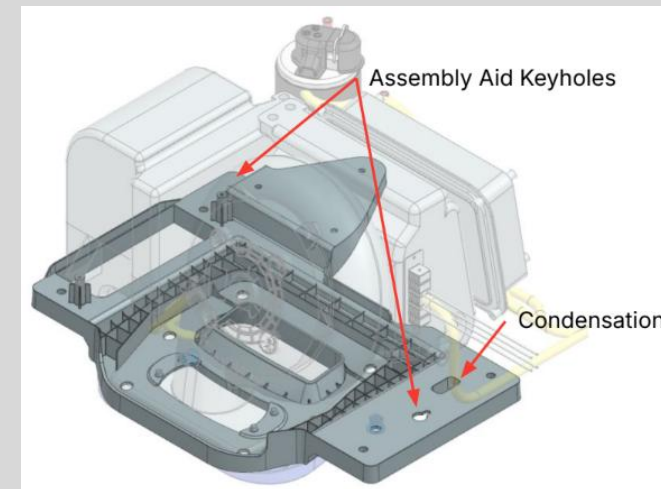
- 45% reduced BOM cost
- Simplified but upsized architecture
- Second generation HVAC system to air cool drone battery while docked, accommodating higher charge rate & wider ambient envelope
- Modeled thermodynamic performance to convert operational goals to system requirements
- Tested V1 system to support models, including modifications as a V2 proxy
- Designed RFQ package and interfaced with China-based suppliers for detailed design



Compressor cooling capacity characterization and comparison, validated against empirical data (red)



Cooling capacity data collection



Injection molded frame designed to survive 1200 N drone docking impact

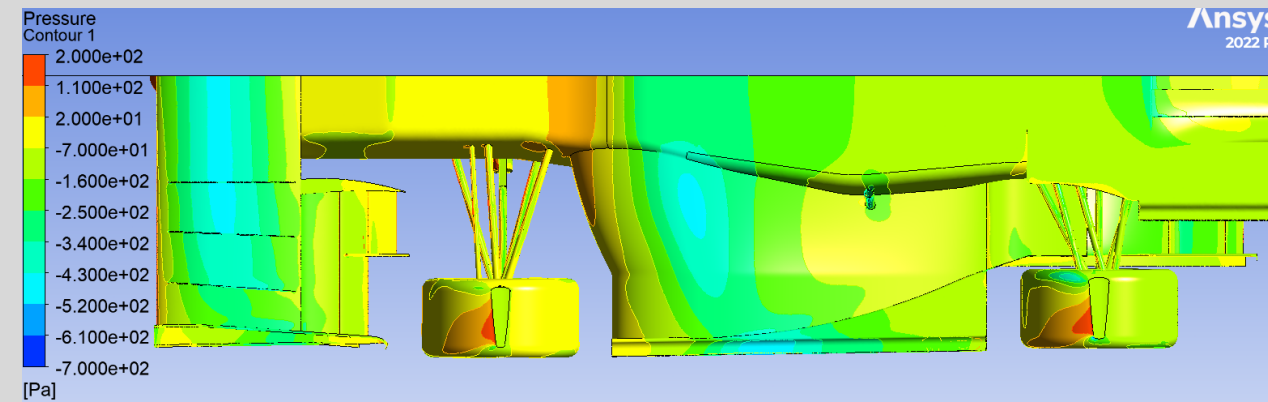
FSAE Sidewings

Objectives:

- Higher downforce to increase cornering speed

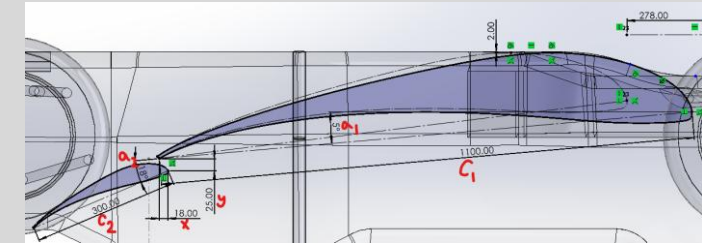
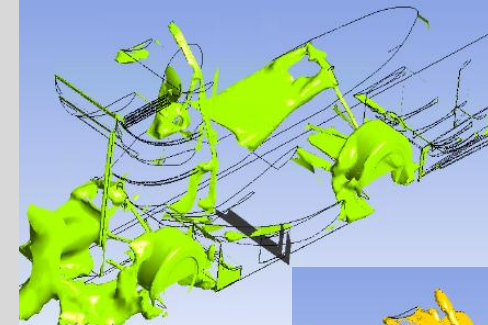
Outcome:

- Increased part downforce by 60%
- High-potential concept
- Rapid concept evolution through design-of-experiments based CFD simulations with robust, parametric CAD
- Iterated with straight-line symmetry condition, verifying against cornering, pitch, and roll sensitivities for faster sim turnaround
- Designed in collaboration with monocoque & other aero to maximize full-car performance
- Bottom skin laid up on negative mold for better surface finish to encourage flow attachment

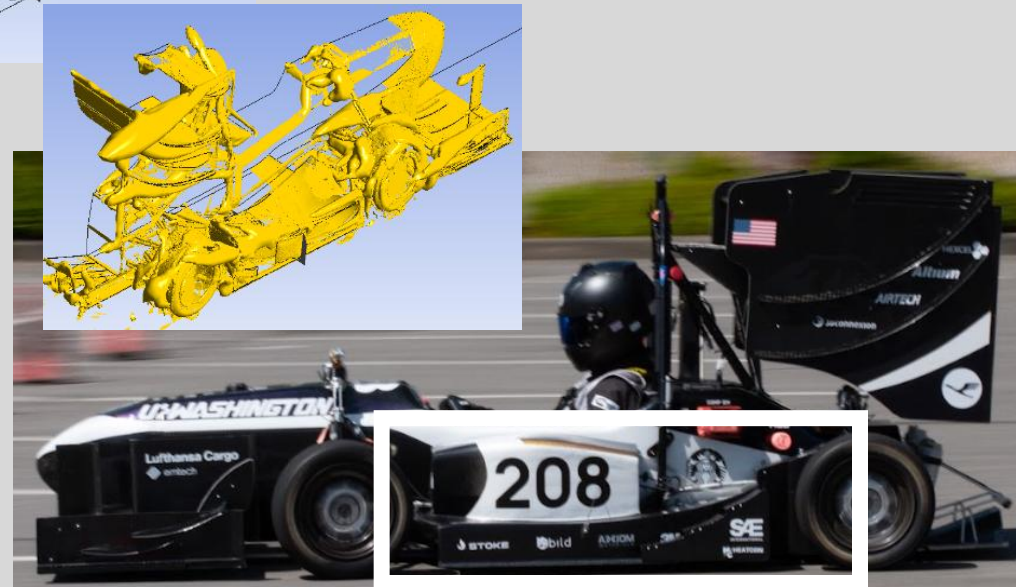


Suction side pressure contours

Recirculation regions and vortices



Parametric wing elements



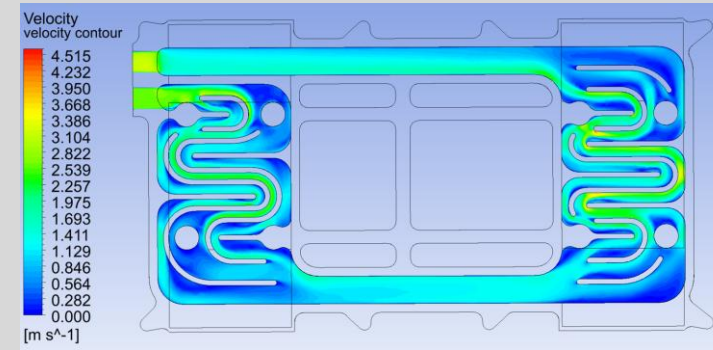
FSAE Inverter Cold Plate

Objectives:

- Improve drive-critical cooling
- Weight reduction

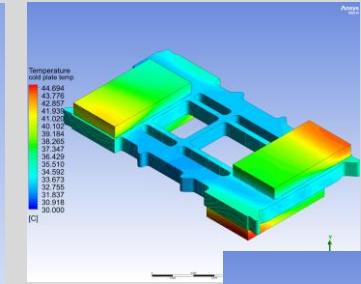
Outcome:

- Increased heat transfer by 44%
- Reduced weight by 50%
- Designed in Solidworks, optimized with Fluent
- DFM – min feature sized for 1/8" end mill
- DFA – 30° chamfer for proper RTV sealant application, locating pin/slot
- Backwards compatible to derisk development
- SDP-6560 Thermal Interface Material to IGBTs
- Validated through on-track & bench testing with silicone heating pads



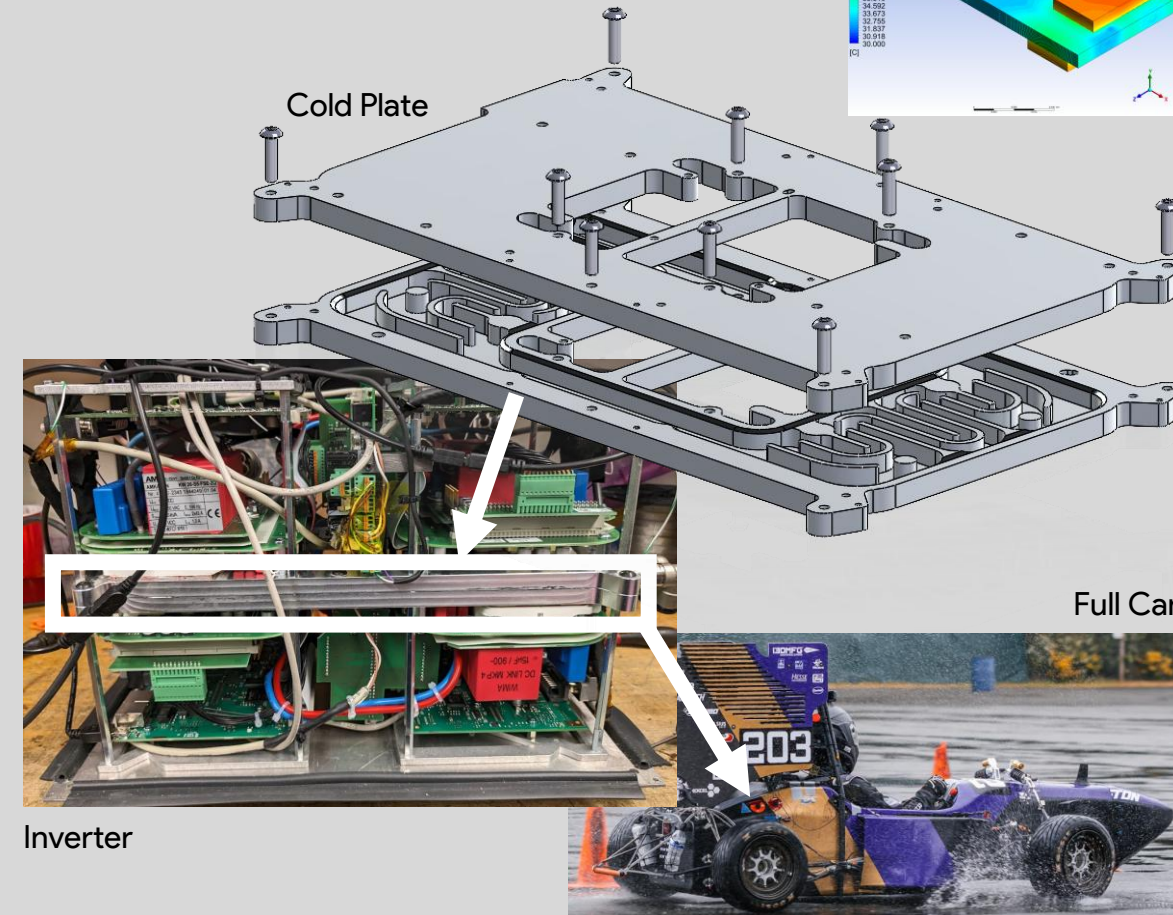
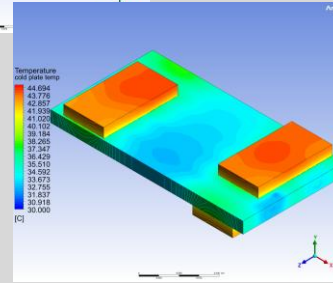
Flow simulation examining velocity uniformity

700 W Heat Input



New Cold Plate

Old Cold Plate



3D Printed Broadsword

Objectives:

- Aesthetic display piece
- Wieldable prop

Outcome:

- >4 ft long
- Printed in 8 pieces
- Designed in Blender
- Flowers modeled separately, rendered in two tone and used as a profile to extrude
- Iconography drawing from biblical symbols
 - Lilies on blade represent Mary, dahlias as contrast
 - Skull is a Memento Mori, reminder of mortality
 - Demon horns, angel wings, and the snake/apple of the Garden of Eden
- Spray painted/hand detailed color



Broadsword



Opposite Face