Winston Zhang

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I am a final year Mechanical Engineering student with a keen focus on simulation-driven iterative design. I have proven hands-on experience in aerodynamics, CFD, FEA, and carbon-fiber composite manufacturing for high-performance engineering applications. I have led the design, validation, and manufacturing process for the FSAE aerodynamic package, and contributed to the drag-reduction optimization process in sustainable electric aviation.

EXPERIENCE

SYDNEY MOTORSPORT FORMULA STUDENT TEAM

CAD | Aerodynamic Design | CFD Validation | Composite Manufacturing

Advisor *February 2025 - Present*

Working with the aerodynamics team to validate the full car aerodynamic package using the University of Sydney's wind tunnel as part of graduate thesis project. Provided technical guidance on CFD validation and composite manufacturing, utilsing in-house knowledge and development over the 4 years with the team.

Aerodynamics Section Lead *December 2023 - February 2025*

Led a team of 10 student engineers for the in-house development and manufacturing of a full aerodynamics package using SOLIDWORKS, ANSYS Fluent, laser cutting, and 3D printing. We delivered a structurally robust aerodynamic package with improved structural rigidity over previous years while maintaining a strict 3 kg weight target. This required the design of a rib and spar system for the front wing to handle both expected and unexpected loads during testing and competition. Coordinated the large full car assemblies (>1000 parts) to ensure team design cohesion, enforced compliance with FSAE rules, and managed my personal and teams timelines and task delegation to ensure the car was delivered on time.

Aerodynamics Engineer *July 2022 - December 2023*

Designed and validated the front wing and undertray of the SM23 vehicle using CFD within Ansys Fluent. Conducted an iterative design processes using a large computing cluster to optimize aerodynamic performance. Participated in mold design and manufacturing, and performed carbon fiber layups using pre-impregnated and conventional wet-layup techniques to produce high-performance composite components.

DOVETAIL ELECTRIC AVIATION

CAD | CFD Validation | Reverse Engineering

Computational Fluid Dynamics Engineer (Intern) *September 2023 - January 2024*

Reverse-engineered a propeller nacelle assembly by generating parametric CAD models from 3D scans in SOLIDWORKS. Validated scanned propeller geometry in ANSYS Fluent, allowing for the optimisation of cooling duct geometries to be developed, minimising drag and improve airflow duct efficiency. Created efficient lightweight CFD models to reduce simulation time and resource consumption, without impact to data resolution.

EDUCATION

THE UNIVERSITY OF SYDNEY

Expected Graduation: 2025

Bachelor of Mechanical Engineering Honours (Fluid Mechanics) *2021 - Current*

TECHNICAL SKILLS

Software

- Created mechanical designs with DFM principles in **SOLIDWORKS** and **Autodesk Inventor**
- Conducted various numerical simulations within **SOLIDWORKS** and the **ANSYS suite** such as **FEA**, **topology studies**, **CFD** and **thermal analysis**
- Developed **MATLAB** scrips for numerical simulations as well as various data-parsing programs.
- Proficient in **Python** through various calculation and simulation scripts.
- Literate in the **Microsoft Office** suite

Manufacturing

- Carbon fiber composite parts with **pre-impregnated** and conventional **wet-layup** techniques
- Create composite molds with contemporary techniques such as **hot wire cutting**, **laser cutting**, **3D printing**, along with conventional techniques such as **hand-sculpting** foam molds
- **3D Printing** and **laser cutting** for rapid design and manufacturing
- Extensive experience in common workshop tooling, and machinery

TECHNICAL PROJECTS

- **Homelab Server** - Functions as both a local media server and a self-hosted cloud storage solution, enabling high-speed remote access and data redundancy.
- **Robotic Arm** - A 6-axis robotic arm powered by NEMA stepper motors, with motion transmitted via belt drives to reduce backlash. The accuracy was enhanced through a custom-developed zero-backlash cycloidal gearbox tailored for precise torque and speed control.
- **Custom PC Peripherals** - Engineered a 32-gram fingertip grip mouse optimized for competitive FPS gaming, and assembled a Lily58 split ortholinear keyboard with a custom-designed case for improved ergonomics and portability.
- **UNIX** - Daily-operated dual-boot Windows/Linux setups, leveraging distros such as Arch and Ubuntu derivatives for development flexibility, customization, and deep system-level understanding.

Reference avalible on request