Adrin Alias

Mechanical Engineering Portfolio

682 306 0471

adrinalias@gmail.com

linkedin.com/in/adrinalias

University of Texas at Arlington

B.S. ME, December 2025

Brake Dyno

Sensors & Data Acquisition

In Progress / Active

August 2024 – May 2025

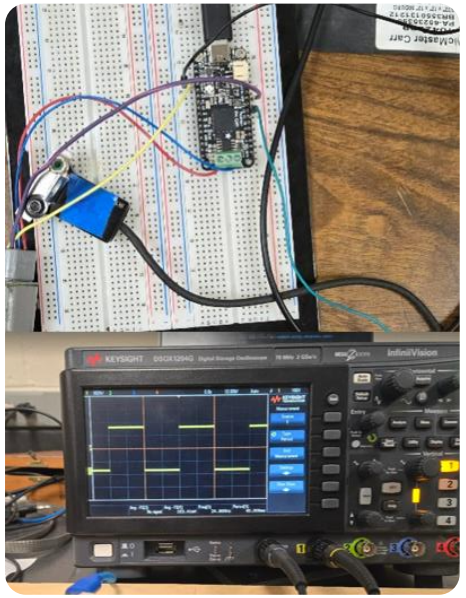
Signal Processing	Arduino/C++
Sensor Selection	MATLAB
CAD	CAN Communication

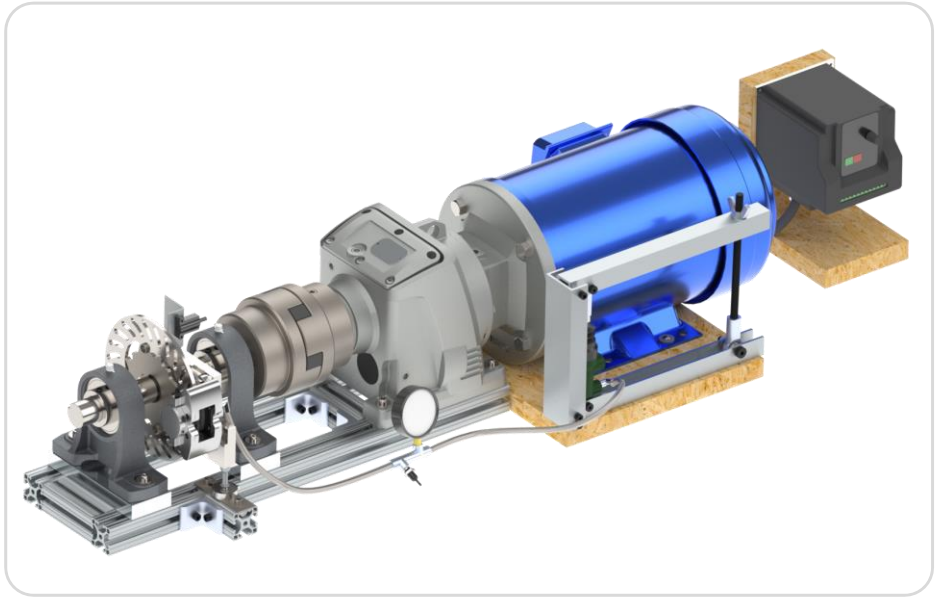
What & Why

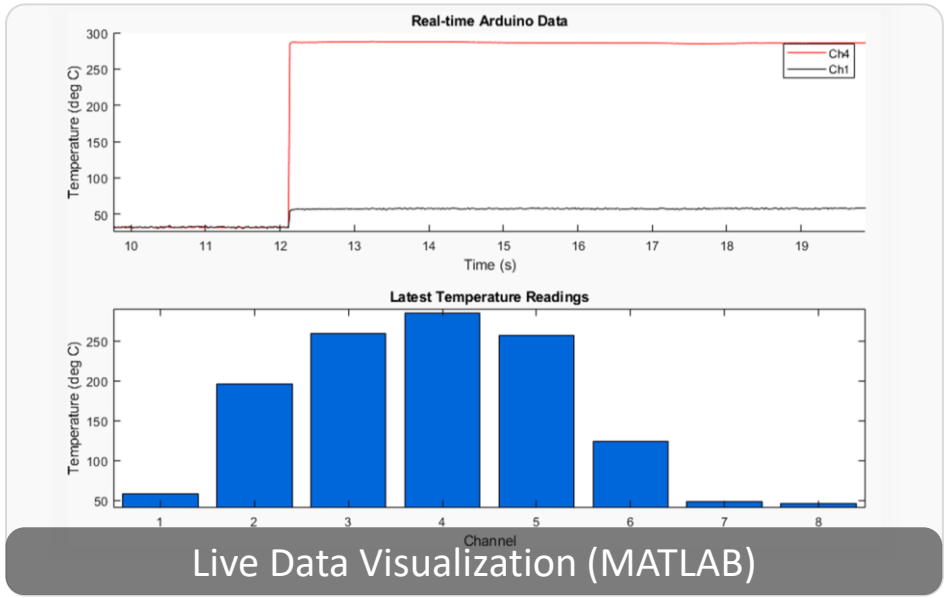
- Designing a DAQ system from the ground up to measure sensor data for a Brake Dynamometer for the Formula SAE Team.
- Collection of data from steady state tests of the brake rotor & pad at different temperatures to determine impact of temperature on coefficient of friction for different pad & rotor combinations.

How

- Developing the DAQ based on the Adafruit feather M4 Express CAN & selected cost-effective sensors.
- Using amplifiers and voltage dividers to read various signals from all the sensors.
- Programmed the microcontroller using C++ to enable the Real Time Clock (Hardware Clock), calculate pulse frequencies, read other signals & transmit data to the PC.
- Designing an app using MATLAB to real-time data visualization.
- Made additional contributions to write create a MATLAB model of brake rotor temperature, selection of powertrain components (motor, controller & gearbox).
- Selected to use thermocouples, IR temperature sensor, pressure transducer, load cell, and a rotary encoder.







Live Data Visualization (MATLAB)

IOT Smart Binds

Powered by ESP32

May 2024 – August 2024

CAD	Arduino
3D Printing	C++
Packaging	Communication Protocols
Iterative Design	Testing & Validation

What & Why

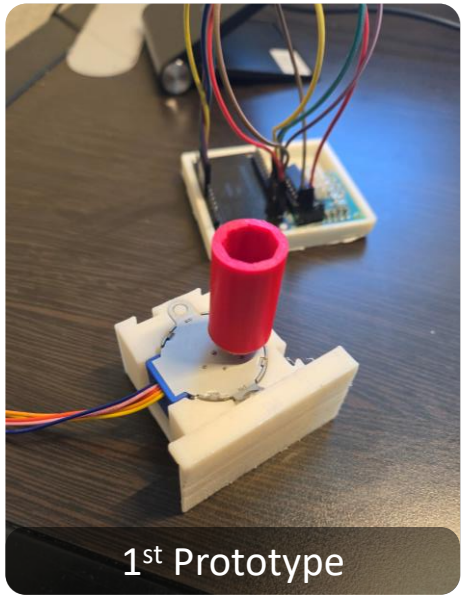
- A small electromechanical device with a 3D printed housing to automate opening and closing blinds.
- Improves sleep quality and quantity by only letting in light from wake-up time till dusk.

How

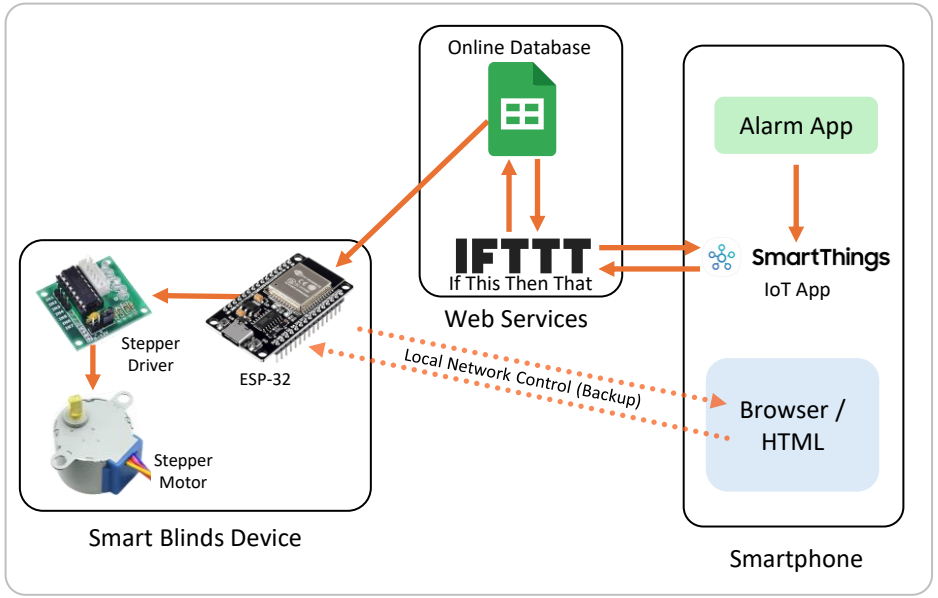
- Used an ESP-32 for its Wi-Fi connectivity and low price to implement Arduino libraries in C++ to remotely control a stepper motor connected to window blinds.
- Modeled all parts in SolidWorks to achieve tight tolerances with a compact minimal design.

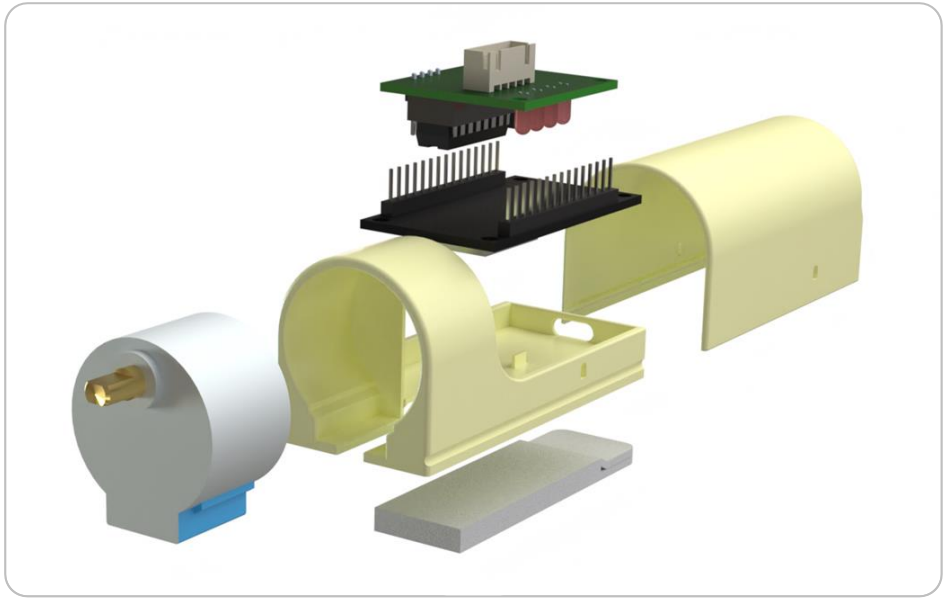
Results

- Blinds close automatically after Sunset and opens 5 minutes before alarm goes off.
- Uses double sided tape, hence not damaging the wall. Perfect for student apartments.
- In-Progress: Upgrading system to use an H-bridge and a car power window motor to open bigger blinds with strings



1st Prototype





Current Version

Air Heaters

Enclosures & Control Systems

June 2024 – October 2024

CAD	Manufacturing
Digital Twin	Sheet Metal Design
Electrical Wiring	DFMA

What & Why

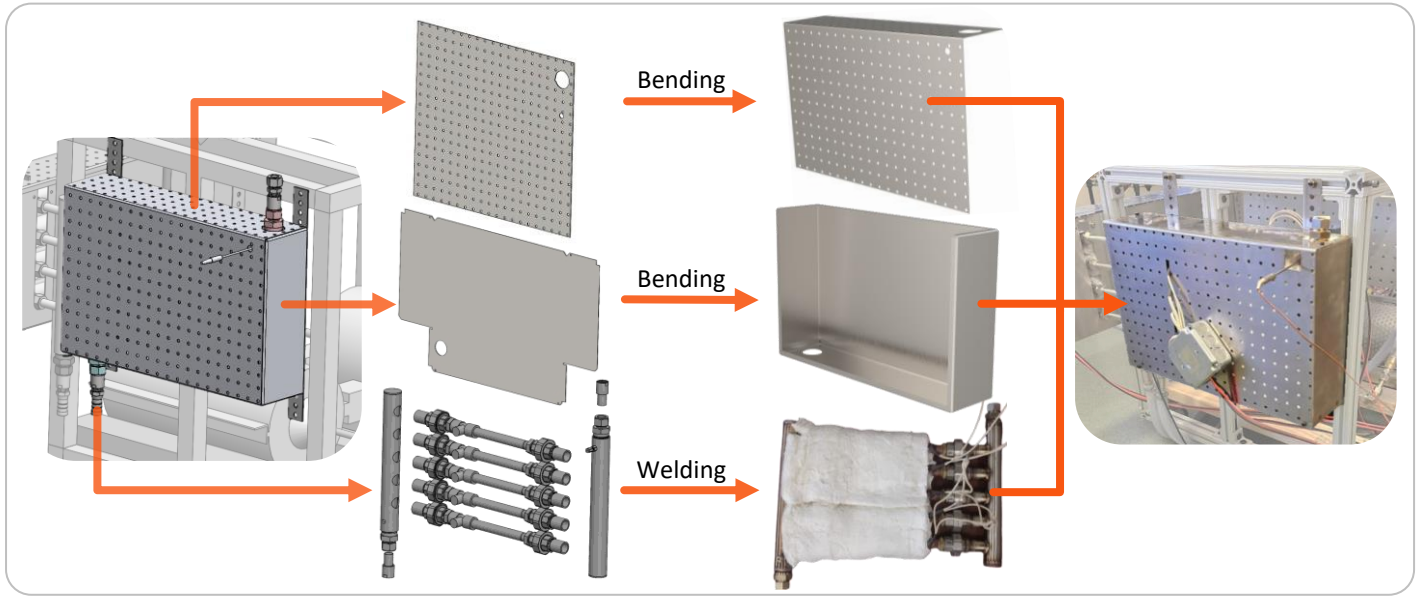
- Designed, assembled, & integrated 4 custom heaters for a high temperature and pressure test rig.

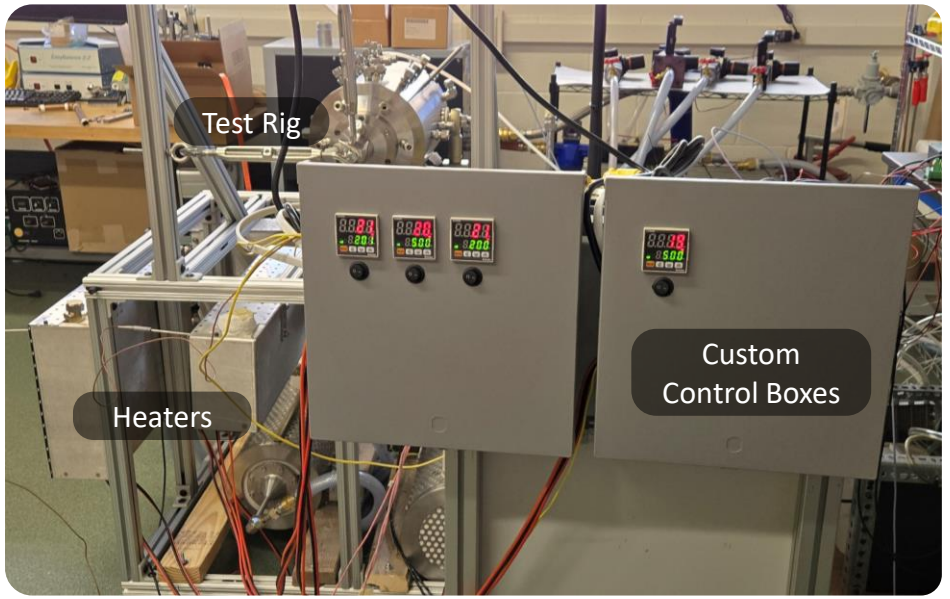
How

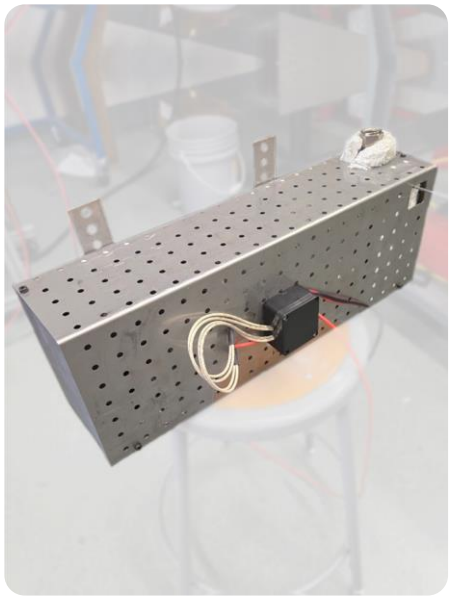
- Designed & manufactured 3 heater enclosures using SS 304 sheet metal using SolidWorks and SendCutSend.
- Collaborated with the machine shop for manufacturing parts and welding the heaters.
- Designed, tested & implemented a power and control circuit for all the heaters using easily available parts.

Results

- Reduced manufacturing cost 30% by outsourcing sheet metal cutting & bending without delaying the project.







Turbine Blade

Generation & Modelling

March 2024 – July 2024

MATLAB	CAD
Parametric Modelling	FEA

What & Why

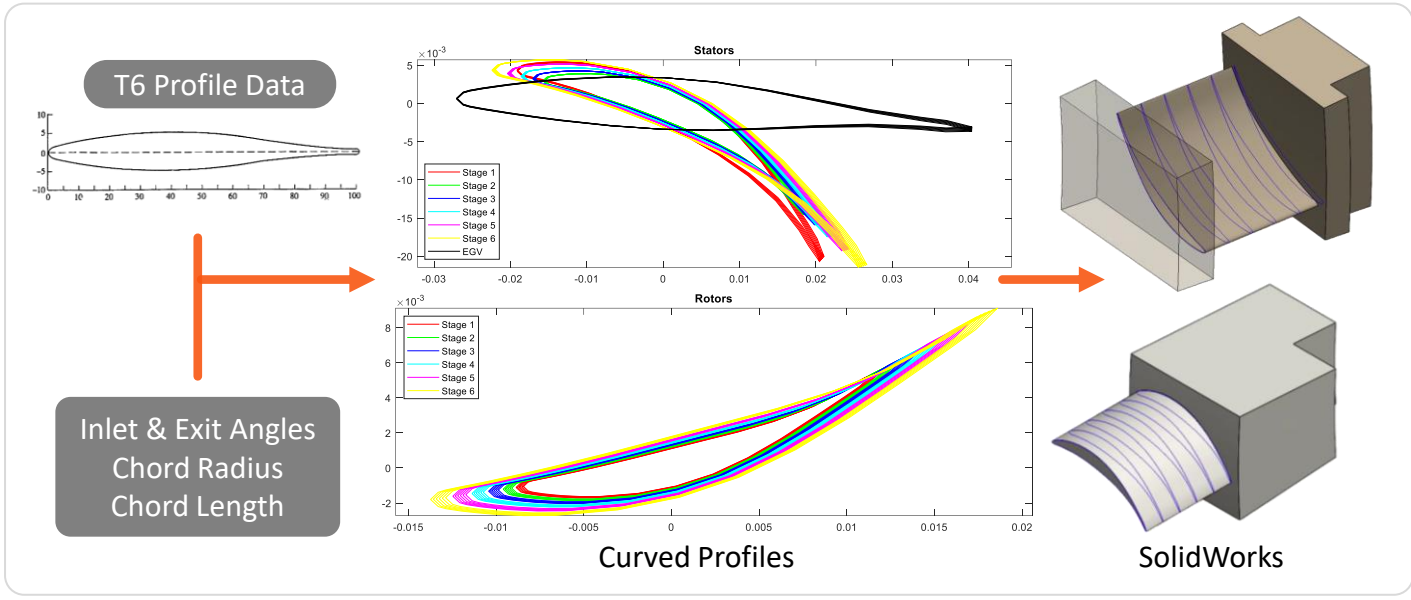
- Transformed a T6 turbine airfoil cross-section into curved airfoils for turbine rotors & stators.
- Blade designs for a multistage Helium Turbine.

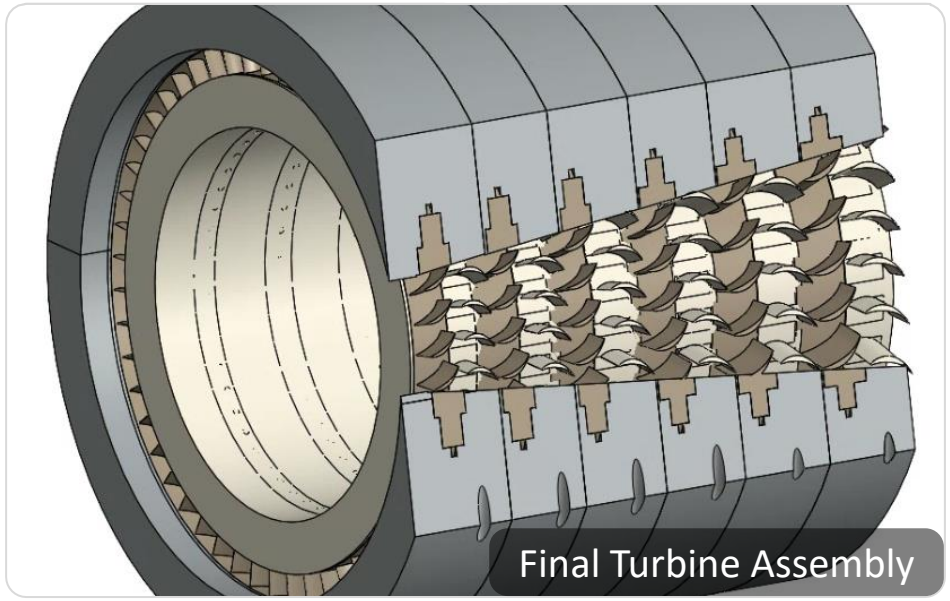
How

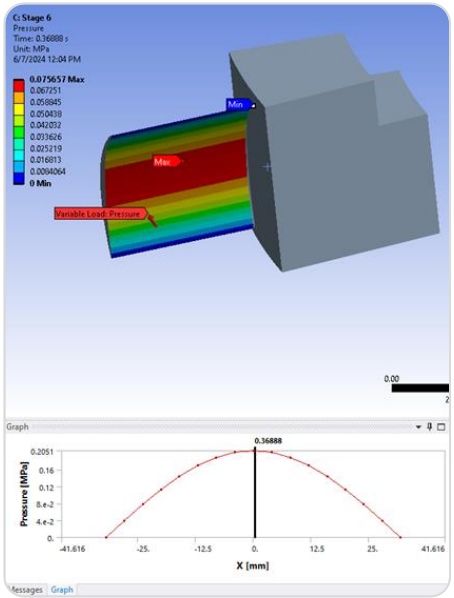
- Used previously calculated entry & exit angles, and curvature radii to bend the T6 profile in MATLAB.
- Imported profiles as points into SolidWorks & modelled each rotor & stator.
- Developed a macro to speed up importing workflow.
- Conducted preliminary FEA in Ansys to check for stress concentrations.

Results

- Developed easily modifiable code to bend any turbine blade profiles.
- Created complete assembly of turbine and compressor assembly in SolidWorks for the proposal submission.







Mobius Racing
Formula 1 in Schools Competition

December 2020 – January 2021

CAD	First Principles
Fixture Design	Design of Experiment
Rapid Prototyping	3D Printing
DFMA	CFD

What & Why

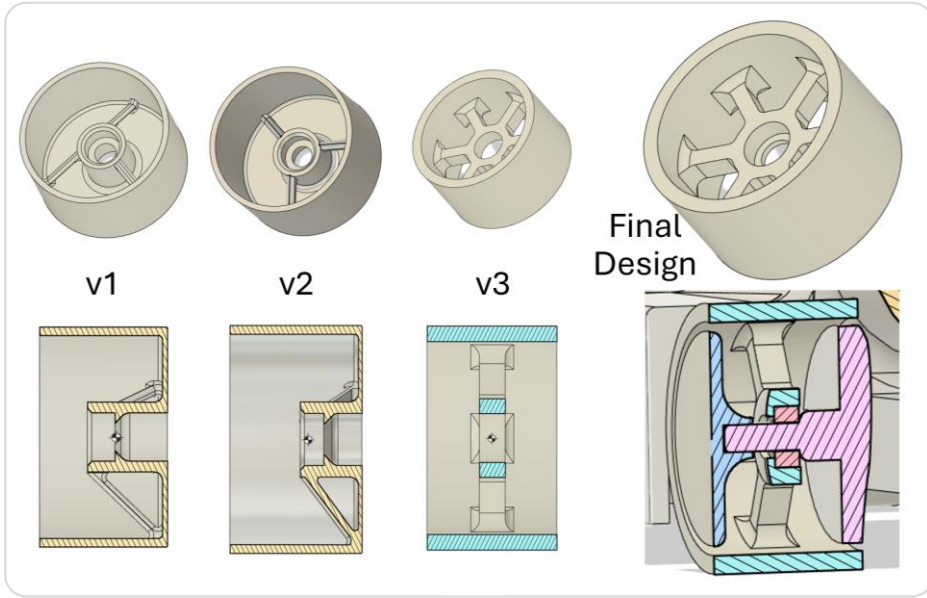
- Design, manufacture & race a miniature racecars powered by a CO_2 canister (F1 in Schools Competition).
- Team represented high school in National Finals.
- My Roles: Team Lead, Vehicle Manufacturing & Assembly, & Wheel Design.

How

- Used Fusion360 to model different configurations of the wheel and conduct elementary FEA.
- Conducted DOEs to controls variable for 3D printing to maximize layer adhesion & part strength.
- Design fixtures to align the parts of the car during assembly.
- Conducted tests to check dimensional accuracy to verify interference levels for the bearings.

Results

- Fastest car in the competition.
- Selected to represent the nation in the World Finals.
- Judge's pick for Best Engineered Car.

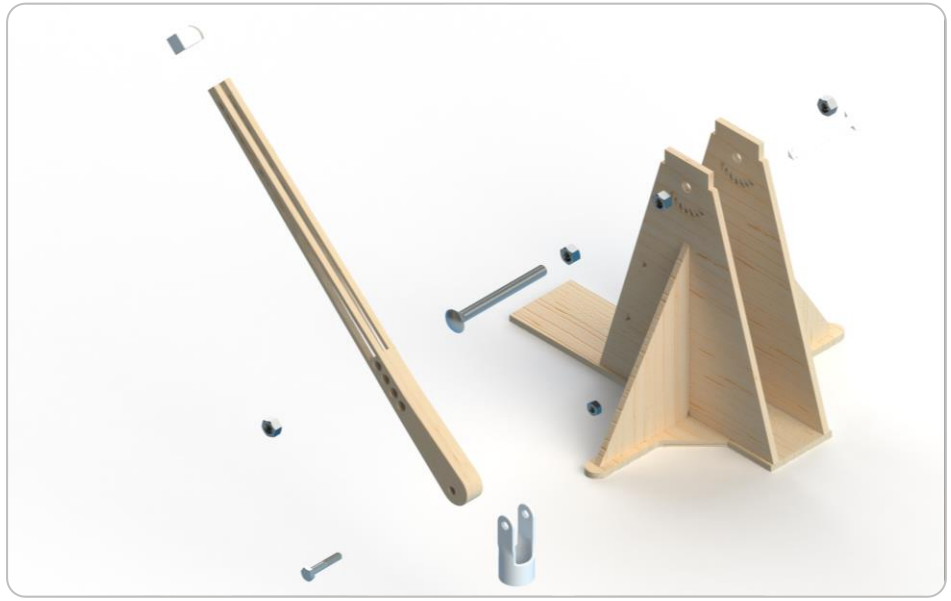


Trebuchet

Design Project

March 2022 – May 2022

CAD	Laser Cutting
GD&T	3D Printing
Rapid Prototyping	DFMA
Testing	Simulation

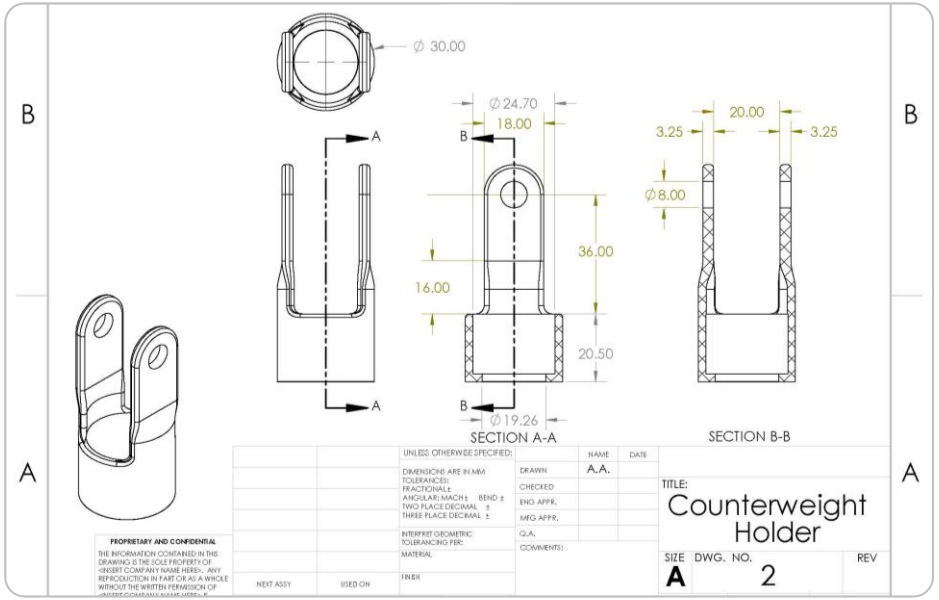


What & Why

- Design and build a trebuchet using computer-controlled manufacturing methods to launch a penny using quarters exactly 6 feet.

How

- Designed in SolidWorks to be manufactured using laser cut wood, 3D printing & COTS components only.
- Laser cut parts assembled only with interference fits due to tolerancing studies.
- Used initial prototype to test and correct simulation data.



Results

- Trebuchet was able to launch the penny as designed and did not break any design requirements.