



UND Formula SAE Vehicle Design Overview

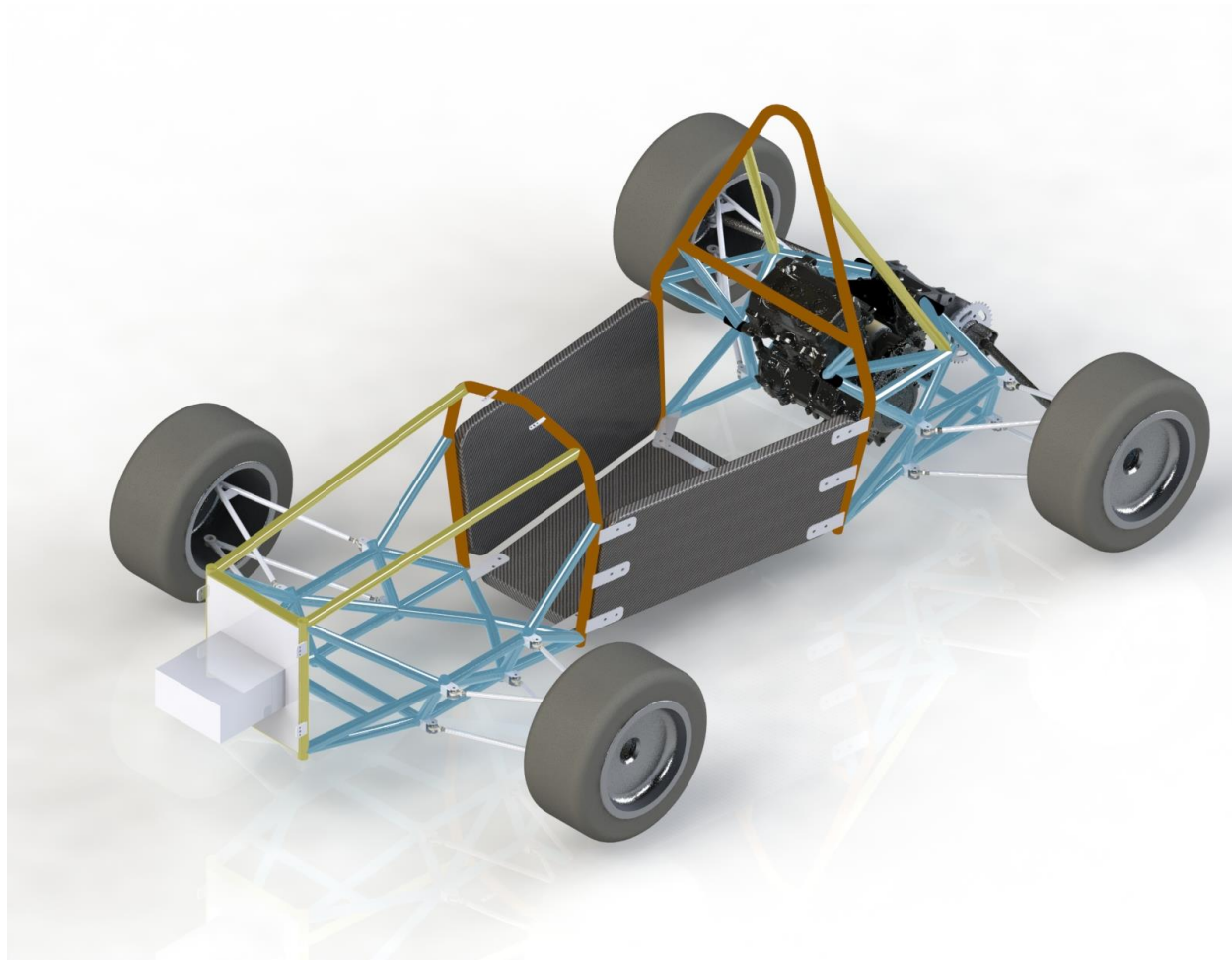
NDSGC Student Symposium



Introduction

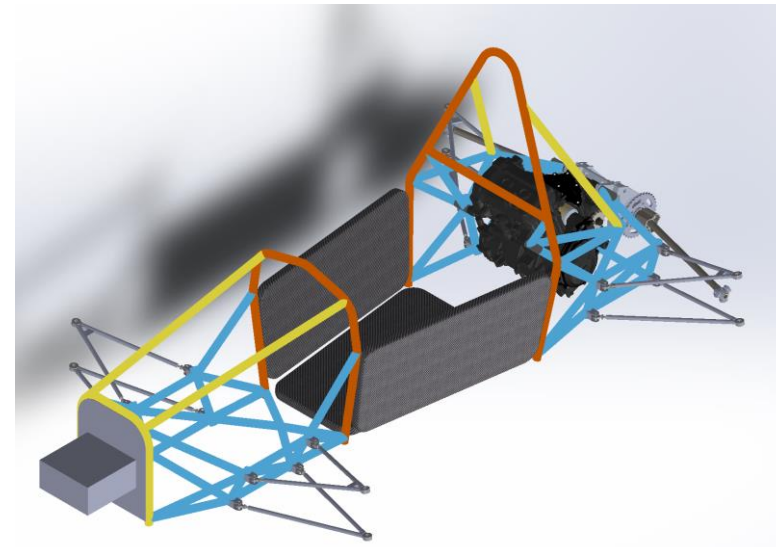
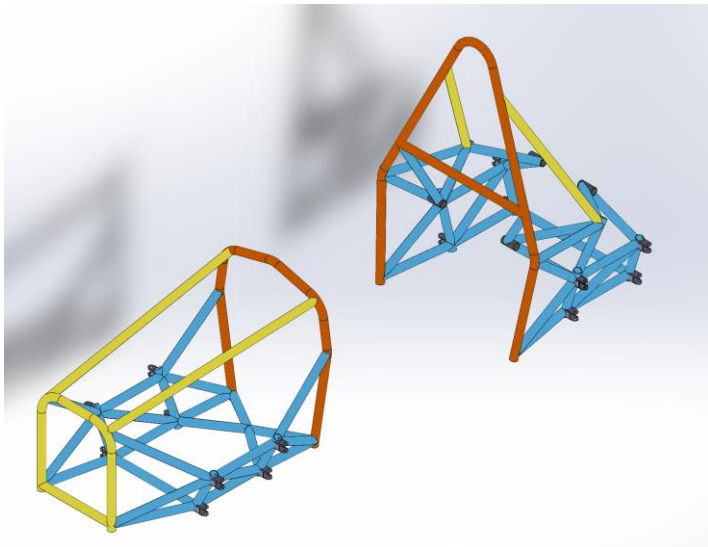
- Alex Swanson – President
- Corbin Goodreau – Vice President / Engine & Drivetrain Lead
- Trenten Johnson – Electronics Lead
- Billy Kendall – Chassis & Ergonomics Lead
- Justin Grunseth – Suspension & Steering Lead
- Christian Vannoy – Aerodynamics & Body Lead

Vehicle Overview



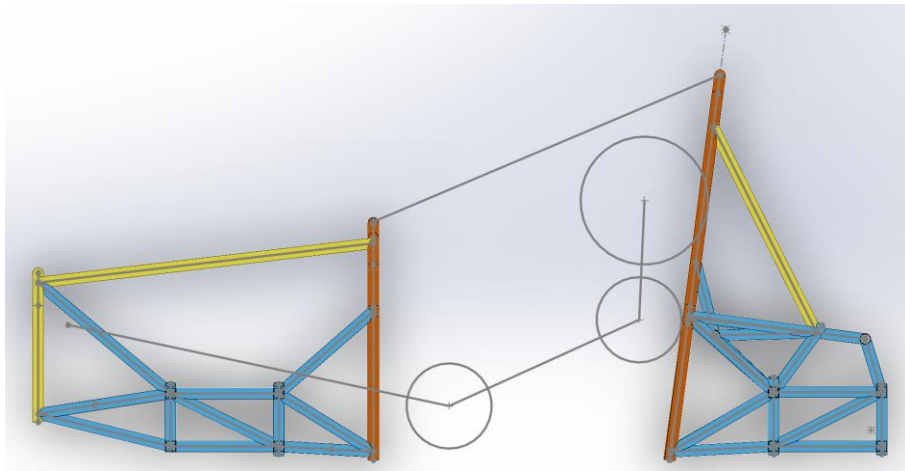
Chassis Purpose

- The Chassis and Ergonomics team is tasked with testing, verifying, and designing the chassis for the UND Formula SAE team.
- Big bracket connecting all the pieces of a car together.

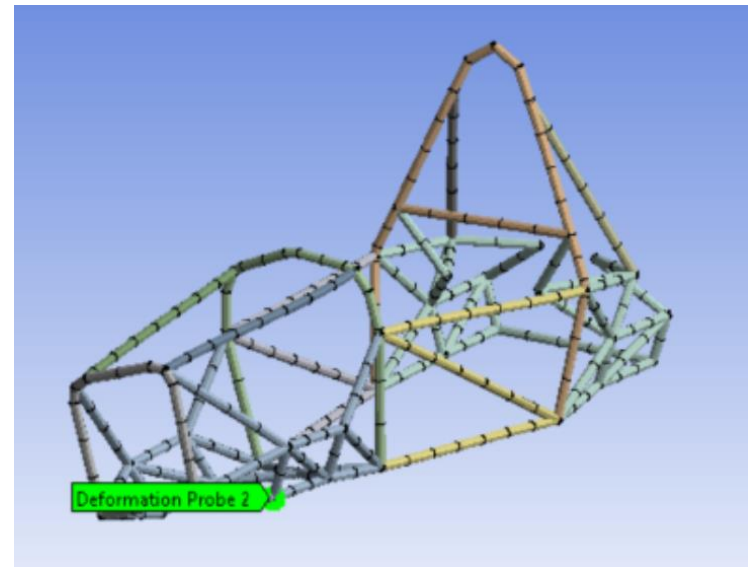


Chassis Requirements

- Needs to fit the driver comfortably so that they can operate the vehicle properly.

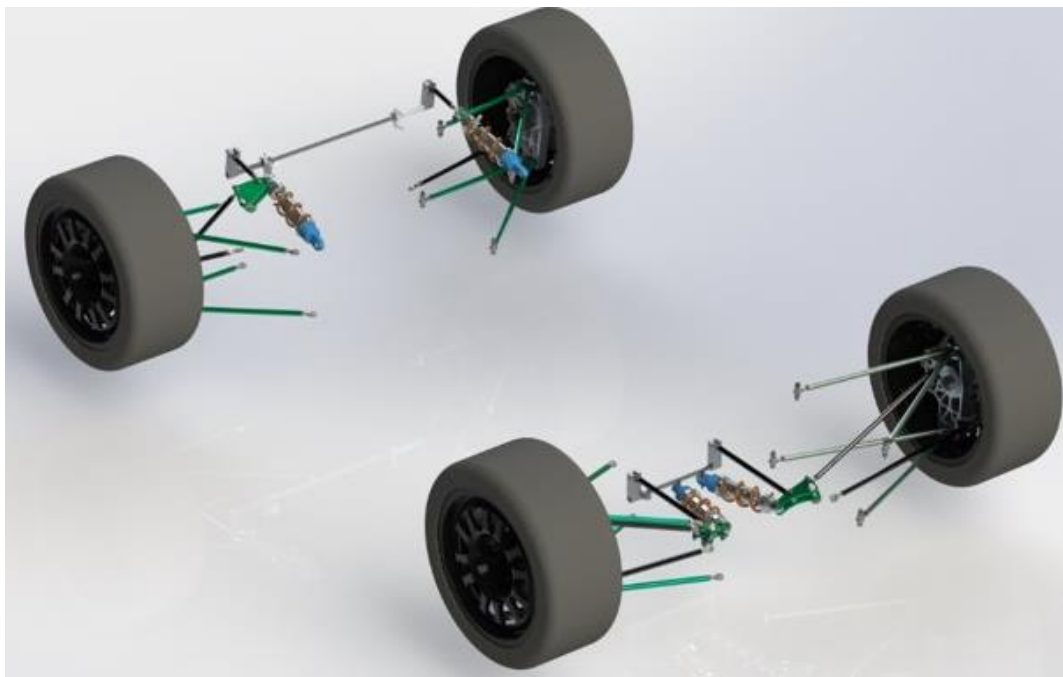


- Chassis needs to be very rigid to keep the chassis from flexing too much when taking corners.

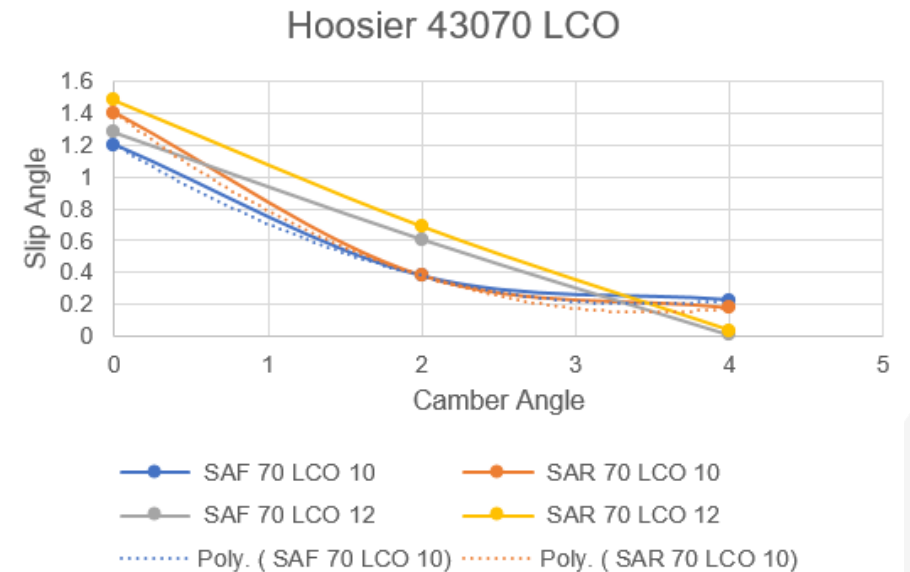


Suspension

- The Suspension team is responsible for the design, testing, and verification of the suspension, steering, and braking system.

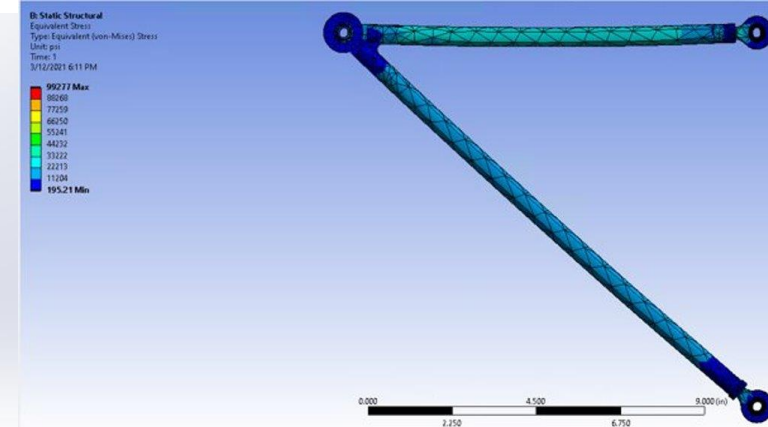
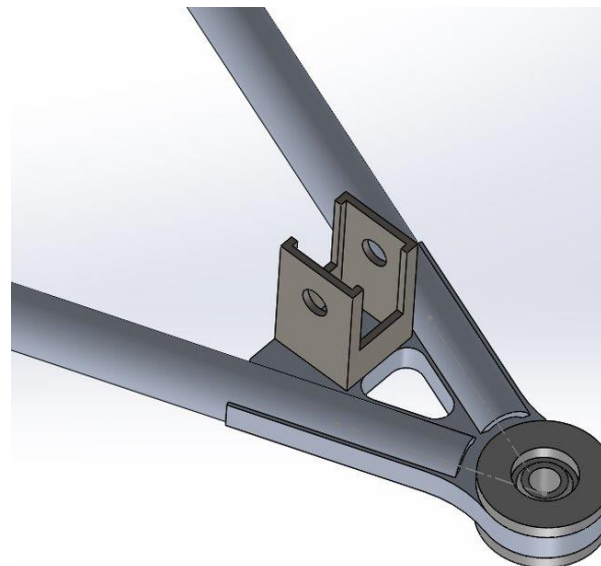
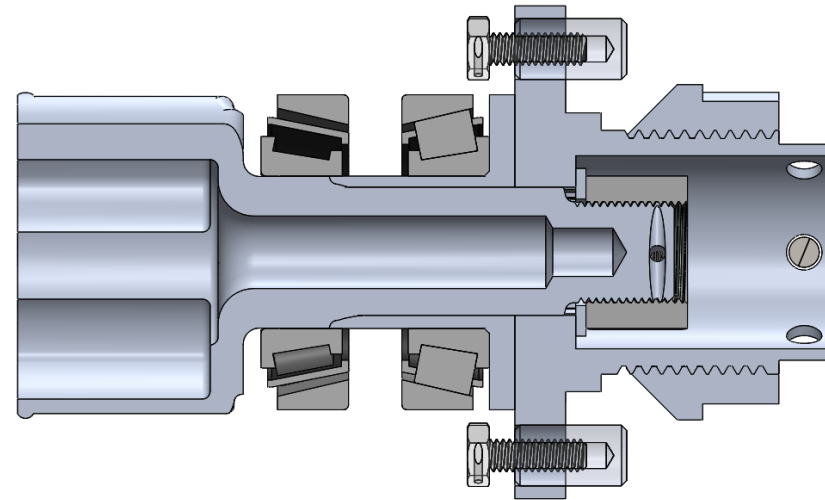


- Focus for the year
 - Design suspension geometry around specific tire data.
 - Ground up redesign of systems to accommodate 10" center lock wheels.



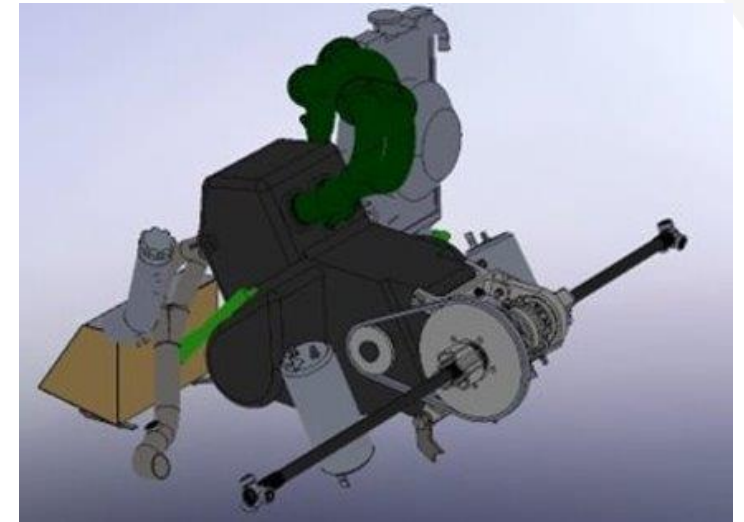
Suspension

- Rear hub design
 - Uses an internal distorted locknut to secure the tripod housing to the hub
- A-Arm design
 - Designed using determined suspension geometry
 - Designed to withstand all vehicle forces acting at one wheel



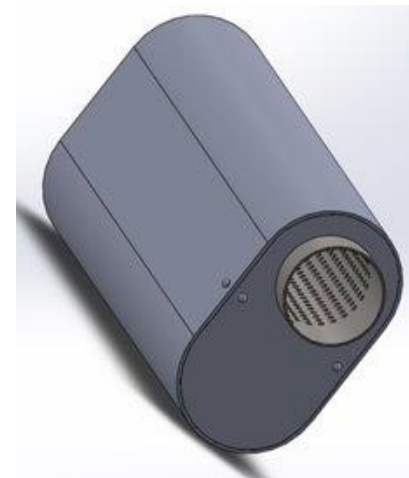
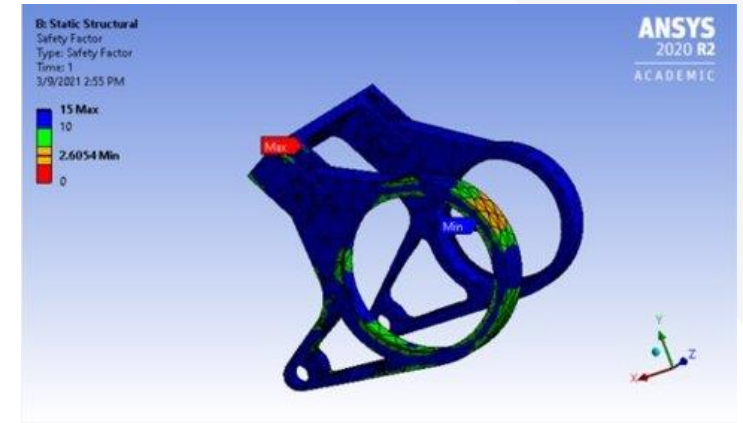
Engine/Drivetrain System

- Encompasses everything that delivers power from the engine to the vehicle wheels
- Engine (Yamaha YZF R3)
 - Drivetrain
 - Cooling System
 - Fuel System
 - Exhaust
 - Intake
- Focus for this year:
 - Structural analysis of Differential Mount
 - Lightweight muffler
 - Intake routing



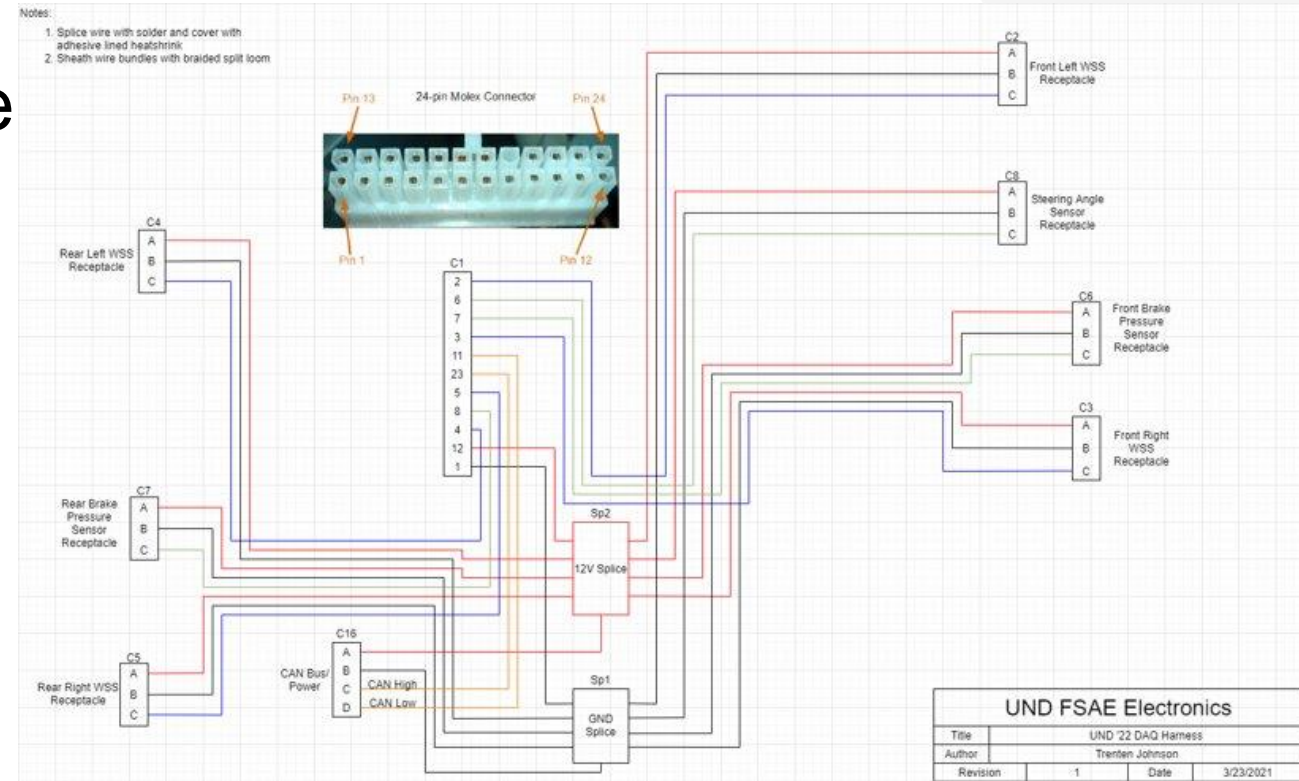
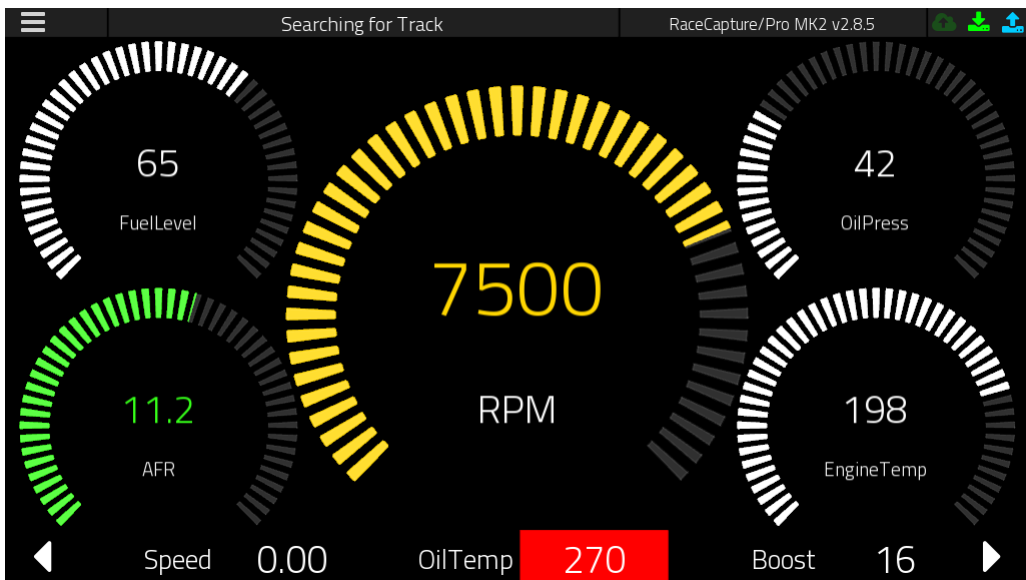
Engine System

- Differential Mount Structural Analysis
 - Max load based of max chain load
 - Material location optimized for weight
- Lightweight muffler
 - Aluminum versus stainless steel
 - Dual core design
 - 110 dBC at all RPMs



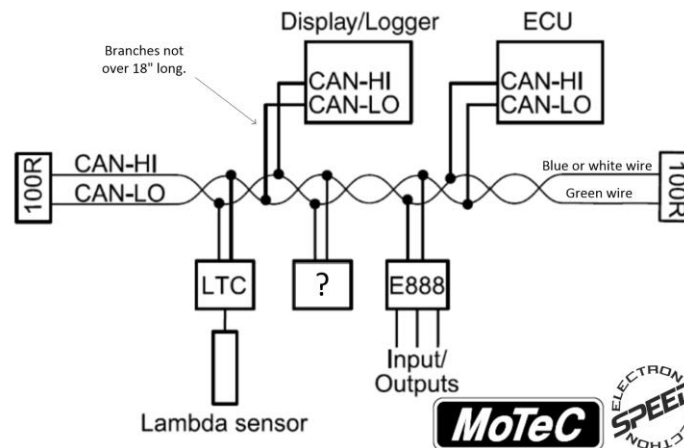
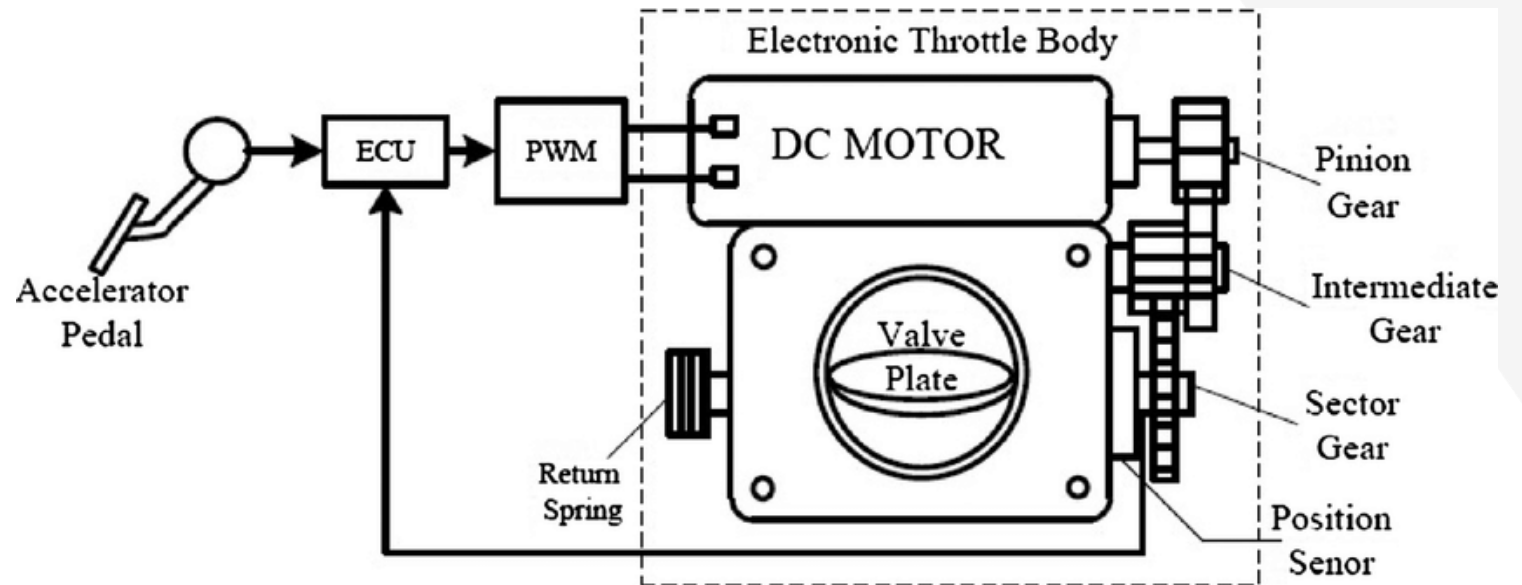
Electronics System

- Electronics is responsible for the wiring harness and data acquisition implementations
- Tune the engine using a dynamometer test bench



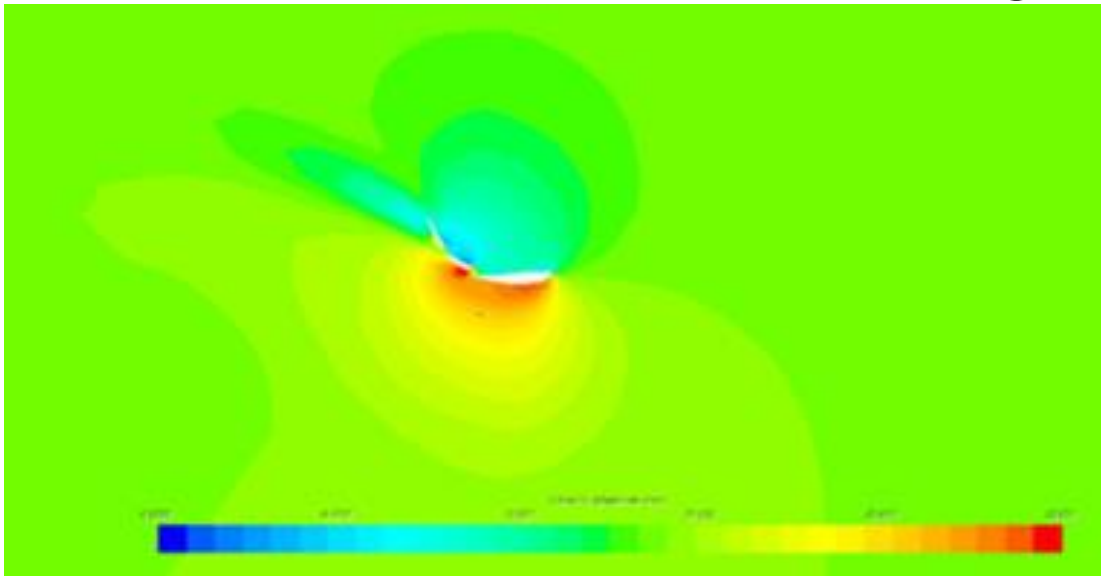
Electronics Team Research

- Electronic throttle control to complement paddle shifting system allowing for clutch-less shifting
- CAN-Bus based dashboard to minimize weight, complexity, and downtime



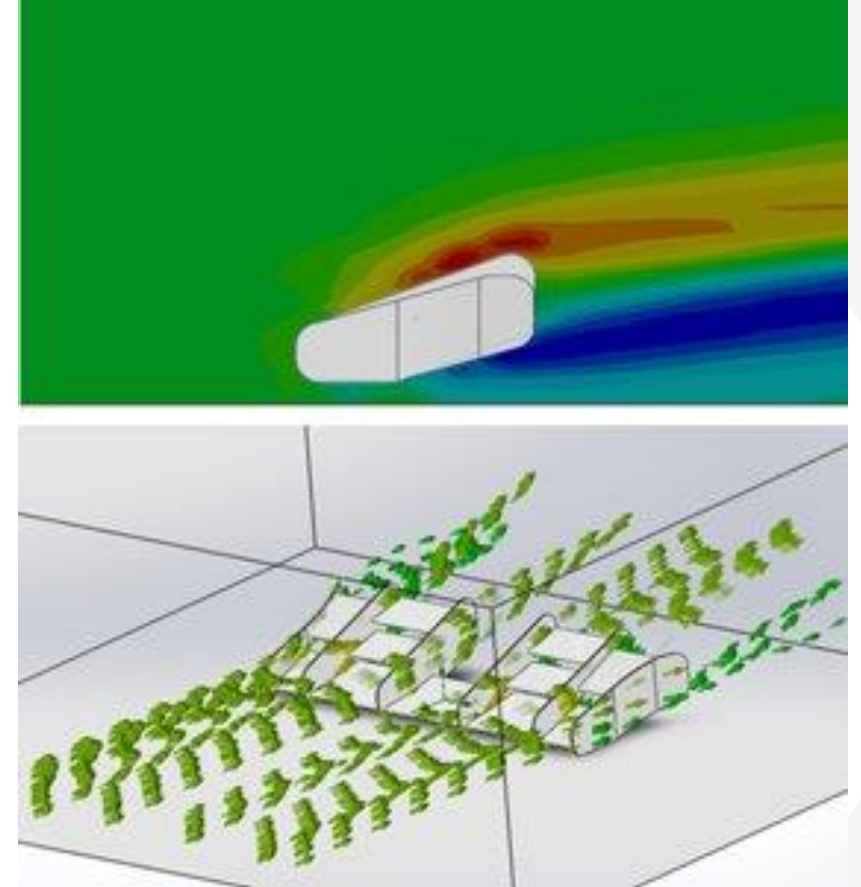
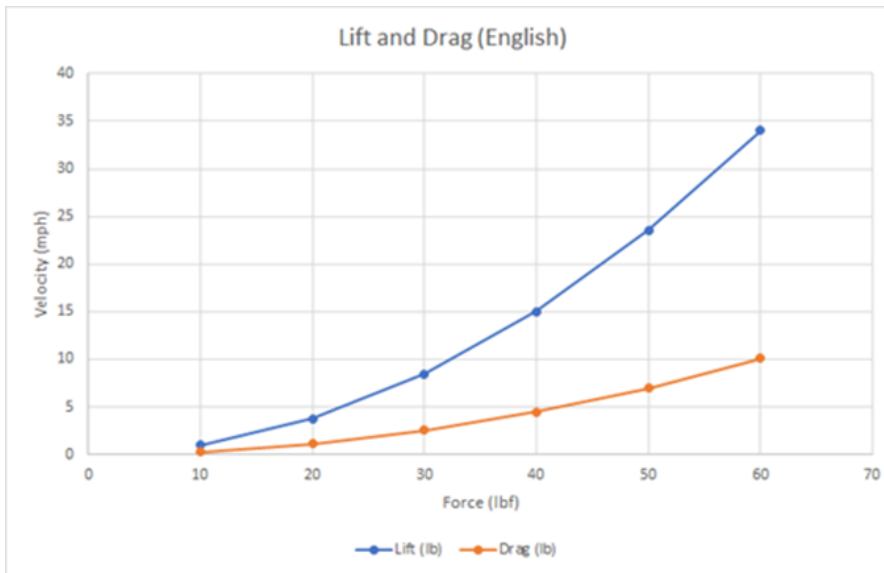
Aerodynamics and Body

- Design and manufacture the aerodynamic components of the vehicle
 - Produce downforce and minimize drag
 - Stay within the FSAE rules
 - Validate downforce and drag with testing



Aerodynamics

- The wings act like airplane wings accept airplanes lift from the ground while we push the car into the ground
- Analysis of airflow helps to estimate the amount of downforce and drag the vehicle sees



Contact us!

Do you have questions?
Want to learn more about the team?

Send us an email at
und.fsae@und.edu