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Problem Statement and Background

SolarCar at Virginia Tech is a new design team developing a solar-powered electric vehicle from scratch to race in the 2023 Formula Sun Grand Prix. Part of the challenge in engineering this type of vehicle is ensuring safe operation and maximizing energy efficiency.

As part of our senior design project, we designed multiple subsystems of the vehicle including the chassis, front vehicle dynamic systems, braking systems, tire and wheels, UI system, motor, and solar systems.

It was important that we not only fulfill requirements set out by our customer (Eashan Gupta, President of SolarCar at VT), but also engineer the best system to fulfill other needs related to all systems.

Objective

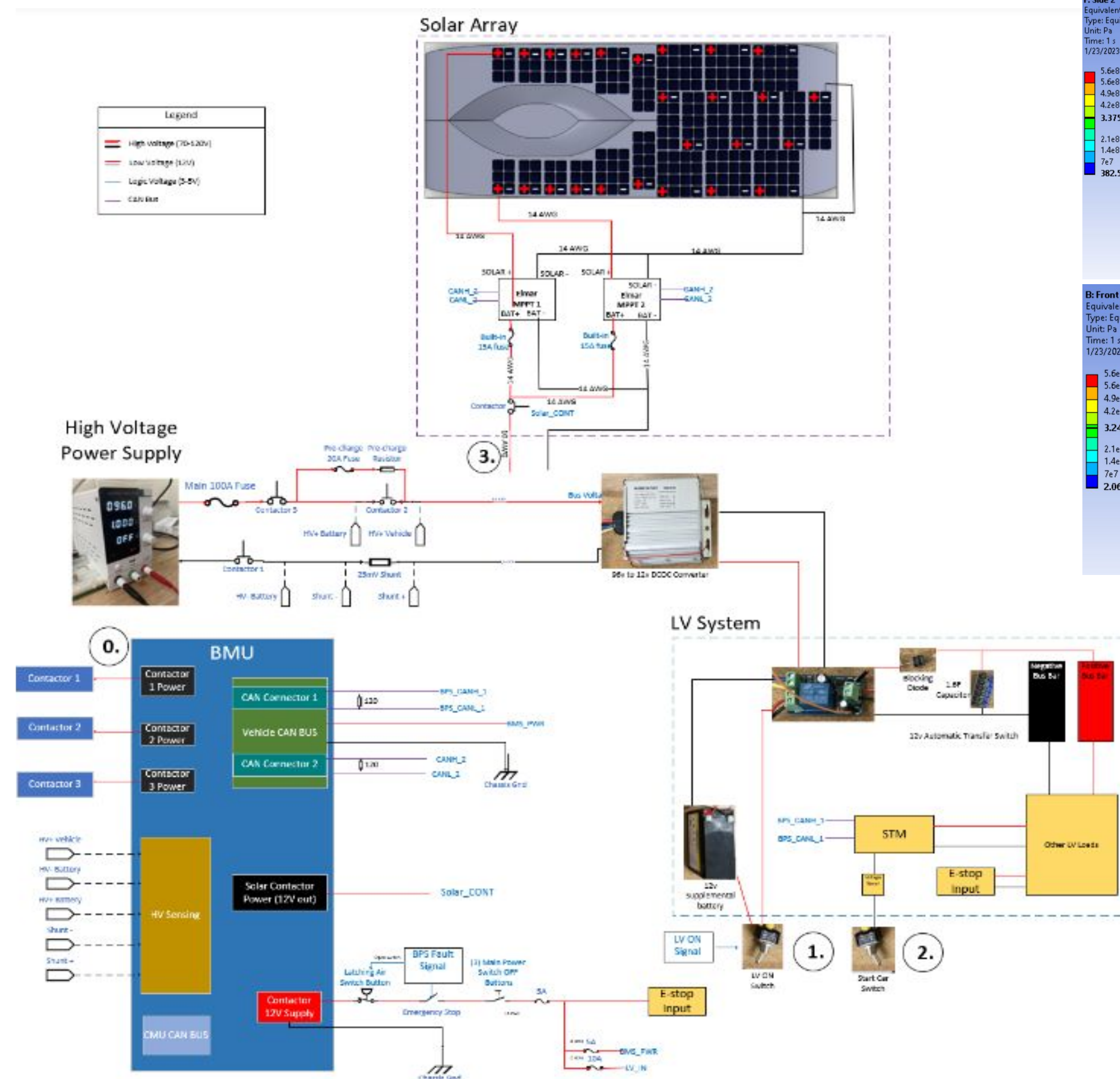
- Interface fault procedure among Battery Pack, Solar Array, and Motor
- Display Motor and Battery Data to the Driver while Vehicle is Running
- Driver Control of Various Peripherals
- Finished Chassis Design
- Make a fully functioning Front-Rear redundant braking system
- Make a Functional Steering System
- Design a performance front suspension
- Design or select solar car wheel for vehicle

Design Data

- Detailed product design*
- CAD renderings*
- Schematics*
- Software*
- Images and documentation of built system*
- Significant analytical results:*
- Results of simulation*
- Predicted performance data*

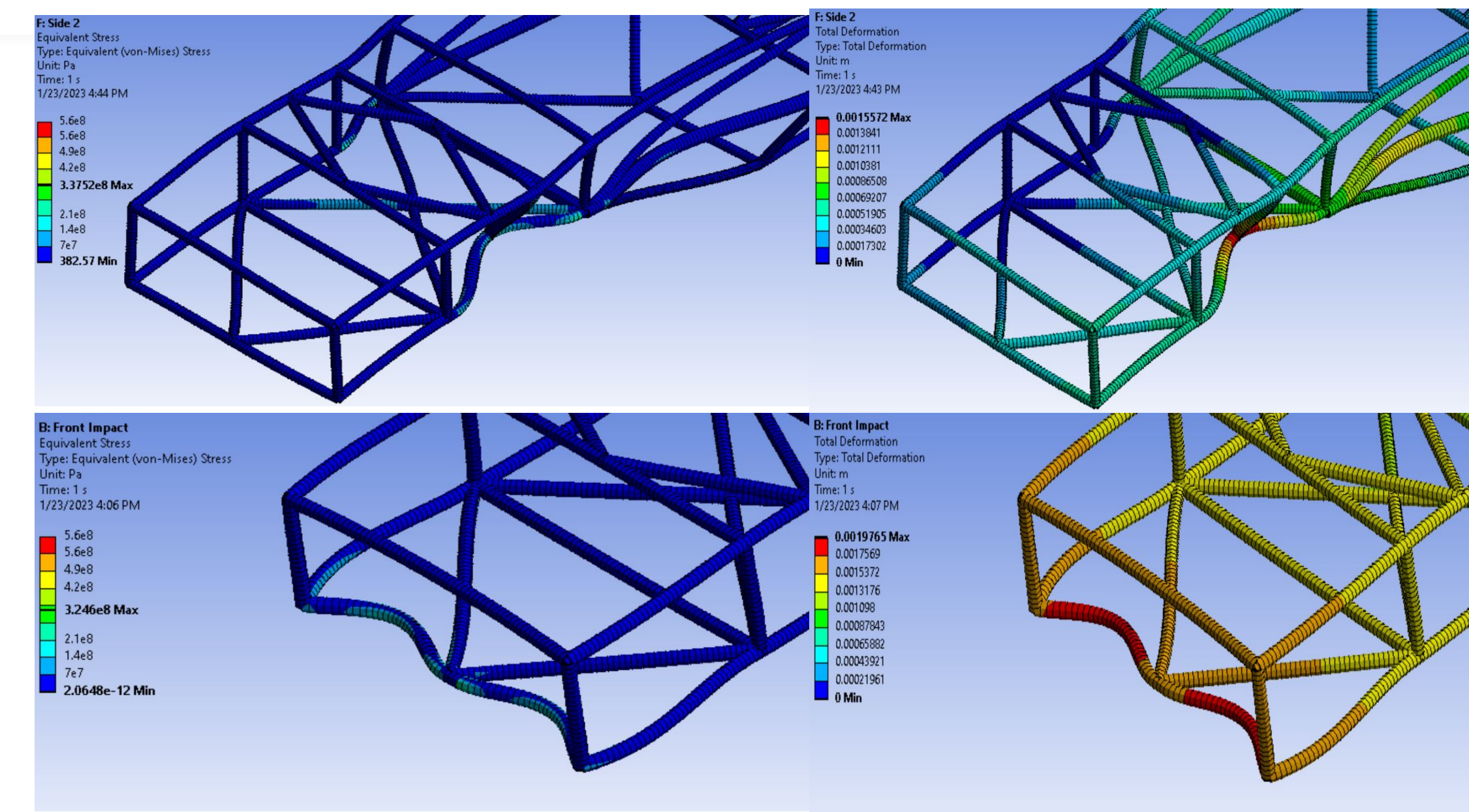
Powertrain Overall Diagram

This diagram highlights the main components that make up our electrical architecture.



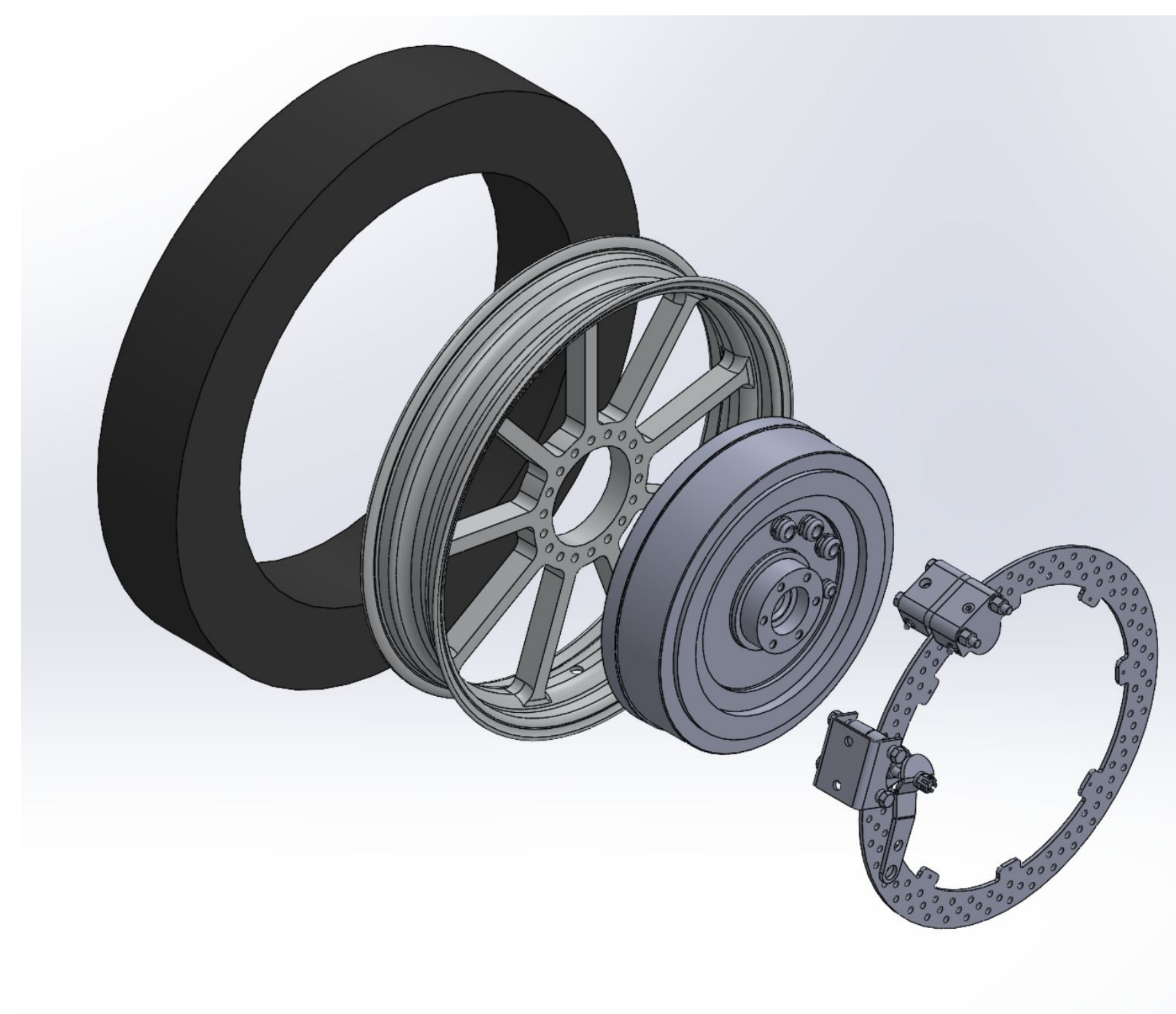
Chassis FEA

This diagram highlights the FEA Analysis.

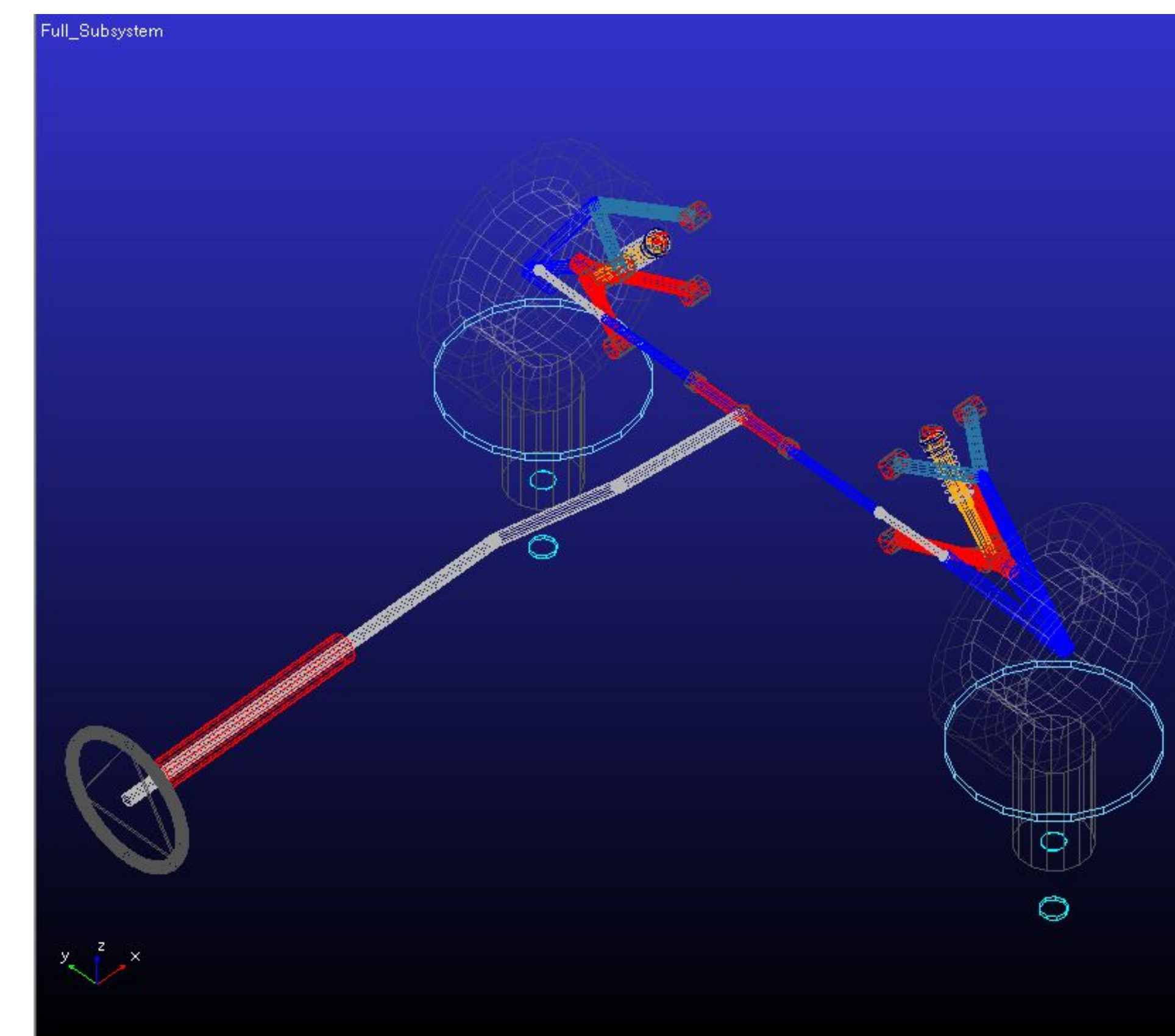


Test	Front	Back	Side 1	Side 2	Side 3
Factor of Safety	1.725	1.566	1.398	1.659	1.181
Deformation (mm)	1.977	2.245	6.224	1.557	2.305

Exploded Traction Diagram



Suspension Kinematics



Validation

INSERT VALIDATION PHOTOS AND DESCRIPTION

Self assessment of design and future work

Did your design meet target specs and/or show satisfactory performance?
 Is your design clunky or elegant? Can it be improved upon?
 What are the positive and negative aspects of your design?
 Recommendations if this project continues?

Acknowledgements

- Dr. Saied Taheri- Advisor
- Eashan Gupta- President of SolarCar@VT Club
- SolarCar@VT Club