



FSAE 2021 Drivetrain

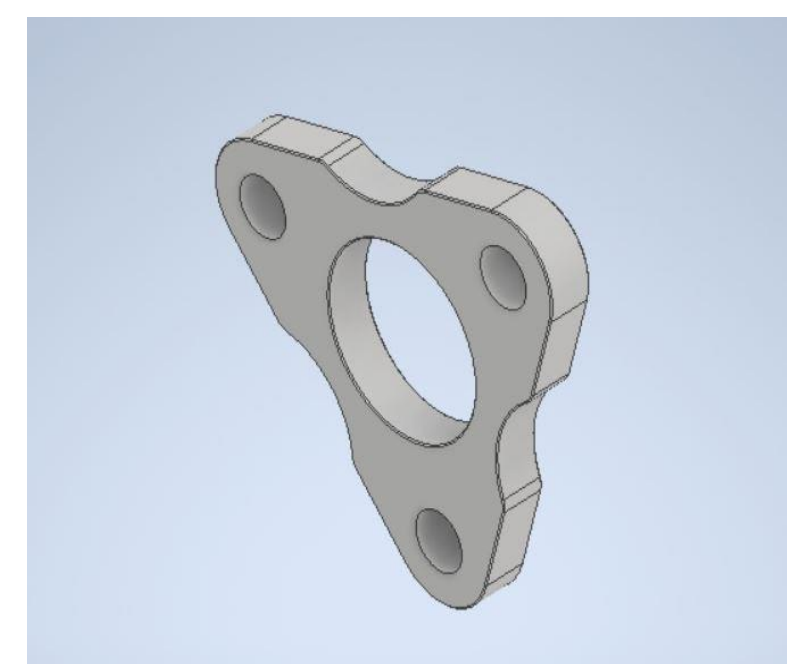
Lucas Foulk



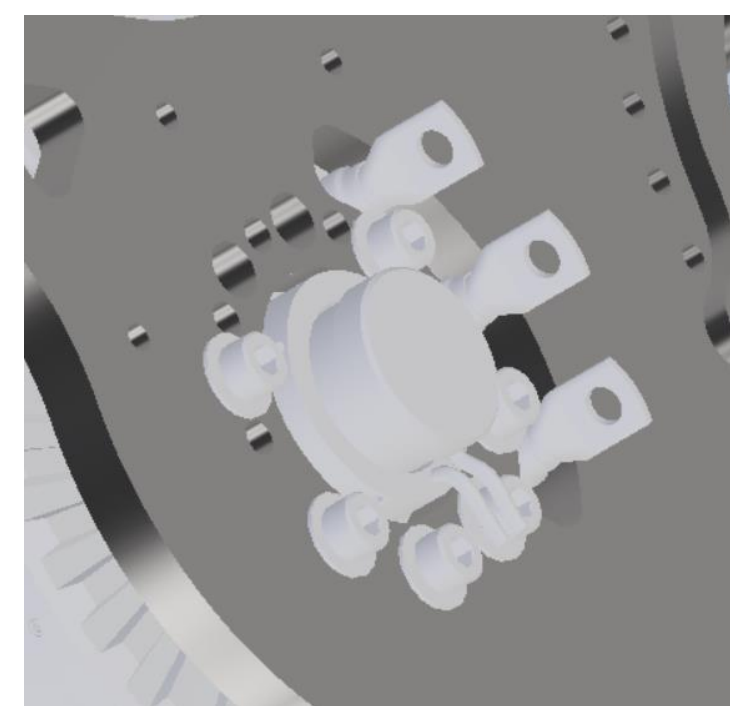
A joint project of the Lafayette College ECE and ME Departments

Design Considerations

- Increase and enhance stiffness and vibration isolation in the drivetrain housing
- Remove cantilevered motor shaft from previous design
- Incorporate a multi-axis support to preserve internal motor bearings from angular misalignments
- Maintain a lightweight drivetrain package
- Give next years team a workable drivetrain that will propel the car at a fast and efficient pace



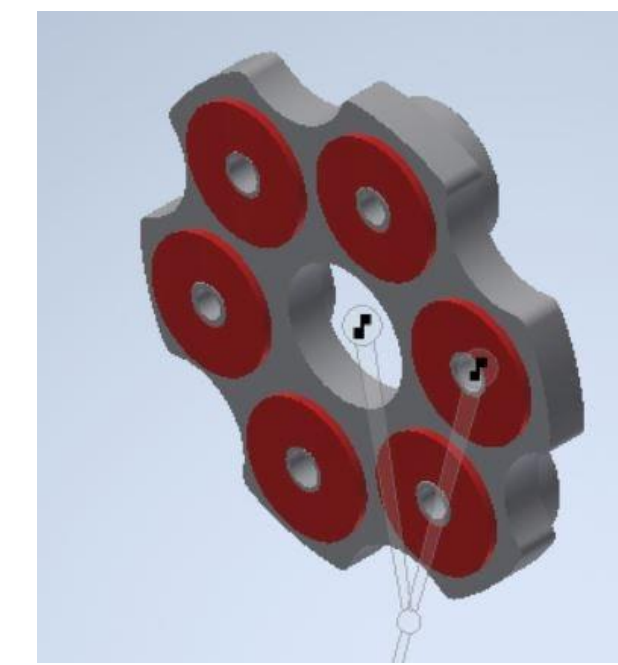
Torque Transmission Triangle: This triangular plate allows the flex hub to act as a joint. Providing the boundary between the motor shaft and the flex hub.



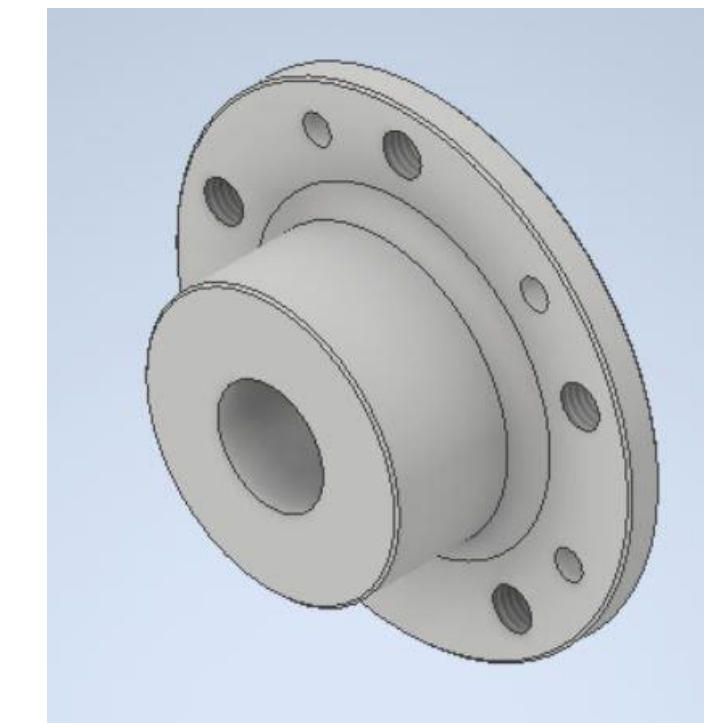
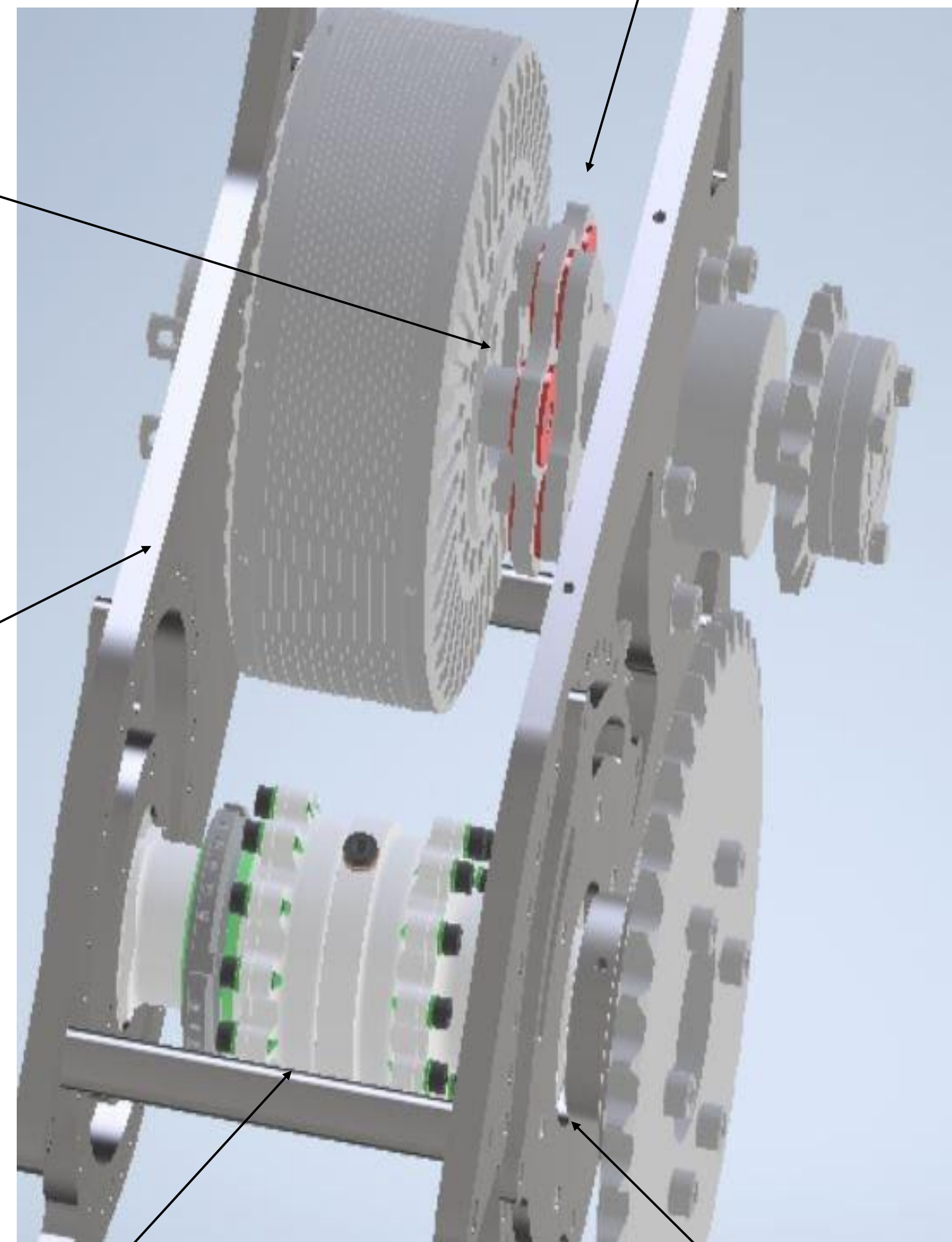
Further exposed motor electrical and cooling connections. As well as a motor mounting plate optimized for structural rigidity.



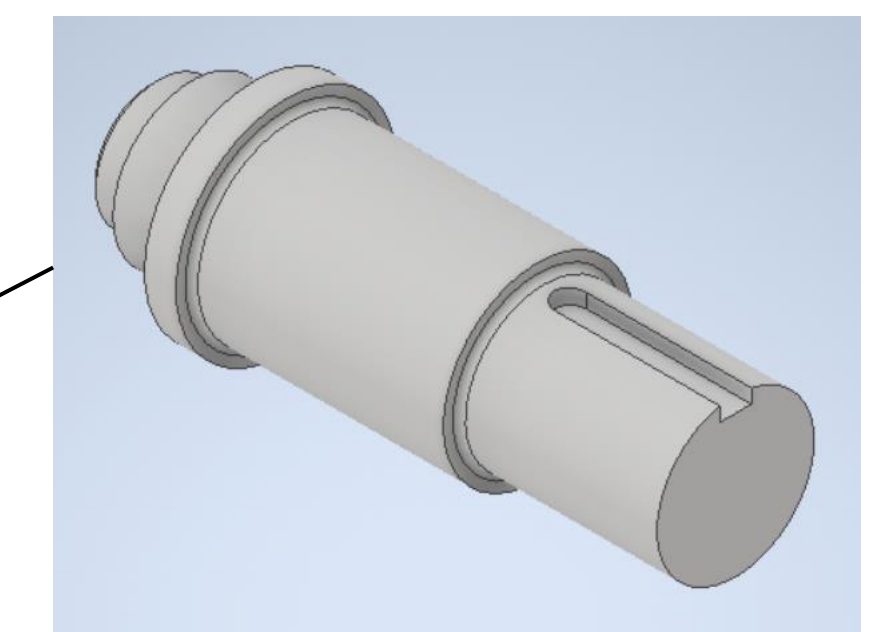
Drexler limited slip differential. The state-of-the-art FSAE differential offering fast preload adjustment, and reduced weight.



Flex Hub: This flex hub was added to remove angular misalignment during load. Preserving the internal motor bearings.



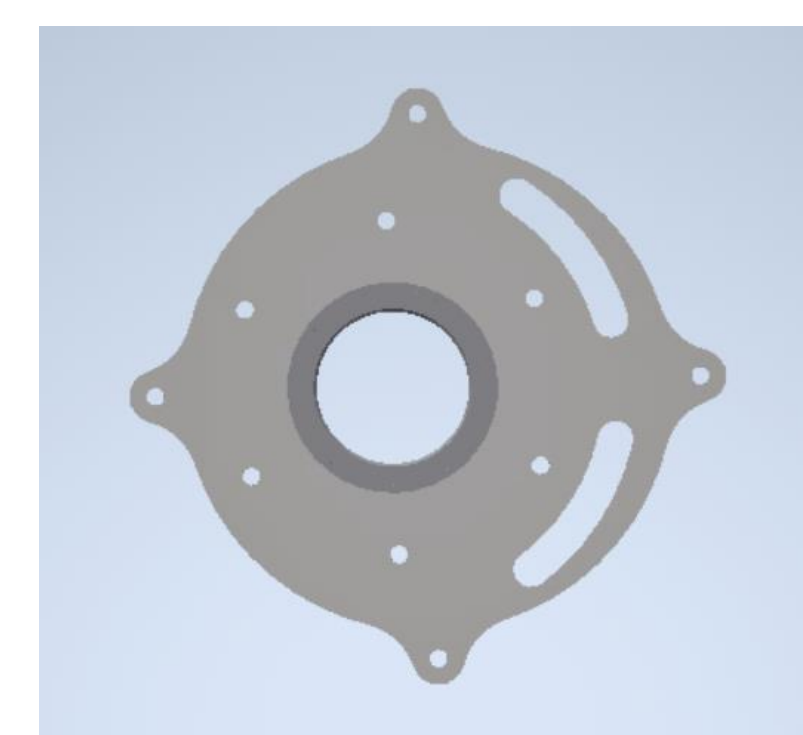
Support bearing: Repurposed from a VW Jetta, this rear wheel bearing provides support to the motor shaft. Eliminating the previously cantilever design.



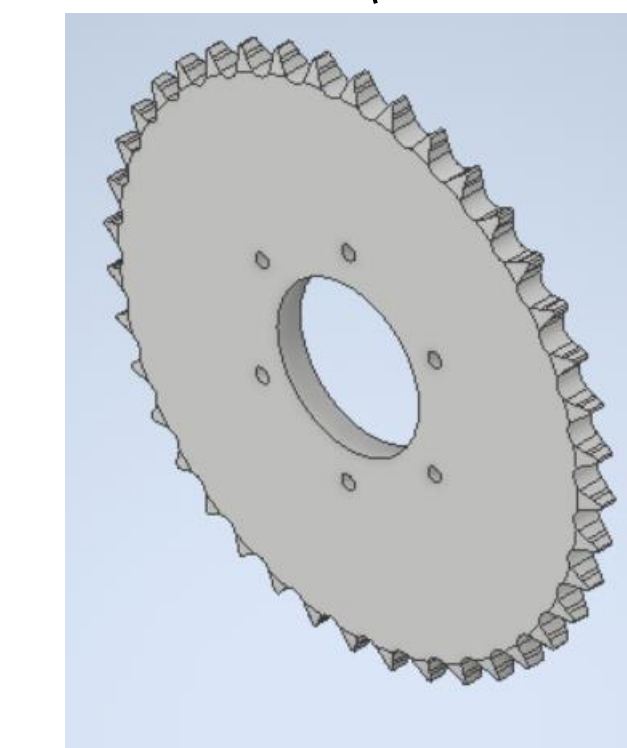
Motor Shaft: Keyed and tapered to be press fit through the bearing support.



Quick disconnect front sprocket. This sprocket transmits torque from the motor to the rear wheels.



Eccentric tensioner rings for easy chain tensioning prior to full scale car testing.



Rear Sprocket and Differential hub adapter. Developed with a 3:1 gear ratio optimized for both acceleration and endurance.

Achievements

- Improved rigidity in drivetrain housing
- Frame integrated motor shaft bearing support
- Proprietary flex hub allowing for angular deviations under load
- Fully assembled differential providing rear wheel independence
- Car performance analysis conducted in MATLAB, used to calculate effective gear ratio in different scenarios.

Website QR

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