Our senior design project is a vehicle with an unconventional suspension design. The suspension is designed to reduce the lateral acceleration that the driver feels while cornering while increasing traction and efficiency. It will do this by leaning into the curve, instead of away—as all vehicles now do. Our design will use a double suspension system. The primary suspension controls the vehicle tilting during cornering and the secondary suspension absorbs the energy from road surface bumps.

The problem is that cars lean outward, creating more than necessary lateral acceleration. The centripetal force causes drivers and passengers to experience forces contrary to the direction that the vehicle is heading. As previously mentioned, our car will lean into the turn, thus reducing the lateral acceleration felt.

At this point we do not have an official customer. Since our idea is rare, part of the intent of this project is to raise awareness and raise the standard for improved vehicle suspensions.

The key constraints of our design are
- Creating a successful drivetrain
- Creating a smooth steering system
- Creating a smooth ride
- Maintaining a low center of gravity
- Overall weight down
- Cost

Discipline topics are
- Machine Design/Mechanics (metals, weldments, fasteners, springs, shafts, fatigue)
- Statics and Dynamics (structures, forces)
- Thermal/Fluid Analysis
- Vibrations
- CAD for FEA and vibrational analysis
- Kinematics (linkages, forces, accelerations)
- Measurement, uncertainty
- Business (budgeting, organization)

Primary tasks to be carried out by each team member
- Lake – design analysis, parts supply
- Scott – machining, fabrication
- Nate – design synthesis, budgeting
- Jacob – design synthesis, fabrication
A preliminary 3D design ensures us that the concept can work (Figure 1). Using this design, we ran a geometry analysis which shows how the center of gravity changes when the car turns (Figure 2). We also assembled an early prototype of our design from Lego® (Figure 3). After seeing the physical model, we created a 3D model of the frame (Figure 4) and a more detailed model of the suspension system (Figure 5).

![Figure 1. Concept Design](image1)

![Figure 2. Preliminary Geometry Analysis](image2)
Figure 3. Small-scale Prototype

Figure 4. Frame Design
Figure 5. Current Design of Primary Suspension System