Steven Kuo

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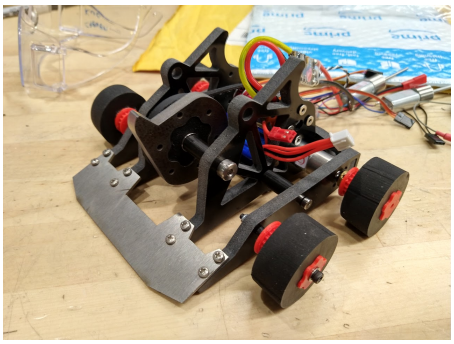
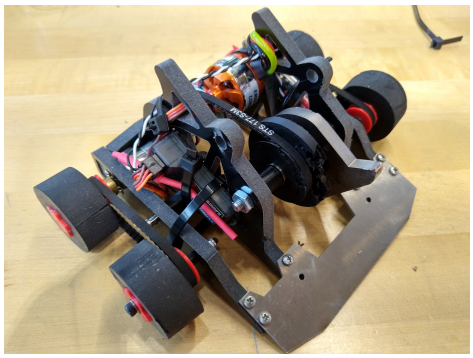
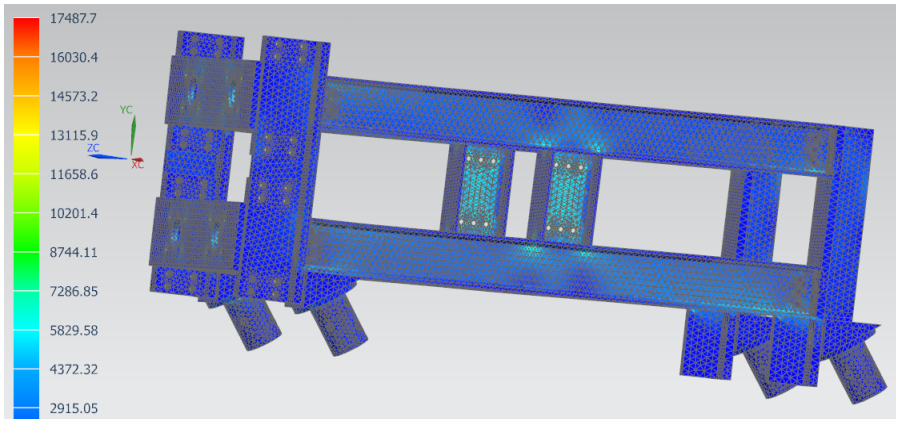
Project: Leatherbacks Combat Robotics 1 lb robot
When: March 2023 - April 2023
Description:
I worked with a partner to design and build a 1 lb robot to compete internally at the University of Maryland. In order to avoid the weak interlayer adhesion of a 3D printed PLA chassis, our robot structure consisted entirely of 2D UHMW plates cut on the waterjet. I also soldered all the electrical components together and used a multimeter to ensure the proper connections were made.



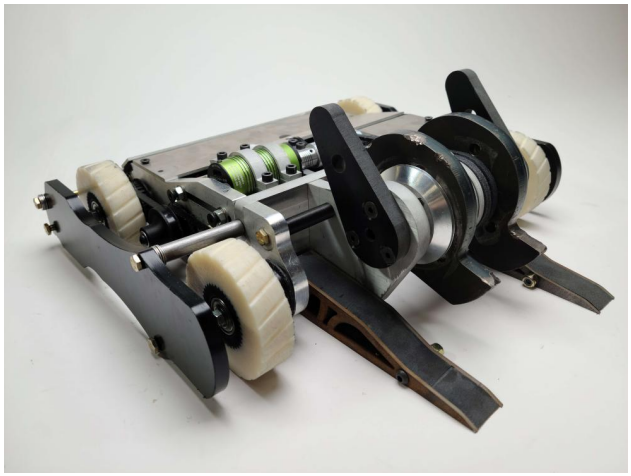


Project: UMD Loop Tunnel Boring Competition
When: September 2022 - January 2023
Description:
As a member of the tunnel support subteam, which consisted of six people, we were responsible for the pipe segments and the reaction frame for the pipe jacking process. I utilized FEA in NX to determine if the reaction frame can withstand the pipe jacking force with a safety factor of 2. I used mesh controls where necessary to achieve more accurate results, and design changes were made to reduce stress concentrations. In addition to simulating bolts with 1D and spider elements, hand calculations were performed to validate the results.

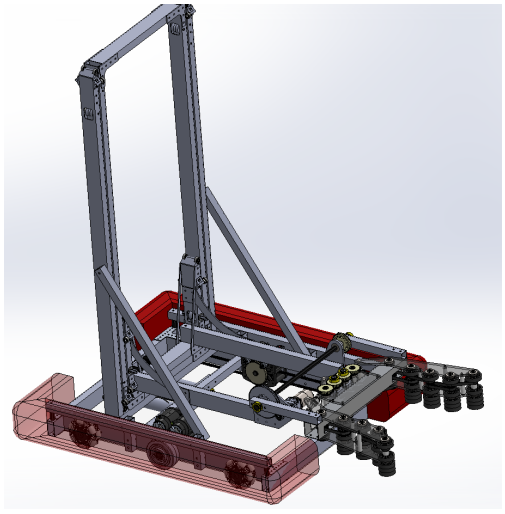


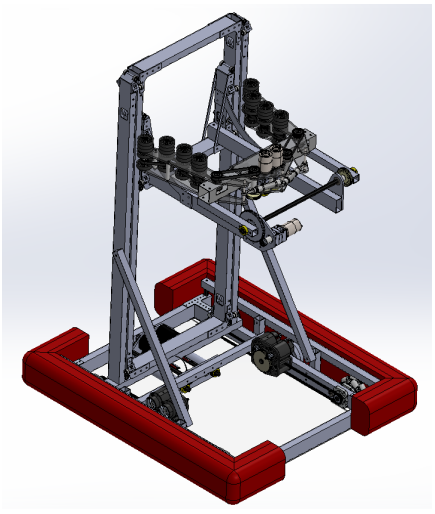
Before the reaction frame got a chance to be tested at competition, UMD Loop has pivoted away from the Tunnel Boring Competition to the University Rover Challenge. I am currently transitioning to the arm subteam for this new competition.

Project: Leatherbacks Combat Robotics 30 lb robot
When: September 2022 - Present
Description:
I work on a team of seven people to build a 30 lb robot to compete in NHRL (Norwalk Havoc Robot League). For this robot, I used Solidworks to design the outer profile of the forks. The forks pivot around a point to always maintain contact with the ground, and it also includes limiting geometries to ensure it does not pivot more than 20° from horizontal. I assisted in manufacturing through subtractive methods such as running the waterjet with CAM software and operating the drill mill for precision machining.

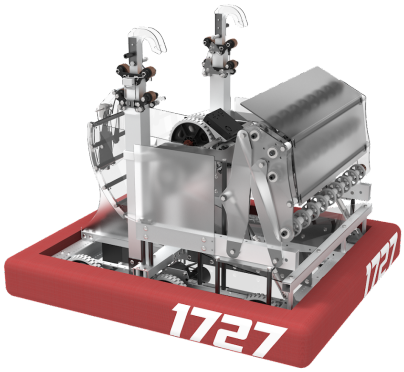


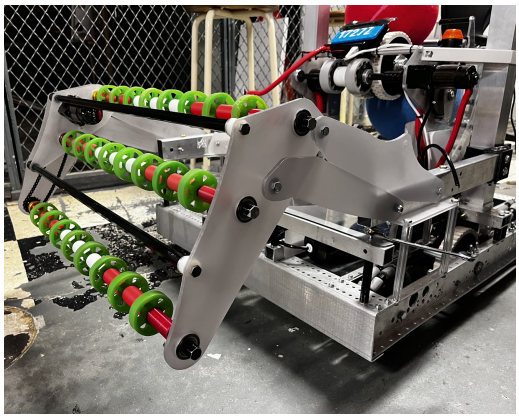
Project: Modeling a FIRST Robotics Competition (FRC) Robot in CAD
When: June 2022 - August 2022
Description:
This is a personal project where I design a FRC robot in Solidworks so that I can translate my Autodesk Inventor skills and experience from FRC Team 1727 into Solidworks. The robot is designed to manipulate cubes and place them on elevated platforms at various heights. This is achieved through an intake with compliant rollers on a two stage elevator. The elevator uses continuous rigging with the rigging running through the hollow rectangular tubes of the structure.





Project: FIRST Robotics Competition Team 1727 (2022 Season)
When: January 2022 - April 2022
Description:
For the 2022 season, I managed a team of twenty people to design a robot that can intake 9 inch diameter tennis balls from the field floor and shoot them into a funnel 8 feet above the ground. Additionally, the robot was designed to climb a series of monkey bars that increased in height. In terms of the robot, I mainly developed the geometry of the intake on a four bar linkage and the gearbox for the climbing mechanism with CAD in Autodesk Inventor. I also assembled the intake and climbing mechanism, as well as operated and troubleshoot 3D printers to produce parts. Furthermore, I oversaw the programming team and aided with debugging.



Project: FIRST Robotics Competition Team 1727 (2020 Season)
When: January 2020 - March 2020
Description:
For the 2020 season, our team built a robot designed to intake and shoot foam balls while being allowed to hold five at a time. I helped prototype mechanical subsystems, including one that allows the robot to climb and hang on an uneven bar. I also worked on conveyor subsystems that indexed the balls and transported them to the shooter.