Steven Kuo

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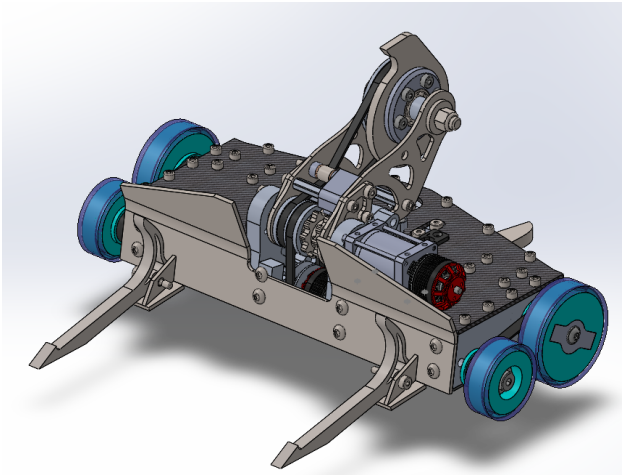
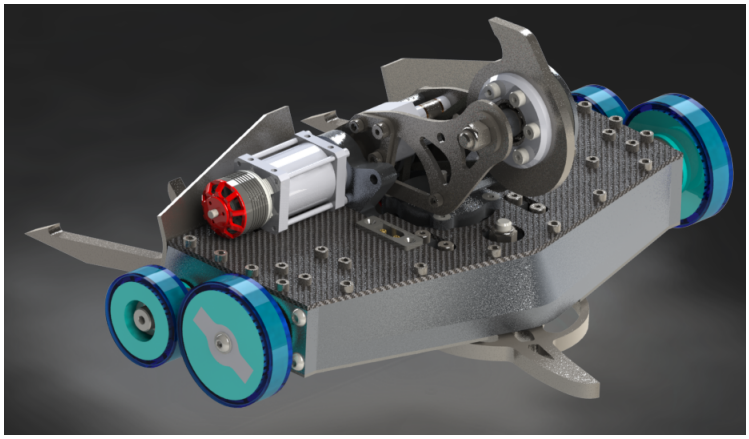
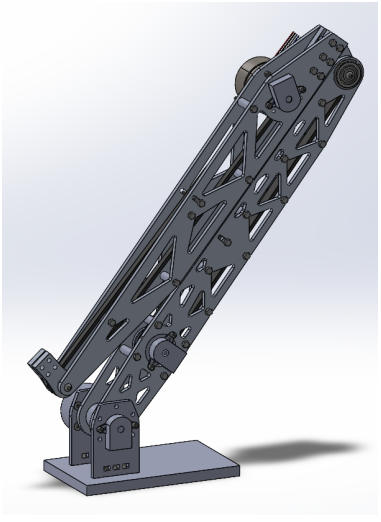
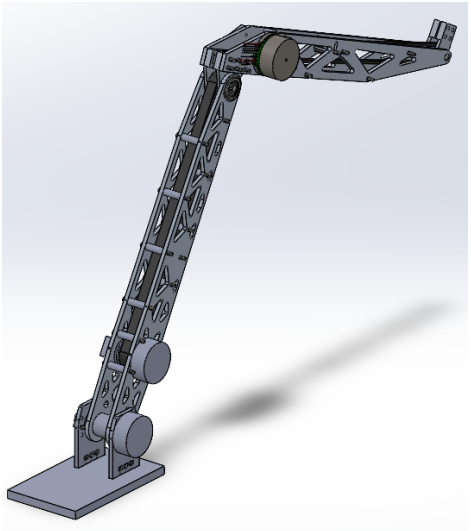
Project: Leatherbacks Combat Robotics 12 lb robot
When: November 2023 - Present
Description:
In a team of three, we designed a combat robot with two weapon systems: a horizontal spinner and a hammer saw. I was mainly responsible for the chassis and hammer saw. In order to protect the gearbox from the reaction forces of the hammering action, a custom slip clutch was employed, and hand calculations were used to design the clutch to a specified torque.

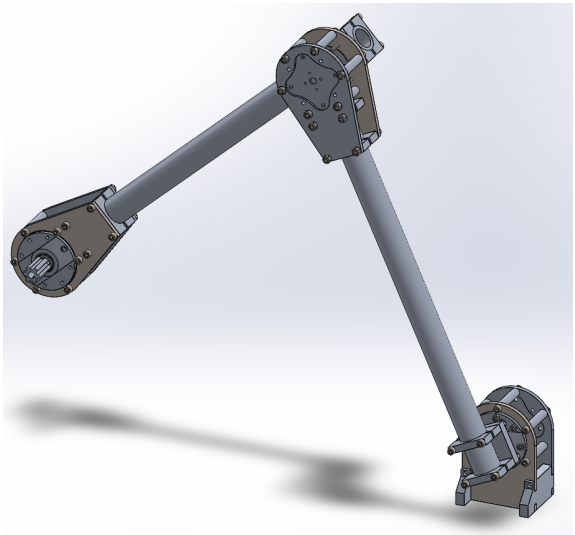




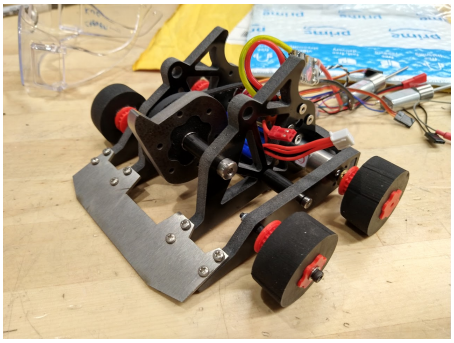
Project: UMD Loop University Rover Challenge - Arm
When: February 2023 - December 2023
Description:
I am a member of the arm subteam, consisting of seven people. Within this team, I am responsible for the primary structure of the arm, which I have designed in SolidWorks. The first iteration (pictured on the left) focused on placing the weight close to the base to make it easier to control. However, after finding that the weight wouldn't pose an issue, I designed a second iteration with more robust direct driven joints.

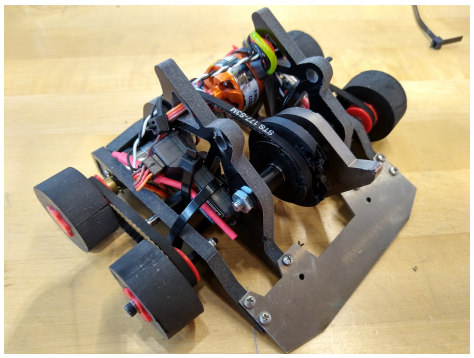




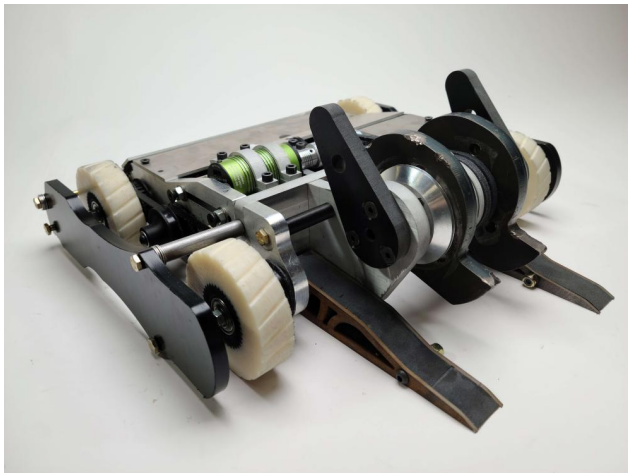


Project: Leatherbacks Combat Robotics 1 lb robot
When: March 2023 - April 2023
Description:
I worked with a partner to design and build a 1 lb robot to compete internally at the University of Maryland. In order to avoid the weak interlayer adhesion of a 3D printed PLA chassis, our robot structure consisted 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.

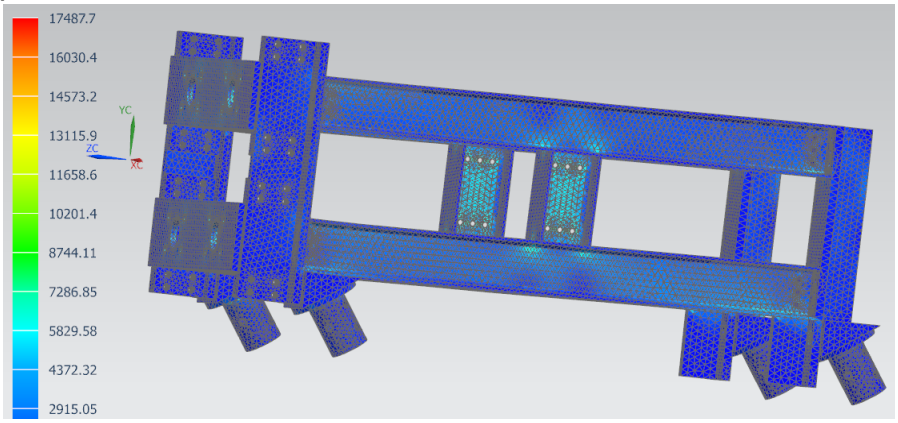




Project: Leatherbacks Combat Robotics 30 lb robot
When: September 2022 - March 2023
Description:
I work on a team of seven people to build a 30 lb robot to compete in NHRL (Norwalk Havoc Robot League). For this robot, I used SolidWorks to design the profile of the forks. The forks pivot around a point 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: UMD Loop Tunnel Boring Competition - Reaction Frame
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.



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.