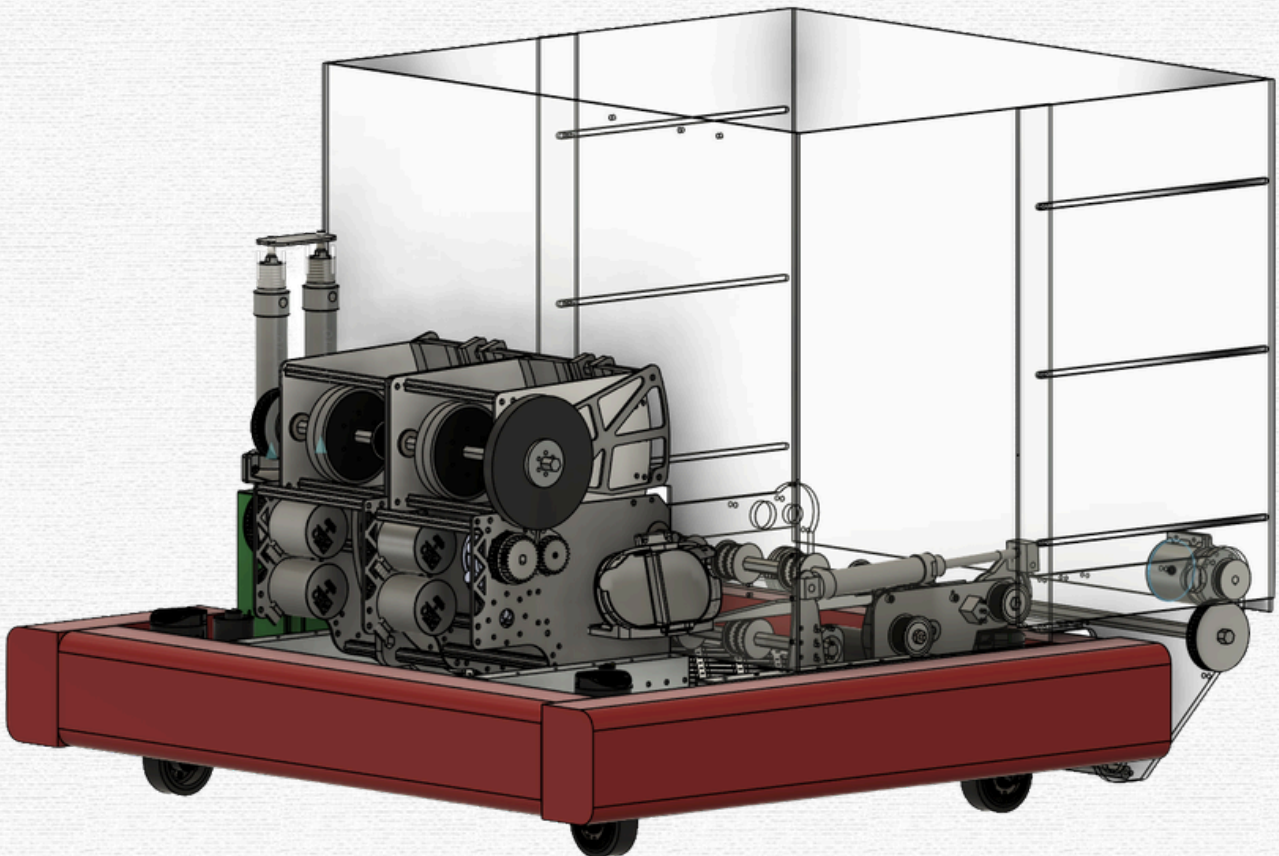


ENGINEERING

6228

NOTEBOOK

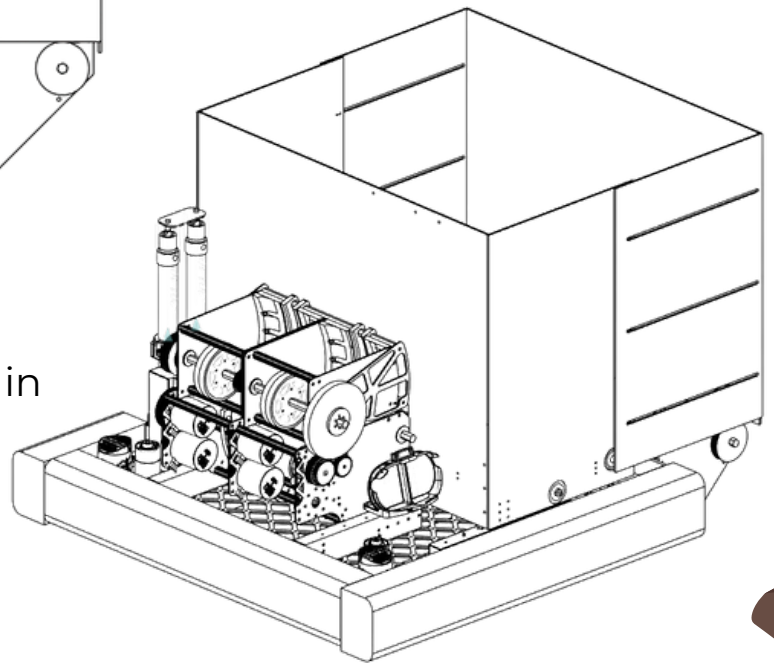
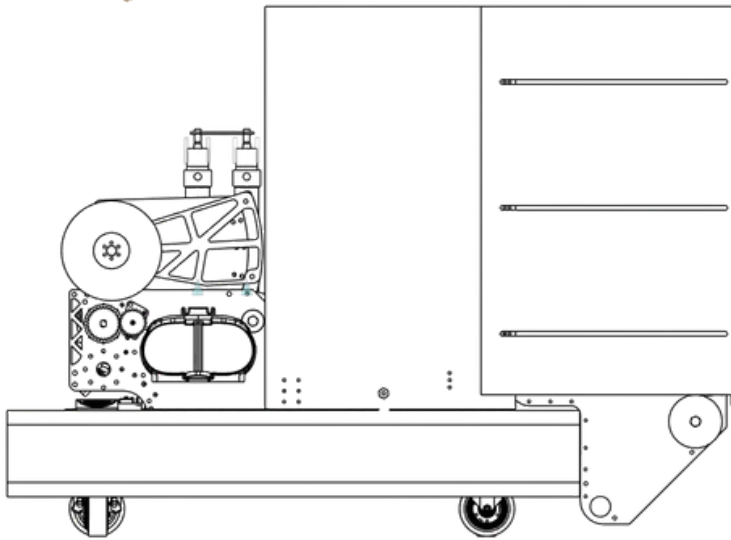


WHO ARE WE ?

MAT Robotics is a robotics team from YTÜ Maçka Vocational and Technical Anatolian High School, located in Şişli, Istanbul, that participates in the FRC competitions. The team was founded in **2015** by 2 teachers and 8 students to compete in the FRC competitions, which were held in Turkey for the first time that year.



ROBOT OVERVIEW

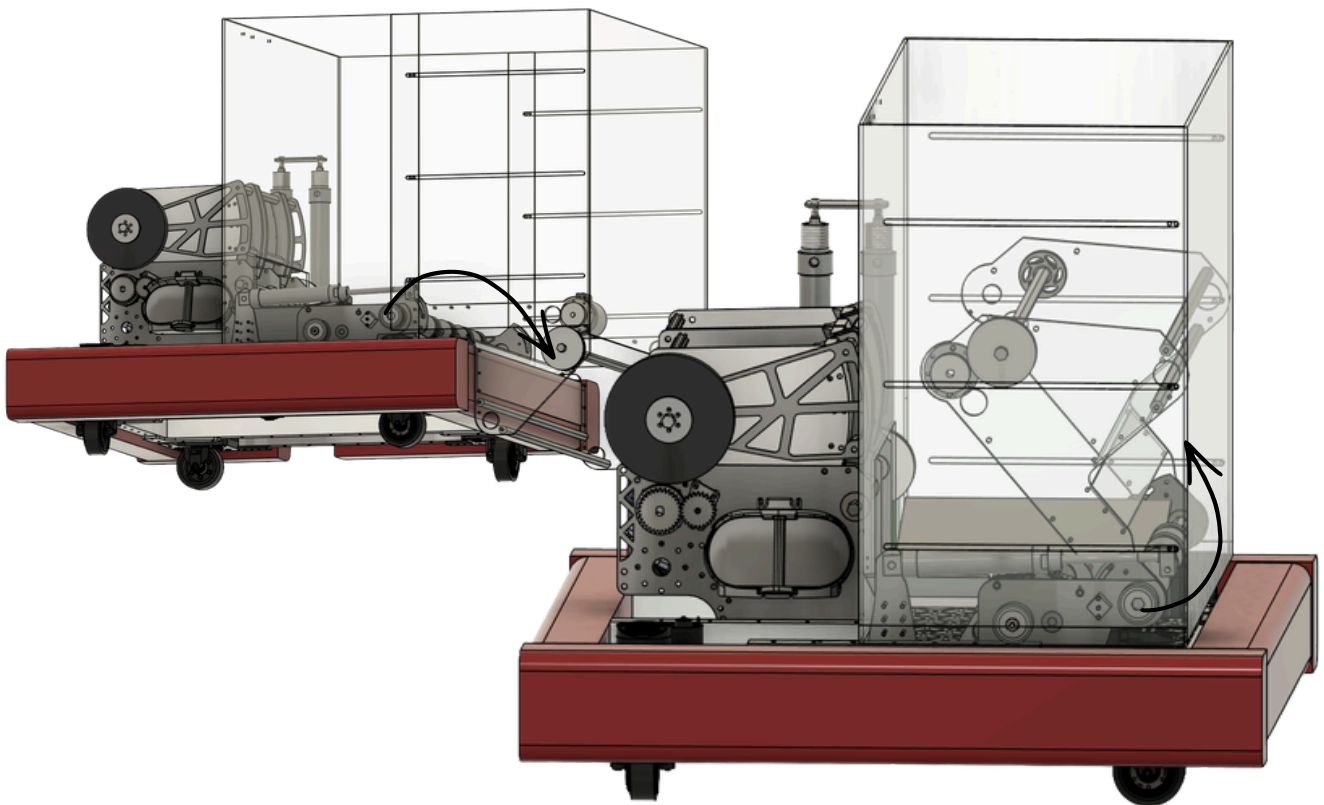


This year, we designed our robot in **Fusion** with a focus on speed, **agility**, and **efficiency**. Using a **swerve drive**, we achieved excellent maneuverability and **field** control.

The robot features a high-capacity storage system capable of holding dozens of fuel. A **dual-shooter mechanism** delivers **fast**, **accurate**, and **stable** shots. Additionally, a reliable climbing system and an advanced autonomous system using a **virtual reality headset** and **IMU sensor** enhance overall performance. For the chassis, we selected **aluminum** for its balance of strength, weight, and cost.

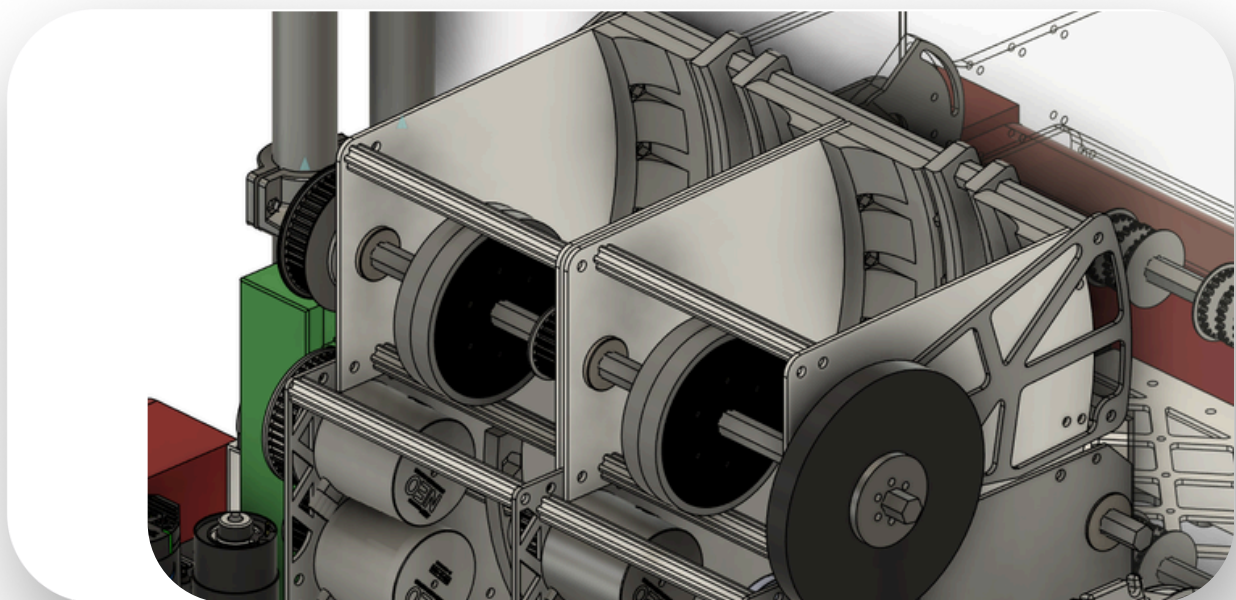
INTAKE MECHANISM

Our intake system starts inside the tank at the beginning of the match, but it is designed to expand outward using an expansion mechanism, extending beyond the robot's exterior to collect the ball. We use pneumatic systems to open and close it because they are both powerful and compatible with our climbing capabilities, which is a significant advantage for us. Additionally, the intake material is polycarbonate, just like the tank, because polycarbonate is a durable material with high impact resistance. Using polycarbonate and keeping the intake simple yet sturdy provides a significant advantage in better absorbing impacts and damage from other robots.



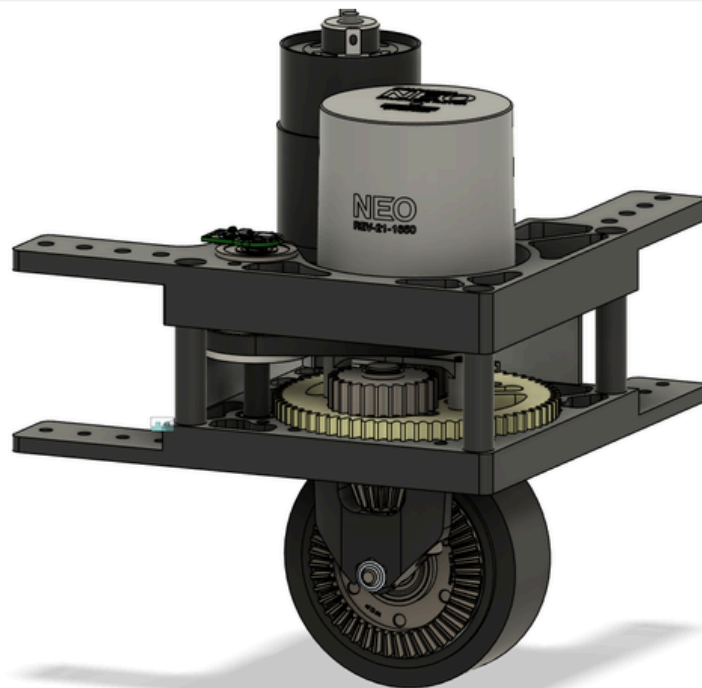
SHOOTER MECHANISM

This season, our primary focus was to develop a balanced, stable, precise, and fast shooting system. To rapidly shoot a high ball capacity, we designed a dual-shooter mechanism powered by brushless NEO motors. Our system can shoot 8–9 balls per second. To maximize stability and kinetic energy, we implemented a 1kg fitness weight on the main shaft as a flywheel, storing energy to ensure consistent speed and power for each shot. Using a virtual reality headset and IMU sensor, we determine our field position and automatically optimize the hood angle. For the hood mechanism, we implemented a Snowblower wiper motor, which self-locks at the zero position without additional hardware, maintaining a fixed hood angle during shots for increased precision, while remaining easy to deploy when needed. The design is constructed using aluminum sheet.



SWERVE SYSTEMS

This season, we chose the WCP Swerve XS, which is both affordable and high-performance, and equipped it with 775 motors on the rotation axis and brushless NEO motors for driving, ensuring smooth operation.

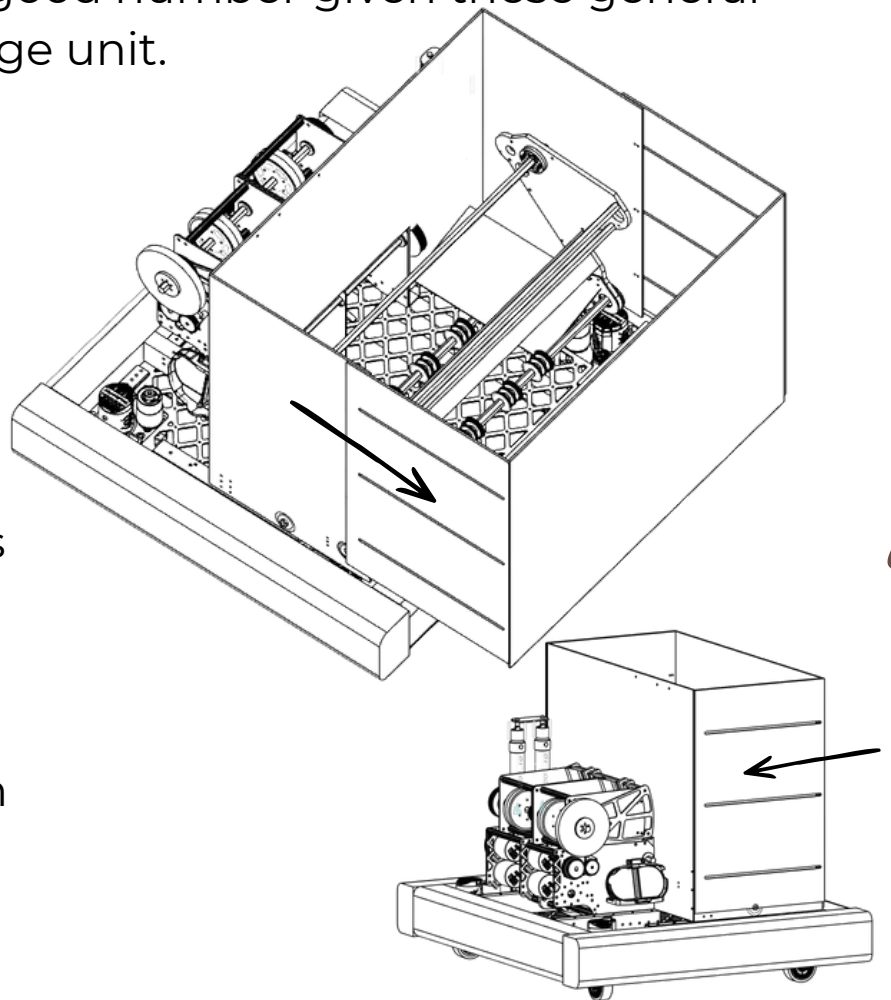


Additionally, since the WCP Swerve XS generally has a higher swivel angle than other swerves, we turned this into an advantage by opting to go over bumps.

STORAGE

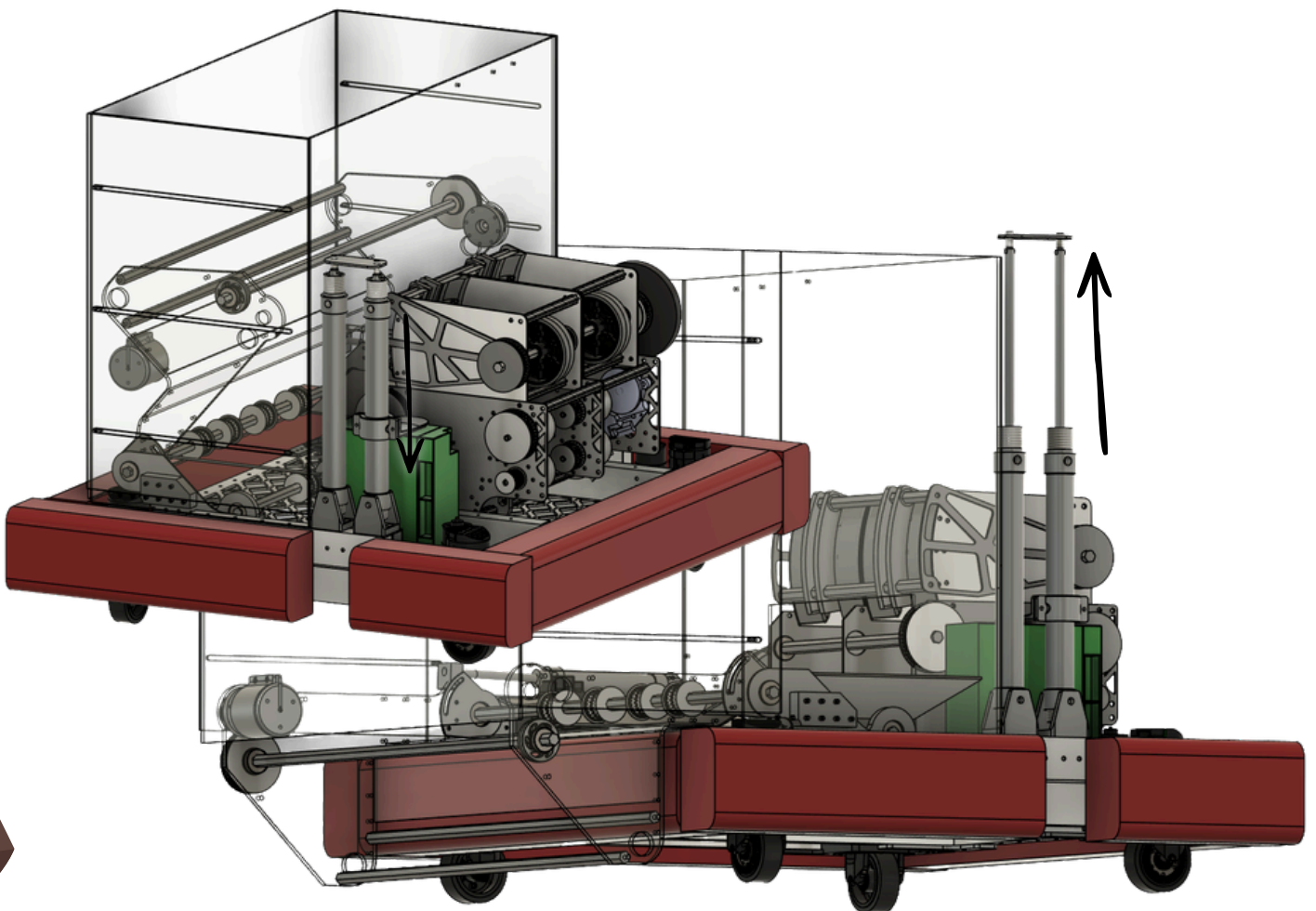
In our storage system, we wanted to use an expandable storage unit both to avoid exceeding the width limit and to ensure it was large enough. To open this storage unit, we designed a sliding system. Since this sliding system needs to operate during the match, our intake system will naturally open the storage unit as it moves up and down. This will allow us to carry around 60 to 70 balls, which is a very good number given these general limitations for a storage unit.

Additionally, as I mentioned earlier, since we opted for a “bump” design, we did not shorten the length of any of the tanks, and we used polycarbonate sheets for the tanks as well; the reason for this, of course, is that it is a durable material with high impact resistance.

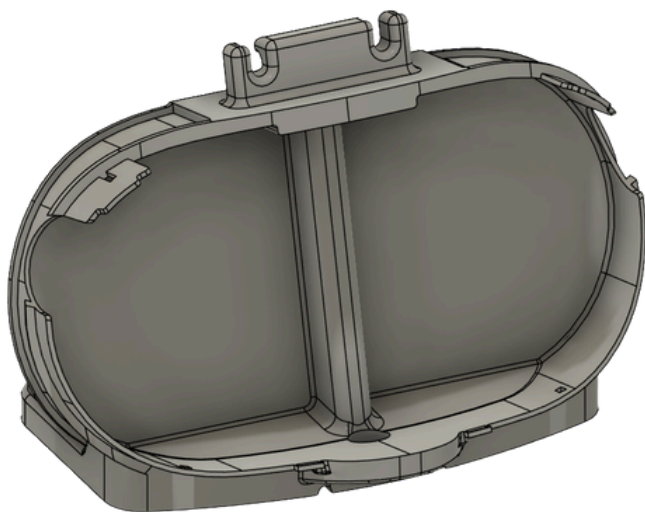


CLIMBING

As for climbing, we opted for L1 climbing because L2 and L3 would have required extra effort, time, and materials; instead, we kept them simple so we could use those resources for the robot's other features, such as the shooter, and chose to implement our climbing mechanism using pneumatic—that is, air-pressure—systems.



QUESTNAV



QuestNav enables streaming Oculus VR headset pose information to an FRC robot using the Network Tables 4 (NT4) protocol. This pose data provides robot control systems with accurate mapping and navigation capabilities in competition fields, practice spaces, or any location.

1 Nov - 10 Dec

The early stages were primarily focused on seeking grants and securing sponsorships; we reached out to various brands and companies that might be interested.

10 Jan - 10 Feb

After the theme was announced, we generated ideas regarding the robot's general design for the first few days and the first week, and established the overall framework.

10 Ma - 25 Ma

Robot design is finalized, all tests and assembly are complete. Driver trials have begun, and final competition prep is underway.

10 Dec - 10 Jan

During this period, we focused on foundational pre-competition tasks such as securing sponsorships and preparing for the kickoff. We also prepared for the 2025 YTU Off-Season, building an additional robot to test our custom-made mecanum wheels, and participated in the event.

10 Feb - 10 Ma

We've started transferring the design to Fusion, modeling it, and assembling the mechanical and electronic components; the general drivetrain is now in place.