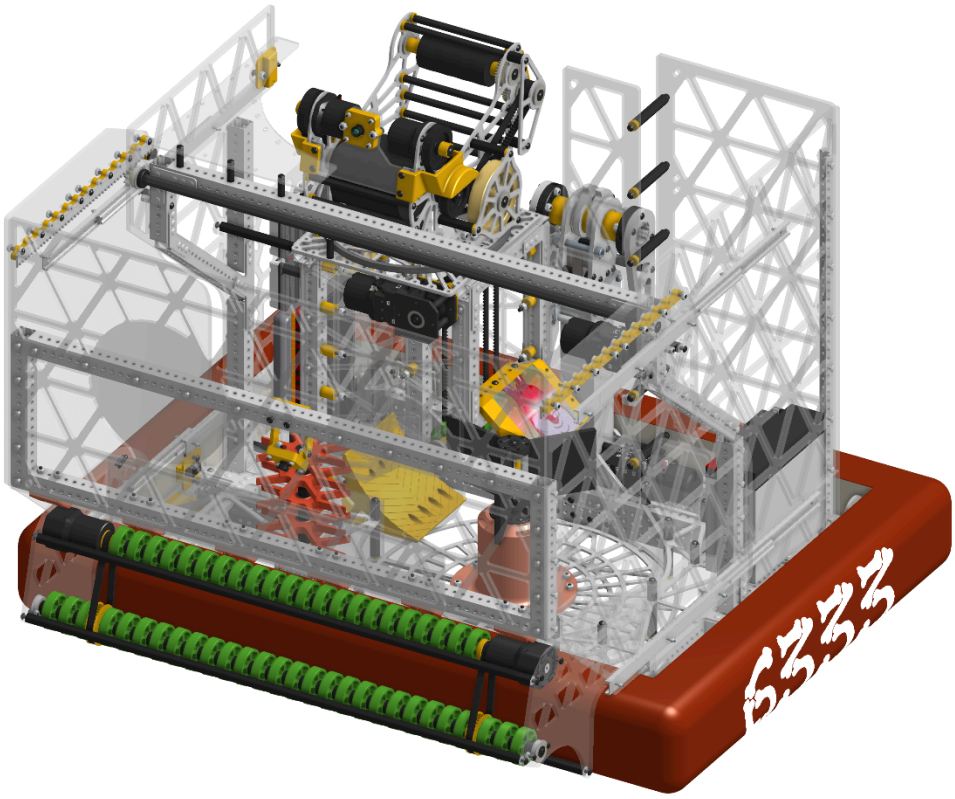


6333 MARION

SCAVENGER ROBOTICS

2026 Technical Binder

Foreword

At Team 6333 Scavenger Robotics, we strive to provide the best STEM education and inspiration to all levels of students of Windham County, CT.

We leverage FIRST Robotics Competition to provide an engaging environment in which students are given freedom to explore their passion in STEM, or to just come and have some snacks and a good time with friends and family.

By analyzing this year's game Rebuilt, determining the optimal strategies suitable for us, designing, manufacturing, programing and operating our 2026 robot, all within a tight budget and schedule, we continue to sharpen our STEM skills and advance our goals of servicing and inspiring our community

Team 6333 is proud to present our 2026 robot:

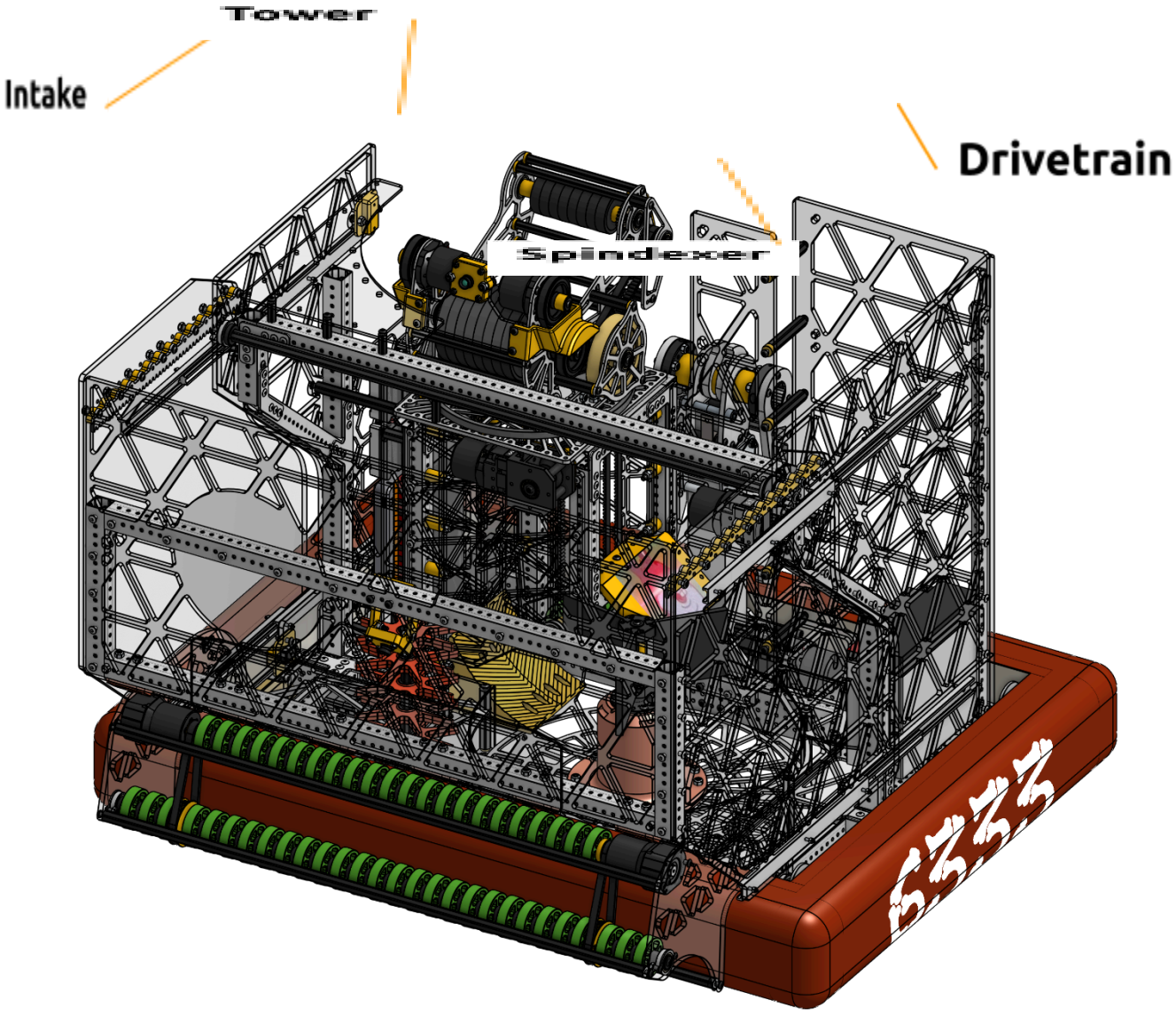
MARION

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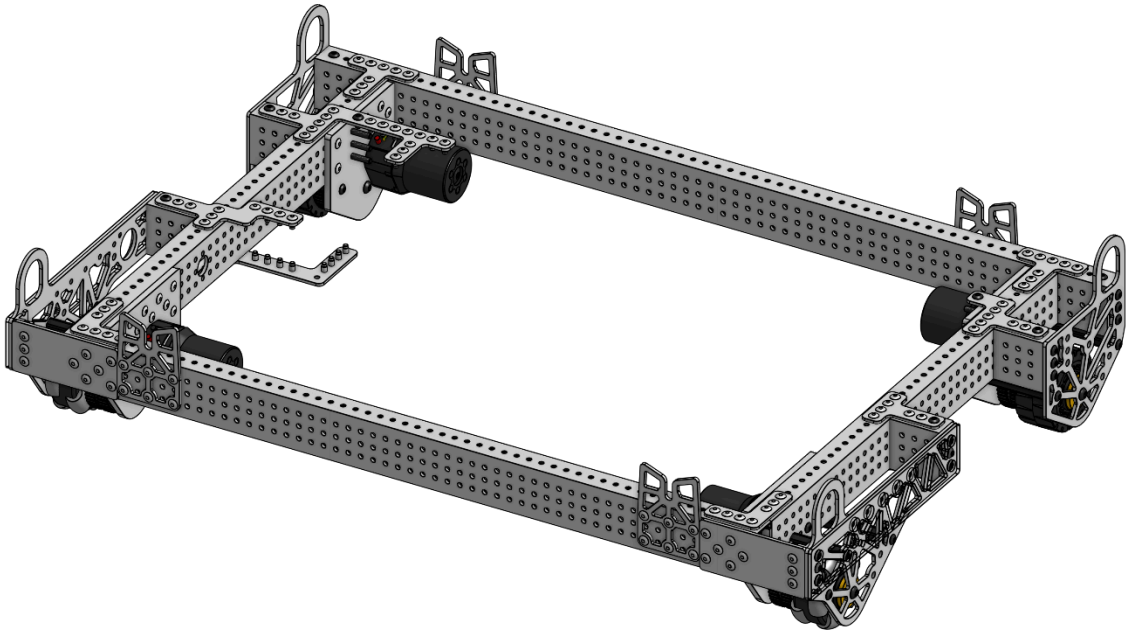
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MARION



Drivetrain



The drivetrain allows the robot to maneuver the field.

Compared to the currently mainstream swerve drive in FRC, the tank drive is chosen for its weight and cost saving, simplicity, ease of programming, reliability and the specialized ability to navigate over the bump.

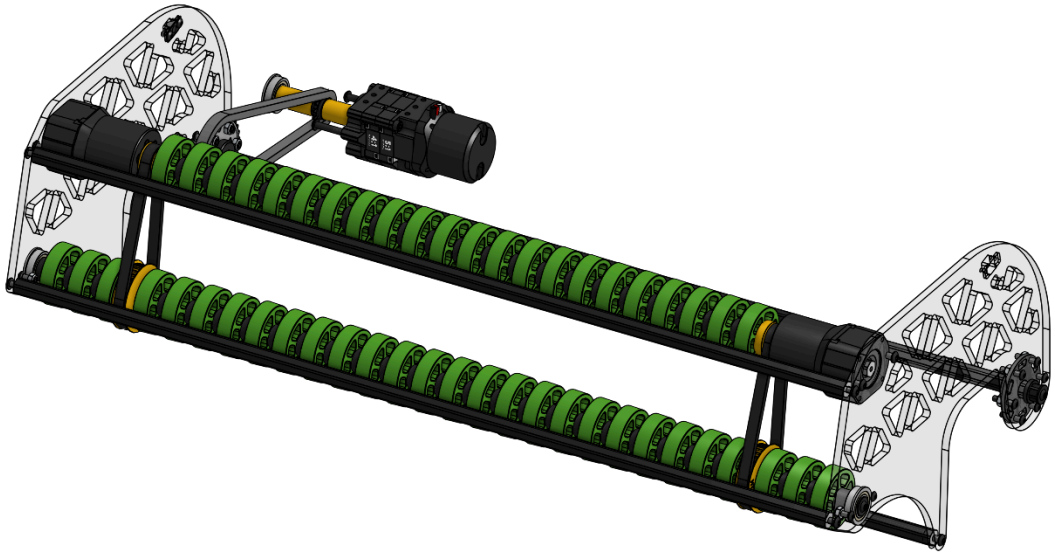
NEO Vortex Single Stage Reduction Wheel Pods

- 8T integrated gear shaft of the NEO vortex motor directly drives a 44T gear for a light weight, compact, reliable single stage gear reduction
- 3in wheels for packaging, allowing the intake pivot to be positioned low
- 17.1 ft/s top speed

Chassis

- 6061T aluminum
- 32in x 22in ultra wide chassis for maximization of intake width and expanded hopper volume
- 0.1” custom designed gussets for corner framing
- Integrated lifting points

Intake



The intake collects fuel from the ground and into the hopper. Compactly spaced 2” compliant wheels produce high traction with fuel, enabling touch-and-own operation. A maximized 29.25in active intake length allows us to intake at maximum efficiency.

Structure

- 1/4in polycarbonate, isogrid pattern slightly lightened
- 1/2in rounded hex shaft as roller axle
- 1/2in rounded hex shaft as cross bracing and crash bar
- 1/2in rounded hex shaft wrapped in surgical tubing as backing bar to eliminate intake dead spot

Roller

- 2in AndyMark 35A durometer compliant wheel
- Actuated with 2 coaxial NEO motors on the second row for speed and torque
- First row of rollers geared down 32:16 for torque
- Maximum roller surface speed 1.8x robot maximum speed to enable effective intaking in all situations

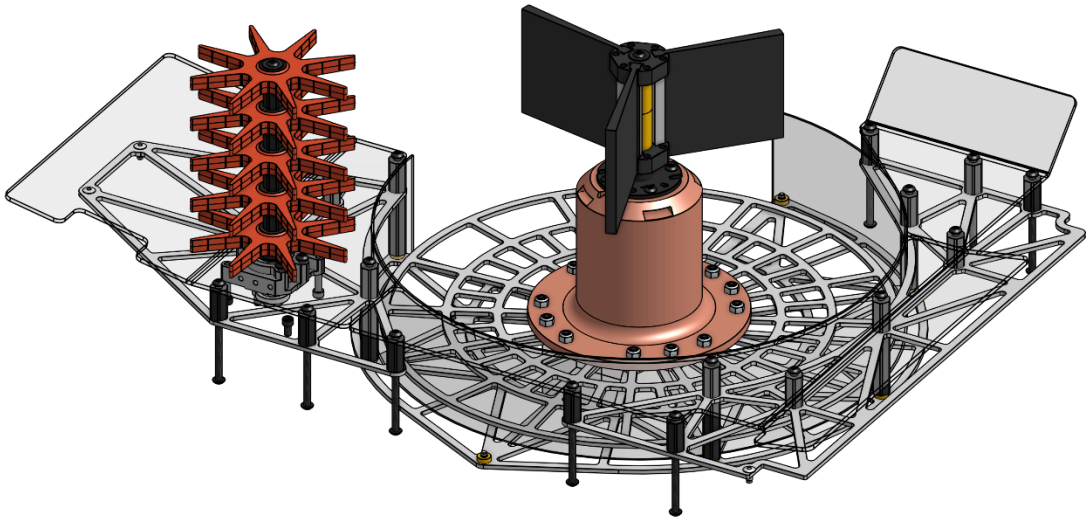
Deployment

- 1 NEO v2.0 motor, 20:1 MaxPlanetary gearbox plus final chain drive reduction of 32:12
- #25 chain is in-line tensioned

Electronics

- 1 REV magnetic limit switch for bottoming detection

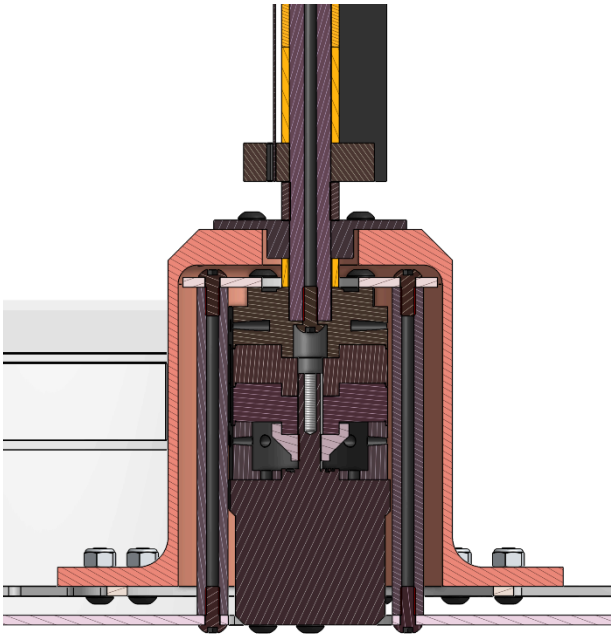
Spindexer



The spindexer indexes fuel in the hopper into the shooter tower to be further indexed into the shooter. A fin-less moving bottom design is chosen for its reliability in never having ball jam issues. REV brushes are incorporated for agitation. An additional spinning tower of AM stars serves as additional agitation to ensure consistent feeding into the spindexer.

Structure

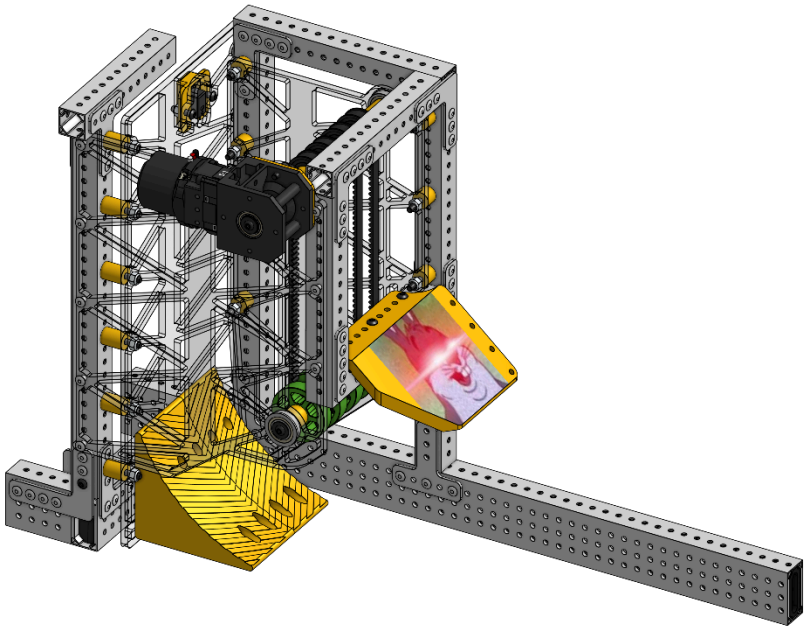
- 1/4in aluminum hanger plates and base plate form the stationary structure
- Standoffs and a 1/4in motor mount plate reverse mount the motor and gearbox inside the spindexer core
- 3D printed spindexer core serves as a sleeve shaft that translates the rotational movement of the gearbox output shaft to the 1/4in aluminum spinning pan



Actuation

- 1 NEO v2.0 motor for the main spindexer
- 15:1 MaxPlanetary gearbox for the main spindexer
- Theoretical maximum 13.93 fuel per second @ 5225 RPM / 10A
- 1 NEO v2.0 motor for the star tower
- 9:1 MaxPlanetary gearbox for the star tower

Tower



The shooter tower serves as the structural support for the turret shooter. It also indexes fuel from the spindexer into the turret shooter to be shot.

Structure

- Tube structure primarily uses 1x1 MAX tube for weight saving
- Custom designed aluminum corner brackets for fastening
- 1/4in polycarbonate aggressively lightened to form the ball path
- 3D printed entry ball blocker to prevent entry jam
- TPU 3D printed indexer wheel backing provide a flexible 0.5in compression to ensure a reliable ball engagement

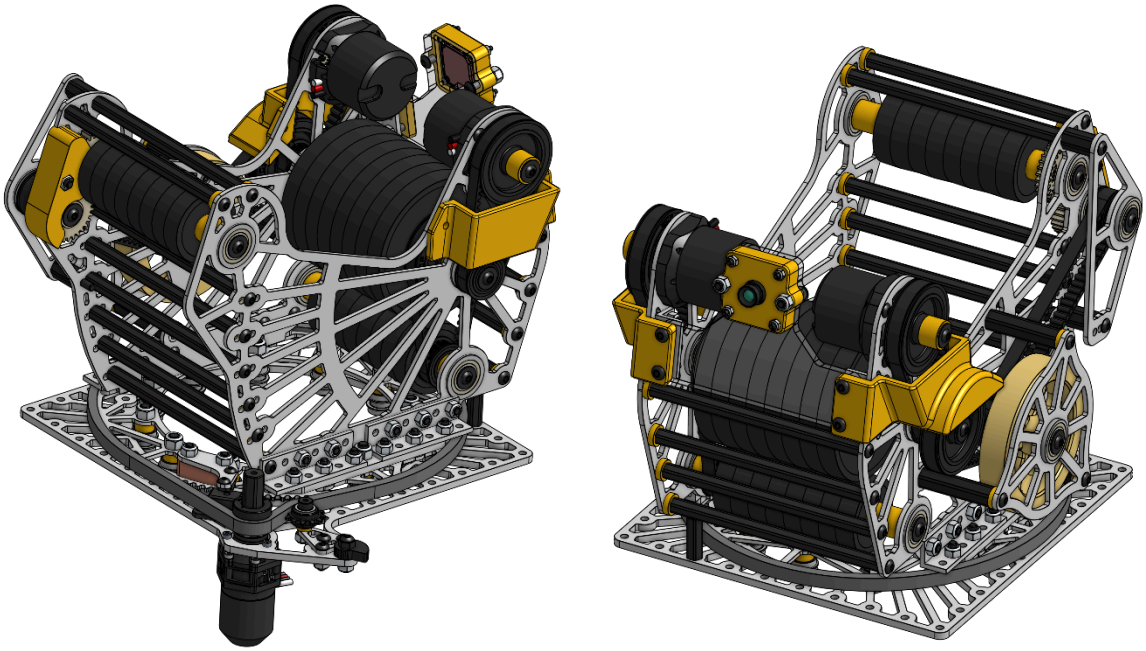
Actuation

- 1 NEO v2.0 motor
- 3:1 MaxPlanetary gearbox
- 2in AndyMark compliant wheels at the tower intake, followed by HTD timing belts for ball movement
- Theoretical maximum 10.38 fuel per second @ 5225 RPM / 10A

Sensing

- 1 REV distance sensor to park fuel precisely at the shooter inlet

Turret Shooter



The turret shooter uses three sets of shooter wheels to impart kinetic energy upon the fuel to shoot it into the hub. The chain driven turret mechanism allows the robot to shoot in any chassis orientation.

Structure

- 1/8in aluminum for the majority of structures
- 0.19in aluminum for the main stator plate around which flanged bearing stacks rotate

Shooter Drivetrain

- 2 NEO v2.0 motors for actuation
- Geared up 1:2 to the main 4in shooter wheel
- Geared up 1:4 to the secondary 2in shooter wheel and the 2in backspin control wheel
- Geared up 1:4 to the brass flywheel for energy storage
- Total effective moment of inertia 19.15lbm-in2

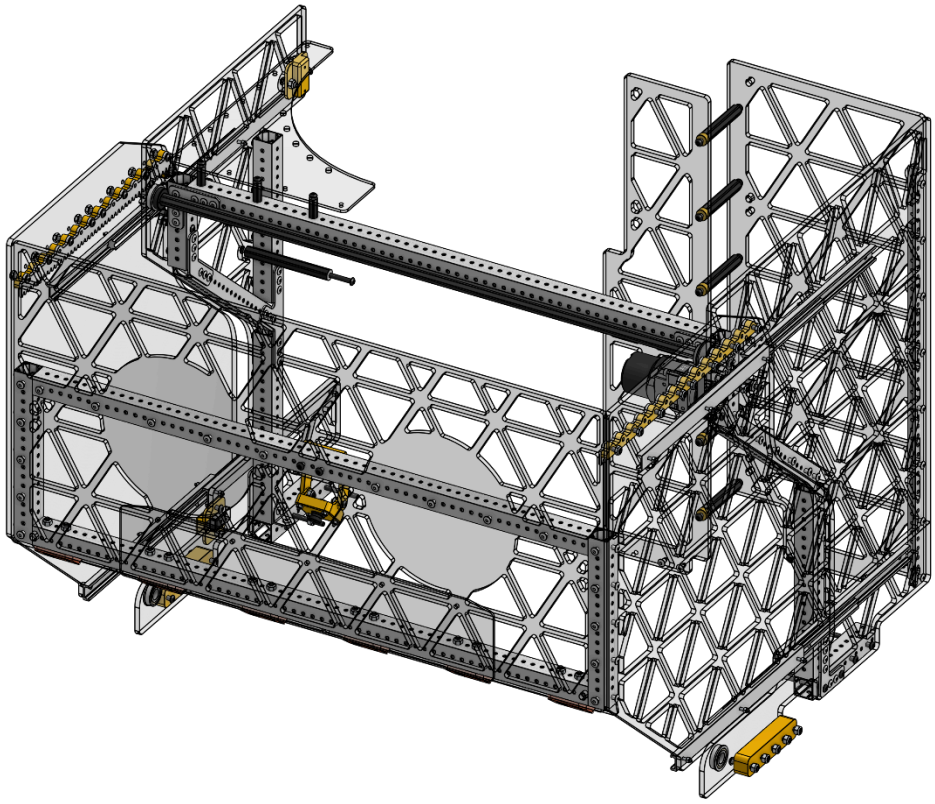
Turret Mechanism

- 1 NEO 550 motor geared down 5:1 via an UltraPlanetary gearbox
- #25 chain tensioned via an idler sprocket pushed by a snail cam
- Hard stop prevents over-rotation, 355 degrees of effective targeting azimuth

Sensing

- ArduCam provides global positioning
- 1 REV magnetic limit switch to provide homing for the continuous integrated encoder

Hopper



The hopper contains fuel inside the robot for the spindexer to process. It expands out of the frame perimeter to obtain most of its capacity. Total capacity estimated at 80 fuel.

Structure

- 1x1 MaxTube and custom designed 0.1in aluminum gussets for framing
- AndyMark aluminum slides for robust linear movement
- 1/4in polycarbonate for main plate structure to provide rigidity, heavily lightened in an isogrid pattern to reduce weight while maintaining strength

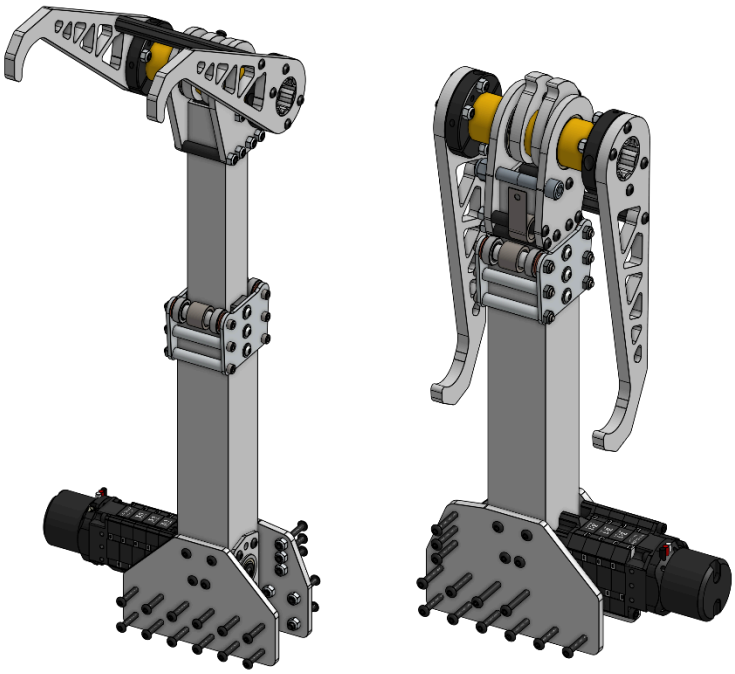
Actuation

- 1 NEO v2.0 motor for actuation
- 5:1 MaxPlanetary gearbox driving two 10t 10dp gears which actuates two 10dp racks

Sensing

- 1 REV magnetic limit switch for bottoming detection

Climber



The climber enables the robot to achieve an L1 ladder climb. It folds within the frame perimeter before deploying reliably to the correct hook position to climb.

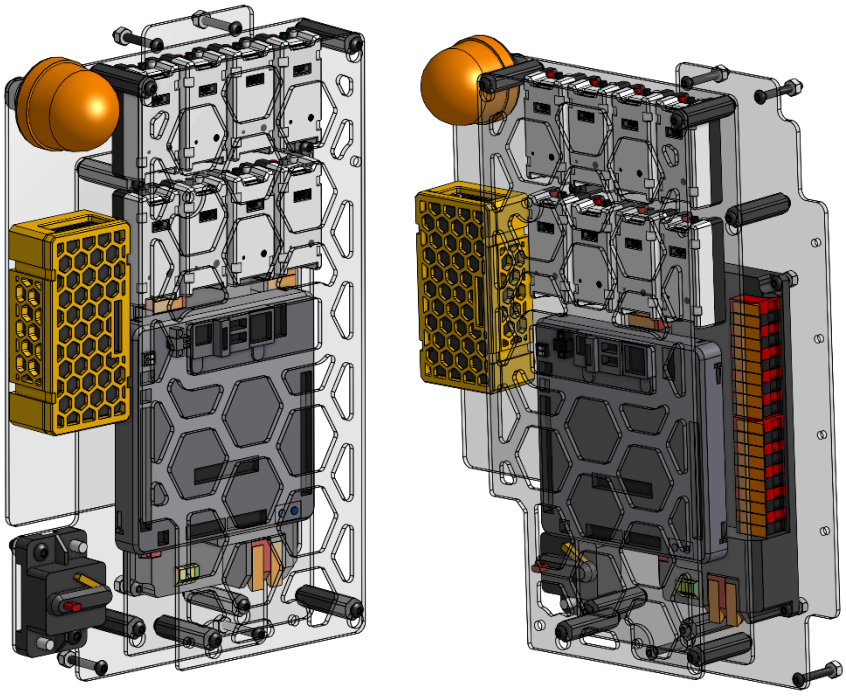
Structure

- 1/4in aluminum plate for mounting to the chassis
- 1/16in thick 2inx2in stationary tube
- 1/8in thick 1.5inx1.5in moving upper tube
- 3/8in thick aluminum for hooks, hook mounting plate and hook deployment hard stop plate
- 3/8in bolt serving as the hook deployment hard stop
- MAXSpline and associated hardware serving as the main hook rotation axle, transmitting the torque from the hook to the hard stop plate
- AndyMark climber in a box bearing kit for linear bearing and winch

Actuation

- Constant force spring and bungee elastics passively deploy both the linear extension and the hook rotation
- 1 NEO v2.0 motor powering a 45:1 MAXPlanetary gearbox driving a 0.85in pitch diameter winch
- REV MAXBrake passively stops back-drive which both locks the deployment of the elastics and robot falling down the ladder after a climb

Electronics Bay



Our robot this year employs a two layer vertically mounted electronic bay. Compared to the traditional approach of putting electronics on the chassis pan, this approach frees up our chassis for optimizing the spindexer geometry and clearing the bump, and enables direct servicing of all the electronics without flipping or disassembling the robot.

The main breaker board which is not frequently accessed is designed on the bottom layer, and other electronics are on the top layer. Master switch is intentionally protected. 4 standoffs connect the layers via over-sized holes. The layers can be easily loosened and disassembled for servicing. A cover plate is added for protection and styling.

Electronics

- REV breaker board, RoboRIO, master switch, VH-109 radio
- 8 SparkMAX motor controllers
- OrangePi and ZincV power supply for vision processing