



High Rollers



2025 Technical Binder
"Card Shark"



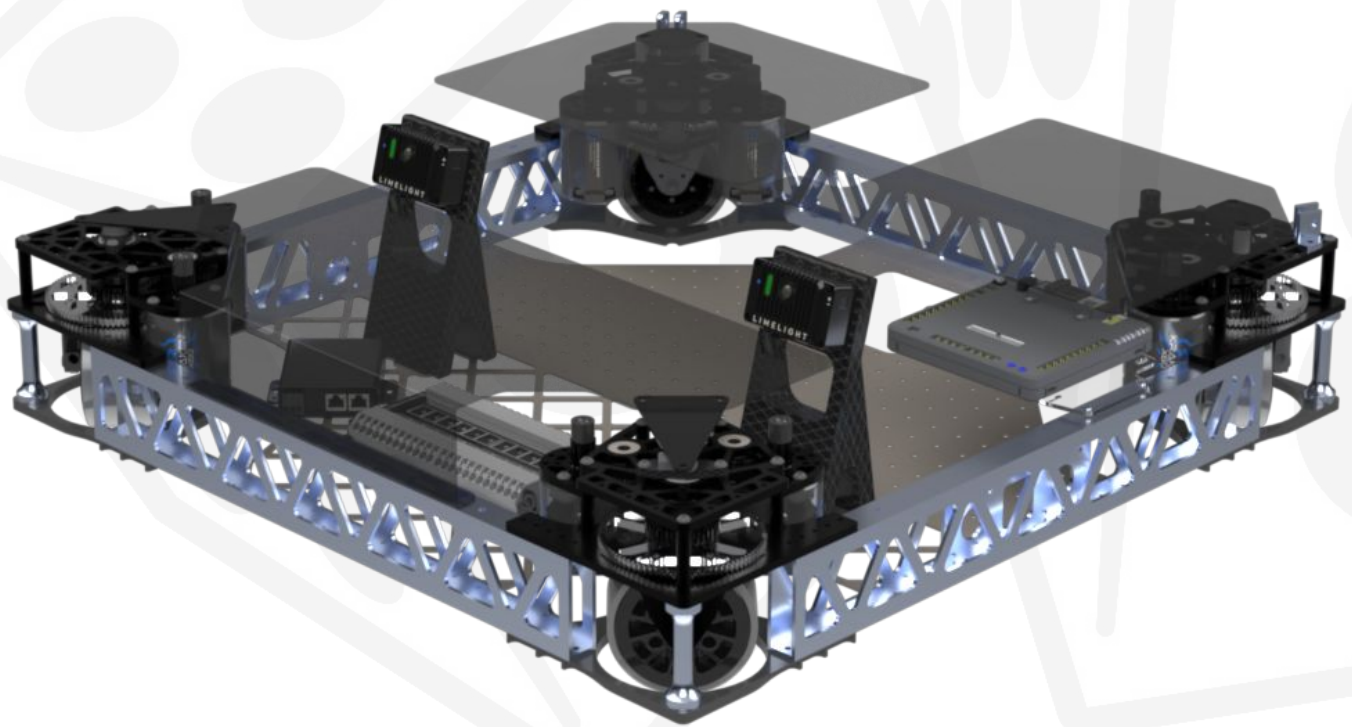
Table of Contents

	Page
Drivebase	3-8
Drivetrain	4
Limelight Mount	5
Upper Structure	6-10
Elevator	7
Coral Shooter	8
Algae Arm	9
Funnel	10



Drivebase

- Frame
- Swerve Modules
- Limelight Mount



Built around our the WCP Swerve X2i, the frame delivers extreme robustness and reliability.

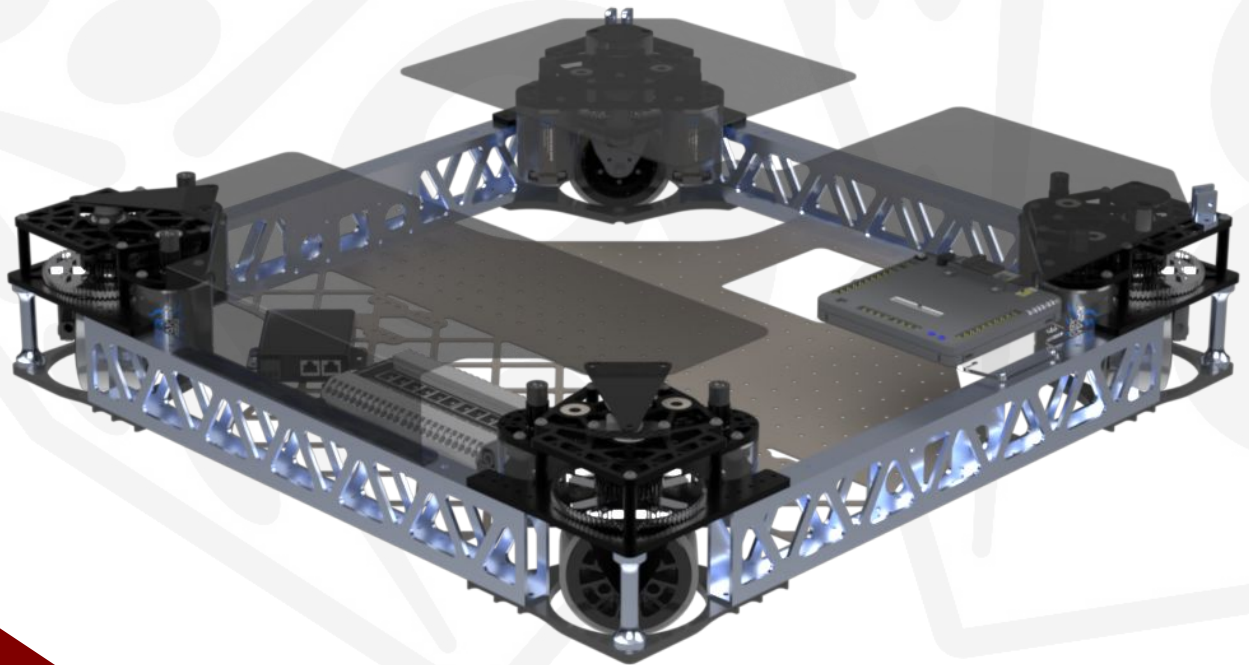
- Comprised of 3" x 1" x .125" Aluminum Tubes
- Bumper Supports strategically positioned off the side
- 29" x 29" frame dimensions

Bellypan

- Steel belly pan to keep robot COG as low as possible
- All robot electronics are mounted on the belly pan
- Back-biased battery to counter the weight of front-mounted mechanisms

Electronics Cover

- All critical components are covered by a piece of polycarbonate
- Front cover made from a sheet metal-like assembly of 0.030" polycarbonate



Drivetrain



To address frequent pose loss during teleop, caused by high-speed collisions disrupting odometry, we integrated two lightweight Limelight mounts. These pose-tracking cameras significantly enhance the accuracy and consistency of our robot's localization throughout match play. Additionally, they are strategically offset to precisely align with the left and right reef poles.

Structure

- Custom 3D-printed mounts designed to securely hold the limelight
 - The 3D-printed mount positions the camera at a 10-degree angle from perpendicular to the floor, allowing it to see over the bumper for improved visibility.
- Hole in the center for wire routing/zipting
- Heat-Set insert mounting holes in the bottom allowing for easy integration

Cameras

- Two Limelight 4 cameras to combat pose loss caused by external interactions
- Limelight 4's equipped with the Hailo Accelerator Module for increased performance



Limelight Mount

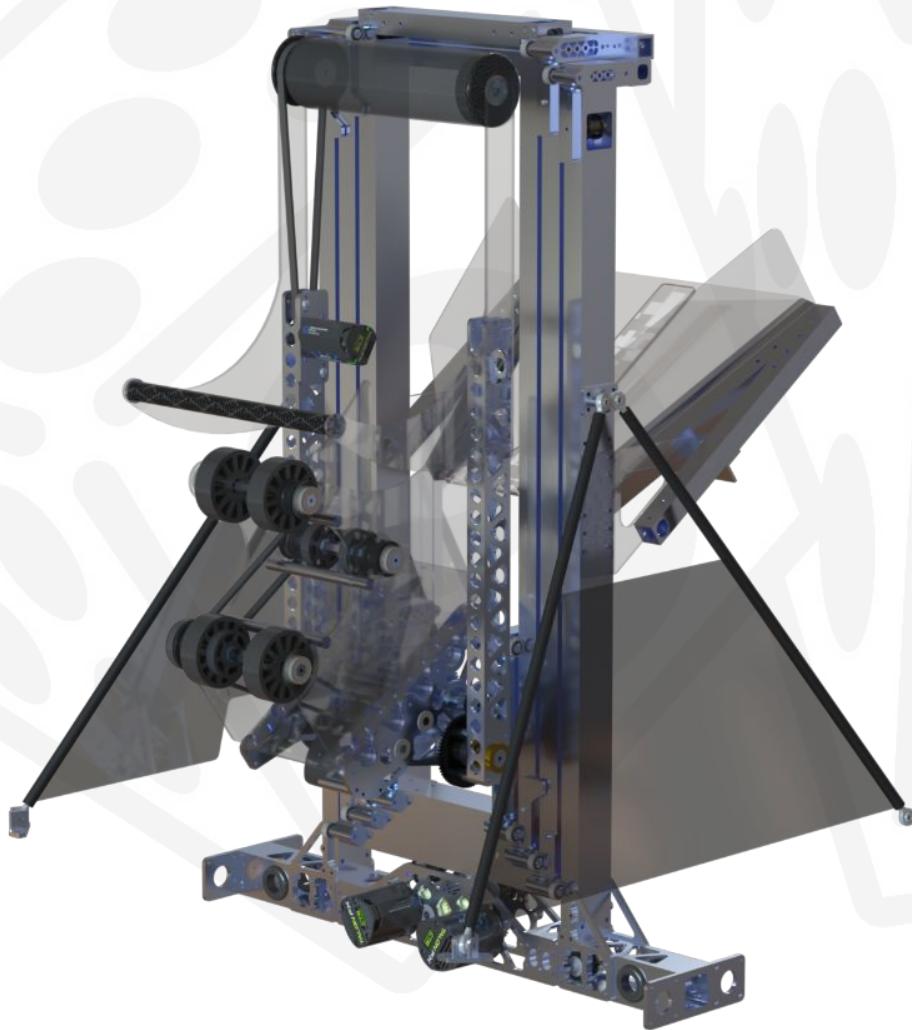


Upper Structure



High Rollers

- Elevator
- Coral Shooter
- Algae Arm
- Funnel



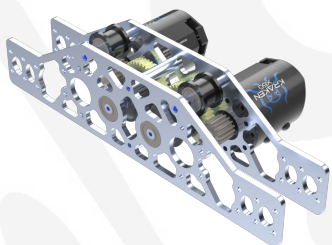
We decided to implement a 3 stage elevator this year to ensure accurate scoring at all levels of the reef. Our in-tube belt system minimizes profile and keeps packaging compact.

Gearbox

- 2x Kraken X60 Motors on a 2.6:1 Gear ratio quickly power the elevator carriage
- 2x 5lbs Constant Force Springs assist in retraction and stage order enforcement

Stages

- 0.25" Hard Stops to prevent excessive extension and unintended stage dislodgement
- Custom Delrin Pulleys to ensure smooth interfacing between the belt on each stage
- Belt Tensioners on the Carriage to compensate for any potential belt loosening
- Custom lightened Nut Strip on the Carriage to accommodate mounting solutions
- Base Stage supported by .5" OD Steel Rods on Heim Joints



Elevator



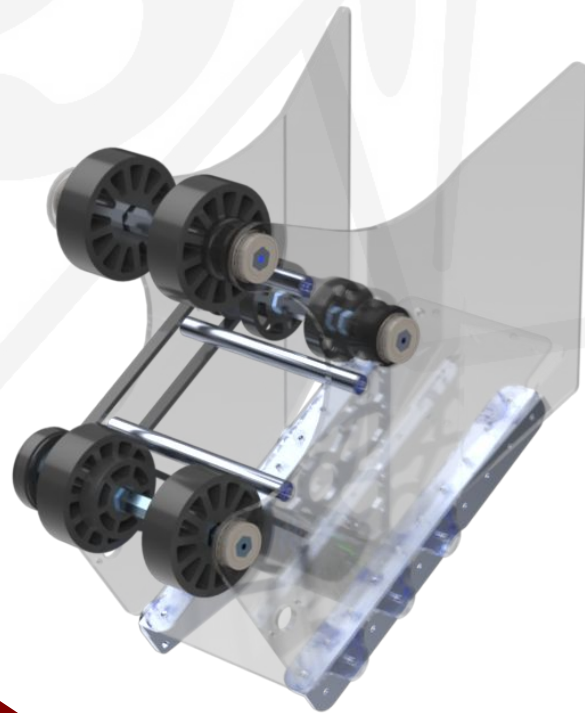
The Coral Manipulator is configured and designed for the ability to shoot Coral efficiently on all levels of the Reef. We found that being able to hold the Coral in both parallel and perpendicular orientations relative to the shooter was the most efficient way to score level 1 and all other Reef levels.

Shooter (Parallel)

- Parallel Coral control for Reef levels 2 through 4
- Flared out Polycarbonate to better centralize Coral when loaded from the station
- Standoffs to enforce plate rigidity
- Compliant Wheels driven by belts and a Kraken X44 on a 2.5:1 ratio to secure and shoot Coral
 - 3" 30A Wheels facilitate coral shooting
 - 2" 30A Wheels ensure efficient loading from the funnel
- Coral positioning is precisely controlled by a CTRE CANRange sensor, which detects its endpoint and ensures accurate stopping after loading

Shooter (Perpendicular)

- Perpendicular Coral control for level 1 scoring
- Compliant wheels are powered by the same Kraken X44 motor as the parallel shooter
 - 3" 30A wheel serves as the bottom roller, maintaining consistent contact
 - Additional 3" 30A wheels driven by a serpentine belt to achieve reverse rotation



Coral Shooter

The Algae Arm is engineered for maximum reliability and efficiency, consisting of a precisely designed gearbox and arm assembly. Optimized for extensive range over the barge, it enables full mobility to score in any position, even when multiple balls are stacked in the net.

Pivot Gearbox

- 3 Stage Spur Gearbox enables quick identification of issues and simplifies the maintenance process
- Driven by a Kraken X60 motor with a 130:1 reduction, optimizing efficiency and minimizing current draw

Arm Assembly

- The arm's base is constructed from 1.5" x 1" tubes, providing a stable pivot point
- A gear is directly mounted to the arm, ensuring effective torque transmission
- The arm's end features a compliant plastic design, which absorbs impact and "springs" back to its original state
- Powered by a Kraken X44 on a 3.33:1 reduction
- Lightweight Polycarbonate Roller wrapped in Rubber Mastic Tape to increase grip on the Algae



Algae Arm



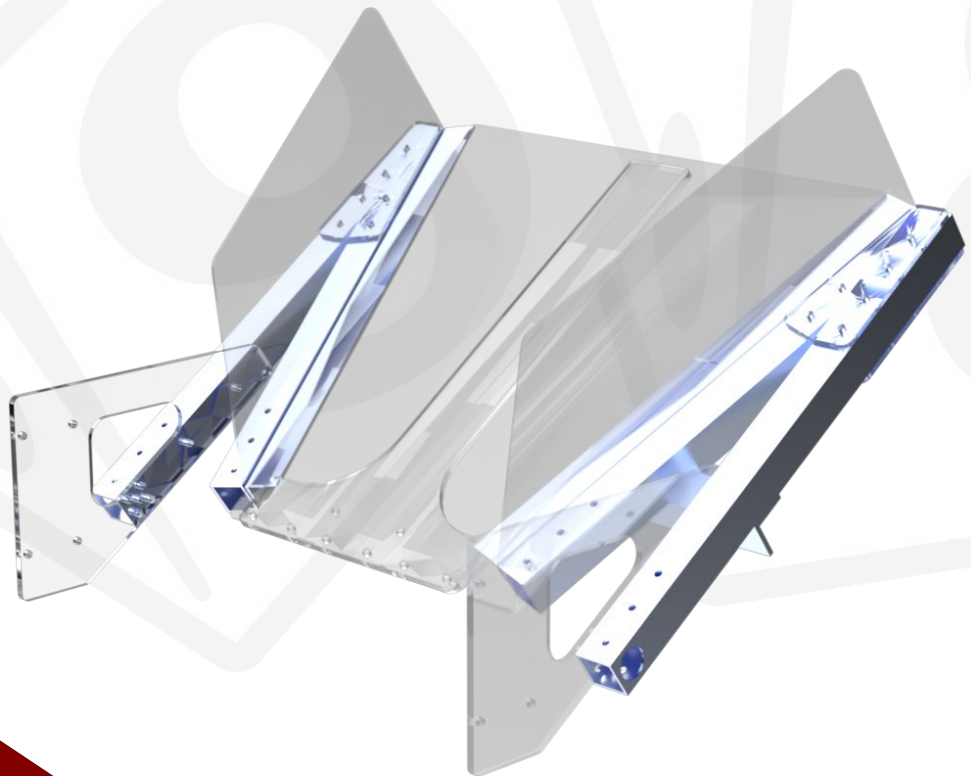
The Funnel is designed to ensure reliable loading, even when Coral obstructs the station. Positioned at 35°, it is collinear with the Coral Station ramp for smooth loading all the way through to the Coral Shooter. Side plastic panels guide the coral into the funnel, securely containing it during loading. Additionally, the ramp can flip upward to accommodate the cage during the climbing process.

Structure

- 1" x 1" x 0.0625" Aluminum Tubing with 3/16" Polycarbonate gussets
- Fully riveted assembly
- 1/16" Polycarbonate Side Walls and Floor

Trap Door Floor

- The bottom floor of the Funnel features a trap door, allowing the cage to move deeper into the robot
- Spring-loaded door hinges pull the trap door up, enabling a compact and efficient setup



Funnel





“It’s Not Enough!”

