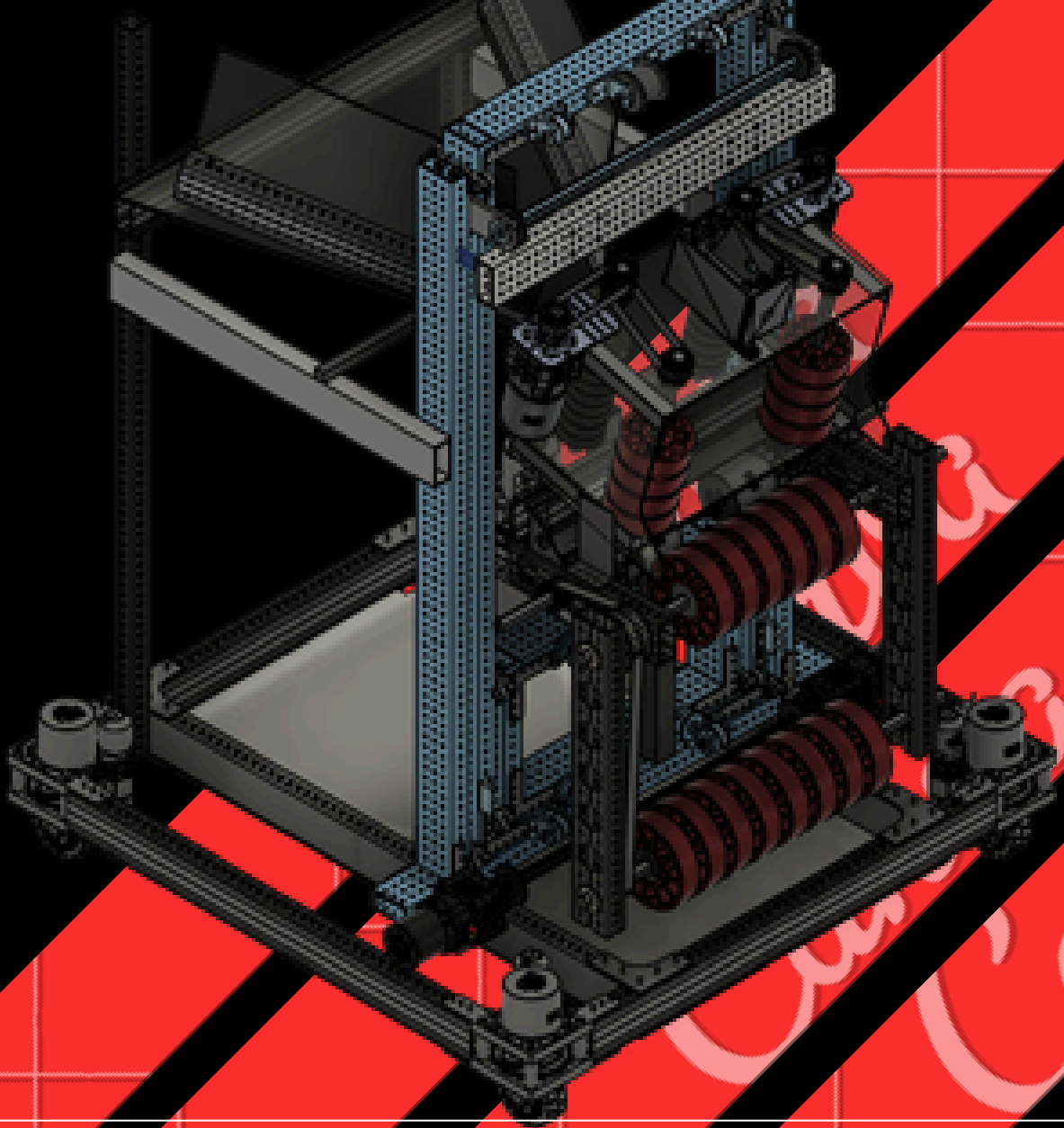
FORGE

9404

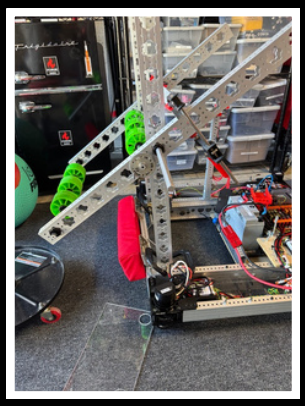
2025 Season

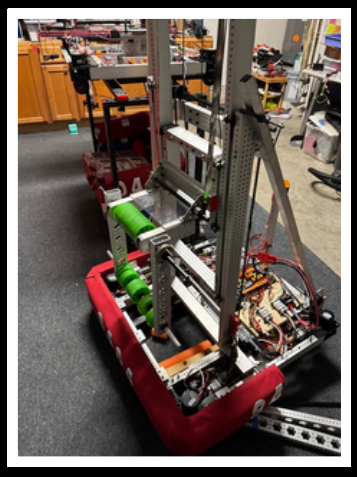
Technical Summary



DESIGN PROCESS

ITERATIONS, PROTOTYPES & PLANNING





MVP 1

1. Drive train
2. L1 or L2 scoring
3. Auto Leave
4. Auto leave and preload (L1 or L2)
5. Coral Pickup from Station

MVP 2

1. L3 Scoring
2. Algae pickup from processor
3. Algae pickup from reef
4. Auto algae pickup
5. Driver automations V1

MVP 3

1. Algae pickup from ground
2. Coral Pickup from ground
3. Shallow climb
4. L4 scoring
5. Auto L4
6. Driver automation V2

PROJECT MANAGEMENT AND ITERATIONS

MVP 1

Iteration 1

Item	Owner	Impact	Timeline	Initiative status
Swerve drivetrain			Jan 12 - 26	Not Started
L1 Scoring or L2 Scoring			Jan 12 - 26	Not Started
Auto leave			Jan 12 - 26	Not Started
Auto Leave and Preload score (L1 or L2)			Jan 12 - 26	Not Started
Coral pickup from station			Jan 12 - 26	Not Started
Sub items: 3			Jan 12 - 26	Not Started
+ Add item				

MVP 2

Iteration 2

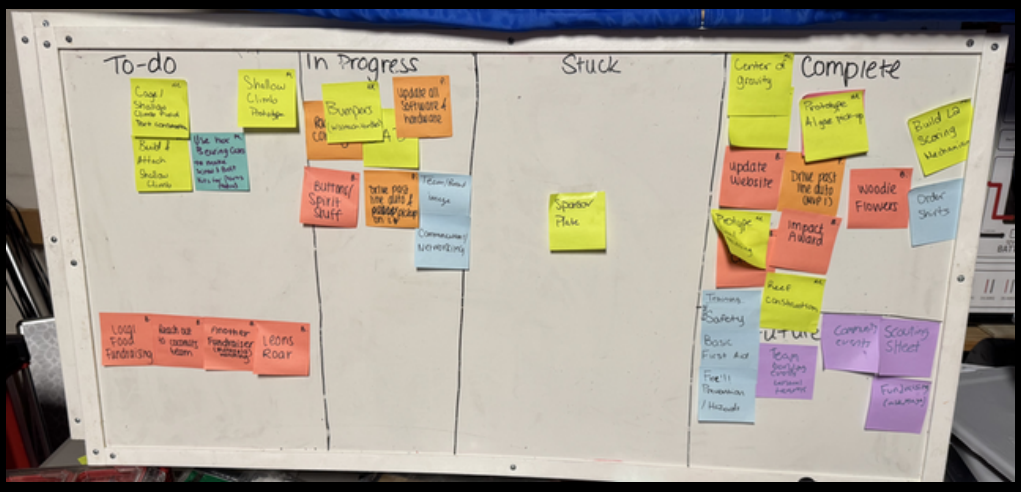
Item	Owner	Impact	Timeline	Initiative status
Driver automation			Feb 2 - 9	Not Started
L3 Scoring			Feb 2 - 9	Not Started
Algae pickup from reef			Feb 2 - 9	Not Started
Algae score in processor			Feb 2 - 9	Not Started
Auto Algae Pickup *			Feb 2 - 9	Not Started

MVP 3

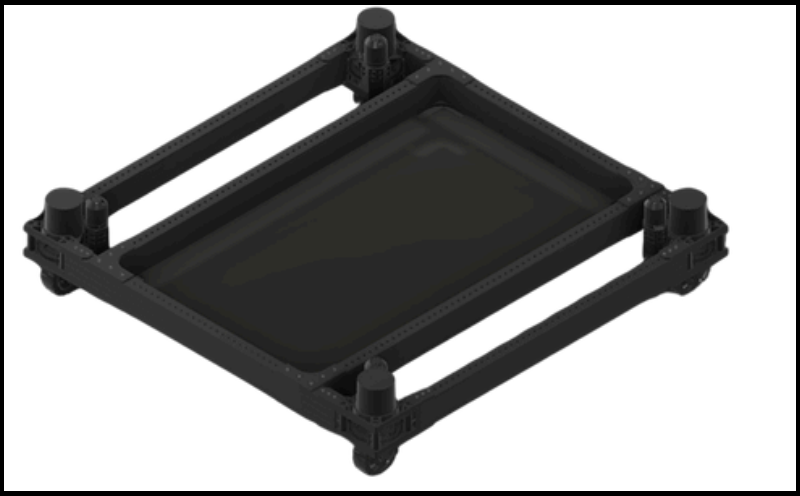
Iteration 3

Item	Owner	Impact	Timeline	Initiative status
Pickup from ground (coral and algae)			Feb 16 - 23	Not Started
L4 Scoring			Feb 16 - 23	Not Started
Shallow Climb			Feb 16 - 23	Not Started
Leave and auto score on L4			Feb 16 - 23	Not Started
Drive automation V2			Feb 16 - 23	Not Started

Kanban- Work Management

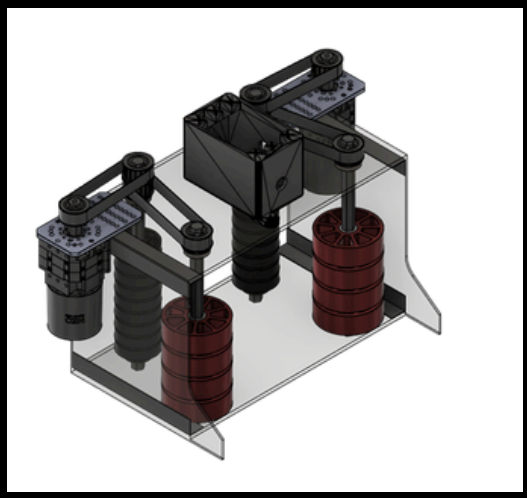


DRIVETRAIN



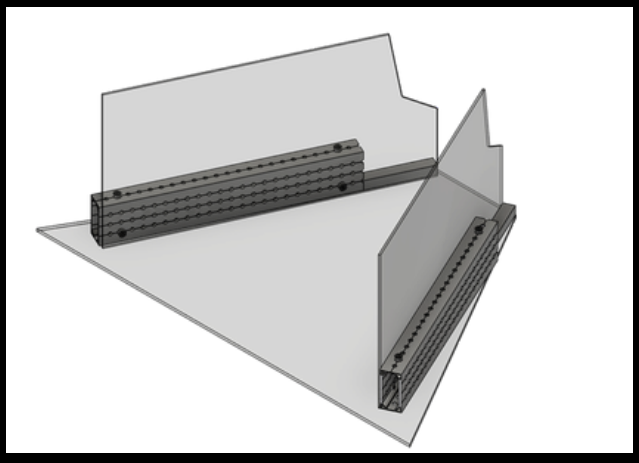
- SWERVE DRIVE TRAIN REV MAX SWERVE MODULES
- OUR DRIVETRAIN HAS 4 STEERING MOTORS AND 4 PROPULSION MOTORS
- GEAR RATIOS OF 5.08:1 - L2
- PID CONTROLLED, 1 REV THROUGHBORE AND ABSOLUTE ENCODER

CORAL INTAKE



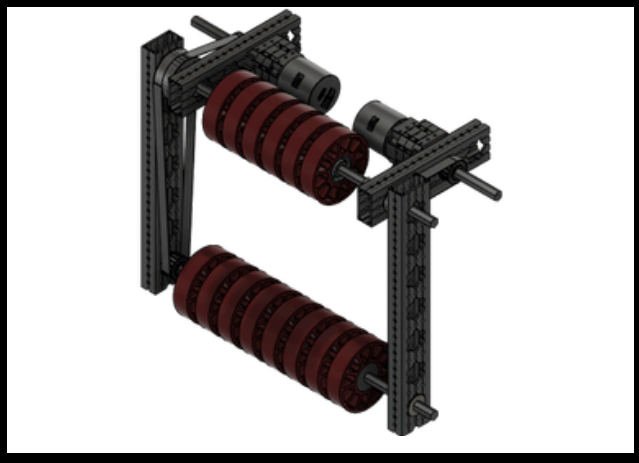
- POWERED BY 2 REV NEOS ON A 5:1 GEAR BOX
- SMALLER WHEELS FOR INTAKE, BIGGER WHEELS FOR OUTTAKE
- CAMERA BOX ATTACHED ON THE TOP.
- LASER CAN TO SENSE CORAL

CORAL HOPPER



- FLEXIBLE POLYCARBONATE PLATE AS A BASE
- 2 EXTRUSIONS IN A V SHAPE TO CENTER CORAL INTO THE CORAL INTAKE

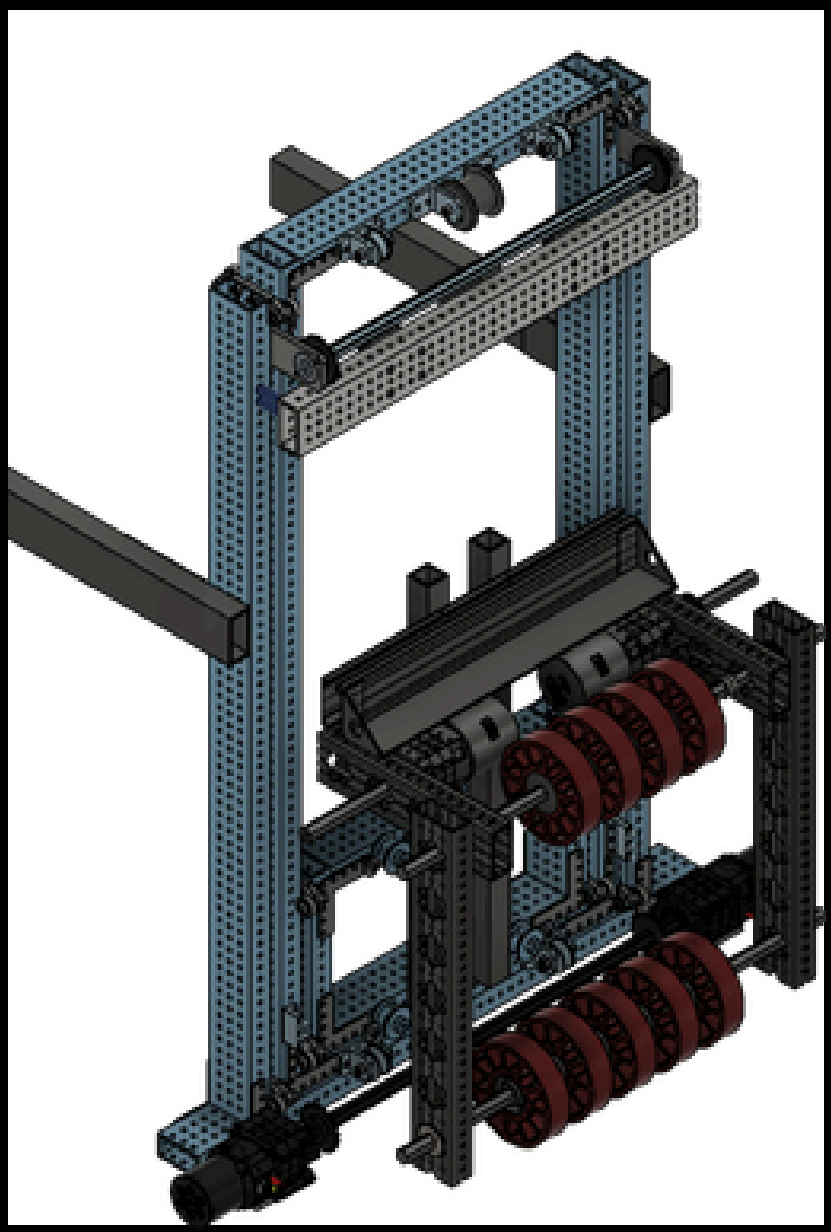
ALGAE INTAKE



- POWERED BY 2 NEOS ON A 27:1 GEAR RATIO FOR PIVOT
- 5:1 FOR PICKUP
- BELT DRIVEN
- 3IN COMPLIANT WHEELS TO INTAKE ALGAE

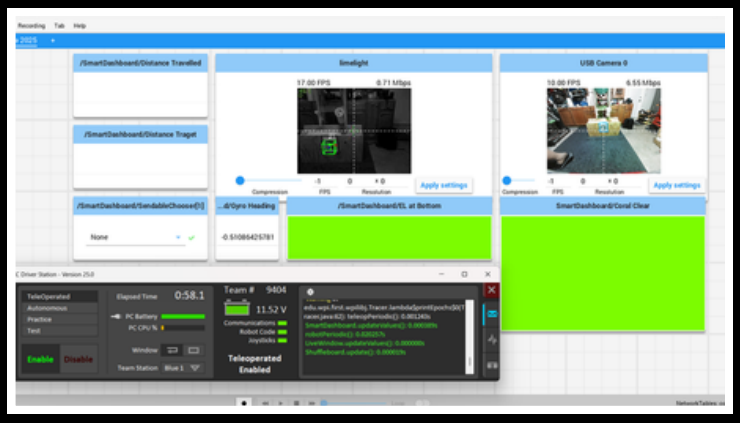
ELEVATOR ASSEMBLY

THRIFTY BOT ELEVATOR
25:1 GEAR RATIO
POWERED BY 2 REV NEOS
PID CONTROLLED



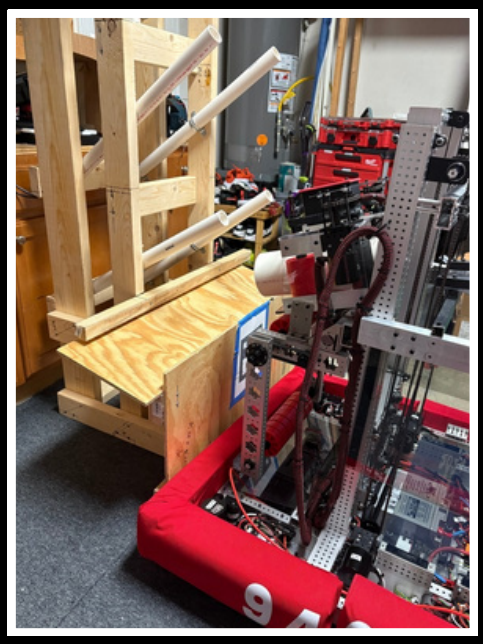
KEY AUTOMATIONS

SHUFFLEBOARD/ PATHPLANNER



This season, we used PathPlanner, which allows us to create individual paths and put together auto's quickly. We also have our Limelight feed and our fisheye camera on Shuffleboard for better visuals on the field. In addition, we also have a red and green indication to show the current state of the coral and another one to show if the elevator is at the bottom, which is determined by our limit switch.

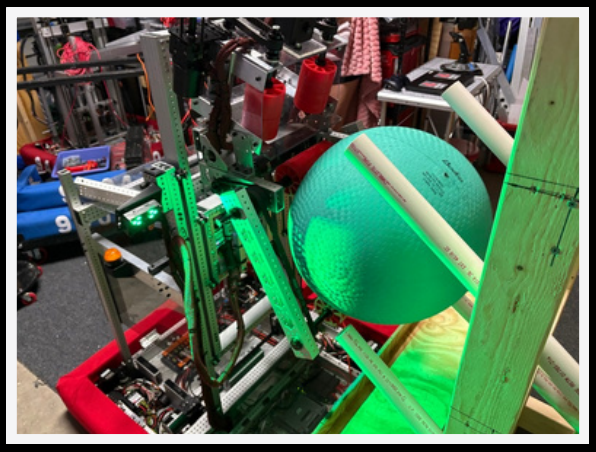
CORAL DETECTION



With the use of a LaserCAN sensor we are able to detect when the sensor is placed correctly in the coral intake and able to stop the coral in place when the correct range of the coral is reached.

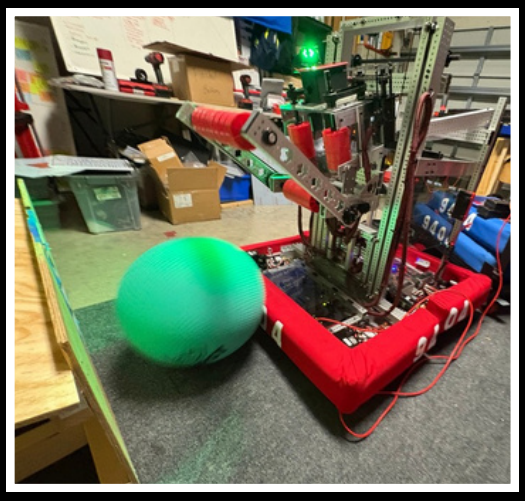
DRIVER AUTOMATIONS

ELEVATOR SCORING



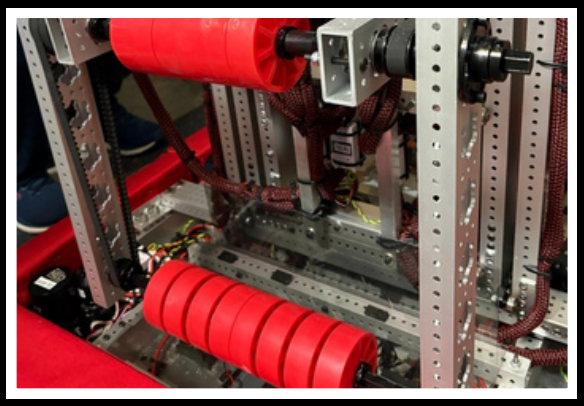
Elevator Scoring Automation is used for both coral and algae scoring. Our elevator will raise up to the desired position and either pickup the algae from the tree or place the coral on the tree and backup automatically, following that will give the driver back control.

ALGAE SCORING



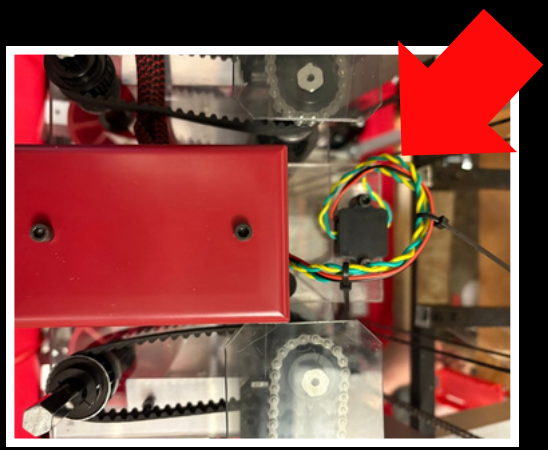
Our automation for algae can either pickup from the ground or from the tree. Pickup from the tree can pickup low or high will place the algae and drive back automatically.

THROUGH BORE ENCODER



Our through bore encoder on the Algae Intake allows our algae mechanism to zero in place to avoid any drift. Moreover, it was also used to help find the position of how far out or in our algae mechanisms needed to be to pickup/place the algae.

LASERCAN



The LaserCAN sensor is utilized to ensure the coral is in the coral chamber. We also use the LaserCAN to ensure that it cannot get stuck in between our elevator. The house-like encloser provides a home for our sensors and cabling, and provides an optimal angle for the driver to see scoring and positioning.

ADAPTATIONS SINCE LAST COMPETITION

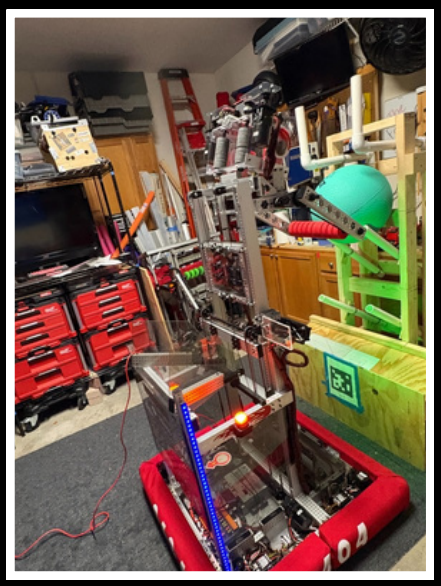
APRIL TAG TRACKING

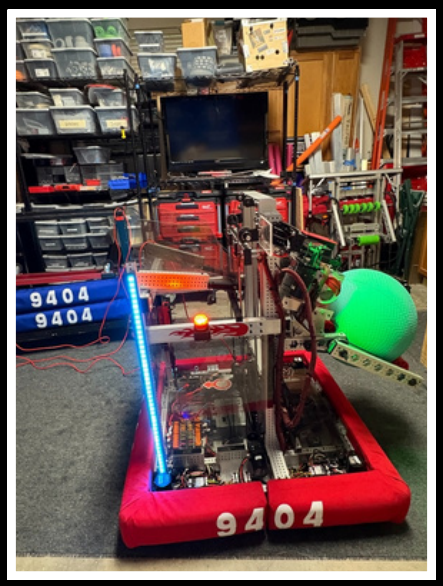
LEFT

CENTER

RIGHT

With the use of a Limelight we are able to track and align with the April Tag on the field. This ensures that are driver is able to lineup with any April Tag and more precise pickups and placements of algae and coral game pieces. We have three different alignment options including left, right, and center.

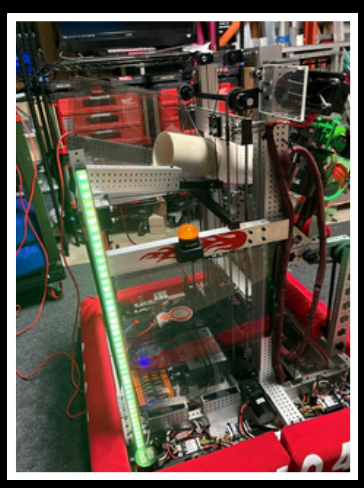


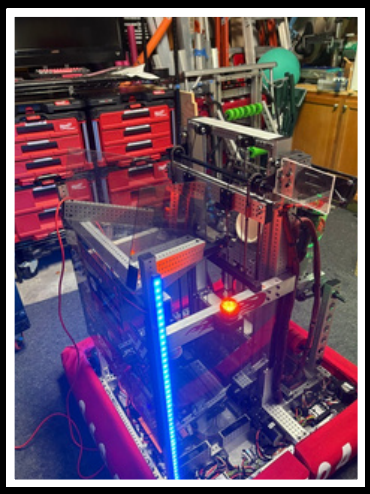


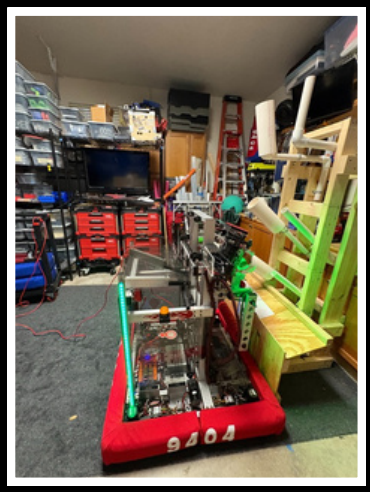
The LED’s are another helper to our drive team and allow them to see when the game piece is in the correct position and ready to be scored or picked up.

ADAPTATIONS SINCE LAST COMPETITION

CORAL LED INDICATIONS

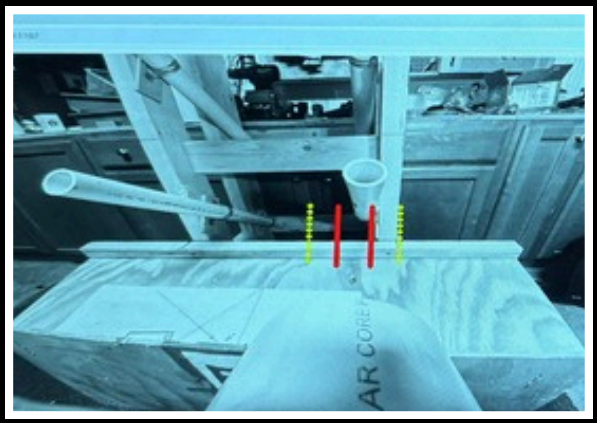






After our last competition we chose to add LED's to our robot to indicate the current state of our robot in its scoring process. The yellow LED's indicate that the coral is stuck in between the elevator and is a safety feature to not score the coral, the blue LED's indicate it is ready to score and isn't in the way of the elevator, and the green LED's indicate that it is in the process of scoring.

ELP CAMERA ALIGNMENT AIDES



It uses degrees to provide us with a view without distortion. We developed custom crosshairs using the CV library. The outer dotted lines provide our driver with a sense of the margin of error to score, and the red lines give us the perfect alignment to score coral. It is gray scaled to optimize bandwidth.