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1 Summary

FRC Team [8858 Beast From the East's](#) 2025 robot is named '[Doris](#)'. Initial inspiration of this robot came from the [Penn State RI3D](#) design with modifications made as the season went on.

1.1 Capabilities

[\(Reveal Video\)](#)

- Score coral at **all levels** of the reef
- Intake Coral from feeder station
- Remove **high and low** algae
- Score algae in **processor**
- Hang from **deep barge** in endgame

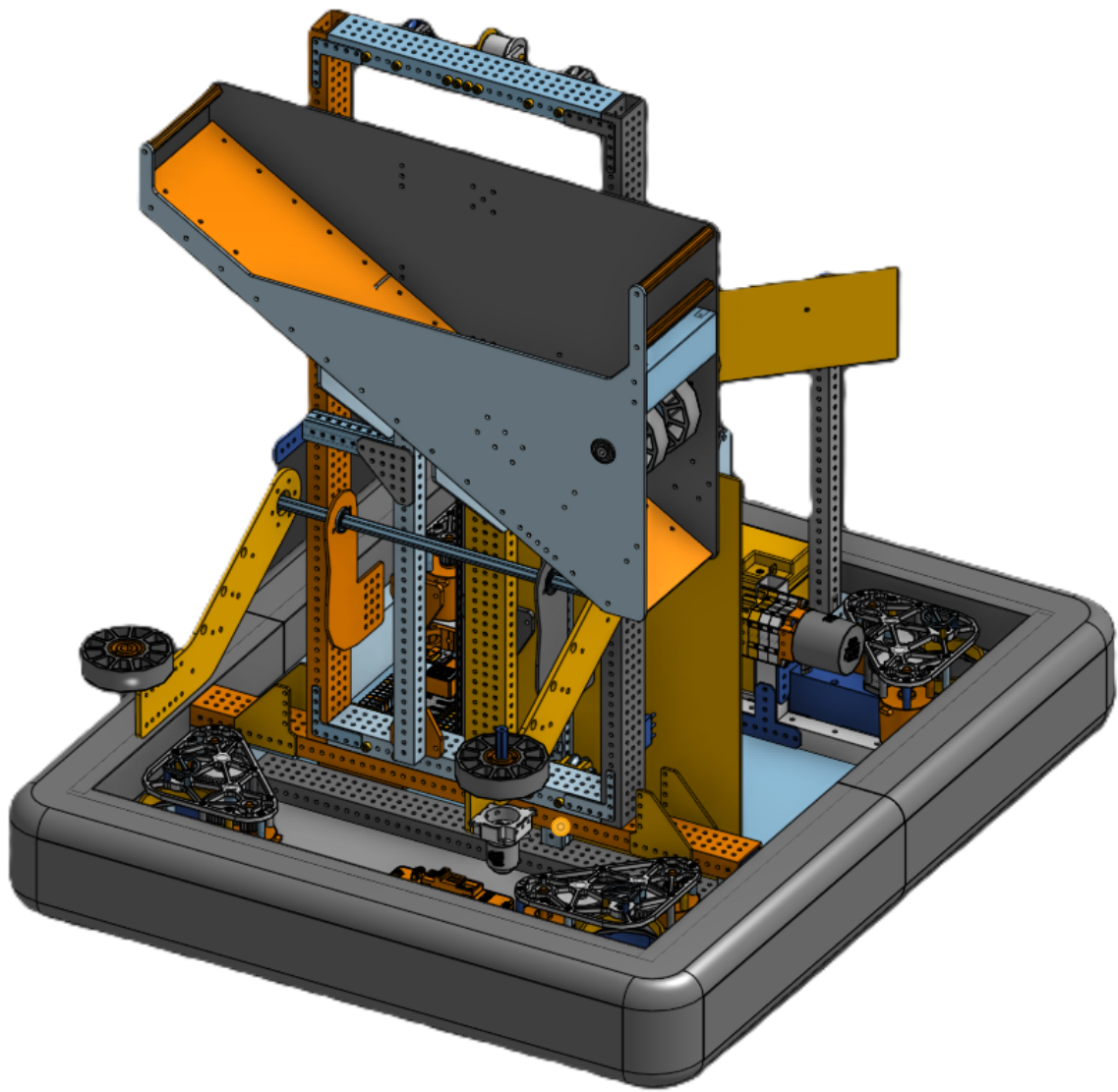


Figure 1: 3D Render of Doris

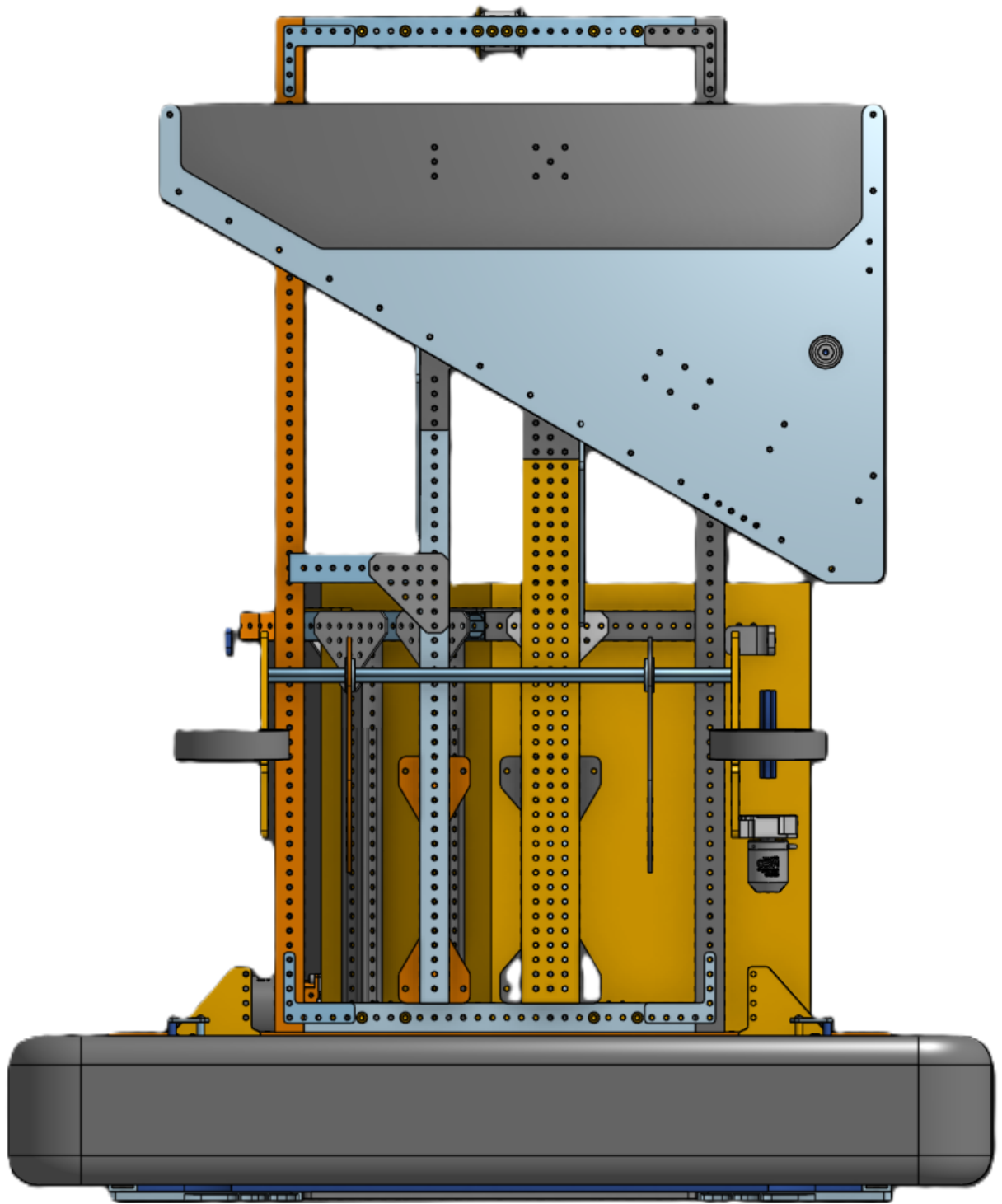


Figure 2: Front view of Doris

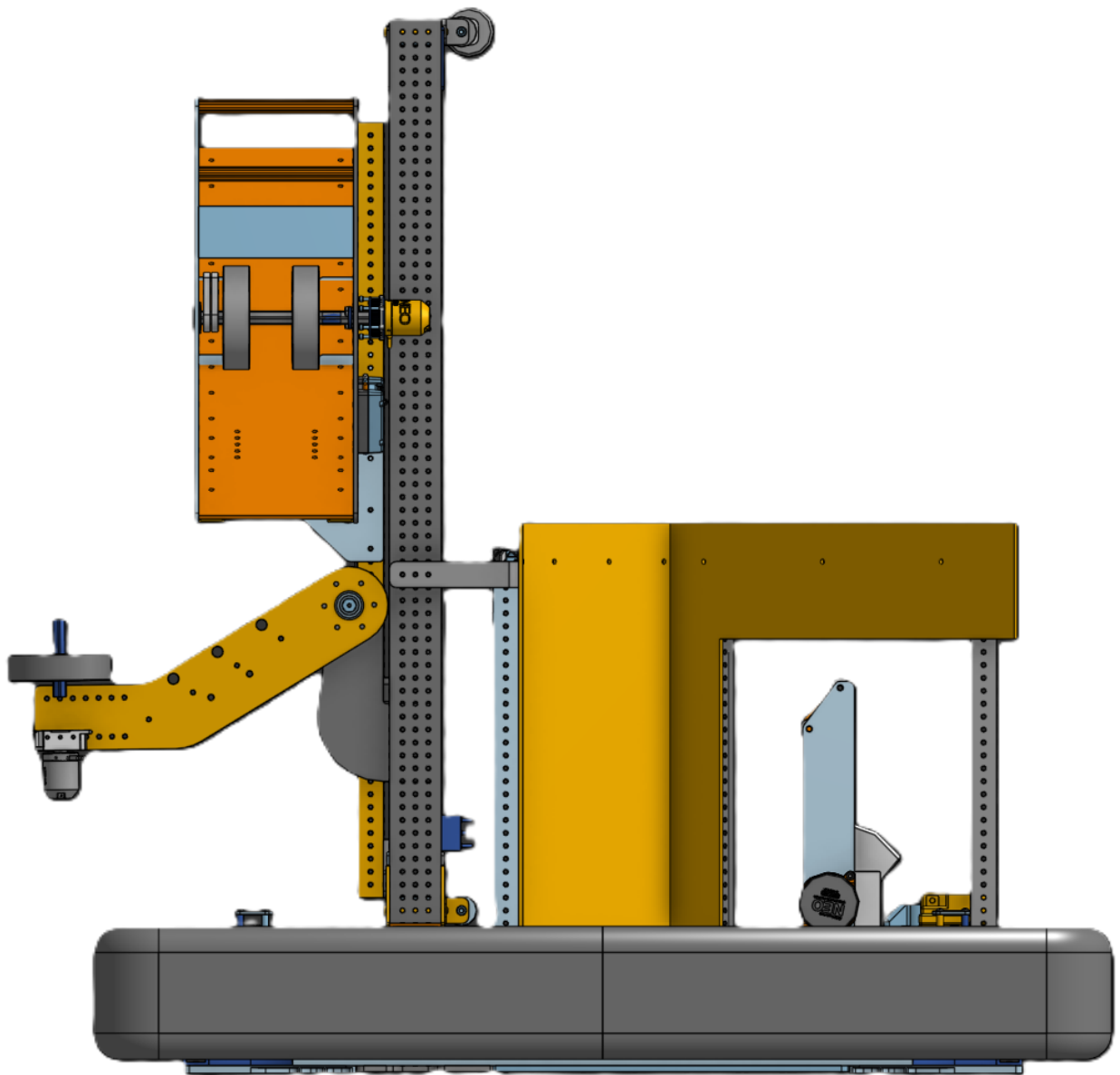


Figure 3: Side view of Doris

2 Button Mapping

Control of this robot requires 2 operators:

1. Main Driver with Xbox Controller responsible for moving around field and Aglae.
2. Operator responsible for fine movement near reef while scoring coral.

Table 1: Main Driver Xbox Controller Mapping

Button Name	Press or Hold	Functionality
Left Stick	N/A	Translation Movement (<i>ie forward/backward, strafing</i>)
Right Stick	N/A	Rotational Movement (<i>ie spinning</i>)
A	Press	Algae Intake (starts intake, automatically stops when algae detected)
B	Hold	Climber Ascend (climber down, robot up)
X	N/A	None
Y	N/A	None
Left Bumper	Press	Coral Intake (Lowers Elevator, enable coral auto-intake mode)
Right Bumper	Press	Score Algae (runs Algae motor for 1 second)
Left Trigger	Press	Low Algae (raises elevator only)
Right Trigger	Press	High Algae (raises elevator only)
Back	N/A	None
Start	Press	lower elevator, stop motors, resets odometry
Left Stick Press	N/A	None
Right Stick Press	N/A	None
D-Pad Up	N/A	None

Button Name	Press or Hold	Functionality
D-Pad Down	Press	<i>Experimental</i> Auto-Score Algae
D-Pad Left	Press	<i>Experimental</i> Auto-Score Coral method 1
D-Pad Right	Press	<i>Experimental</i> Auto-Score Coral method 2

Table 2: Operator Button Box Mapping

Button #	Button Box Label	Press or Hold	Functionality
1	Coral Out	Press	Score Coral (runs 0.5s after last limit switch released)
2	Coral In	Hold	Coral Intake (normally unused)
3	L1	Press	Level 1 Coral prep (raises elevator)
4	L2	Press	Level 2 Coral prep (raises elevator)
5	L3	Press	Level 3 Coral prep (raises elevator)
6	L4	Press	Level 4 Coral prep (raises elevator)
7	Switch Camera	Hold	Enable Climb prep (switch camera, slow drive speed relative to camera)
8			N/A
9	Drive Left	Hold	Drive Left relative to Camera
10	Drive Right	Hold	Drive Right relative to Camera

3 Elevator Subsystem

- The Elevator Subsystem raises up to 4 different levels. Using motors and encoders to figure out its position.

3.1 Coding

- Include example definition of the subsystem's class:

```
// Example instantiation within RobotContainer.java
private final ElevatorSubsystem elevatorSubsystem = new ElevatorSubsystem()
```

3.1.1 Tele-op control

- A Player Operator can click a button for each level that the elevator can go to.
- Buttons L1 L2 L3 L4

3.1.2 Autonomous control

- Can be accessed using pathplanner to allow for it to go to each height

3.2 Electrical

3.2.1 Feedback

- Sensor Types: Encoders to check the positions. Spark Max's to allow for the elevator to move.

3.2.2 Interface types

- CAN ID 15
- Using CANBUS to control it through the roborio
- Wiring Diagram [here](#).

3.3 Mechanical

- [Penn State Elevator Design](#)

3.3.1 CAD Models

- This is a picture of a CAD Model

4 Coral Intake

- Intakes, holds, and releases coral to score on the reef in both teleop and auton.
Less precision required for this subsystem.

4.1 Coding

- Include example definition of the subsystem's class:

```
// Example instantiation within RobotContainer.java  
private final CoralIntakeSubsystem coralSubsystem = new CoralIntakeSubsystem
```

4.1.1 Tele-op control

- Driver Input through a button box

4.1.2 Autonomous control

- Two limit switches
- Path Planner

4.2 Electrical

- Schematic Here
- CAN ID 21

4.2.1 Feedback

- Sensor Types and their use-cases
- Limit switches detect how far in or out coral is in the intake

4.2.2 Interface types

- CAN Bus
- CAN ID 21
- Wiring Diagram showing both data *and* power connections
- Pretend this is an image of the schematic :3
- Top limit switch is Digital input 1
- Bottom switch digital input 2

4.3 Mechanical

- Inspired by [Team 6201 The Highlanders](#)

4.3.1 CAD Models

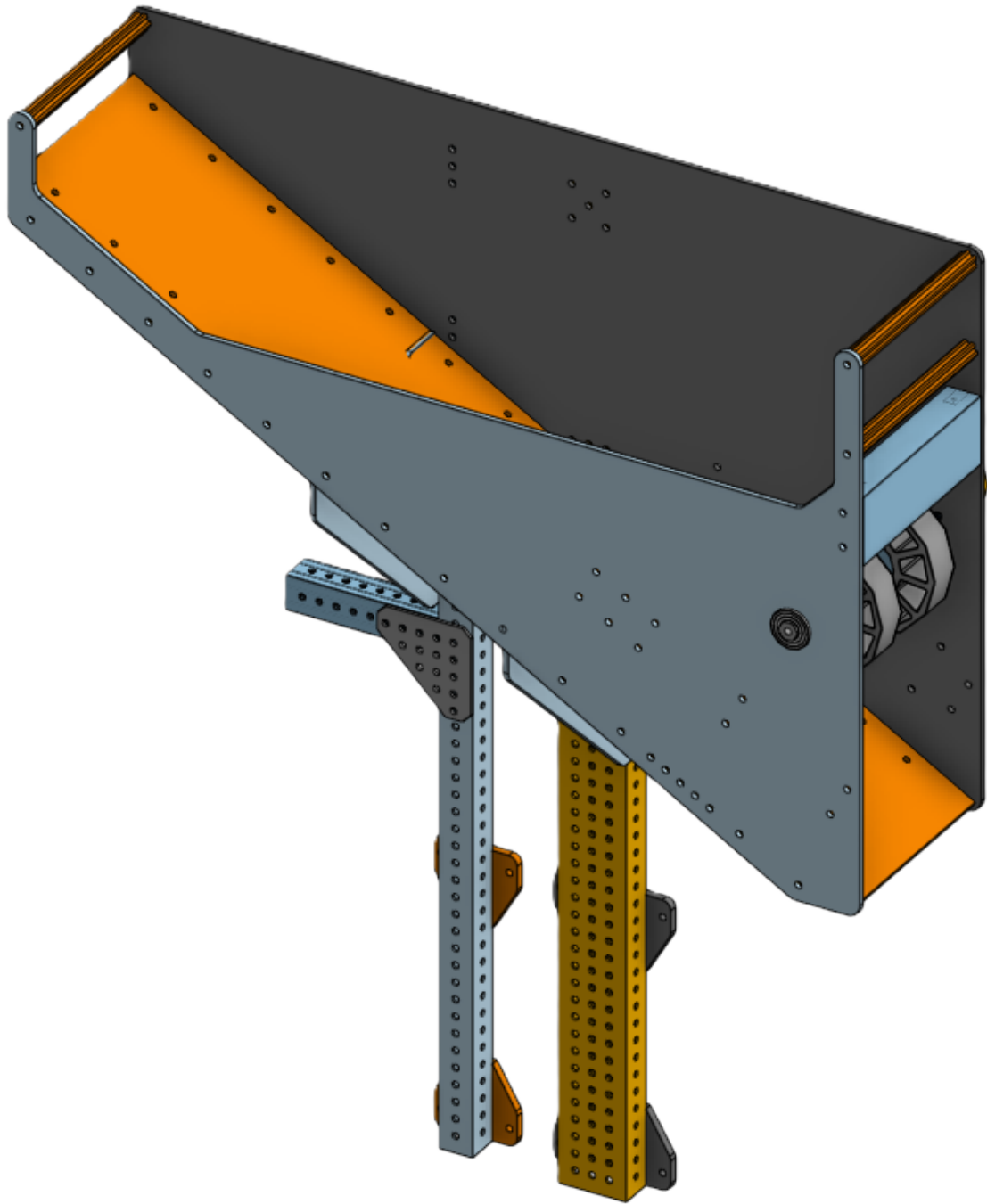


Figure 4: Coral Intake (front)

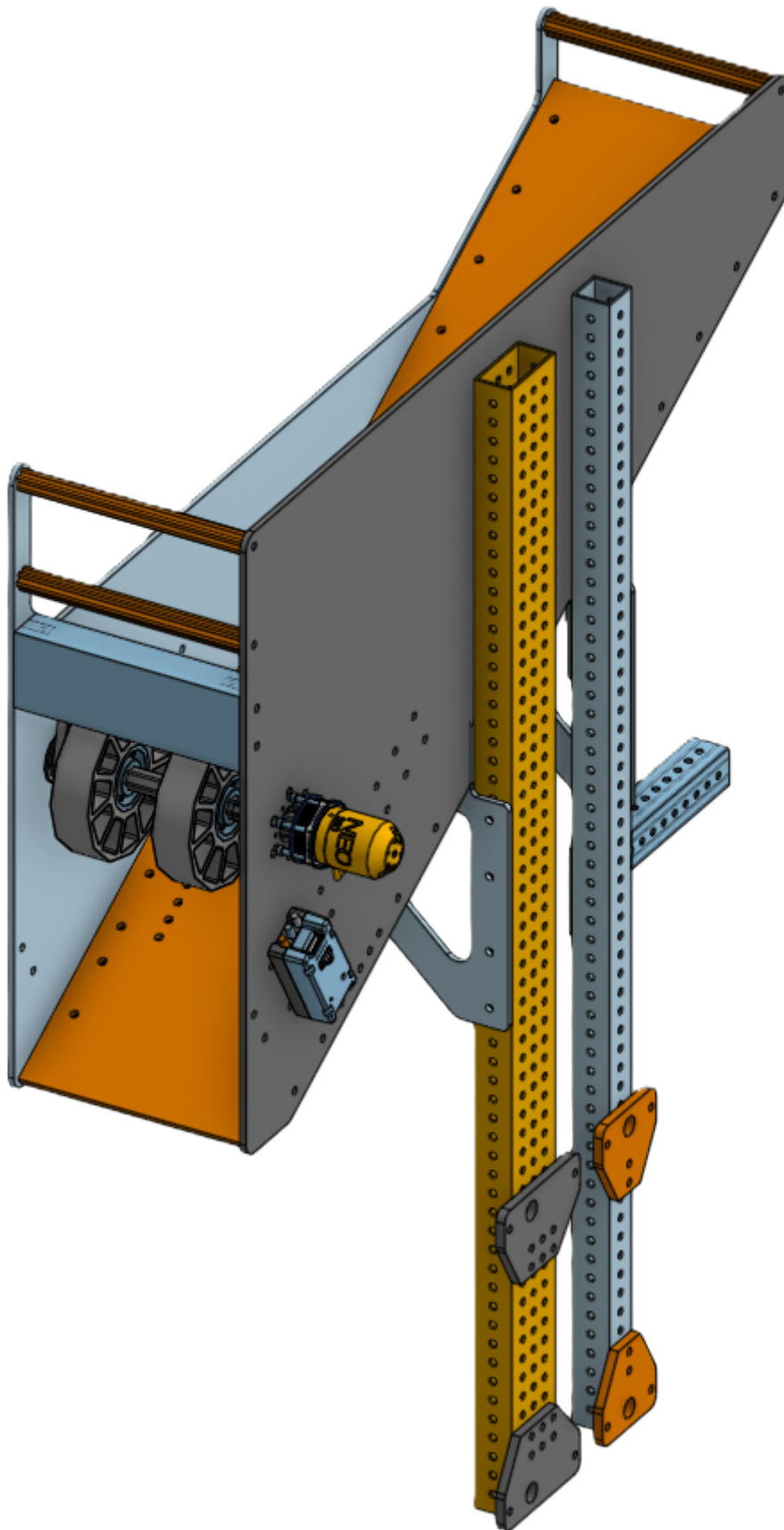


Figure 5: Coral Intake (rear)

5 Limelight

5.1 Setup

1. Navigate to [Limelight Local](#)
2. Set "FIRST Robotics Team Number / Net ID" to "8858"
3. Click "Change Team Number"
4. Set "IP Address Assignment" to "Static"
5. Set "IP Address" to "10.88.58.11"
6. Set "Netmask" to "255.255.0.0"
7. Set "Gateway" to "10.88.58.1"
8. Click "Change IP Settings"

5.2 Limelight Configuration

To view Limelight configuration settings, navigate to [Limelight Local](#)

5.2.1 Input

- Ensure "Pipeline Type" is set to "AprilTags"
- Change "Sensor Gain" such that April Tags can be reliably detected in game lighting

5.2.2 Advanced

- Change "Full 3D Targeting" to "Yes"
- Set "MegaTag Field-Space Localization Setup" to align with Limelight's position on the April Tag