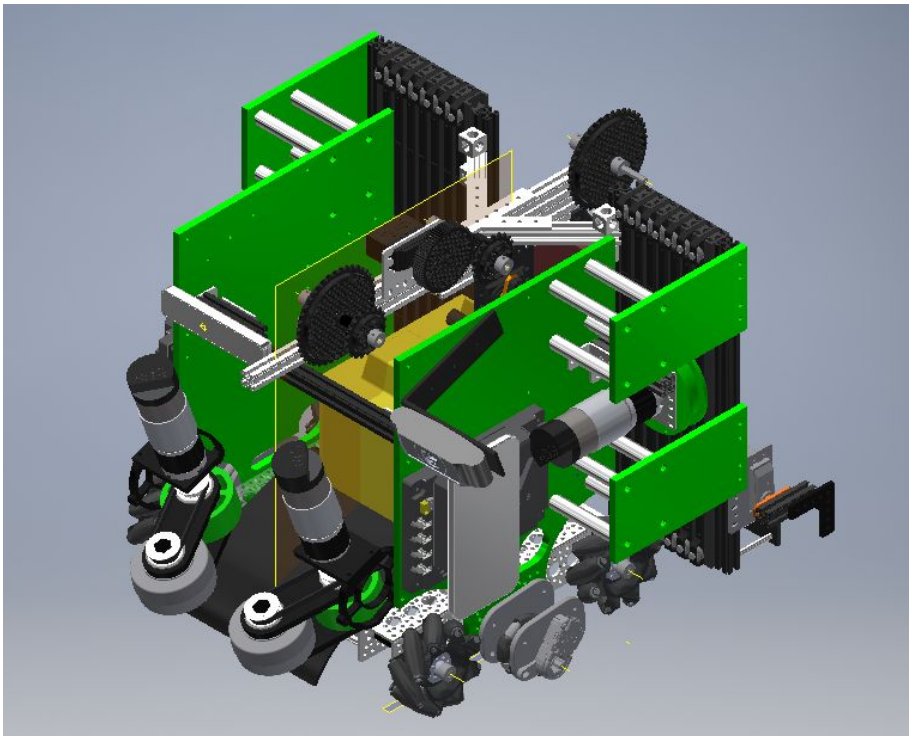
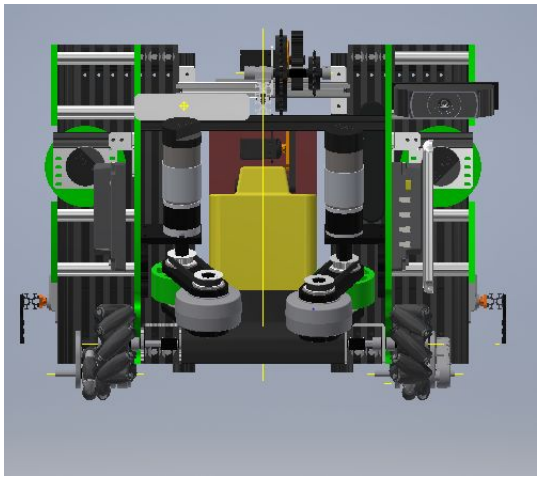
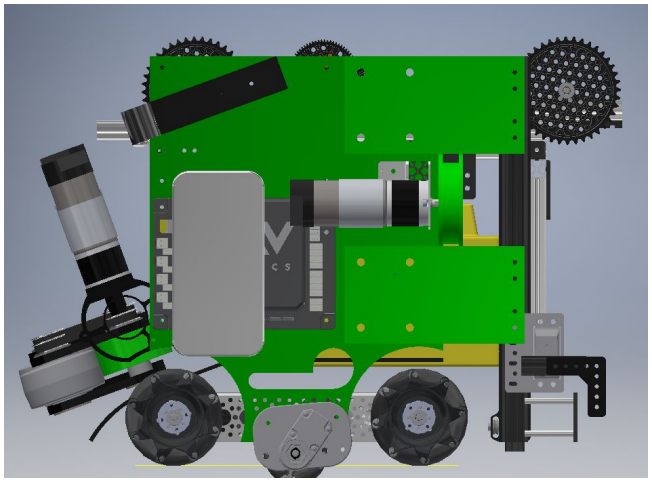
OUR ROBOT

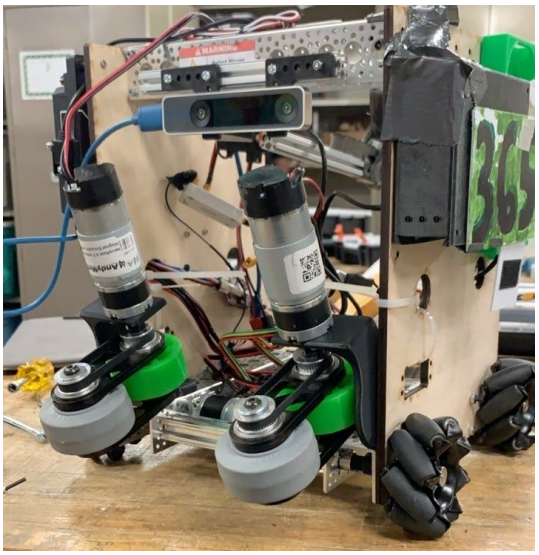




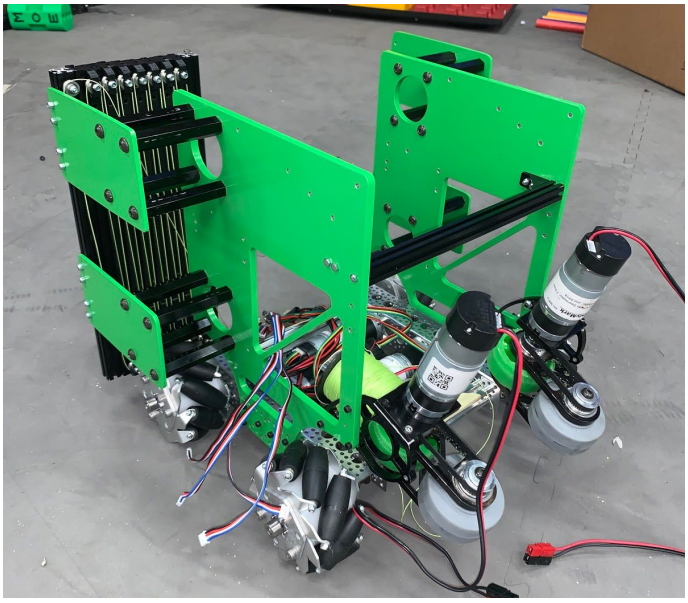


THE ROBOT

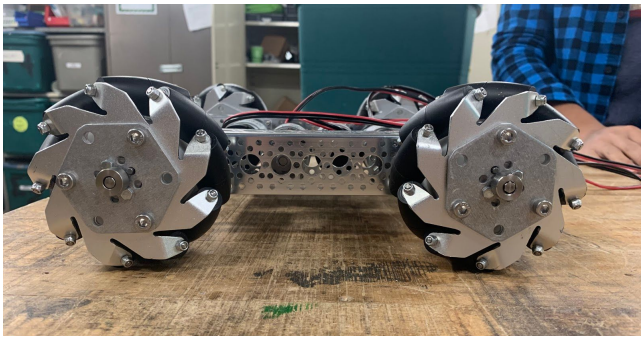
PREVIOUS ITERATIONS

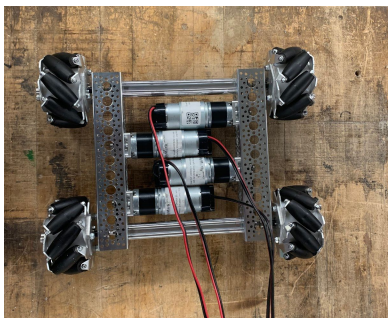
ITERATION 1	
	*ANALYSIS:* This Robot was our early-season robot. We used it at a scrimmage and a Delaware meet, and its performance was fair for the time. We upgraded everything to be mostly made out of aluminum.

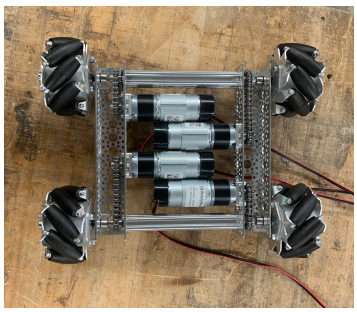
THE *CHASSIS V2.1*



OTHER VIEWS OF THE CHASSIS







THE *CHASSIS V2.2*

DESCRIPTION:

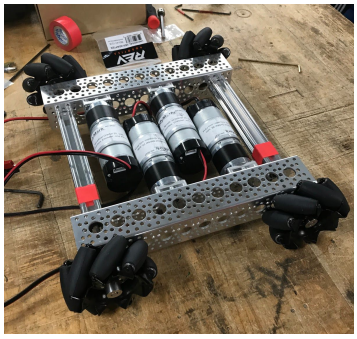
This chassis features custom ¼" aluminum side panels. The wheels are Nexus Mecanum wheels used for omni-directional movement, and they are powered through metal chain and sprocket on hex axles with bearings.

DOCUMENTATION FOR CURRENT ITERATION:

- DEVELOP A SOLUTION: C169
- FABRICATE & INTEGRATE: C160, C171, C177, C226
- TWEAK & EVALUATE: C169, C196

*See sections titled "Chassis" in Section C for **more details** about our chassis and **its previous iterations.***

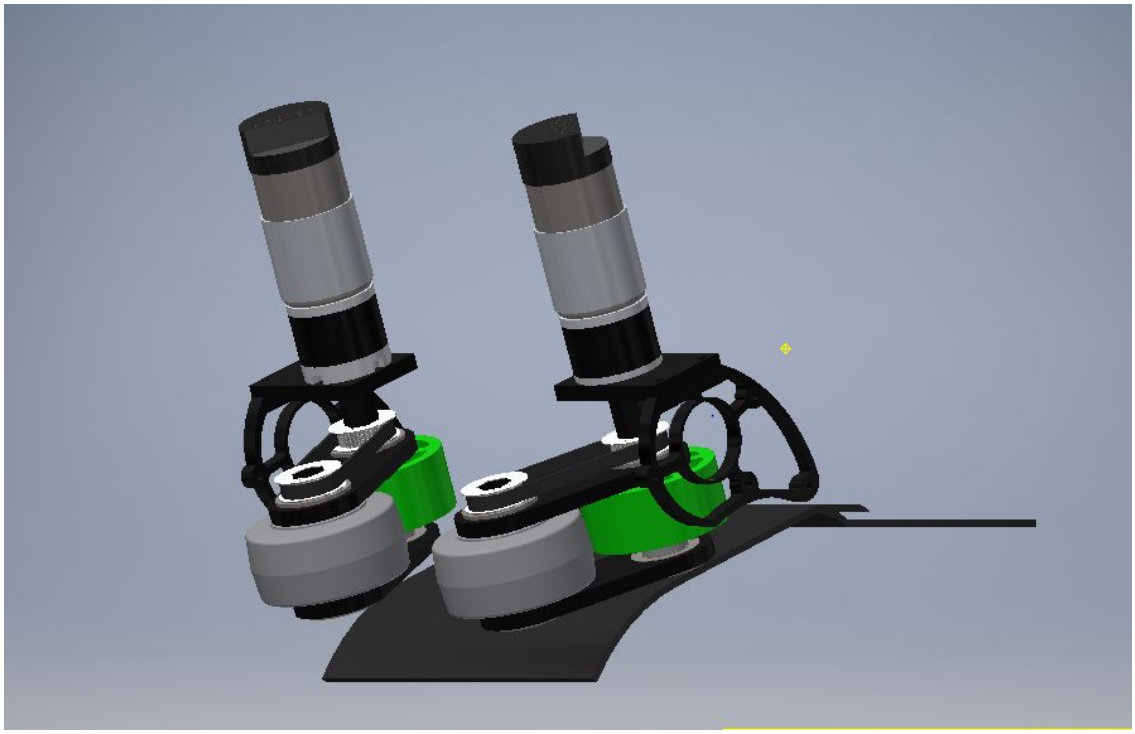
PREVIOUS ITERATIONS

ITERATION 1	
	*ANALYSIS:* This iteration used ¼" wooden side panels and REV Mecanum wheels. The wooden side panels were temporary, but we chose to switch to Nexus Mecanums because it was difficult to go over the neutral bridge with the small wheels.

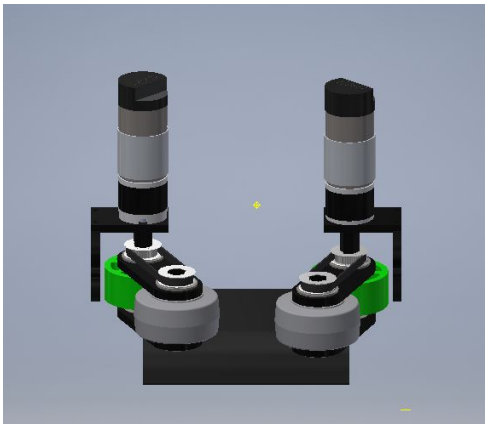
ITERATION 2: This iteration used 3D printed GT2 pulleys. These have metric measurements, but our drivetrain was imperial-based. We switched to metal XL Pulleys for iteration 2.1.

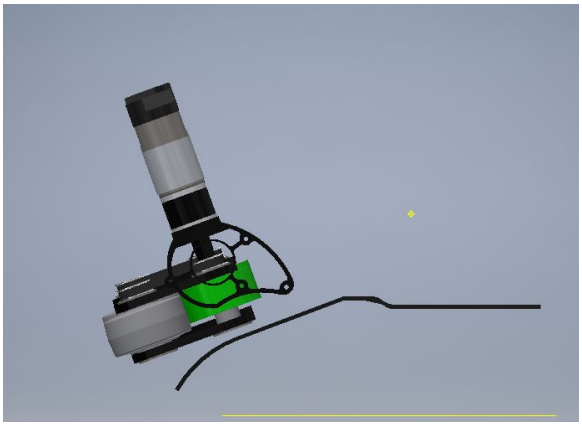
ITERATION 2.1: This iteration used metal XL pulleys. Although the pulley quality was better, the belts constantly shredded, causing us to switch to chain and sprocket.

STONE INTAKE SYSTEM V2.1



OTHER VIEWS OF THE INTAKE





STONE INTAKE V2.1 SYSTEM

DESCRIPTION:

This system features a double wheel intake with passive expansion and compliant inner wheels to conform to the shape/orientation of the stones. The mounting is custom CNC-milled aluminum

DOCUMENTATION FOR CURRENT ITERATION:

- DEFINE A PROBLEM: C3, C14
- GENERATE CONCEPTS: C3, C14, C140
- DEVELOP A SOLUTION: C124, C154
- FABRICATE & INTEGRATE: C136, C140, C159, C164, C180
- TWEAK & EVALUATE: C124, C140, C154

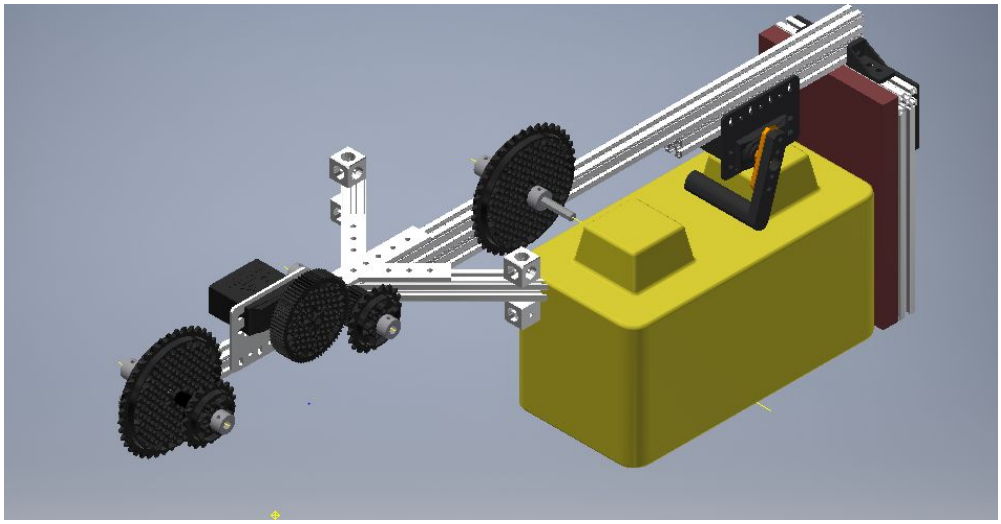
*See sections titled "Delivering Stones" in Section C for **more details** about our intake and **its previous iterations.***

PREVIOUS ITERATIONS

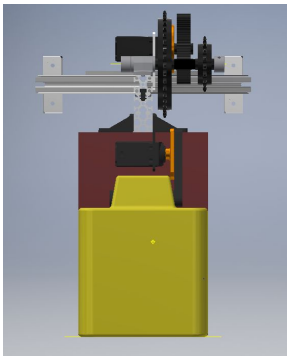
ITERATION 1	
	*ANALYSIS:* The wheels of the intake hit the drivetrain wheels when spinning, and also did not intake the Stones far enough into the robot. Otherwise, the compliant wheels were able to intake stones in most orientations.

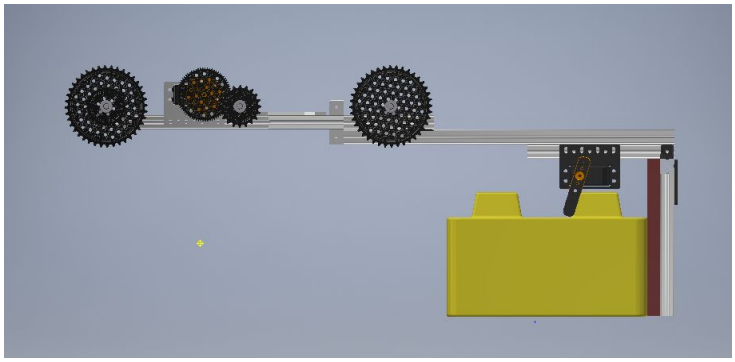
ITERATION 2: This iteration has the same wheel system as the current one, except the mount was 3D printed plastic. This broke easily, so we designed a mount out of aluminum.

STONE SCORING V3 SYSTEM



OTHER VIEWS OF THE OUTTAKE





STONE SCORING V3 SYSTEM

DESCRIPTION:

Our stone scoring system (“Outtake”) is a horizontal, chain-driven slide system with a grabber. The chain is able to extend and retract the slides in a 270º servo rotation.

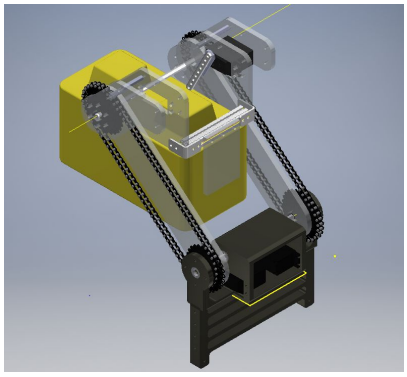
DOCUMENTATION FOR CURRENT ITERATION:

- DEFINE A PROBLEM: C4, C14
- GENERATE CONCEPTS: C4, C8
- DEVELOP A SOLUTION: C49, C58, C69, C81, C90, C126, C143, C144
- CONSTRUCT & TEST A PROTOTYPE: C37, C82, C84, C107, C116
- FABRICATE & INTEGRATE: C160, C167, C192, C209
- TWEAK & EVALUATE: C209,

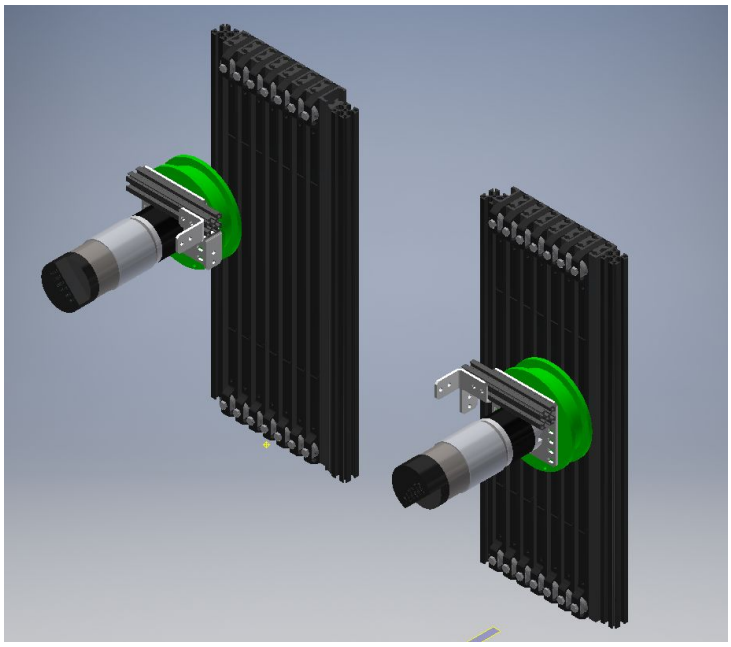
*See sections titled “Scoring Stones” in Section C for **more details** about our outtake and **its previous iterations.***

PREVIOUS ITERATIONS

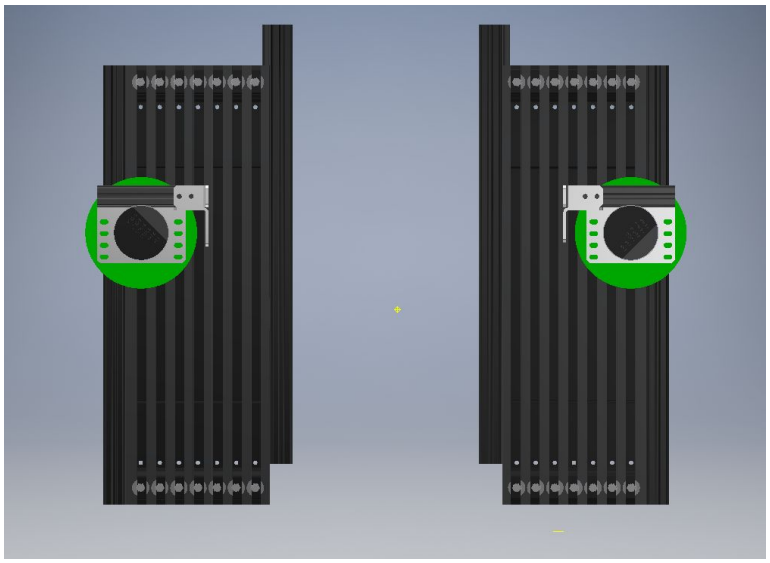
ITERATION 1: This iteration was a temporary solution to score stones. It pushed stones from the inside of the robot to the foundation. It did not perform consistently, but it helped score points before we mounted our lift system.

ITERATION 2	
	*ANALYSIS:* This is a virtual four bar system that can keep the stones upright when taking it out of the robot. This did not get passed the design stage because it would be too big and hard to maintain.

STONE LIFTING V3 SYSTEM



OTHER VIEWS OF THE LIFT



STONE LIFTING V3.1 SYSTEM

DESCRIPTION:

Our vertical lift is able to reach a maximum physical cap of 15 stones tall. It is an 8-stage system with continuous string rigging for extension and retraction. It uses two sets of slides for stability.

DOCUMENTATION FOR CURRENT ITERATION:

- DEFINE A PROBLEM: C4
- GENERATE CONCEPTS: C4
- DEVELOP A SOLUTION: C144
- CONSTRUCT & TEST A PROTOTYPE:
- FABRICATE & INTEGRATE: C147, C162, C166, C172, C173, C174, C175, C178, C179, C182, C183, C185, C186, C187, C192, C197, C200, C201, C210, C223
- TWEAK & EVALUATE: C172, C173, C186, C191, C197

*See sections titled "Stacking Stones" in Section C for **more details** about our lift and its **previous iterations.***

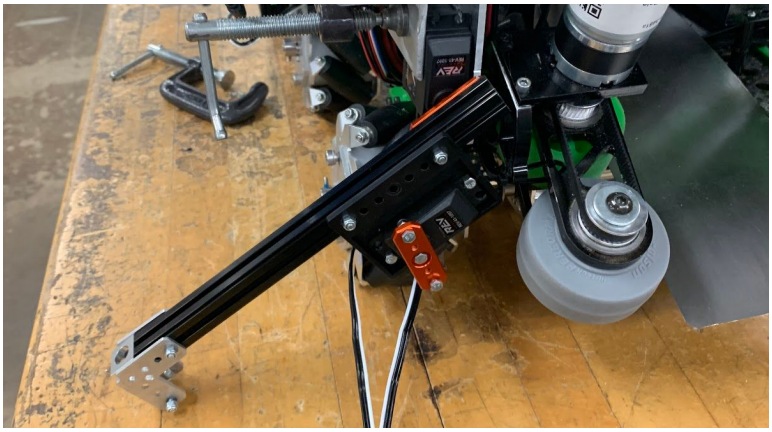
PREVIOUS ITERATIONS

ITERATION 1: This first iteration of linear slides was a design that used REV V2 Extrusion for the linear slides. There were two sets, one mounted on each side of the robot, running along the inside of the wall.

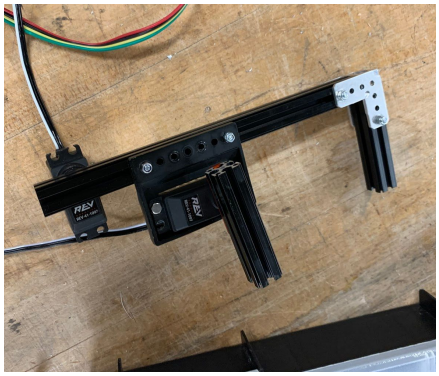
ITERATION 1.1: We switched the orientation of the slides so that they would support each others weight when going upwards.

ITERATION 2: This iteration used REV Ultraslides.

STONE GRABBING SYSTEM



VIEWS OF THE STONE GRABBER



STONE GRABBING SYSTEM

DESCRIPTION:

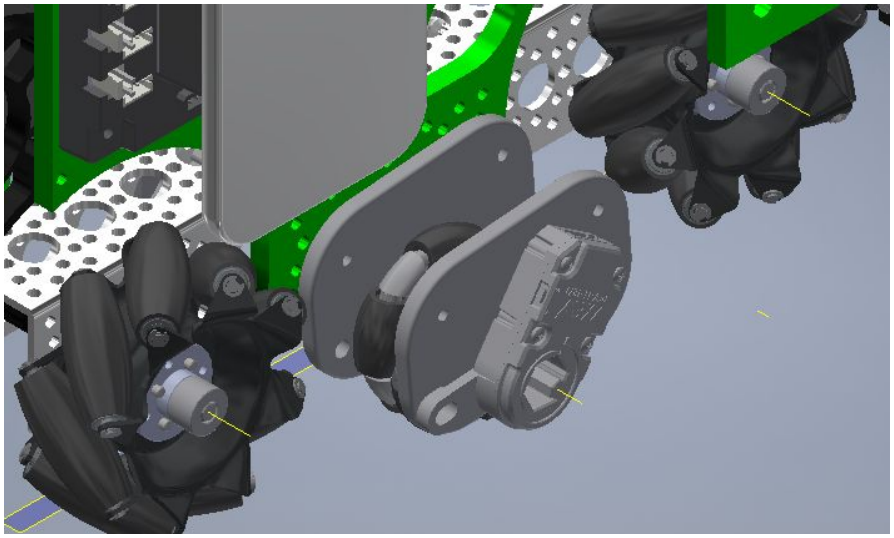
This grabber is used in autonomous for fast foundation placing.

DOCUMENTATION FOR CURRENT ITERATION:

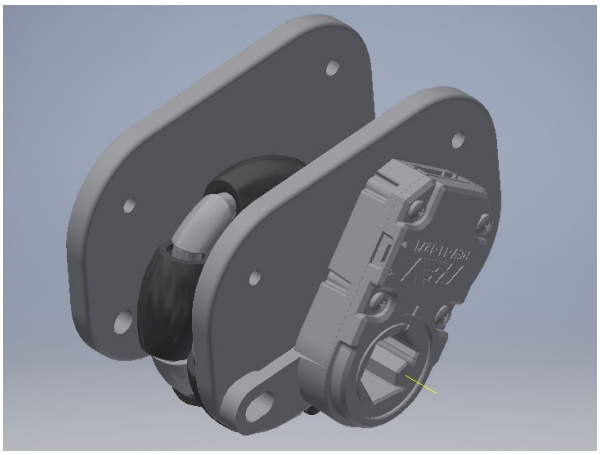
- CONSTRUCT & TEST A PROTOTYPE: C215, C219
- FABRICATE & INTEGRATE: C209, C219, C224
- TWEAK & EVALUATE: C209

*See sections titled "Scoring Stones" for **more details** about our autonomous arm and **its previous iterations.***

ODOMETRY V8



VIEWS OF ODOMETRY



ODOMETRY V8

DESCRIPTION:

This is a compact dead wheel connected to an encoder to give accurate and precise odometry readings. It is spring loaded onto the ground to ensure contact at all times.

DOCUMENTATION FOR CURRENT ITERATION:

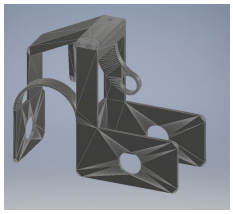
- DEVELOP A SOLUTION: C197
- CONSTRUCT & TEST A PROTOTYPE: C197
- FABRICATE & INTEGRATE: C200, C206, C210

See sections titled "Odometry" for ***more details*** *about our odometry and* ***its previous iterations.***

PREVIOUS ITERATIONS

ITERATIONS 1-3: These iterations of odometry were done over the summer. They were all very large and bulky, and were not compatible with the current chassis.

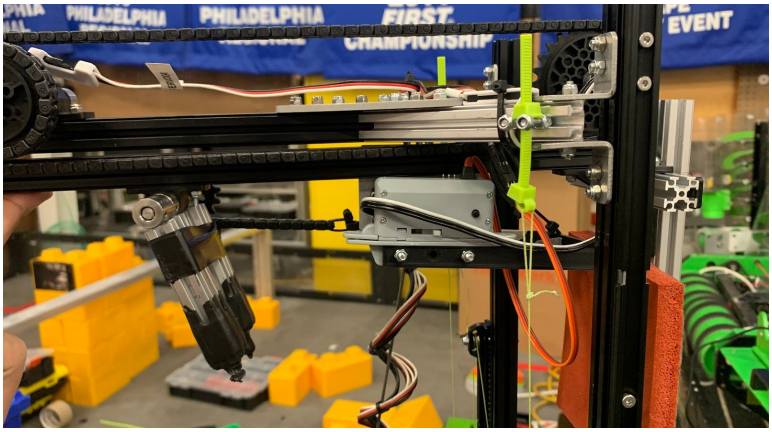
ITERATION 4: This was the start of trying to make the two wheels fit into one pod.

ITERATION 5	
	*ANALYSIS:* *This outlined the general shape of what Iteration 7 would be like. This one's walls were way too thin, and we needed to increase the ease of building.*

ITERATION 6: Iteration 5 but with thicker walls

ITERATION 7	
	*ANALYSIS:* *This Iteration of odometry was far too bulky and unstable. It worked when held by hand, but the spring steel on the servo simply could not support the pod from wobbling.*

CAPSTONE SCORING SYSTEM



VIEW OF THE CAPSTONE

CAPSTONE SCORING SYSTEM

DESCRIPTION:

This capstone-scoring mechanism features a “pay-load release” servo on our horizontal outtake to quickly release our capstone onto a stone. We can then stack this stone on our skyscraper

DOCUMENTATION:

- CONSTRUCT & TEST A PROTOTYPE: C262

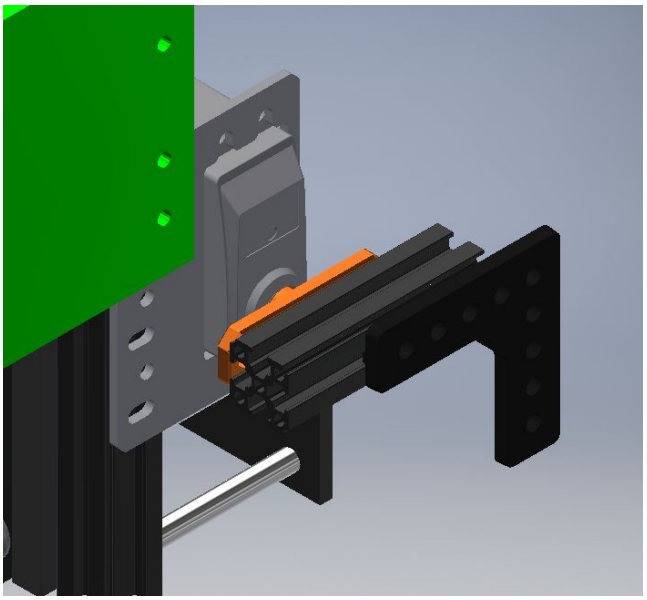
*See sections titled “Scoring Captone” for **more details** about our capstone scoring and **its previous iterations.***

PREVIOUS ITERATIONS

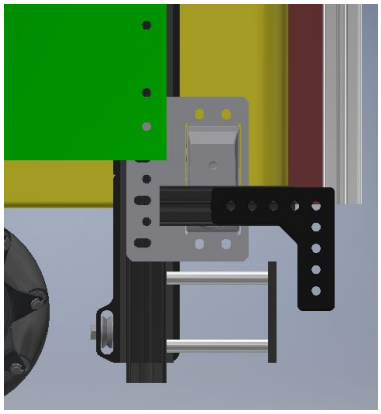
ITERATION 1: Our first iteration just used the temporary outtake mechanism to score the capstone. *See Stone Intake V1*

ITERATION 2: Our second iteration used our stone grabbing system to grab a capstone and place it on the foundation. *See Stone Grabbing System*

FOUNDATION CONTROL V2.1 SYSTEM



OTHER VIEWS OF THE FOUNDATION GRABBER



FOUNDATION CONTROL V3 SYSTEM

DESCRIPTION:

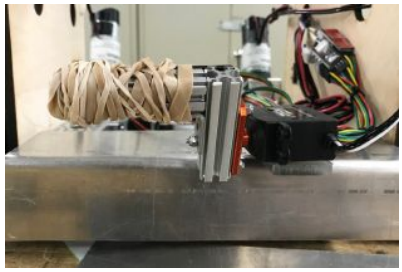
We use two servos with rubber dipped L-brackets for a simple yet effective foundation grabbing system.

DOCUMENTATION FOR CURRENT ITERATION:

- DEFINE A PROBLEM: C2
- GENERATE CONCEPTS: C2
- DEVELOP A SOLUTION: C169
- FABRICATE & INTEGRATE: C188

See sections titled "Moving Foundation" for ***more details*** *about our foundation grabbers and* ***its previous iterations.***

PREVIOUS ITERATIONS

ITERATION 1	
	*ANALYSIS:* This iteration used one servo and we found that we did not have a good hold on the foundation. It often rotated when we tried moving it straight backwards.

ITERATION 2: This iteration worked fairly well using two servos to grab, so version 2.1 just uses smaller grabbers to be more compact.