

Engineering Notebook

47126A

Team Number

I can't say it out loud

Team Name

Henryville Jr Sr High

School

Start Date

00/00/0000

End Date

1

Book #

of 1

V2.1 Date 6.12.23



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Date: 03/03/26

Event Name: Indiana Robotics
State Championship

Innovate Award Submission Information Form

Instructions for team: Please fill out all information, printing clearly. This form should be included either behind the front cover, or in a clearly marked section in your Engineering Notebook. Teams may only submit **one** aspect of their design to be considered for this award at each event. Submission of multiple aspects will nullify the team's consideration for this award.

Full Team Number: 47126A

Brief description of the novel aspect of the team's design:

A brief novel aspect of our teams design is our intake. Our intake is vertical
in the front and horizontal on the top.

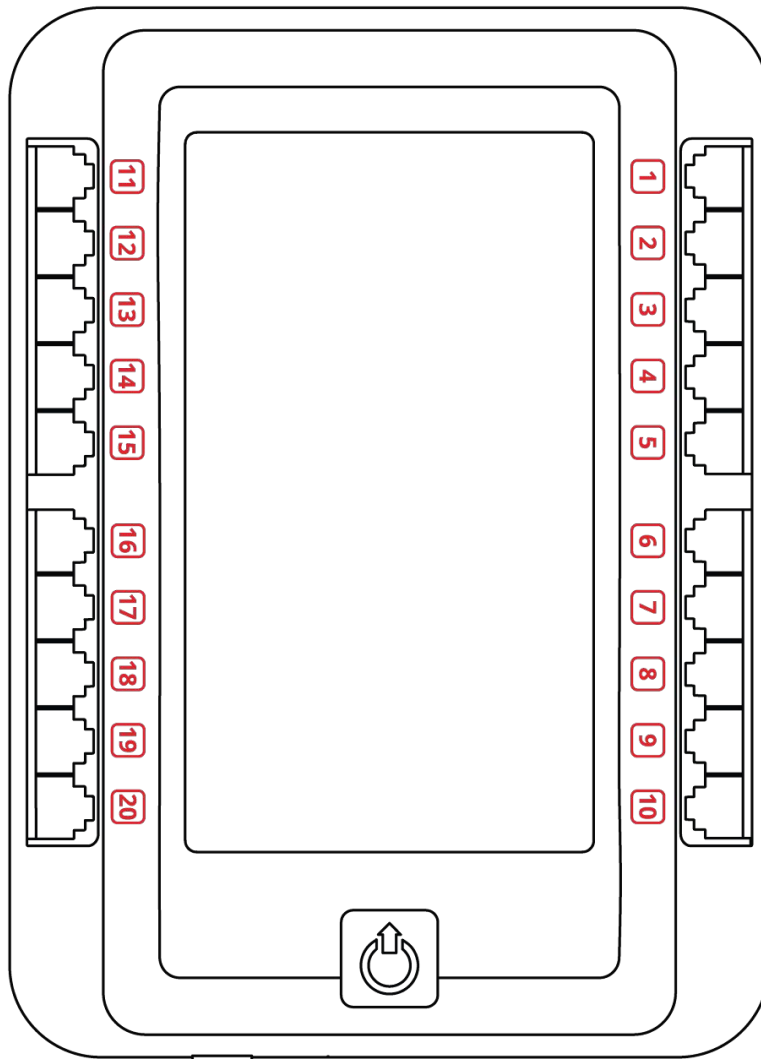
Identify the page numbers and/or the section(s) where documentation of the development of this aspect can be found:

Our intake is talked about on page #9 where we designed the first rendition
of it, page #10 where we started building the intake, page #11 where we
built part of the intake, page #12 where we designed the top intake, page
#13 where we started building the top intake, page #14 where we built part
of the top intake, #15 where we started building the top conveyor, #16
where we built the rest of the top conveyor, and page #31 where we made
tweaks to the front intake.

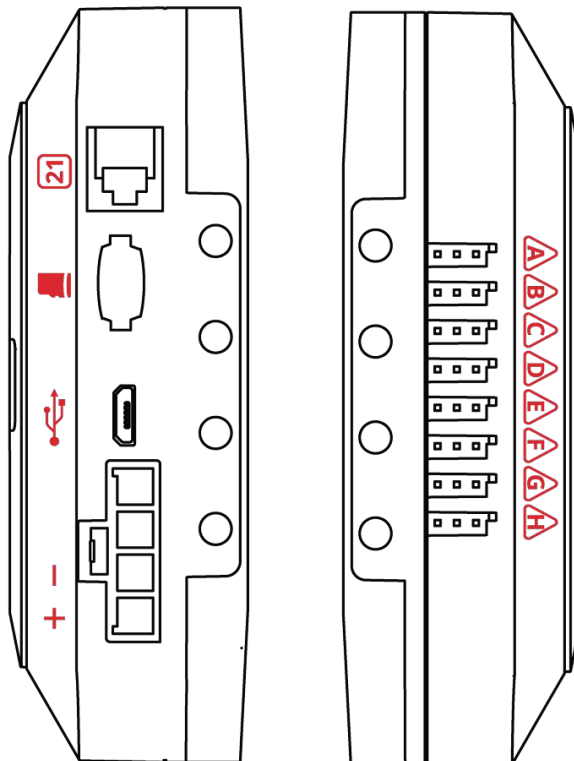
Explain why your submission is unique from other approaches to the problem it solves or task it performs:

Our intake is unique from there approaches because most other designs
have a collection box that the blocks fall into which causes them to score
slower while our intake is one path with little room for error. The other
designs most teams have is the S-intake which due to its long path has
many spots that can cause jamming while our intake is short but not to
short which allows us to hold 7 blocks and they will not get jammed when
we score.

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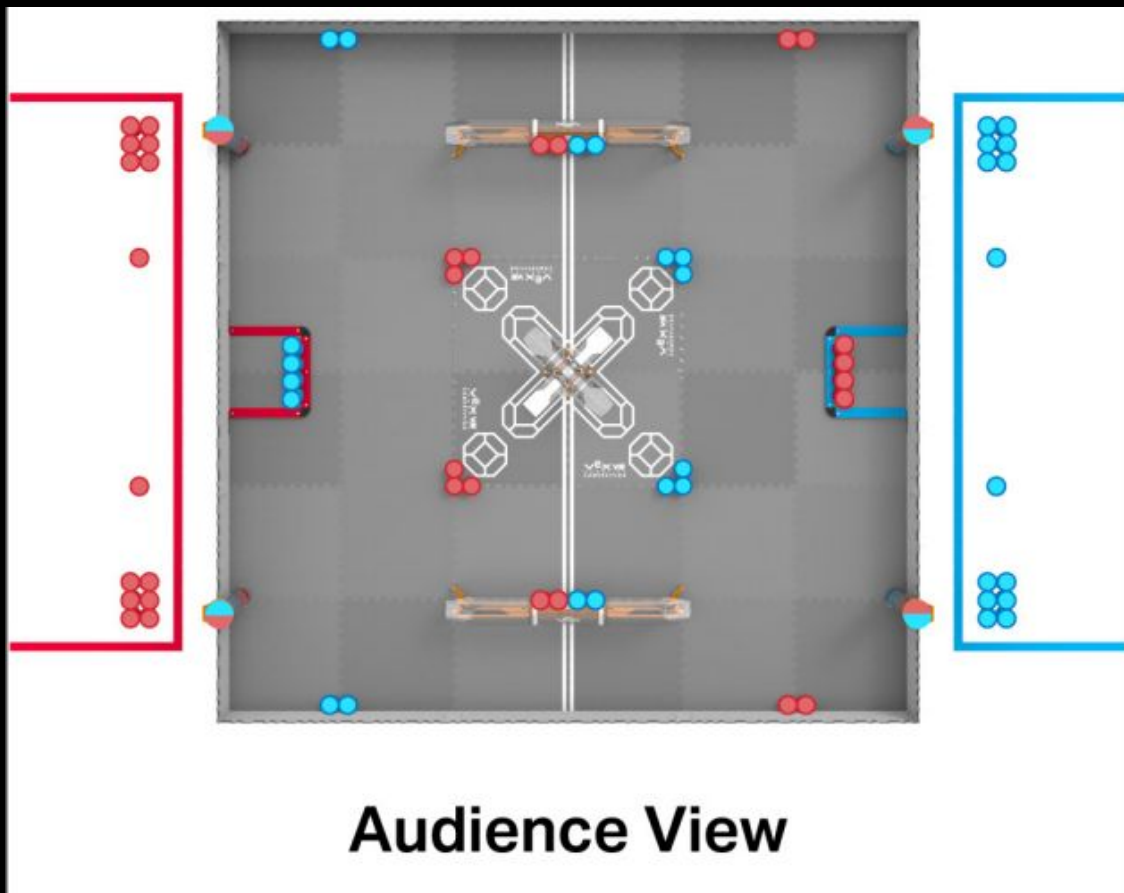
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Game analysis

Game premiss

Two alliances one red and one blue made up of two teams each. They will compete against each other on a 12x12 field where they will compete to see which alliance can score the most points in the 4 goals using the game objects called Octoballs during the 2 minute long match.



AWP (Autonomous win point)

An Autonomous Win Point is awarded to any Alliance that ends the Autonomous Period with all of the following tasks completed, and that has committed no Violations during the Autonomous Period:

- At least seven (7) Blocks of the Alliance's color are Scored.
- At least three (3) different Goals include at least one (1) Scored Block of the Alliance's color.
- At least three (3) Blocks of the Alliance's color have been removed from Loaders adjacent to the Alliance's Alliance Station.
- Neither Robot is contacting the Park Zone barrier.

Game Analysis

Important rules

- <SG2> and <SG3> Robot must fit within 18in wide, 18in long, and 18in tall but can be expanded upon up to 22 in at a time once the match starts.
- <SC3> A Control Zone is considered Controlled by an Alliance if a majority of the Blocks Scored in that Control Zone are the same color as the Alliance. For Long Goals, a Scored Block is considered Scored in the Control Zone if it is entirely contained within that Control Zone
- <SG7> Don't cross the Autonomous Line, and don't interfere with your opponents' actions. During the Autonomous Period, Robots may not contact foam tiles, Blocks, or Field Elements which are on the opposing Alliance's side of the Autonomous Line
- <SC4> A Robot is considered Parked if it meets all of the following criteria:
 - A. The Robot is not contacting the Floor outside of its Alliance-colored Park Zone.
 - B. The Robot is not contacting any Field Elements other than the inside face of the Field Perimeter, the Floor inside of its Alliance-colored Park Zone, and/or the plastic extrusions and connectors that are part of the Park Zone. Contact with these allowed elements is not required.
 - C. The Robot is at least partially within the vertical projection of its Alliance-colored Park Zone.
- <GG18> Blocks may not be used to accomplish actions that would be otherwise illegal if they were attempted by Robot mechanisms.
- <SC6> An Autonomous Win Point is awarded to any Alliance that ends the Autonomous Period with all of the following tasks completed, and that has committed no Violations during the Autonomous Period
 - 1. At least seven (7) Blocks of the Alliance's color are Scored.
 - 2. At least three (3) different Goals include at least one (1) Scored Block of the Alliance's color.
 - 3. At least three (3) Blocks of the Alliance's color have been removed from Loaders adjacent to the Alliance's Alliance Station.
 - 4. Neither Robot is contacting the Park Zone barrier.

Game analysis

Important Takeaways

- This will be a very defence based game
- Double parking will be difficult
- You will need very good coordination with your alliance to succeed

Things you will need to succeed

- 55 watt drivetrain (four 11 watt motors + two 5.5 watt motors)
- Descore mech
- Intake make
- Parking mech

Measurements

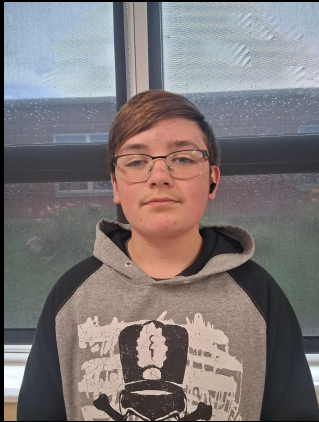
- -The width of the tube funnel is 5 ½ in by 6 in
- -The height of the tube plus funnel is 21.34 in
- -The width of the octoballs are 3.25 inches by 3.85 inches
- - The length of the control zone of the long goals is 13.3 in (3 of the octoballs can fit in it)
- -The length of the of the long goal itself is 48.8 in (15 of the octoball can fit in it)
- -The center goal is 22.6 inches in length
- - The parking zone is 18.87 inches wide x 16.86 inches deep

SCORING	
Autonomous Bonus	10 points
Each Block Scored	3 points
Each Controlled Zone in a Long Goal	10 points
Controlled Center Goal - Upper	8 points
Controlled Center Goal - Lower	6 points
1 Parked Alliance Robot	8 points
2 Parked Alliance Robots	30 points

MEET THE TEAM

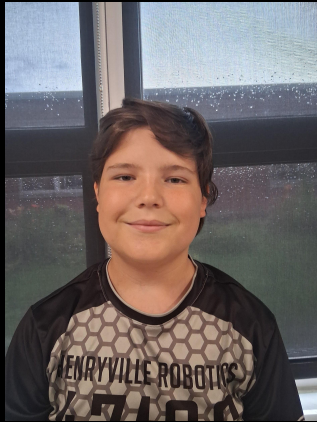
Zach

The team's main digital note booker and designer. He has 4 years of experience in robotics. 8th grade.



Landen

The team's main coder, builder, notebook reviewer, and backup driver. He has got 3 years of experience in robotics. 8th grade.



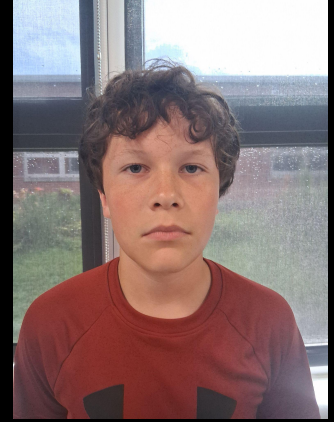
Levi

The team's photographer, builder, filer, occasional notebooker, and loader. He has 1 year of experience in robotics. 8th grade.



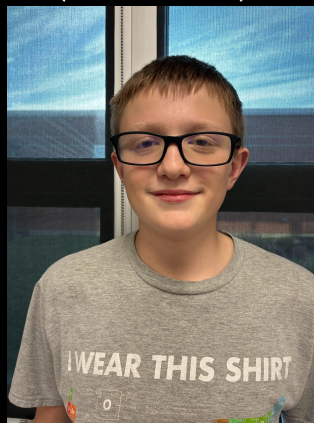
Johnny

The team's main driver, builder, designer, filer and backup coder. He has got 3 years of experience in robotics. 8th grade.



JACK

The teams builder, backup loader, and backup designer. He has 3 years of experience in robotics. 7th Grade (Joined 12/08)



Deciding the drivetrain

TO DO LIST

- 4 wheel chain drive
- 4 wheel chain H-drive
- 6 wheel chain drive

To test each drivetrain we will be doing a combination of tasks to see which performs the highest. For the speed test we will measure the time it takes for the robot to drive in a straight line across the field. To test the agility we will be doing 2 figure-eights around the entire field. To test difficulty we will be coming together as a team to determine how easy or hard it is to control based on the outcome of the agility test.

	SPEED	AGILITY	CONTROL ABILITY	OVERALL
4 wheel 400rpm	6/10	6/10	5/10	17
4 wheel H-drive 400rpm	6/10	7/10	7/10	20
6 wheel 800rpm	8/10	9/10	9.5/10	26.5

We are going to work on building our prototypes for the drive trains. We will be building the 4 wheel 400 rpm chain drive first. By the end of practice we hope to have started on the 4 wheel 400 rpm chain drive with a 200 rpm H-drive. We are 1 ½ hours into the practice and we are almost half way through the first drive chain. Now we are 2 hours into practice and we are almost ready to assemble. We have an hour left in practice and we came across an issue with the width of the pontoons. Right at the end of practice we finished the first drive.

Deciding the drivetrain (cont)

TO DO LIST

- 4 wheel chain drive
- 4 wheel chain H-drive
- 6 wheel chain drive
- 6 wheel chain H-drive

Today we are going to work on building and testing the 4 wheel 400 rpm chain drive. Because the 4 wheel 400 rpm chain drive is the same as the first we just need to add an H-drive to save time. The 4 wheel 400 rpm chain drive with a 200 rpm H-drive is almost done 2 hours into practice. We took longer than expected due to an issue with the design, but we fixed it and now we are about to code it then we will test. After we tested the 2nd drivetrain we determined that it was slightly better than the 1st but not by much. Practice is about to be over so we are preparing for the 6 wheel 800 rpm gear drive. Hopefully because we are keeping the H-drive mech we will get the 3rd and the 4th drivetrain done tomorrow.

Deciding the drivetrain (cont)

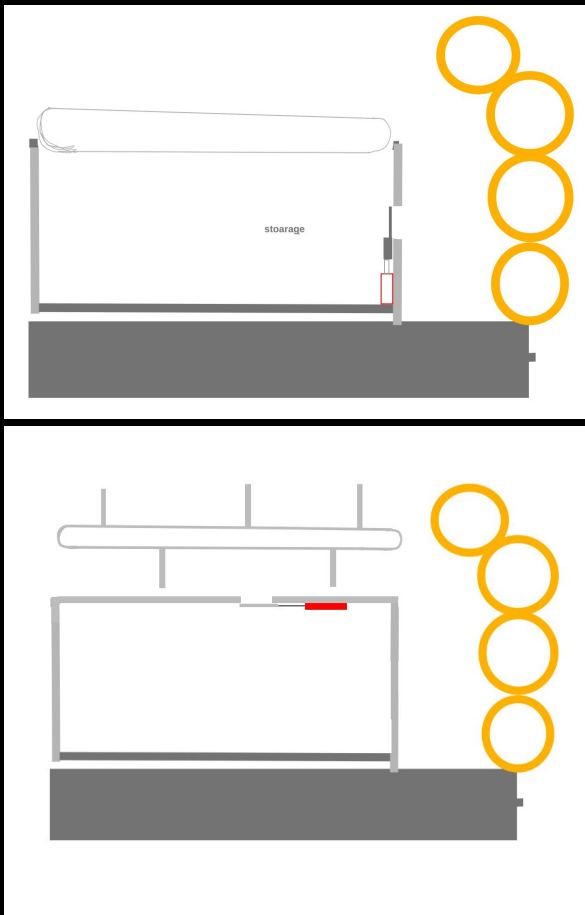
TO DO LIST

- 4 wheel chain drive
- 4 wheel chain H-drive
- 6 wheel chain drive
- 6 wheel chain H-drive

To day we will be building and testing the 3rd and maybe 4th drivetrain. When we started building it we decided that we will make all the wheels screw joint to reduce friction and increase speed. We are an hour into practice and we are about to connect the two pontoons after we do that we will probably test then attach the H-drive. We are now ½ the way into practice and we are coding the drivetrain.

Designing the intake

Today we will be getting started on the intake. For our design we will be using a vertical lift that converts to a horizontal conveyor at goal level. One of the main perks to this design is that because it is vertical we can add a color sorter that allows us to hold onto opposite color octoballs so the other team can't score.



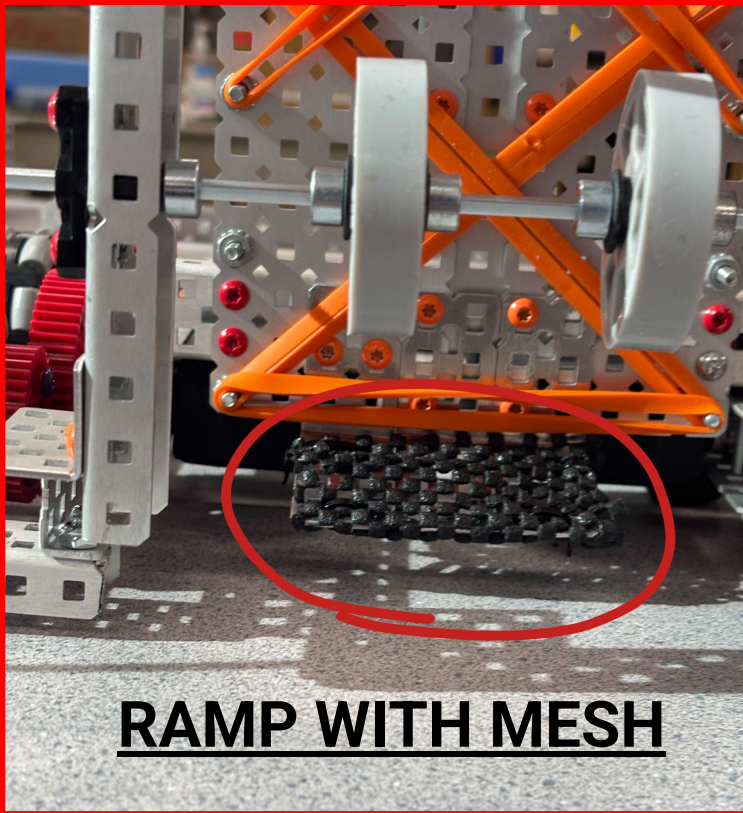
This is the first concept design for our intake. How it works is the octoballs will get sucked up by the rubber band gears (rubber bands wrapped on 16 tooth sprockets) then there's two paths for the octoballs either they can keep going up to be scored or they will be detected by the color sensor which will cause the actuator to contract and open up a gate to where the opposite teams octoballs will be collected in the storage compartment.

This is the second design for our intake. How it works is the balls will travel up the rubber band balls like the first design but instead of the balls being filtered on the front it will now happen on the top so that the blocks don't pile up on the side blocking the hole to where they can't be sorted.

Building front Intake

- As of September 9th we have the main frame of the front first intake and hope to have the intake entirely done by the 16th
 - Building materials
 - two 14.5 inch c-channels
 - 12 flex wheels
 - 6 axles
 - 16 nuts
 - One 12.5 inch x 5 inch wall
- Issues we have ran into so far and how we fix/will fix them. (9/11)
 - The spacing between the flex wheels being to big to the point where that blocks don't travel up the vertical conveyor.
 - So we decrease the distance between the flex wheels for better traction
 - The left c-channel we used got cut wrong and at first when started building the intake we didn't think it would be an issue but as built it up we came to the realization that we would need more room for flex wheels to help the block travel.
 - We will cut the left c-channel short and add a 90° piece that is 2 inches tall to give us a piece that will extend the c-channel to match the other side.
- Issues we have ran into and how we will fix them. (9/16)
 - We accidentally made the spacing wrong on the top set of spinners where they are to high up and they don't contact the octoballs
 - To fix it we are going to take it off and move it down a spot so they start to catch on the octoballs.
 - We discovered that the way we spaced the gears caused them to turn in reverse
 - To fix it we are going to rebuild the intake with better spacing for more gears.
- Issues we have ran into and how we will fix them (9/22)
 - Because of the spacing of the axles being inconsistent it caused the gears to lock up when spun.
 - To fix it we are going to take down the axles and move them to a more consistent spacing pattern.

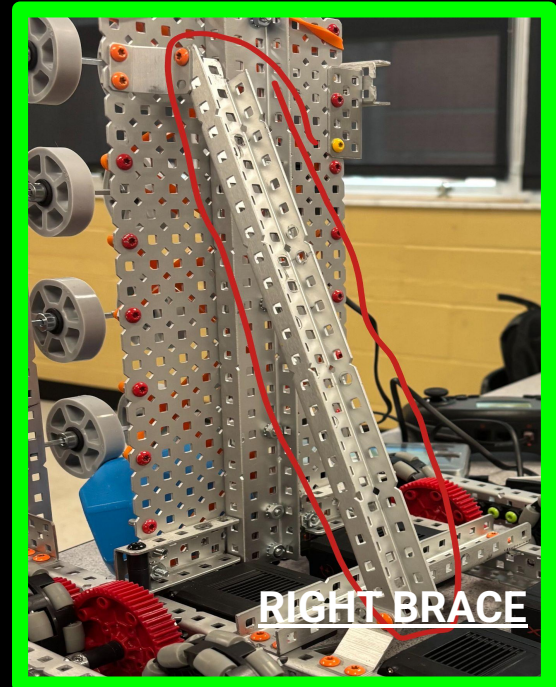
Maintenance On The Front Intake



RAMP WITH MESH

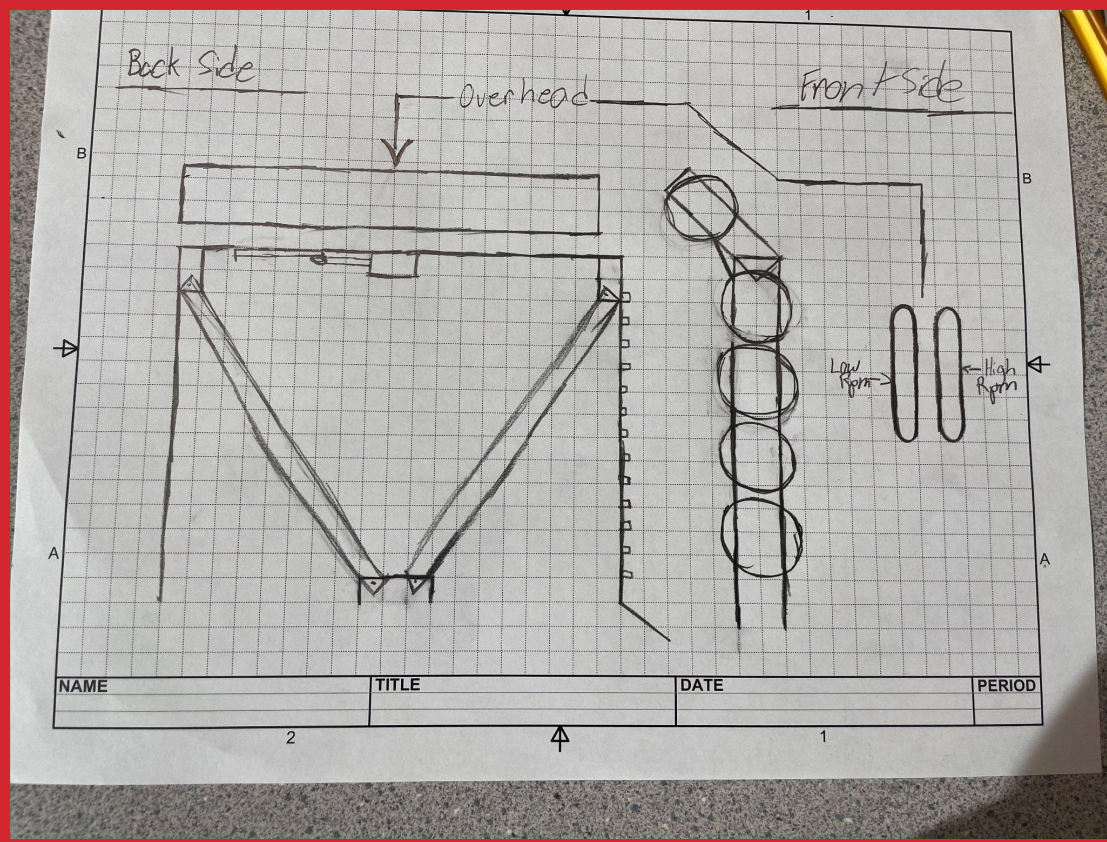
We started off the day by adding three 45 degree metal pieces on the bottom of the rubber band wall, so that the blocks would be able to be brought up the intake. After testing we realized that the pieces were too slick so we added rubber mesh around the metal to cause more friction between the blocks and the ramp.

After some more testing we came to the realization that the block was still getting stuck on the ramp. We looked at the ramp more and realized that the first set flex wheels were too far apart. We moved them closer to each other and tested it again. It went up well but after the first 2 sets of flex wheels the balls would spin freely and not go up any more. We decided to add a support beam to the right side to try and keep the back wall steady and to keep it from bending back and not gripping the balls.



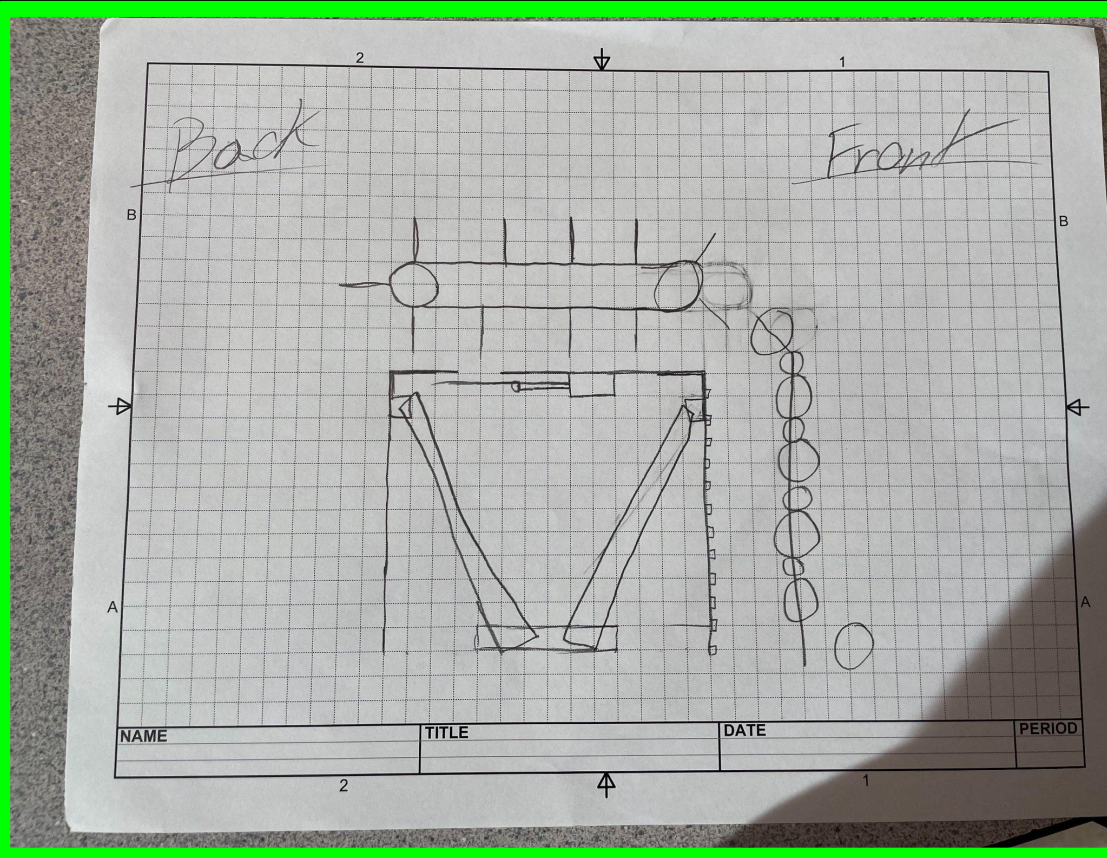
We ended up adding a second brace and then tested it and it worked really well. We did not run into any more problems after the test and the day was almost over so we planned on starting the rest of the intake on the next practice.

Designing The Top Intake



IDEA 1

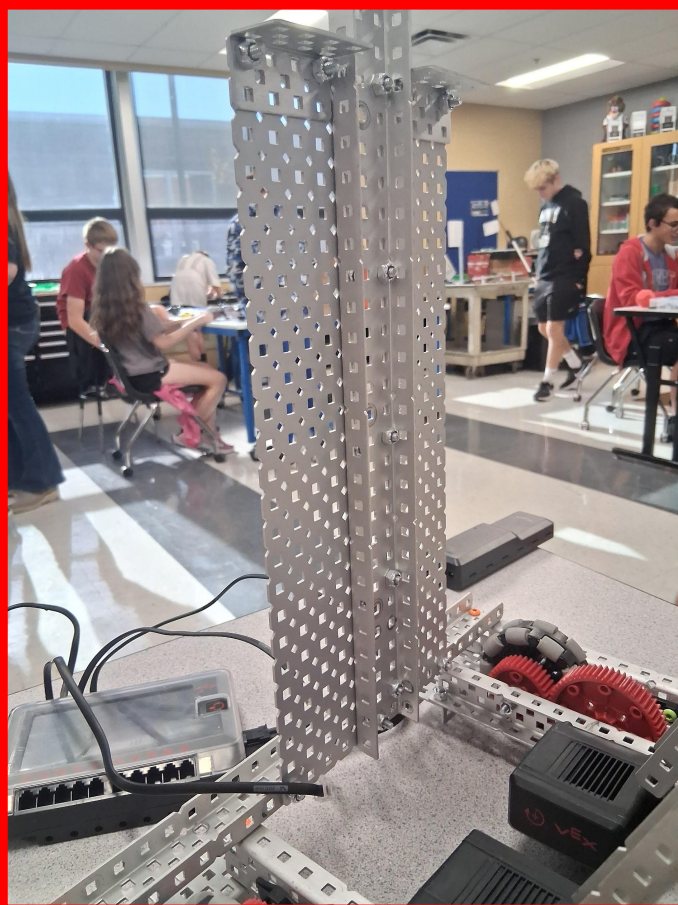
Idea 1 is 2 conveyors on their sides that both spin independently with different rpms. The reason for this is so that with one side we can score normal and the other side we can descote.



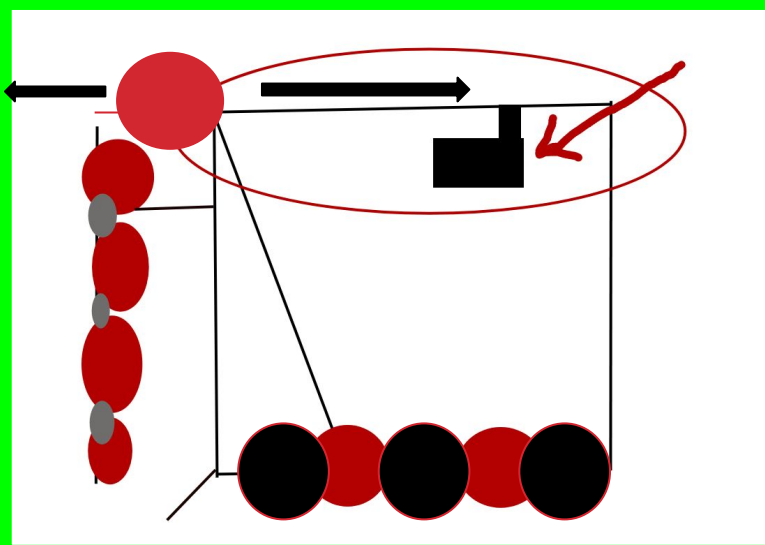
IDEA 2

Idea 2 is a single conveyor on top of the robot that will glide the blocks under it on a path that has walls on both sides so the balls won't fall off.

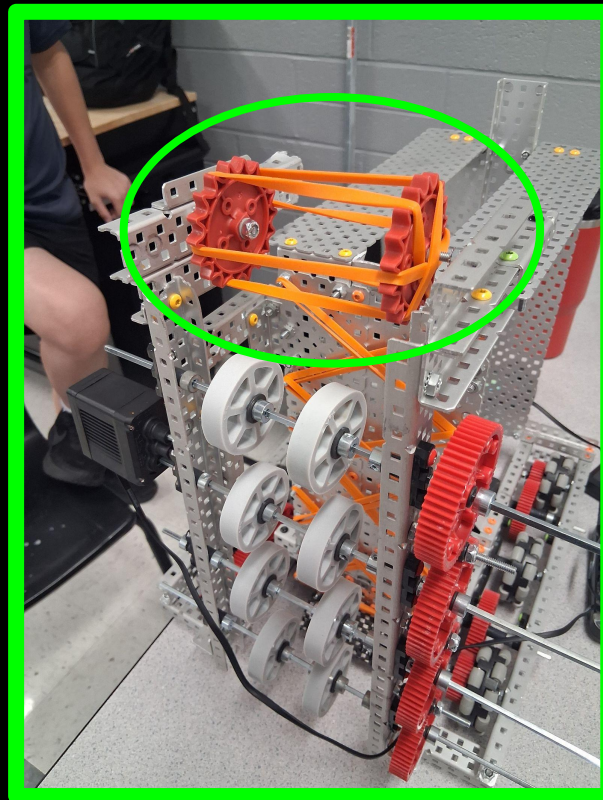
Start Building The Out Take



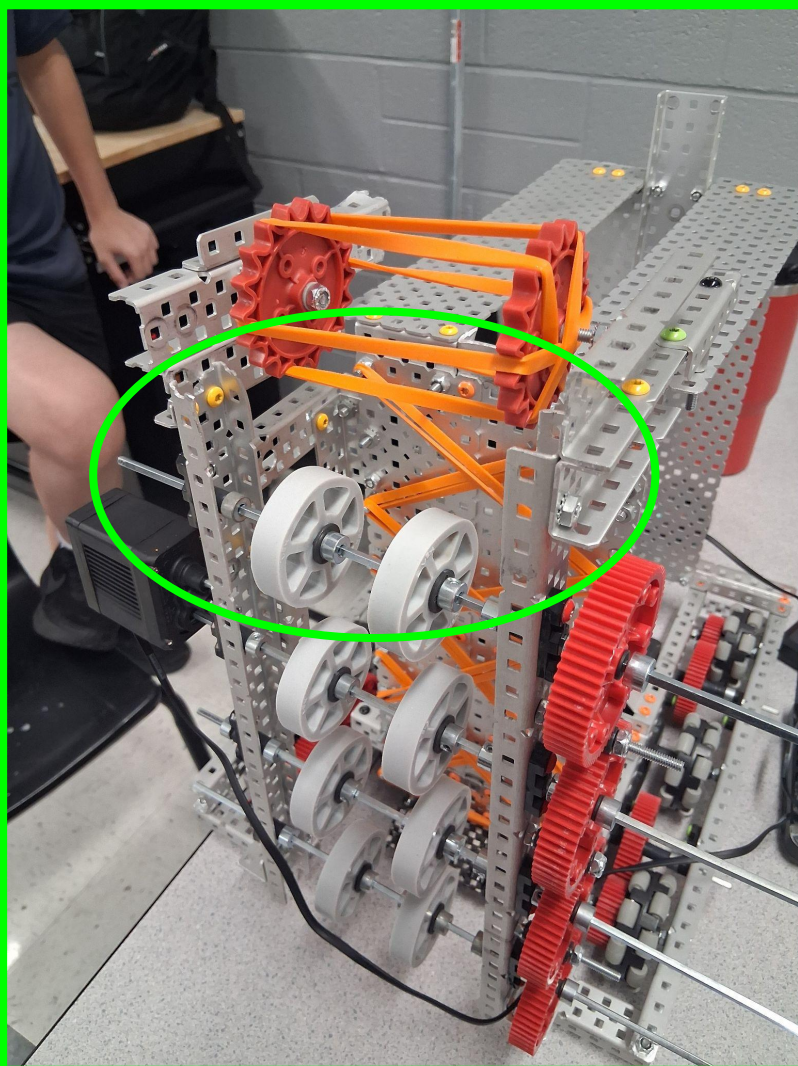
The purpose of the back wall is to prevent blocks from spilling out of the collection area and to add support to the intake



The rubberband barrel is there to help change the direction of the blocks on to the top. While testing the 1st design we found out that due to the barrel not being powered it caused the blocks to fall out the front rather than going on top. To fix this issue we are connecting the barrel to the top spinner by adding a sprocket to the top spinner and connecting the two with chain. After a quick test we came to the conclusion that we will need to have an extra set of sprockets on both sides so that one will have the chain and one will have rubber bands.

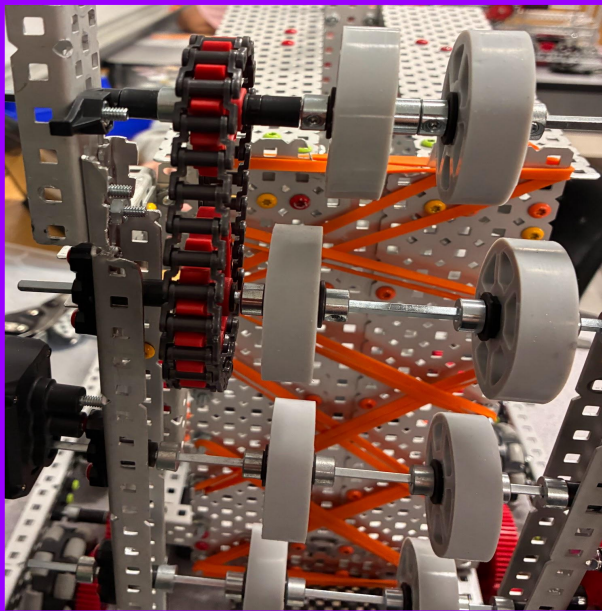
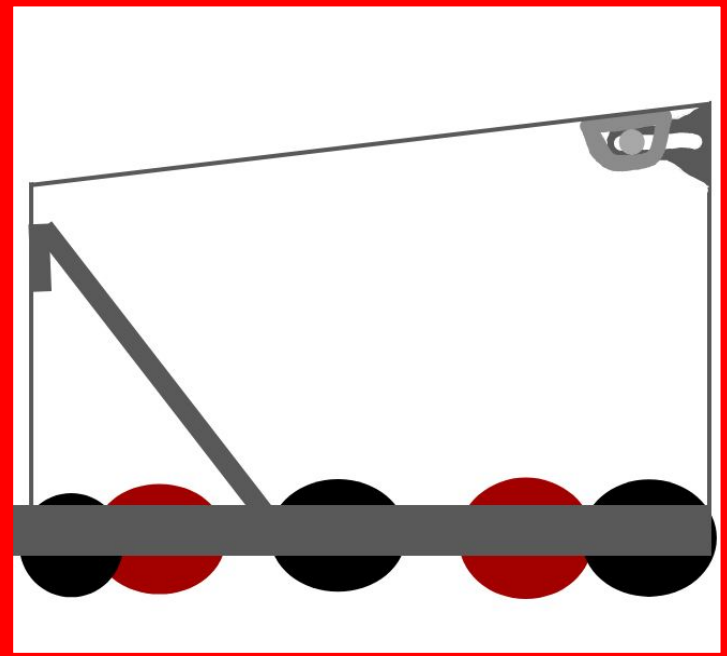


Building the out take



We found out with the 2nd attempt that no matter what the block gets pushed into the wall so we decided to move it up and add another spinner to the top so that the blocks don't lose momentum.

After some testing the new spinner we discovered that maybe instead of there being too much grip to get on to the out take. To fix this issue we are going to lower the front of the out take so that the blocks will glide in better rather than being pushed in.



After some testing with the adjusted ramp we decided to help the block change direction even more we can move the top spinner back by one and connect it to the one below it with chain. This new design works almost perfectly with a little bit of issue controlling direction left and right. But that will be fixed once we add the spinner walls.

Building the Out take

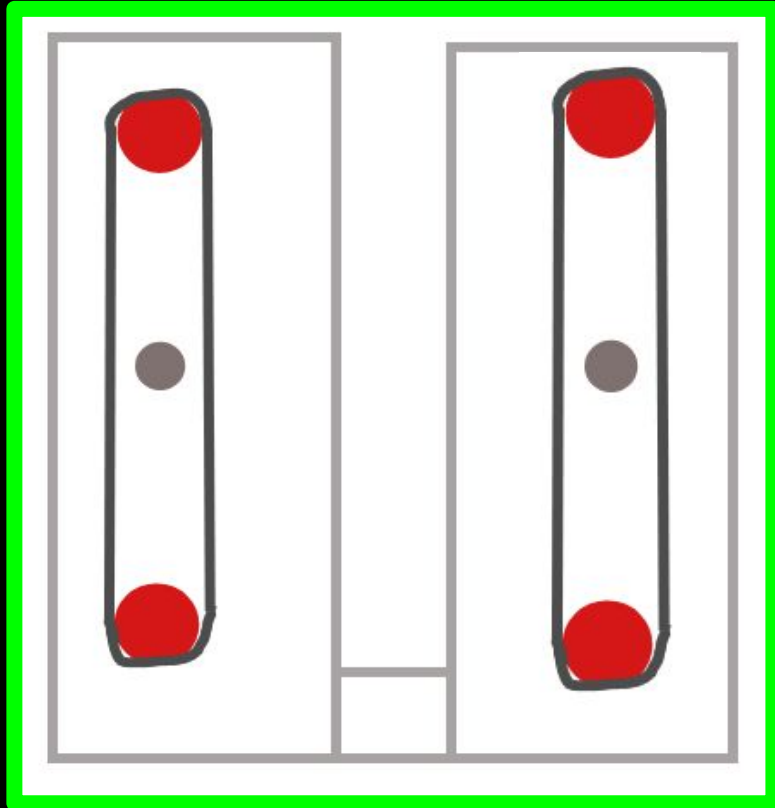
Zach Snider

10/23-10/27

#14

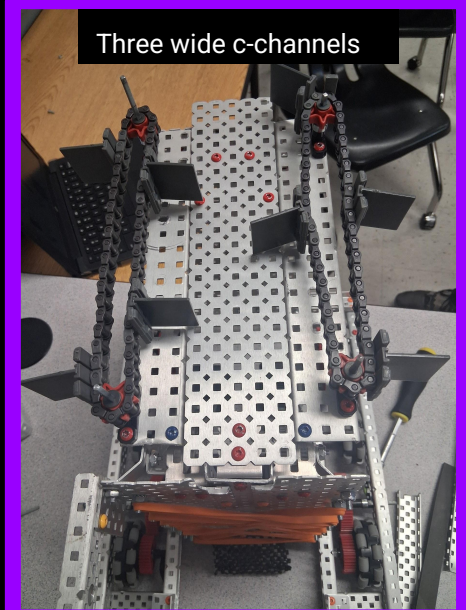
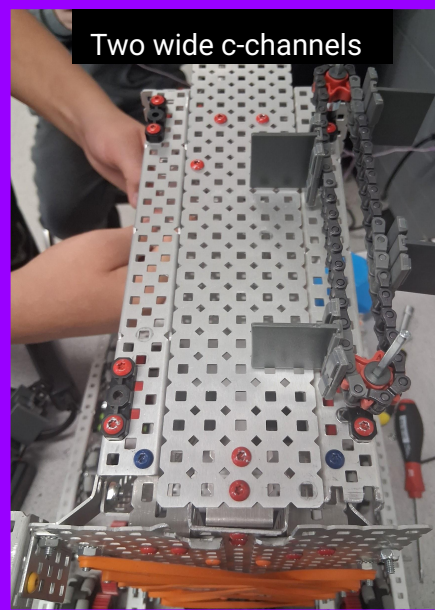
Building the Top Conveyor

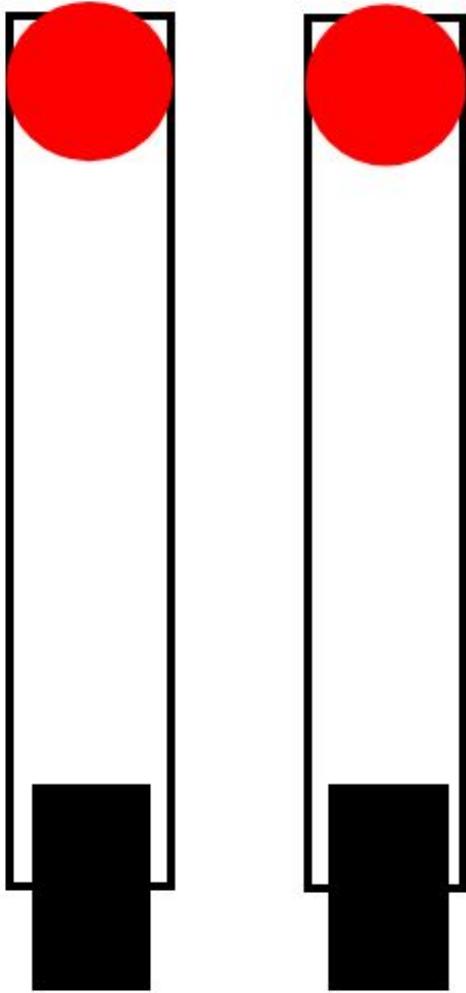
For the Top conveyor it will be two conveyors on their sides will be placed next to each other and connected via gears so we only have to use one motor.



After testing with the two wide c-channels on each side we discovered that the spinners were now to close causing the blocks to get stuck. To fix this we will replace them with three wide c-channels.

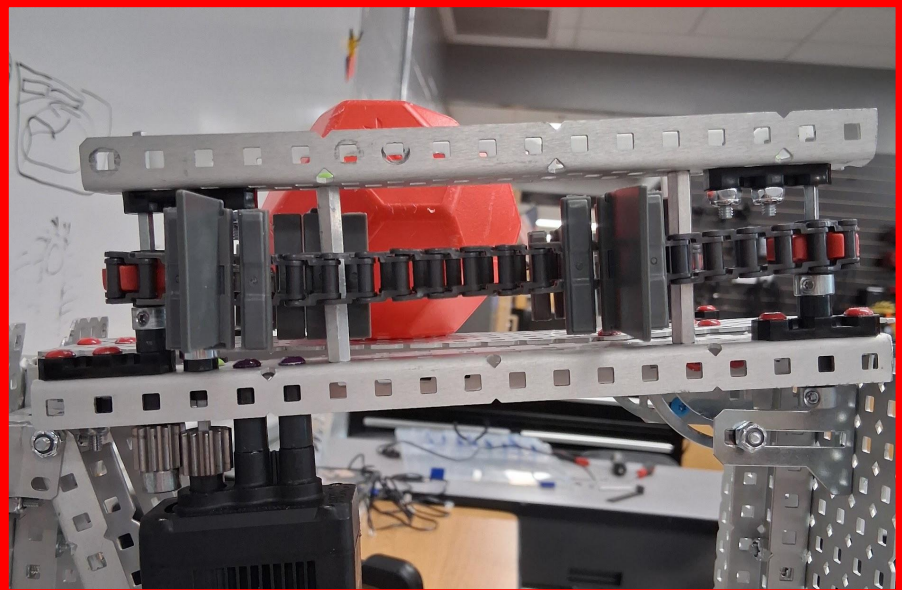
After building one side we noticed that there is a lot of bowing on the platforms. To fix it we are going to remove the entire out take and rebuild it with better supports by adding a platform in the center and adding a c-channel on the left and right side.



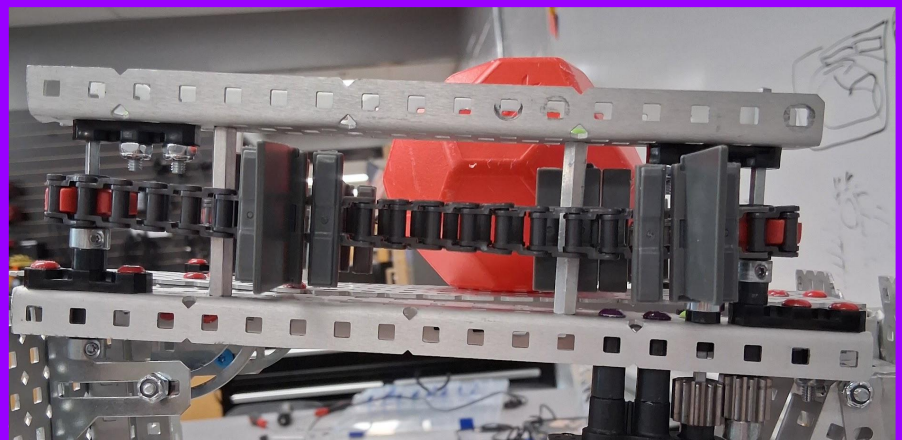


This is the design we are going to use to power both conveyors. It will work by rotating axle that is directly connected to the sprocket and chain.

We have built one side and it is way smoother because we added a c-channel going across the top to add support on the axles.



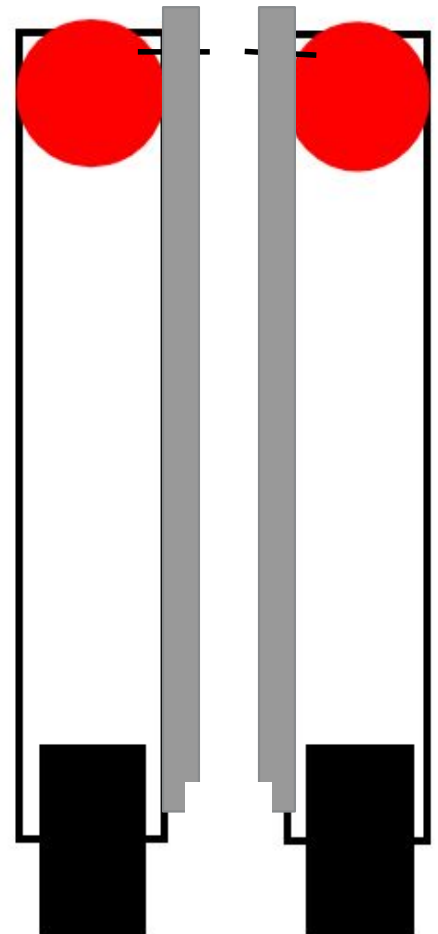
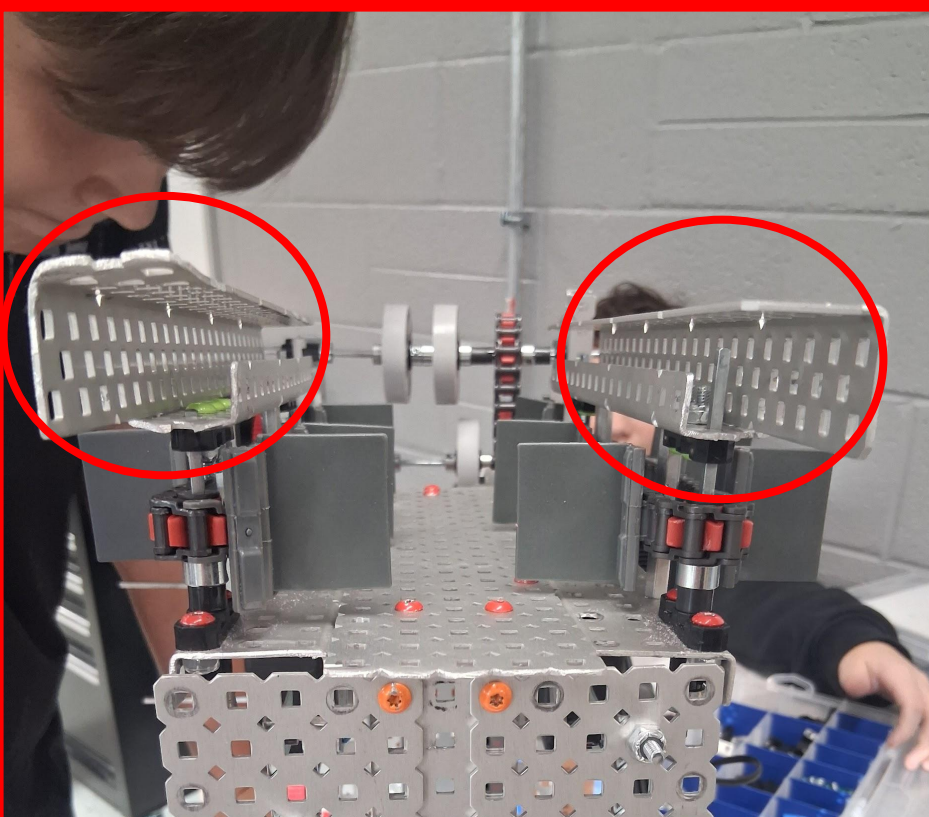
We have added the other side and now it is running smoothly. It does however send the blocks in different directions. To fix it we are going to build a box/hood.

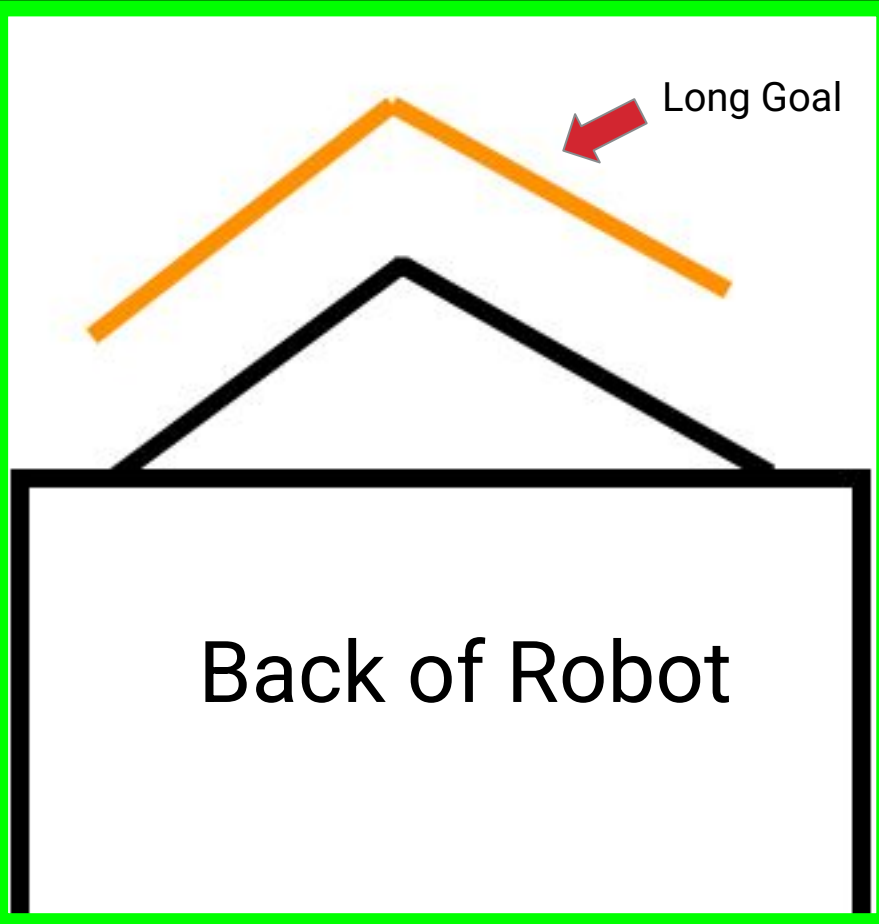


Building the Hood

For our first attempt at building a hood we are going to try to screws on the inner side of each conveyor which will center the blocks.

After some thought we determined that the screws alone would not be enough to guide the blocks. To solve this issue we added a 90° beam to guide that balls and to keep them from popping up when they come out of the intake.

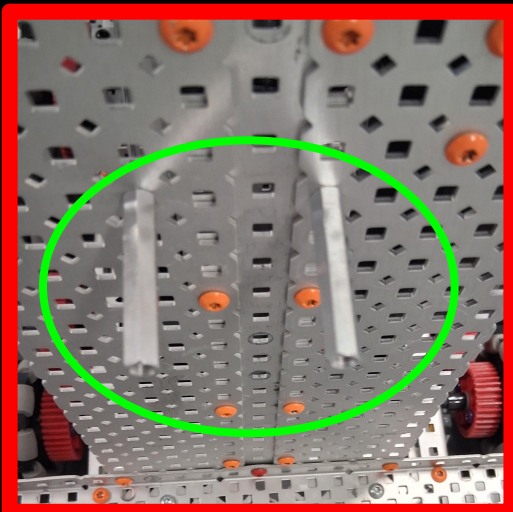
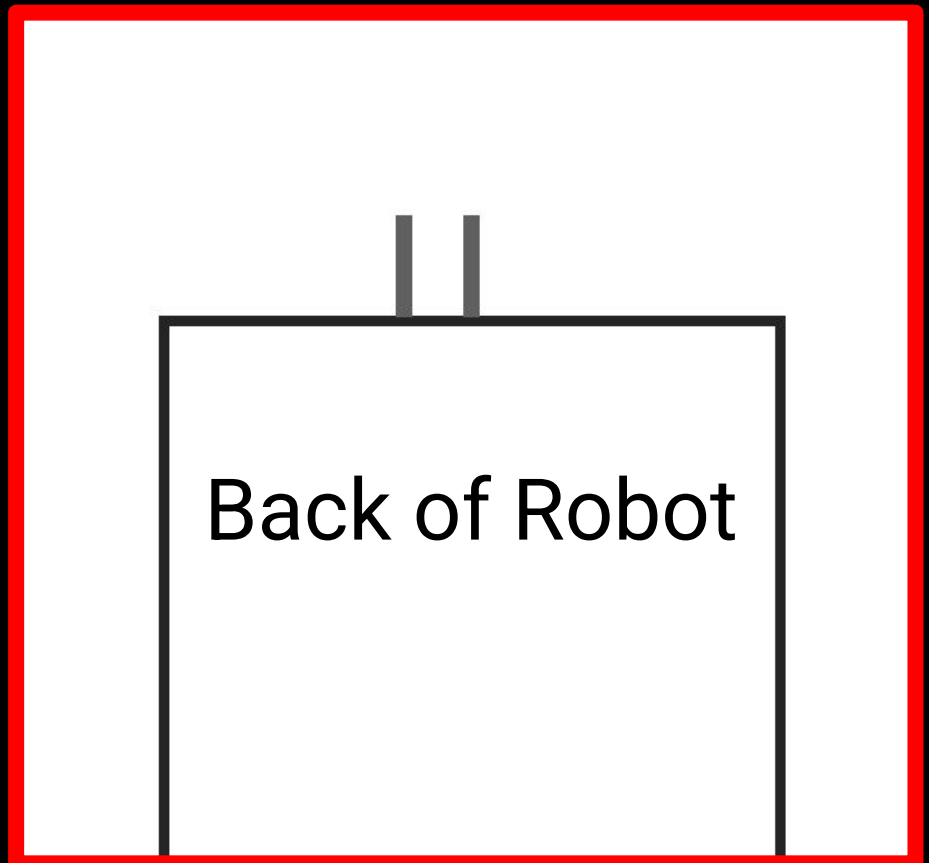




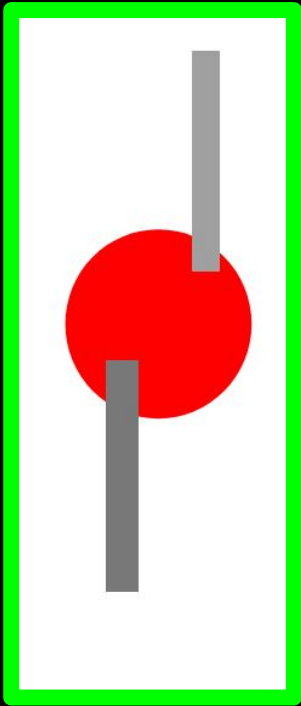
This is the first design for the score assist. It works by backing into the long goal to score and it will align our outtake with the center of the goal causing the blocks to flow smoothly into the long goal.



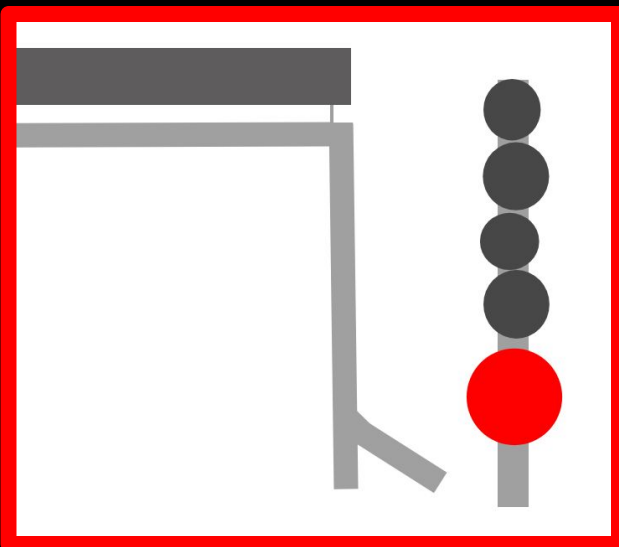
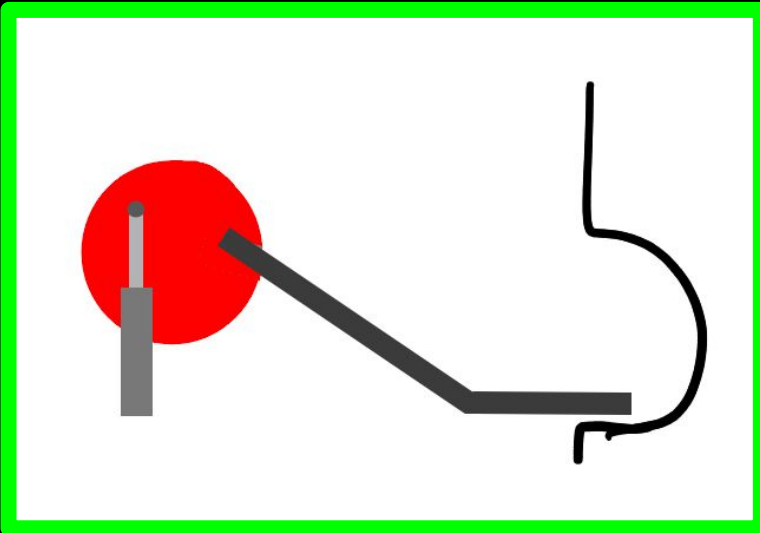
This design is intended for the upper middle goals. It is used to line up the outtake with the upper middle goal. As well as descoring the upper middle goal



Designing the Tongue Mech



The Tongue mech is a piston connected to a 32 tooth gear with a 4 inch c-channel connected to the other half via axel that. When the piston extends it will spin the gear and lower the c-channel down to the floor. Then we will drive into the tower and it will slip under the lowest block causing them to roll into the front intake. After testing this design it did not work and was to inefficient.



Our second design was to replace the bottom flex wheel spinner to a rubber band spinner so that we can reach directly into the towers without using up a motor or air. After testing it ended up not working but it did however increase efficiency while picking up blocks.

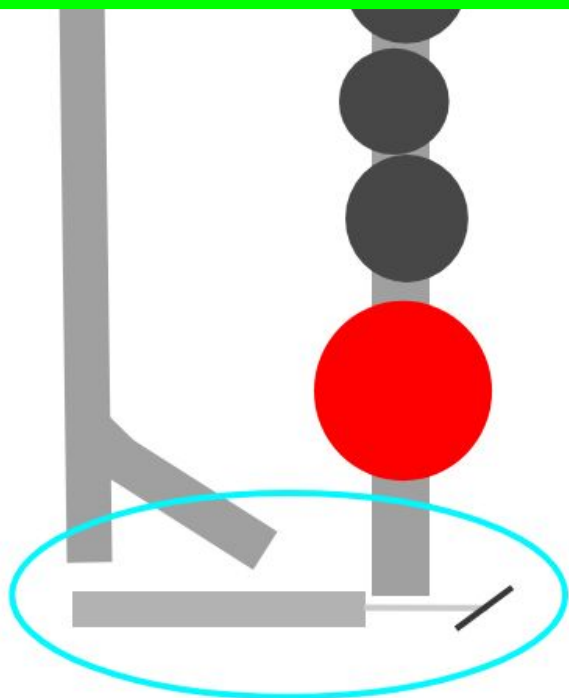
Designing the Tongue Mech

Zach Snider

11/11-11/12

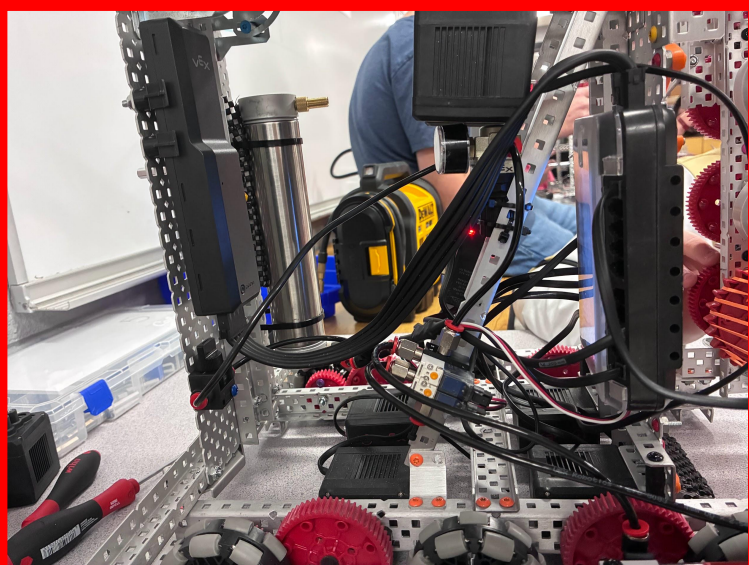
#19

Designing and Building the Tongue MechAnd Pneumatics



Our third design is an actuator with a 30° 1x2 piece of polycarbonate that will push out into the towers causing the blocks to roll into the front intake then once there done it pull back into the intake.

We added pneumatics to power all of the tongue mech designs



Building and Testing the Tongue Mechs

	Clear Speed	Clear Accuracy	Block Pick Up Ability	Total
Fold Out	8 /10	5/10	6/10	19/30
Rubber Band Wheel	0/10	0/10	7/10	7/30
Straight	4/10	3/10	6/10	13/30

The Idea for the fold design was an actuator that caused a c-channel to fold out and make the blocks spill out into the intake. This design did work the best with a slight issue when the blocks spill out because they spill out to the side rather than into the intake.

The Idea for the rubber band wheel is for the wheel to reach into the towers and suck up the blocks into the front intake. It didn't work because it was too small to reach into the tower, the flex wheel spinners above it would run into the tower, and we couldn't move it due to size. Therefore it couldn't empty the tower.

The Idea for the straight design was a single actuator that would extend directly into the tower. However it was too hard to line up. After adjusting the location of it it still didn't work because the blocks kept sliding off to the sides and it being too flimsy..

Glving the Tongue Mechs A Second Chance

The Fold out mech is being improved by adding the same design on to the opposite side of the first one. We are doing this because when there was just one side it would cause the blocks to roll off to the side. With two know it will funnel the blocks into the center.

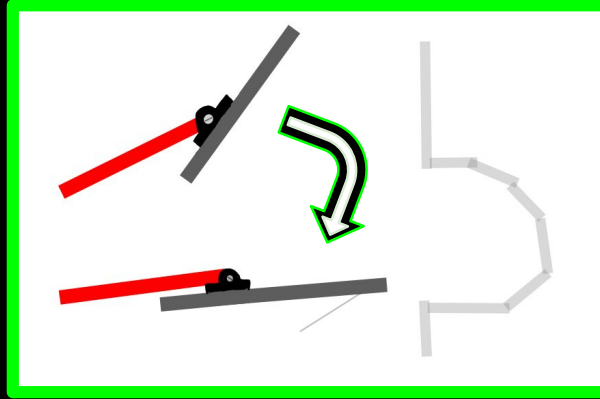
The rubber band wheel is being improved by making the sprockets smaller and lowering them and moving them forward so that it can reach into the tower better. If it doesn't work it will still increase our intake efficiency.

The straight mech is being improved by copying it to the other side like the fold out mech. But it will be harder still to get the blocks to roll out of the tower faster.

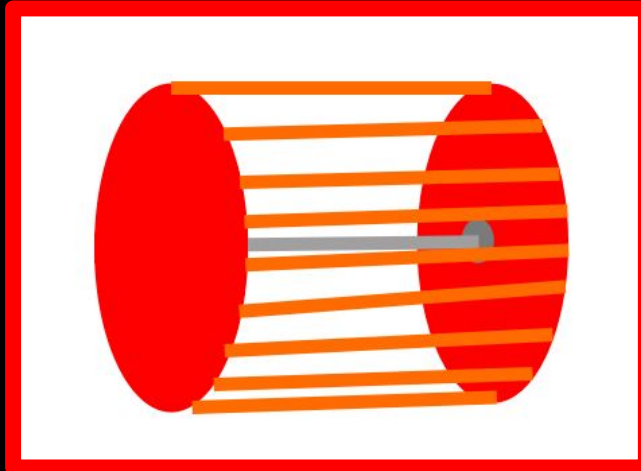
	Clear Speed	Clear Accuracy	Block Pick Up Ability	Total
Fold Out	8/10	5/10	6/10	19/30
Rubber Band Wheel	0/10	0/10	8/10	8/30
Straight	4/10	5/10	7/10	16/30

Building The Updated Tower mechs

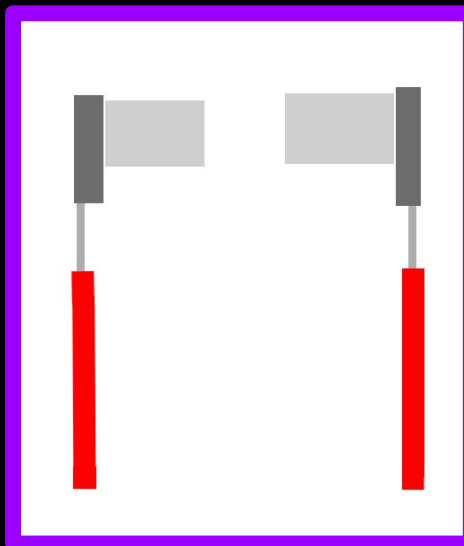
On the fold out mech we are going to add the same mech on the opposite side of the first one so that the blocks don't roll out to the side. They will be connected via a sheet of poly-carb that is bent inwards that will cause the blocks to roll out into the intake.



On the Rubber band wheel we are making it smaller and moving it forward to reach into the towers and pull the blocks out and into the intake.



On the straight mech we are going to copy it to the other side and angle the polycarb inwards so that the blocks funnel towards the center of the intake after they leave the tower. They will be connected to a piece of polly carb angled at a 30°.

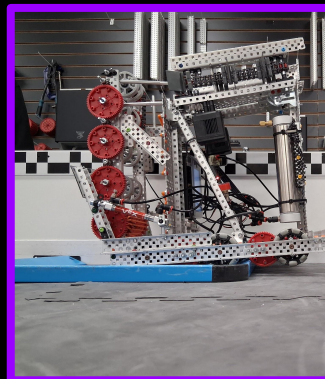
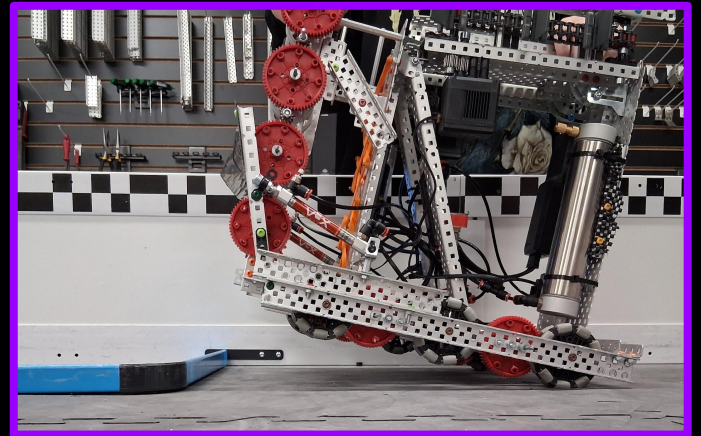
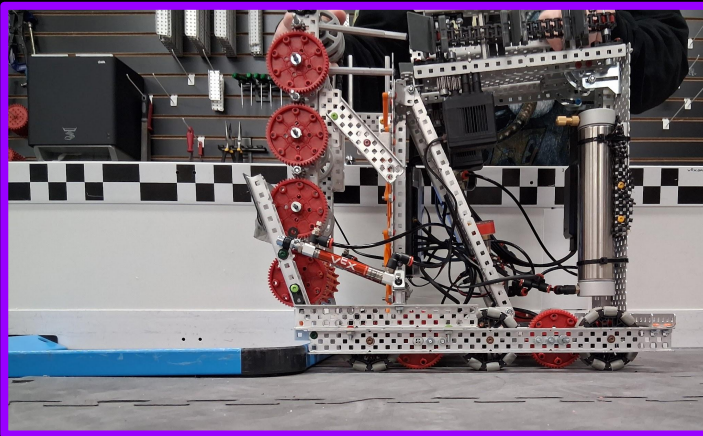
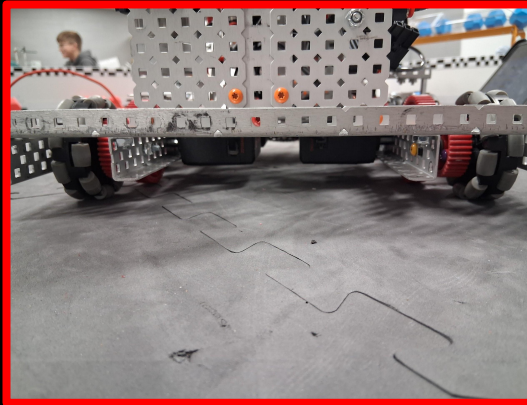


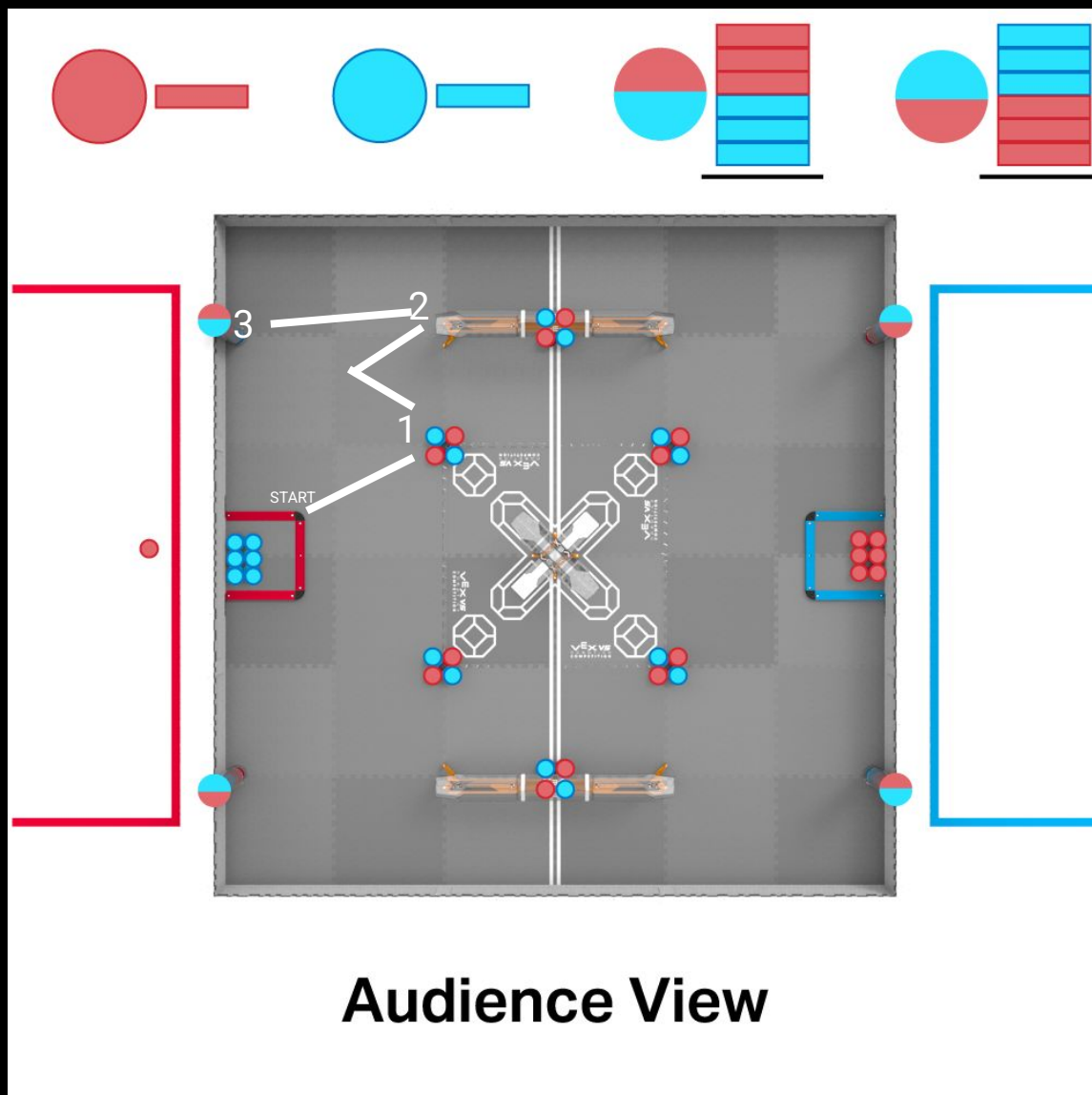
Building a Way to Park

We decided that we are going to pare up with team C at finals at all of our comps. We decided this because we think that we will have better scores because we practice together unlike other teams. Doing this will benefit us both also because our robots can park with extreme speed and accuracy.

Our first method to park is to remove the c-channel supports from under the backside of each pontoon and replace them with standoffs so that we can run into the parking zone. Doing this will lift the back of the robot and let us drive in to the parking zone

Our second method to park is to drive up to parking zone then back and drive forward in quick succession. Doing this will cause the front of our robot to lift due to the center of mass being closer to the back.





STEP ONE

Go to the group of four blocks and get two

STEP TWO

Go score the 2 + preload blocks in the nearest long goal.

STEP THREE

Get more blocks from the tower in front of us.

```

when Controller1.button pressed
  set drive velocity to 25 %
  set turn velocity to 50 %
  spin fronttake forward
  drive forward for 382 mm
  wait 0.5 seconds
  turn left for 12 degrees
  spin topintake reverse for 1.5 turns
  stop fronttake
  drive forward for 140 mm
  spin fronttake forward for 2 turns
  turn right for 25 degrees
  drive forward for 48 mm
  spin fronttake forward for 2 turns
  
```

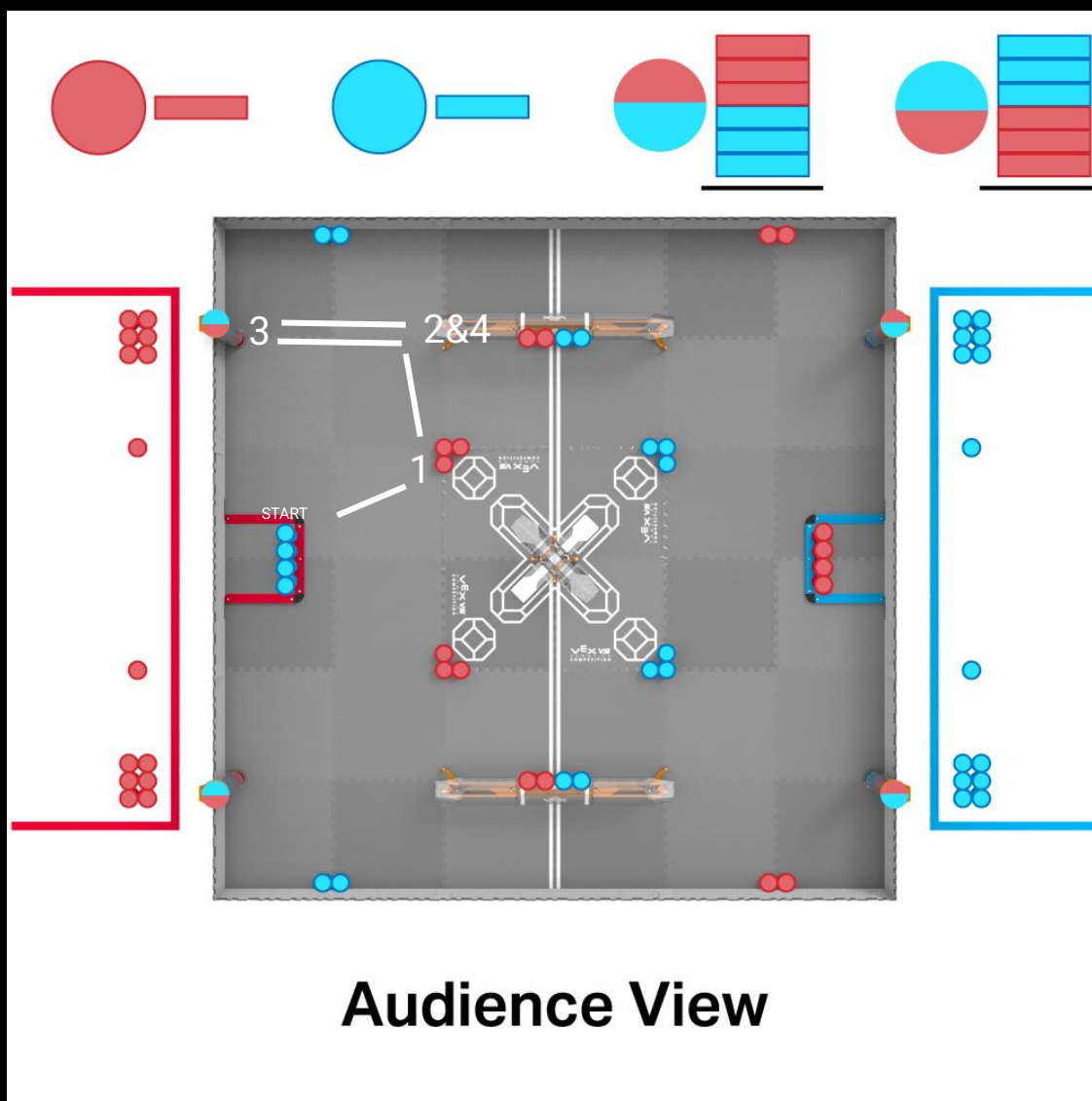
```

turn right for 70 degrees
drive reverse for 400 mm
turn right for 50 degrees
turn right for 40 degrees
drive reverse for 200 mm
turn right for 40 degrees
drive reverse for 175 mm
spin topintake reverse for 3 turns
spin fronttake forward for 2 turns
spin topintake reverse for 20 turns
  
```

```

set DigitalOut1 high
set drive velocity to 50 %
drive forward for 450 mm
turn left for 30 degrees
drive forward for 175 mm
spin fronttake forward
spin topintake reverse
wait 4 seconds
stop topintake
stop fronttake
  
```


Match Code (steps 1-3)



STEP ONE

We will go to pick up 2 blocks

STEP TWO

Go score the two blocks + preload in the nearest long goal

STEP THREE

Go get three blocks from the tower

```

when started
  set drive velocity to 40 %
  set turn velocity to 50 %
  set TopIntake velocity to 100 %
  set front velocity to 100 %
  spin front forward
  drive forward for 23 inches
  turn left for 30 degrees
  stop front
  drive forward for 3 inches
  spin front forward for 4 turns
  turn right for 45 degrees
  stop front
  drive forward for 3 inches
  spin TopIntake reverse for 2 turns
  spin TopIntake reverse for 1 turns
  spin front forward
  drive forward for 15 inches
  spin TopIntake reverse for 40 degrees
  
```

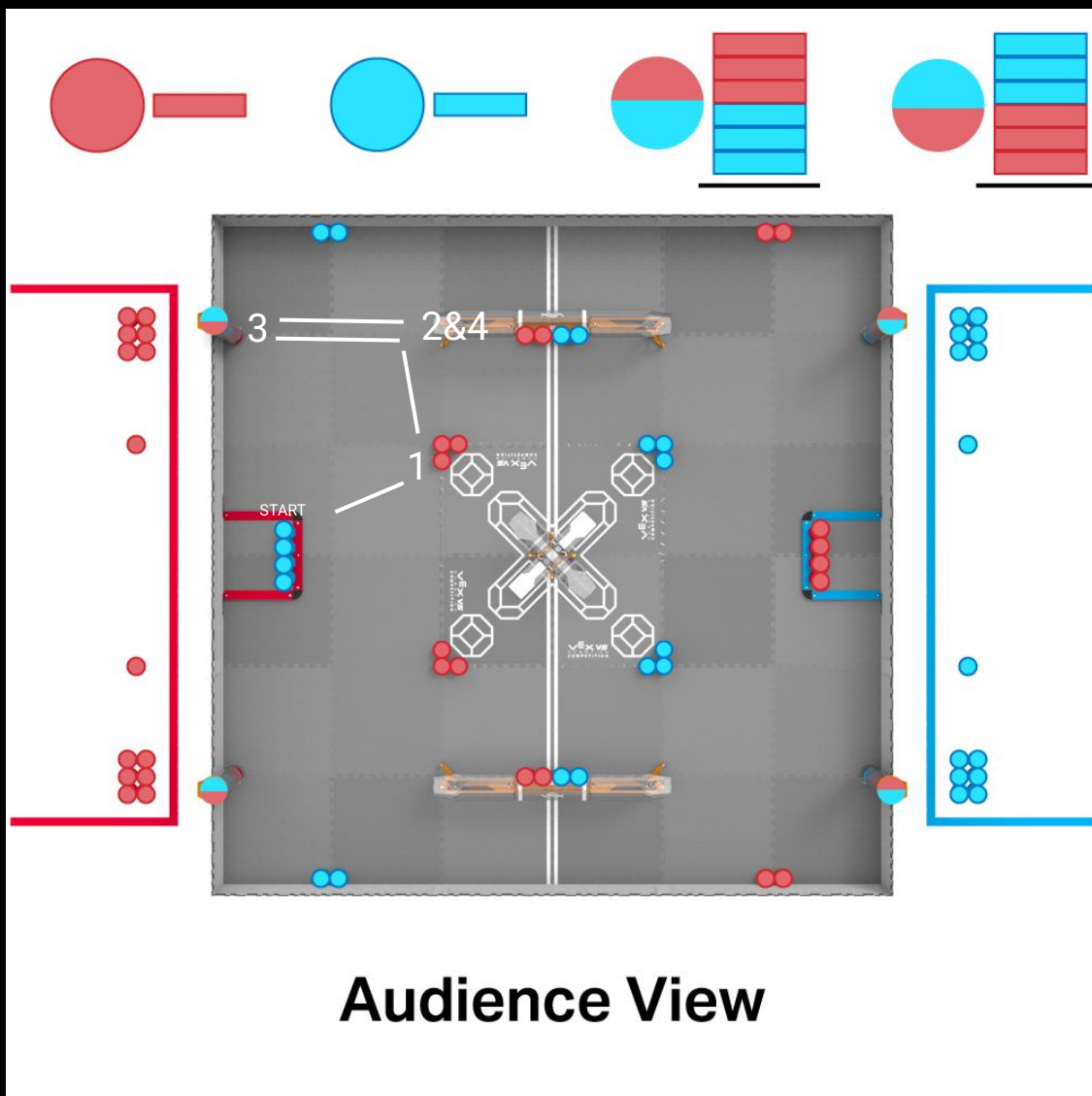
```

wait 1.5 seconds
stop front
drive reverse for 15 inches
drive reverse for 150 mm
turn right for 140 degrees
drive reverse for 1200 mm
turn right for 140 degrees
drive reverse for 200 mm
spin front forward
spin TopIntake reverse
wait 3 seconds
stop TopIntake
  
```

```

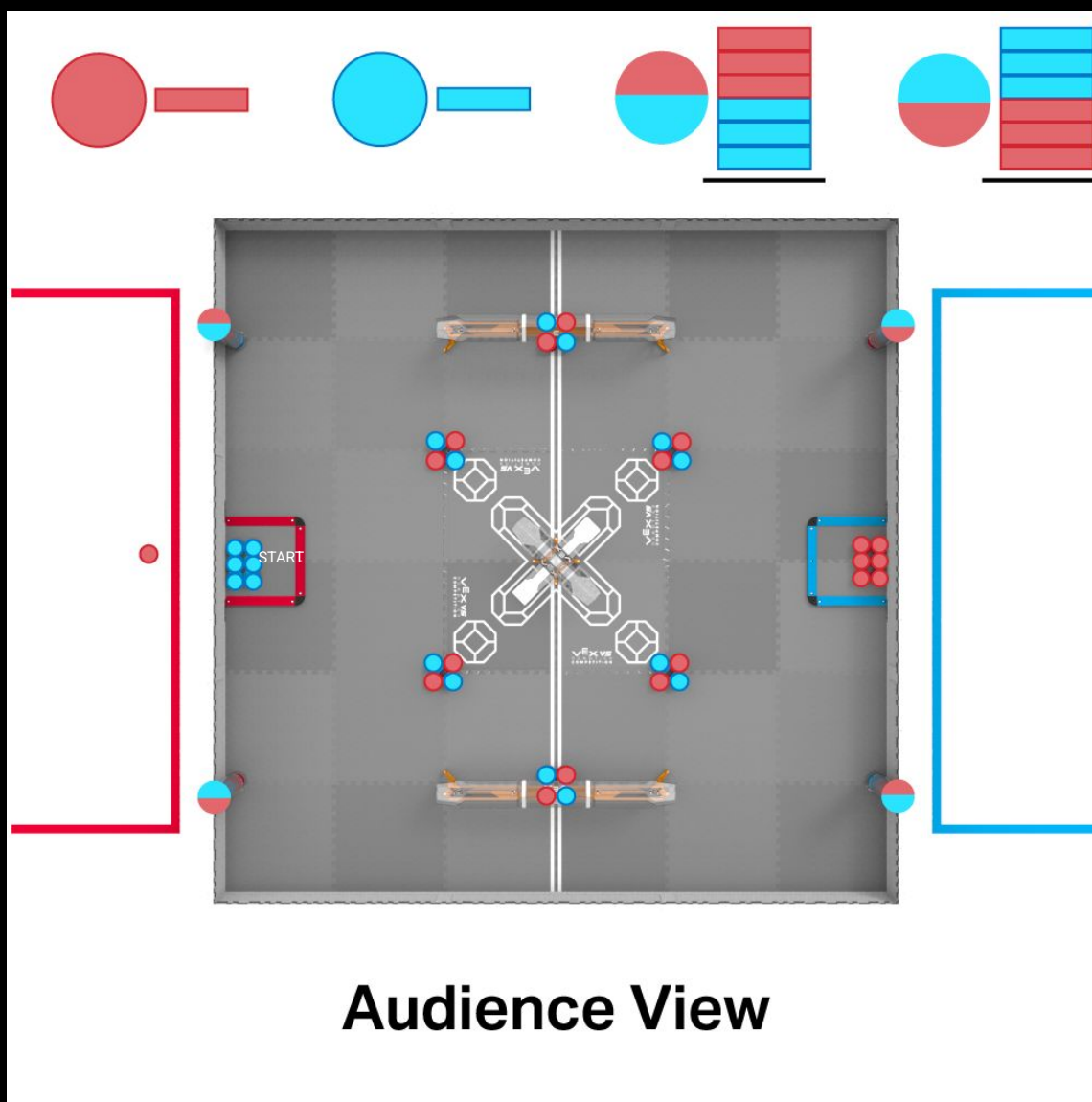
stop TopIntake
set drive velocity to 75 %
set DigitalOutH high
drive forward for 1200 mm
turn right for 15 degrees
wait 0.5 seconds
drive reverse for 50 mm
drive forward for 50 mm
wait 0.5 seconds
turn right for 15 degrees
drive reverse for 50 mm
drive forward for 50 mm
wait 0.5 seconds
drive reverse for 900 mm
  
```


Match Code (Step 4)



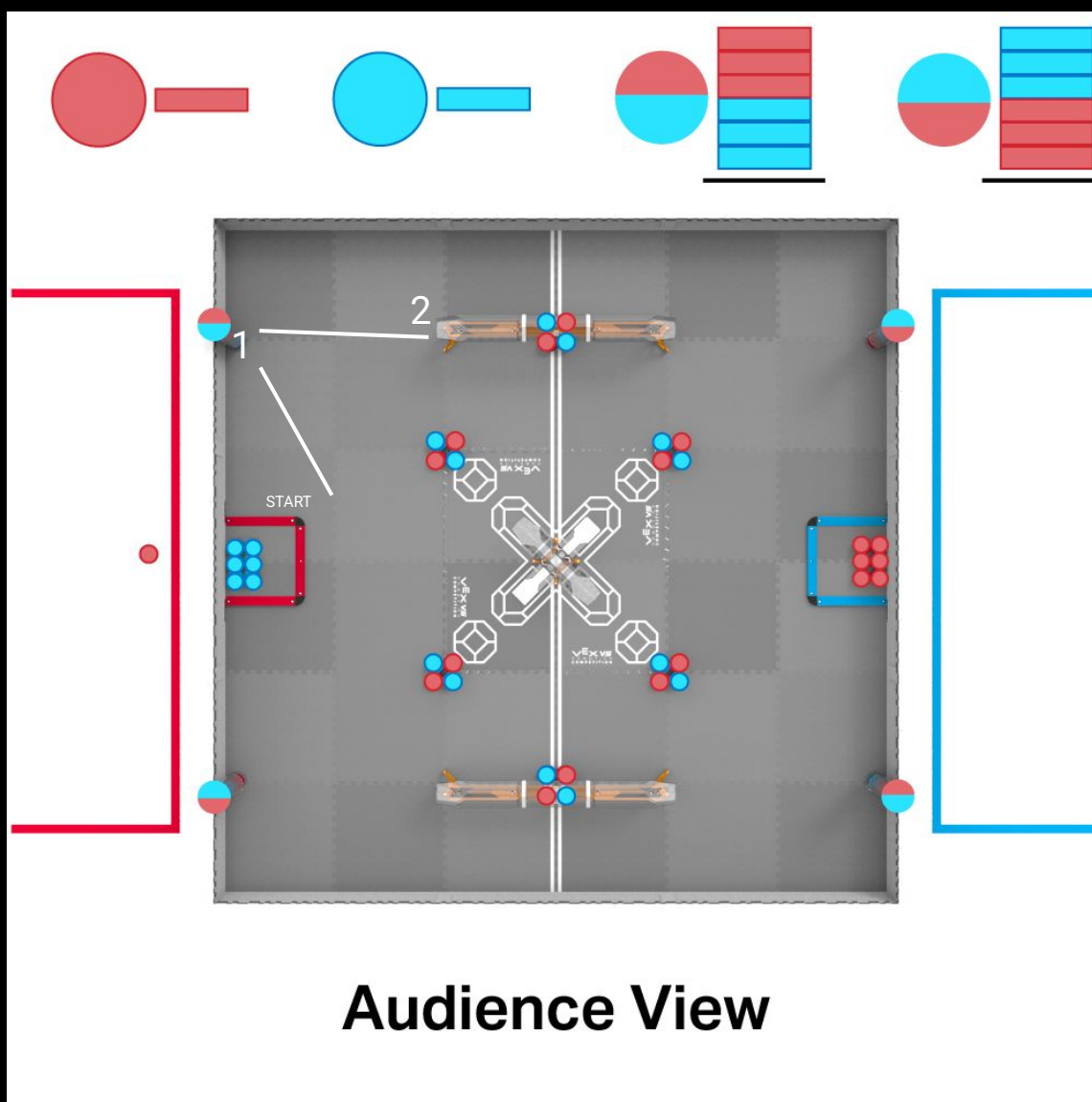
STEP FOUR

Go to the nearest long goal and score the blocks we got from the tower



The purpose of the update is to score more points in a faster and simpler way. To do this we are starting in the parking zone and running the intake for 1 second then saying stop so we can get a faster stop time

Doing this will allow us to score 15 points in 1 second



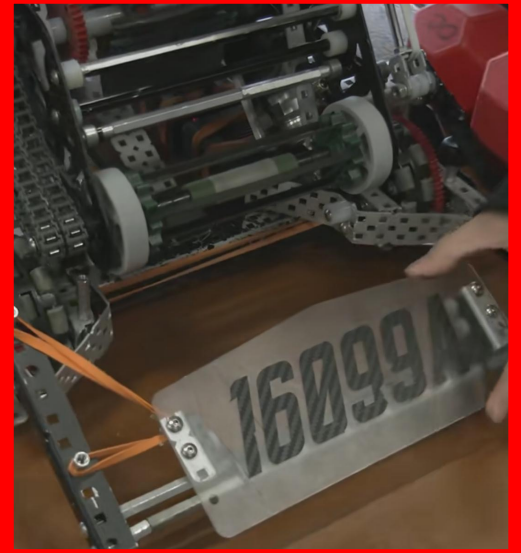
The purpose of the update is to score more points in a faster and simpler way. To do this we are going straight to the tower take out 3 blocks then going to the long goal and score them

Doing this will allow us to score 12 points

Rebuilding Tongue Mech

We are rebuilding the tongue mech because after we drove and coded it started to have issues that made us have to back up slightly and then move forward to get the blocks to dump.

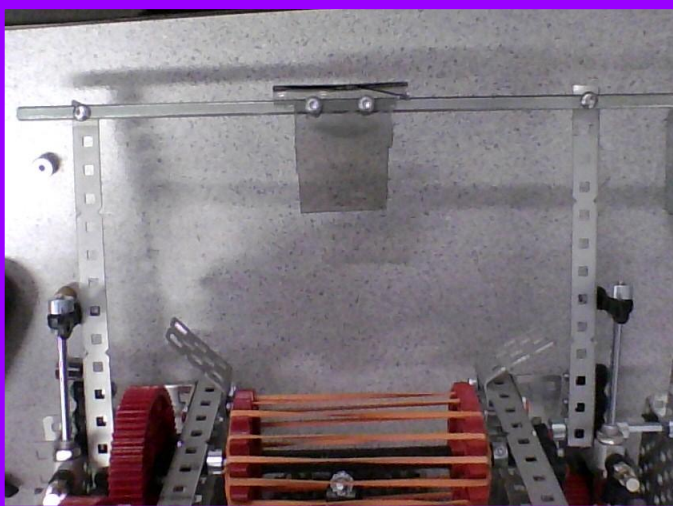
The design first we are using for the tongue mech is from team 16099A. This design uses a method of attachment that allows the polycarb to adjust its angle on its own.



Our second design is a reinforced axle that goes across the tongue supports. There is also a piece of poly carb that is bent at a 90°.

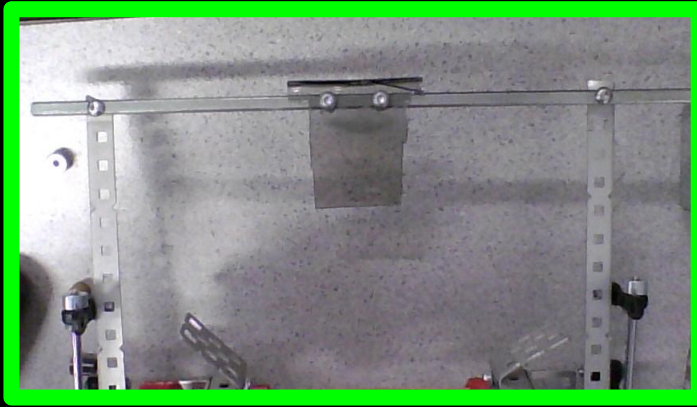
The main issue with this design is that it extends over size by an inch.

The main issue with this design is the rubber bands (when the tongue mech is up) will rub on the front intake gears.



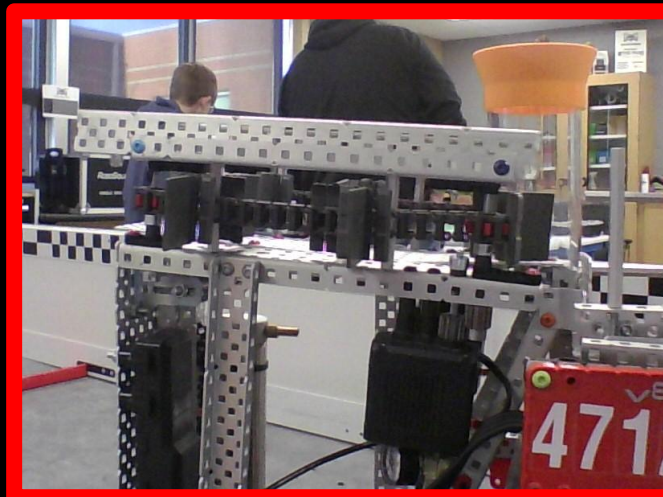
Making the Final Tweaks

The first tweak we made was to the tongue mech.



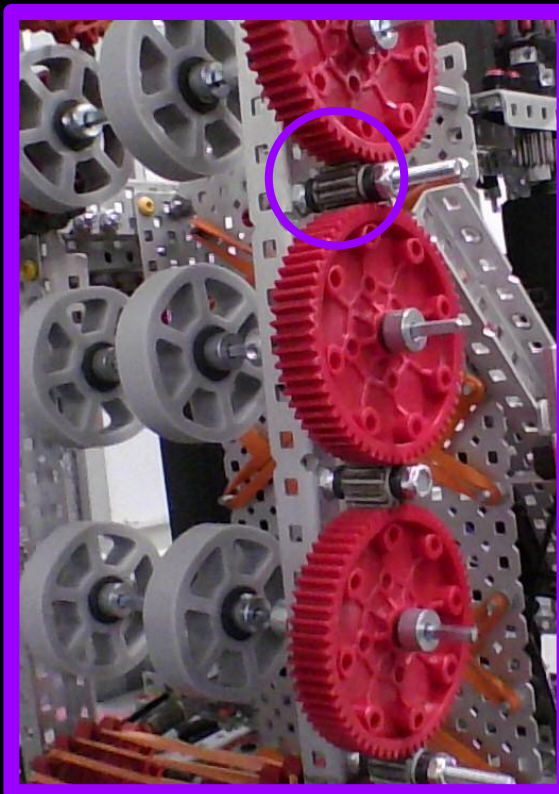
We are moving the reinforced axle back an inch to be in size.

The second tweak we are making is to the out take .



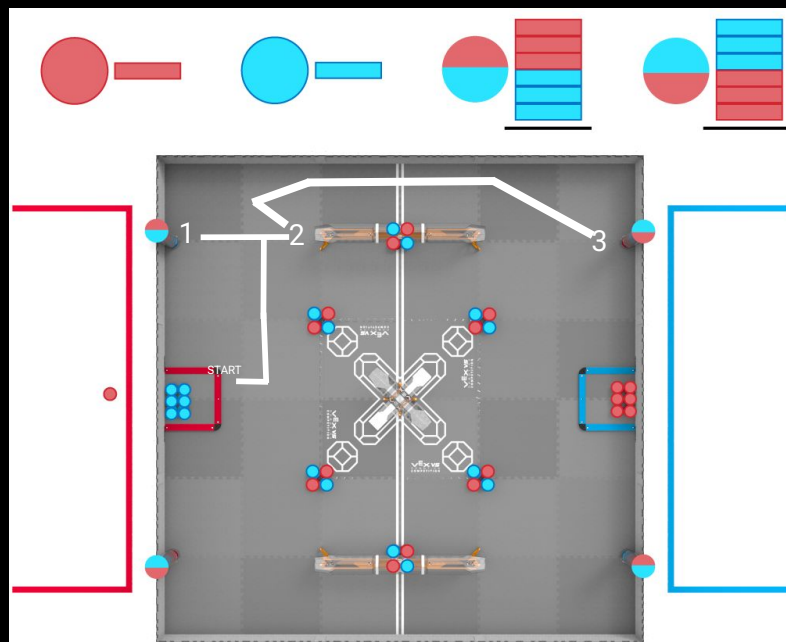
We are getting rid of the angle so the blocks have a more direct path onto the long goals

The third tweak we are making is to the front intake.



We are getting rid of the 16 tooth gear that is circled. The purpose of this tweak is to separate the top and bottom of the front intake so we can have them spin at different speeds because the blocks sometimes got jammed

Restarting Code Skills (steps 1-3)



Audience View

The reason for the restart was to take into account for the tweaks and changes we made since last time worked on code skills.

STEP ONE

Go to the tower and empty it.

STEP TWO

Go score the 6 + preload blocks in the nearest long goal.

STEP THREE

Go to the tower across from the one we emptied and unload it.

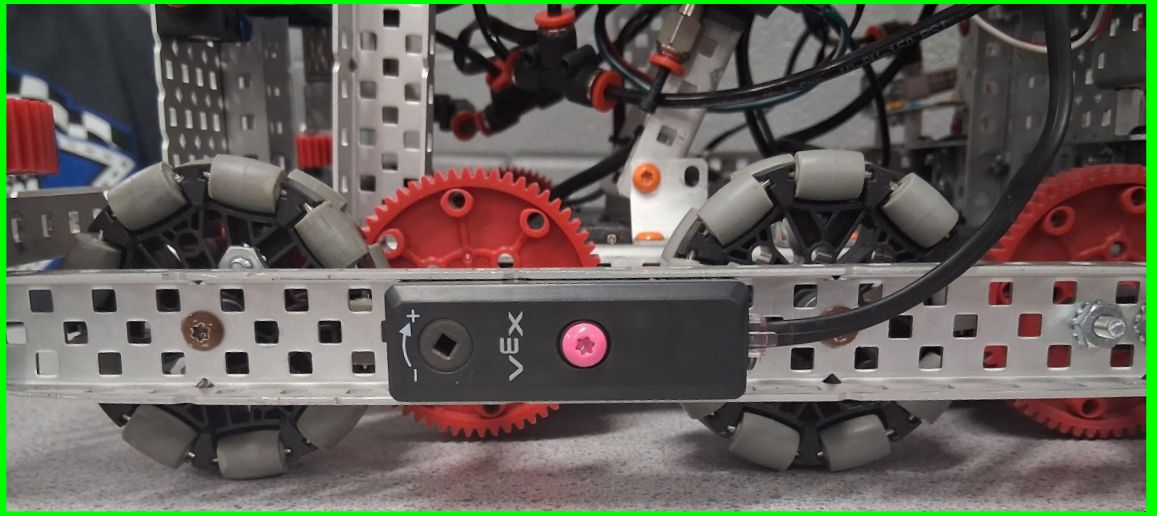
```
when Controller1 button Y pressed
  set TopIntake velocity to 100 %
  set b_frontintake velocity to 100 %
  set T_frontintake velocity to 100 %
  set drive velocity to 50 %
  set turn velocity to 50 %
  drive forward for 200 mm
  turn left for 145 degrees
  drive forward for 1850 mm
  turn left for 140 degrees
  set drive velocity to 100 %
  set DigitalOutH high
  spin b_frontintake forward
  spin T_frontintake forward
  wait 0.5 seconds
  drive forward for 850 mm
  wait 0.5 seconds
  spin TopIntake reverse for 20 degrees
  drive reverse for 50 mm
  drive forward for 80 mm
  wait 0.5 seconds
```

```
stop T_frontintake
stop b_frontintake
drive reverse for 50 mm
drive forward for 80 mm
spin b_frontintake forward
spin T_frontintake forward
wait 0.5 seconds
spin TopIntake reverse for 20 degrees
drive reverse for 50 mm
drive forward for 80 mm
wait 0.5 seconds
stop T_frontintake
stop b_frontintake
wait 0.5 seconds
spin b_frontintake forward
spin T_frontintake forward
```

```
drive reverse for 50 mm
drive forward for 80 mm
stop T_frontintake
stop b_frontintake
drive reverse for 1000 mm
turn left for 10 degrees
spin TopIntake reverse
spin b_frontintake forward
spin T_frontintake forward
```

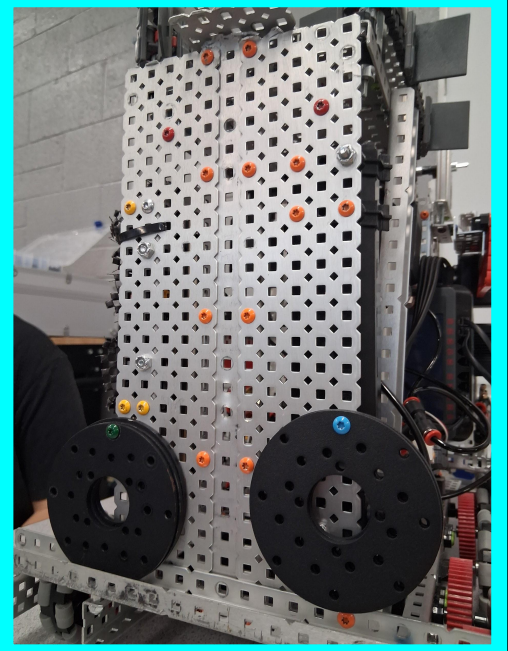

Fixing Drivetrain Drift

While practicing driving we noticed that the robot would veer to the right when we drove forward



The way we can find the difference in both sides is by adding rotation sensors to each pontoon then subtracting one side from the other

After more testing we found out that the back half of the robot would bounce off the ground.



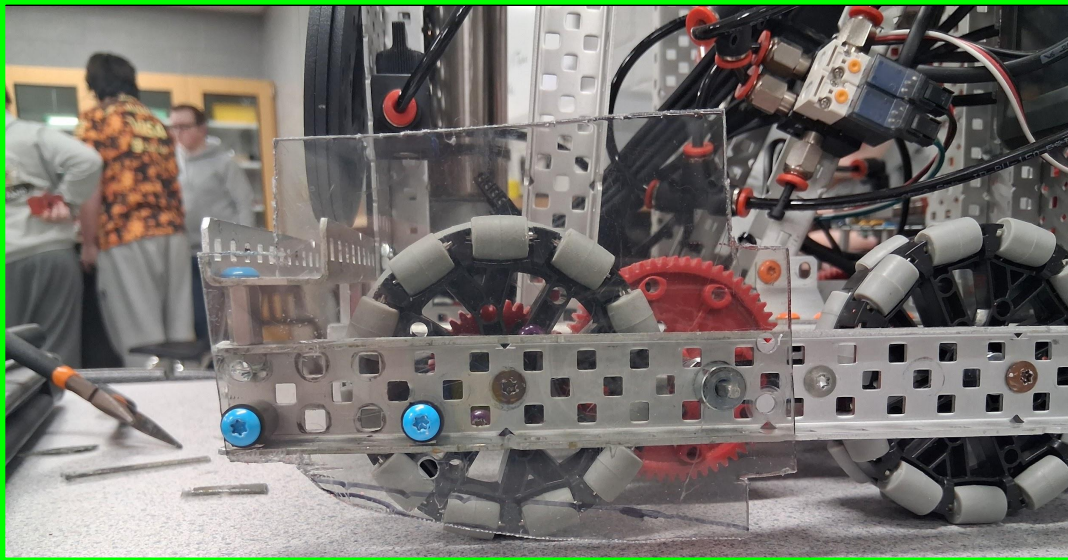
After testing we found out that the wheel rotations might not be the main contributor to the issue. But it might be the 64 tooth gears in each pontoon. They were catching on the seams between each foam tiles.

To fix this issue we will add weight to the back to add grip to the back wheels.

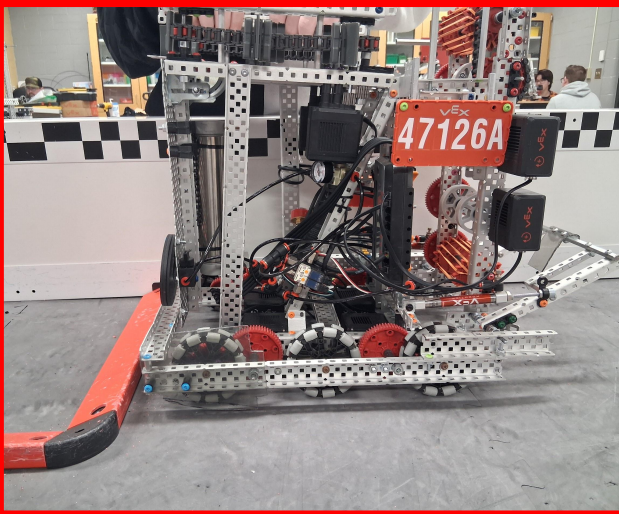
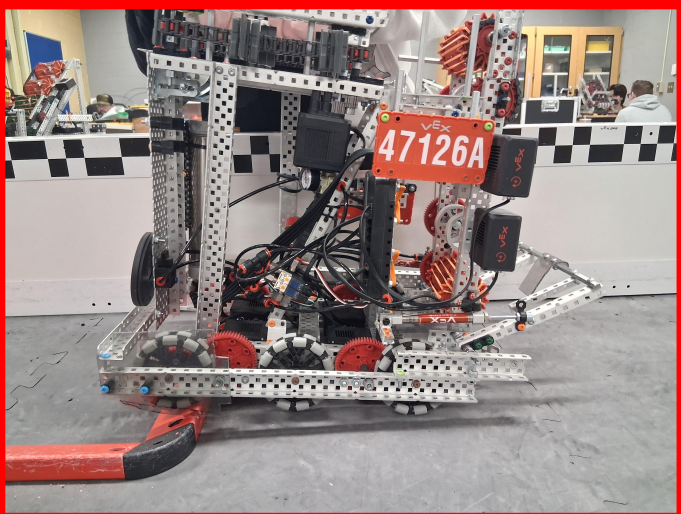
The solution to the gears getting caught on the seams of the tiles is to move up a size in wheels which will allow us to be 0.25 inch off the ground but will also give us less height.

The solution to the underpowered side is to replace the motors on that side. Doing this should allow for better power because these motor are newer.

Another contender to the issue could be that the right half of the drivetrain is underpowered. Causing the robot to drift to the left when we drive forward.



We added polycarb to the back on both sides to help us drive over the barrier.



Adding the Inertia Sensor To Fix Drift

The inertia sensor works by using a 3-axis accelerometer and a 3-axis gyroscope to measure both linear and rotational movement.



We will be utilising the sensor by adding it to the bottom of the drivetrain. Doing this will allow us to use it to help us turn in code because it works with the drivetrain when turning by sensing when the robot has turned the right amount and force stopping and if it over turns it will turn the opposite direction until it reaches the right angle.

A brief novel aspect of our teams design is our intake. Our intake is vertical in the front and horizontal on the top.

Our intake is talked about on page #9 where we designed the first rendition of it, page #10 where we started building the intake, page #11 where we built part of the intake, page #12 where we designed the top intake, page #13 where we started building the top intake, page #14 where we built part of the top intake, #15 where we started building the top conveyor, #16 where we built the rest of the top conveyor, and page #31 where we made tweaks to the front intake.

Our intake is unique from there approaches because most other designs have a collection box that the blocks fall into which causes them to score slower while our intake is one path with little room for error. The other designs most teams have is the S-intake which due to its long path has many spots that can cause jamming while our intake is short but not too short which allows us to hold 7 blocks and they will not get jammed when we score.

- Electronics case
 - Controllers
 - Batteries
 - Pliers
 - Battery chargers
 - Wrenches
 - Pencils
 - Spare smart cables
 - Spare battery cable
- Robot in case
- Chromebook
- 2 pares of safety glasse (most of us have glasses)
- Zip ties, rubber bands, small tools, extra nuts and bolts
- Extra wheels, gears, intake parts
- Kits with common nuts, bolts
- Metal for robot repairs
- license plates
- clipboard

Competition Results

Skills Code 1

Our code malfunctioned and scored 0 points

Skills Code 2

After some thinking we decided that starting parked would be best, we scored 15 points

Skills Drive 1

Normal, intake was super slow, scored 13

Skills Drive 2

Cleared all loaders except for one, scored 18

Qual. 9

31-14, we did good at scoring, alliance flipped, won auton because other team crossed half way

Qual. 16

42-56, reds auto scored 7 blocks compared to our 2, everyone was very aggressive

Qual. 23

53-27, against very fast scoring bot, alliance didn't do defence

Qual. 37

11-101, other team got disqualified for being out of size, did not go well at all

Qual. 46

46-19, we played heavy defence, first, alliance used wing very effectively

Qual. 53

46-12, heavy defence, first time auton worked

Selection Round

53-30, great defense, auton worked,

Quarter Finals

8-96, very violent, insane defence

Won the Inspiration Certificate

Rank	Team
1	7701Y
2	7368G
3	55760V
4	54225A
5	39972A
6	7368C
7	7701R
8	55760R
9	2390A
10	7368W
11	7368M
12	47126B
13	47126A
14	14819M
15	6842N
16	7701U

Competition Results

Zach Snider

01/20

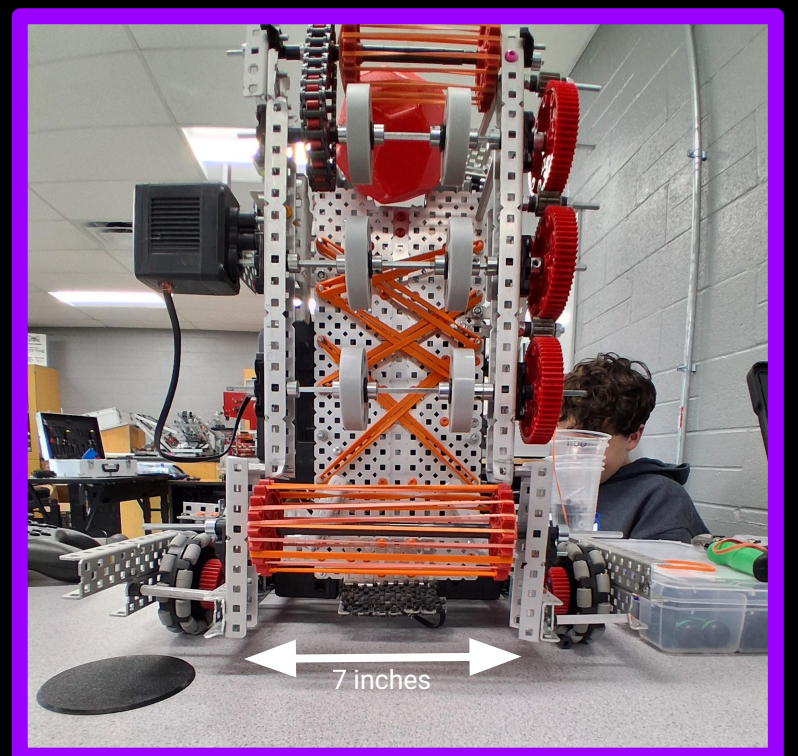
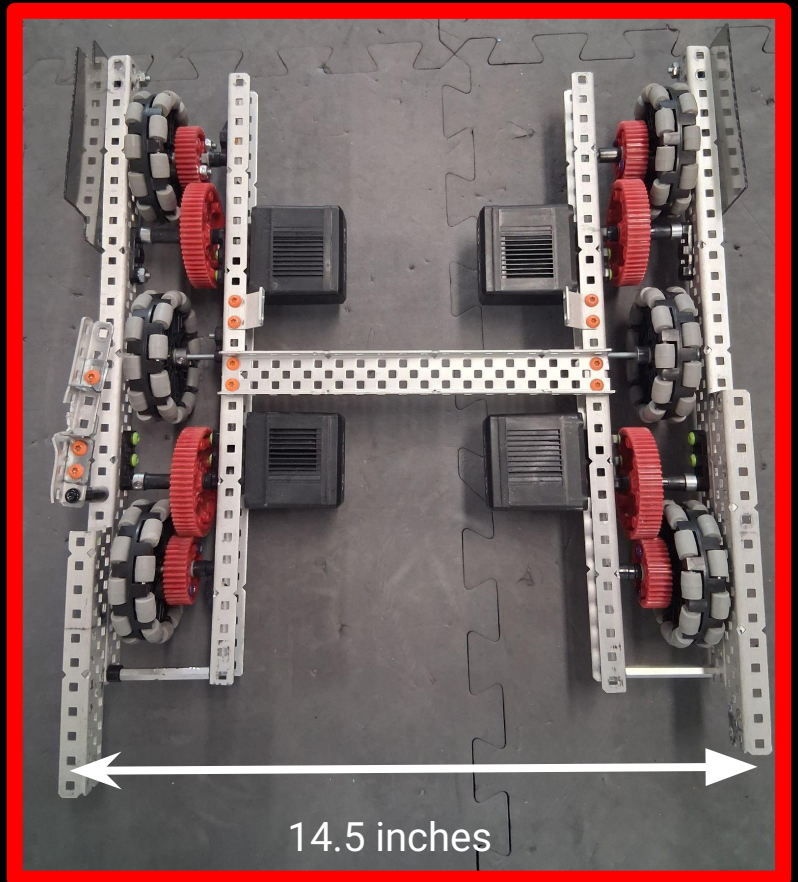
#38

Updating the Drivetrain and Front Intake

The reason for the update is because when we were at the competition there were so many teams that could pick up more than one block at a time. To do this we are going to expand the intake and drivetrain by two inches.

The original drivetrain was 12.5 inches wide while the new one is 14.5 inches

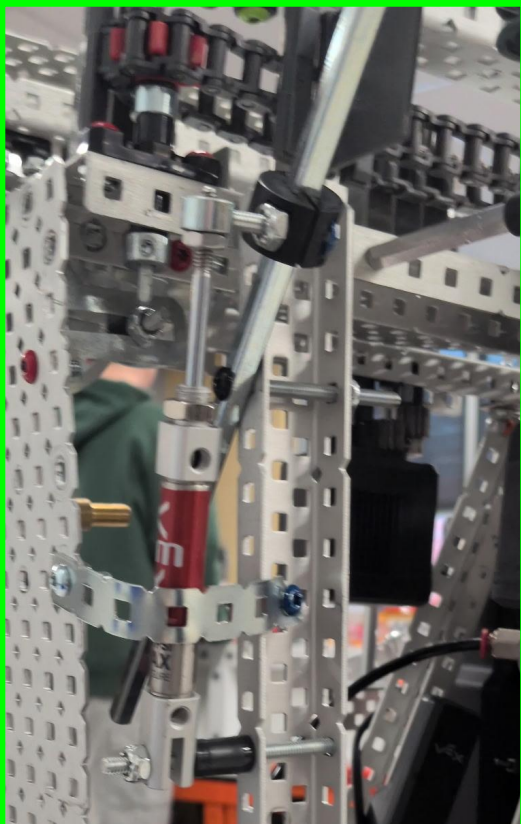
When we reattach the front intake we are going to widen the sides on the bottom 2 inches to fit into the drivetrain.



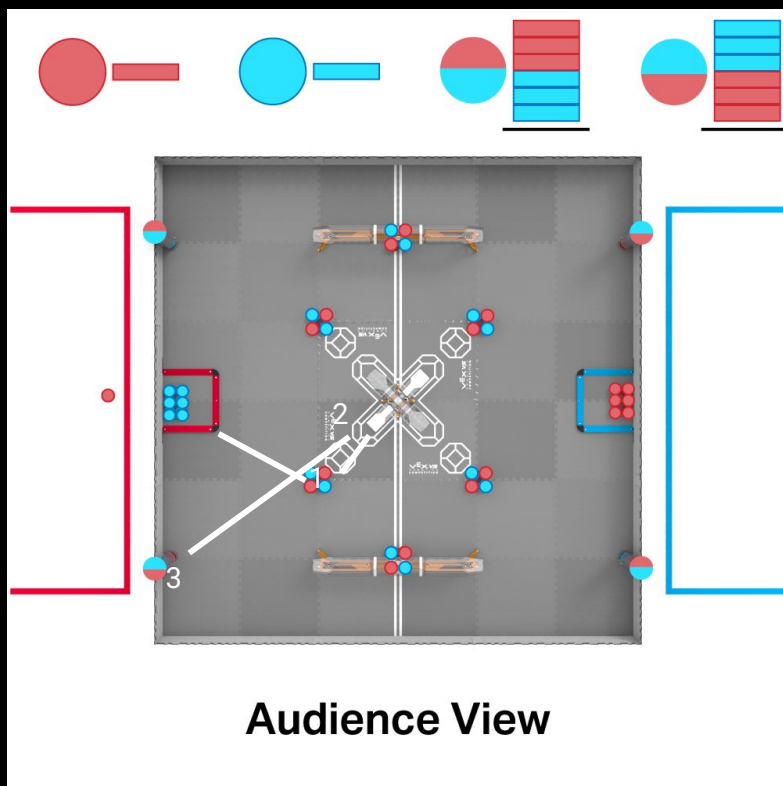
Adding the Wing Mech

The purpose of the wing is to de-score long goals at rapid speeds. To do this we will extend the piston/ actuator and that will cause the high strength axle to lift. Then we retract said piston and reach into the long goals and drive forward or backwards.

After testing we found an issue with space for a 2nd air tank. To fix this we cut the end of the



Restarting Code Skills (steps 1-3)



The reason for the restart was to take into account for the tweaks and changes we made since last time worked on code skills.

STEP ONE

Go to the set of 4 blocks and grab them

STEP TWO

Then score them in bottom middle goal

STEP THREE

Go to the tower and descore

Comp Results

Skills Drive 1

20 points we messed up park,
everything else went well

Que 1

13956A, 14-60 defence was good but
our teammate was not scoring so
opponent scored alot

Que 7

621A, 43-21 great match we used the
wing very good and descored a lot

Que 13

39972A, we got dequed because we
accidentally flipped opponent

Auton Skills 1

15 started parked

Drive Skills 2

13 did horrible

Drive Skille 3

19 did alright messed up on loaders
twice

Que 24

47126Z, 65-13 great match used wing
scored a lot auton half way worked

Que 31

31458A, 27-49 drive train broke good
defense

Finals Match 1

31458A, 13-31 got auton WP and it
went downhill from there

6	39972A
7	2390A
8	6210P
9	13956A
10	47126C
11	47126B
12	91976A
13	47126Z
14	47126D
15	47126A
16	97817V
17	39972B
18	45535B
19	42616B
20	45535A
20	84934A

Comp Results

Zach Snider

02/23

#42

Designing State Bot

We will be building a robot on the side for state. The reason for this is so we have a better and faster bot.

The idea for this bot is similar to team 7700R. There robot works well because it can score on all goal effectively, empty loaders and can park.

7700R's skills scores are very good compared to our current skills scores. But they also are in highschool and have way more experience than us so we probably won't be scoring as much as them.

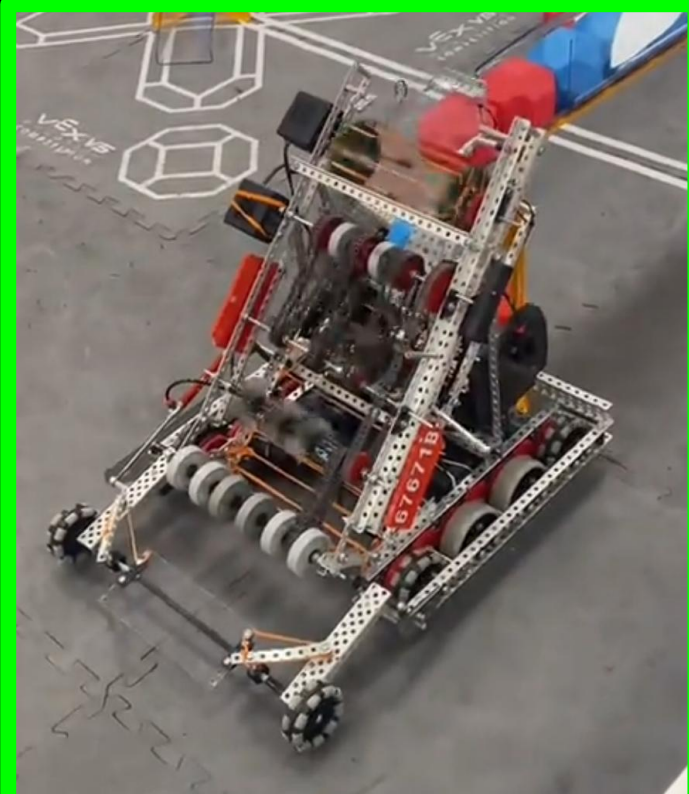


			Highest			
			Autonomous		Autonomous	
			Coding		Coding	
			Skills		Skills	
Row	Rank	Score	Driver		Driver	
			Skills		Skills	
172	172	162	67	95	67	95

Designing State Bot

The idea for this bot is similar to team 67671B. There robot works well because it can score on all goal effectively, empty loaders and can park.

67671A's skills scores are good compared to our current skills scores. They also are in middle school which means that their scores are reachable.

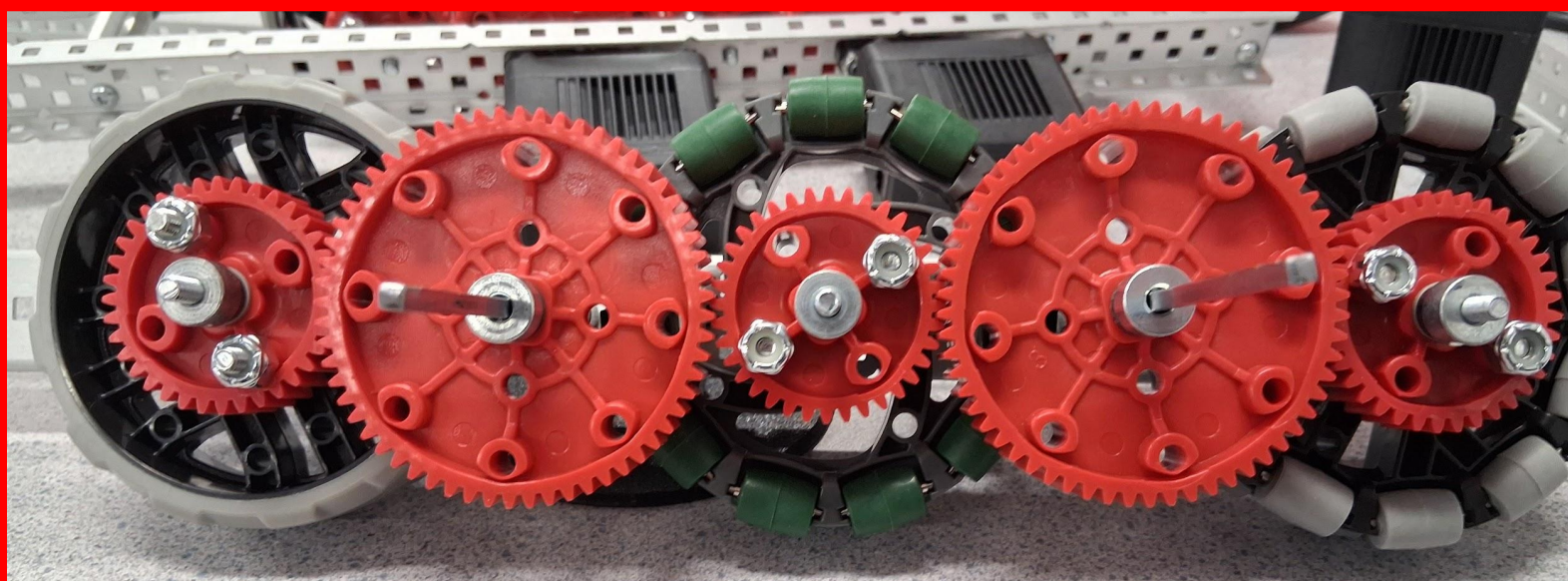
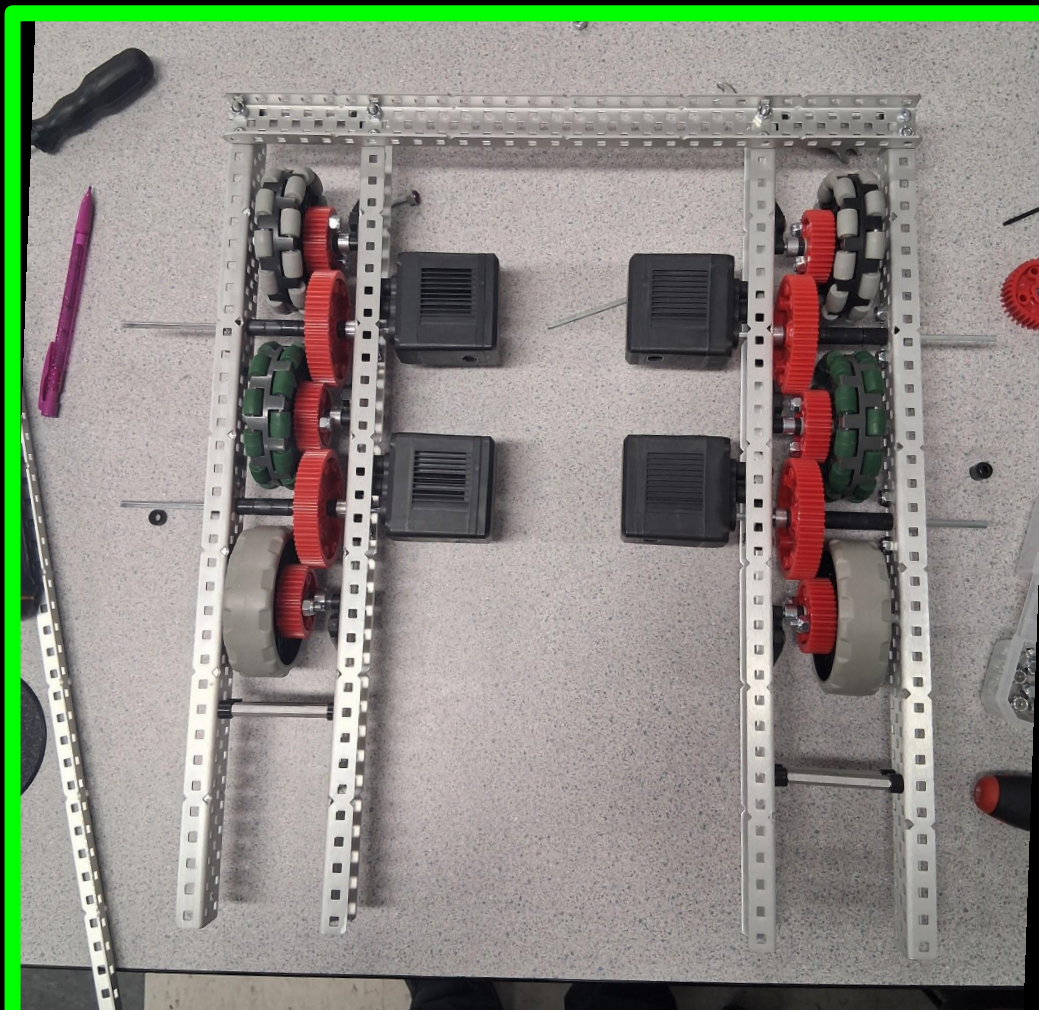


			Autonomous		Highest	
			Coding Skills		Autonomous Coding Skills	
Row	Rank	Score	Driver Skills		Highest Driver Skills	
483	483	64	20		44	

Designing & Building State Bot's Drivetrain

With all of our experience combined we decided that a 3 wheel gear drive would be the best option for a drivetrain.

Our drivetrain has a 3:5 gear ratio that helps give us speed and power when braking.



Designing & Building World Bot's Drivetrain

Zach Snider

02/25

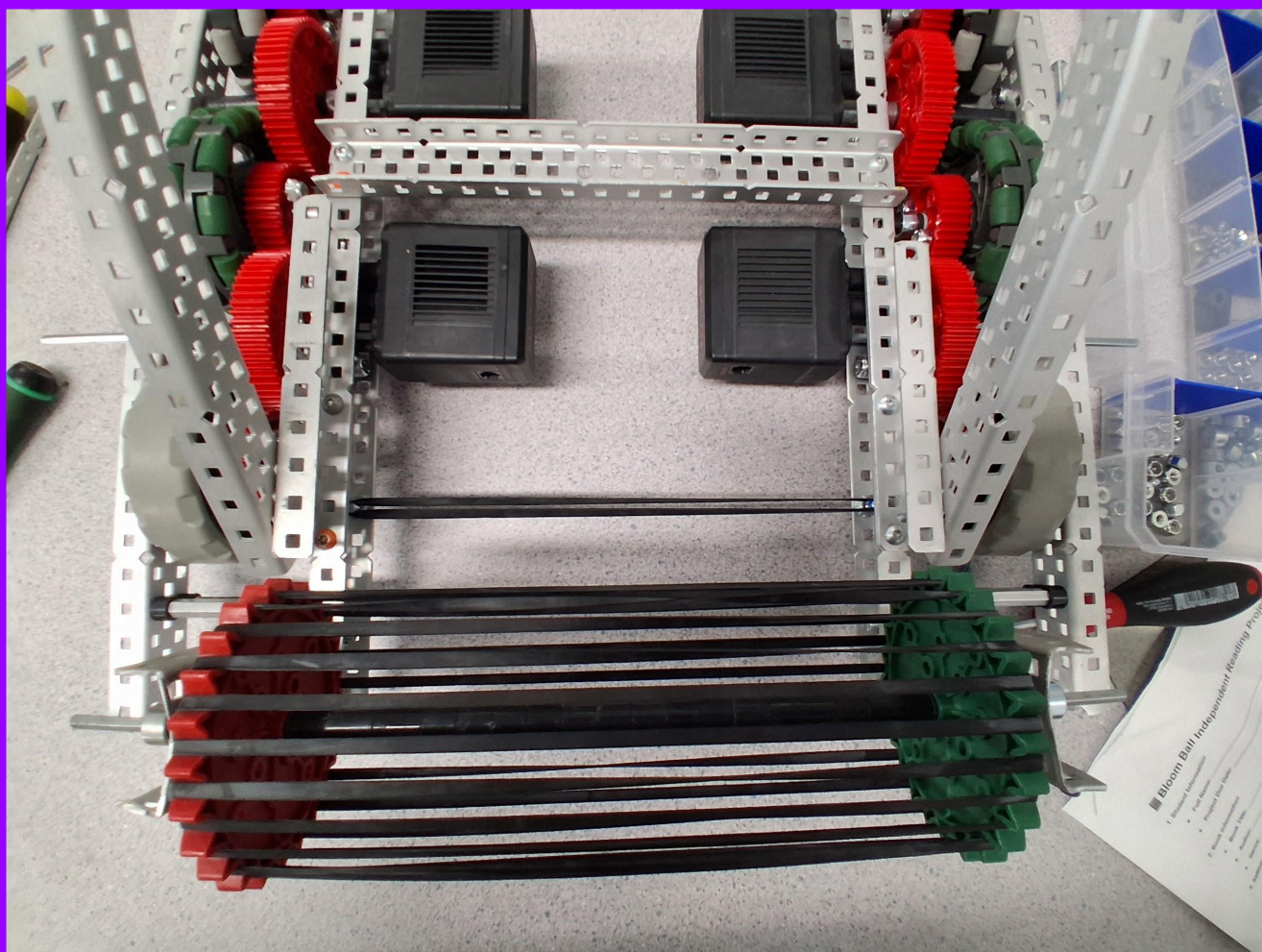
#45

Designing & Building State Bot's Front Intake

For our front intake we are going to build an elevated rubber band spinner.

Our front intake has a 600 rpm direct drive.

We will also add a rubber band going across the inside of the drivetrain to act as a ramp for the blocks coming from the front rubber band



Designing & Building World Bot's Front Intake

Zach Snider

02/26

#46

Comp Results

Drive Skills 1

35, did everything well hiccuped in the beginning didn't use wing.

Drive skills 2

39, everything went well

Que 6

49-9, scoring was alright defense was good

Que 11

46-24, everything went well but didn't park

Code Skills 1

15, started parked

Drive Skills 3

56, insanely good run reff gave us control on an extra long goal on accident

Que 26

16-14, robots drive train broke at the end

Que 31

37-17, everything went well

Que 44

36-12, great everything alliance scrapper messed up

Que 58

78-11, got pinned but ref didn't count it

Finals Match 3

115-8, against two hero bots

Quarter Finals

36-54, very close most of game won auto

Rank	Team
1	39972A
2	47126A
3	1483C
4	13956A
5	47126C
6	2390A
7	47126B
8	47126D
9	31330C
10	47126Z
11	39972B
12	1483B
13	83941D
14	97191A
15	91976A

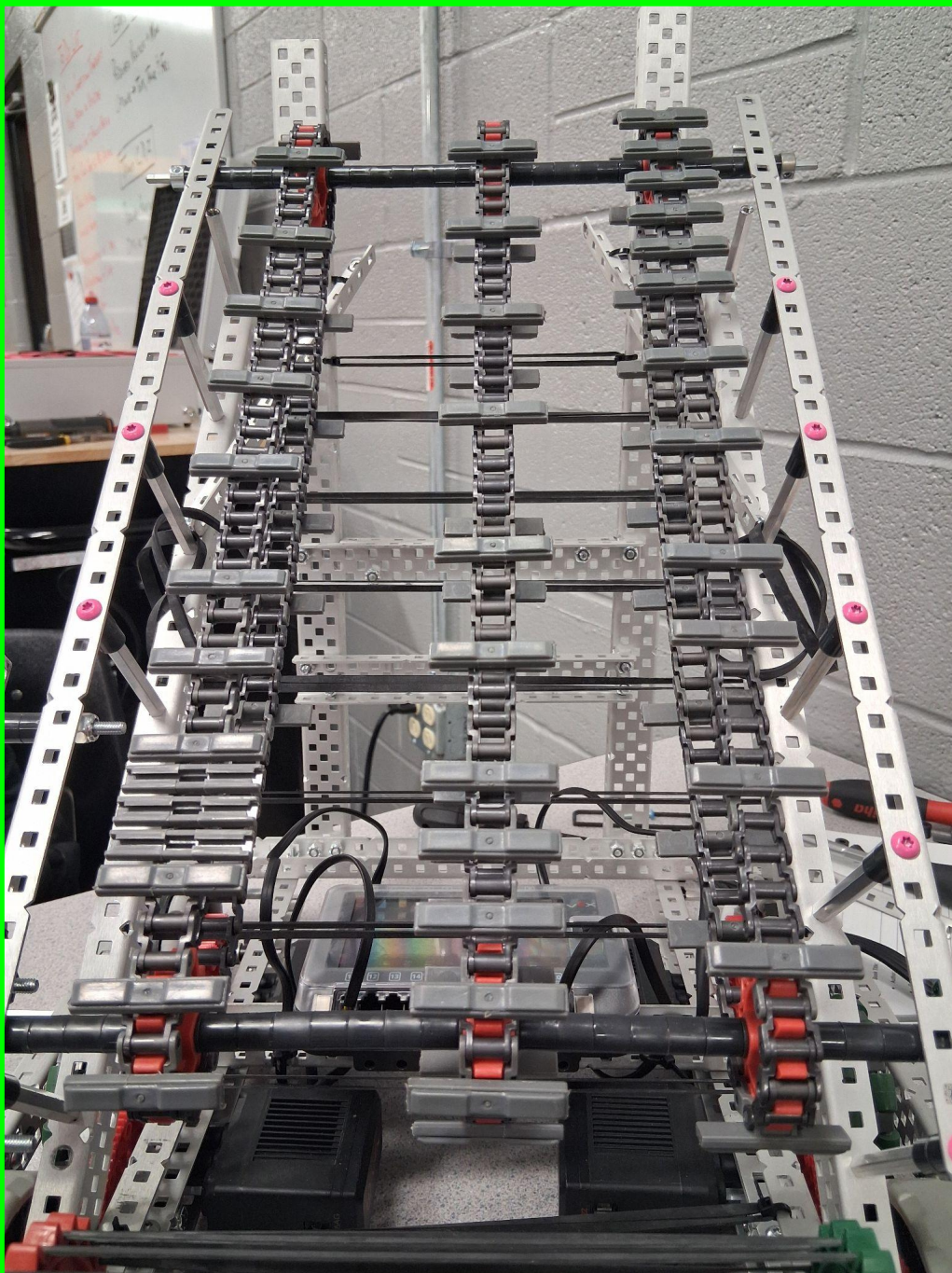
MADE IT TO STATES!!

Designing & Building State Bot's Main Intake

For our Main intake we are going to have a $\sim 55^\circ$ intake. It moves the blocks up the intake with 3 chain conveyors that have rubber flaps to grip them.

Our main intake has a 600 rpm direct drive.

The "floor" of the drivetrain is made out of a series of rubber bands that allow for high grip whilst also providing just enough give.



Designing & Building World Bot's Main Intake

Zach Snider

03/02

#48

Making Tweaks to the State Bot

The first tweak we made was an extra rubber band spinner that will give the blocks an extra boost when changing the directions while also acting as a hood.

The second tweak we are making is we are switching out the inserts on the intake motors too blue.

