Engineering Notebook

47126A

Team Number

I Can’t Say It Out Loud

Team Name

Henryville Jr Sr High

School

00/00/0000	00/00/0000	1 of 1
Start Date	End Date	Book #

V4.0 Date 3.27.25

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V5RC 2025-2026 Game - Rules & Game Video

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Season Summary

Half Scale

Project Season Summary

Name Zach Snider Date Page #I

Code Summary

Half Scale

Project Code Summary

Name Zach Snider Date Page #II

Credits Summary

355B - Intake Idea 1
29651J - Intake Idea 2

Half Scale

Project Credits Summary

Name Zach Snider Date Page #III

Meet The Team

Team 47126A has been competing together for 1 year now. This will be all of our team members 3rd year competing in V5RC. Our team has fortunately competed at most levels of events including local state qualifiers, Indiana State Competition, and even 2025-2026 worlds competition. In the 2025-2026 Push Back season we were consistently top 10 in skills in Indiana.

Landen - 4 years



Builder, Coder, Skills Driver, Loader

Zach - 5 years



Note Booker, Scouter

Johnny - 4 years



Match Driver, Builder

Half Scale

Project Meet The Team

Name Zach Snider Date 05/08 Page #1

The Engineering Design Process

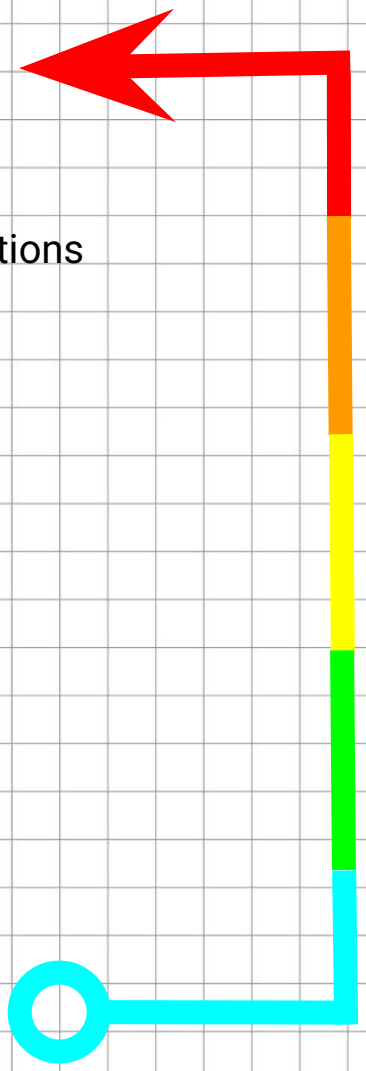
1. Identify the problem
   - Identify game and robot design
   - Use words and pictures

2. Brainstorm, Research, and Prototype Solutions
   - List Possible Solution
   - Research Different Designs
   - Build and Test

3. Select Best Solution and Plan
   - Testing
   - Decision Matrix
   - Plans

4. Build and Program the Solution
   - Record Steps
   - Document instructions
   - Make Iterations

5. Test Solution
   - Record all Testing Data
   - Find Best Solution



What Do The Colored Coded Notebook Entries Mean?

- Identify the problem
- Brainstorm, Research, and Prototype the Solution
- Select Best Solution and Plan
- Build and Program the Solution
- Test the Solution
- Tournament Results
- Team Management
- Extra Info

Half Scale

Project Notebook Setup

Name Zach Snider Date 05/08 Page #2

Game Analysis - Identify the Problem

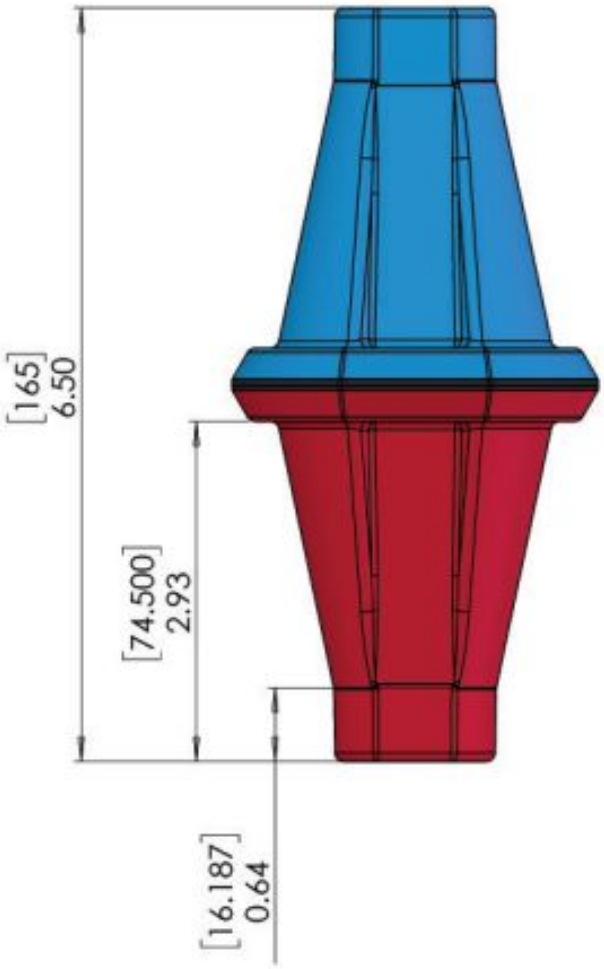


Game Elements

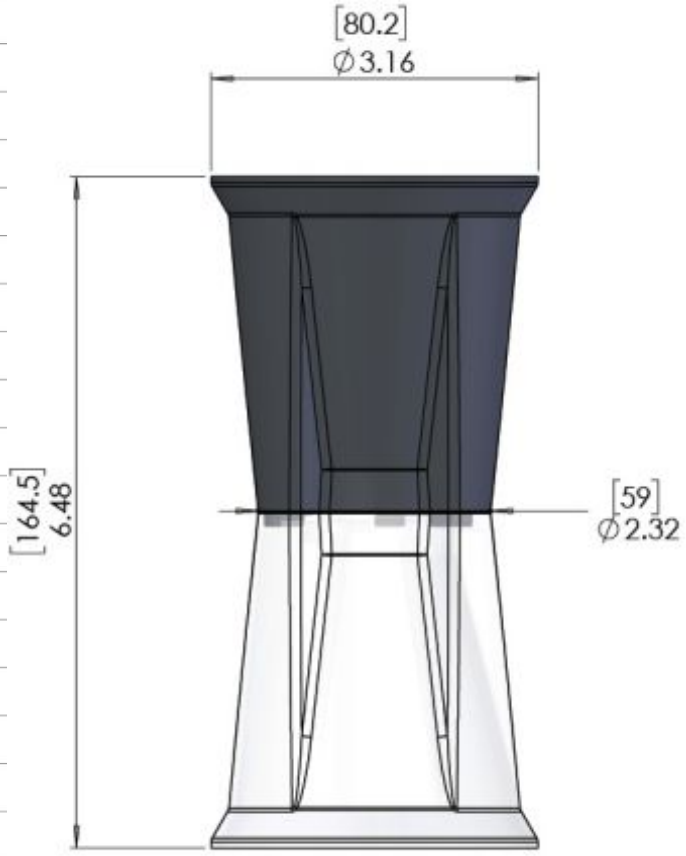
- 56 Cups (36 start on field and each alliance match loads)
  - 24 start grey side up
  - 12 start clear side up
- 63 Pins
  - 4 red/blue
  - 20 red/yellow
    - 2 preloads
    - 10 match loads
    - 8 start in predetermined locations
  - 20 blue/yellow
    - 2 preloads
    - 10 match loads
    - 8 start in predetermined location
  - 19 yellow/yellow
    - 2 Match Loads
    - 17 that start Match in predetermined locations
- 9 goals
  - 4 alliance collared
    - 2 red
    - 2 blue
  - 4 neutral
    - 4 short
    - 1 tall
- 4 toggles
- 4 loaders, two adjacent to each alliance

Half Scale

Cups and Pins



- A pin can only be considered scored if it is on one of the 5 goals or 4 alliance goals.
- A points on a pin are determined by the visible alliances color
- There is also a yellow side and it is considered scored when it is visible and the toggle is switched to either the blue or the red side.



- A cup is used to score the pins
- If a pin is in the gray side of the cup then it would be considered not scored
- If a pin is in the clear side of the cup then it is considered not scored

Half Scale

Project Game Analysis - Identify the Problem

Name Landen McCormick Date 05/08 Page #4

Cups and Pins



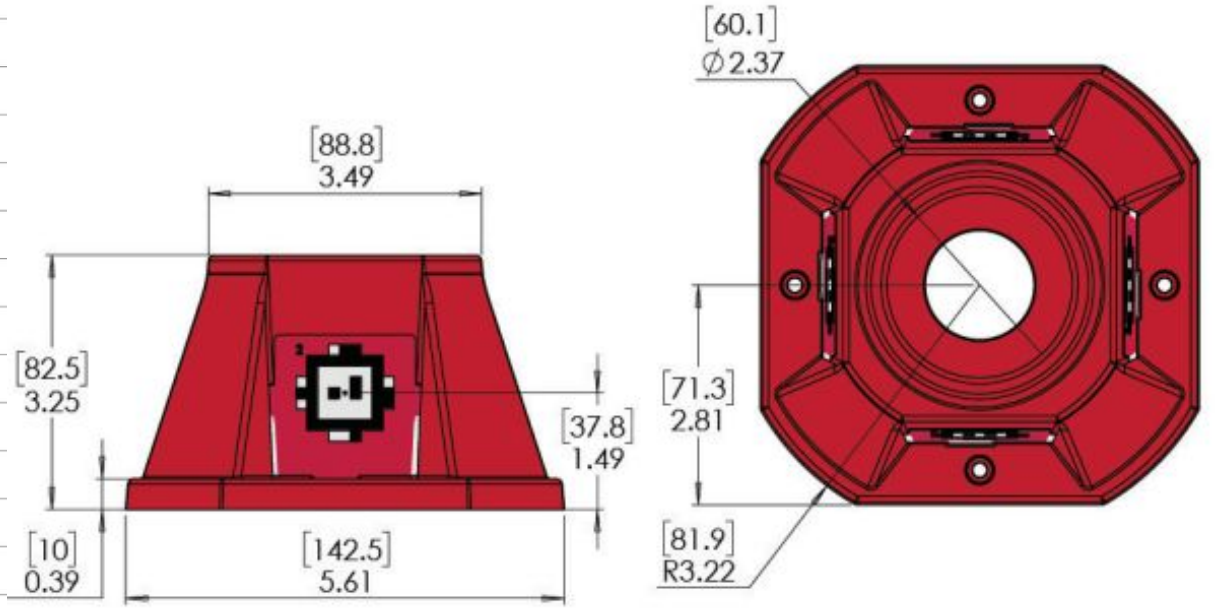
Half Scale

Project Game Analysis - Identify the Problem

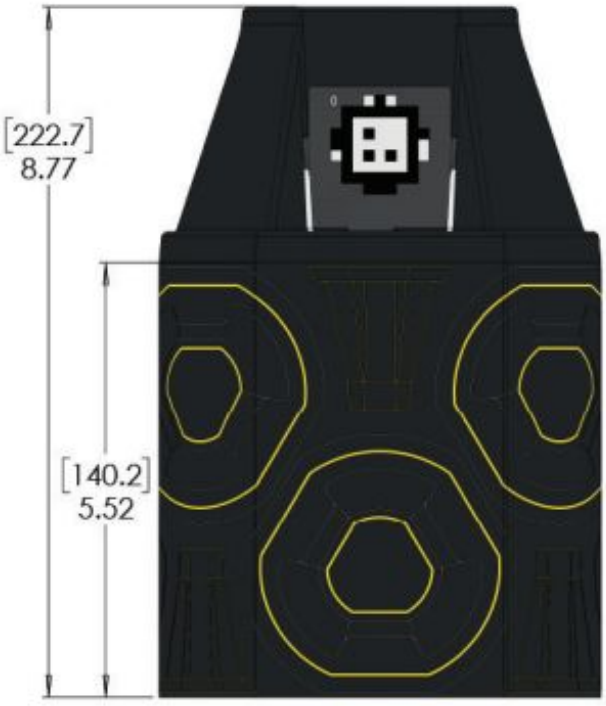
Name Zach Snider Date 05/08 Page #5

Goals and Alliance Goals

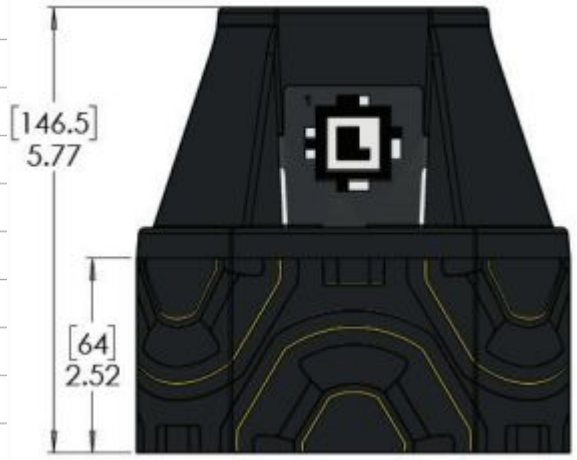
Alliance Goal



Center Goal



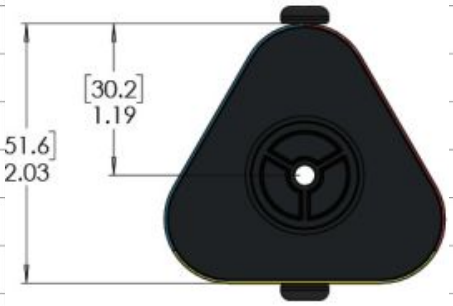
Short Goal

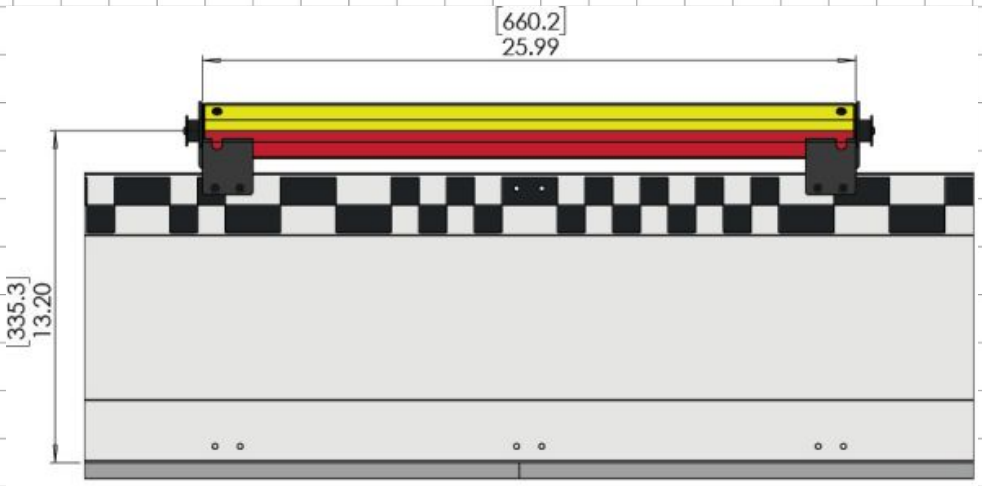


- To score you need to place pins then cups on the goals
- Every team can use the center and short goals
- Only the red alliance can score on the red goal and only the blue alliance can score on the blue goal

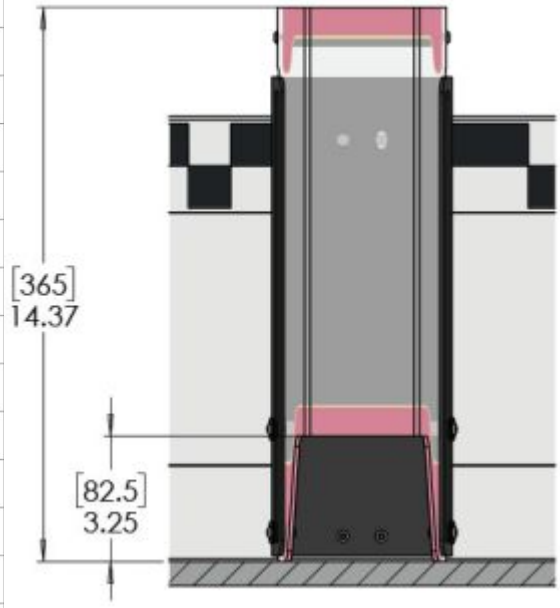
Half Scale

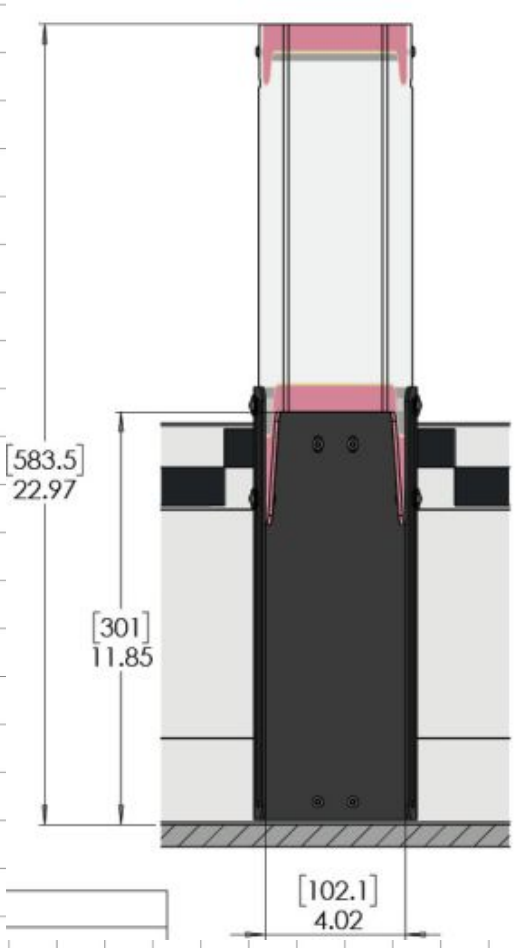
Toggles and Loader





- The toggle determines what alliance gets the points for the yellow pins in the same quadrant





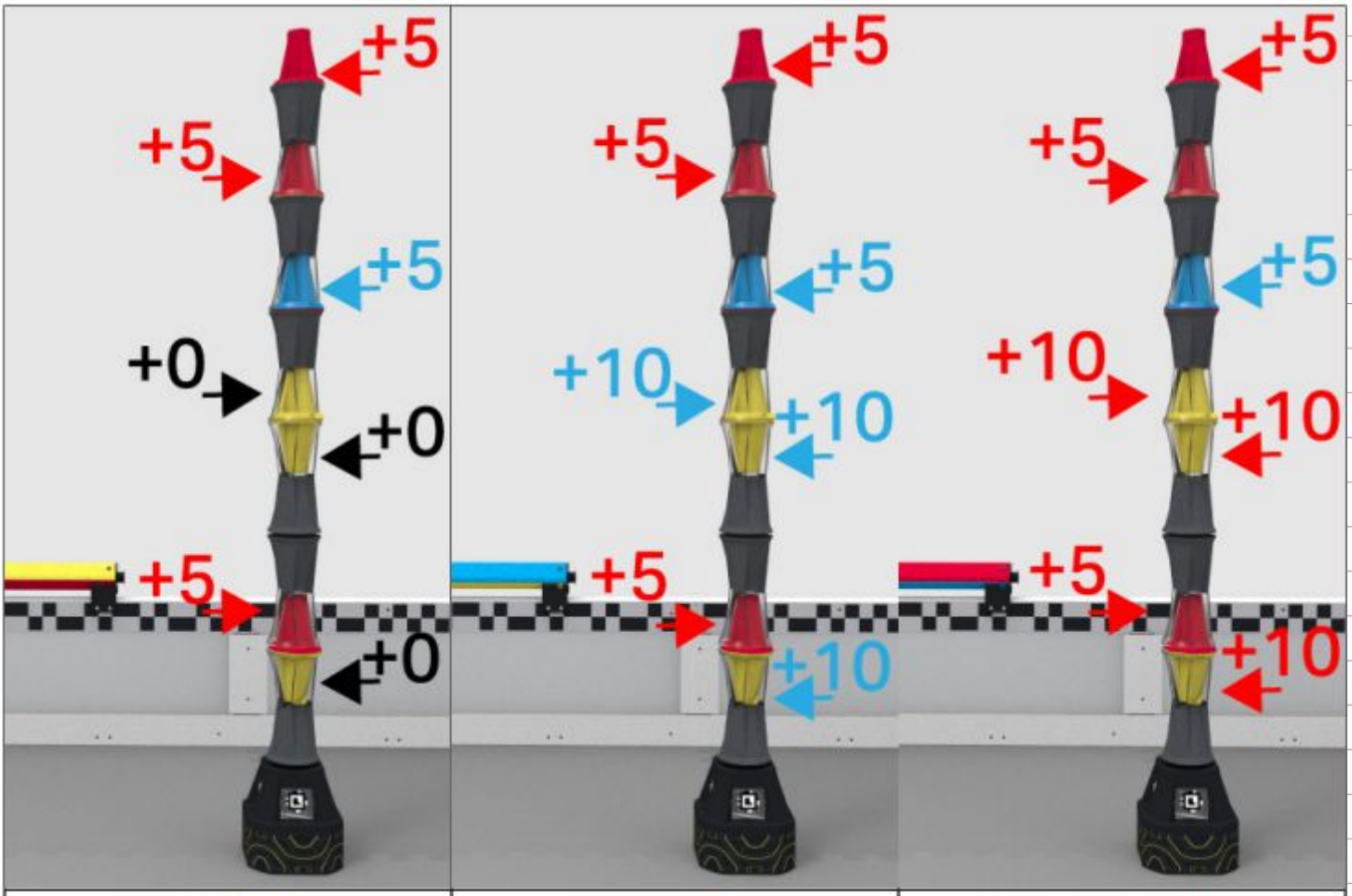
- The loaders are where you place your match loads.
- To grab the match loads from the loaders you need to lift them up.

Half Scale

Project Game Analysis - Identify the Problem

Name Landen McCormick/Zach Snider Date 05/08 Page #6

Scoring



Toggle: **Yellow**	*Toggle*: **Blue**	*Toggle*: **Red**
Red *Pins*: 15 points	**Red** *Pins*: 15 Points	**Red** *Pins*: 15 Points
Blue *Pins*: 5 Points	**Blue** *Pins*: 5 Points	**Blue** *Pins*: 5 Points
Yellow *Pins*: 0 Points	**Yellow** *Pins*: 30 Points (scored for Blue)	**Yellow** *Pins*: 30 Points (scored for Red)
Total **Red**: 15 Points / **Blue**: 5 Points	**Total** **Red**: 15 Points / **Blue**: 35 Points	**Total** **Red**: 45 Points / **Blue**: 5 Points

Autonomous Bonus	12 Points
Each *Placed Alliance*-colored *Pin*	5 Points
Each *Owned* yellow *Pin*	10 Points
Each *Robot* in the *Midfield*	8 Points

- At the end of the match each robot that is in the crossing the invisible 3D vertical plane is considered in midfield.
- This means that the alliance gets an extra 8 points.
- The alliance with the most robots in midfield get the points for each of the yellow pins on the center tall goal.

Half Scale

Important rules

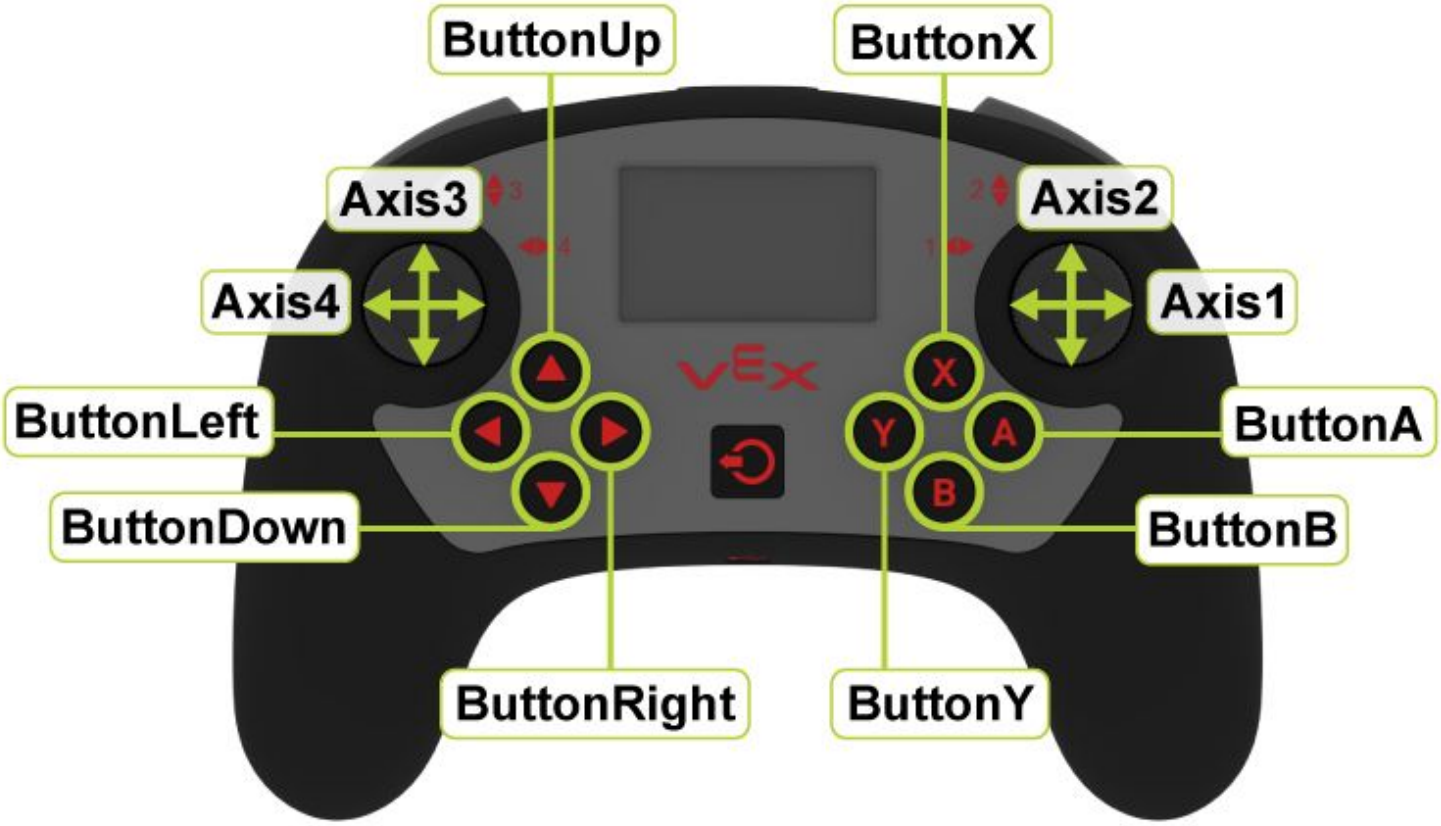
1. <SG2> — ***Horizontal Expansion is Limited*** - Robots are allowed to extend past the original size constraints after the match starts to a max of 24” width and 24” length.
2. <SG3> — ***Vertical Expansion is Limited -*** Robots are allowed to expand past the original size constraints up to 50” vertically after the match starts.
3. <SG6> — ***Possession is Limited to one Cup and one Pin*** - Robots must not contain more than one Cup and one Pin. If a *scoring object* gets stuck in the robot the robot must return to a legal starting position.
4. <SG9> — ***Alliance Goals are Protected*** - Robots aren’t allowed to contact/interact with the opposing alliances goal.
5. <SG12> – ***Some Rules Change During EndGame Period*** - Robots in the midfied must limit vertical expansion to starting height.
6. <R3> – ***Robots Must Fit Within A 18” x 18” x 18”*** - Robots must be in the size restraints until the match starts when they can expand to the restraints of <SG2> and <SG3>.
7. <R10> – ***Motors are Limited*** - You can have up to *88w of motors meaning 16 5.5w motors and 8 11w motors.*

Half Scale

Project Game Analysis - Identify the Problem

Name Zach Snider Date 05/14 Page #8

Controller Controls



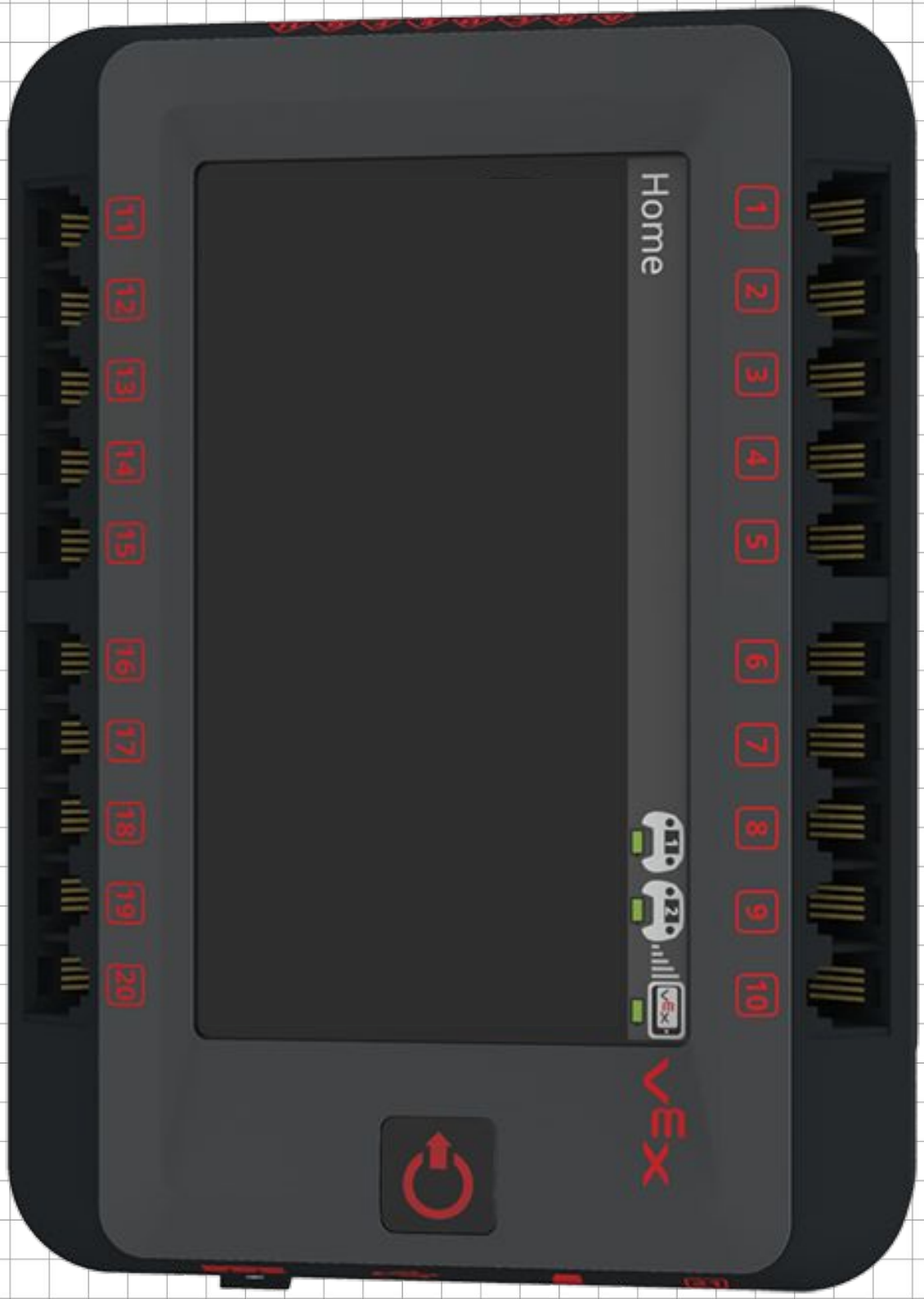


Half Scale

Project Controller Controls

Name Zach Snider Date 08/12 Page #9

Brain Ports



Half Scale

Project Brain Ports

Name Zach Snider Date 08/12 Page #10

Week of 10/12

Brainstorm, Research, and Prototype the Solution

TASKS	Monday	Tuesday	Wednesday	Thursday	Friday
8 omni wheel, 4 motor					
8 wheel 5 motor h-drive					
8 friction wheel 4 motor					

Half Scale

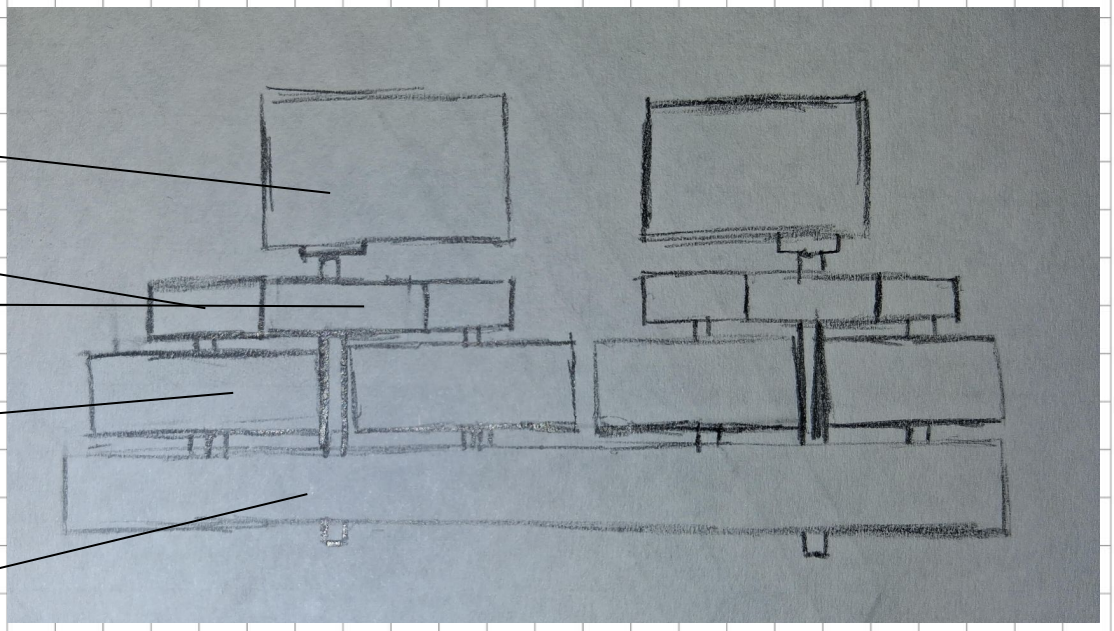
Project Week of 10/12

Name Zach Snider Date 10/12 Page #11

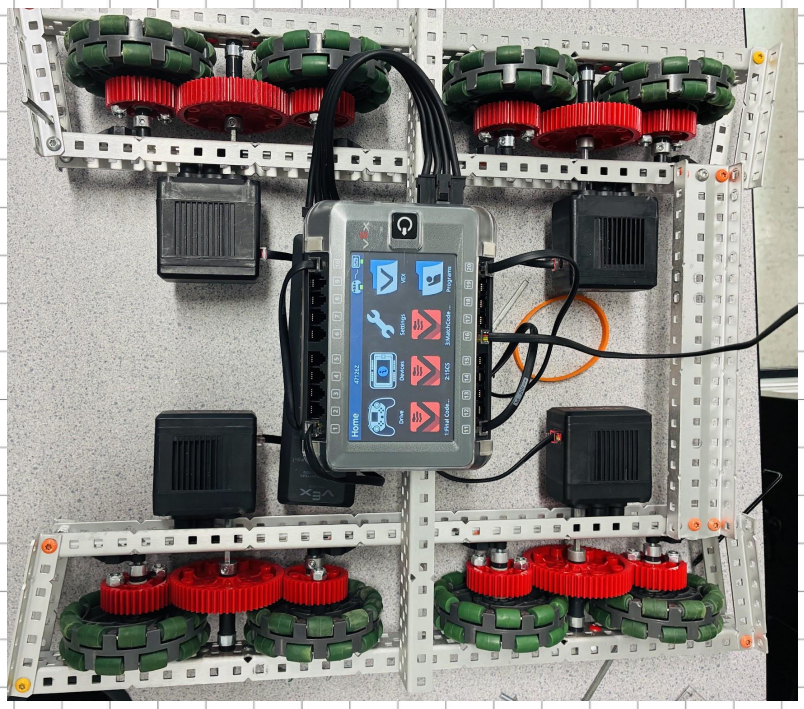
Brainstorming the Drivetrain

The 1st of our ideas is a 4 motor 8 wheel drive train. All wheels are an omni- wheel. This is an all around good drivetrain because it is sturdy and fast while still controllable.

#1



Positives	Negatives
• Stable • Easy to Build	• Slower • Low Torque

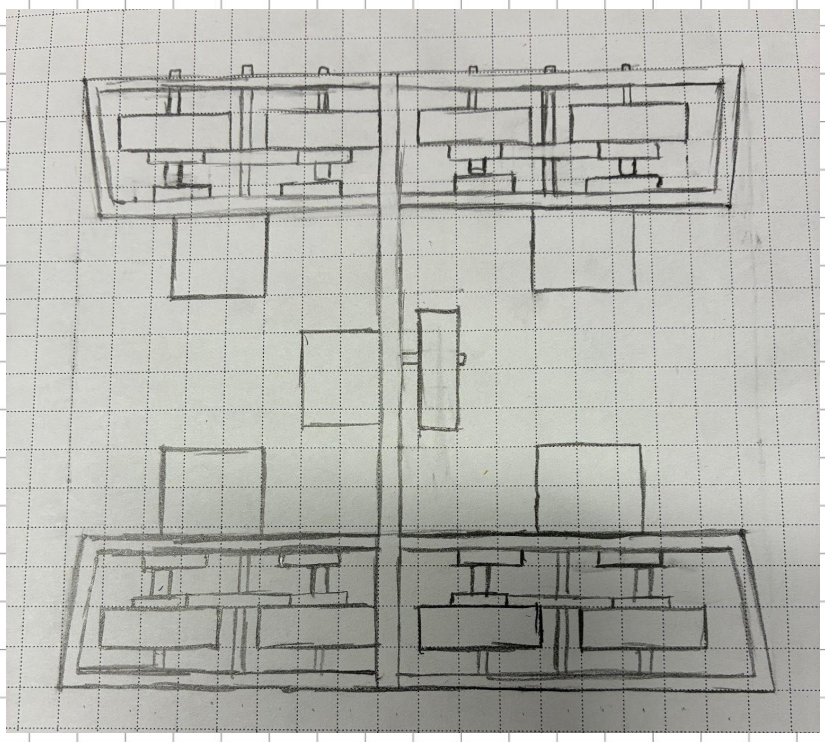


Half Scale

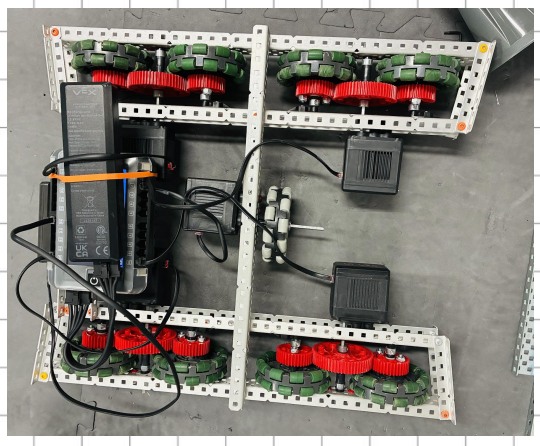
Brainstorming the Drivetrain

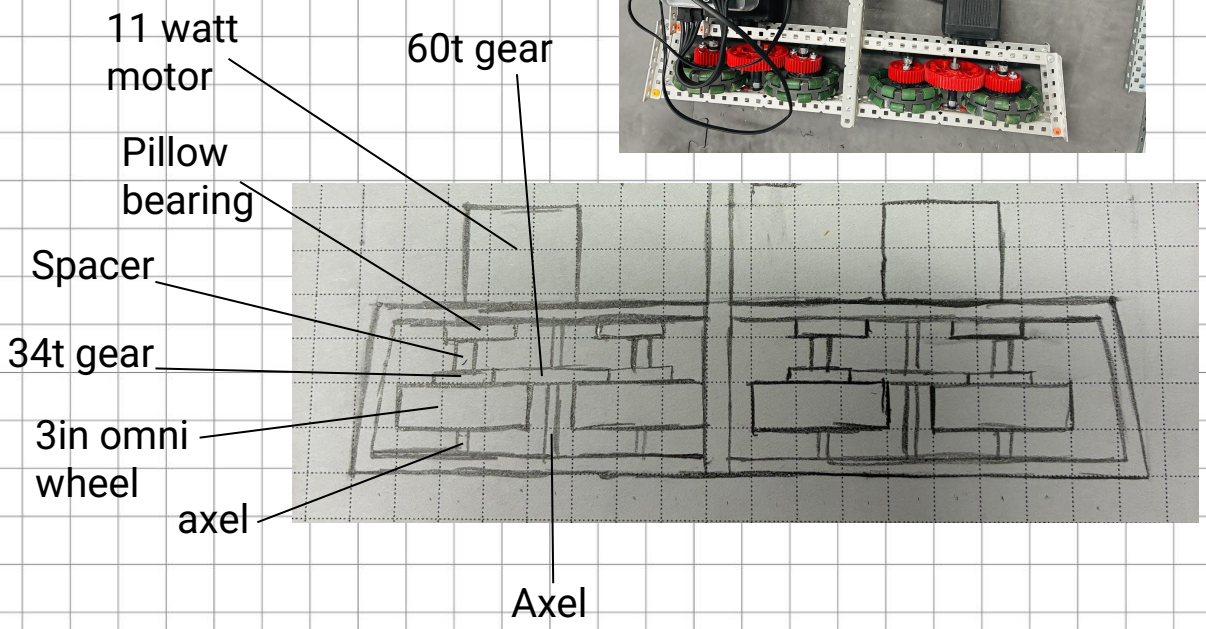
The 2nd idea is a 5 motor 8 wheel h-drive, drivetrain. Every wheel is an omni wheel. This drivetrain will allow us to move sideways as well as forward and backward.

#2



Positives	Negatives
• Stable • High Maneuver ability	• Slower • Low Torque





Half Scale

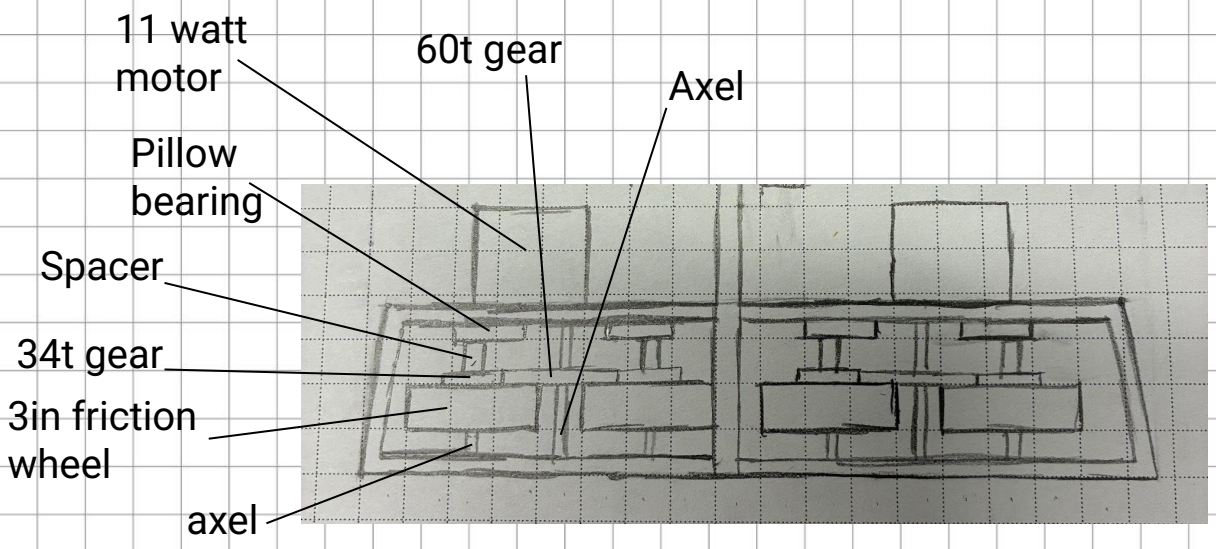
Project Brainstorming the Drivetrain

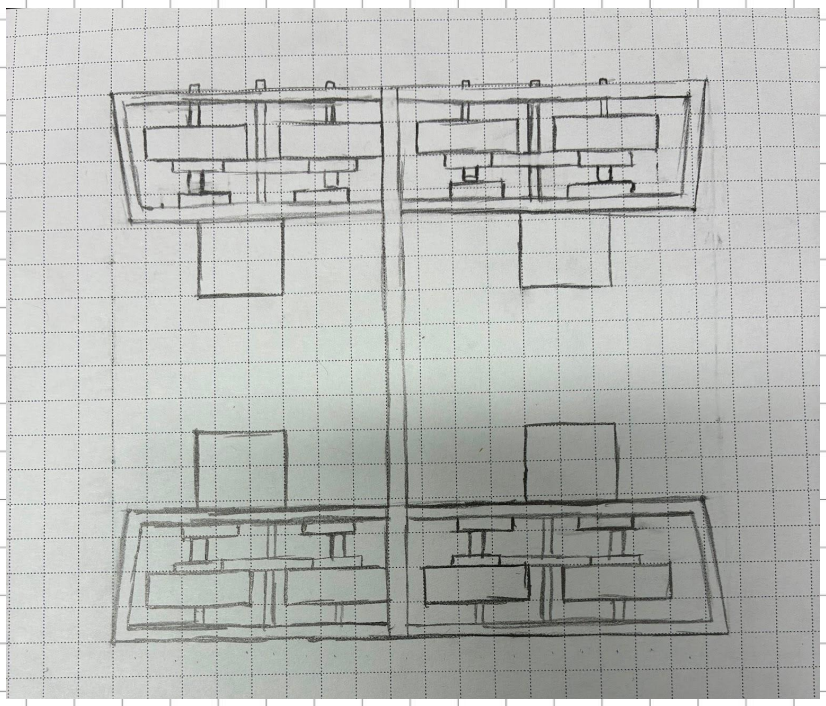
Name Zach Snider Date 10/13 Page #13

Brainstorming the Drivetrain

The 3nd idea is a 4 motor 8 friction wheel drivetrain. This drivetrain will allow us to move sideways as well as forward and backward.

#3





Positives	Negatives
• Stable • Good Maneuver ability • Push resistance	• Slower • Low Torque

Half Scale

Project Brainstorming the Drivetrain

Name Zach Snider Date 10/14 Page #14

Week of 10/19

Test the solution

Brainstorm The Solution

TASKS	Monday	Tuesday	Wednesday	Thursday	Friday
Drive Train					
Front Intake					

Half Scale

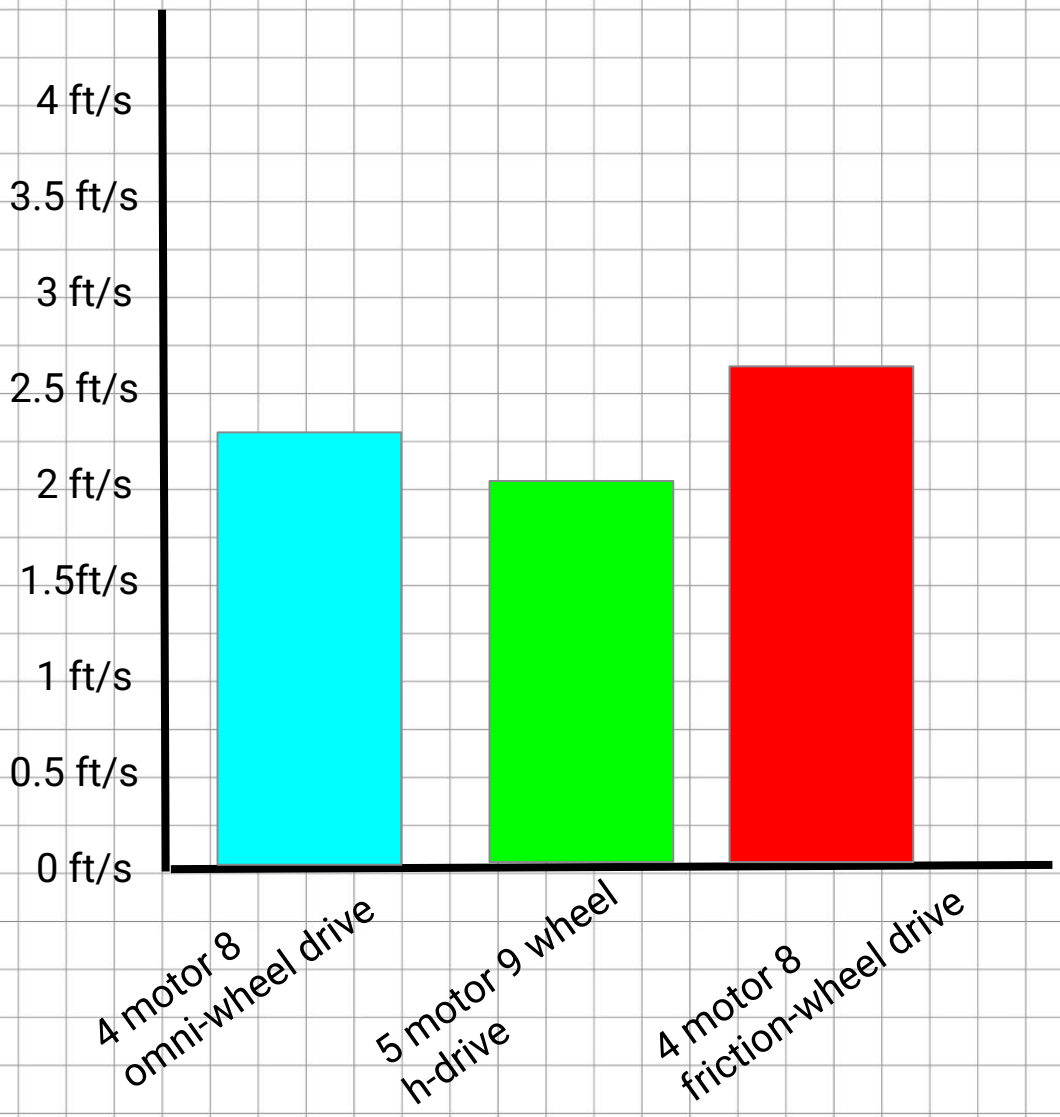
Project Week of 10/19

Name Zach Snider Date 10/19 Page #15

Speed Test

For the Speed test we are going to see how long it takes for the drivetrain to get from one end of the fied to the other end(12 feet).

To determine the feet per second we will use the equation feet/time.
Example: 12ft/4.5sec=2.66ft per second



Half Scale

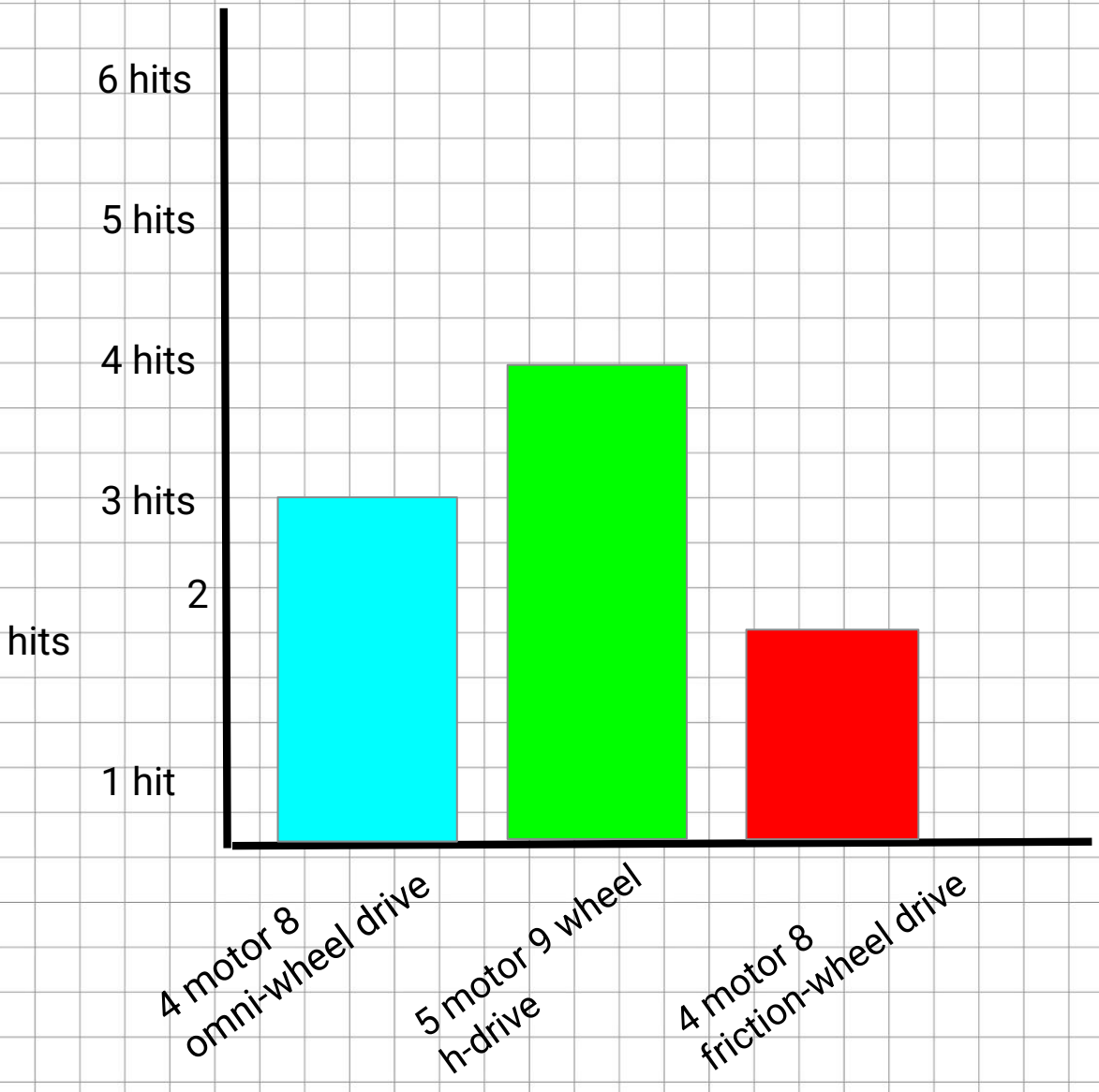
Project Speed Test

Name Zach Snider Date 10/21 Page #16

Maneuverability Test

For the maneuverability test we are basing it off of personal preference and control.

To determine control we made a circle around the field with cups and we will count each cup we hit.

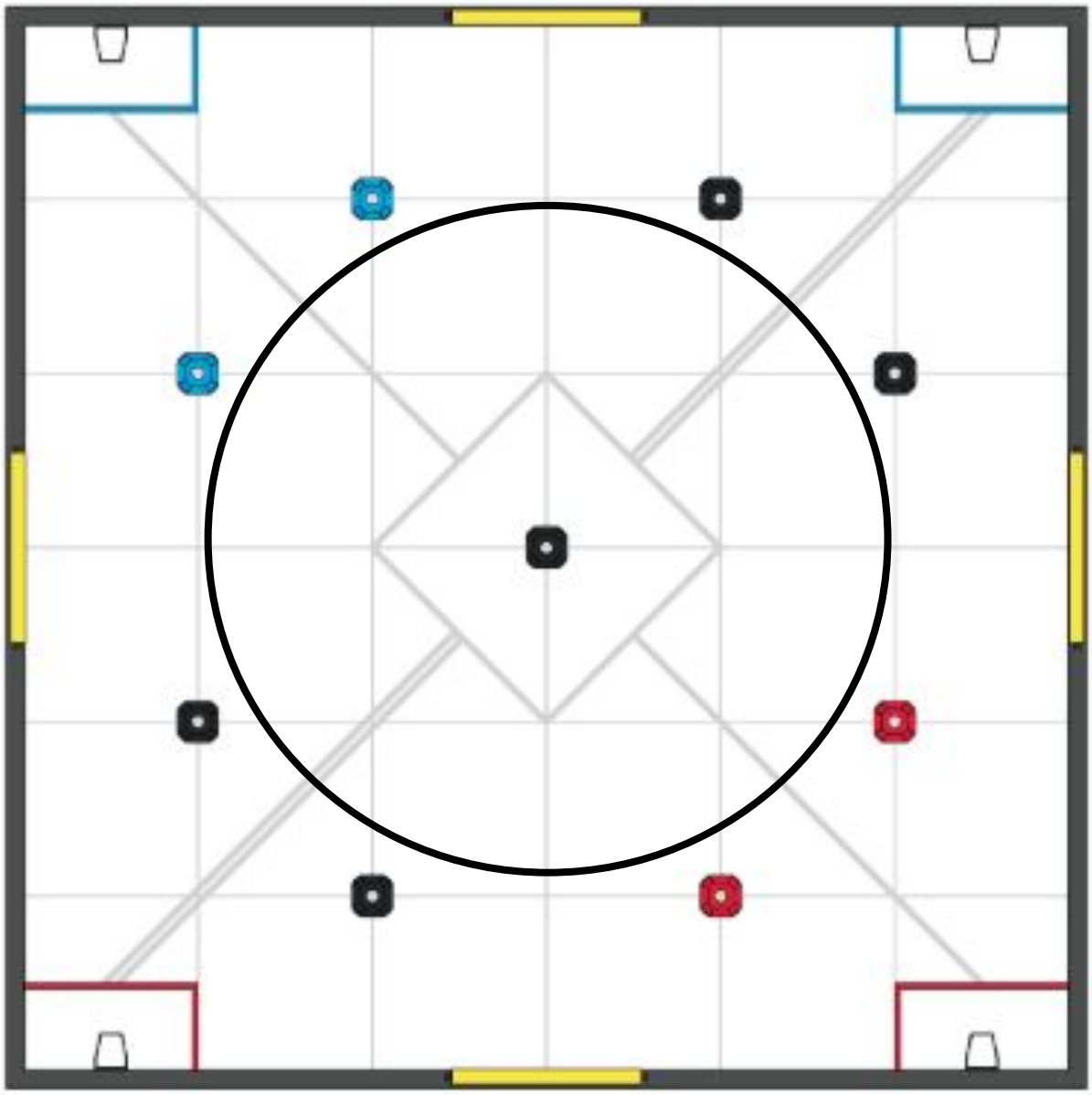


Half Scale

Project Maneuverability Test

Name Zach Snider Date 10/21 Page #17

Maneuverability Test Field Setup



There will be 30 cups evenly spaced around the circle

Half Scale

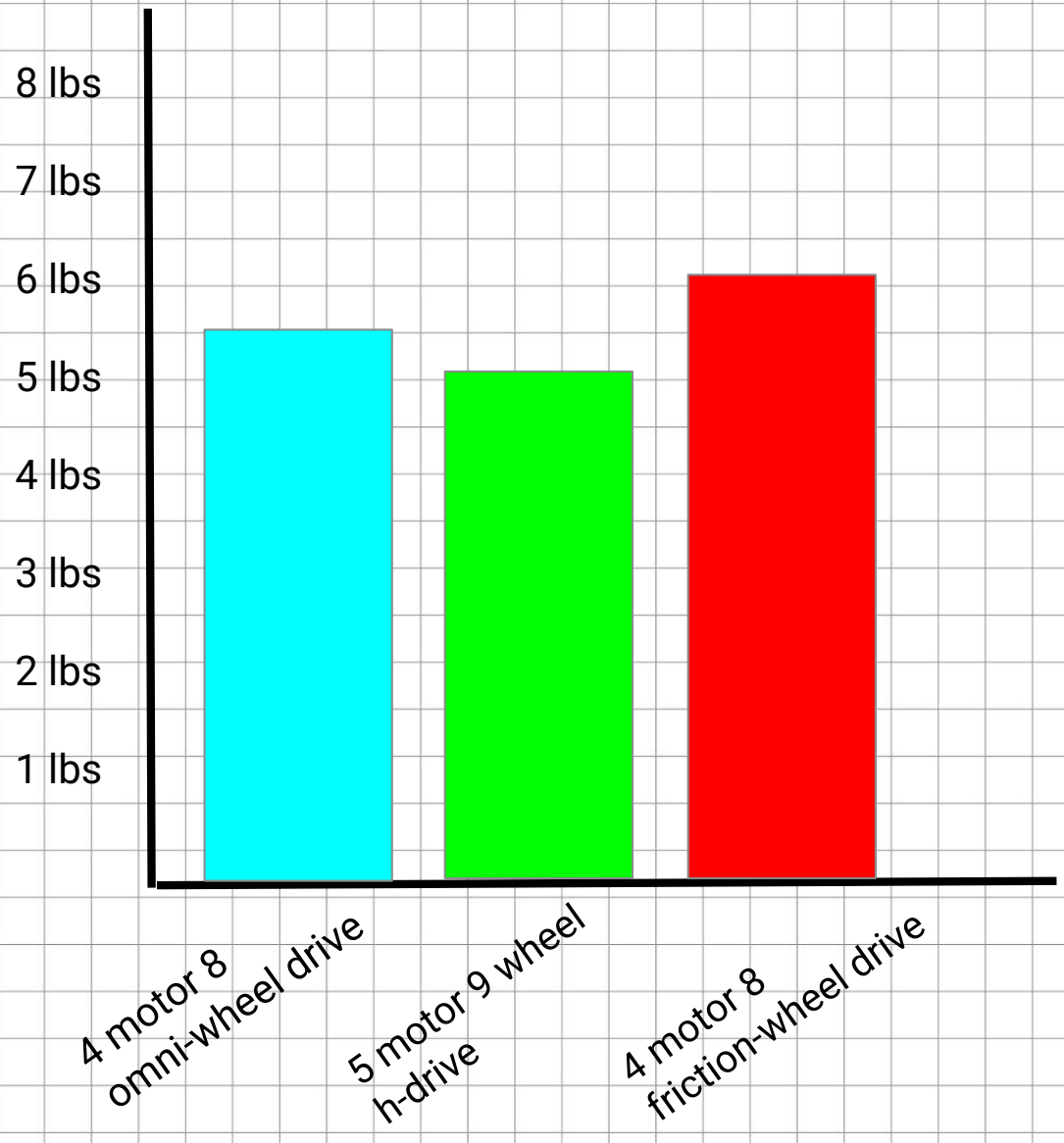
Project Maneuverability Test Field Setup

Name Zach Snider Date 10/21 Page #18

Push Force Test

For the push force test we are using the Dual-Range Four Sensor which has a spot to drive the robot into which will measure the pounds of force the robot uses.

For this test we will be using the mean push force in pounds (lbs).



Half Scale

Project Push Force Test

Name Zach Snider Date 10/21 Page #19

Determine The Drive Train

For the push force test we are using the Dual-Range Four Sensor which has a spot to drive the robot into which will measure the pounds of force the robot uses.

	Speed	Maneuv-erability	Push Force
4 Motor 8 Omni wheel	7/10	8/10	3/10
5 motor 9 Omni wheel H-drive	6/10	8/10	3/10
4 motor 8 Friction Wheel	8/10	7/10	9/10

	Total
4 Motor 8 Omni Wheel	18/30
5 Motor 9 Omni Wheel H-drive	17/30
4 Motor 8 Friction Wheel	24/30

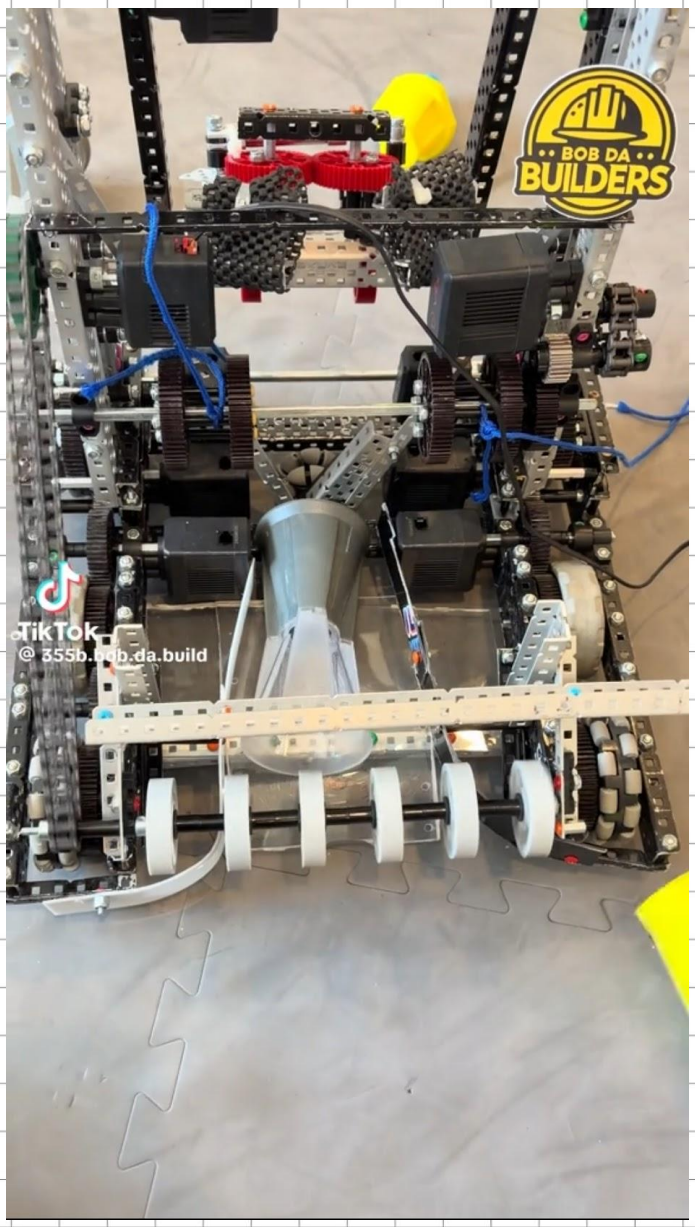
Half Scale

Brainstorming The Front Intake

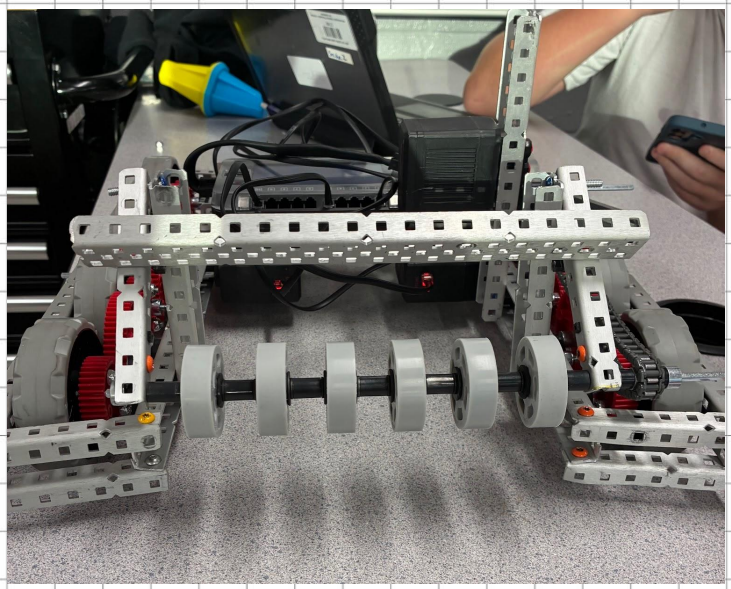
The 1st of our ideas idea is a flex wheel roller on the front of the drivetrain that funnels into the scoring mech.

This idea came from team 355B.

#1



Positives	Negatives
• Funnels good • Fast • Small	• Stops close to the front • Potential room for error



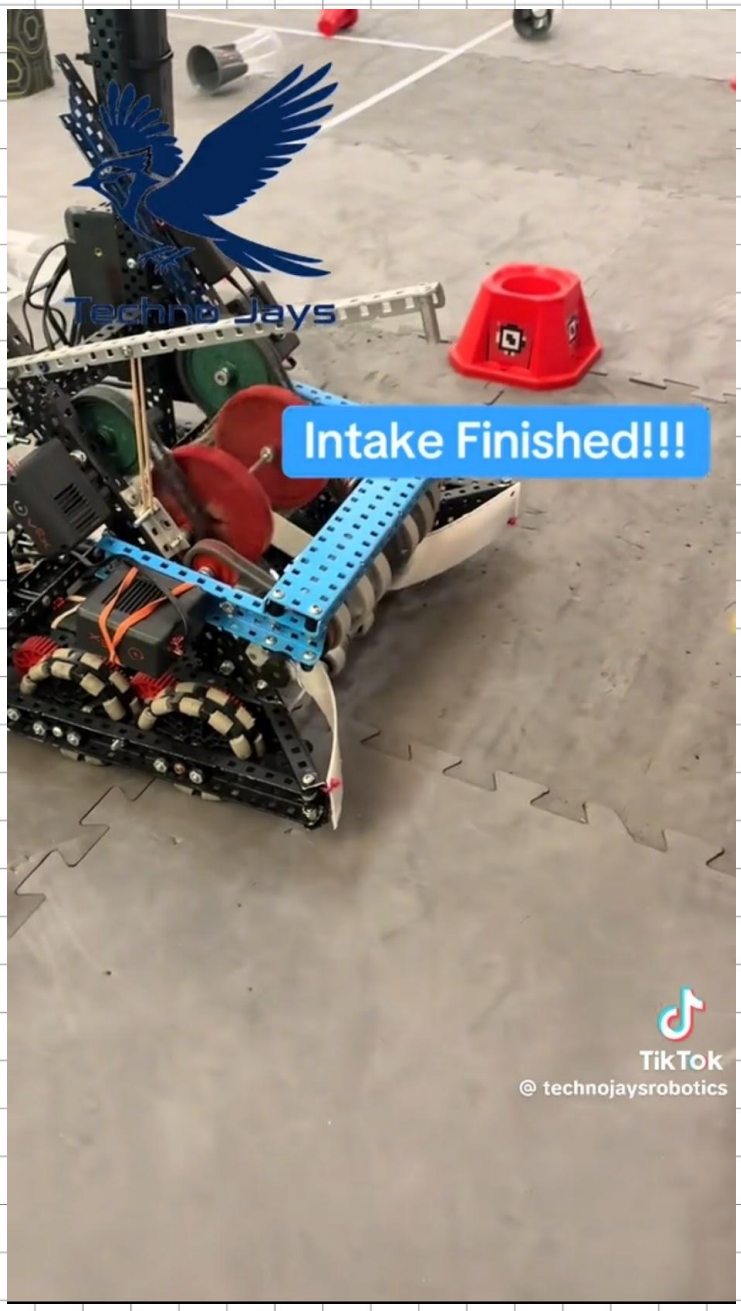
Half Scale

Brainstorming The Front Intake

The 2nd idea is 1 flex wheel roller and 2 rubber band rollers. This design also uses polycarbonate to funnel the pins/cups directly into the front intake.

This idea came from team 29651J.

#2



Positives	Negatives
• Funnels good • Fast • No zero spots	• Takes up a lot of space • Potential room for error

Half Scale

Project Brainstorming The Front Intake

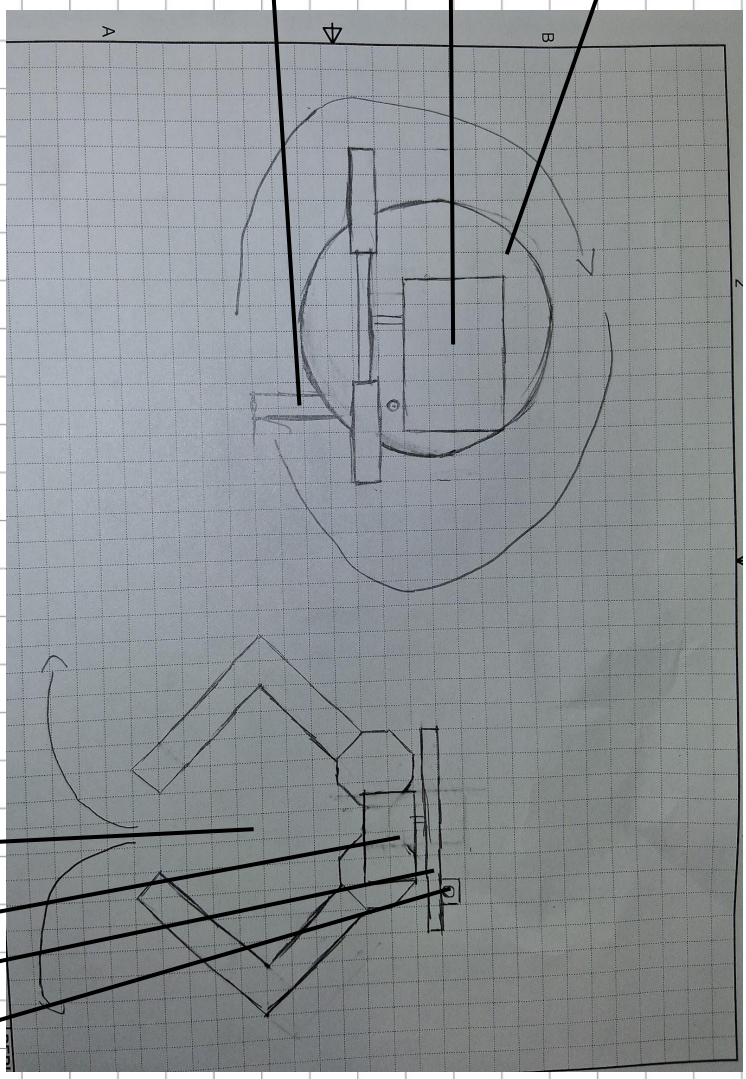
Name Zach Snider Date 10/22 Page #22

Brainstorming The Front Intake

The 3rd idea is a claw on the front that can grab pins and cups then dunk them into the scoring mech.

#3

Positives	Negatives
• Small • Sturdy • Accurate • Picks up all angles	• Slow • Only holds one pin or one cup



The actuator is attached to the 60T gear so that when it extends it rotates the gear and the claw.

Half Scale

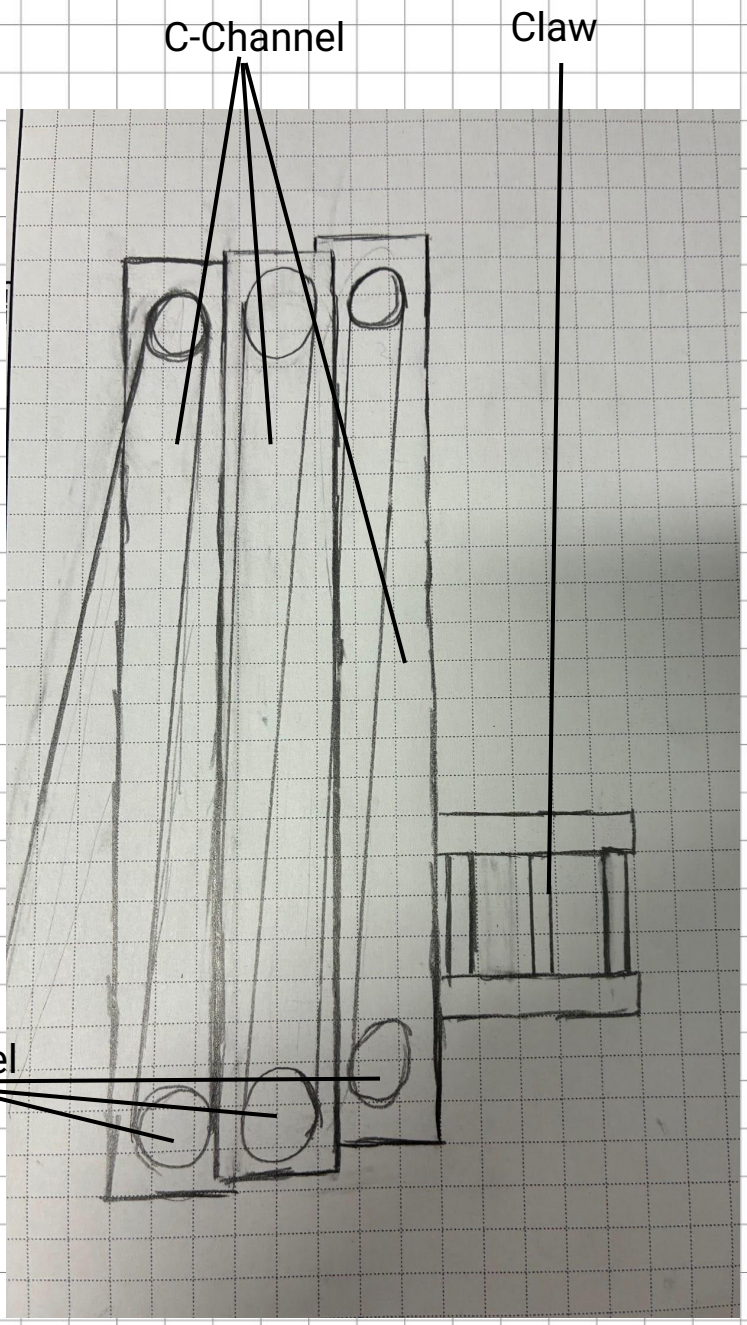
Project Brainstorming The Front Intake

Name Zach Snider Date 10/22 Page #23

Brainstorming The Front Intake

The 4th idea is a Continuous lift with a claw that can grab pins and cups that are standing straight up.

#4



Positives	Negatives
• Fast • Reliable • Only one scoring system	• Only picks up right up pins and cups. • Can be wobbly

Half Scale

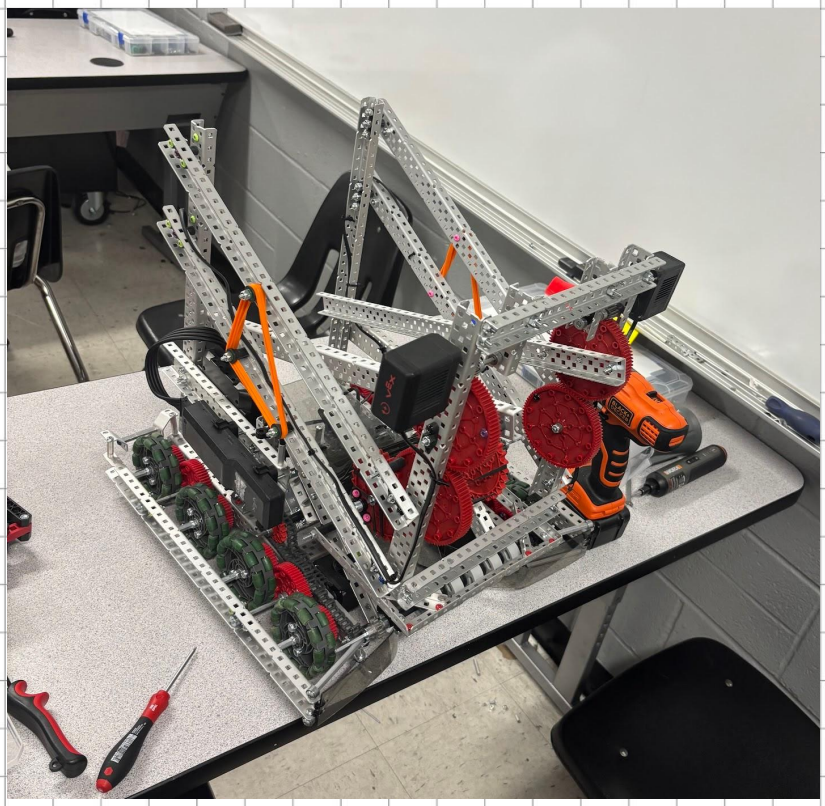
Project Brainstorming The Front Intake

Name Zach Snider Date 10/22 Page #24

Brainstorming The Front Intake

The 5th intake idea is a double reverse 4 bar (DR4B) . This intake can pick everything up.

#5



This Idea came from our sister team 47126C

Positives	Negatives
• Tall • Accurate	• Weighs a lot • Wobbly

Half Scale

Week of 10/26

Test the solution

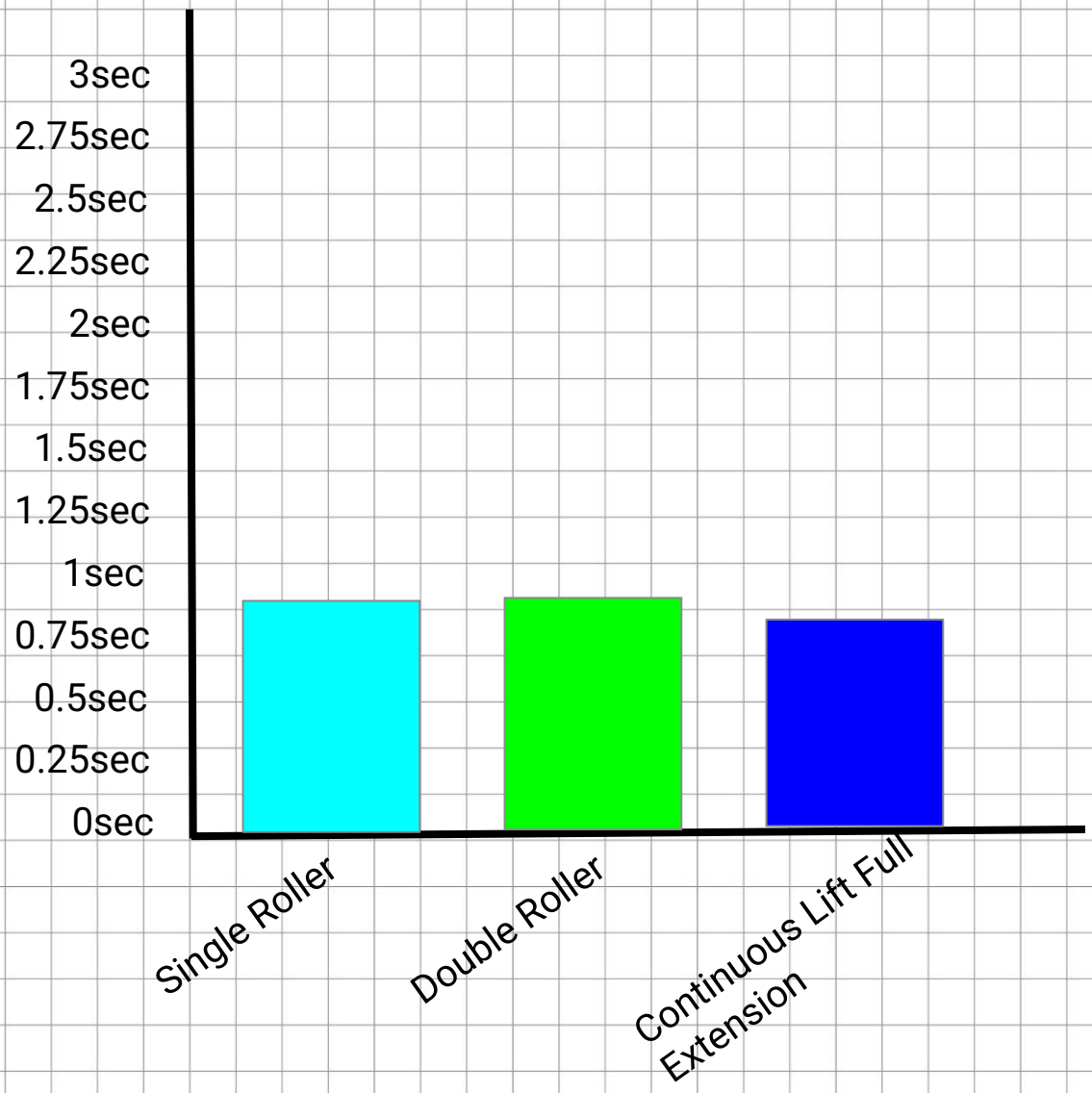
TASKS	Monday	Tuesday	Wednesday	Thursday	Friday
Front Intake					

Half Scale

Speed Test - Pin

For the Speed test we are going to see how long it takes for the front intake to pick up a pin.

To determine the speed at which we pick up pin we will use a stop watch.



Half Scale

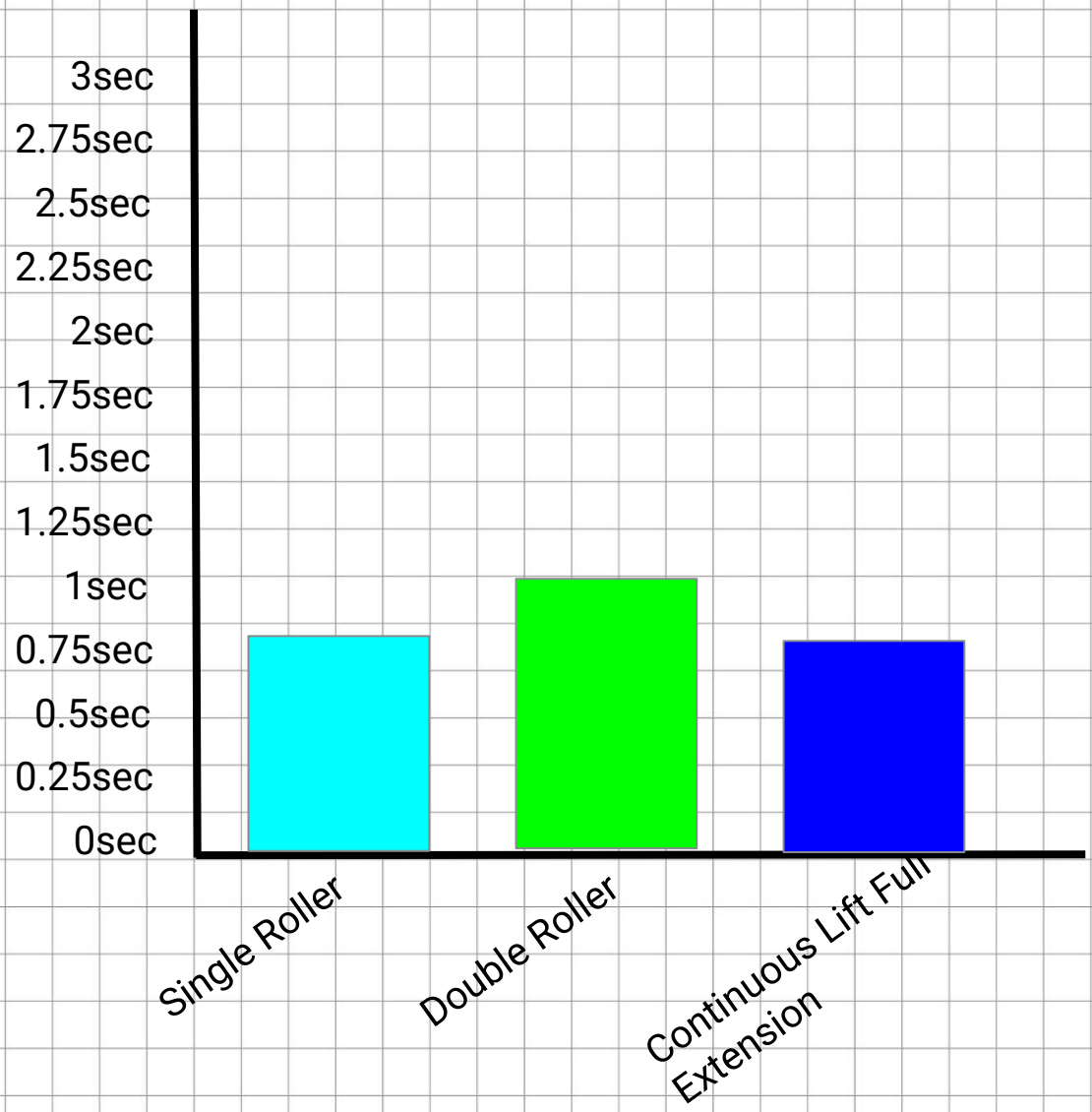
Project Speed Test - Pin

Name Zach Snider Date 10/26 Page #27

Speed Test - Cup

For the Speed test we are going to see how long it takes for the front intake to pick up a Cup.

To determine the speed at which we pick up cup we will use a stop watch.



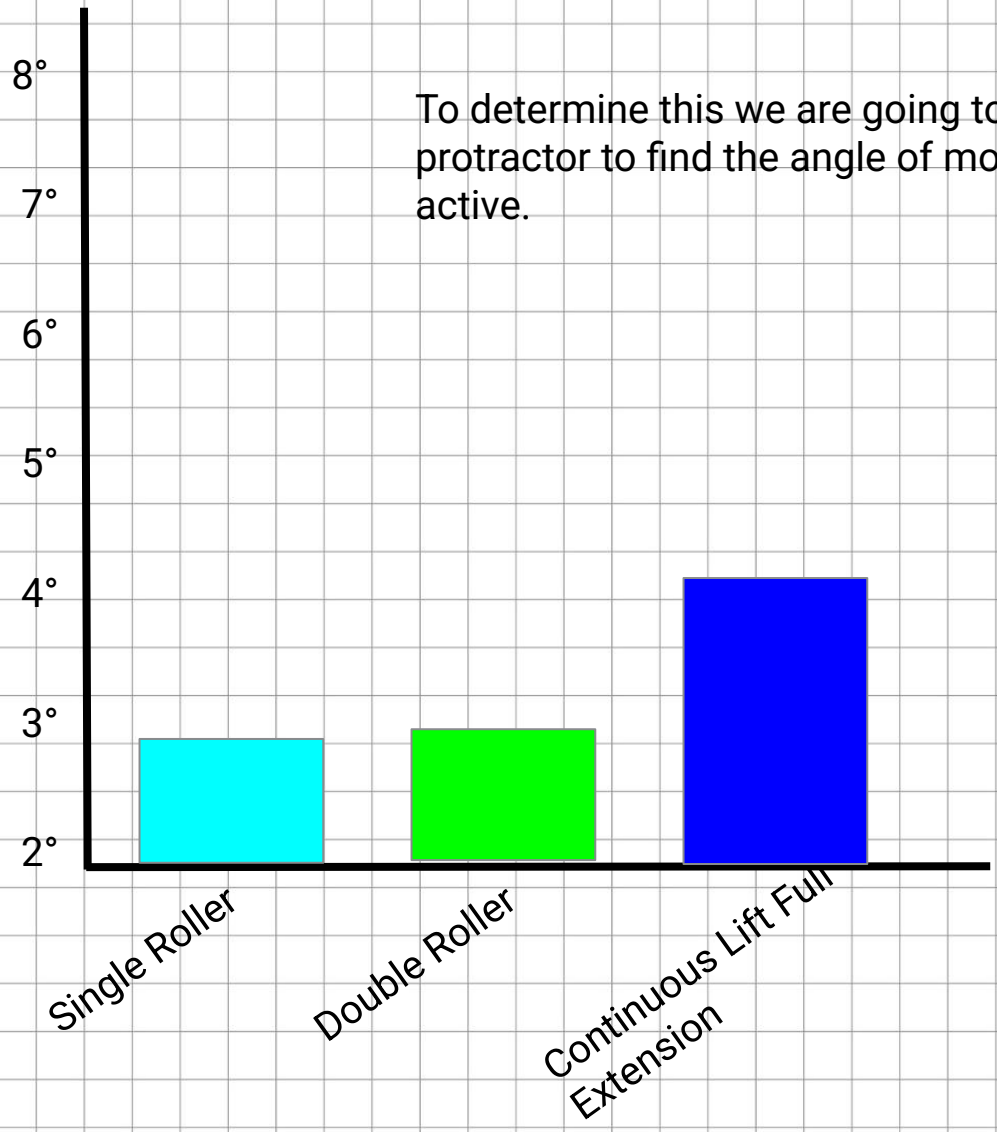
Half Scale

Project Speed Test - Cup

Name Zach Snider Date 10/26 Page #28

Stability Test

For the Stability test we are determining how much each intake woobbles



To determine this we are going to use a protractor to find the angle of motion when active.

Half Scale

Project Stability Test

Name Zach Snider Date 10/28 Page #29

Determine The Intake

For the push force test we are using the Dual-Range Four Sensor which has a spot to drive the robot into which will measure the pounds of force the robot uses.

	Speed	Stability	Jamming
Single Roller	7/10	9/10	6/10
Double Roller	6/10	9/10	5/10
Continuous Lift	8/10	6/10	10/10
DR4B	7/10	5/10	9/10

Total

Single Roller 22/30 **DR4B** 21/30

Double Roller 20/30

Cascade Lift 24/30

Half Scale

Project Determine The Intake

Name Zach Snider Date 10/30 Page #30

Week of 11/02

Iterations of the Lift

Brainstorming

TASKS	Monday	Tuesday	Wednesday	Thursday	Friday
Cascade lift					
Claw					

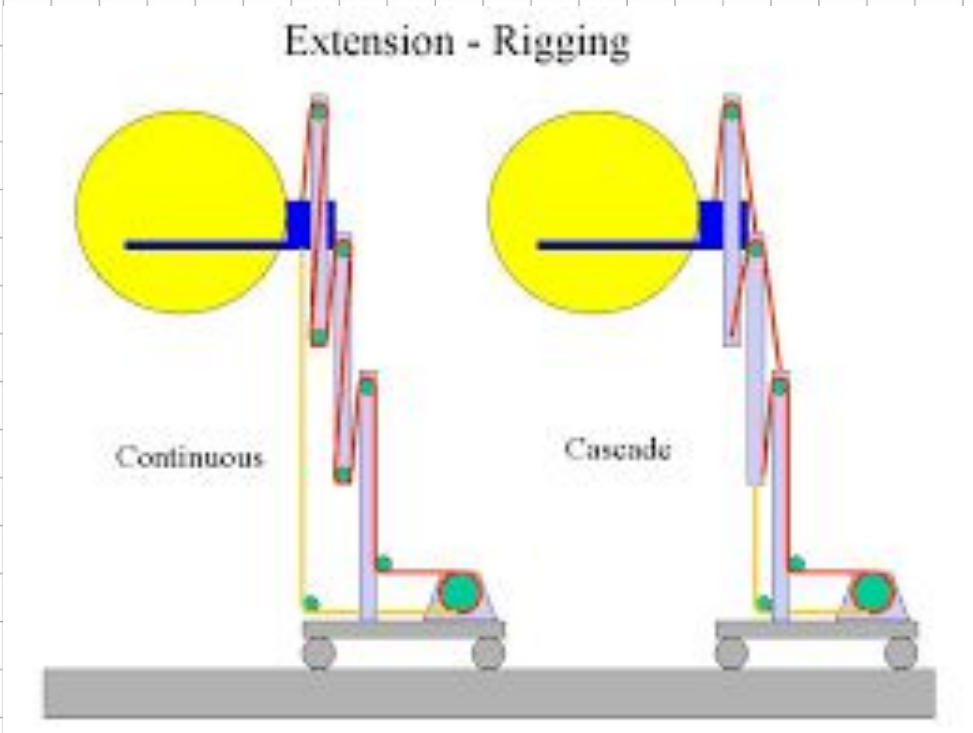
Half Scale

Project Week of 11/02

Name Zach Snider Date 11/02 Page #31

Making the Lift Better

To make the Continuous lift better we are going to change it to a Cascade lift. To do this we just need to change the setup for the fishing line.



We are also going to be fixing minor issues like wobbling and friction.

Old **New**

Half Scale

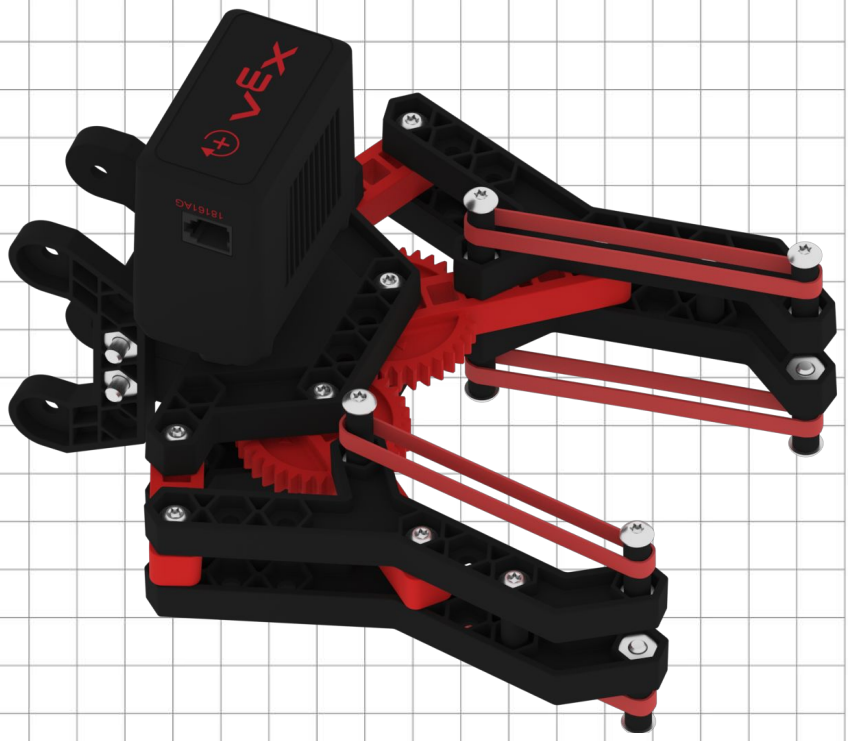
Project Making the Lift better

Name Zach Snider Date 11/02 Page #32

Brainstorming The Claw

The 1st claw design is the Vex claw. This claw is a good claw for beginners

#1



Positives	Negatives
• Sturdy • Grippy	• Weighs a lot • Picks up one cup or pin

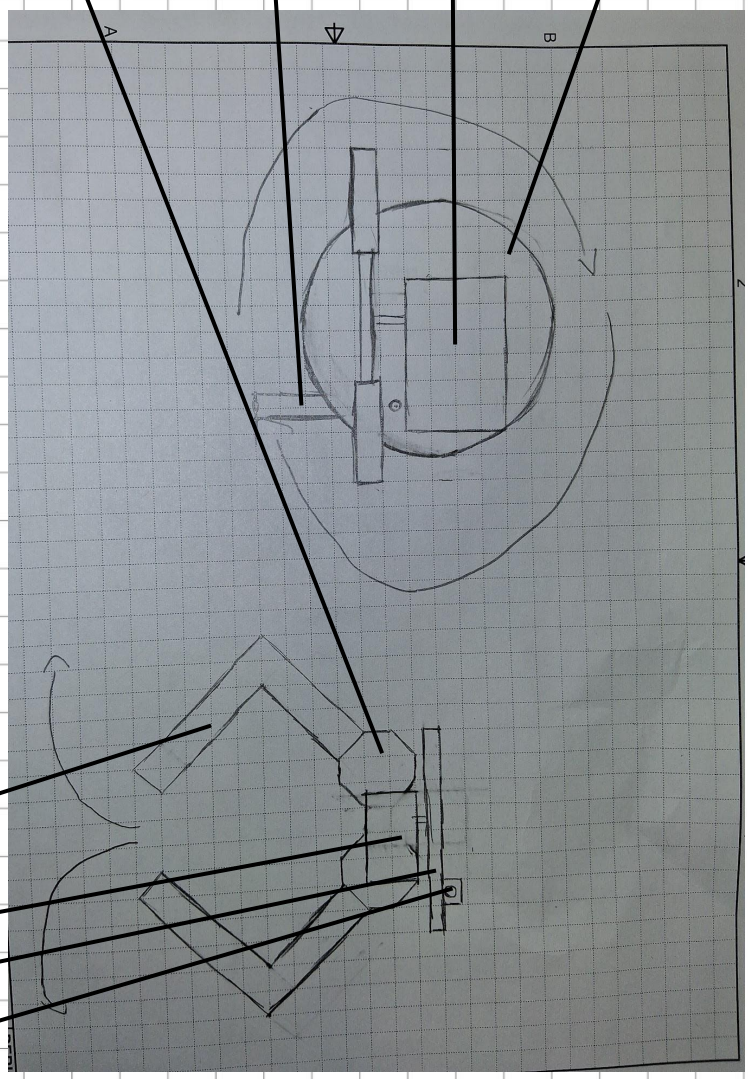
Half Scale

Brainstorming The Front Intake

The 3rd idea is a claw on the front that can grab pins and cups then dunk them into the scoring mech.

#2

Positives	Negatives
• Small • Sturdy • Accurate • Can change orientation	• Can't Pick up fallen over pins or cups



The actuator is attached to the 60T gear so that when it extends it rotates the gear and the claw.

Half Scale

Project Brainstorming The Front Intake

Name Zach Snider Date 11/03 Page #33