Vex Roootic

8876C

ENGINEERING NOTEBOOK

Steam-C

Queensbury High School, NY

VOLUME I

NOTEBOOK

NOTEBOOK NO. 1

CONTINUED FROM NOTEBOOK NO. CONTINUED TO NOTEBOOK NO. 2

ASSIGNED TO:

NAME Alana [redacted]

SIGNATURE alana [redacted] DATE

DATE ISSUED 9/9/21 BY

[redacted]

COMPANY

DEPARTMENT

ADDRESS

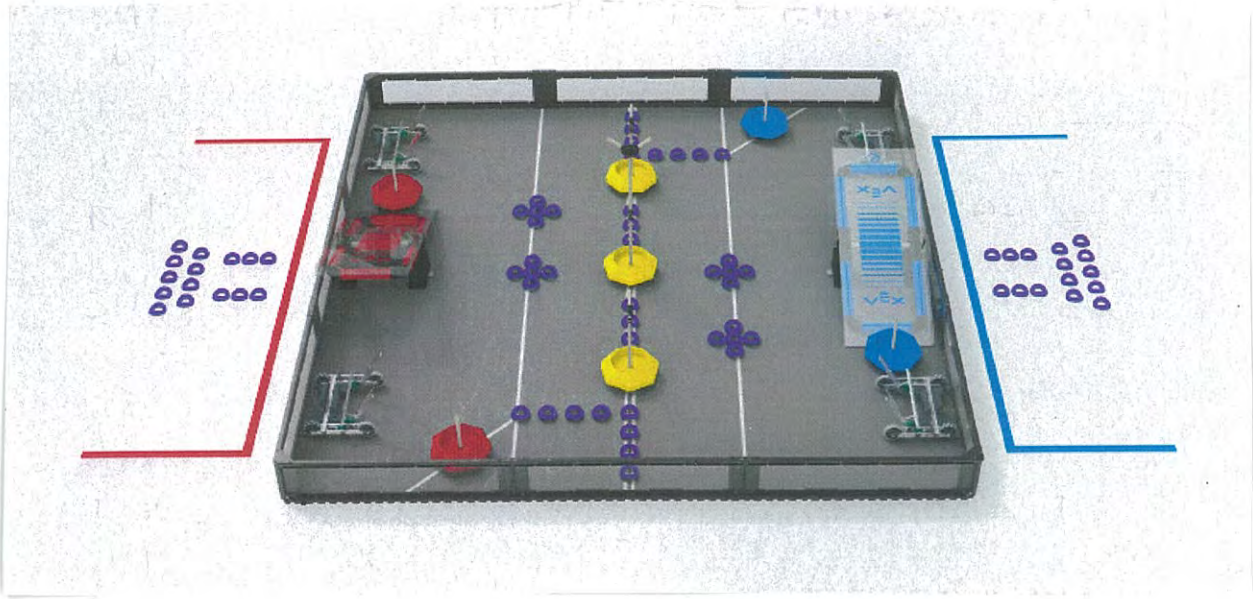
CITY Queensbury STATE New York ZIP 12804

DATE NOTEBOOK COMPLETED 2/18/22 NUMBER OF PAGES FILLED IN 162

NOTES:

VEX ROBOTICS COMPETITION

TIPPING POINT



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Title - (Notebook setup)

page number

Plan: Write out the plan for todays meet here

- Main Topic
  - Subtopic / information
- Guidlines / Requirements
  - use black pen
  - cross out extra space
  - use 1 line to cross out mistakes and sign your initials above/below the mistake
  - must have 2 different people sign their names at the bottom of the page
  - team number on the front cover of the book
- Future Goal(s):
  - goal for next meet

Photo Insert

Engineer - writer sign

Date

Date

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SIGNATURE [redacted]

DATE 9/9/21

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About Our Team - First Meeting

- Team 8876C "STEAM-C"
  - Members on the team
    - Alana [redacted]: Design Notebook
    - Christopher [redacted]: Programmer
    - Samuel [redacted]: Engineer
    - Elijah [redacted]: Programmer
    - Tyler [redacted]: Engineer
    - Manuel [redacted]: Spotter
    - Claire [redacted]: Engineer

We are a highschool team. Christopher, Samuel, Tyler, and Manuel were on a robotics team together two years ago (their freshman year). Alana did robotics two years ago in 7th grade (middle school) and 6th grade. We are student led.

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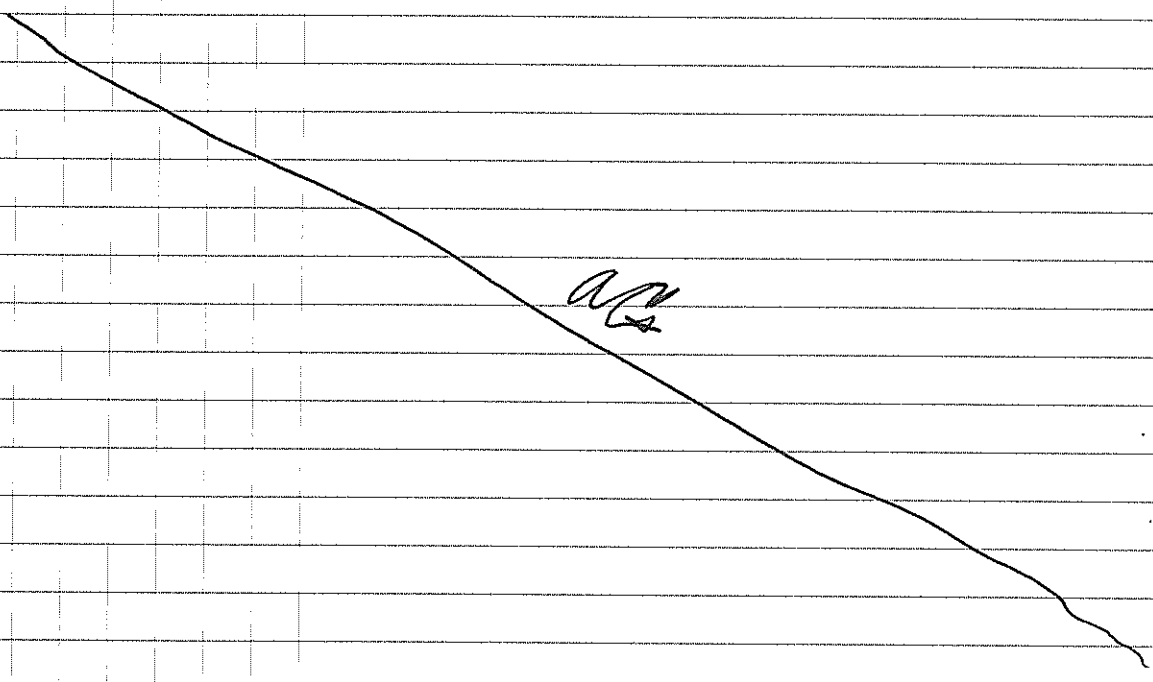
PROPRIETARY INFORMATION

Team Schedule and Club Meetings

- Team 8876C Schedule

  - Tuesdays, Wednesday, and Thursdays
  - 2:00pm-4:00pm on Tuesdays and Thursdays
  - 2:00pm- 3:00 pm on Wednesdays
  - 3 hours a week minimum
  - Room 123
  - Share space with other teams
  - Each team has their own table to work at
  - Make it to all meetings
  - Increase time and frequency of club meetings closer to date of competition if needed



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SIGNATURE [redacted] DATE 9/9/21

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Team Positions and Responsibilities

- Tyler [redacted] (Male)

[redacted]

  - Tyler is a Junior at Queensbury High School in his 3rd year of Robotics. He is One of ~~two~~ three engineers on our team who specializes in the sketching, modeling, designing, and constructing our robot. While he is an engineer, he helps out with the design notebook needed in order to provide our team with the best chance of success.

- Christopher [redacted] (Male)

[redacted]

  - Chris is a Junior at Queensbury High school. He is the lead programmer for our team. This is his 3rd year of robotics. He also participates ~~[illegible]~~ in the design, construction, and strategy of the robot.

- Samuel [redacted] (Male)

[redacted]

  - Samuel is an engineer at Queensbury High School. He specifically works on sketching of ideas and the Building of these ideas. This is his 3rd year of robotics. He also likes all his team members, contributes to Brainstorming and writing within the design notebook.

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SIGNATURE Samuel [redacted] DATE 9/9/21

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- Elijah [redacted] (Male)

[redacted]

- Eli is a junior at Queensbury High school, This is his second year of robotics. He is the secretary of the robotics club and a programmer for our team. He also helps build the robot and brainstorms ways to solve problems.

- Alana [redacted] (Female)

- Alana is a Freshman at Queensbury High Schod. She is the head of our design notebook for our team. This is her 3rd year of robotics. She is in charge of documenting our design process as we build and improve our robot. Alana helps out her teamates whenever she can and contributes to the design and construction of the robot.

[redacted]

- Claire [redacted] (Female)

[redacted]

- Claire is a Junior at Queensbury High School. This is her first year of robotics. She is an engineer on our team who helps with designing and building the robot.

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SIGNATURE alana [redacted] DATE 9/9/21

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- Manuel [redacted] (Male)
- [redacted]
- Manny is a junior at Queensbury High school. He is the spotter for our team. This is his third year of robotics. He is in charge of learning the rules and the scoring during the matches. He helps out whenever and wherever he can during the meetings, from helping build the robot to modifying a program with our programmers, Eli and Chris.

MP

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SIGNATURE Manuel [redacted] DATE 9/9/21

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VEX Competition Overview

- VEX Robotics
  - The VEX Robotics Competition is meant to prepare students to become innovators in the future. We will use teamwork, our problem solving skills, and our knowledge of math, science, and design to build a robot as well as be competitive. As the world continues to grow we face more complex challenges. The traditional methods of teaching science, technology, engineering, and math may not be sufficient to prepare students to fix complex problems later on. Being on a VEX Robotics team will offer us students methods to approach and solve these new challenges and problems with confidence and creativity.

SIGNATURE Alana [redacted]

DATE 9/14/21

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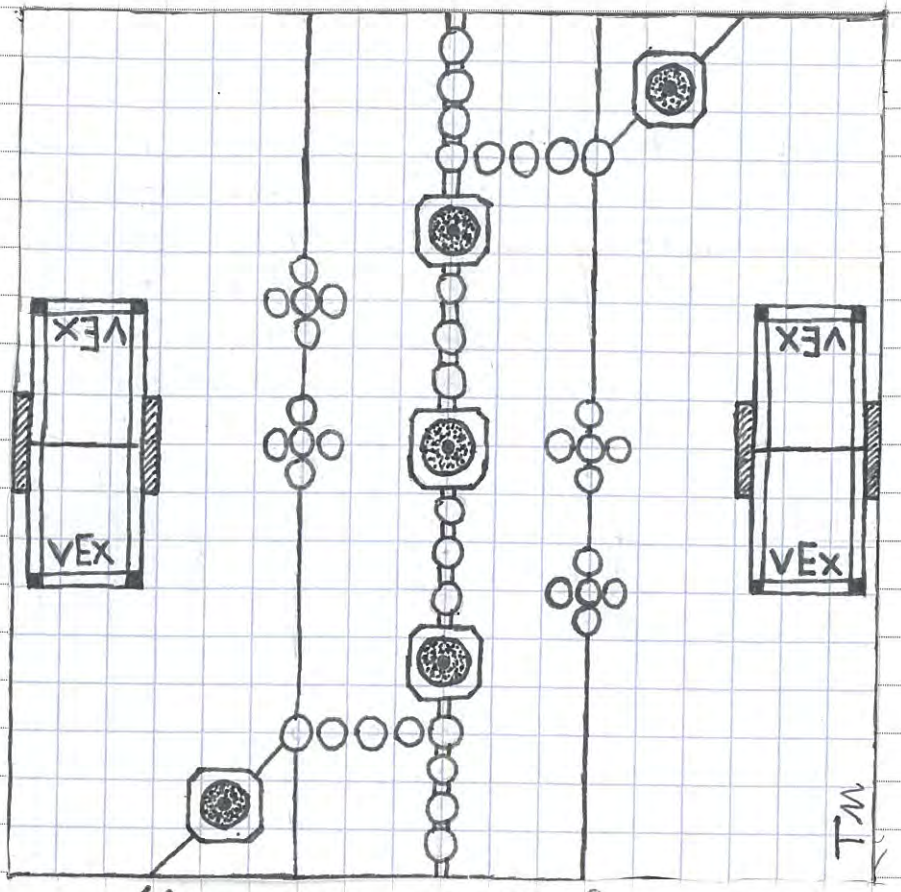
Manuel [redacted]

DATE 9/14/21

VEX Tipping Point Game



(2021-2022 VEX VRC Game Field)

This is the VEX VRC playing arena for the 2021-2022 Tipping Point Competition. The arena is a 12' x 12' square field. The driver will use the different size bases, the platform, and the alliance home zone to score as many points as they can using the ~~rings~~ ag rings on the playing arena.

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VEX Tipping Point Scoring

Ring on or in a scored Mobile Goal	Mobile Goal High Branch	10 Points
	Any other Mobile Goal Branch	3 Points
	Mobile Goal Base	1 Point
Neutral Mobile Goal	Either Alliance's Home Zone	20 Points
	Elevated on a Balanced Platform	40 Points
Alliance Mobile Goal	Correct Alliance's Home Zone	20 Points
	Elevated on Correct Alliance HZ	40 Points
Robot	Elevated on Correct Alliance HZ	30 Points
Alliance	Wins Autonomous Bonus	6 Points

Platform must be balanced.

- Balanced; A Platform state.
  - Considered Balanced if:
    - i) Platform is roughly parallel to field
    - ii) ~~Plat~~ MPR Both flat surfaces of the Platform hinges are contacting the Platform base.
    - iii) Robots and/or Scoring Objects contacting the Platform in their Alliance Home Zone are not also contacting any other Field Elements such as foam tiles or field perimeter.

- Contact is considered transitive, through robots and Scoring Elements.

Elevated:

- A robot / Mobile Goal state.

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SIGNATURE Manuel [redacted] DATE 9/14/21

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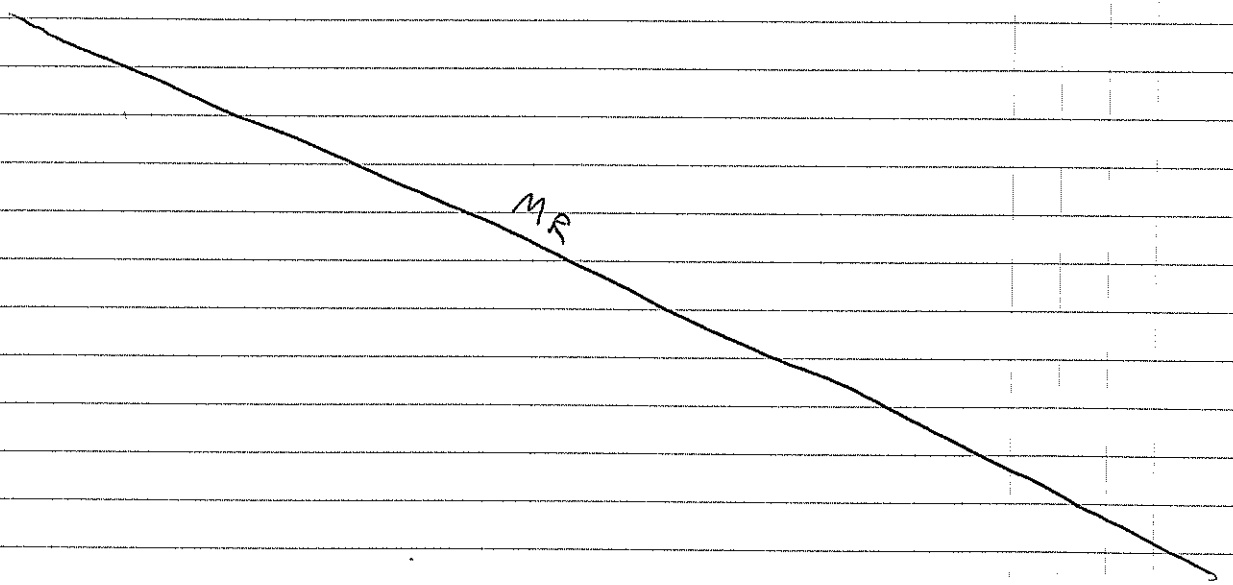
- To be elevated:
  i) ~~If~~ MR the robot/Mobile Goal must be contacting the Alliance Platform
  ii) Platform must be balanced (see Previous page)
  iii) Robot and or Mobile Goal cannot contact any other Field Element. (Once again, contact is transitive, see previous page)

Rings Scoring:

- Rings are only scored if they are ~~not~~ MS NOT touching a robot, a field Element, or a ring that is not considered scored.

- Rings are only scored on a Mobile Goal Branch if they are fully or partially encircling a branch.



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SIGNATURE Manuel [redacted] DATE 9/14/21

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VEX Tipping Point Rules Overview

Safety Rules:

- Tie hair back, tighten loose clothing.
- Safety glasses are required when operating any cutting tools or the robot.
- Closed toe shoes need to be worn at all times.
- Do not walk on playing field during match.
- No running at any time.
- Follow any and all COVID-19 procedures.
- Most importantly, be helpful and friendly to everyone.

Robot Rules:

- One robot per team.
- Vex parts only
- Robot must fit within a 18" x 18" x 18" cube.
  - Robot may expand past 18" cube after match starts
- Must pass inspection
- Must stay on own side during autonomous.
- Must keep all field elements in the field
- Don't destroy other robots.

Possession -

- A robot is considered to be in possession of a Mobile Goal if any one of the following is met:
  1) Robot is carrying, holding, or controlling the movement of a Mobile Goal such that if the robot changes direction, the Mobile Goal will move with the robot.

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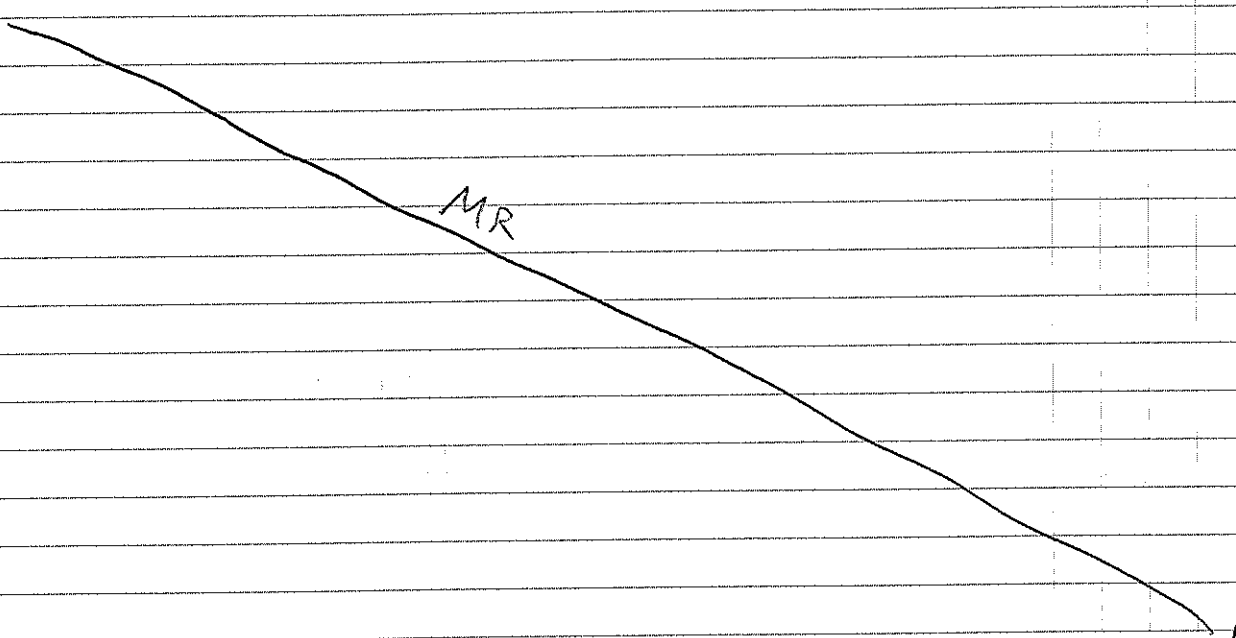
i) Pushing or Plowing a Mobile Goal is not considered in Possession unless it is in a concave portion of the robot.

2) Robot is actively blocking opposing robot's access to Mobile Goals, such as expanding horizontally and restricting access to a portion of the field.

3) Robots in the same alliance working together to restrict access to Mobile Goals are both in possession.

Hoarding - A form of Possession.

- A robot is hoarding if it is in possession of any Mobile Goal in either of the 2 corners of the field in their own Alliance Home Zone.



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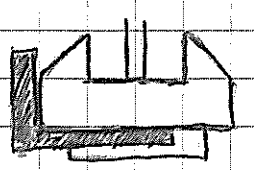
Initial Thoughts

- watching the explanation/rules video
  - Rings not worth much.
  - Focus on bases and getting them on the elevated platform.
  - Rings only viable if you can get a lot at once.
  - Tip enemy platform and maybe even shove something underneath.
  - Put rings on a base while holding it?
  - Rings can get stuck in wheels.

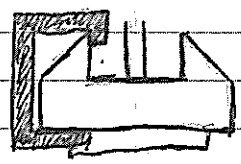
Task	Points
Base ring	1
Low ring	3
High ring	10
Home base	20
elevated base	40
elevated robot	30

Designs
- Ring-focused robot.
- Base focused robot.
- Plough robot to collect as much as possible.

Base Grabbing Ideas

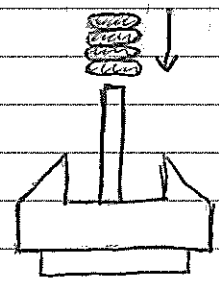


Forklift (requires long arm)



Clamp (requires motor/piston)

Ring Scoring Idea
Drop rings in stacks, not one-at-a-time



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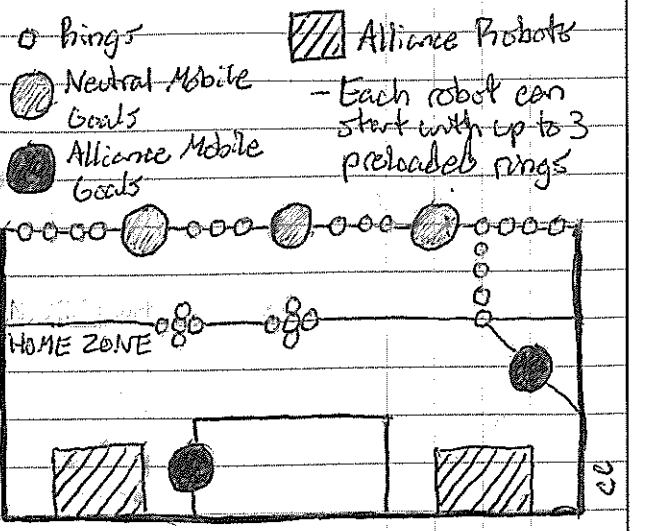
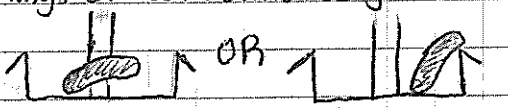
Autonomous Overview

- 15 second period where the robots move based on programming only, with no driver control
- Scoring
  - Rings (placed on mobile goal in alliance home zone)
    - 10p on high branch
    - 3p on low branch or vertical
    - 1p in base
  - Goals: 20p in alliance home zone
  - There are NO POINTS for putting anything on the platform during autonomous
- Bonuses
  - To the alliance that wins autonomous
    - 6p bonus for the driver control period (or 3p each in a tie)
    - (6) AP for each alliance member (or 3 AP for all four teams in a tie)
  - (1) WP for each team on each alliance that completes the necessary tasks

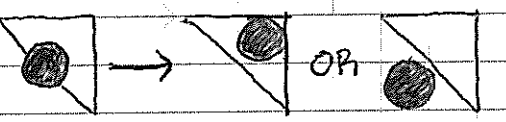


To get the WP Bonus:

Rings on both alliance goals



AND the alliance goal clears the AWP Line



- Importance of WP
  - Teams can get (2) WP for winning a match, (1) for a tie, and (1) as described above

$$\text{Ranking Score} = \frac{\text{Total WP}}{\text{\# of matches}}$$

- Since the bonus increases the total WP without increasing the # of matches, it is better than a tie but worse than a win
- AP are used as tiebreakers if the WP calculation is equivalent for two teams

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SIGNATURE

Christopher [redacted]

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Alana [redacted]

DATE 9/15/21

DATE 9/15/21

PROPRIETARY INFORMATION

VEX Robotics Tipping Point Requirements

- Requirements:

  - To design and build a robot that can pick up rings and place them on and/or in the bases.
  - Robot may also or instead pick up and move bases to in their goal and/or balance them on the platform
  - Program an autonomous mode in which the robot moves on its own to score points at the start of the match
  - Driver should practice driving robot so they have experience for allianee matches and for skills matches
  - Program an autonomous mode for skills match in which the robot moves on its own to score points
  - Cooperate and work together as a team to develop game plans with allianees
  - Work as a team to score as many rings on bases and/or move as many bases into our home zone as possible
  - Engineer (design, build, test, ~~ad~~ and maintain) a working robot by our first competition on December 4th at Chittenango High School

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SIGNATURE Alana [redacted]

DATE 9/15/21

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Robot Design Research

Amongo (Hybrid Ring & Base Robot)

Pros:
- Reliable Autonomous
- Dual Function
- Efficient Rings
- Quick
- Alliance Oriented

Cons:
- Weak Defense
- Cannot lift bases onto platform
- Cannot move bases quickly
- Limited range of motion
- 2 base capacity

Unicorn 2145z (Base Robot)

Pros:
- Can control 3-4 bases
- Compact, simple
- Quick
- Efficient
- High point potential
- Uses pnuematics

Cons:
- Cannot do rings
- Cannot obtain autonomous win point solo
- Solo Oriented

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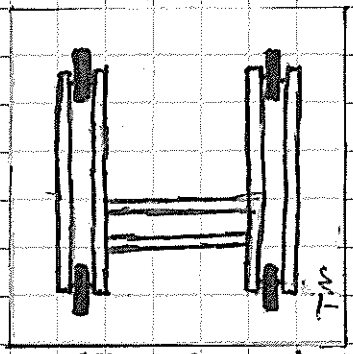
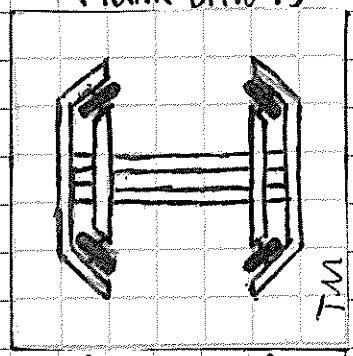
Base Concepts:



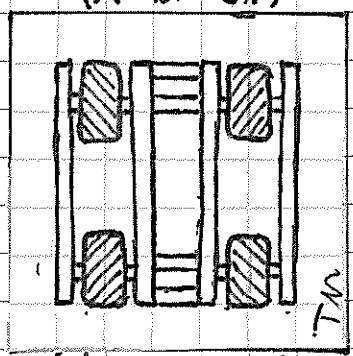
(Tank Drive ↑)

Tank Drive:
- Simple
- Quick to build
- 4 wheels, 4 motors
- Easy to program



(X-Drive ↑)

X-Drive:
- Quick
- Complicated to build
- Omni-Directional movement
- 4 motors, 4 omni wheels
- Mediocre to program



(Mecanum Drive)

Mecanum Drive:
- Slow
- Omni-Directional movement
- Average complexity
- 4 motors, 4 mecanum wheels
- Hard to program

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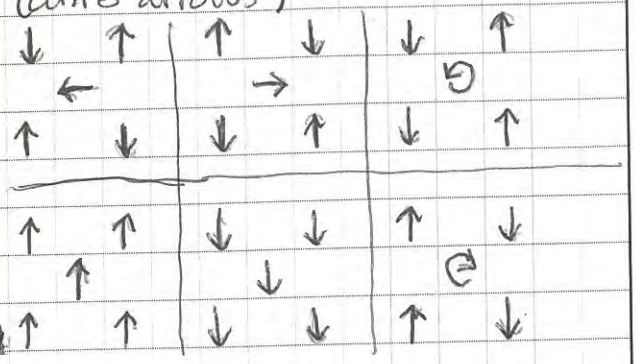
Mecanum Robot:

Mecanum wheels allow omni-directional motion with parallel-aligned wheels. The below diagrams show certain wheel movements (corner arrows) to achieve certain robot movements (center arrows)

Top-Down View of Mecanum Base



- We had experience with X-drives and tank drives, however we'd never used mecanum wheels before. We decided to make a small mecanum robot to test it out.
- The robot was slow, wobbly, and inconsistent. It was clear that we did not want to put them on our competition design.
- The Mecanum Robot has come in useful for us and other Queensbury teams as a programming test bed as well.

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SIGNATURE Christopher [redacted] DATE 9/21/21

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Drive Train

	Maneuverability	Maintence	Construction Time	Total
Tank Drive	5	8	7	20
X-Drive	9	4	3	16
Mecanum	5	2	6	13

- Winning Design was the tank drive through a mix of voting and the design Matrix Pictured above.
- We considered all the variables such as Maneuverability, Maintence, and construction time.
- SD ~~X-Drive~~ Mecanum, we decided that it was not the robot that would help us win. Its clunkly body, bad maintence, and how awkwardly it moved around all contributed to counting this design out of our focus
- X-Drive, we decided that it would not be the design that would help help us win. While its maneuverability is amazing, its maintence is a pain and is easily pushed around.
- Tank Drive, we belive this base design will help us win the most as it's easy maintence and easy design to attach things too, along with the majority vote help secure the design.

SD

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SIGNATURE Samuel [redacted] DATE 9/21/21

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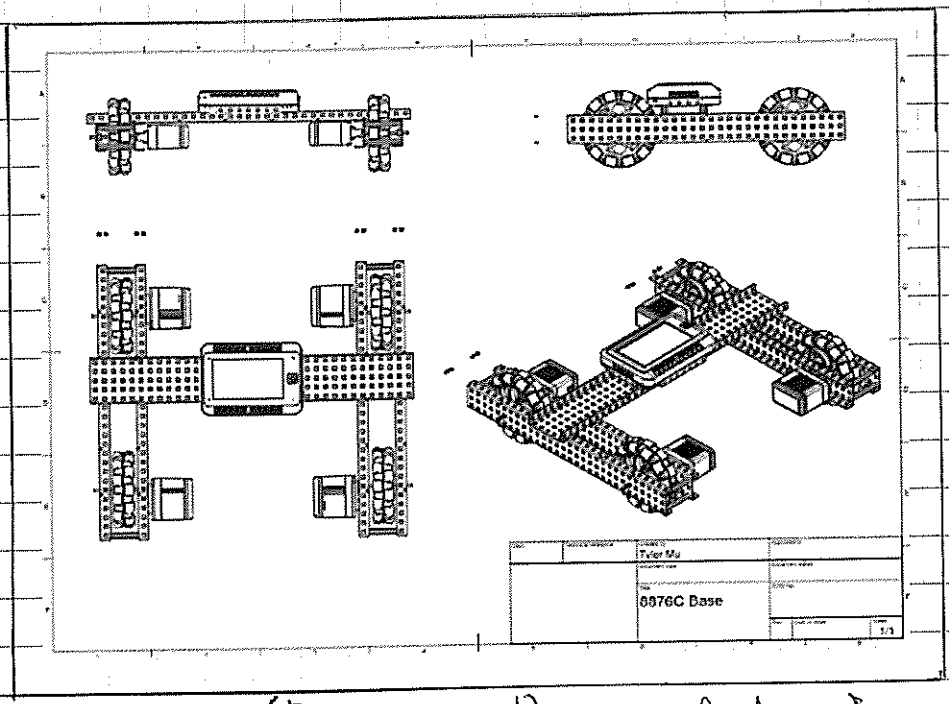
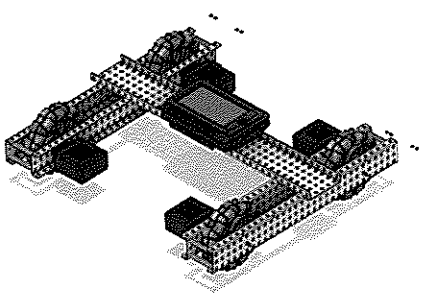
Base Construction



Made With Fusion 360

(Engineering Drawing of base)

- We started to build the base after modeling a design in Fusion 360
- Our model follows a standard four wheel drive model
- 4 motors allows us ~~the~~ tm to have mobility and horsepower, whild leaving room to allocate motors for sub systems



(3D model of base)

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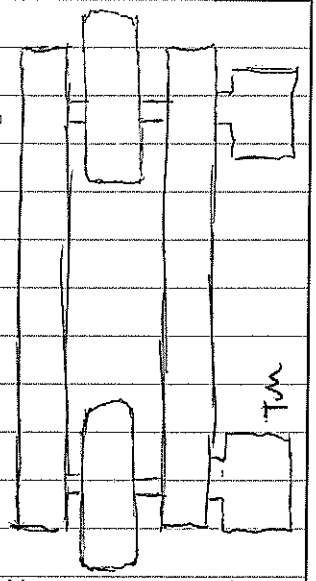
PROPRIETARY INFORMATION

- We constructed one side of the base containing one half of the wheels
  - Afterwards we mirrored it to create two total sides
  - By connecting the two sides with a 5x1x33 C-channel
  - We mounted the ~~battery~~ TM carter in the center of the bar
  - The ~~mounte~~ TM battery was mounted below the carter to keep the base compact.



(Half of our base)

- We used various support pieces such as c-channel, standoffs, and bearing flats to support each piece.

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SIGNATURE [signature] DATE 9/22/21

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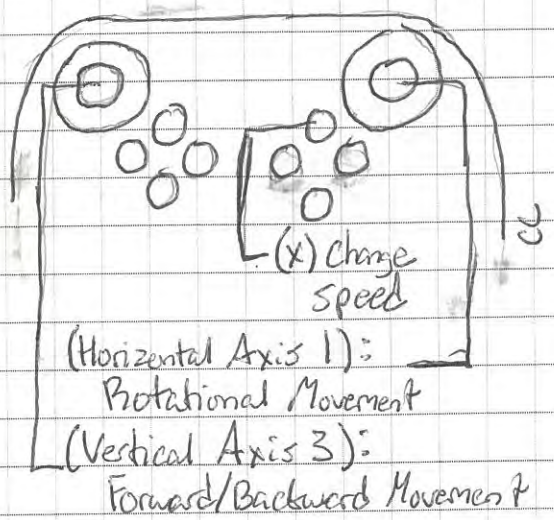
Base Programming

- This is the code for a simple tank-control base movement
- It includes a deadzone for the remote control
- It also includes a way to switch between two speeds by pressing the X on the Controller




```
#include "vex.h"

using namespace vex;

// CLASS INSTANCE INITIALIZATIONS
controller Controller{};
motor LBMotor{ PORT11 };
motor LFMotor{ PORT1 };
motor RBMotor{ PORT20, true };
motor RFMotor{ PORT10, true };

// SPEED DEFINITIONS
// Low drive speed
double speedLow = 0.5;
// High drive speed
double speedHigh = 1.0;
// Actual drive speed (changes during execution)
double driveSpeed = speedLow;
// Swaps the speed between high and low
void changeSpeed() {
  if (driveSpeed == speedLow) driveSpeed = speedHigh;
  else driveSpeed = speedLow;
}

// DEADZONE
int deadzone = 5;


// DRIVE CONTROL
void drive() {
  // Axis positions
  int A3 = Controller.Axis3.position(percent);
  int A4 = Controller.Axis1.position(percent);

  // Calculate deadzone
  A3 = abs(A3) <= deadzone ? 0 : A3;
  A4 = abs(A4) <= deadzone ? 0 : A4;

  // Calculate left and right power (tank controls)
  double lPow = A3 + A4;
  double rPow = A3 - A4;

  // Apply
  LBMotor.spin(forward, driveSpeed * lPow, percent);
  LFMotor.spin(forward, driveSpeed * lPow, percent);
  RBMotor.spin(forward, driveSpeed * rPow, percent);
  RFMotor.spin(forward, driveSpeed * rPow, percent);
}

// MAIN
int main() {
  // Initializing Robot Configuration. DO NOT REMOVE!
  vexcodeInit();
  Controller.ButtonX.pressed(changeSpeed);
  while (true) {
    drive();
    task::sleep(5);
  }
}
```

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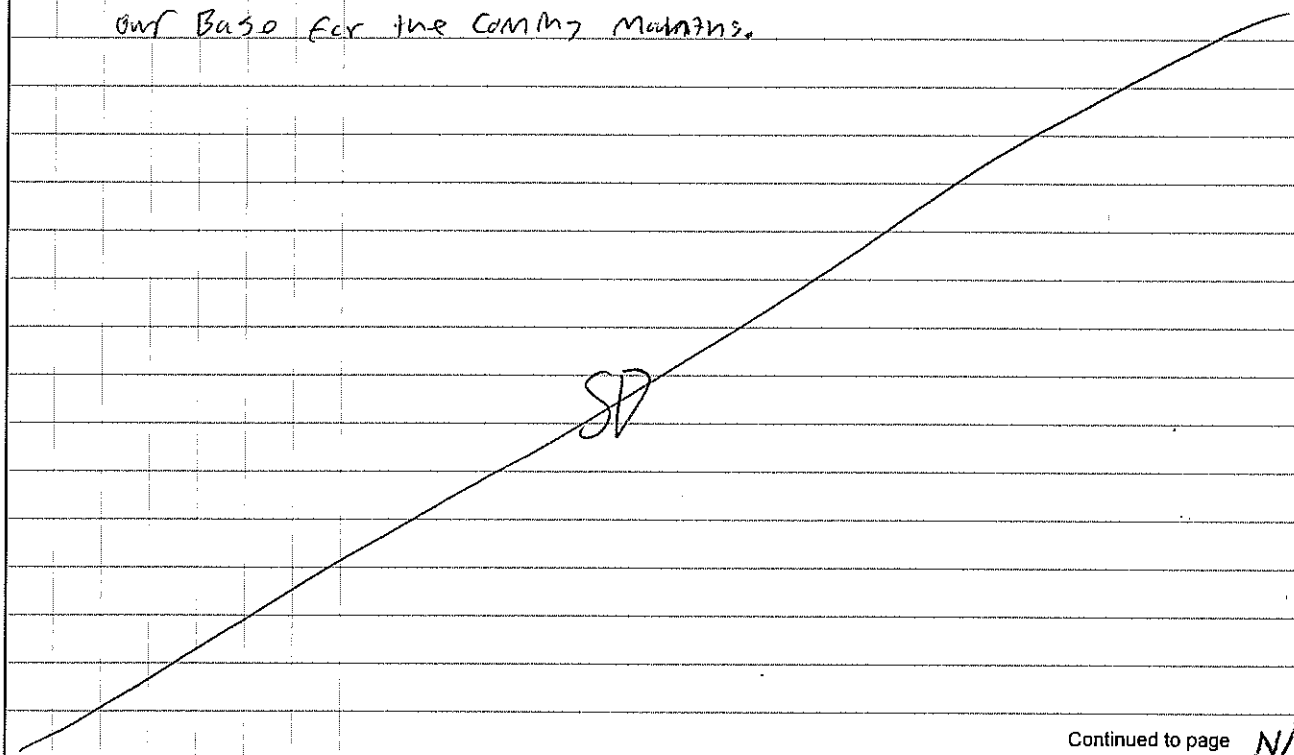
SIGNATURE Christopher [redacted] DATE 9/23/21

DISCLOSED TO AND UNDERSTOOD BY Elijah [redacted] DATE 9-23-21

PROPRIETARY INFORMATION

Drift Problems SD

- When we began Driving the Base arond we relized there was Significant drift after we stoped pressing onto the drive Button.
- we attempted to fix this by making the max value of the encoder after we stopped pressing the drive joystick a max of 10.
- This did not work so we deleted this from the program with no consequences.
- we then noticed the front left and back axel where extremly bent and we replaced these with fresh axels.
- we saw Significant improvment yet there was still a decent amount of dift
- we attempted to finally fix the dift through Slowing the total speed down by replacing the speed inserts inside the motors with normal inserts.
- this worked amazingly with minimal drift and was now our Base for the coming months.



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SIGNATURE Samuel [redacted] DATE 9/28/21

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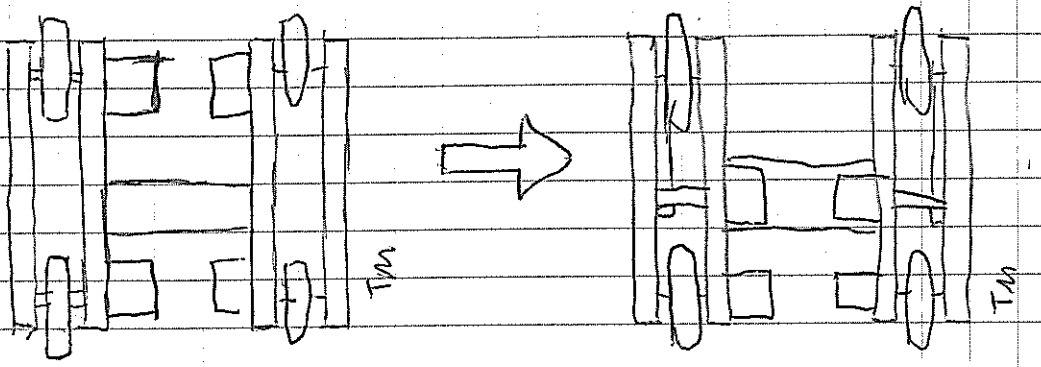
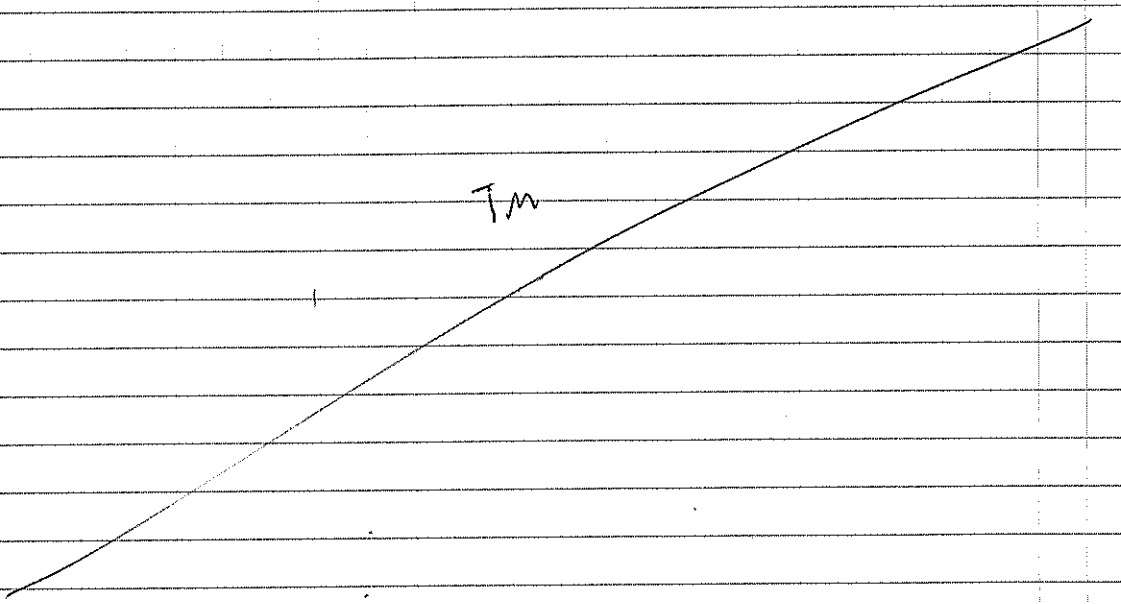
Motor Relocation:

- We noticed we had very little space in the front of the robot, so we decided to move the motor back and connect the axles with a chain





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DATE 9/29/21

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DATE 9/29/21

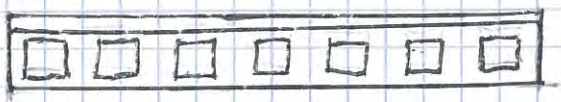
Bumpers

One of the most important issues we noticed while we were testing our robot inside of our practice field ~~white~~ was that the rings were becoming stuck below ~~a~~ in our wheels and in our drive train, which was preventing our robot ~~w~~ from moving. As a solution, we designed and installed bumpers near the wheels to block rings.

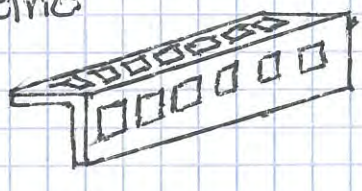
Bumpers:

(TOP)

(Front)



Isometric:



(Side)

Results:

- The bumpers performed as intended and blocked most of the rings from getting stuck
- However, during testing we noticed that rings were still getting stuck in the motors

Further Goals: Find solution to prevent rings from getting stuck in motors → Rounded bumpers instead of angular?

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SIGNATURE

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Base Supplies List

- Parts Used For Base:
  - Cortex: 1
  - Battery: 2
  - Wired Receiver: 1
  - Battery Wire: 1
  - Wire: 8
    - Small: 5
    - Medium: 2
    - Large: 1
  - Screws: 97
    - 1/3 inch yellow: 20
    - 1/2 ineh orange: 37
    - 2/3 ineh ~~yellow~~ red: 32
    - 1 inch ~~orange~~ blue: 2
    - 3/4 inch light green: 0
    - 7/8 inch dark green: 6
    - 1 1/2 inch purple: 0
    - 2 ineh black: 0
  - Nuts: 83
  - Motors: 5
    - Torque: 1
    - Speed: 0
    - Normal: 4
  - Axels: 7
    - Normal: 7
    - Large: 0
  - Wheels: 5
    - Omni wheels: 5
    - Mecanum wheels: 0
    - Normal: 0
  - Gears
    - Sprocket: 4
      1. 5 tooth: 0
      2. 12 tooth: 4
      3. 18 tooth: 0
    - Normal: 0
      1. N/A tooth: 0
    - Fat gears: 1
      1. 12 tooth: 1
  - Spacers: 15
    - White: 11
      - 1/8 ineh: 2
      - 1/2 inch: 9
    - Black: 4
  - Collars: 8
    - Black: 6
    - Metal: 2
  - Standoffs
    - 2 1/2 inch: 8
    - 1 inch: 6
    - 1/2 ineh: 8
  - Chain Links:
    - Small Grey: 80
    - Green: 0
    - Grey: 0

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- C-Channel
  - 3x1x30:4
  - 5x1x33:1
  - (CUT) 1x2x7:2
  - 1x1x7:1
  - (CUT) 3x4x2:1

TM

TM

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SIGNATURE [signature] DATE 9/30/21

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Sub-Systems

- Decision Matrix for Scoring Strategy (load 1-10 great)

Priorities	Point Potent.	Complexity	Reliability	Alliance Help	Total
Bases	10	8	6.8	5.8	30.6
Rings	3.4	5.8	6.2	7	22.4
Hybrid	7.2	3	5	7.4	22.6

* Totals are averaged based on team votes

- We picked the bases for our scoring strategy because have the highest point potential with the least amount of complications occuring.

(load 1-10 great)

- Decision Matrix for Sub-Systems

	Point Potent.	Complexity	Reliability	Defensive	Total
Hooks	5	8.3	8.8	5.4	27.5
Base Pusher	3.2	10	9	0	21.2
Piston Wing	5.5	6	6	3.2	20.7
Claw/Clamp	9.4	2.4	5.2	8.2	25.2
Storage	3.8	6.8	8.4	9.6	28.6
Conveyer	7.8	1.1	4.6	7.9	20.5

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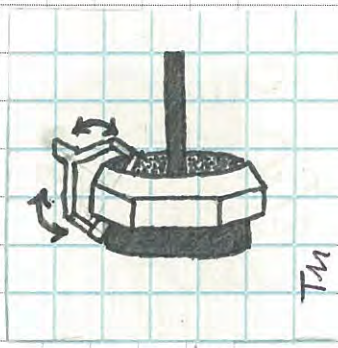
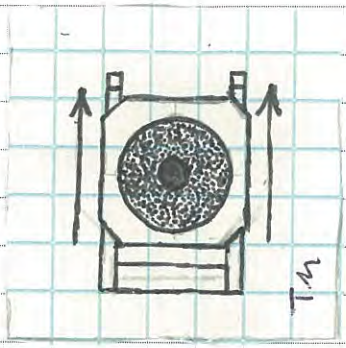
SIGNATURE [redacted] DATE 10/5/21

DISCLOSED TO AND UNDERSTOOD BY Manuel [redacted] DATE 10/5/21

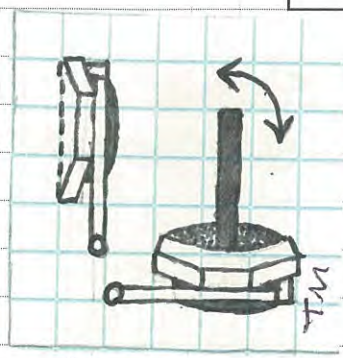
PROPRIETARY INFORMATION



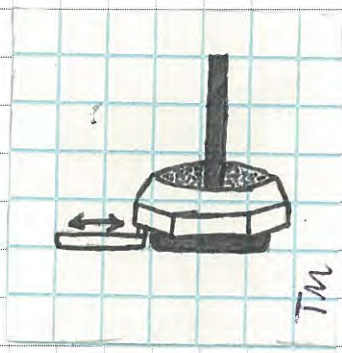
Clamp/Claw



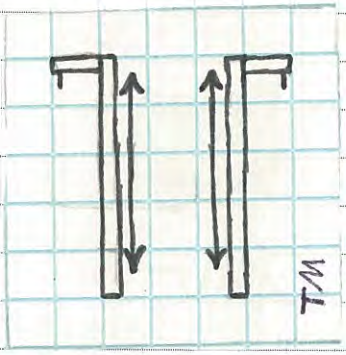
Base Pusher



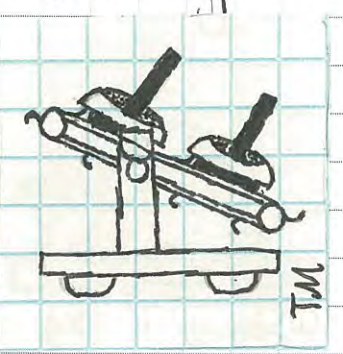
Storage



Hook



Pistun Wings



Conveyer

- Although the claw/clamp design didn't have the highest overall point total, we had to consider the small amount of time we had before the competition on Saturday, December 4th. The claw/clamp design was the quickest design to build and had the highest point potential. Also, unlike the other designs, the claw/clamp grabbed onto the bases on the bottom and top making it harder for the other team to steal the bases.

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SIGNATURE [redacted] DATE 10/5/21

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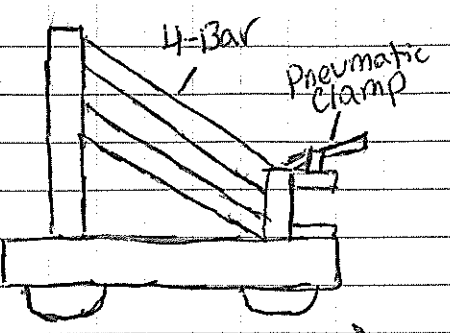
Armbot Conceptualization

- We came up with a basic arm design as shown below. It would use a torque motor along with a torque aligned gear ratio that will assist the motor.



(Sketch of robot concept)

- The estimated range of motion, provided we utilized 35 unit long c-channel, would be around 18 inches which is more than enough to deposit loses onto the platform.

- Primary Subsystem:
  - Pneumatic ~~Sc~~ powered
    - Allows us to control loases without risk of dropping the base and/or another team stealing it

SD

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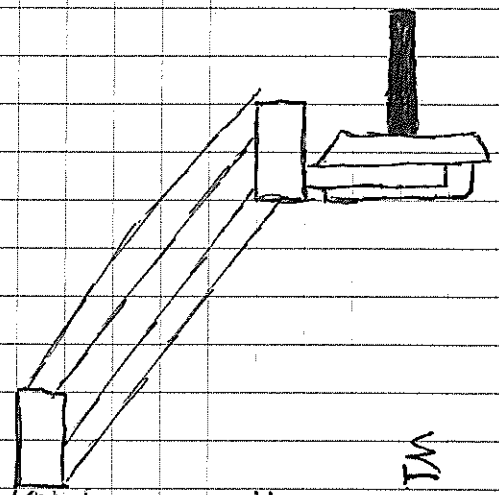
Construction of the 4-Bar Lift



(Sketch of a 4-bar w/a base)

The 4-Bar lift design allows for a motor to rotate and elevate an extension while keeping the base parallel with the Upper section

- Our 4-bar can rotate around 100° from its resting position to its maximum elevations
- Has room for rubber bands to support the lift
- Can have any sort of attachment mounted to the top. Such as a clamp or claw

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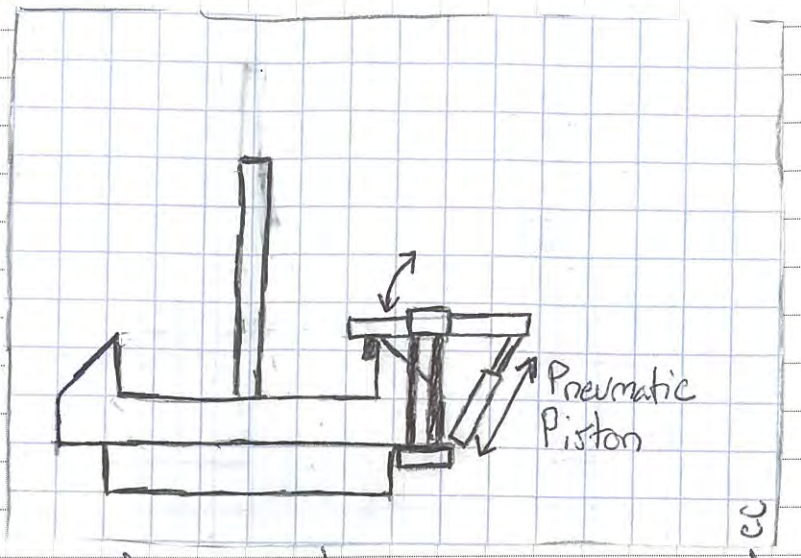
Pneumatic Clamp



We designed the clamp in order to accommodate the use of pneumatics, where a pneumatic piston would lift the upper ~~level~~ lever on the right side, which would clamp the base.

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DATE 10/14/21

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Assembling the Armature

(Claire working on the) Armature

Finishing Touches:

- We fully mounted the clamp to the 4-bar lift
- We had to shorten the length of the 4-bar to accommodate the 18" x 18" size constraint
- Mounted motors to the 4-Bar through the use of 2 torque geared gears and an idle gear

Tm

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DATE 10/19/21

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DATE 10/19/21

Base Adjustments

To account for our newly installed armature, we had to make various changes to our pre-existing base to accommodate the arm

- We had to shorten the inner C-Channel in order to allow the arm to rest near the ~~ground~~ Im ground and grab bases
- We also adjusted the location of the center bar to allow the arm to reach a more appropiate elevation
- The H-bar had to be shortened again ~~to~~ Tm as well as the clamp to meet the 18" x 18" size constraint

Note: At the time we still do not have any pneumatics and are unsure if they will arrive

Tm

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SIGNATURE [signature] DATE 10/21/21

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Pneumatics and Conveyor Design

- Our designs required that we use pneumatics but as all the canisters where being used by other teams we had to order them. These pneumatics would most likely not arrive for another few weeks which we did not have time for.
- Me and Eli came up with a solution which we then proceeded to pitch to the other members of our team, This was a conveyor lift.
- The team talked through all the pro and cons to this as shown below.

Pros	Cons
- Pros include a fast way to collect bases, Protect them from opposing robots, and carry many bases at once. These Pros were very similar to many of the other designs such as the Pneumatic clamp and the Base pusher design.	- Cons include that we have no idea how the conveyor will deposit the bases and whether they would land upright or side ways. Also we would have to add a folding segment so it could fit within the 18x18x18 starting limit but not epand more then the 36inch expansion limit.

- We were able to sketch a basic design of this idea and after that we had a vote and decided this would be the best idea to move forward with to get the best results we can.

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SIGNATURE Samuel [redacted] DATE 10/21/21

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PROPRIETARY INFORMATION

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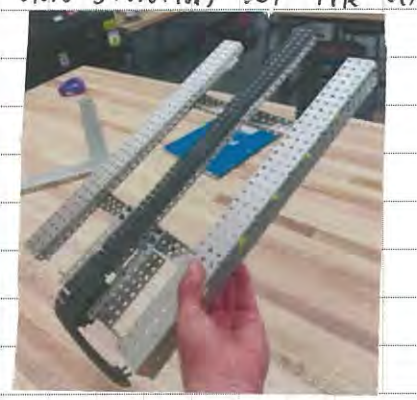
Build of Conveyor Frame

To Start the Build of the conveyer, We first needed a Basic frame to build off of.

- To Start we took 2 C Shaped Peices of Aluminum metal and Screwed them together to to create a Short L Shape.
- We made one of these for each side and they where approximitly 14inches apart and had a small Gearbox w/ SP with Sprokets Jutting out at the bottom ready to recive and redirect chain links.
- Afterwards we added an axel that would rotate around 180 desrees, This would facilitate to movement of the extension of the conveyor which was positioned on the inside of the main frame.
- This folding extension was also equipped with a gearbox and sprockets.
- We then added the motor ~~hardware~~ SP necessary with a torque insert to move the sprockets and eventually the chain links at top of the folding extension.
- Afterwards we had to put Collars and Spacing on all our axels to prevent them from falling off and Stability for the axels.



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SIGNATURE Samuel [redacted] DATE 10/26/21

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Mounted Conveyor on Fulcrum

Once we Belived the basic frame was complete we mounted it onto the base.

- We added a large 84 tooth fat Gear on the left side where we assumed our moter would go, and a 60 tooth fat Gear on the right side. These where placed on because they helped rotate the conveer and could have a fat axel placed inside.
- We relized that to stop and axels from bending under so much torque, so we placed a fat axel through these.
- we then placed rubber collars to keep it from moving from side to side

Ramp while folded

Ramp unfolded

SV

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SIGNATURE Samuel [redacted]

DATE 10/28/21

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DATE 10/28/21

PROPRIETARY INFORMATION

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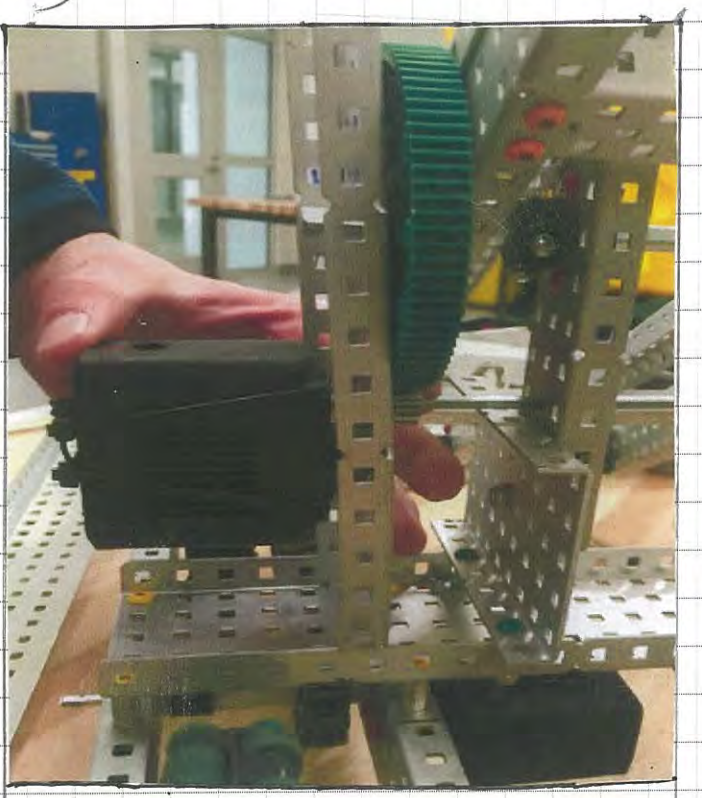
Mounting the Motors for the Fulcrum:



New Location of the Fulcrum Motor

We spent while figuring out where to mount the motor, however most locations interfered with the 18" by 18" constraint or the track. Eventually we found this location after some trial and error which satisfied both criteria.

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DATE 11/4/21

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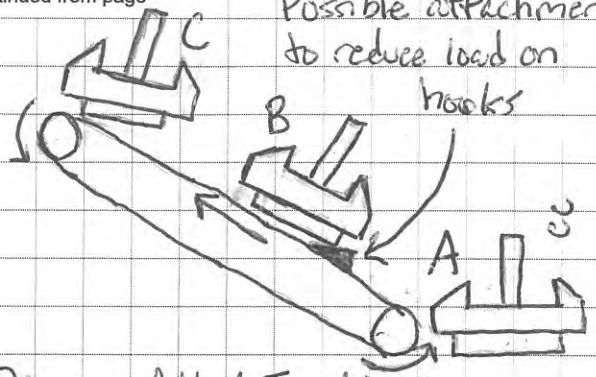
DATE 11/4/21



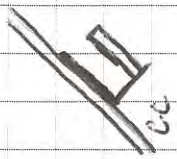
Possible attachment to reduce load on hooks

Diagram of Hook Functions

Hook Design Attempts

We thought that an obtuse-angled hook would be good because it would stay vertical

We also tried shorter prongs to make releasing the base easier



We ended up choosing long prongs at 90° angles (see image left)

Image of our chosen hook design (for now)

Pros and Cons

- The obtuse-angled hooks did not work because the chain actually bends so the hooks angle is not what was intended (see image below)
- The small hooks could release the bases well, but not pick them up
- The large hooks worked best overall, but struggled to release the bases. More testing/development is required

Hook Design Goals

(refers to top diagram)

A – Must be able to pick up bases from the floor

B – Must be able to pull the bases up the conveyor

C – Must be able to release bases onto the platform

CC

Image of hooks angle changed by bent chain

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SIGNATURE

Christopher [redacted]

DATE

11/9/21

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Samuel [redacted]

DATE

11/9/21

Fulcrum Programming and Conveyor Rearranging

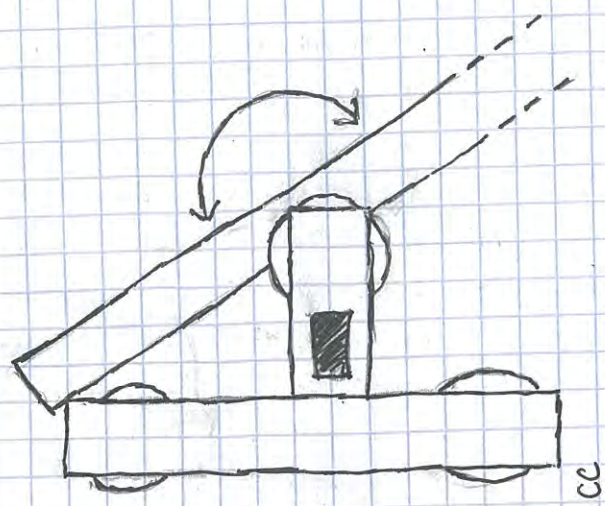

Diagram Of Fulcrum Action

- We programmed the fulcrum to rotate. Originally, with the motor switching between zero and full speed instantly, the whole robot would shake around because of the amount of weight that was being moved
- Instead, we reprogrammed the motor to speed up and slow down gradually, which solved the shaking problem but introduced some delay to the movement
- The program also uses the hold brake type to keep the conveyor in place

```
// FULCRUM EASING
if (Controller.ButtonL1.pressing()) {
  // Speed up clockwise relative to delta time
  fulcrumEaseSpeed += dTime / fulcrumEaseTime;
} else if (Controller.ButtonL2.pressing()) {
  // Speed up counterclockwise relative to delta time
  fulcrumEaseSpeed -= dTime / fulcrumEaseTime;
} else if (abs(fulcrumEaseSpeed) < 10 / fulcrumEaseTime) {
  // If slow enough within a certain threshold, stop the motor in a brake hold
  FulcrumMotor.stop(brakeType::hold);
  fulcrumEaseSpeed = 0;
} else {
  // If neither button is pressed, slow down the motor
  fulcrumEaseSpeed -= (fulcrumEaseSpeed < 0 ? -1 : 1) * dTime / fulcrumEaseTime;
}
if (fulcrumEaseSpeed != 0) {
  // Clamp the speed
  fulcrumEaseSpeed = clamp(fulcrumEaseSpeed, -fulcrumSpeed, fulcrumSpeed);
  // Apply the speed
  FulcrumMotor.spin(forward, fulcrumEaseSpeed * 100, percent);
}
```

dTime is the delta time (in ms) since the last loop

Program Notes

fulcrumEaseSpeed keeps track of the current motor speed

fulcrumEaseTime is the time for the fulcrum to fully accelerate or decelerate (default 500 ms)

fulcrumSpeed is the max fulcrum speed (default 0.5)

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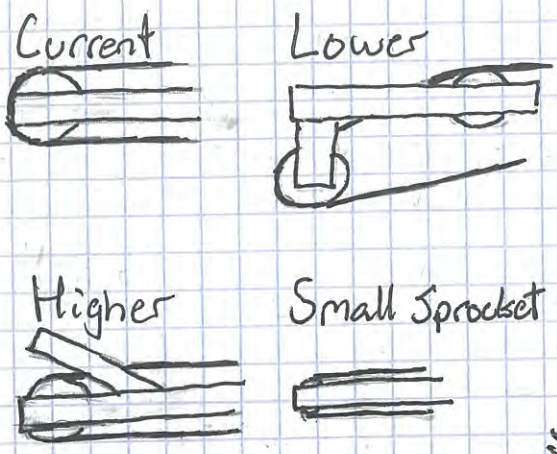
Fulcrum Programming and Conveyor Rearranging Cont.



- The end of the conveyor was flat, and the bases were flipping when coming off the end
- We tried a few possibilities to make the hooks release without flipping (diagrammed on the left)
- The small ~~spock~~ CC sprockets were worse – they didn't release the base at all, the chain just got stuck
- The "Higher" model pushed the bases up at an awkward/inconvenient angle
- The "Lower" model releases better, though still not as good as we'd like. It also makes the chain hang lower on the bottom, causing the hooks to get caught on things.
- We chose to keep the "Lower" model, for now

CC

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PROPRIETARY INFORMATION

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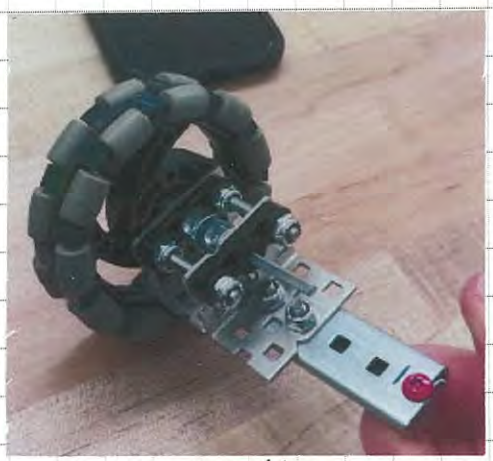
Stabilization Wheel

- As we started testing the autonomous we realized that the whole robot under so much force from the combined power and momentum of the rubberbands and motor flipping the extention of our conveyor belt out, that the robot was tipping over on its backside.
- We needed a quick and easy, yet temporary way of stabilizing the robot.
- We came up with the "Fake Wheel" which is what we call the omni wheel operating on the backside of our robot, freely, and without a motor.

wheel top



wheel bottom

SD

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SIGNATURE Samuel [redacted]

DATE 11/18/21

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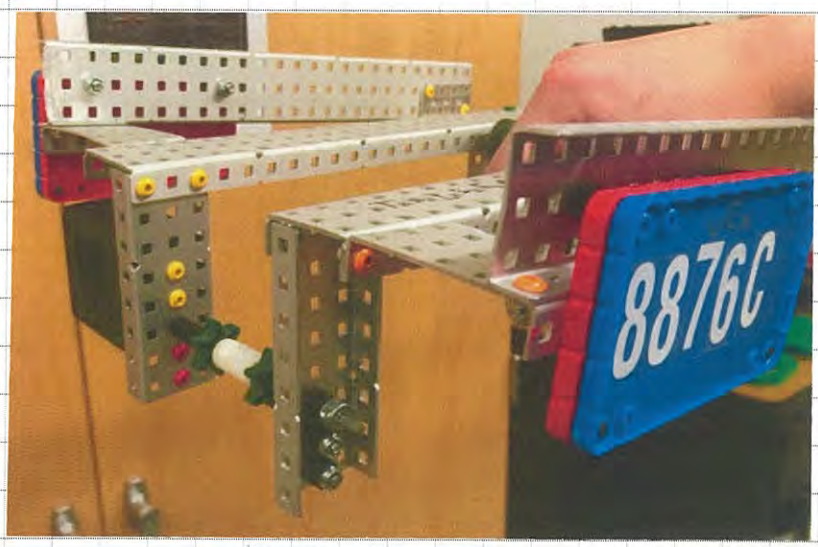
Testing Base Dismount

- At this point we had most of what we needed So Began testing how well we could actually dismount the bases from the conveyor onto the platform.
- We attempted this in many differt way from the angle of the fulcrum to the speed of the conveyor, Yet the bases would rarly get detached from the hooks, and when it did it would not get pushed onto the tipping platform without falling over.
- Our first idea was to lower the motor and conveyor at top to provide leverage as well to help slowly slide the hooks off the bases.
- The defenity helped and the detachment of the hooks occored more frequently, esspesally when the fulcrum was flat.
- The problem with this is that the hooks could never push the bases off anymore and the likly hood of the bases being unhooked was still relativly low, and we wanted 100%



Base dismount

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SIGNATURE Samuel [redacted] DATE 11/18/21

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Sizing Constraint Problems

- We decided to do a quick measurment of our robot after the new addition to make sure it fit within the 18x18x18in and the 36inch sphere constraints
- After a quick measerment we found that it was too Big in both regards
- We reasoned that shortening the extension would fix these problems
- After we shortened these peices of metal the robot fit within the constraints in both regards

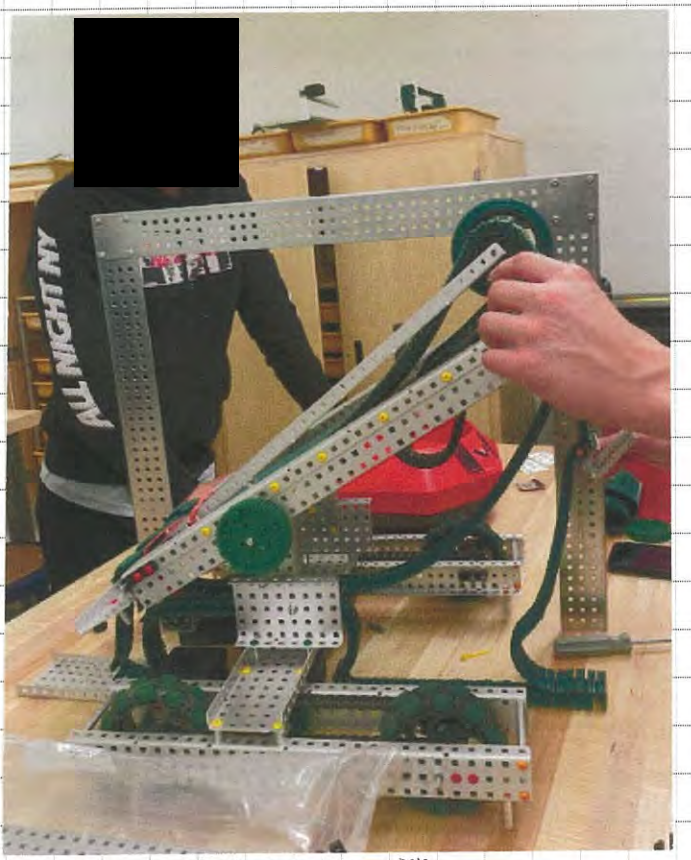

photo of sizing discusion

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SIGNATURE Samuel [redacted]

DATE 11/18/21

DISCLOSED TO AND UNDERSTOOD BY Elmer [redacted]

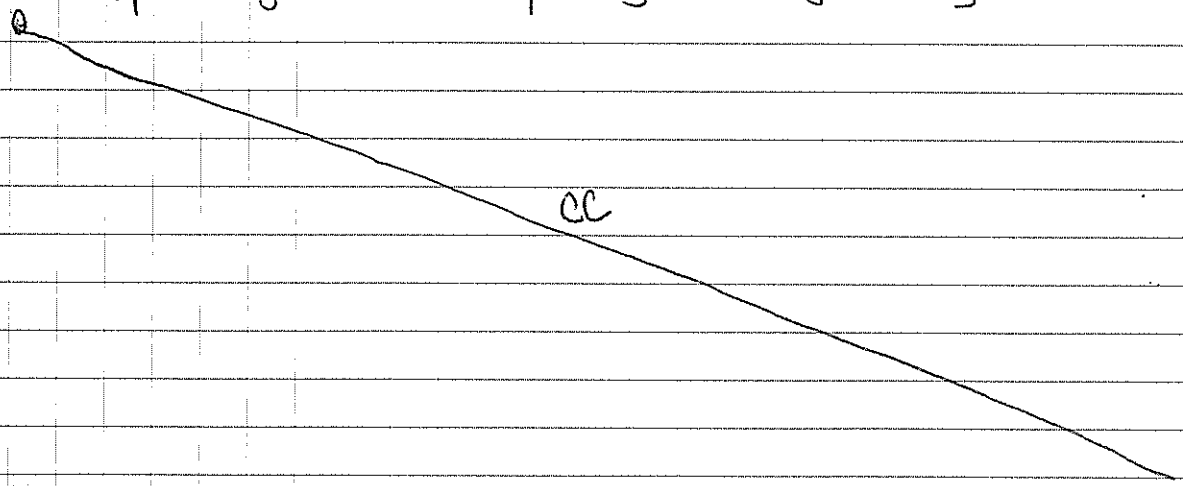
DATE 11/18/21

Autonomous Strategy Discussion

- As discussed in the Autonomous Overview, there is the opportunity to gain a WP during Autonomous. The question posed to the team was if it is worth it to go for the WP or just try to get normal points

Pros	Cons
Worth more than an additional match ending in a tie (see Autonomous Overview)	Dependent on the ally's abilities
	Time spent reduces normal scoring potential
	Our robot is not designed to handle rings

- We decided that, for this competition, we would just focus on getting points and not on the WP
- In the future, however, we would like multiple programs and the option to go for the WP depending on our ally's ability



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SIGNATURE Christopher [redacted]

DATE 11/18/21

DISCLOSED TO AND UNDERSTOOD BY alana [redacted]

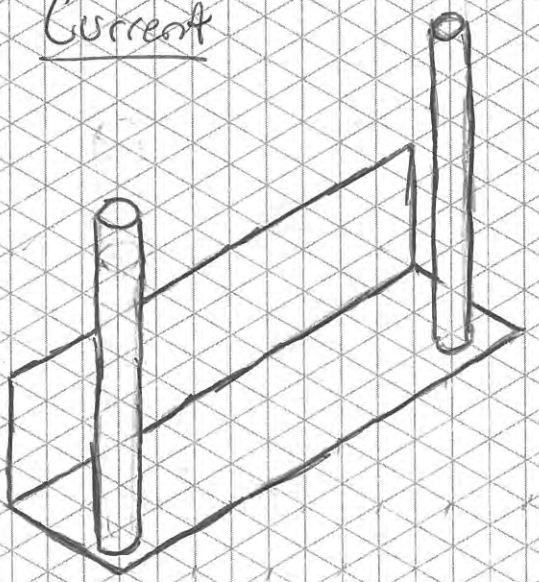
DATE 11/18/21

Continued from page

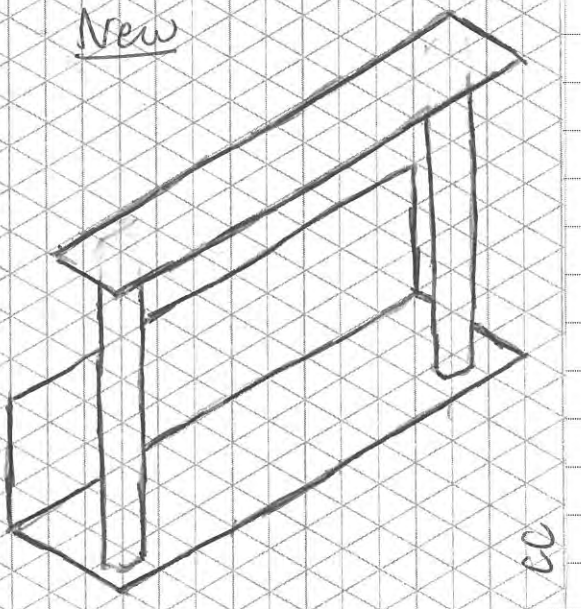
Hooks Redesigned

- We have had issues with the base flipping over and not landing flat on the tipping platform
- We fixed this ~~so~~ 50 by adding a straight piece of metal across so it wouldn't go as far into the base
- This made it easier for the bases to unhook and be deposited onto the platform
- This is the design we will use in our first competition

Current



New



This picture shows why the new design does not get stuck as deep into the base

SV

Continued to page N/A

SIGNATURE Samuel [redacted]

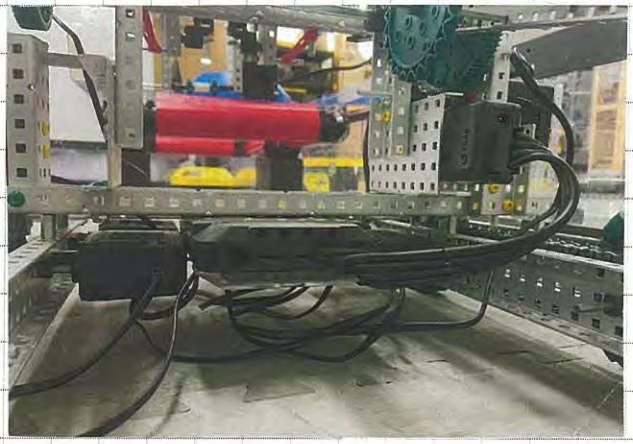
DATE 11/23/21

DISCLOSED TO AND UNDERSTOOD BY Alana [redacted]

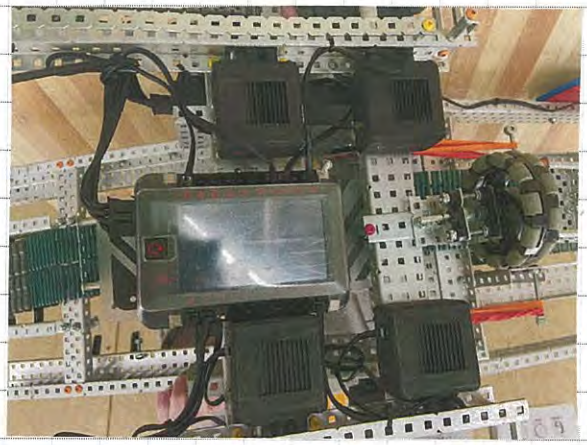
DATE 11/23/21

PROPRIETARY INFORMATION

Moving Cortex



(front view)



(bottom view)

We realized during a test that the hooks on the conveyor belt were hitting the cortex. We moved the cortex from the top side to the bottom side of the c-channel connecting the two inside sides of our base. In order for it to fit there, we had to move the battery onto a c-channel connecting the conveyor to the base.

CS

Continued to page N/A

SIGNATURE Claire [redacted]

DATE 11/29/21

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted]

DATE 11/29/21

Passing out Jerseys

- passed out 8876 jerseys for people who didn't have one already.
- It is a simple design with a blue and gray camo pattern.
- "Spartans" is written on the front while "8876" is written on the back

Jerseys

Tool Box

- we added spare parts like gears, chains, torque inserts, and motors to our toolbox.
- Another communal toolbox was made for the other teams to bring to competitions.
- organised our own tool box and added more screws, metal, and axels.

Continued to page N/A

SIGNATURE	DATE
Elijah [redacted]	12-3-21
DISCLOSED TO AND UNDERSTOOD BY: Claire [redacted]	DATE: 12-3-21

Chittenango High School Tournament

- Everyone arrived on time
- Sam and Manny attended Drivers Meeting
- 22 other teams
- Paper Schedule handed out at competition.

8710C "Steam-C"

Qualification Match List

Bears Robotics Tipping Point Tournament 2021

VEX COMPETITION

Match	Field	Time	Red 1	Red 2	Blue 1	Blue 2
Q1	Field 1	Sat 9:00 AM	99001A	8214C	7157A	1757A
Q2	Field 2	Sat 9:06 AM	8876A	8876C	64040B	64040C
Q3	Field 1	Sat 9:12 AM	7157F	7157X	34000E	64820A
Q4	Field 2	Sat 9:18 AM	64040A	7157C	99001B	8876E
Q5	Field 1	Sat 9:24 AM	53999B	1757T	1757U	53999F
Q6	Field 2	Sat 9:30 AM	7157B	7157E	34000E	1757A
Q7	Field 1	Sat 9:36 AM	8876E	64040B	8214C	7157X
Q8	Field 2	Sat 9:42 AM	1757U	7157C	53999B	8876C
Q9	Field 1	Sat 9:48 AM	53999F	64820A	7157E	99001A
Q10	Field 2	Sat 9:54 AM	7157A	64040C	64040A	1757T
Q11	Field 1	Sat 10:00 AM	99001B	7157F	7157B	8876A
Q12	Field 2	Sat 10:06 AM	1757A	1757T	8876C	8214C
Q13	Field 1	Sat 10:12 AM	8876A	53999F	64040A	7157F
Q14	Field 2	Sat 10:18 AM	1757U	64040B	64820A	7157A
Q15	Field 1	Sat 10:24 AM	7157E	7157X	64040C	53999B
Q16	Field 2	Sat 10:30 AM	34000E	99001A	7157C	8876E
Q17	Field 1	Sat 10:36 AM	7157B	99001B	64040B	53999F
Q18	Field 2	Sat 10:42 AM	8876E	8876C	7157F	7157E
Q19	Field 1	Sat 10:48 AM	53999B	99001A	1757T	7157B
Q20	Field 2	Sat 10:54 AM	34000E	8214C	1757U	8876A
Q21	Field 1	Sat 11:00 AM	7157A	64040A	7157X	99001B
Q22	Field 2	Sat 11:06 AM	64820A	1757A	7157C	64040C
Q23	Field 1	Sat 11:12 AM	64040A	53999B	64040B	34000E
Q24	Field 2	Sat 11:18 AM	7157A	64820A	7157B	8876C
Q25	Field 1	Sat 11:24 AM	64040C	53999F	7157C	8214C
Q26	Field 2	Sat 11:30 AM	7157X	7157F	99001A	1757T
Q27	Field 1	Sat 11:36 AM	7157E	1757U	99001B	1757A
Q28	Field 2	Sat 11:42 AM	8876E	8876A	1757T	64820A
Q29	Field 1	Sat 11:48 AM	99001B	8876C	99001A	64040C
Q30	Field 2	Sat 11:54 AM	7157C	7157B	7157X	8876A
Q31	Field 1	Sat 12:30 PM	8214C	7157E	64040A	1757U
Q32	Field 2	Sat 12:35 PM	34000E	7157A	53999F	8876E
Q33	Field 1	Sat 12:40 PM	64040B	1757A	53999B	7157F
Q34	Field 2	Sat 12:45 PM	64040C	53999F	8876A	1757X
Q35	Field 1	Sat 12:50 PM	99001B	8214C	53999B	64820A
Q36	Field 2	Sat 12:55 PM	64040B	1757T	7157E	7157C
Q37	Field 1	Sat 1:00 PM	64040A	1757A	99001A	8876A
Q38	Field 2	Sat 1:05 PM	64040C	7157B	1757U	8876E
Q39	Field 1	Sat 1:10 PM	7157C*	7157F	8214C*	7157A

Lost

Won

Won 11:20 about malfunction with chain (conveyor) not working

Lost

Judge

Lost

Skill

Lost

lunch break 1hr.

Won

page N/A

SIGNATURE [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 12-4-21

- First Match of the Day:
  - Started off 25 minutes late due to technical difficulties
    - robots wouldn't move during autonomous although the timer was started
  - Match began at 9:25am
  - Information Regarding First Match:
    - Red Team: 99001A & 8214C
    - Blue Team: 7157A & 1757A
  - Results:
    - Blue Team won by 1 point
    - 8214C was the only robot able to successfully put rings on the leases
    - Point Total: 143 to 142
  - What Could Have Been Done Better?
    - Scoring by putting rings on the leases for blue team
    - 99001A's robot wasn't able to successfully place rings on leases due to a gap between their conveyor lift for the rings and the pole of the lease
  - Scoring Questions for Tournament:
    - Do leases knocked over and/or leaning on a wall in the home zone count?
    - Does a platform with lease(s) on ~~it~~ it that is not parallel to the playing field and is nearly touching the ground on one side count?
    - Can a robot be touching an elevated platform at the end of the match?

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SIGNATURE [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 12/4/21

- Our First Match:
  - Updated Information:
    - Began at 9:40am
    - Alliance with Queensbury 8876A Team (Freshmen)
    - Against 64040B and 64040C (Lake George Teams)
  - Results:
    - Blue Team Won Autonomous (Opposite Team)
    - We lost
    - Point Total: 40 to 107
  - What Could We Have Done Better?
    - Improve autonomous mode in which our robot pushes a loose into our goal to score some points. This is because our current autonomous can only open up (extend/expand) our conveyer and moves forward a couple inches
    - Communicate more clearly and frequently (miscommunication occured during match).

Win: 0 Tie: 0 Lost: 1 Matches Played: 1

- Teams to Alliance with for Elimination Rounds:
  - 8214C (LED light robot)
    - Can successfully put rings onto loases and put loases onto platform (can move loases)
  - 64040C (Lake George
    - Had an autonomous that ~~scored~~ scored a high amount of points
    - Their Autonomous:
      - Went forward
      - Grabbed neutral loase
      - turned around

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SIGNATURE [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 12/4/21

- ~ graded alliance base
  - Had 2 bases at once
- ~ Attempted to put rings on the pole of the alliance base but were unsuccessful and instead the rings landed in the base (landed in bottom of base).

- Talked to future alliance teams:
  - 8214C (LED robot)
    - Strategy; they drive up the platform with 2 mobile goals while we collect other goals and move them to our side; placing some of the goals on our platform.
    - They need us to help push their robot onto the platform during driver control period to score points
  - 7157A
    - Asked them about their Autonomous
      - They can only get neutral base during autonomous mode
      - Can't put rings on bases, but can score by placing bases on platform and in our home zone.

- Looked into autonomous scoring:
  - Elevation of robot/bases on platform parallel to playing field does not count towards point total during the autonomous period.

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SIGNATURE [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 12/4/21

PROPRIETARY INFORMATION

- Our Second Match: Win: 1 Tie: 0 Lost: 1 Matches Played: 2
  - Updated Information:
    - Began at 10:31am
    - Alliancees with 53999B
    - Against 1757U and 7157C
  - Game Plan Discussed With Alliance:
    - Alliance would drive up with 2 loases (onto platform)
    - We would help them drive up by using our robot to push their robot up the platform
    - We would push/move the rest of the loases around marking it harder for the opposing team to possess the loases
  - Alliancees Autonomous:
    - moved forward and backward
  - Results:
    - Tie for Autonomous
    - We won (blue team)
    - Point Total: 83 to 93
    - No teams used rings to score points during match
  - What Could we Have Done Better?
    - Putting more loases into our homezone
    - Placing more than one loase onto our platform
    - Remember to play more defensively in which our robot can try to knock off loases on the opposing team's platform (before last 30 sec. of match) during driver control along with stealing loases from other team's robot's possession.
  - What Could the Other Team Have Done Better?
    - Improve/develop an autonomous that can successfully score a minimum of 1 point.

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SIGNATURE Alana [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 12-4-21

Third Match:

Wins: 2 Ties: 0 Lost: 1
Total Matches: 3

- Started at 10:56 AM (8876C & 8214C vs 1757A & 1757T)

Strategy: Our team would prioritize base collections while our ally loaded rings.

Autonomous:
- At the beginning of the ~~one~~ period our chain snapped while unfolding.
  - Likely due to too much stress on the chain during our violent unfolding.
- Other alliance won, putting us at a disadvantage

Driver Period:
- Back and forth.
- After the 30 second left mark the other team contacted our platform and wedged a base underneath.
  - After the Judges discussed, it was declared that the other team would not be disqualified but we were awarded with bonus points

Results:
- We won, 111 points to 65 points
- One improvement we could make would be the incorporation of bumpers to block rings from entering our drivetrain.

TM

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SIGNATURE [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Claire [redacted] DATE 12-4-21

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Fixing the Chain

After the conclusion of our ~~first~~ third qualifying match, we found that our conveyer belt had ceased functioning.

- At first we tested the cord in order to determine the source of the issues; we connected the original motor with anew wire and had the same problem.
- Next, we replaced that and tried both motors. Once again, no results.
- From here, we deduced that the problem had to be within the cortex
- A common with the cortexes is that the ports overload and blow out. We changed the port and tested it, which turned out to be the problem.
- Our programmer then modified the program to account for the port change.

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SIGNATURE

DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Claire [redacted]

DATE 12-4-21

Continued from page

Fourth Match:

Wins: 2 Ties: 0 Lost: 2 #7 → #12
Total Matches: 4

- Started at 11:39 AM (8876C + 8876E vs. 7157F + 7157E)

Strategy: Our team would defend bases on our side while our allies planned to drive onto the platform with bases.

Autonomous:
- Our alliance did nothing, we unfolded the conveyer
- Other team captured a mobile ~~Bat~~ goal and nearly scored, however we still lost.

Driver Period:
- We controled a few goals however the other team held more
- At the end, our ally slid off the platform right before the end
- We lost 136:60

Reflection:

Going forward we should try to load bases onto the platform rather than relying on our ally. We could also attempt to push bases into the home zone and guard without hoarding.
- Between matches we worked on adding underneath bumpers.

Im

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SIGNATURE

DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Clover [redacted]

DATE 12-4-21

Judges Meeting

- We went for our interview between our fourth and fifth match.

- We begun by introducing each team member and their team roles.
- Off the bat, the Judges expressed that they loved the originality of our robot design.
- After a prompt, Sam explained the primary mechanisms behind our robot.
- Alana described how our matches have gone so far where we've gone 2-2 and the misfunctions we've experienced so far.
- Chris explained how our autonomous program only drived forward and unfolded, as well as how the main program functioned.
- Eli described our process building our robot and how we abandoned our previous design due to lack of pnuematics.
- Manny demonstrated how the conveyer unfolded.
- The Judges inquired on a few more specifics which were answered by various members.
- As we made our leave, we thanked them for their time, which they responded in kind. Once again expressing their intrigue with the originality of our design.

TM

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SIGNATURE

DATE 12/4/21 CC

DISCLOSED TO AND UNDERSTOOD BY

Claire [redacted]

DATE 12-4-21

Continued from page

Wins: 2 Ties: 0 Lost: 3 #12→#19

Fifth Match

Total Matches: 5

- Started at 12:22 PM (8876C + 7157B vs. 7157A + 64820A)

Strategy: Our ally TM focused on controlling one medium mobile goal while we aimed for several bases and to be on the platform at the end.

Autonomous:
- We unfolded the conveyer and slightly moved
- Our teammate did not have an autonomous
- Lost Autonomous

Driver Period:
- The other team quickly gathered multiple mobile goals
- We secured two goals, but found ourselves unable to break the enemy's defenses.
- We ended up losing 40:146

Notes:
- Rings interfered with our drivetrain which inhibited our movement
- Our conveyer struggled to put bases on the platform

Reflections:
- After this match, we truly ~~understand~~ TM understood the importance of autonomous
- We also need to be better prepared as our batteries died midway through

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SIGNATURE

DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Claire [redacted]

DATE 12-4-21

Skills

- Sam and Eli headed to skills in between matches.
- Everyone later joined while Alana worked on the Documentation of the current tornament.
  - Specificly Match number 5 and extra information regarding alliances and strategys.
- Driver Control Skills: new record of 40 Points
  - We completed 2 Attempts.
  - Both only recived 40 points as we only where able to get two buses onto our side.
  - Sam was our driver for both Attempts and has been for the whole competition Scince he is the most experinced with driving from this year and Previous Years, as well is the main designer of the conveyer and knows it the best.
  - It was obvious even with our most experienced driver that we had not enough practice with Skills and were unprepared and had no plan nor strategy for taking it on.
- Autonomous Skills: 0 Points
  - At the time we barly had an autonomous so we had no chance at getting any Points from this

SD

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SIGNATURE Samuel [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Clain [redacted] DATE 12/4/21

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Autonomous Changes At The Tournament

- We had a little bit of time between some of our matches to work on autonomous at the practice field

Before: the robot would drive forward for time and then flip open

After: the robot would drive forward for distance (using the motor encoders), flip open, and drive towards the neutral goal in front of it. We did not get to the point of actually collecting the goal during autonomous.

```
// FORWARD ROTATIONS
// Moves forward a certain number of rotations
// Input: double pow (the power of the motors)
// Input: double rots (the number of rotations)
void forwardRots(double pow, double rots) {
  // Reset rotations
  LBMotor.resetRotation();
  LFMotor.resetRotation();
  RBMotor.resetRotation();
  RFMotor.resetRotation();
  // Booleans for when each wheel has reached its full rotation
  bool LBDone = false, LFDone = false, RBDone = false, RFDone = false;
  // Start motors
  LBMotor.spin(forward, pow * driveSpeed * 100, percent);
  LFMotor.spin(forward, pow * driveSpeed * 100, percent);
  RBMotor.spin(forward, pow * driveSpeed * 100, percent);
  RFMotor.spin(forward, pow * driveSpeed * 100, percent);

  // Loop until all motors are done
  while (!(LBDone && LFDone && RBDone && RFDone)) {
    Brain.Screen.clearLine();
    // For some unknown reason the motor encoders don't work unless this line is
    Brain.Screen.print(RBMotor.rotation(rev));
    // Each of these stops motors after they've reached their number of rotations
    if (!LBDone && abs(LBMotor.rotation(rev)) >= rots) {
      LBDone = true;
      LBMotor.stop();
    }
    if (!LFDone && abs(LFMotor.rotation(rev)) >= rots) {
      LFDone = true;
      LFMotor.stop();
    }
    if (!RBDone && abs(RBMotor.rotation(rev)) >= rots) {
      RBDone = true;
      RBMotor.stop();
    }
    if (!RFDone && abs(RFMotor.rotation(rev)) >= rots) {
      RFDone = true;
      RFMotor.stop();
    }
    task::sleep(5);
  }
}
```

here that prints to the screen

```
// Robot is 18 inches wide. Distance from the wall to the mobile goal
// is 72 inches. Thus the robot must move 54 inches. It moves 25,
// then expands, then moves 29
void autonomous(void) {
  // Lock the fulcrum
  FulcrumMotor.stop(brakeType::hold);
  // Move forward away from wall
  forwardDist(1.0, 25.0);
  // Expand at the hinge (rubber-band assisted)
  HingeMotor.spin(forward, 30, percent);
  // We can use a time delay instead of encoders because precision
  // isn't as important
  task::sleep(3000);
  HingeMotor.stop(brakeType::coast);
  // Correct for turning
  LBMotor.spinFor(forward, 0.2, rev);
  // Move forward
  forwardDist(1.0, 29.0);
}
```

CC

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SIGNATURE Christopher [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Manuel [redacted] DATE 12-4-21

Continued from page

Sixth Match

Wins: 2 Ties: 0 Losses: 4
Total Matches: 6 Rank: #15 → #18

- Started at 12:50 pm
- 8876C + 99001B vs. 99001A + 64040C
  Red ↑ ↑ Blue
- Game Plan: Both of our alliance robots were designed to handle bases, so we both tried to get as many bases as we could. We planned to start potting them on the platform at the end of the match

Autonomous:
- 8876C – Drove forward and extended the conveyor belt
- 99001B – Drove to and collected a neutral goal, but did not bring it into the home zone
- 99001A – Drove forward slightly. It looked as if their autonomous did not work as intended
- 64040C – Collected a neutral goal and an alliance goal, brought both into the home zone
- Blue won autonomous

Driver Control: We collected both of our alliance goals and tried to put them on our platform, but 64040C tipped it. 64040C held on to its goals from autonomous and put them on the platform at the end. The other team got ~~both~~ cc two neutral mobile goals early on and guarded them in a corner for the whole match. We lost 146–40

Reflection: We shouldn't have gone for our alliance goals so soon because it allowed the other team to get control of the neutral goals. Their puppy guarding of neutral goals almost seemed like hoarding

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SIGNATURE
Christopher [redacted]
DISCLOSED TO AND UNDERSTOOD
Manuel [redacted]
DATE
12-04-21
DATE
12/4/21
PROPRIETARY INFORMATION

Seventh Match (last qualification match)

- Started at 13:23 (1:23pm)
- Alliance with Team 7517X
- Against 34000E and 53999F

- Game Plan Disscussed with Alliance:
  - To keep neutral goals (2) on our side while our Alliance takes a blue or neutral base and a neutral base and drives onto the platform with them. At the end we intend to have 2 neutral goals on our side at the end of the match as well as our alliance's robot holding one of our alliance goals (blue colored) and a neutral goal on an elevated/balanced platform to slide to the ~~other~~ opposite side and the platform to not be elevated (due to the unbalanced distribution of weight)

- Our Autonomous:
  - Same as before

- Alliance Autonomous:
  - Drove forward/diagonal towards middle neutral

- Results
  - We lost the match
  - Point total was 86 to 40

Continued to page 65

SIGNATURE Manuel [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Cellum [redacted] DATE 12/4/21

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- What could we have done better
  - Went for neutral goals and grabbed them off platform when it was not elevated

- What could the other Team have done better
  - Should have tried to balance their platform since they had more than 1 minute to balance knocked off neutral goals onto their platform since they had them on their side and were protecting them so we couldn't reach the neutral buses. They also could have tried to make our platform unelevated/balenced by pushing on the goals on our side onto the end of the platform that was touching the ground.

MR

Continued to page

SIGNATURE Manuel [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD B [redacted] DATE 12/4/21

Alliance Selection

- We were Chosen by 7157E.
- We are the first match of the elimination bracket.
- 10th Place to start off in the elimination bracket
- First elimination round:
  - **updated information**
  - 2:18 pm
  - Alliianced with team 7157E
  - Against 1757T and 1757U
  - **Our autonomous**
  - moved forward and expanded Conveyor
  - **Game Plan**
  - No time to make a Plan
  - **Results**
  - Tie Autonomous
  - Tie Match
  - 60-60 Point total
  - **What could we have done better**
  - Put an additional base, Preferably a netral base (decreases points of opposing teams) and move it to our side

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SIGNATURE Elena [redacted]

DISCLOSED TO AND UNDERST Alana

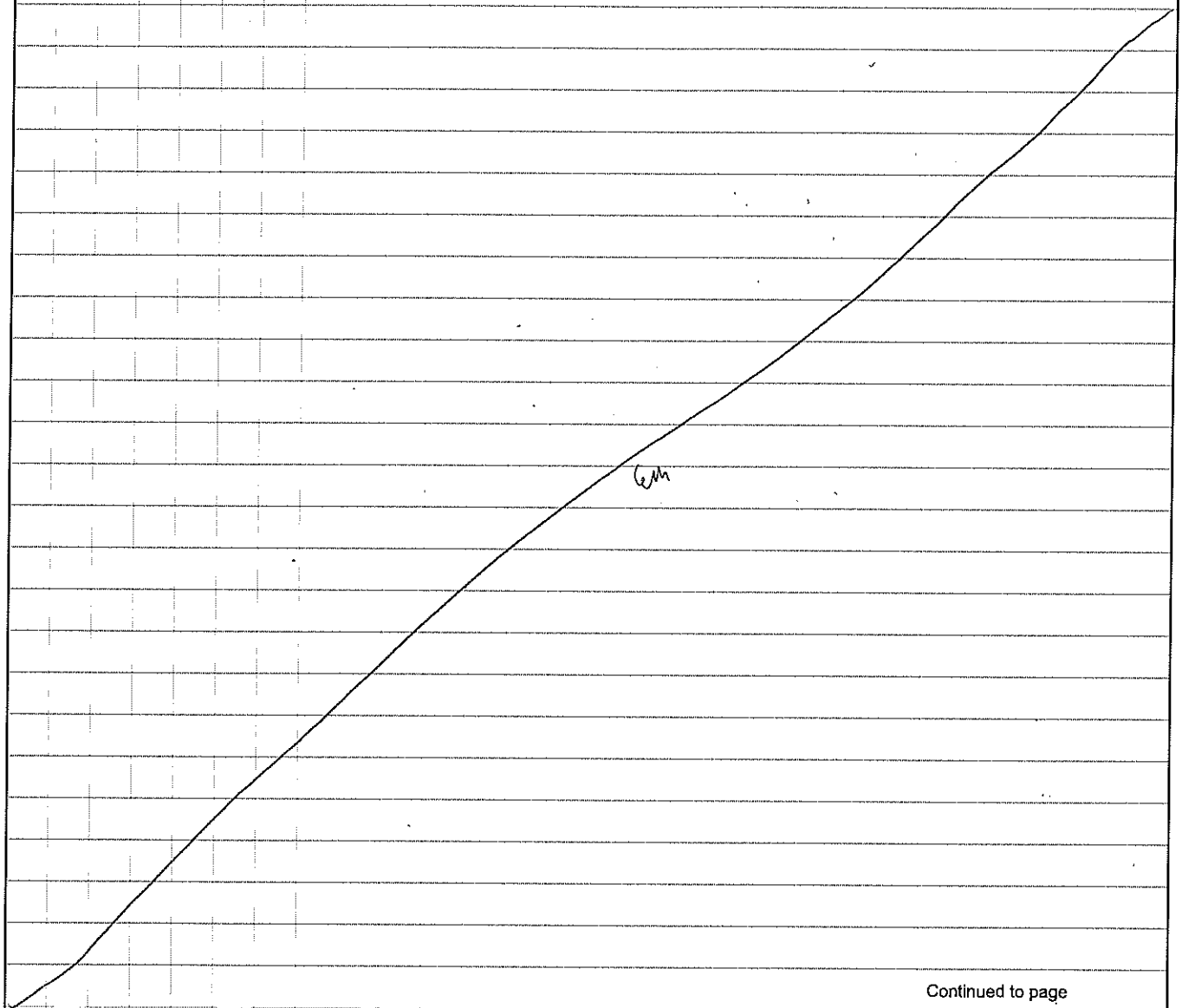
DATE 12-4-21

DATE 12/4/21

PROPRIETARY INFORMATION

Continued from page 66

- Confusion over tie
  - Decision was to do a rematch to determine would move on in the bracket and which would be eliminated.
  - the winner of this rematch would move on, loser would be eliminated



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SIGNATURE [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 12-4-21

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Elimination Round 1 rematch

- Started at 2:22 PM
- Alliance with Team 7157E
- Against Teams 1757T and 1757U

Our Autonomous and our alliances autonomous was the same as the 1st Elimination round

Results
- We won Autonomous
- We won the match
- Point Total 40 to 66

What could we have done better
- Put blue base on Platform instead of Placing it in the home zone
- Make sure our alliance doesn't hit the other team's platform or push a base into the other team's platform under the 30 seond period or else there could be Points added onto other teams Score or even disqualifications

SD

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SIGNATURE Samuel [redacted] DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted] DATE 12-04-21

Quarter finals round

- 2:57 PM
- Alliance with Team 7157E
- Against 34000E and 7157X

Our Autonomous and our alliances autonomous was the same as the 1st round and its rematch

Results
- we lost Autonomous
- we lost the match
- Point total 176 to 40

What could we have done better
- take bases from 7157X

SD

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SIGNATURE Samuel [redacted]

DATE 12/4/21

DISCLOSED TO AND UNDERSTOOD BY Manuel [redacted]

DATE 12-04-21

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Steam-C Awards

Record
- All Time: 1
  - Design: 1
  - Excellence: 0
  - Tournament champion: 0
- 2021-2022
  - Design: 1
  - Excellence: 0
  - Tournament champion: 0

At our tournament today we won our first award in Steam-C History in the 3 years we have participated in Vex Robotics. Specifically we won the design award, and this was due to our hard work, organization, and perseverance in planning, documentation, and hours of writing and drawing. Everyone played a part in thinking of a design and executing it while documenting every part of it we could including discussions, designs, and concepts.

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SIGNATURE Samuel [redacted]

DATE 12/4/21

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Tournament Reflection

- Future Improvements to Robot (Ideas):
  - Develop an autonomous that scores enough points to win autonomous mode (grabs neutral goals and moves them into our home zone).
  - Find a solution to prevent our robot from falling over (distribute weight on robot better by either making the bottom of the robot heavier or by making the top of the robot weigh less)
    - We have to consider that adding weight to our robot will make it move slower and our robot is already slow compared to the robots we saw at the tournament.
    - Currently, our robot is top heavy
- Patterns in Gameplay (during matches):
  - Getting neutral mobile goals on our side during autonomous is very good since we saw that the alliance that had the neutral goals on their side from the start (during autonomous mode) were usually able to keep the neutral goals on their side for the whole match
  - Rings are good for protecting an alliance base (since they can't be knocked off). Putting a base with rings on the platform protects it from being tipped over.
  - Getting the mobile goals onto the platform is good. However, spending too much time putting them onto the platform is bad because it allows

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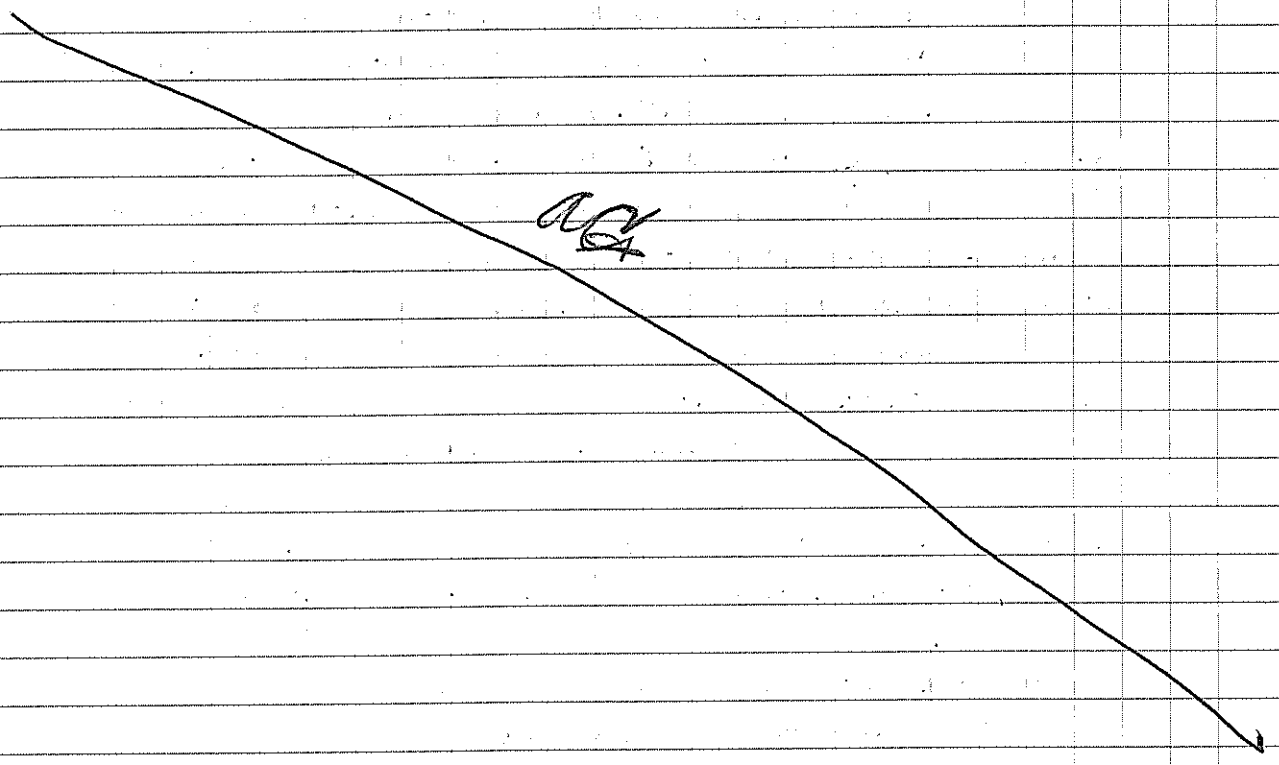
the other team to take the other mobile goals onto their side (allows them to score points easily).

- Don't underestimate the value of just having a mobile goal in your homezone. (doesn't have to necessarily be on the platform as long as its in our homezone).

- Knocking leases over on your side (especially the tallest lease) is good for making it harder for the other team to pick up the leases to move them to their side (makes it harder for other alliance to move the leases into their home-zone). It also makes it more difficult for the other team's robot to enter our homezone.



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SIGNATURE Alana [redacted] DATE 12/4/21

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Reflection of Drivers

San was the Driver for most of the tournament today minus game 5 where we tested a new driver, tyler. Below are their reflections or their driving.

Samuel - Driver during qualifiers rounds 1-4 and elimination round 1-2 Plus rematch of round 1

- During my driving today it was obvious that we needed more Practice at driving the robot. The issues I ran into while driving today where that the robot was very big and clunky and it's 2 speeds we programed were either too slow or too fast. Something I had noticed is that there was also a problem where everytime I went to Pick up a base the hook was almost always reliable at any position as long as I was able to see the hook which I often could not due to the size of the robot. Another issue that allways came up was that when the robot was moving around it would always get stuck under the wheels and omni (tube) wheel in the back causing the robot to slow down and almost come to a complete stop. I also had many Problems dropping the bases onto the tipping Platform or Picking up a least 3 bases and holding on to them but that was more of a design failure than a driver error. Lastly an issue I had was that there was not enough communication from spotters telling me and the other alliance member what to do.
- Overall I would rate my Preformance today a 5/10 a we where unable to get many Basic functions going

Tyler - Driver during qualifiers round 5

- No comment

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Reflection of Mechanical Performance

Our unique design exposed us to many different obstacles that we had to overcome prior to this tournament. However, we found that we did not have enough time to fix every single problem. As a result, our robot underperformed in this tournament.

Key Notes:

- Our design certainly had potential, however we found it was limited by its reliance on chain.
  - When the chain snapped in one of our matches, our robot was rendered useless.
- Our robot was comparatively slow, most of the other robots were able to quickly acquire one or more goals in a short period of time, while we struggled to get one in the same time.
- The controls were ~~very, most of the other~~ In very sensitive to movement

Based on our performance and the issues we encountered, we should innovate a solution that does not rely on chains to eliminate their risk factor. We may also want to aim for less goals. We must prevent ringles from jamming the drive train. ~~It~~ In We also need an autonomous

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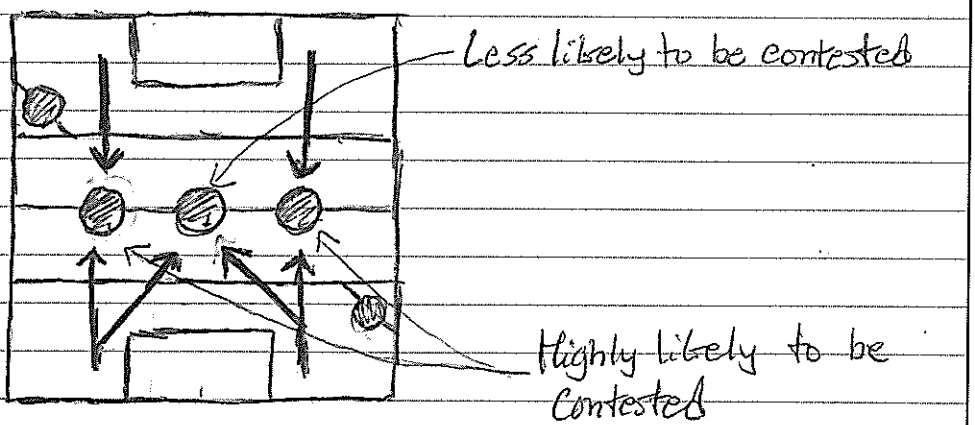
Reflection of Programming

Driver Control: Overall the controls setup was fine, however there were some issues with speed. The high speed was too fast to manouver accurately without getting caught on rings. The low speed was also too fast for lining up precisely to collect mobile goals. We tried somewhat to change these at the tournament but couldn't find good values.

cc ← Performance
~~Left~~ Autonomous: Our robot was not prepared soon enough before the competition to create a full autonomous. We also had problems with its orientation changing unpredictably from the force of the conveyor flipping out.

Autonomous Strategy: It became clear very quickly that obtaining a neutral goal during autonomous is critical, because you often keep control of them for the rest of the game. Getting the WP didn't seem effective (I don't think any teams tried). In one case, multiple robots grabbed the same goal and played tug-of-war. We might also consider going for the central neutral goal, since it might be uncontested.



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SIGNATURE Christopher [redacted] DATE 12/4/21

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Reflection of Rules

There were multiple occurances that there was unclear decisions on. We came up with a short list of the most important occurrances that we experienced.

- There was a match where a base tipped over and was leaning on the wall around the field. We were unsure over whether or not it should be scored. We were unable to find any specific rules for this instance. The head referee decided to count it as scored.

- There were several occurances of a mobile goal being put underneath a platform. There was a large amount of controversy over what should be done. RUle SG3 states that Platforms are safe during the endgame. Point "d" of SG3 says that
  - Accidental placements of ~~bases~~ mobile bases under the platform that are quickly removed are issued warnings.
  - If the placement is intentional and/or not immediately removed, the head referee can consider it a violation
  - Repeated, strategic, and/or egregious warnings may escalate to a violation at the discretion of the head referee.

- We tried in our first elimination match. There was a lot of confusion over what to do. Rule G20 says that match replays are rare, but allowed.

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SIGNATURE Manuel [redacted] DATE 12-04-21

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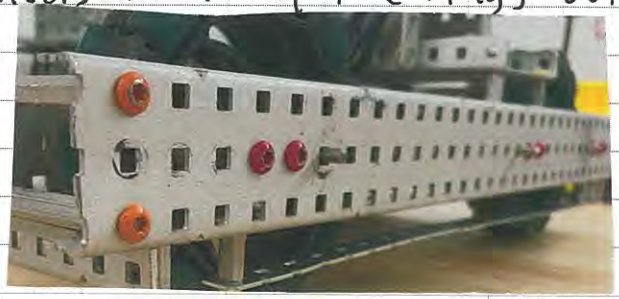
Post Tournament Reflection Meetig Notes

Plan: Discuss and reflect on the tournament.

- Reflection:
  - Autonomous is crucial to securing neutral mobile goals for the match
  - Rings are good for protecting alliance mobile goals because they cannot be knocked over.
  - Strategies for making alliances
    - Be friendly
    - We have some teams that follow us on Instagram, but we need some local friends.
    - Lake George would be a very good ally
    - We will send a message to Lake George reaching out about possible alliances.

- Robot Improvements
  - Use smaller gears in the front where bases are picked up
  - Make the hooks smaller that pick up the bases
  - Shorten the conveyor to make it more stable
  - add bumpers to keep the rings out of the drive chain



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SIGNATURE Manuel [redacted] DATE 12-07-21

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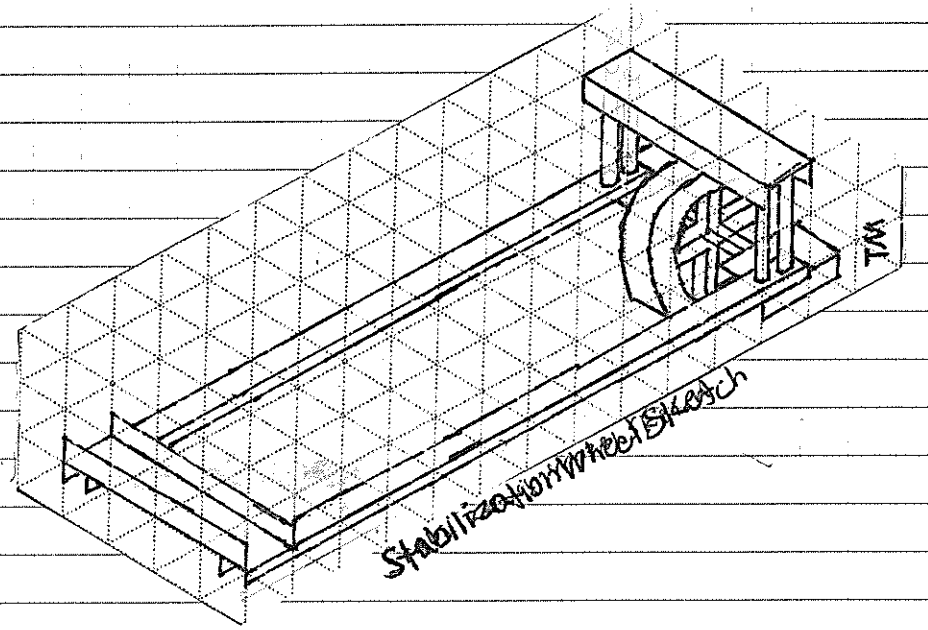
Stabilization Wheel

One major problem we had with our robot in the first tournament was balance when we had multiple bases on the conveyer

- We designed a passive wheel mounted to an extendable slide.
- It was mounter to the back to counteract backwards tipping.
- Used rubber bands to avoid using a motor
- We made an isometric sketch (Below)



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DATE 12/7/21

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DATE 12/7/21

PROPRIETARY INFORMATION

Roller Ideas

When Brainstorming the replacement of the chain we had the idea of wheels pushing the bases up the ramp and eventually onto the tipping platform or just for holding to the base.

Below are both ideas we came up with, what we needed to make it function with both their pros and cons

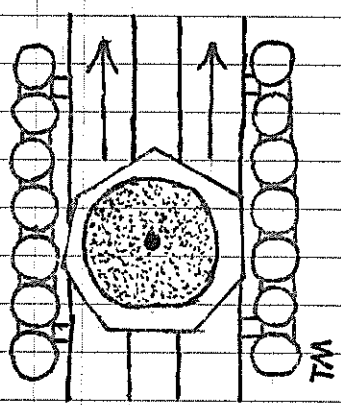
Side Rollers

Pros

- Easy to move base
- Squeezed bases well
- Works in any direction

Cons

- Hard to make
- Can't have base be still



(Sketch of side rollers)

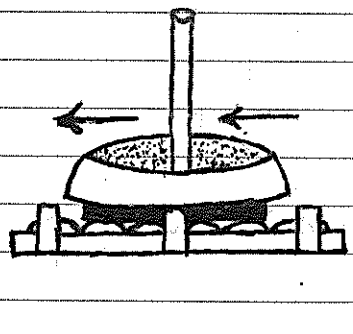
Bottom Rollers

Pros

- Easy to make
- Works in any Direction

Cons

- Doesn't squeeze bases
- Can't have bases stand still
- Can't grab bases well



(Sketch of Lower Rollers)

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SIGNATURE Samuel [redacted] DATE 12/9/21

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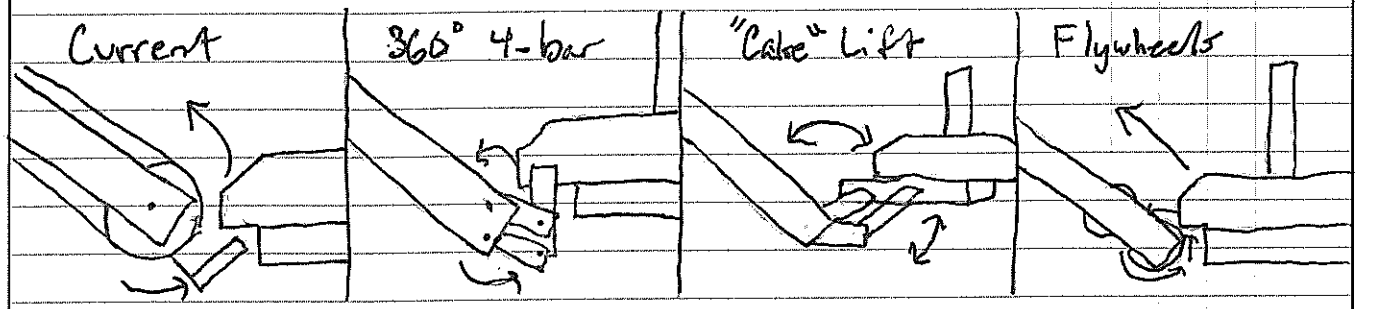
New Intake Ideas



- We felt that our intake system was one of the more difficult and problem-prone parts of our design
- We brainstormed new ideas to get the bases onto the platform. With the roller ideas, the intake would only have to lift the base onto the platform, not pull it all the way.
- 360° 4-Bar: The always-vertical hooks would eliminate the flipping problem. But making it go a full 360° is difficult
- "Cake" Lift: The always-horizontal lift also solves the flipping problem, but would be much larger
- Flywheels: Would be simple and fast if they worked, but it's unlikely that they have enough friction

	Effectiveness	Complexity	Size	Speed	Defense	Total
360° 4-Bar	7	4	7	6	7	(31)
"Cake" Lift	8	5	3	3	5	24
Flywheels	2	8	8	7	1	26

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SIGNATURE Christopher [redacted] DATE 12-9-21

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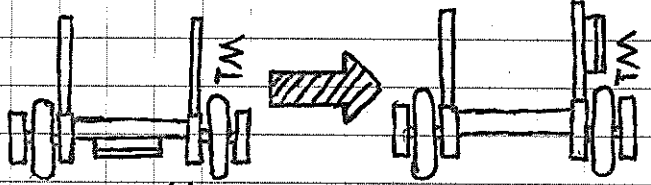
Moved Cortex

- We decided to move the cortex from the bottom of the robot to the side for better placement.
- Longer wires were used for the motors on the opposite side of the robot.
- Cortex is easily accessible on the side of the robot, while on the bottom it is hard to access.



(Movement of the Cortex)

M.R

MR

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SIGNATURE Manuel [redacted]

DATE 12-14-21

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Drift Problems

When testing how well the robot moved we noticed there was a significant amount of back drift

Problems/Causes of the dift

- front right moter died
- one of the axels was twisting

Fixes

- replaced the motors
- replaced axel
- Created plan to fix drift Prolems fast

Drift Fix list

1 lift robot off ground and slowly "move" Forward using controller

2 If any wheels arnt spinning the moter needs to be replaced

3 If any axels look like they are moving they should be replaced

4 check to make sure any cords are not unplugged

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SIGNATURE Samuel [redacted]

DATE 12/16/21

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DATE 12/16/21

Meeting Notes

We fully constructed one set of rollers for the lower section of the conveyer.

- One major problem we had was devising a solution on how to cross the rollers over the Gears for the fulcrum.
- We also did not have a method to put bases between the rollers yet.

(Side View of Front Rollers)

Results:

- The rollers moved the bases up the conveyer very well.

Goals:

- Create a mechanical extension to the upper section
- Design an intake system that did not rely on a conveyer
- Connect rollers ~~to~~ ~~in~~ across the fulcrum region

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SIGNATURE

DATE 1/4/22

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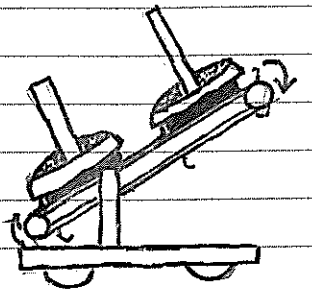
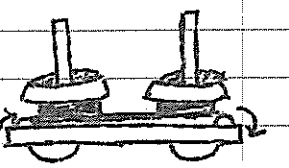
Concept Reconsideration

We had felt we hit a wall so we decided to re-evaluate our design. We proposed a flattened design.



(Sketch of Inclined Conveyer)



(Sketch of Flat Conveyer)

	Complexity	Effectiveness	Defense	Maintence	Repeatability	Total
Inclined Conveyer	6	8	5	3	8	30
Flat Conveyer	9	8	8	7	7	39

Inclined Conveyer:
- Can deposit bases on the platform from ground.
- Can't pick up tall metal goals
- Relies on folding chairs
- Needs a lot of torque

Flat Conveyer:
- High defense
- Easy to build
- Consistent
- Linear extension, rather than radial
- Can have other systems simultaneously.

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SIGNATURE MW DATE 1/6/22

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Stickers For Competition

- As a team we decided to order custom stickers to pass out to other teams so they can get to know us better. Each sticker not only has our custom team logo (made by Tyler), but they also have a qr code that brings them to our instagram page when scanned.

Product Details

Stickers
Shape : Square/Rectangle
Size : 2" x 2.5"
Material : 4 mil. White Vinyl High Gloss (UV)
Printed Side : Front Only
Quantity : 150
Rounded Corners : Yes
Bundling : None
Printing Time : 3 Business Days
Proofing: Proof Waived

Sub Printing Cost:	$39.92
Total:	$39.92
Tax:	$4.26
Shipping & Handling:	$20.90
Total:	**$65.08**

- Although ~~vinyl~~ acrylic vinyl stickers were slightly more expensive than paper, vinyl stickers are protected from fading, very easy to clean and maintain, perfect for harsh outdoor conditions (ex. if sticker were to be put on a water bottle), and they are ideal for long term usage (will last a long time). Paper stickers are vulnerable to elements (which involve water), or in other words, the paper stickers don't do well when wet because they will rip and peel easily. Also, paper stickers will fade fast and are difficult to maintain. So although they may be cheaper, paper stickers don't last as long and aren't as durable vinyl stickers which is why we chose to order vinyl stickers over paper stickers.

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Possible Intake Systems

	Complexity	Speed	Stability	Consistency	Effectiveness	Total
Chain with Hooks	8	6	4	9	9	36
Cake Lift	2	5	8	5	8	28
Ramp	10	6	3	2	7	28

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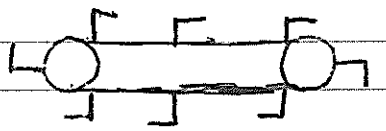

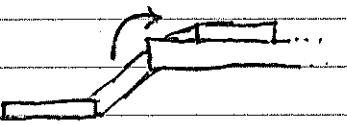

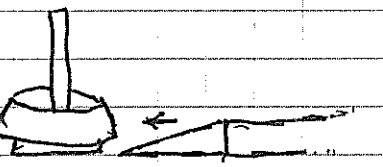

(Sketch of Chains with Hooks)

Chain with Hooks:
- Strong hold on bases
- Simple to build
- Needs torque
- Could snap chains or bend hooks

(Sketch of Cake Lift)

Cake Lift:
- Sets bases flat on the platform
- Hard to make
- Needs precise positioning
- Heavy burden on motors

(Sketch of a Ramp)

Ramp:
- Very simple to build
- Inaccurate
- Difficult to use
- Requires precise positioning

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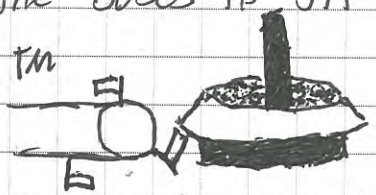
SIGNATURE [signature] DATE 1/11/22

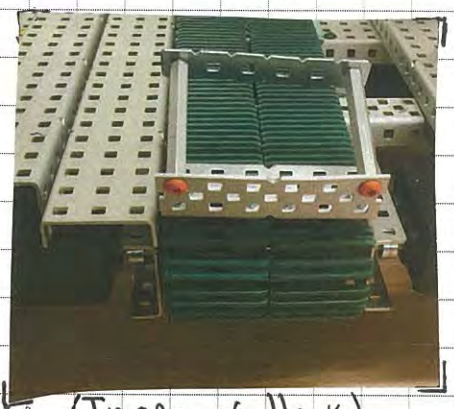
DISCLOSED TO AND UNDERSTOOD BY Emm [redacted] DATE 1/11/22

Construction of Flat Conveyer:

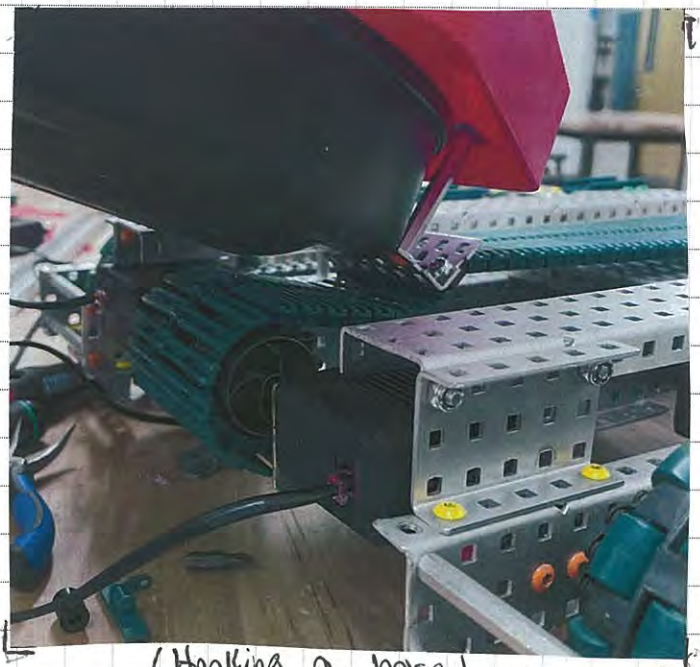
- ~~S~~TM After removing the old conveyer, we started building the new conveyer off of our old base
- We created a flat surface for the bases to sit on using 3-wide C-Channel
- In between the C-Channel we attached a conveyer with hooks operated by two torque motors



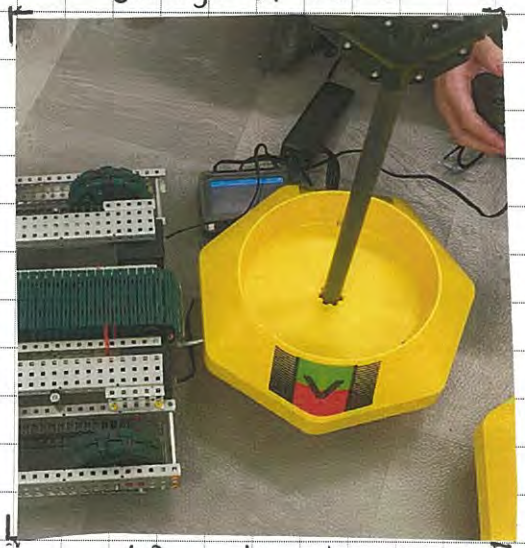
(Sketch of Conveyor)



(Image of Hook)



(Hooking a base)



(Base Next to a base)

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SIGNATURE TM

DATE 1/13/22

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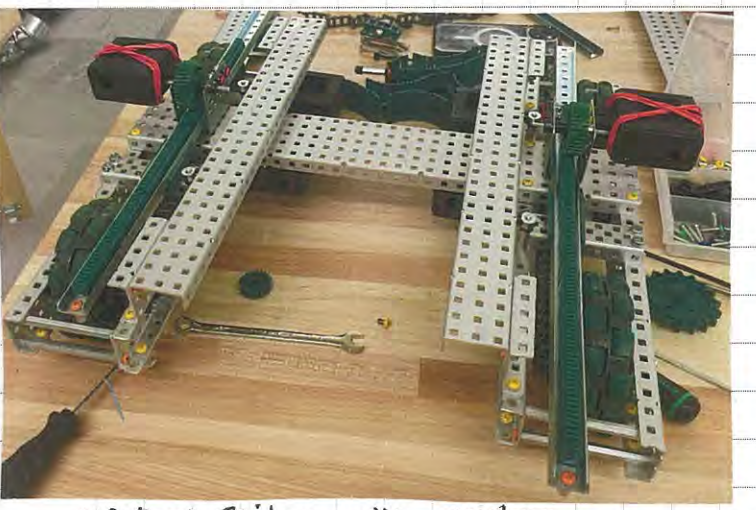
Expanding Slider

After we got the conveyor working we wanted to hold more bases. After we saw how unreliable and prone to snapping our old folding out extension was, we decided to have it slide out on the slider that was originally vex 4 (V4). We had 2 ideas, a passive slider or a Rack and Pinion. after discussing how unreliable the Rack and Pinion is we choose to go with the passive slider powered by rubber bands.

Early problems

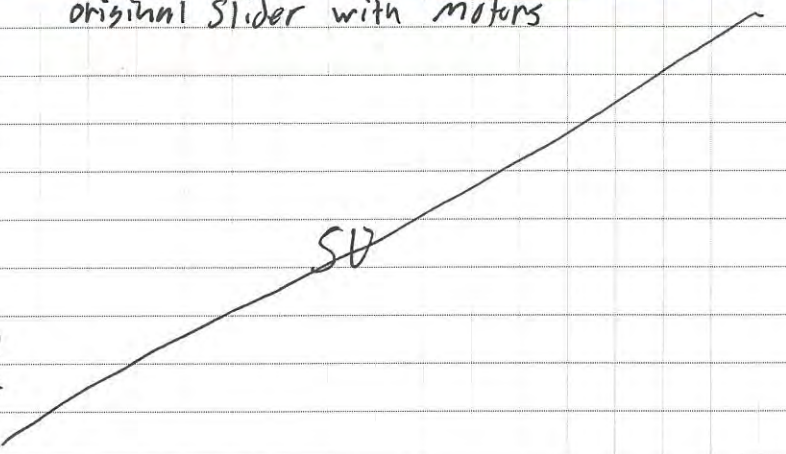
- the screws had to be secured with the slider itself as there wasn't room for nuts
- after adding weight of the supports, the sliders wouldn't slide as smoothly



original slider with motors

Solutions

- we use a rack with tight holes so we wouldn't need nuts
- we added oil but only a little as we have to keep it relitivly low for the tornament



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SIGNATURE Samuel [redacted] DATE 1/14/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/14/22

PROPRIETARY INFORMATION

Cage and cortex

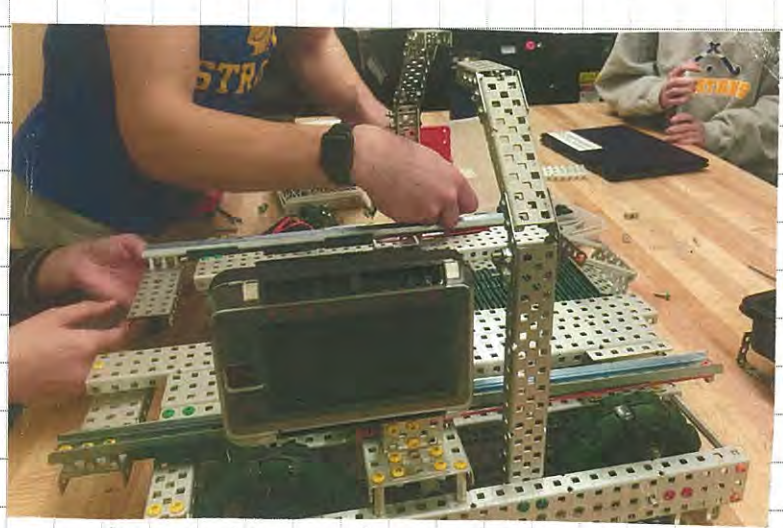
In our final day before the tournament, we needed to attach the cortex to a safe place. but we also wanted guard rails front so up and around the base. so to takle 2 birds with one stone we decided to build the cage and to then attach the cortex to it as well as the battery.

Cage

- to build the cage we had to go inside the wheel box and go straight up
- then a 45° angle inwards more aluminum was built
- we did this to both sides

Cortex

- we attached the cortex to the outside of the cage
- we also attached the reciver to the top part of it as well
- as well we added the battery to the top



installation of cage + cortex

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SIGNATURE Samuel [redacted] DATE 1/14/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/14/22

Baldwinsville High School Tournament

Qualification Match List

Baldwinsville VRC Tipping Point Tournament Qualifying Tournament

VEX COMPETITION

Match	Field	Time	Red 1	Red 2	Blue 1	Blue 2	
Q1	Field 1	Sat 9:30 AM	45924B	5651A	7157A	8876C	✓
Q2	Field 2	Sat 9:34 AM	15796D	7323F	7323A	174A	✓
Q3	Field 1	Sat 9:38 AM	1757A	64040D	64040B	64040A	✓
Q4	Field 2	Sat 9:42 AM	1757U	34000E	45924C	45924A	✓
Q5	Field 1	Sat 9:46 AM	8876A	15796C	7323C	7323B	✓
Q6	Field 2	Sat 9:50 AM	7323E	7157F	174C	8746A	✓
Q7	Field 1	Sat 9:54 AM	7157C	15796A	7157X	7157E	✓
Q8	Field 2	Sat 9:58 AM	15796B	174B	1757T	8876E	✓
Q9	Field 1	Sat 10:02 AM	64040C	7323A	64040D	5651A	✓
Q10	Field 2	Sat 10:06 AM	8746A	7323C	1757A	7323F	✓
Q11	Field 1	Sat 10:10 AM	64040A	174A	7157E	1757U	✓
Q12	Field 2	Sat 10:14 AM	7157X	7323B	15796B	7157A	✓
Q13	Field 1	Sat 10:18 AM	64040B	7157C	174B	64040C	✓
Q14	Field 2	Sat 10:22 AM	8876C	~~174B~~	15796C	34000E	✓
Q15	Field 1	Sat 10:26 AM	45924A	1757T	7157F	45924B	✓
Q16	Field 2	Sat 10:30 AM	7323E	45924C	8876A	15796D	✓
Q17	Field 1	Sat 10:34 AM	8876E	15796A	7323F	64040D	✓
Q18	Field 2	Sat 10:38 AM	174C	7157A	7323A	7323C	✓
Q19	Field 1	Sat 10:42 AM	45924A	174B	64040A	7323B	✓
Q20	Field 2	Sat 10:46 AM	8876A	7157X	1757A	45924B	✓
Q21	Field 1	Sat 10:50 AM	8746A	1757U	7157C	8876E	✓
Q22	Field 2	Sat 10:54 AM	5651A	64040B	7323E	174A	✓
Q23	Field 1	Sat 10:58 AM	64040C	15796C	15796D	1757T	✓
Q24	Field 2	Sat 11:02 AM	15796B	7157F	15796A	34000E	✓
Q25	Field 1	Sat 11:06 AM	8876C	7157E	45924C	1757A	✓
Q26	Field 2	Sat 11:10 AM	7323A	7323E	1757U	174B	✓
Q27	Field 1	Sat 11:14 AM	174A	45924B	174C	64040C	✓
Q28	Field 2	Sat 11:18 AM	7157A	8746A	45924A	15796C	✓
Q29	Field 1	Sat 11:22 AM	1757T	7323B	45924C	15796A	✓
Q30	Field 2	Sat 11:26 AM	15796D	64040D	7157X	34000E	✓
Q31	Field 1	Sat 11:30 AM	7157F	7323C	5651A	7157C	✓
Q32	Field 2	Sat 11:34 AM	7157E	8876E	8876A	64040B	✓
Q33	Field 1	Sat 11:38 AM	64040A	7323F	~~15796B~~	8876C	✓
Q34	Field 2	Sat 11:42 AM	174A	64040D	8746A	174B	✓
Q35	Field 1	Sat 11:46 AM	1757A	15796A	7323E	15796C	✓
Q36	Field 2	Sat 11:50 AM	7157E	7323B	7157F	7323A	✓
Q37	Field 1	Sat 11:54 AM	7323C	64040C	1757U	15796B	✓
Q38	Field 2	Sat 11:58 AM	45924C	8876E	7157X	174C	✓
Q39	Field 1	Sat 12:30 PM	64040B	8876C	15796D	45924A	✓
Q40	Field 2	Sat 12:34 PM	64040A	7157A	7157C	1757T	✓
Q41	Field 1	Sat 12:38 PM	5651A	34000E	8876A	7323F	✓
Q42	Field 2	Sat 12:42 PM	45924B	15796C	64040D	1757U	✓

(halfway)

Qualification Match List

Baldwinsville VRC Tipping Point Tournament Qualifying Tournament

VEX COMPETITION

Match	Field	Time	Red 1	Red 2	Blue 1	Blue 2	
Q43	Field 1	Sat 12:46 PM	7157X	174B	~~7323C~~	8876C	✓
Q44	Field 2	Sat 12:50 PM	45924C	7157A	7157F	64040C	✓
Q45	Field 1	Sat 12:54 PM	174C	15796D	15796A	64040A	✓
Q46	Field 2	Sat 12:58 PM	34000E	7157C	1757A	7323A	✓
Q47	Field 1	Sat 1:02 PM	7323E	7323B	8876E	45924B	✓
Q48	Field 2	Sat 1:06 PM	8876A	15796B	174A	45924A	✓
Q49	Field 1	Sat 1:10 PM	5651A	1757T	8746A	7157E	✓
Q50	Field 2	Sat 1:14 PM	1757U	7323F	64040B	7157F	✓

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DATE 1-15-22

PROPRIETARY INFORMATION

Qualification Matches:

Match #1:

- 4592A3 + 5651A vs. 8876C + 7157A
- We won autonomous
- We focused on storing 1-2 mobile goals while our teammate defended and planned to balance on the platform.
- We won, 146: 23

Reflection: Going forward the driver needs to slowly pick up the bases. Fast, erratic movement only prevents our robot from scoring

Match #2:

- 8876C + 184C vs. 15796C + 34000E
- We lost autonomous
- Our teammate obtained one base while we prioritized 2 bases and defense.
- We lost the match

Reflection: The spotter needs to keep track of time and keep the driver informed.
- Also, take care to end match on our side to score the bases.

TM

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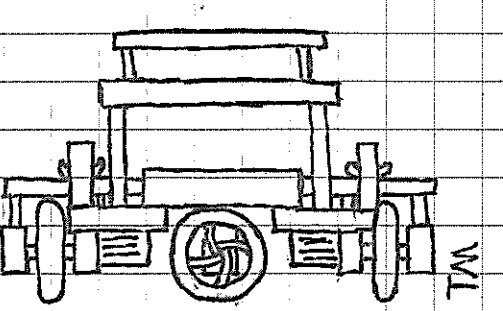
Improving the Spoiler

- One key feature of our design is to store a base in the back of our conveyer
- We wanted to lock the bases there so we created and tested the design to the right.



(Rear view of Spoiler)

- The system traps the top sections of the bases between two C-Channel
- While it doesn't fully trap the base, it limits movement and secures it.
- After we ~~buttted~~ built the Spoiler, we tested it in ten test runs with an alliance base. Out of ten runs, it worked 100% of the time
- One flaw is that it can only store the alliance bases as the branches of the neutral goals block the bases

TM

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Qualification Matches 3 & 4

Match #3:

- 8876C + 7157E vs. 45924C + 1757A
- We won autonomous
- We focused on collecting as many bases as we can while protecting our goals
- We won the match, 86 to 80
- Reflection: Moving forward we should rely less on our teamates.

Match #4:

- 64040A + 7323F vs. 15796B + 8876C
- We lost autonomous
  - Our alliance got DQ for crossing into the opposing team's homezone during autonomous
  - Our controller disconnected during autonomous
- Other team got DQ for coming in contact with our platform during driver ~~control~~ control after 30 seconds remaining in the match
- We focused on getting 2-3 goals and defending them from leaving our homezone
- Reflection: Moving forward we should rely less on our teamates and make sure not to ~~e~~ come in contact with the other team's platform after 30 seconds remaining in the match.

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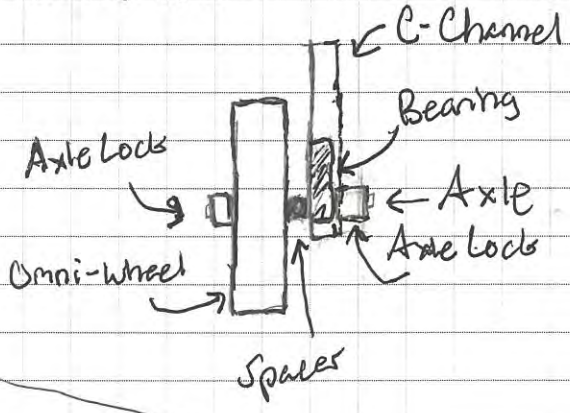
Stabilization Wheel

- At the tournament during the first few matches our robot was very unstable and would tip over with a mobile goal on it.

- We put a simple omni-wheel on an axle to support the back of the extension

- There was some difficulty in attaching it within the size constraints, however it doesn't need to bear a lot of weight so we found a way to attach it with an axle mounted only on one side.



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Qualification Matches 5 & 6

- Match #5: 64040B + 8876C vs. 15796D + 45924A
  - We were able to collect multiple bases and then focus on defense
  - Our teammate was able to score with ringed bases
  - Our wheel broke, so we relied on pinning robots on the other team with our robot
  - The other team was DQ'd for crossing into our homezone during autonomous, meaning we won autonomous and the match

- Match #6: 7157X + 174B vs. 7323C + 8876C
  - We were able to collect multiple bases
  - Our teammate tried to move neutral bases
  - The stabilization wheel helped a lot with support, but it was harder for us to get bases into our spoiler
  - Autonomous was a tie
  - We lost the match 43 - 113

Reflections: We should work on improving our spoiler and autonomous. We should also be careful no to cross into the other teams homezone during autonomous.

ES

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Disqualification Discrepancies

In qualification match 4, our team mate crossed into the enemy home zone during autonomous and was disqualified. Later on, one of the enemy teams came in contact with our platform in the final 30 seconds and was disqualified.

In qualification match 5, one of the enemy teams crossed into our home zone and was disqualified.

Disqualification Game Definition: A penalty applied to a team For a rule violation

- A team that is disqualified during a qualification match will reciene 0 win points, Autonomous win points, Autonomous points, and strength points.
- A team that is disqualified during an elimination match disqualifies the alliance.

In the definition rule <T11> is referenced.

Rule <T11>:

When a team is disqualified they reciene 0 points.
- If the disqualified team is on the winning alliance, then non-disqualified teams on the losing alliance will reciene the match win point.

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- If the match was a tie, each team on the alliance without the disqualification will recieve the match win point and 2 additional win points.

- If both alliances have a disqualified team, all non-disqualified teams will recieve a tie and 1 win point.

If ~~R~~ MR both alliances in an elimination match recieve a disqualification, they both recieve a loss and replay the match to determine a winner.

MR

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Final Rankings and Results

- Placed 10th in qualification.
- 8th to select our alliance.
- Made it to the semi-finals.

Rank #10

8876C

STEAM-C

QUEENSBURY SENIOR HIGH SCHOOL

Queensbury, New York, United States

Division 1

VEX COMPETITION

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PROPRIETARY INFORMATION

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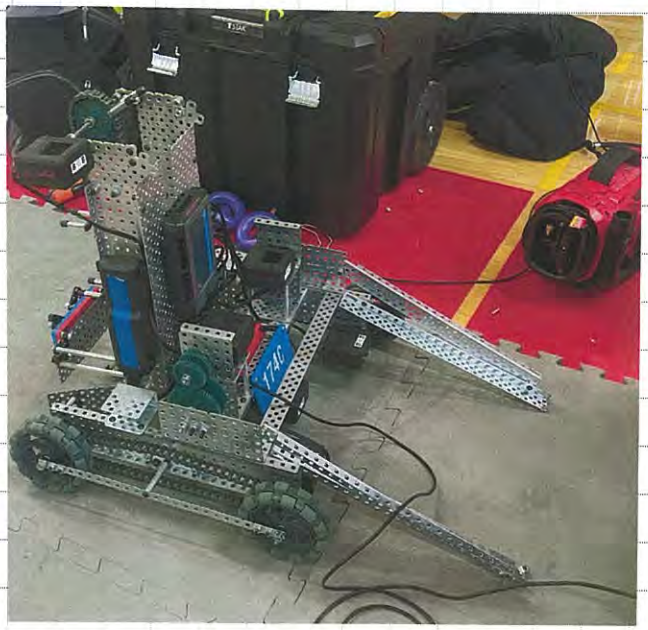
Alliance Selection

We were Ranked #10th out of 32 teams and team where picked without our involvement until #9th Ranked team 7157E

- Team 7157E asked us to be in an alliance
- we responded with the following "we respectfully decline."
- After they picked a different team it was our turn
- we asked 2 different teams Ranked 21 and 22
- they both declined
- we they went on to ask team 174C
- They accepted and we became seed #8
- They pinned us against seed #9 for the first round

174C's robot



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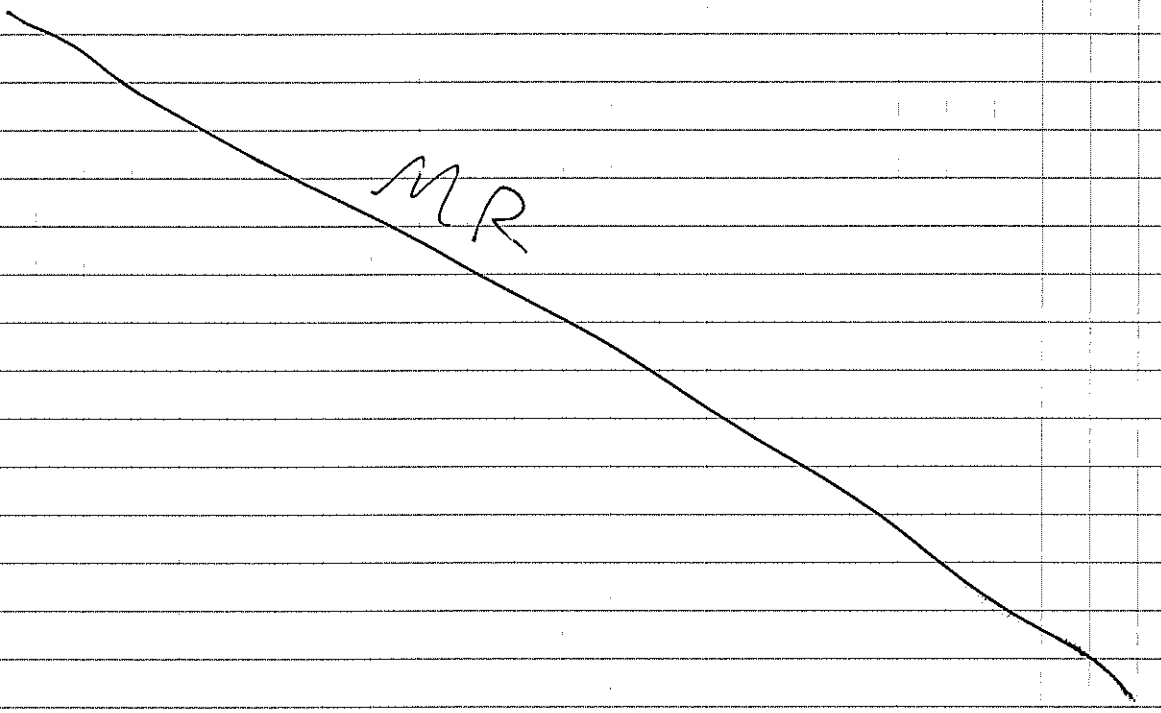
Helping alliance with their autonomous

Our alliance, 174C, didn't have an autonomous for the elimination matches. They asked us for help and we drafted an autonomous with them that moved the robot forward and picks up a base directly in front, then it retreats.

- We used Vex Block coding for the autonomous
- Unfortunately we didn't have time during elimination to finish the program.



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Elimination Round 1 and 2

- Match 1 of Elimination Rounds
  - 8876C + 174C vs. 15796C + 1757U, seeds #8 + #9
  - we wanted to win autonomous to get early control of the helmet goals
  - we wheeable to get one heural sout through our autonamous
  - we successfully completed our plan and controled
  - we won 100 to 46

- Match 2 of Elimination round
  - 64040A + 34000E vs. 8876C + 174C, seeds #1 + #8
  - we lost in embarisms fusion but still was able to retain control of our 2 alliance bases
  - we lost 113 to 40

SD

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System Error

- During the semi-finals there was an alliance that lost the quarter finals but was called up to play. The coaches of the teams that were supposed to go up went to the head ~~ref~~ referee MR and argued with the intent to get the alliance that won their chance. In the end, the match was replayed and all of the matches after were as well.

- The actual systemerror was that the computer was saying that the wrong team won the match. as MR Since the wrong team was called up, in order to keep it as fair as possible, every elimination match starting with the error and going up to the point that it was discoverd was replayed.

- What would have happened if the ~~team~~ MR alliance that was mistakenly moved on had made it to the finals and won?

MR

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Steam-C Awards

Record
- AllTime: 1
  - Design: 1
  - Excellence: 0
  - Tournament champion: 0
- 2021-2022
  - Design: 1
  - Excellence: 0
  - Tournament champion: 0

At our tournament today we won no awards. Our judges meeting did not goas well as we hoped. our robot was also not caush up as well as we hoped it would be it was much better but if it was a more complete thing than we belive that we would have done better and have the chance to win exelence awards.

SD

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Baldwinsville Tournament Reflections:

Tyler:

This last tournament held mixed feelings from me. On one hand, our team and robot performed much better than the last tournament. On the other hand, the rules and conduct of the tournament were all over the place which created a chaotic and turbulent flow and atmosphere. However, I still feel that the experience was valuable to our team. Our robot performed much better compared to the last tournament. While our robot isn't perfect, it has set us in the right direction. Going forward it is imperative that we dedicate time to practice for our driver, and to develop a strong autonomous.

Samuel:

My reflection is mostly focused on my drivins and less on the rest of the tournament itself. My one thought about it though was that the rules, refs, and conduct of the tournament did not preform well. Other than that though that the last minute change of the robot definitly hindered our chances. This had a direct correlation with my performance today. I was proud that we were able to fisnre it out near the end and had a chance to compete for semi finals. Next time for the tournaments we need to be able to

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Have a better strategy and driving experince before going into the tournament so we dont go into it blind. Overall I would rate my performance 7 out of 10 which is the best of the 2 tournaments. I rate myself this as near the end we had good driving and were able to do well in defending and collecting balls and overall doing a chunck above average, not yet near the best but hopefully soon.

Christopher:

This was a chaotic and poorly run tournament that made it difficult for us to stay organized. However, I don't believe that our poor performance was due to the tournament. Our new design was created too recently and wasn't fully finished. We also didn't have enough driving practice. I am proud of the autonomous changes we made at the tournament. Due to the changes we were still making to the robot we hadn't been able to develop an autonomous beforehand. Between the first and second matches at the tournament we put some space foam tiles on the ground and created a simple autonomous that drives forward, hooks a neutral goal, and reverses into the home zone. Despite its simplicity we were extremely proud when it worked and we earned our first actual points during autonomous, and no longer had to rely only on our partners. I hope that we will have time to create a full autonomous for the next tournament

Alana:

Overall we placed better at this tournament than we did at our last tournament because our robot was reliable in which we didn't have to worry about the chain snapping like it did at our last tournament, which had left us with no way to pick up the bases. One way to improve our robot for the next tournament

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Continued from page 105 is to program an autonomous that can score more points. This would not only improve our chances of winning autonomous during a match, but it would also help improve our ~~rankings for~~ autonomous skills rankings.

Manny:

There were many rule violations that occurred during this tournament. The biggest issues were with license plates and field elements breaking during a match. There were a couple matches where an alliance had a team with the wrong color license plates. Upon inspection of the ~~IFI~~ rules, having the wrong color license plate doesn't incur any penalties. There was also a match where a mobile goal's stake broke away from its base. According to Safety rule <S1>, any time the robot operation has damaged any field or scoring objects they may be disabled or disqualified.

Eli:

There are mixed feelings towards this tournament. Our robot did much better than before and proved that our concept can be effective at controlling the bases, especially during autonomous. If we can improve upon our quickly made program we can beat the other alliance to the neutral bases every time. However the tournament was poorly executed by the school and there were many problems. We had to dispute rulings with the judges and only led to confusion.

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Claire:

There were many issues with the overall organization of the tournament. Our new robot design is more effective than our previous one. We placed much higher in the qualification rounds than we did at our last competition. The autonomous program that was created during the tournament earned us points, but we have an opportunity to earn more points in that area because we will have time before our next tournament to test it and improve upon it. Other things we could focus on before the next tournament are improving our spoiler and finding time for driving/strategy practice, possibly by having practice matches against other Queensburg teams.

CS

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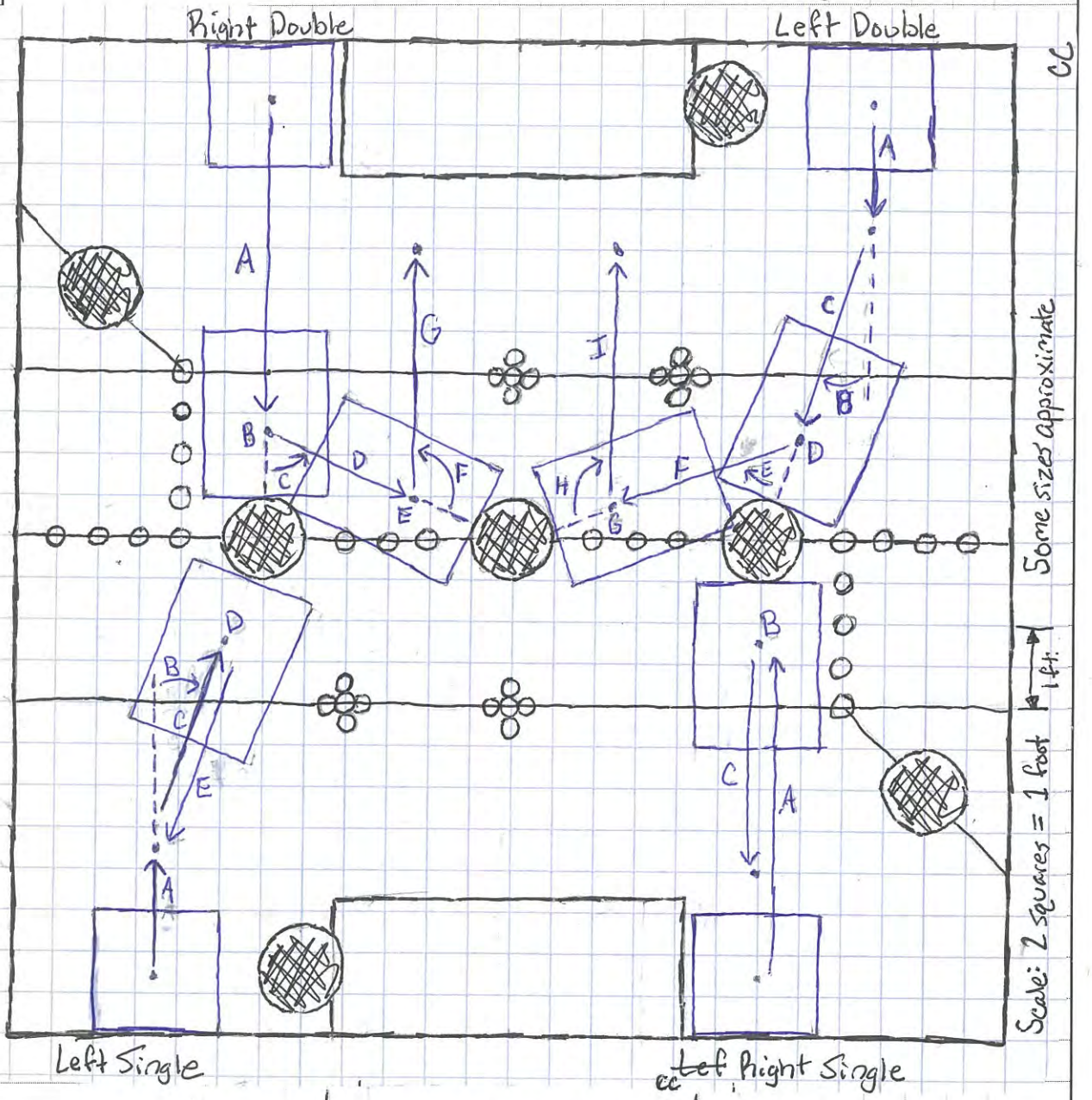
New Autonomous Planning



cc

Compact Base	18" / 17"	FRONT	Extended Base	25" / 17"	FRONT	Mobile Goal	13"

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Christopher [redacted]

DATE

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Alana [redacted]

DATE

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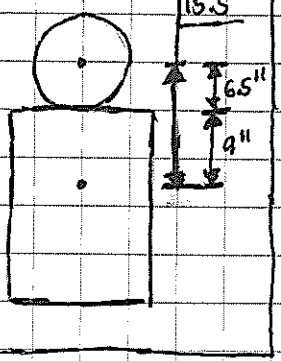
New Autonomous Planning

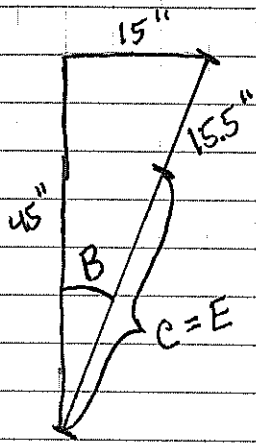
Right Single

A: ↑ 47.5"
B: Hook
C: ↓ 32.5"



Left Single

A: ↑ 18"
B: ↺ 18.435°
C: ↑ 31.934"
D: Hook
E: ↓ 31.934"

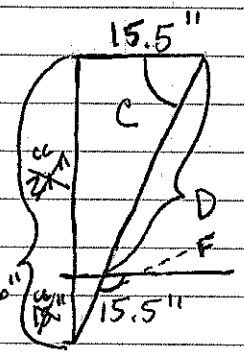


$C = E = \sqrt{45^2+15^2} - 15.5$
$= 31.934"$

$B = \arctan\left(\frac{15}{45}\right) = 18.435°$

Right Double

A: ↑ 47.5"
B: Hook
C: ↻ 66.705°
D: ↑ 23.695"
E: Hook
F: ↻ 113.295°
G: ↑ 36"



$D = \sqrt{36^2+15.5^2} - 15.5$
$= 23.695"$

$C = \arctan\left(\frac{36}{15.5}\right)$
$= 66.705°$

$F = 180° - C = 113.295°$

Left Double

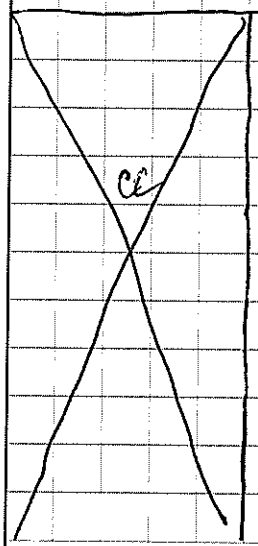
A: ↑ 18"
B: ↺ 18.435°
C: ↑ 31.934"
D: Hook
E: ↺ 51.791°
F: ↑ ~~43.464"~~ 27.964" CC
G: Hook
H: ↺ 109.774°
I: ↑ 36"

$C = \sqrt{45^2+15^2} - 15.5$
$= 31.934"$

$y = 45\left(1 - \frac{C}{C+15.5}\right)$

$x = 15\left(\frac{C}{C+15.5}\right)$

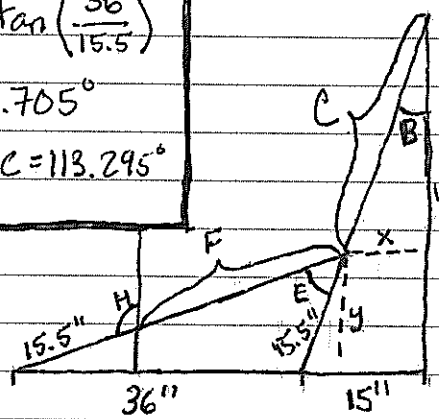
$F = \sqrt{(51-x)^2+y^2} - 15.5$
$= 27.964"$



$B = \arctan\left(\frac{15}{45}\right)$
$= 18.435°$

$E = \arctan\left(\frac{51-x}{y}\right) - B$
$= 51.791°$

$H = 180° - \arctan\left(\frac{51-x}{y}\right)$
$= 109.774°$



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New Autonomous Planning

CC

- In the past, we've had struggled to create an autonomous because our robot isn't physically complete until right before the tournament.
- Although the robot is still not ready, I decided to create an autonomous based solely on mathematical calculation. Although it will require tweaking, it will be a better starting point once the robot is ready.
- This can be implemented in code with functions to move a certain distance and rotate a certain angle
- Our goal, given enough time, is to create the Right and Left Double autonomous programs, which get two neutral goals but if there isn't time we'll settle for Single

CC

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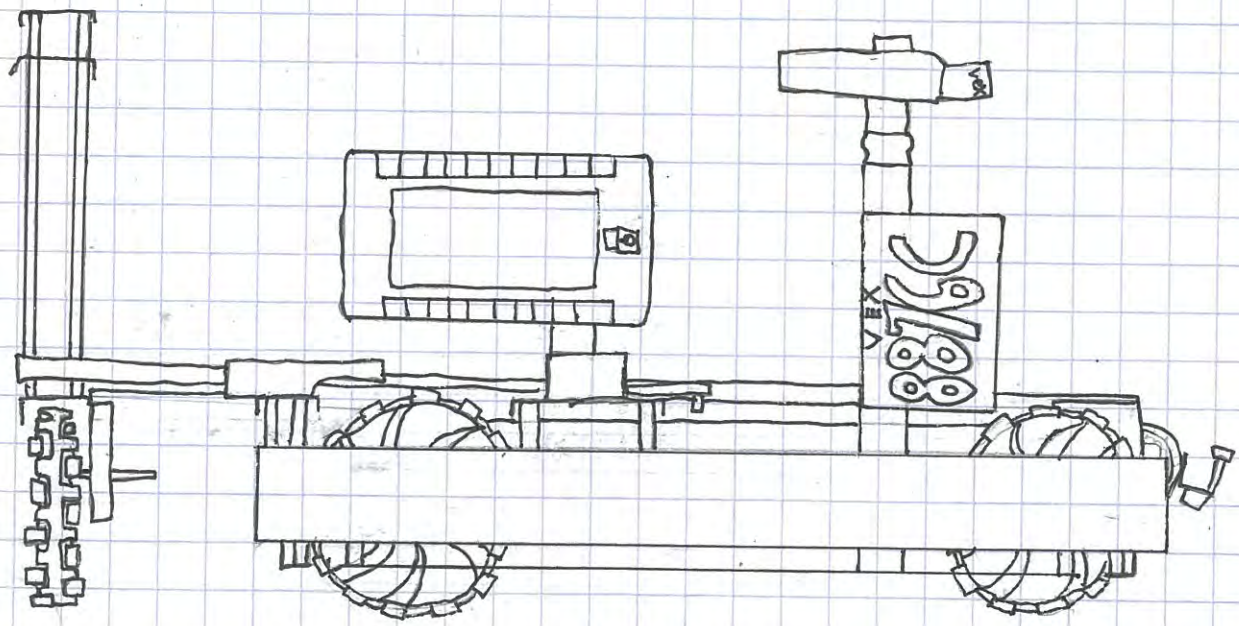
Post tournament robot

Since our last tournament through this one we have made many changes such as...

- Changing of conveyor idea
- sliding base
- Cage
- Battery, cortex, and reciver Placement
- New and improved stabilization "snake" wheel
- and slight hook redisign

These have all been documented in the note book in erlier pages.
Below is what our robot look after these many, many changes.



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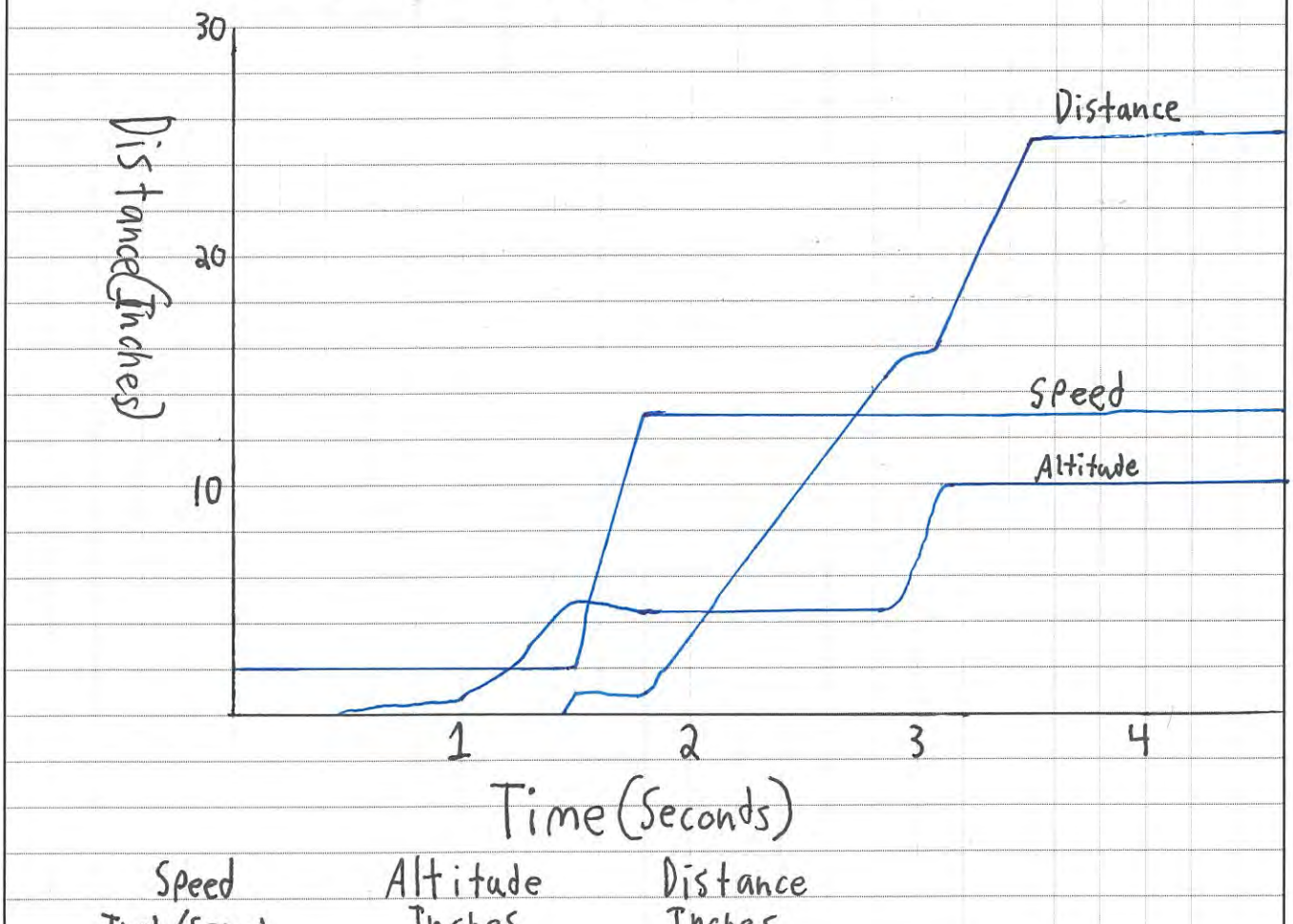
What the new additions do

Plus a graph

During the past tornament we added a new spoiler. We didn't know much about it or how to do it consistanly with a new driver, we have been able to replicate it 10/10 times with our driver but if he was not there, then we would be in trouble. to fix this we created the graph below



Speed	Altitude	Distance
Inch/Second	Inches	Inches

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This graph shows many things. This include Speed of the chain, Altitude of the center of mass of the center and botom of the bases, and distance of that center of Mass has traveled from left to right. This proccess starts from the base in a netral position flat on the ground in front of our robot. the ~~Sprocket~~ Hook started under the base. Below are the explanation of each.

Speed	Altitude	Distance
- The speed happens at 2 levels. Slow which goes at 2 inches per second and fast which goes at 13 inches per second. this speed differential happens because at first to pick up the base we must do it at a slow speed untilwe get to 5 inches off the ground and 1 inch Distance moved right. Then to be able to "fling" it to the back of our new spoiler we increase the speed to 13 inches per second. then this speed stays constant unit the base is in its position	- The Altitude stays at reletivly 3 levels. resting, movment phase, and Final resting Altitude when the proccess starts the altitude is at is resting/ starting value of 0, when it eventualy gets hooked and has a slight upward incline untill it reaches it speed is increased. then it stay the same until it eventualy "~~Flinged~~ slong Sp" into the spoiler in the back where its altitude climes steeply into its Final resting Altitude.	- the Distance can be catigorized into 1 big section and 2 final idle sections. first once the hook picks up the base the Distance it has moved is reletivly 0 until it sets up to 5 inches off the ground. then it stendely with a few slight Breaks in its upward trajectory. it finally is flung into the back of the robot in the spoiler where its ~~Speed~~ is at rest.

Continued to page

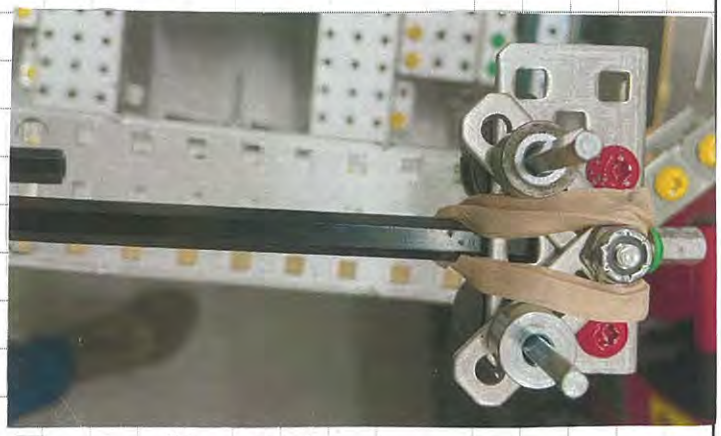
SIGNATURE Samuel [redacted] DATE 1/18/20

DISCLOSED TO AND UNDERSTOOD BY Glenn [redacted] DATE 1/18/22

PROPRIETARY INFORMATION

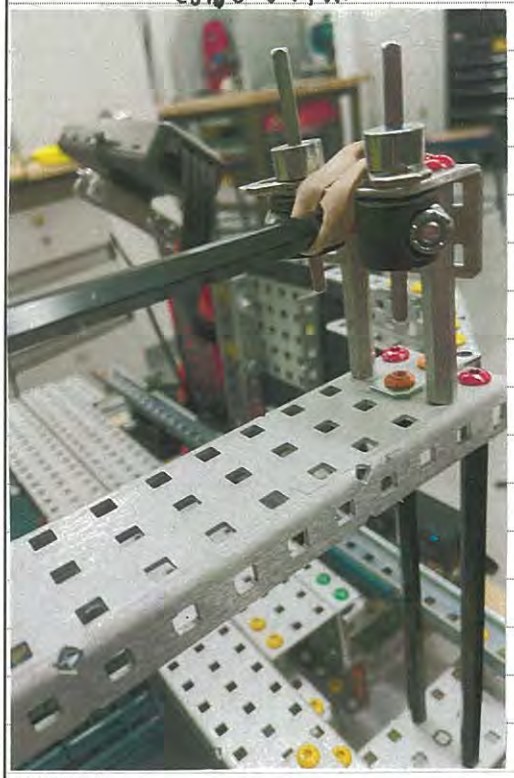
One-Way Gate

- Our goal was to be able to store the first base we picked up sideways so that we would have more room for more bases.
- The makeshift spoiler we made at the Baldwinsville tournament helped us accomplish this, but it was unable to hold neutral bases.
- Our solution to this was a one-way gate made with screws, rubber bands, axels, axel clamps, and standoffs.



(top view)

(side view)



- The screw + standoff pieces are given some slack so that bases can pass through, but the rubber bands hold them up and keep them from sliding forward or backward.
- At first we had issues with the screw + standoff pieces moving from side to side and allowing bases to fall back out of the gate, so we added axels and axel clamps on either side of each screw. This fixed the issue.

Continued to page

SIGNATURE [redacted] DATE 1/18/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted] DATE 1/18/22

PROPRIETARY INFORMATION

Continued from page

Brainstorming: Motor Applications

At this time, we have two motors and two pnuematics available that we could utilize to improve our robot. After discussion, we established key points and features we would like:

- We would like to hold more bases
- We also considered how complex the concepts were given our limited amount of time before our next competition
- We brainstormed and reduced it to four concepts:
  - Two motorized arms at the front to hold a base
  - Two pneumatic clamps on our sides
  - A cake-lift which remains parallel to the ground
  - 4-Bar lift to get bases on the platform

Design Matrix	Design Matrix Categories				Total
	Size	Complexity	Effectiveness	Build Time	
Double Arms	9	9	6	9	33
Pneumatic Clamp	7	4	10	7	29
Cake Lift	3	4	8	4	19
4-Bar Lift	4	8	7	7	26

Continued to page

SIGNATURE

DATE 1/20/22

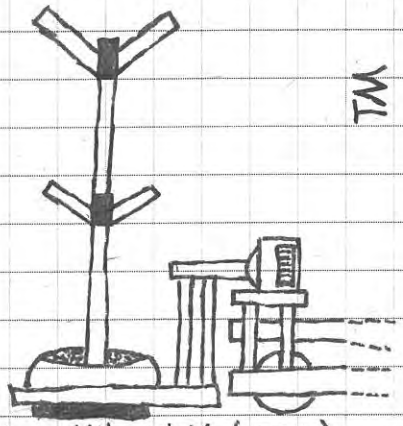
DISCLOSED TO AND UNDERSTOOD BY Samuel

DATE 1/20/22

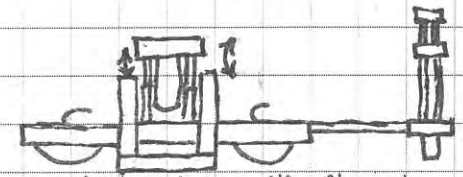
Continued from page

Arm Build

After the Design Matrex we took into account what we wanted to build the most with the voted numbers. We narrowed it down to 2 options, the arms and the Phenatic clamp. We ultimatly choose the arms due to the Phenatic clamps compexity and size.



(Side view of arms)



(Side view with Clamp)

Build

- We ran into some early Problems, the place to attach said Arm was extremly unstable.
- We Fixed this by adding a weird base Plate that I cant find the name of.
- We needed these arm to go down then out that we able to pick up the base Yet still fit in the 36inch limit
- lastly the arms had to start folded in to stay inside the 18X18 starting limit

Side view of Arms

Diagonal top view of Arms

Continued to page

SIGNATURE Samuel [redacted] DATE 1/21/22

DISCLOSED TO AND UNDERSTOOD BY Alana [redacted] DATE 1/21/22

Driving Practice

Because of our poor preformance at our last ~~Preformance~~ SD tournament we decided we needed to dedicate time to driving practice. We repeated several actions, espesially the action explored by the graph on page 112. This time we wanted to perfect it but with the new one way gate and with a netral base as we want our autonomus that we are practicing tomorrow. We also wanted to know how many bases we would be able to hold during driver period. With only driver and no outside help we were able to get 4 total bases on our robot. overall the driving dire today was very helpful and will prepare us well for the tournament Friday.

(Robot holding 4 bases)

SD

Continued to page

SIGNATURE Samuel [redacted] DATE 1/25/22

DISCLOSED TO AND UNDERSTOOD BY Christopher [redacted] DATE 1/25/22

PROPRIETARY INFORMATION

Autonomous

- We finally created a proper autonomous!
- We started with the plan from page 109, and made changes through trial and error
- We had time to create a fully functioning Right Double (gets 2 neutral goals) and a Left Single (gets 1)
- Both are very consistent on our practice field
- Our concerns are:
  - It could be less consistent on other fields
  - Our opponent's actions could interfere with our autonomous
  - Our hooks will likely lose a tug-of-war to a pneumatic clamp

Left Side Autonomous

```
void autonomous(void) {
  // LEFT SINGLE
  // Unfolding
  LAMotor.spin(reverse, 100, percent);
  RAMotor.spin(reverse, 100, percent);
  forwardDist(autonSpeed, 40);
  LAMotor.stop(brakeType::hold);
  RAMotor.stop(brakeType::hold);
  // First base
  forwardDist(0.2, 5.5);
  chainRots(chainSpeedHigh, 4.75);
  // Reverse
  forwardDist(-(autonSpeed-.5), 27.5);
}
```

Right Side Autonomous

```
oid autonomous(void) {
  // LEFT DOUBLE
  // Unfolding
  LAMotor.spin(reverse, 100, percent);
  RAMotor.spin(reverse, 100, percent);
  forwardDist(autonSpeed, 40);
  LAMotor.stop(brakeType::hold);
  RAMotor.stop(brakeType::hold);
  //First Base
  LCMotor.setVelocity(chainSpeedHigh * 100, percent);
  RCMotor.setVelocity(chainSpeedHigh * 100, percent);
  LCMotor.startRotateFor(5, rotationUnits::rev);
  RCMotor.startRotateFor(5, rotationUnits::rev);
  forwardDist(0.2, 5.0);
  task::sleep(1000);
  //Second Base
  turnDegs(autonTurnSpeed, -60);
  forwardDist(autonSpeed * 0.5, 15);
  forwardDist(0.2, 5.75);
  LAMotor.spin(forward, armSpeedUp * 100, percent);
  RAMotor.spin(forward, armSpeedUp * 100, percent);
  task::sleep(1000);
  LAMotor.stop(brakeType::hold);
  RAMotor.stop(brakeType::hold);
  // Turn and Reverse
  turnDegs(autonTurnSpeed * 0.1, 35);
  forwardDist(autonSpeed * -0.4, 45);
```

SIGNATURE Christopher [redacted] DATE 1/26/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted] DATE 1/26/22

Continued from page

Grip added to Arm

- Noticed slight problem during Autonumus and driving
- It was hard to actualy hang on to the bases
- we added some cheap rubber grippings which we attached with zip ties
- tested Autonumus and driving again to see improvments
- it worked well with driving but scraped the ground which cause Autonumus to mess up well over 50% of the time
- we Fixed this by tightning all the screws to keep arms parrallel to the ground

Before Grip Before Bend Fix

After Grip Before Bend Fix

After Grip After Bend Fix

SD

Continued to page

SIGNATURE Samuel [redacted]

DATE 1/27/22

DISCLOSED TO AND UNDERSTOOD BY Christopher [redacted]

DATE 1/27/22

Chittenango Friday Night Tournament

- Left class at 10:30 am and went to the robotics room.
- Bus left at 12:00 pm (noon)
- Sam and Manny attended drivers meeting
- Paper Schedule Handed out at competition.

8816C

Qualification Match List

Bears Robotics Friday Night Fever 2022

VEX COMPETITION

Match	Field	Time	Red 1	Red 2	Blue 1	Blue 2
Q1	Field 1	Fri 4:15 PM	64040D	64040A	8876E	78792T
Q2	Field 2	Fri 4:21 PM	7157E	7157D	7157C	64040B
Q3	Field 1	Fri 4:27 PM	78792E	64040C	7157F	34000E
Q4	Field 2	Fri 4:33 PM	8746A	7157A	34087B	7157B
Q5	Field 1	Fri 4:40 PM	8214C	8876A	7157X	34087A
Q6	Field 2	Fri 4:46 PM	8876C	7157C	64040D	8876E
Q7	Field 1	Fri 4:52 PM	78792T	7157F	8214C	7157A
Q8	Field 2	Fri 4:58 PM	34087A	34000E	64040A	7157B
Q9	Field 1	Fri 5:05 PM	34087B	64040B	64040C	8876A
Q10	Field 2	Fri 5:11 PM	7157D	7157X	8876C	78792E
Q11	Field 1	Fri 5:17 PM	8746A	7157E	64040C	34087A
Q12	Field 2	Fri 5:23 PM	34087B	7157C	8876C	78792T
Q13	Field 1	Fri 5:30 PM	7157A	64040A	7157D	64040B
Q14	Field 2	Fri 5:36 PM	7157B	64040D	8876A	7157E
Q15	Field 1	Fri 5:42 PM	7157F	34000E	8746A	7157X
Q16	Field 2	Fri 5:49 PM	8876E	8214C	78792E	64040B
Q17	Field 1	Fri 5:55 PM	7157X	64040C	78792T	64040A
Q18	Field 2	Fri 6:01 PM	7157D	64040D	8214C	8746A
Q19	Field 1	Fri 6:07 PM	8876E	34087A	7157E	34087B
Q20	Field 2	Fri 6:14 PM	78792E	7157B	7157C	7157F
Q21	Field 1	Fri 6:20 PM	8876C	8876A	7157A	34000E
Q22	Field 2	Fri 6:26 PM	64040B	7157B	8876E	7157X
Q23	Field 1	Fri 6:32 PM	7157A	34087A	64040D	78792E
Q24	Field 2	Fri 6:39 PM	8876C	7157F	64040A	7157E
Q25	Field 1	Fri 6:45 PM	8746A	64040C	7157C	8876A
Q26	Field 2	Fri 6:51 PM	34000E	8214C	7157D	34087B
Q27	Field 1	Fri 6:57 PM	78792T	78792E	8876A	7157E
Q28	Field 2	Fri 7:04 PM	8876E	7157A	64040C	7157D
Q29	Field 1	Fri 7:10 PM	34087B	7157X	7157F	64040D
Q30	Field 2	Fri 7:16 PM	64040B	8746A	8876C	34087A
Q31	Field 1	Fri 7:23 PM	7157C	64040A	34000E	8214C
Q32	Field 2	Fri 7:29 PM	78792T	7157B	34087A*	7157D*

Judges Meeting

Skills

Continued to page

SIGNATURE alana [redacted]

DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted]

DATE 1/28/22

PROPRIETARY INFORMATION

Qualification Matches 1 & 2

Match 1:

- We were paired with 7157C against 64040D & 8876E
- Our team focused on defense while our teammate did rings and put bases on the platform
- We lost autonomous
- During the match the battery fell off; our robot shut down.
- We lost the match 40 pts to 100 pts

One thing we need to work on not hesitating as much in matches. We need to be quick to react to the enemy.

Match 2:

- We were allied with 78792E vs 7157D & 7157X
- We played defense most of the match, towards the end we would help our allies get onto the platform.
- We tied autonomous
- During the autonomous we interupted their program by knocking the large middle base
- Our alliance got onto the platform with two bases with our help
- We won 153 pts to 123 pts

We worked very well with our teammates, strong coordination and good strategy.

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SIGNATURE MW

DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted]

DATE 1/28/22

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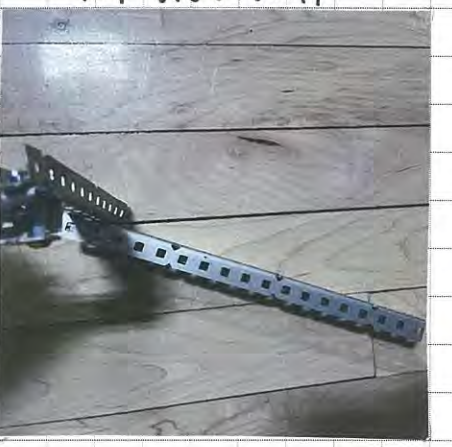
Arm Problems

- During our first match our arm reapeatedly ran into others robot causing them to bend outward and down
- We didn't have time to Fix this as we did not have much time in between matches
- it affected our Preformance in this match in a few ways
  - the downward bent arm steered the robot away from the netral base causing us to not get control of either base effectivly causing us not to win but tie autonomous
  - It also streched the arms outward and severly reducing the relability of our Arms
- we attempted to fix this by creating new arms/replacing the bent metal with new metal
- this did not work so we ultimatly ended up trying to bend it back our selfs and tightning any screws
- this we hoped would fix the problem for at least this tournament

Side view bent

top view bent



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SIGNATURE		DATE
Samuel [redacted]		1/28/22
DISCLOSED TO AND UNDERSTOOD BY	DATE	PROPRIETARY INFORMATION
Alana [redacted]	1/28/22	

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Qualification Matches 3 & 4

Match 3:

- We were alliance with team 7879ZT against teams 7157C and 34087B
- We focused on holding and defending the bases while our ~~teammates~~ teammates drove up the ~~platform~~ platform as we helped support the platform
- We won autonomous
- We won the match; 147 to 30

We communicated very well and easily with our teammates.

Match 4:

- We were alliance with team 8876A against teams 7157A and 34000E
- We defended the bases while our teammates focused on getting 2 bases onto the ramp
- Our teammate's robot was having trouble picking up bases because their arm broke
- We tied for autonomous
- We lost the match; 23 to 163

We should rely less on the arms of our robot because the arms would not work since the part where the arm was attatched to the motor was loose and there was little time inbetween matches to fix the robot. This is because the tournament was fast paced (moved quickly).

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SIGNATURE [redacted] DATE 1/28/22

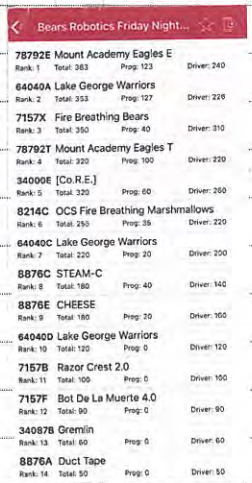
DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/28/22

Skills - Driver

Skills Record
- 40
Skills today
- 140
Possible Points
- 140

- we got a new record for skills today
- we only used 2 Attempts as we wher able to get the max possible points we could get

Atempts	Points earned	Max
1	140	140
2	120	140
3	0	0
Total	260	280



SD

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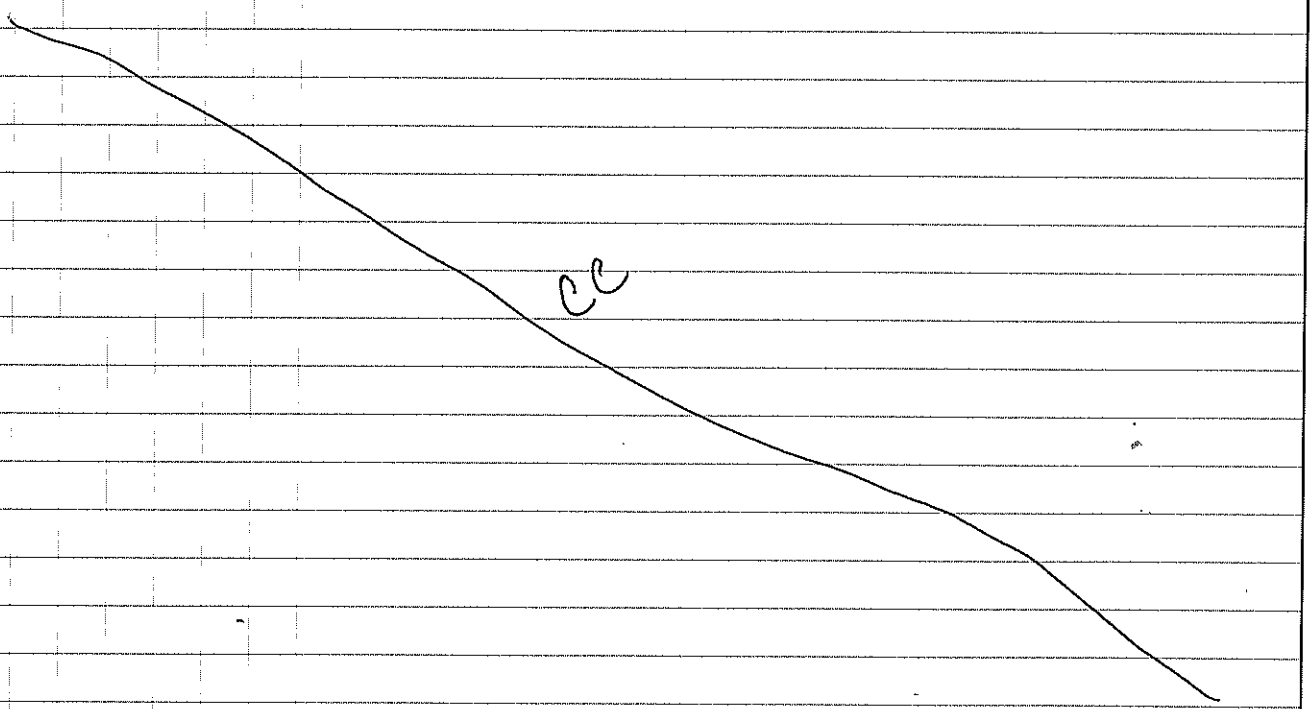
SIGNATURE Samuel [redacted] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Christopher [redacted] DATE 1/28/22

Autonomous Skills

- We didn't have a specific skills autonomous, so we ran the Right Double autonomous that we use in competition matches.
- Despite being consistent in the competition, the autonomous failed to grab the tall neutral goal on the first two attempts.
- Thankfully, it worked on the third attempt. 40 was the maximum that our program could score.
- Possible sources of error:
  - Variations in field setup
  - Variations in the initial alignment of the robot
- Possible solutions
  - Go slower, since we aren't racing an opponent in skills
  - Use sensors (unfortunately we don't have the GPS set up)

Attempt	Points
1	20
2	20
3	40
Best	40



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SIGNATURE Christopher [redacted]

DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted]

DATE 1/28/22

Qualification matches 5+6

Match 5

- we were allied with teams 7157F against teams 64040A and 7157E
- we lost the autonomous when we where unable to pick up a base against the opposing alliance
- our strategy was that our alliance would get a base drive up and balance while we collect as many Onses as possible
- this did not work as the opposing alliance was to fast and had early control of the bases and lost 60 to 148
- we learned that we need to rely less on teamate

Match 6

- we were allied with team 34087A against teams 64040B and 8746A
- we won Autonomus by getting a singular netral base onto our side which was more than the opposing alliance
- our strategy was the same as the last one, we take control of as many bases as possible while our teamate grabs a base and balances on the platform
- this worked better than last time but they where still better than us but lost 111 to 86
- Same as last time, do not rely on teamate

SD

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SIGNATURE Samuel [redacted] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Claire [redacted] DATE 1/28/22

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Rankings and Results

After Qualification Rounds

- Qualification rounds:
  15TH
- Skills ranking:
  8TH
- Things we did well:
  - Communication and coordination with teammates
  - Autonomous program
- Things we could work on:
  - Issues with arms
  - Relying less on teammates

CS

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SIGNATURE [redacted] DATE 1/28/22

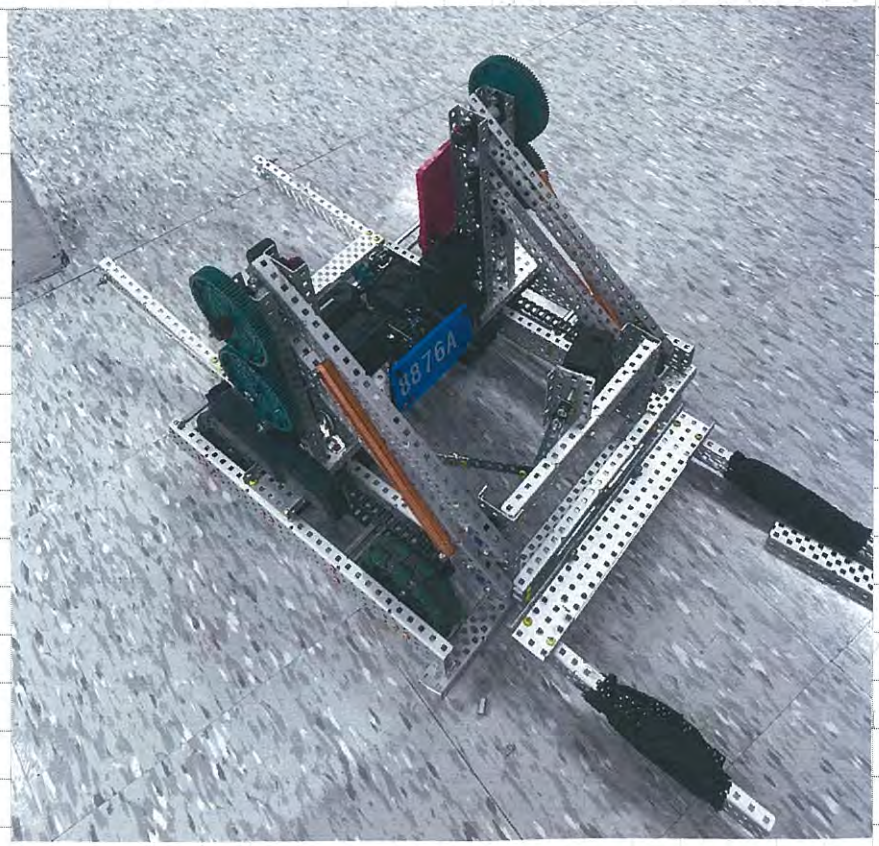
DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/28/22

Alliance Selection

we where ranked 15 ont of 21 teams, and we where not invrolved in the decision proccess unsilrank #13th team 8876A

- Team 8876A asked us to be in an alliance
- we responded with "we accept
- we became the #9th seed
- This pinned us against the #8 seed

8876A's robot



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SIGNATURE Samuel [redacted] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Alarna [redacted] DATE 1/28/22

Elimination matches 1+2

Match 1

- we were allied with 8876A against teams 34087A 34087B
- we tied in autonomous as we where able to beat our opponent to the base and neutralize them securing the tie
- our strategy is to leave the Alliance bases for 8876A and get as many neutral bases as possible on our side while 8876A gets those alliance bases and sets on the Alliance platform and balence
- we where able to get all neutral bases on our side as well as 1 opposing aliance base which wouldnt count for our point anyway. 8876A got balenced on the platform which secured an easy 173 to 83

Match 2

- we whore allied with 8876A against teams 34000E and 64040A
- we won Autonomous thanks to cancelling their Autonomus while 8876A got control of the neutral base to win it for us
- our strategy was the same as last time to get both Alliance platform balenced and get control of neutral bases
- we Where able to set 8876C balenced and steal away a neutral base as well as a red
- that red was stolen back and ended up hitting the opposing alliance platform causing it to be unbalenced giving us the win 136 to 98

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SIGNATURE Samuel [redacted]

DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Alexa [redacted]

DATE 1/28/22

Elimination Semi-Finals

After we won our last two matches, we were matched up against 7157X and 8214C. We had seen 7157X at previous tournaments and knew they were a formidible foe, at our last tournament they took home the excellence award. Still paired with 8876A, our strategy remained the same:

- We would prioritize defense while gathering as many bases as possible
- Our allies would possess two bases and end balanced on the platform

---

Autonomous begun and our team interrupted both of the enemies autonomous while ours obtained one nuetral goal, scoring us autonomous victory. However, driver period did not go as smoothly. Our strategy was working well for most of the match until around the one minute mark. As we were maneuvering, the large nuetral pushed their base under the platform. We attempted to ~~retrive~~ retriere it but were blocked by 7157X. After the match, we spoke with the referees about how the other team excessively pinned us, however we were still disqualified.

Afterwards we were frustrated as we were in the semi-finals and felt it was an unfair call. After watching the video replay it was obvious that the enemy team prevented us from retrieving the base and excessively trapped us multiple times which was not called by the judges. In the end we lost, however had we not been disqualified we would have won 136pts to 60pts.

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SIGNATURE [signature] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted] DATE 1/28/22

PROPRIETARY INFORMATION

Continued from page

Disqualification

During the third elimination match, we got disqualified for pushing a mobile goal under the opposing alliance's platform. We attempted to remove the base but were blocked by one of the opposing teams. After we were blocked, we didn't have another chance to retrieve the base. We brought this information to the head referee but, sadly, were still disqualified.

Rule SG3 has 4 points, the 4th point refers to bases being put under platforms of the opposite alliances.

- When placement is accidental and immediatly rectified, the violation is considered a warning
- When placement is intentional and/or not immediatly rectified, as judged by the head referee, this would be a violation.
- Repeated or strategic placement may result in a violation at the head referee's discretion.

If any of the above conditions result in a violation it is automatically considered interfering with the game and results in a disqualification.

MR

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SIGNATURE Manuel [redacted] DATE 01-28-22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/28/22

Steam-C Awards

Record
- All Time: 2
  - Design: 1
  - Excellence: 1
  - tournament champion: 0
- 2021-2022
  - Design: 1
  - Excelence: 1
  - tournament champion: 0

Athe tournament today we won the excellence award for the first time in school history. we did amazing at the tournamal today, had greatsportsmanship, and had a great design notebook, as well as a good judges meeting, this all helped us win but we cant count out the work of 8876A and 8876E our fellow teams from Aneonsburg that also followed many of these recomendetion showing how great our program at aneonsburg is ultimatly securing the award today.

SD

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SIGNATURE Samuel [redacted] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/28/22

Robot Reflection

During this tournament, our robot did very well. With coordination with our alliance we managed to beat the top two teams during the quarterfinals. Going forward we have a few goals for the robot:

- To improve the structural integrity of our arms
- To implement pnvematics into our design
- To better support the bases

Some problems we had:

- The Hooks were bending a lot
- The front arms bent
- We could not get onto the platform
- Bases sometimes got Jammed in our robot.

TM

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SIGNATURE

DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY [redacted]

DATE 1/28/22

Autonomous Reflection

- This was the first tournament that we actually had a full-fledged autonomous prepared before hand
- Our left side was only able to get one base, but most of our alliances allowed us to go on the right side, which could get two bases
- It worked consistently! Yay! There were a few times where our opponent went for the same base as we did, and it got messed up because of that, but we got the full 40 points when we were uncontested
- Our autonomous was fast enough to beat out several slower robots

QUALIFICATION

Match	1	2	3	4	5	6
Points scored by our robot	20	20	20	20	0*	20
Autonomous Victory	Loss	Tie	Win	Tie	Loss	Loss

ELIMINATION

Match	1	2	3
Point scored by our robot	0*	0*	20
Autonomous Victory	Tie	Win	Win

* Every time that we got 0 it was because we got caught on the enemy robot. We also prevented them from getting points in these instances

CC

Continued to page

SIGNATURE Christopher [redacted] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 1/28/22

Driver reflection

This was by far our best drivins we have had so far. I struggled early on but once we got into the elimination round, we dominated in 2 out of the 3 matches. 1st match we easily won the 3rd match which I will elaborate later on we also did extremly well in. the only match we didnt do the best on was the 2nd match of the elimination round. during it we preformed poorly at the start but as the game developed we did better and ended a majority of bases. they ended stealing their own alliance base buck causing their platform not being balanced, which won us the game. match 3 driving was very good except for the part where we where trying to set a base out from opponents side we where not able to get away from a robot that hit us and ended up pushing that base under their platform which we where not able to get out from under. the rest of the match went fine but we where disqualified. overall a good day. I would rate my drivins 8 out of 10.

SJ

Continued to page

SIGNATURE Samuel [redacted] DATE 1/28/22

DISCLOSED TO AND UNDERSTOOD BY JM DATE 1/28/22

Rules reflections

There were 2 major rule issues at this tournament. The first was with bases being placed under an opponent's platform. The other was whether or not you can be forced into a penalty.

Rule SG3 point "d" ~~says~~ MR ~~that~~ MR has the rules and stipulations about bases being placed under ~~the~~ opposing alliance's platform.

- when placement is accidental, a warning is issued if it is immediately removed.
- when placement is intentional or not immediately removed, a warning is issued that may become a violation

If you get a violation from any of the above conditions, it will result in immediate disqualification.

Rule G14 prohibits strategies that force an opponent into a penalty. Match affecting instances will result in a disqualification.

MR

Continued to page

SIGNATURE Manuel [redacted] DATE 01-28-22

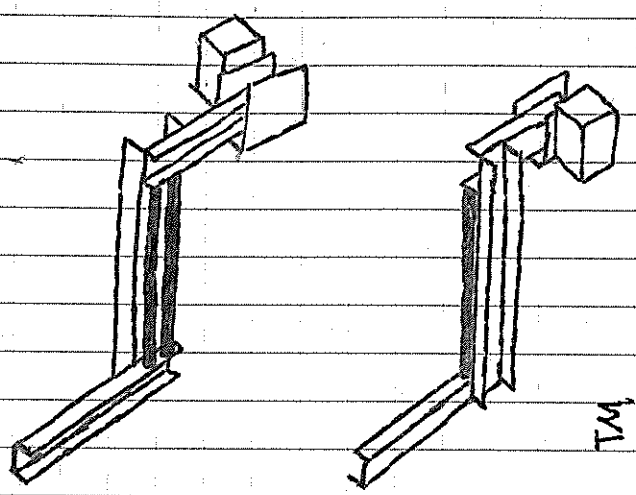
DISCLOSED TO AND UNDERSTOOD BY Elena [redacted] DATE 1/28/22

PROPRIETARY INFORMATION

Redesigning the Arm

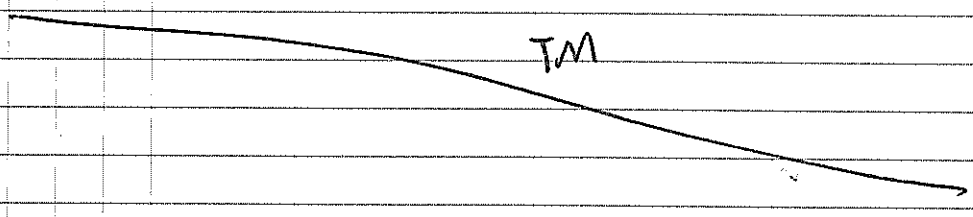
After the last tournament we found that the arms were very helpful for not only holding more bases, but also to line up bases for the hooks during driver period.

- One large problem we had was that our current arms easily bent.



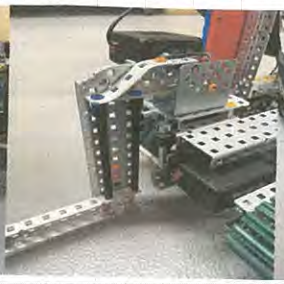
(Sketch of new Arms)

The new arms would minimize the risk of them bending, while still performing their intended function.



Continued to page 138

- The process of building the arm was quite simple
- The new design barely could bend
- We had to smooth the top section to allow boxes to pass freely
- We also needed to add standoffs to stop the arms from scraping the ground.


(Side View) (Inside View) (Holding Base)

- The arm worked better than before, having more strength due to the new sturdiness.
- However, while the metal did not bend anymore, the axle still could bend..

TM

Continued to page

SIGNATURE

DATE 2/8/22

DISCLOSED TO AND UNDERSTOOD BY [redacted]

DATE 2/8/22

Designing the Club Shirts

Our robotics club has an annual fundraiser where we design apparel and sell it to raise funds. This year, we had not yet made a design so I offered to make one.

- Our advisor wanted our school logo with a gear on the front, with the vex vrc logo on the back
- I pitched the idea to our coach and he loved the design
- We decided we would vote on it by thursday,
- If we ordered now we should receive them before states

(Front of T-Shirt)

(Back of T-shirt)

TM

Continued to page

SIGNATURE [signature] DATE 2/9/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/9/22

Driving Practice

- After the past tournament driving was very good but we needed to have more esspesions for our last tournament before states
- we attempted to set up on the platform and realized that if a robot holds the platform up and we have no more than 3 bases and a big space for momentum
- we were not able to set up on our own which was disappointing
- the last thing we did was to see how many bases we could fit
- we got a new record of 5 which is one more than last time

5 bases in 1 robot

Continued to page

SIGNATURE Samuel [redacted] DATE 2/9/22

DISCLOSED TO AND UNDERSTOOD BY Christopher [redacted] DATE 2/9/22

Code Refactoring

- Our code thus far has been slowly building on itself over time as we create more complex things
- This leads to a somewhat bloated, disorganized program. Additionally, all of the code was in one file (main.cpp), which was getting long and making it hard to find things
- Without having to make major build changes this week, I had enough time to completely rewrite the code in a more organized way
- Major Changes
  - Organized pairs of motors into classes with more concise method calls (see the examples below)
  - Added more files to organize the code (main.cpp, utils.h, device-setup.h, usercontrol.h, autonomous.h)
  - Standardized parameters: first argument is power, second is a measurement

```
void autonomous(void) {
  // ~~LEFT~~ DOUBLE RIGHT
  // Unfolding
  LAMotor.spin(reverse, 100, percent);
  RAMotor.spin(reverse, 100, percent);
  forwardDist(autonSpeed, 40);
  LAMotor.stop(brakeType::hold);
  RAMotor.stop(brakeType::hold);
  //First Base
  LCMotor.setVelocity(chainSpeedHigh * 100, percent);
  RCMotor.setVelocity(chainSpeedHigh * 100, percent);
  LCMotor.startRotateFor(5, rotationUnits::rev);
  RCMotor.startRotateFor(5, rotationUnits::rev);
  forwardDist(0.2, 5.0);
  task::sleep(1000);
  //Second Base
  turnDegs(autonTurnSpeed, -60);
  forwardDist(autonSpeed * 0.5, 15);
  forwardDist(0.2, 5.75);
  LAMotor.spin(forward, armSpeedUp * 100, percent);
  RAMotor.spin(forward, armSpeedUp * 100, percent);
  task::sleep(1000);
  LAMotor.stop(brakeType::hold);
  RAMotor.stop(brakeType::hold);
  // Turn and Reverse
  turnDegs(autonTurnSpeed * 0.1, 35);
  forwardDist(autonSpeed * -0.4, 45);
}
```

← Right autonomous before refactoring

Right → autonomous after refactoring

```
void autonomous() {
  // RIGHT DOUBLE
  // Unfold and start forward
  Arm.start(-100);
  Base.driveForAsync(100, 40);
  Arm.stop(brakeType::hold);

  // First mogo
  Chain.spinFor(100, 5);
  Base.driveForAsync(20, 7);
  task::sleep(1000);

  // Go to second mogo
  Base.spotTurnAsync(25, -70);
  Base.driveForAsync(50, 15);

  // Second mogo
  Base.driveForAsync(20, 6.5);
  Arm.start(100);
  task::sleep(950);
  Arm.stop(brakeType::hold);

  // Turn and reverse
  Base.spotTurnAsync(10, 50);
  Base.driveForAsync(40, -47.5);
}
```

Continued to page

SIGNATURE Christopher [redacted]

DATE 2/10/22

DISCLOSED TO AND UNDERSTOOD BY Elum [redacted]

DATE 2/10/22

Setting up for the tournament

- We are hosting the tournament in the blue gym.
- set up three fields: two competition and one practice.
- Helped put signs on the wall and set up tables and chairs for teams on the oprosite side of spectator bleachers.
- Moved TV screens that would display upcoming games and scores.

EM

Continued to page

SIGNATURE Elmm [redacted] DATE 2/11/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/11/22

Adirondack Tournament

Qualification Match List

Adirondack VRC Blended Qualifier @ Queensbury 8876C

VEX ROBOTICS COMPETITION

Match	Field	Time	Red 1	Red 2	Blue 1	Blue 2
Q1	Field 1	Sat 9:00 AM	12054A	5111A	5111B	64040C
Q2	Field 2	Sat 9:06 AM	84207A	5501B	10310A	8876A
Q3	Field 1	Sat 9:12 AM	12054B	5111E	64040B	5111C
Q4	Field 2	Sat 9:18 AM	5501C	91242C	8876C	64040A
Q5	Field 1	Sat 9:24 AM	5111D	91242B	5501A	8876E
Q6	Field 2	Sat 9:30 AM	64040D	3042R	53999F	53999B
Q7	Field 1	Sat 9:36 AM	10310B	5501D	91242A	5111B
Q8	Field 2	Sat 9:42 AM	64040B	8876C	5111D	8876A
Q9	Field 1	Sat 9:48 AM	5501A	91242C	64040D	12054B
Q10	Field 2	Sat 9:54 AM	10310B	5111C	84207A	91242B
Q11	Field 1	Sat 10:00 AM	91242A	5501C	5501B	12054A
Q12	Field 2	Sat 10:06 AM	53999F	64040C	8876E	10310A
Q13	Field 1	Sat 10:12 AM	53999B	5111E	5111A	5501D
Q14	Field 2	Sat 10:18 AM	64040A	5111B	3042R	91242B
Q15	Field 1	Sat 10:24 AM	64040C	64040D	5501C	5111D
Q16	Field 2	Sat 10:30 AM	8876C	10310A	10310B	5111E
Q17	Field 1	Sat 10:36 AM	53999F	5501D	91242C	5501B
Q18	Field 2	Sat 10:42 AM	64040A	53999B	12054A	12054B
Q19	Field 1	Sat 10:48 AM	84207A	64040B	5501A	3042R
Q20	Field 2	Sat 10:54 AM	5111A	8876E	5111C	91242A
Q21	Field 1	Sat 11:00 AM	8876A	91242B	53999B	5501C
Q22	Field 2	Sat 11:06 AM	10310A	5111B	64040B	64040D
Q23	Field 1	Sat 11:12 AM	91242A	5111E	91242C	84207A
Q24	Field 2	Sat 11:18 AM	3042R	8876E	8876C	5111A
Q25	Field 1	Sat 11:24 AM	5111C	12054A	53999F	5501A
Q26	Field 2	Sat 11:30 AM	5111D	5501B	10310B	64040A
Q27	Field 1	Sat 11:36 AM	12054B	8876A	64040C	5501D
Q28	Field 2	Sat 11:42 AM	64040D	84207A	12054A	8876C
Q29	Field 1	Sat 11:48 AM	91242A	64040B	53999F	91242B
Q30	Field 2	Sat 11:54 AM	5111B	8876A	91242C	5111C
Q31	Field 1	Sat 12:30 PM	5111A	5501C	10310B	12054B
Q32	Field 2	Sat 12:36 PM	5501B	64040C	5111E	3042R
Q33	Field 1	Sat 12:42 PM	5111D	5501A	53999B	10310A
Q34	Field 2	Sat 12:48 PM	64040A	8876E	5501D	64040D
Q35	Field 1	Sat 12:54 PM	91242C	64040C	5111A	64040B
Q36	Field 2	Sat 1:00 PM	10310B	12054A	8876A	3042R
Q37	Field 1	Sat 1:06 PM	53999B	5111C	8876C	5501B
Q38	Field 2	Sat 1:12 PM	5111D	8876E	5111E	5111B
Q39	Field 1	Sat 1:18 PM	5501A	5501D	5501C	84207A
Q40	Field 2	Sat 1:24 PM	12054B	91242B	10310A	91242A
Q41	Field 1	Sat 1:30 PM	53999F	64040A	5111E*	8876A*

W W Skills driver W

Judges meeting L

awards ceremony Skills L

SIGNATURE [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/12/22

PROPRIETARY INFORMATION

Qualification Matches 1 & 2

Match 1:

- We were allianced with team 6404OA
- We focused on getting the tall neutral base and a short neutral base as well as the other team's bases and defending them from the other team.
- Our ~~teamates~~ teammates focused on putting rings on the alliance bases (our bases) and stacking these bases onto the platform.
- We won autonomous
  - We got the left neutral base
  - Alliance got right neutral base and center neutral base
  - ~~We won~~ Our team got ~~2~~ 3 bases in total while ~~got~~ opposite team got 0 bases.
- We won the match; 60pts to 18opts

Match 2:

- We were allianced with team 6404OB
- We focused on gathering bases and dropping/releasing the bases at the end of our robot for our alliance to stack on the platform
- We lost autonomous
  - In order win autonomous, both alliance bases must have a ring in them
  - We were able to get the right neutral base before a robot on the other team because we got to the base faster and our clips on the conveyer of our robot

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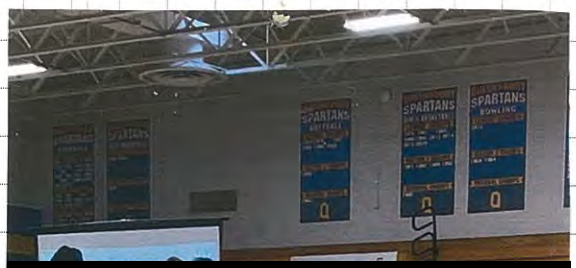
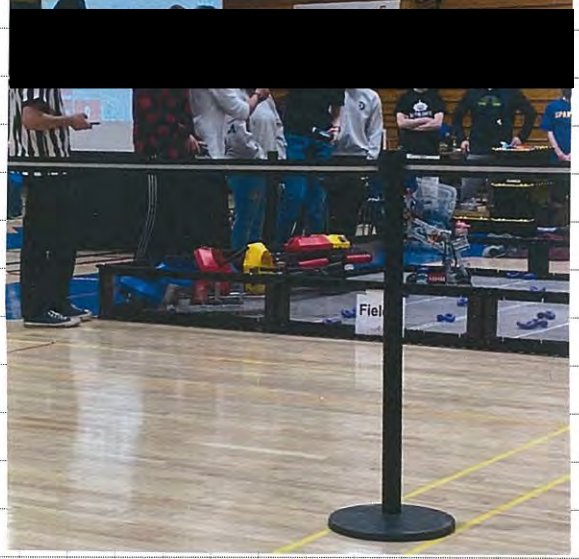
SIGNATURE Alana [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/12/22

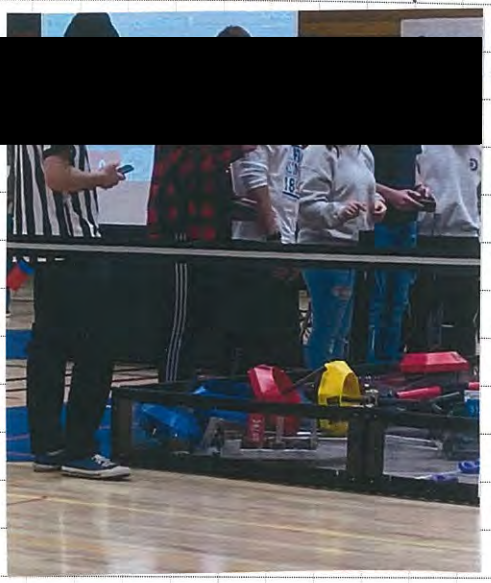
were able to pull the lease on our side/were stronger than the other team's clamp which was trying to grab ~~to~~ onto the lease during autonomous

- We won the match; 26pts to 120pts
  - We had 4 leases on our robot in our homezone at the end of the match





(Sam & Tyler with team 6404OB)



(our robot with 4 leases)

(our robot with 4 leases)

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SIGNATURE	DATE
[redacted]	2/12/22
DISCLOSED TO AND UNDERSTOOD BY [redacted]	DATE 2/22/22

PROPRIETARY INFORMATION

Skills-Driver

Skills Record
-140
Skills today
-140
Possible Points
-140

- we did not create a new Autonomous to get our points but our driver Drived we where able to attempt to drive up the platform on our first try, we failed though
- we got our max points during our second try and didnt have time for a third try

Attempts		
1	100	140
2	140	140
3	0	140
Total	280	420

53999R Robo Hornets
Rank:1 Total:318 Prog:69 Driver:249

64040A Lake George warriors
Rank:2 Total:316 Prog:103 Driver:213

5111C AP 5111C
Rank:3 Total:233 Prog:32 Driver:201
↓ skip 1

53999B Robo Hornets
Rank:5 Total:151 Prog:20 Driver:131

8876C Steam-C
Rank:6 Total:150 Prog:90 Driver:140

Continued to page

SIGNATURE Samuel [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY Alana [redacted] DATE 2/12/22

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Qualification Matches 3 + 4

Match 3:

- We were allied with team 10310A against teams 10310B and 5111E
- Our strategy was to hoard bases and help our alliance get onto the platform with a base
- Our alliance was disqualified during the autonomous phase for crossing into the opposing teams' homezone
- We were disqualified for tipping over one of the enemy teams' mobile goals that had bases on it
- The enemy team was disqualified for crossing into our homezone during autonomous
- We lost the match —
- We lost autonomous

Match 4:

- We were allied with team 5111A against teams 8876E and 3042R
- We focused on gathering and defending bases as well as helping to balance our allies on the platform with 2 bases.
- In the last 30 seconds an enemy team's robot pushed the tall neutral goal under our platform, making it unbalanced
- The offending team was disqualified
- We won the match 80pts to 109pts
- We lost autonomous

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SIGNATURE [redacted]

DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [redacted]

DATE 2/12/22

Autonomous Skills

- We once again did not have a specific Skills Autonomous, so we ran the Right Double autonomous that is our prefered program in normal matches
- Dispite being mostly consistant in the matches our autonomous did not work at all our first two attempts so we went back to our table and trouble shooted until we fixed any problems we were having
- Thankfully it work on our final attempt, getting Both Bases onto our side awarding us 40 points
- we ended up ranking 5th for Programing which is defenitly better than most but we wish we could have done better

Attempt	Points
1	0
2	0
3	40
Best	40

SD

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SIGNATURE Samuel [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/12/22

Qualification Matches 5 & 6

Match 5:

- We were with 12054A against 64040D & 84207A
- Our main strategy was for us to gather and defend multiple, our allies hold one base and park on platform.
- We tied autonomous, both teams got one ~~left~~ neutral base
- In driver period we defended 4 bases while lake george got the other 3.
- At the end, 64040D fell forward trying to park with 3 bases, losing their elevated status for the 3 bases and a robot
- We won 83 pts to 60 pts

Match 6:

- We were with 5501B against 53999B & 5111C
- Our allies would obtain a side neutral base and get on the platform. We would and gather bases and put pressure on the enemies to prevent them from retrieving them
- We lost autonomous, Driver period was back and forth, however at the end we were pinned by the enemy for 8 full seconds. The judges did not call it
- We lost 195 pts to 70 pts

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SIGNATURE [signature] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [signature] [redacted] DATE 2/12/22

Ranking and Results After Qualification rounds

- Qualification rounds:
  11th
- Skills ranking:
  6th
- Thing we did well:
  - communication and coordination with teammates
  - Autonomous Programs Flexability
- Thinks we could work on:
  - Issues with Arms
  - reaction time of Driver
  - talking to other team so we are ready for Alliance Selection

SV

Continued to page

SIGNATURE Samuel [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY DATE 2/12/22

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Alliance Selection

We were ranked 11th ont of 27 teams, and we had been approched for the first time by other Alliances such as 6404OB and 53999B. So when it came to rank #7 robo hornets turn to pick we had to make a choice. we had Previously talked with 6404OB and even played our 2nd Qualification match with them. we Planed to pick from when the time came until 53999B asked us that they where thinking about Picking us. As a team we discussed 6404OB the most as their autonomous did not work which would put us in a significant disadvantage, while 53999B had their best autonomous on the left opposite of our best which fits really well. plus 53999B has the same exact robot concept ont maybe even better. So this is how it went.

- Team 53999B ask us to be in an alliance
- We responded with "we accept"
- we became the 4th seed
- this pinneans against the #10 seed

SV

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SIGNATURE Samue [redacted] DATE 2/12/20

DISCLOSED TO AND UNDERSTOOD BY IM DATE 2/12/20

Elimination Matches 1 & 2

Match 1:

- We were alliances with 53999B, the Hornets
- Our strategy was to pick up middle neutral lease and right neutral lease as well as our alliance lease on the right side and keep them in our homezone.
- Our alliance got a neutral lease on the left and filled it with rings. Afterwards, he put the lease on the platform. He did this for the (our) left alliance lease as well.
- Our alliance almost got us DQ, ~~causing~~ ack which would have resulted in an automatic loss because he grabbed the other teams alliance lease which had rings in it. If our teammate had dropped a single ring from the lease, it would have DQ us both since an alliance lease with rings is considered protected (be mindful of rules in ~~fut~~ ack the future).
- We won autonomous
- We won the match; 130pts to 27pts

Match 2:

- We were alliances with the same team, 53999B
- Same strategy as in elimination match 1
- We won autonomous
- We lost the match; 83pts to 66pts
  - Would have won since we had a lease with ring on our platform, but within the last 3 seconds our ~~alliance~~ ack ~~alliance~~ ack alliance drove backward, away from the platform, and then toward the platform and when the match ended, the robot shut off and his robot's arm touched platform so the platform was no longer considered elevated.

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SIGNATURE Alana [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD Christopher [redacted] DATE 2/12/22

Steam-C Awards

Record

- All time: 2
  - Design: 1
  - Excellence: 1
  - Tournament champion: 0
- 2021-2022
  - Design: 1
  - Excellence: 1
  - Tournament champion: 0

This tournament we did fairly well in but we guess did not do well enough to get an award, but our fellow team 8876A won the design award which is nice. hopefully we will be able to win one more award at the RIT tournament.

SD

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SIGNATURE Samuel [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/12/22

Autonomous Reflection

- We did not make any major changes to our autonomous since the last tournament. We can't get rings, so scoring two neutral bases is about the best we can do.
- Overall our autonomous worked well, as expected

Match #	Side	Points scored by our robot	Win/Loss/Tie	Notes
Q4	L	20	W	Success! We let our partner get the central base
Q8	R	20	L	Lost 1st base due to interference with opponent.
Q16	R	40	L	Lost autonomous because our partner DQ'd
Q24	R	40	W	Success!
Q28	R	20	T	We missed the 1st base. Maybe it was lined up wrong.
Q37	R	20	L	We got DQ'd due to interference with our opponent
R16 8-1	R	40	W	Success!
QF 4-1	R	20	W	Lost 1st base due to interference with opponent

GC

Continued to page

SIGNATURE Christopher [redacted]

DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY Clain [redacted]

DATE 2/12/22

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Rules Reflection

- During multiple matches there were robots that caused field elements to break. Safety rule S1 states that robot operations deemed unsafe and may warrent Disablement or Disqualification at the head referee's discretion.

- During an autonomous period, our alliance won the autonomous but the bonus went to the opposing alliance by mistake. By the time we realized it, the scores were already submitted.

- There was one match where a team had a balanced platform with a robot and 2 mobile goals on it. In the last 30 seconds an opposing robot knocked a neutral mobile goal into the platform and caused it to be unbalanced. Because of this, the opposing alliance won.

MR

Continued to page

SIGNATURE Manuel [redacted] DATE 02-12-22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted] DATE 2/12/22

Driver Reflection

Today I would say we are set for driver as we did very well in our matches and our problem was not in driving but in Autonomous and our teamates. We where able to get 3 buses consistantly when our Autonomous did work, when it did we where still reasonably able to get 2 buses and often able to get a third base back and onto our side. One problem that I encountered when driving was that often I had to improvise because the arms were not working meaning that we couldnt move fast as we where to long to sort out of tight spaces. An instance that this happened I was able to get out using the other arm as leverage and still collect buses and drive it to our side. without the slider in the back we would be able to move most easier though as I have noticed we often don't get 2+ buses meaning something it down would not be bad at all, plus we might be able to get onto the Platform. Overall I would rate my preformance today a 7 out of 10 which is tied for second place.

SV

Continued to page

SIGNATURE Samuel [redacted] DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 2/12/22

Robot Reflection

Overall, the robot performed well, however there are some key problems and aspects we need to look at:

- While our robot can hold up to five mobile goals, we can rarely acquire five in a match. We were able to get four in a match, but most of the time we get two or three
- Our twin front arms greatly assisted in guiding the bases to the chain, but often bent or had the axle come out as bases collided with them often
  - Our vision is a device that can quickly move bases whilst guiding incoming bases
- Ours rear extension permits us to hold more bases, but it prevents us from parking

TM

Continued to page

SIGNATURE

DATE 2/12/22

DISCLOSED TO AND UNDERSTOOD BY Samuel [redacted]

DATE 2/12/22

Designing our banner

We wanted to design a banner to represent our team at states so we decided to design and order a banner from staples

- We decided to incorporate our logo with our team name, team number, and school
- This banner would not only represent our team, but also our school

TM

Continued to page

SIGNATURE JW

DATE 2/14/22

DISCLOSED TO AND UNDERSTOOD BY Christopher [redacted]

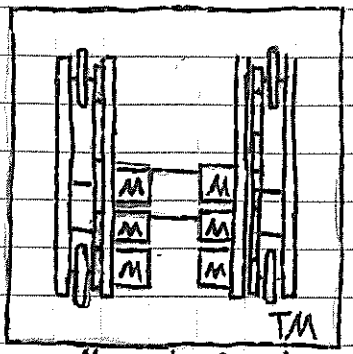
DATE 2/14/22

PROPRIETARY INFORMATION

Brainstorming Modifications

Base Modifications:

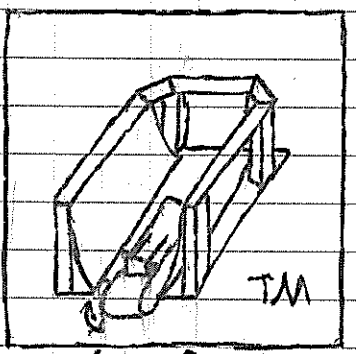
- Our drivetrain is currently powered by a 4-motor
- It did not have enough power to get onto the platform
- We could change our drive train from 4 motor to 6 motor drive



(6-motor Drive)

Cage Modifications:

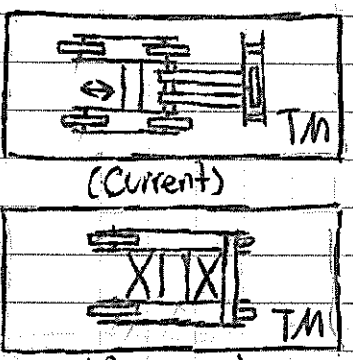
- Our current cage provided minimal value
- We wanted to redesign it to better support the bases
- Some new design features would be one single piece, with concave interior features to feed bases



(New Cage)

Extension Modifications:

- After a few tournaments we found that the extension could hold more bases but we could not often get 4 or 5.
- The extension also prevents us from parking on the platform
- Removing the extension may allow us to park on the platform and won't limit us in practice



(Current)
(Proposed)

Continued to page

SIGNATURE JM

DATE 2/14/22

DISCLOSED TO AND UNDERSTOOD BY Christopher [redacted]

DATE 2/14/22

Extension Motors Changes

With the new Proposal that would remove the extention in the back, We decided that the most vital thing to allow any other notification would be to do this and remove the extensions.

Reasons:

- unessary as we really can only get a few buses in a match, usully 2-3
- it has an unessary sliding mechanism that can make or Break our robot as a whole
- It is also way to big and Prevents much mobility we have, or hope to have
- lastly we cannot Park due to how heavy the extension is and it also lifts our wheels off the ground Preventing good traction also Preventing us from Parking

SD

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SIGNATURE Samuel [redacted] DATE 2/16/22

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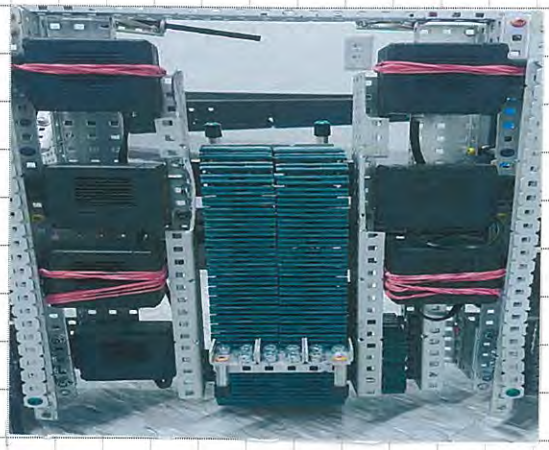
Continued from page

6 Wheel Drive

motor

In order to be able to set onto the Platform we must find a way to get more traction on the Poly-Carbonate Platform. we tried a 6th wheel and motor but it didnt work so we tried something else To get 6 motors we had to attach a chain to all 3 which would Provide torque to all wheels not Just 1 on each side. After we added the 6 wheel drive we tested if we could set up with 1, 2, 3, and 4 bases we did 3 trails each.

Base #	Success		Points	Reason
0	1st	✓	30	Success
	2nd	✓		Success
	3rd	✓		Success
1	1st	✓	70	Success
	2nd	✓		Success
	3rd	✓		Success
2	1st	✓	110	Success
	2nd	X		Tipped over
	3rd	✓		success
3	1st	✓	150	Success
	2nd	✓		Success
	3rd	X		Tipped over
4	1st	X	190	Base went too Far
	2nd	✓		Success
	3rd	X		Base went too far



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SIGNATURE Samuel [redacted] DATE 2/17/22

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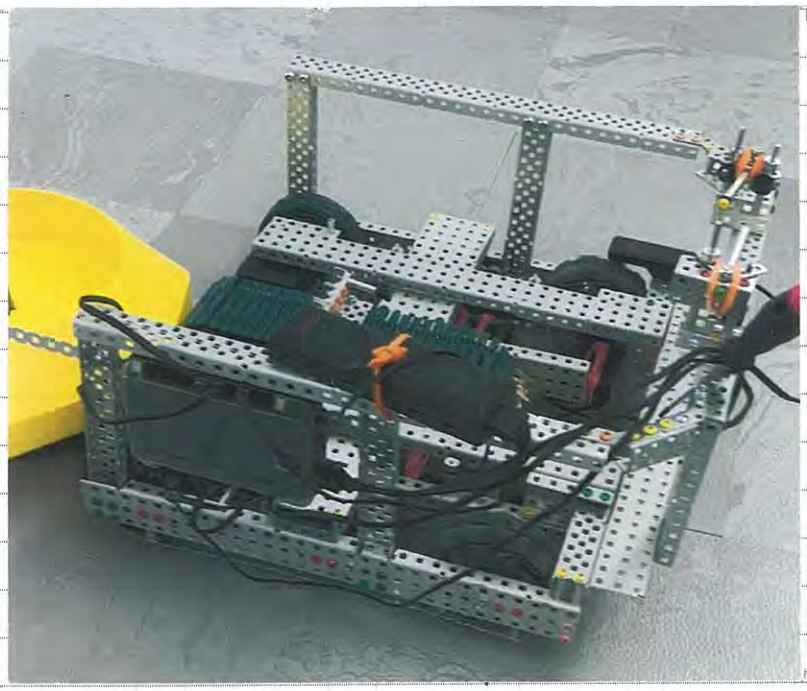
CONTINUED TO VOLUME II

Cage Modifications

- We decided to add onto our cage so that it wraps all the way around the sides and back of the conveyor. This makes it more effective by eliminating spaces where bases could get caught in or be stolen through.
- We shortened the height of the standoffs that connect the one-way gate to the robot. This gives bases trapped in the gates less room to move. Making sure that the first base we pick up is held completely sideways by the gate gives us more room to store other bases.



(Robot with new cage)

CS

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SIGNATURE [redacted] DATE 2/18/22

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Queensbury High School Robotics

8876C

ENGINEERING NOTEBOOK

Steam-C

Queensbury High School, NY

VOLUME II

NOTEBOOK

NOTEBOOK NO. 2

CONTINUED FROM NOTEBOOK NO. 1 CONTINUED TO NOTEBOOK NO.

ASSIGNED TO:

NAME

SIGNATURE Alana [redacted] DATE

DATE ISSUED 2/28/22 BY

[redacted]

COMPANY

DEPARTMENT

ADDRESS

CITY Queensbury STATE New York ZIP 12804

DATE NOTEBOOK COMPLETED NUMBER OF PAGES FILLED IN

NOTES:

GUIDELINES†

INTRODUCTION

Using a Notebook to record ideas, inventions, experimentation records, observations and all work details is a vital part of any laboratory process. Careful attention to how you keep your Notebook can have a positive impact on the patent outcome of a pending discovery or invention.

Following are some overall recommendations to help you keep more efficient and accurate Notebook entries. Remember, however, that these are simply a suggested set of guidelines. Only your attorney can supply the exact guidelines she would like you to follow to satisfy specific legal requirements. That is why we recommend that you consult your legal counsel.

RECORDING DATA

Your Notebook is a vital record of your work whether it is for patent purposes, legal records or documenting drug research under FDA guidelines. The Notebook can help you prove:

a. Exact details and dates of conception
b. Details and dates of reduction to practice
c. Diligence in reducing your invention to practice
d. Details regarding the structure and operation of your invention
e. Experimentation observations and results
f. A chronological record of your work
g. Other work details

Follow a few simple rules of thumb

1. Always record entries legibly, neatly and in permanent ink.
2. Immediately enter into your notebook and date all original concepts, data and observations, using separate headings to differentiate each.
3. Record all concepts, results, references and other information in a systematic and orderly manner. (Language, charts and numbering systems should be maintained consistently throughout.)
4. It is acceptable to make your entries brief. Always, however, include enough details for someone else to successfully duplicate the work you have recorded.
5. Label all figures and calculations.
6. Never, under any circumstances, remove pages from your notebook.

Remember to treat your Notebook as a legal document: It records the chronological history of your activities. The following guidelines should help you maintain the consistent and accurate entries needed for future legal purposes.

1. Start entries at the top of the first page, and always make successive, dated entries, working your way to the bottom of the last page.
2. After completing a page, sign it before continuing to the next page.
3. Make sure that you record the date of each entry clearly and unambiguously.
4. Never let anyone other than yourself write in your Notebook (excluding witness signatures, discussed later).
5. Never leave blank spaces, and never erase or remove material you have added. Simply draw lines through any blank spaces at the same time you are making your entries.
6. Do not erase errors. Just draw a single line through any erroneous entry, then add your initials. Enter the correct entry nearby.
7. You can supplement your entries with supporting material (e.g., test-result printouts and other documentation). But you must permanently affix the material onto a page in its proper chronological location.
8. Never rely solely on any supplemental attachment. Always include your own entry describing the attachment and add any conclusions that you might draw from its substance.
9. Occasionally, secondary sources might be too large or inappropriate to attach directly to your notebook. In this case, you can add all secondary sources to an ancillary record maintained precisely for this purpose. However, always remember to write a description of these secondary sources, clearly and unambiguously, in your notebook.

DOCUMENTING PATENT ACTIVITIES

A primary purpose of a Notebook is the support of documenting work that may be patentable. To support patent activities, it is necessary to provide clear, concise, chronological entries with specific dates. To rely on these dates, you must have at least one non-inventor corroborate that the events actually happened and that he or she understood your invention by signing and dating the "Disclosed to and Understood by" signature blocks.

Your Notebook should help you document and prove:

1. *Conception Date*—The date that you knew your invention would solve the problem.
2. *Date of reduction to practice*—The moment that you made a working embodiment of your invention.
3. *Diligence in reducing your invention to practice*—Diligence refers to your intent and conscious effort to make a working embodiment. You are not required to rush, or even to take the most efficient development strategy. But your Notebook must include details relating to your diligent activities. These are dates and facts that show what activities you have conducted to reduce the invention to practice, and when such activities were conducted. Since you may still be diligent despite periods of not working on reducing your invention to practice, always remember to provide reasonable excuses for these periods of inactivity by supplying facts relating to why there was no activity during the period in question. (e.g., unavailability of test conditions or equipment).
4. *How to make and use your invention*—provide documentation details sufficient to teach a colleague how to make and use your invention.
5. *The best mode of practicing your invention*—document the best way to practice your invention.

A non-inventor colleague should corroborate each of these events/facts by signing the "Disclosed to and Understood by" on the relevant pages.

† BookFactory provides these sample guidelines "AS IS" without warranty.

TABLE OF CONTENTS

Continued from Volume I

Steam-C Awards

Record

- All Time: 2
  - Design: 1
  - Excellence: 1
  - Tournament: 0
- 2021-2022
  - Design: 1
  - Excelence: 1
  - Tournament: 0

All awards have been stated in Volume 1 of our Design notebook, but for a quick recap we have competed in 4 tournaments winning 2 awards. The Design award at the Chittanango High School Robotics tournament and Excelence at Chittanango Friday Night Robotic tournament.

SV

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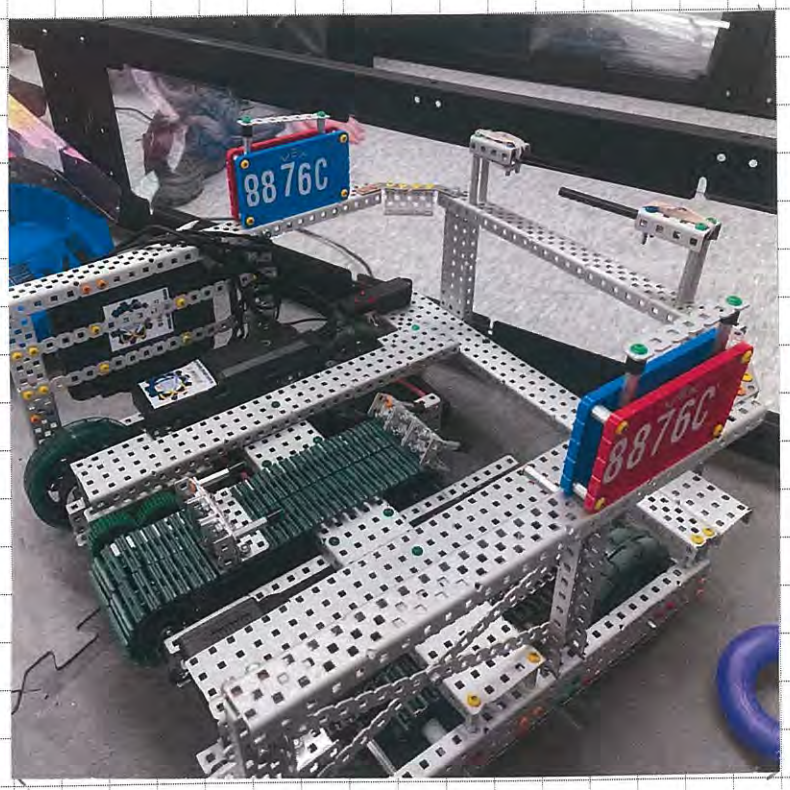
Robot Recap



- 6-Motor drivetrain
- 2M Conveyer

Function:

- The robot primarily gathers bases with a conveyer and hook
- 6-motor drive lets us park on the platform with 3-4 bases

TM

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SIGNATURE TM

DATE 2/28/22

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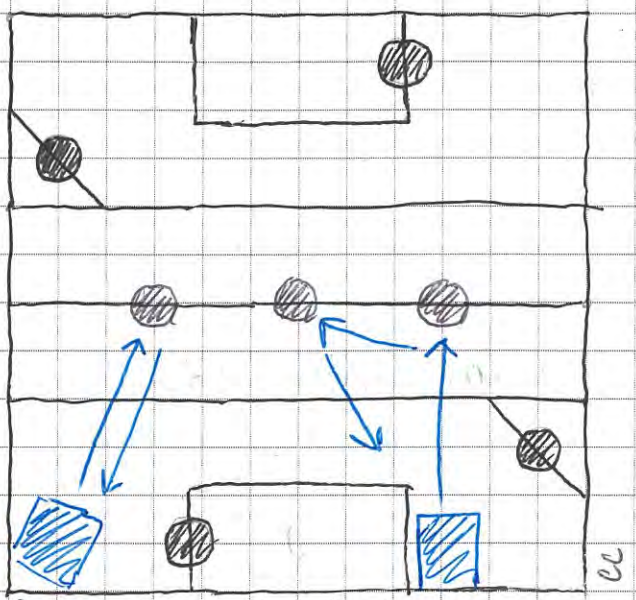
DATE 2/28/22

Autonomous Recap

- For a long time we didn't have a very good autonomous because we were repeatedly updating our robot design which would require remaking the program
- We have been settled on a design for several weeks and now have an autonomous for both sides:
  - Left: Hooks the left neutral goal and brings it to the home zone for points
  - Right: Hooks the right neutral goal and the center neutral goal, bringing both to the home zone for points

- Goals: Create a left autonomous that can also get the center goal

- Create a skills autonomous that can park on the platform



Current Right and Left Autonomous

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SIGNATURE Christopher [redacted]

DATE 2/28/22

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DATE 2/28/22

Lake George Scrimmage

- We went to Lake George Highschool to scrimmage with their teams
- This allows us to test our driving skills, robot performance, and the autonomous in a match-like setting

- Match 1:
  - We lost autonomous; didn't grab side neutral base and pushed the middle neutral base onto the opposing alliances side
  - We won the match; 170 to 66
    - Our robot grabbed 2 bases and drove onto the platform while our alliance put an additional base behind our robot, on the platform
    - This meant that at the end of the match, we had an elevated robot and 3 elevated base on the platform
- Match 2:
  - We won autonomous
  - We lost the match; 156 to 197
- Match 3:
  - We won autonomous
  - we won the match; 142 to 80

Match 4:
- We lost autonomous
- We lost the match; 126 to 102

Match 5:
- We tied for autonomous

Continued to page 5

SIGNATURE Alana [redacted] DATE 3/1/22

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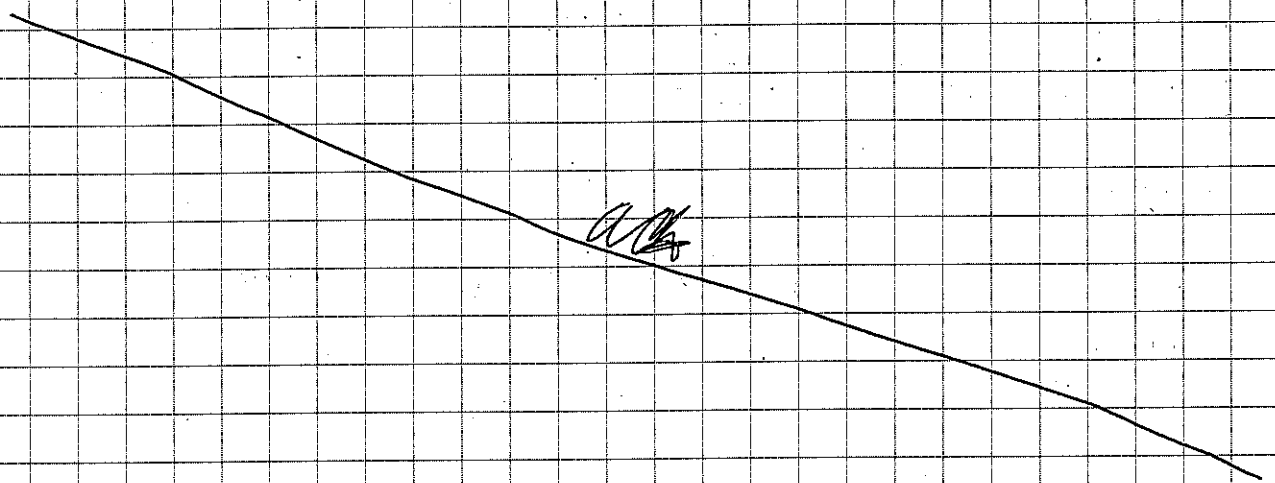
- We lost the match; 136 to 85

- Alliance Selection:
  - since there were 7 teams, the last team that doesn't get picked will be added to the first placed teams' alliance
  - also, matches will best out of 3: this will allow the alliance of 3 teams to have each team play at least 1 match
    - alliances with 6404OB and 6404OC
- Elimination Match 1:
  - Round 1:
    - We lost autonomous
    - We lost the first round of the first elimination round; 40 to 156
  - Round 2:
    - We lost autonomous
    - We lost the ~~match~~; second round of the first elimination match; 156 to 60



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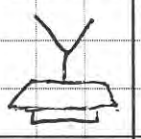
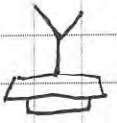
Reflection of Lake George Scrimmage

Overall it was a nice mini competition/tournament that allowed us to make friends with many of the Lake George teams with possibilities of Alliances at States and even knowing what the other team statagy and how they play. The problem is that we hadn't yet come up with a new arm making it hard to Secure, Collect, and Protect the bases. So from our 6 total matches we played we only won 2 matches because by not being able to do much and relied too much on our teamates to do much unless we where very comfortable and they went heavy on the rings and where also able to do it with one we had stored and then place both and more on the tipping platform. We also had many mechanical problem that will most likly be on page 7. Below is the team from lake George and the type of robot they have

64040A		64040B		64040C		64040D	
Robot Type		Robot Type		Robot Type		Robot Type	
Park	NO	Park	NO	Park	Yes	Park	NO
Ability	Zero	Ability	Zero	Ability	80%	Ability	Zero
Platform Placing	Yes	Platform Placing	Yes	Platform Placing	Yes	Platform Placing	Yes

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Problems and Repairs

Problems	Impact	Fix
The Axel in the back came out of its bearing flat due to lack of spacers and locks for the axel were tight	Caused chain the slip, Not rotate Properly, Strip the chain links and started to break the chain	We took the sprockets in the back, added a decent amount of Spacers and Axel locks keeping it in place
At one point in the matches the battery fell off its clip as well as a rubber band holding it still	Caused Power to stop going to some motors and while going up the Platform it got stuck and Prevented as from going in.	we moved the carter to the other side and attached the battery in 2 Clip in the inside of the case
The insert for the fast gear that torques up the chain came out due to it not being locked and there was no Spacers causing it to shift a lot	Broke the chain render it useless and unusable for the rest of the match ultimitly forcing a loss	We added locktite to the insert as well as the correct Spacing and axel locks tightened and everything given a quick check up

SD

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PROPRIETARY INFORMATION

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BrainStorm of New Arms

With our new 6 wheel drive and 1 motor operated chain we are left with only 1 motor to operate Arms which are preferably 2 of them. Below is a design matrix of our Brainstorm whether we wanted 1 Arm, 2 Arms or No Arms

Arm #	Competity	Manuverability	Durability	Size	Practical	total
0	10	10	10	10	0	40
1	6	6	5	6	8	31
2	5	4	4	4	9	26

After much deliberation we decided that we would go with only 1 arm as it still gives us guide for bases but can also grab the and drag them back us well as protecting it from the opposing Alliance. We just need it to be as long as possible, fit inside the 36 inch expansion limit. It would contain a similar hook that comes out grabs a base and brings it back hopefully making our autonomous faster.

50

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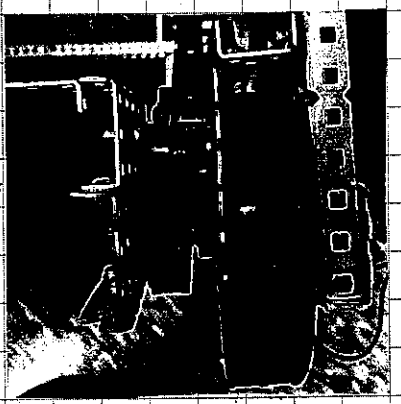
Construction of Javelin Arm

Vision: We wanted to use our last motor to extend our reach and allow us to hasten our autonomous
- The Javelin would be a long arm with hooks on the end to quickly move bases with little accuracy.

- To start, we mounted the motor meshed below the main platform.
- To accomodate our space ~~const~~ In constraints we had to mesh the supports with the wheel's axle.
- The plate does not add any friction to the wheel



- We constructed the Javelin arm using two c-channels connected by standoffs.
- The arm shifts left to clear the intake zone
- The end has hooks which let us quickly move bases In

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DATE 3/4/22

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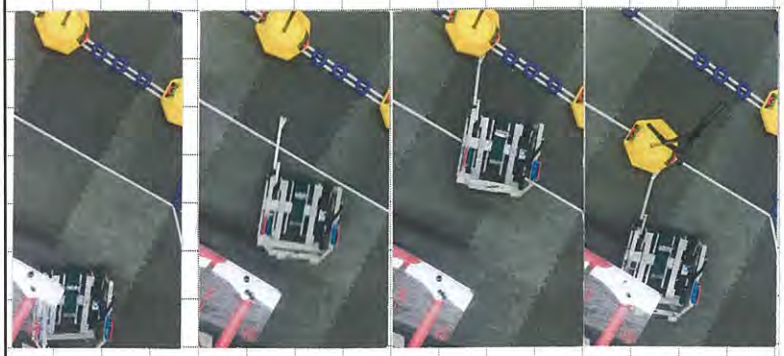
Continued from page

New Autonomous

- With our recent addition of an arm and hook, it was necessary to remake our autonomous
- The goal here is speed — We need to be able to get the neutral goal faster than our opponent
- We created three separate programs — for the left, right, and center neutral goals — in which the robot drives forward and takes the goal as fast as possible with the hook
- We tested several times against the other Queensbury teams. Sometimes we were faster than them, other times we got into a tug-of-war and neither of us succeeded.
- We have found that controlling neutral goals in autonomous is very important in the match's outcome



Center

- Drives forward while lowering the arm
- Raises the arm once under the goal
- Reverses slowly so the goal doesn't tip over

```
void autonomous() {
  // In general, "Async" means it waits for
  // the action to complete, otherwise it doesn't wait

  // left argument is power, right argument
  // is distance/rotations/etc.

  // New Autonomous
  // To base
  Arm.spinFor(100, 0.8);
  Base.driveForAsync(100, 36);
  Arm.stop(brakeType::coast);
  Base.driveForAsync(50, 3);
  Arm.spinFor(-.4);
  task::sleep(100);
  Arm.stop(brakeType::hold);

  // Return
  Base.driveForAsync(25, -40);
}
```

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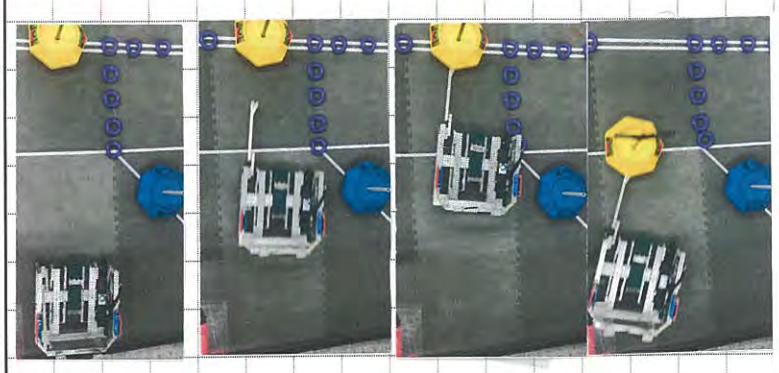
New Autonomous



Right

- Drives forward while lowering the arm
- Raises the arm once under the goal
- Reverses quickly to avoid the opponent

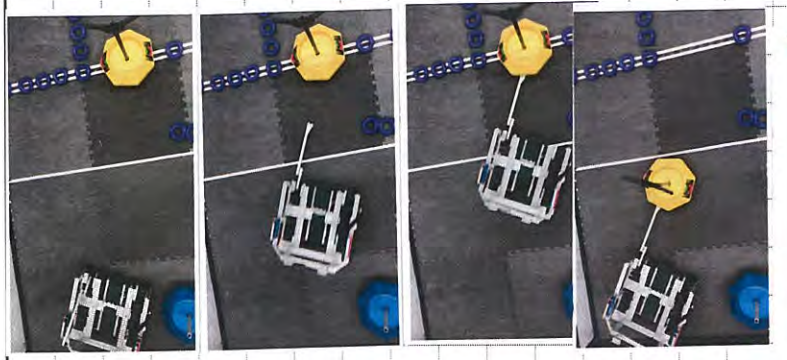
```
void autonomous() {
  // In general, "Async" means it waits for
  // the action to complete, otherwise it doesn't wait

  // left argument is power, right argument
  // is distance/rotations/etc.

  // New Autonomous
  // Extend arm and go to base
  Arm.spinFor(100, 0.8);
  Base.driveForAsync(100, 25);
  Arm.stop(brakeType::coast);
  Base.driveForAsync(50, 3);

  // Hook base
  Arm.spinFor(-0.4);
  task::sleep(100);
  Arm.stop(brakeType::hold);

  // Return
  Base.driveForAsync(100, -30);
}
```



Left

- Drives forward while lowering the arm
- Raises the arm once under the goal
- Reverses quickly to avoid the opponent

```
void autonomous() {
  // In general, "Async" means it waits for
  // the action to complete, otherwise it doesn't wait

  // left argument is power, right argument
  // is distance/rotations/etc.

  // New Autonomous
  // Drop arm and go to base
  Arm.spinFor(100, 0.8);
  Base.driveForAsync(100, 29);
  Arm.stop(brakeType::coast);
  Base.driveForAsync(50, 3);

  // Hook base
  Arm.spinFor(-.4);
  task::sleep(100);
  Arm.stop(brakeType::hold);

  // Return
  Base.driveForAsync(100, -33);
}
```

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SIGNATURE Christopher [redacted] DATE 3/7/22

DISCLOSED TO AND UNDERSTOOD BY [redacted] DATE 3/7/22

Queensbury Scrimmage With Lake George

- Lake George came to our school to scrimmage with us; allowing both school's robotics teams to test their robots, driving skills, strategies, and autonomous programming

- Match 1:
  - Alliance with 6404D
  - Strategy: ~~Double~~ Double park with at least one base by pushing our alliance up onto the platform
  - We won autonomous: We were able to grab the side neutral base quicker and stronger than the other team with the arm on our robot
  - We won the match; 187 to 179

- Match 2:
  - Alliance with 8876A
  - Strategy: Get 3 bases, double park
  - Autonomous: Tie (each alliance recieved 3pts)
  - We won the match; 83 to 203

- Match 3:
  - Alliance with 8876E
  - Strategy: Get 3 bases, double park
  - We won autonomous
  - We lost the match; 150 to 116
    - 8876E couldn't get on the platform so

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PROPRIETARY INFORMATION

Continued from page 12 we tried to single park

- Match 4:
  - Alliance with 6404OB
  - Strategy: we get as many goals, try to park (on platform) and we take left autonomous
  - Autonomous: we won autonomous
  - We ~~lost~~ left the match; 136 to 169

- Match 5:
  - Alliance with 8876E
  - Strategy: double park
  - We lost autonomous
  - We lost the match; 60 to 156

- Match 6:
  - Alliance with 6404OC
  - Strategy: Single park, they go for middle goal while we go for left neutral goal (during autonomous)
  - We lost autonomous
  - We lost the match; 50 to 153

- Match 7:
  - Alliance with 8876A
  - Strategy: Park with 2 bases, run left autonomous
  - Autonomous: We won autonomous
  - We lost the match

- Alliance Selection:

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- Alliances with 64040C
- Strategy: park with 2 loaders, they put an additional loader on the platform

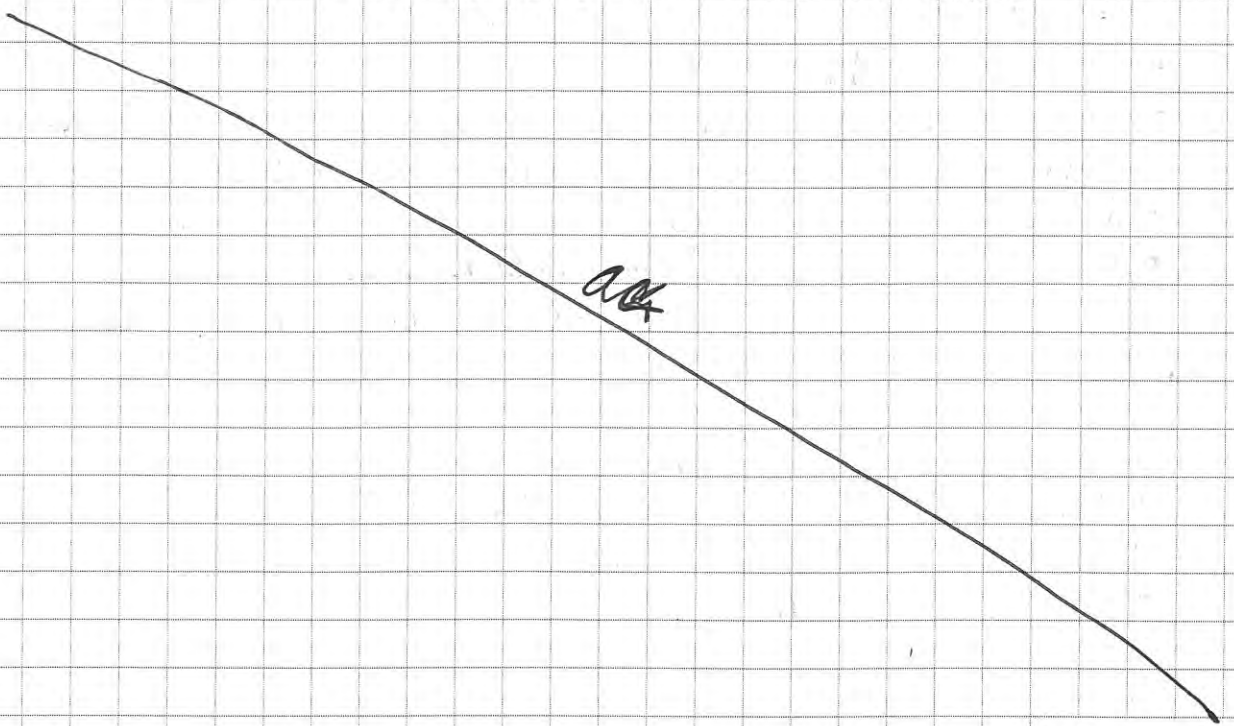
• Elimination Matches:

• Round 1: ~~We~~

- We autonomous
- We won the match

• Round 2:

- We won autonomous
- We lost the match; 100 to 86
  1.) Miscommunication
  2.) Chain stopped working / got stuck because the back axel used for the chain broke



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Lake George Scrimage II Reflection

- New additions
  - New arm
    - this arm heavaly impacted our driving as we could easily steal a base from next to the other team
    - It could also help us protect the base when picking it up making it a lot easier
    - we do need to remeber to pick it up in some situations when we are against a wall or robot
    - it also very much helped our autonomous
  - New Autonomous
    - with the new arm we can easaly get the neutral base very quickly
    - It does need to be quicker because once in a while we would get Beaten ox another robot
    - we could do both sides as well as the center netral bases
- Driving
  - Practice
    - we need more practice in driving esspecially for the Arm as it is a brand new component
    - overall it was a very good day for driving as well as for the robot

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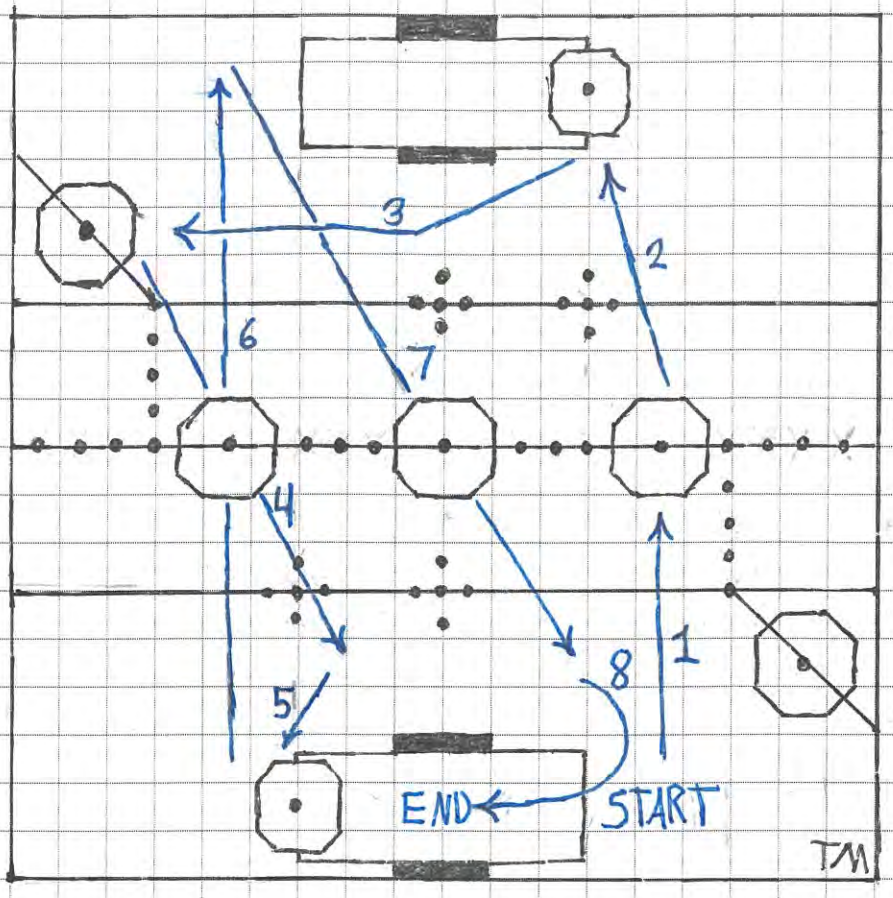
Driver Skills Strategy



1. Go-to and pickup base
2. Go-to and pickup base
3. Go-to and hook base
4. Push base to red side
5. Hook base with arm
6. Drag base to blue side
7. Push base to red side
8. Park on the red platform with 3 bases

TM

Continued to page

SIGNATURE MM

DATE 3/9/22

DISCLOSED TO AND UNDERSTOOD BY Manuel [redacted]

DATE 3-9-22

Driver Skills Practice

We worked on our driving strategy for skills. The strategy that we came up with can get us up to 230 points. Our first few run throughs fell short of 230 points, but we kept practicing and got better and better.

Main issues:

- Rings - The rings kept getting in our drive chain and caused the robot to be immobilized.
- Hooks - The hooks on the chain were not always visible making it difficult for the driver to line up the robot to pick bases up. It was especially hard for the driver to get the bases on the opposite side of the field because he could not see the hooks or rings.

MR

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SIGNATURE Manuel [redacted] DATE 3/9/22

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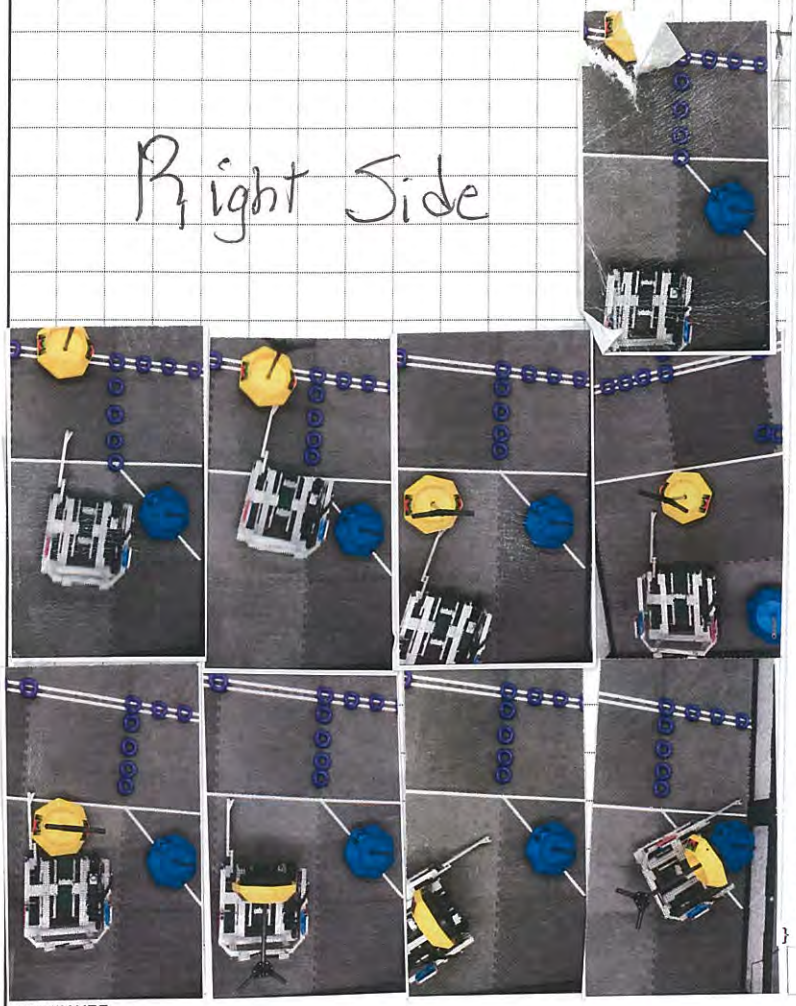
PROPRIETARY INFORMATION

Autonomous Updates

- In general, our autonomous worked well during the scrimmages
- However, there were several times that we got the neutral goal in autonomous but our opponent immediately stole it in driver control
- We changed the autonomous to also pick up the neutral goal onto the chain so that it's secured
- We also made it line up with the alliance goal to be ready for driver control

Right Side



```
void autonomous() {
  // In general, "Async" means it waits for
  // the action to complete, otherwise it doesn't wait

  // left argument is power, right argument
  // is distance/rotations/etc.

  // New Autonomous
  // Extend arm and go to base
  Arm.spinFor(100, 0.8);
  Base.driveForAsync(100, 25);
  Arm.stop(brakeType::coast);
  Base.driveForAsync(75, 3);

  // Hook base
  Arm.spinFor(-0.4);
  task::sleep(100);
  Arm.stop(brakeType::hold);

  // Return
  Base.driveForAsync(100, -35);

  // Drop arm and line up
  Arm.spinFor(10, 0.1);
  Arm.stop(brakeType::coast);
  Base.spotTurnAsync(10, -30);
  Base.driveForAsync(20, 10);
  Base.spotTurnAsync(10, 15);
  Base.driveForAsync(20, 15);

  // Hook with chain
  Chain.spinForAsync(100, -9);

  // Align with blue base
  Base.driveForAsync(20, -15);
  Base.spotTurnAsync(20, 70);
  Base.driveForAsync(20, 30);
}
```

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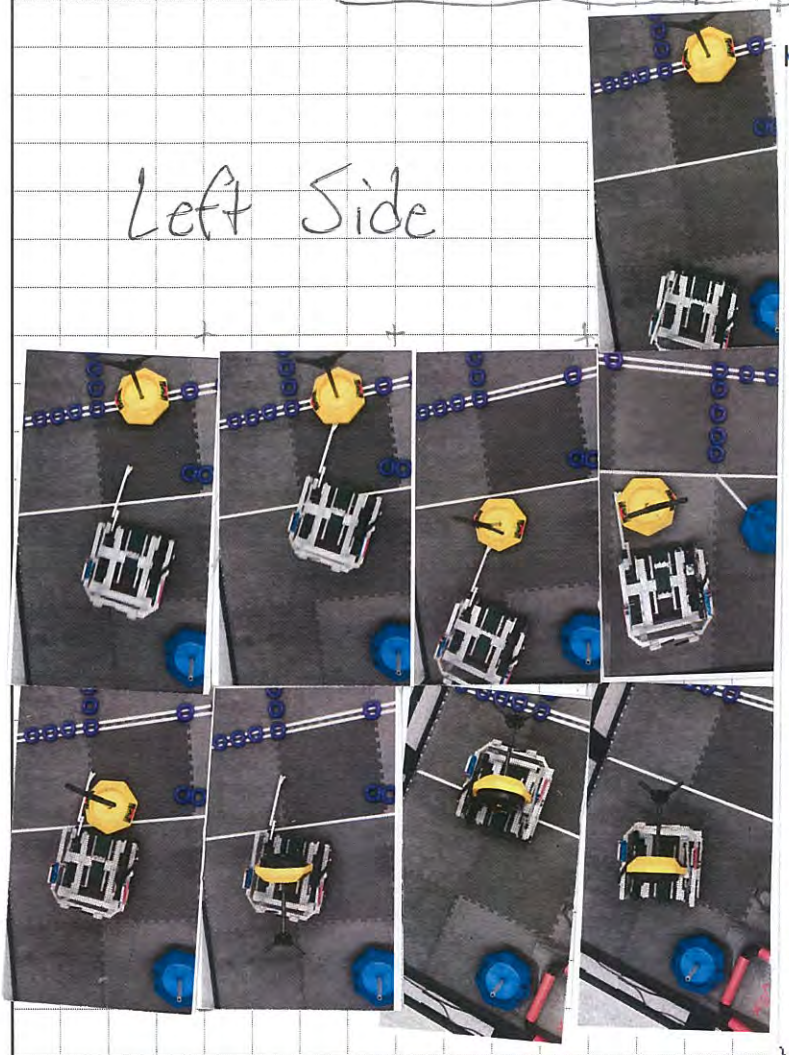
Autonomous Updates

Left Side



```
void autonomous() {
  // In general, "Async" means it waits for
  // the action to complete, otherwise it doesn't wait

  // left argument is power, right argument
  // is distance/rotations/etc.

  // New Autonomous
  // Drop arm and go to base
  Arm.spinFor(100, 0.8);
  Base.driveForAsync(100, 29);
  Arm.stop(brakeType::coast);
  Base.driveForAsync(50, 3);

  // Hook base
  Arm.spinFor(-.4);
  task::sleep(100);
  Arm.stop(brakeType::hold);

  // Return
  Base.driveForAsync(100, -33);

  // Drop arm and line up
  Arm.spinFor(10, 0.1);
  Arm.stop(brakeType::coast);
  Base.spotTurnAsync(10, -30);
  Base.driveForAsync(20, 10);
  Base.spotTurnAsync(10, 15);
  Base.driveForAsync(20, 15);

  // Hook with chain
  Chain.spinForAsync(100, -9);

  // Align with blue base
  Arm.spinFor(50, -3);
  task::sleep(1000);
  Arm.stop(brakeType::coast);
  Base.spotTurnAsync(20, 190);
  Base.driveForAsync(20, 20);
  Base.spotTurnAsync(10, -60);
}
```

CE

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SIGNATURE Christopher [redacted]

DATE 3/9/22

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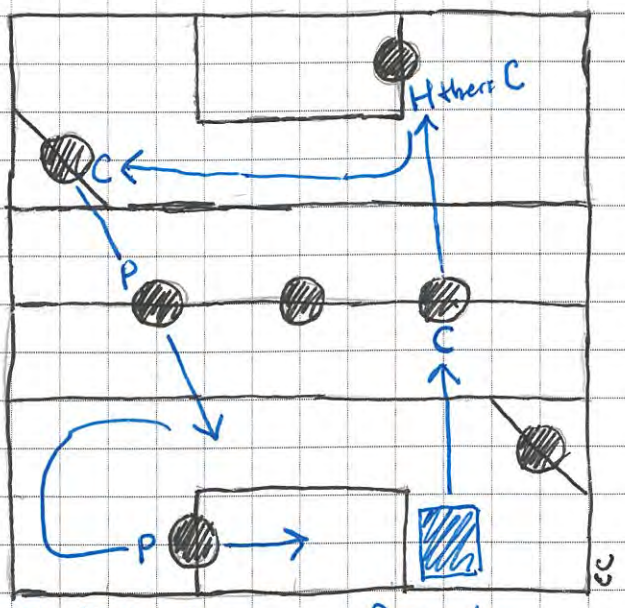
Continued from page

Autonomous Skills

- Our plan for skills was to park on the platform with a neutral goal and two alliance goals
- In reality the balancing is very inconsistent, but even if we don't balance we get points for having them in the home zone (more than we would have had with our db program)
- Our biggest problem was getting stuck on the rings, which could mess up the program with even a slight deviation



H = Hook with arm P = push
C = Collect with chain

```
void autonomous() {
  // In general, "Async" means it waits for
  // the action to complete, otherwise it doesn't wait

  // left argument is power, right argument
  // is distance/rotations/etc.

  // New Autonomous
  // To first neutral mogo
  Base.driveForAsync(50, 49);

  // Hook right neutral mogo
  Chain.spinForAsync(100, -13);
  Chain.spinFor(100, 8);

  // To opposite platform alliance mogo
  Arm.spinFor(100, 0.8);
  Base.driveForAsync(50, 39);
  Arm.stop(brakeType::coast);

  // Get opposite platform alliance mogo with arm
  Arm.spinFor(-0.4);
  task::sleep(100);
  Arm.stop(brakeType::hold);

  // Back up
  Base.diffDriveForAsync(55, -39, 50, -39);
  // Hook opposite platform alliance mogo
  Arm.spinFor(10, 0.1);
  task::sleep(200);
  Arm.stop(brakeType::coast);
  Base.spotTurnAsync(20, -20);
  Base.driveForAsync(20, 25);
  Chain.spinForAsync(100, -8);

  // To opposite triangle alliance mogo
  Base.diffDriveForAsync(10, 10, 50, 30);
  Base.driveForAsync(50, 32);
  Arm.spinFor(100, -4);
  Base.driveForAsync(50, 40);
  Arm.stop(brakeType::coast);
  Base.spotTurnAsync(20, 20);
  Base.start(20);
  task::sleep(500);
  Base.stop(brakeType::brake);

  // Hook opposite triangle alliance mogo
  Chain.spinForAsync(100, -6);

  // To (and push) left neutral mogo
  Base.spotTurnAsync(20, 20);
  Base.driveForAsync(50, -25);
  Base.spotTurnAsync(20, -100);
  Base.driveForAsync(50, 10);
  Base.spotTurnAsync(20, -80);
  Base.driveForAsync(50, 32);

  // To align with platform
  Base.driveForAsync(50, -15);
  Base.spotTurnAsync(20, 50);
  Base.driveForAsync(50, 42);
  Base.diffDriveForAsync(10, 10, 50, 42);

  // Up platform
  Base.driveForAsync(50, 24);
  Base.driveForAsync(10, 50);
}
```

page

SIGNATURE Christopher [redacted]

DATE 3/10/22

DISCLOSED TO AND UNDERSTOOD BY [redacted]

DATE 3/10/22

Syracuse States Tournament

Match	Field	Red 1	Red 2	Blue 1	Blue 2
Q11	Field 1	34000E	64820B	7157E	8746A
Q12	Field 2	7157X	7157A	64040C	9967A
Q13	Field 1	8876C	1870B	7157F	14807A
Q14	Field 2	64040B	1757U	13460A	14737D
Q18	Field 1	9967A	64820A	7323A	8876E
Q19	Field 2	94941A	14737C	14737A	64040A
Q20	Field 1	14737B	1757A	68922B	8876C
Q21	Field 2	13460C	7157X	5111B	34000E
Q33	Field 1	64040C	1757U	94941A	14737B
Q34	Field 2	1870A	1870B	53999F	7157E
Q35	Field 1	174A	8876C	5111D	15796C
Q36	Field 2	15796B	15796A	68922B	14895A
Q44	Field 1	7157F	64040A	1757A	174A
Q45	Field 2	5111B	5111E	13460B	1757U
Q46	Field 1	64040D	7157A	8876C	174C
Q47	Field 2	64820B	14895A	53999P	7323A
Q50	Field 1	64040B	53999B	15796B	7157X
Q51	Field 2	8876E	68922B	8876A	64040C
Q52	Field 1	64040A	1870A	8876C	99001B
Q53	Field 2	53999P	7323F	174C	5111B
Q65	Field 1	1757A	53999M	13460A	14737A
Q66	Field 2	174C	64820A	13460B	14737C
Q67	Field 1	64040C	8876C	14895A	1757T
Q68	Field 2	94941A	8746A	99001B	13460C
Q83	Field 1	34000E	8876E	14737B	174A
Q84	Field 2	7323A	14737C	7157X	68922B
Q85	Field 1	9967A	8214C	8876C	53999M
Q86	Field 2	1757U	15796C	5111C	53999F

SIGI

3/12/22

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Alana [redacted]

DATE 3/12/22

PROPRIETARY INFORMATION

States: Matches 1-5

Match 1: (Q13)

- Alliances with team 1870B
- Strategy: We take right autonomous, we'll park on platform; they'll get 2 leases and try to put rings on the leases
- Autonomous: we won autonomous
  - worked; performed exactly as planned
- Match: We won the match; 66 to 40
  - We got two leases, 20 effective points
  - We tried to park but our teammates were in the way

Match 2: (Q20)

- Alliances with team 68922B
- Strategy: We park with 3 leases, they add ~~elevat~~ all leases to the elevated platform, we take right autonomous
- Autonomous: We won autonomous
  - worked; performed as planned
- Match: We won ~~auto~~ all the match; 156 to 50

Match 3: (Q35)

- Alliances with 174A
- Strategy: We start on left side and control left neutral, our alliance goal, and middle neutral as well as park on the platform
  - they control the other two remaining leases.
- We lost autonomous; took left autonomous, got left neutral lease with our arm; our alliance didn't get right

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SIGNATURE alana [redacted] DATE 3/12/22

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neutral base (other team was quicker).

- Match: we won the match, 80 to 46
  - We struggled against 5111D: they were very aggressive

Match 4: (Q46)

- Alliance with 174C
- ~~Dad~~ Strategy: Double park; they get 1-2 bases, we get 3 bases; we take left autonomous
- Autonomous: We lost autonomous
- Match: We lost the match; 180 to 210

Match 5: (Q52)

- Alliance with 9900IB
- Strategy: Double park with (ideally) 5 bases total; take right autonomous
  - Ideally we want to place top #16 for elimination matches (we are currently ranked 12)
- Autonomous: We won autonomous
  - went as planned
- Match: We won the match; 72 to 156
  - We controlled 2 bases
  - Our alliance held 2 bases and parked on the platform.

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DISCLOSED Christopher [redacted] DATE 3/12/22

Skills - Driving / Autonomous

Driver Skills

Attempts	Points	total
1	190	190
2	120	160
Best	190	230

Sadly we were not able to get our max Points of 250 or our targeted Points of 230. with more Practice we will be able to get max more Points if we qualify for worlds today.

With a total of 230 points we ranked # in the tournament which could help us win the award or other awards.

Autonomous Skills

Attempts	Points
1	0
2	40
Best	40

we were not able to get our autonomous working in time so we had to run our old one which only got us 40 points. If we had more time we would maybe it better but hands only if we win an award

50

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SIGNATURE Samuel [redacted] DATE 3/12/22

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States: Matches 6-7

Match 6: (Q67)

- Alliance with 64040C
- Strategy: We start on right side, we will try to park with 3 bases and they will stack additional bases
- We tied during autonomous
- Match: We balanced on the platform with 3 bases while 64040C stacked more bases and defended

Match 7: (Q85)

- Allied with 53999M
- Strategy: We would ideally park with 3 mobile goals, while our ally would stack extra
- We lost autonomous
- Match: The opposing alliance obtained 4 bases and we were unable to reclaim them.
  - We lost 60pts to 182pts

TM

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SIGNATURE MM

DATE 3/12/22

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DATE 3/12/22

Alliance Selection

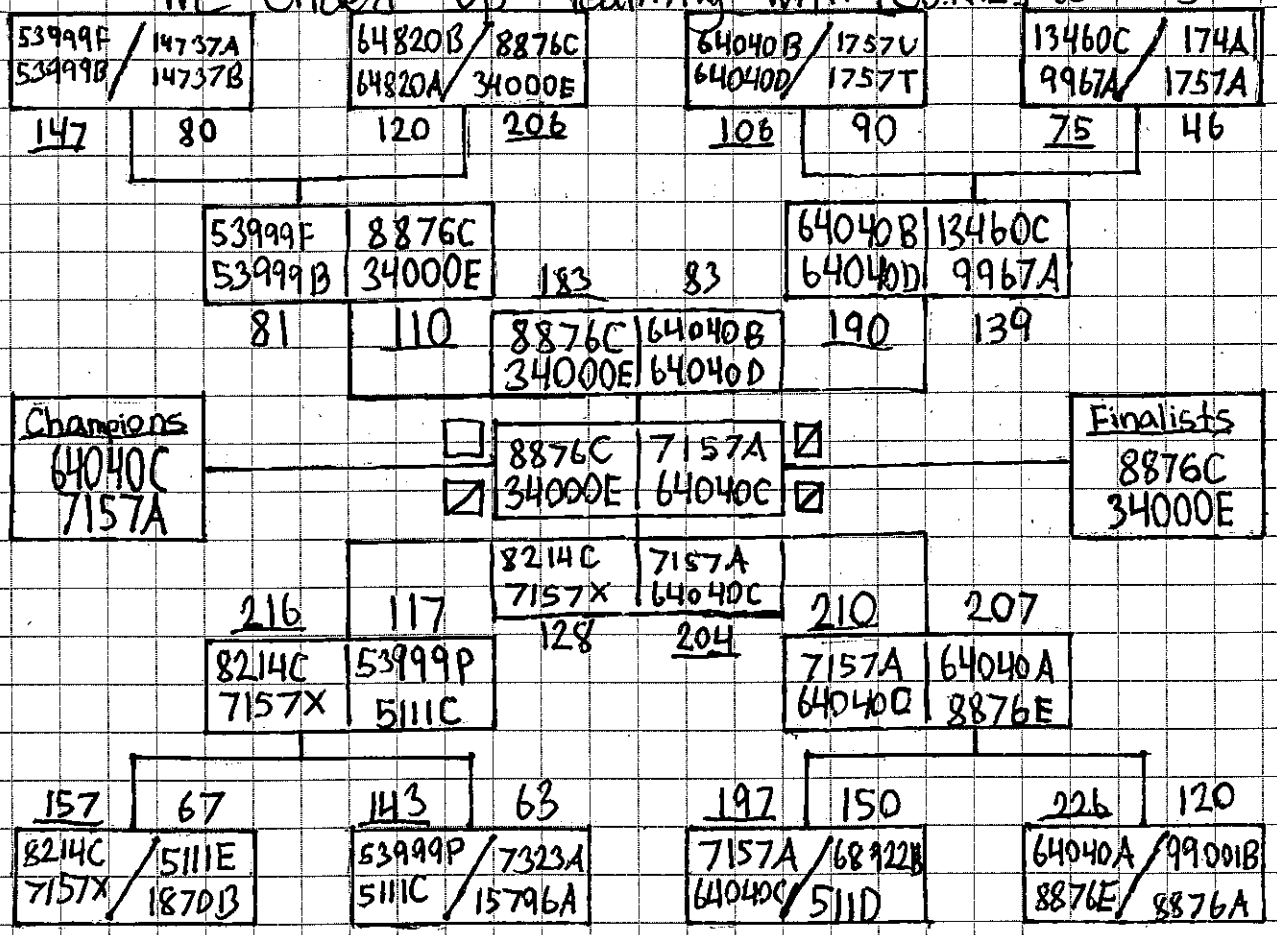
- Currently we are ranked 13th, 5 wins, 2 losses
  - WP: 10, ORR: 64.0, AP: 21, DRR: 34.6, SP: 531, COWM: 25.1

Potential Alliance Partners:

64040A*	68922B*
64040B	34000E*
64040C*	7157X
8876E*	8214C

* Indicates that we spoke to the team and discussed potential strategies

- We ended up teaming with [Co.R.E] (34000E)



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PROPRIETARY INFORMATION

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States: Elimination Matches 1-3

- Match 1: vs. 64820B + 64820A
  - We won autonomous
  - We won the match 206 to 120
  - We balanced 3 mobile goals and both of our robots on the platform
- Match 2: vs. 53999F + 53999B
  - We lost autonomous
  - We won the match 110 to 87
  - We balanced ~~both~~ CS of our robots on the platform
  - We balanced 2 one mobile goals on the platform
- Match 3: vs. 64040B + 64040D
  - We tied autonomous
  - We won the match 183-83
  - The middle neutral base touched their platform, so it wasn't considered balanced
  - We balanced both of our robots on the platform

CS

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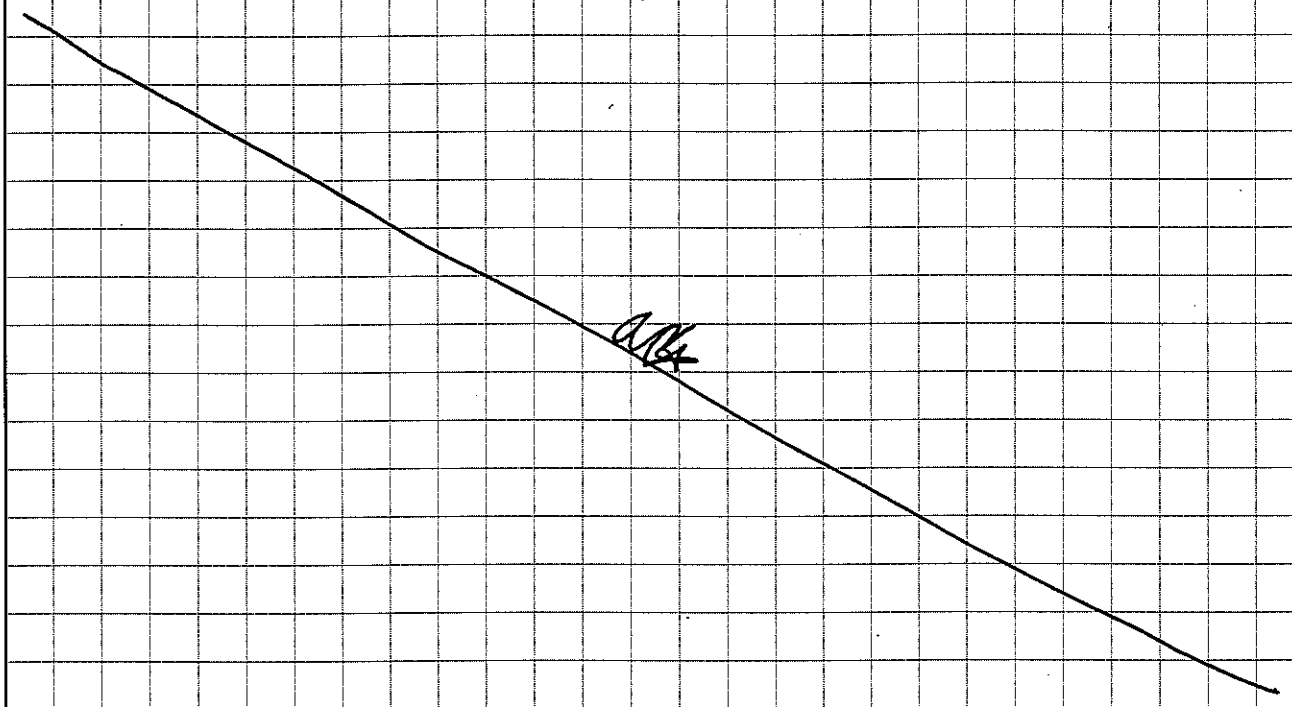
New York State Championship: Finals

- The finals was split into 3 rounds; first to win 2 matches wins the tournament
- 887GC & 34000E vs. 64040C & 7157A
- Round 1:
  - We lost autonomous
  - We lost the match; 120 to 208
- Round 2:
  - We tied for autonomous
  - We won the match; 83 to 23
- Round 3:
  - We tied for autonomous
  - We lost the match; 143 to 191



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New York State Championship: Reflection

Overall, the New York State Championship was very successful for us. We made it to the finals, which automatically qualifies us for the 2022 Vex World Championship in May (5-7). Over the course of the tournament, we learned some very important takeaways. The outcome of autonomous usually decided who won the match. We also realized that rings usually served as tie breakers when both teams held a similar number of goals. The experience also allowed us to make connections with teams we had little communication with before. After the tournament we contacted our alliance partner, [Co.R.E], as well as spoke to the tournament champions 7157A about potential modifications.

Improvements for the Future:

- Improve autonomous skills
- Increase the speed of our drivetrain
- Improve our ability to steal bases
- Solidify our autonomous

(All High School teams at the Oncenter)

TM

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PROPRIETARY INFORMATION

Queensbury High School Robotics