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TITLE Introduction **PROJECT**

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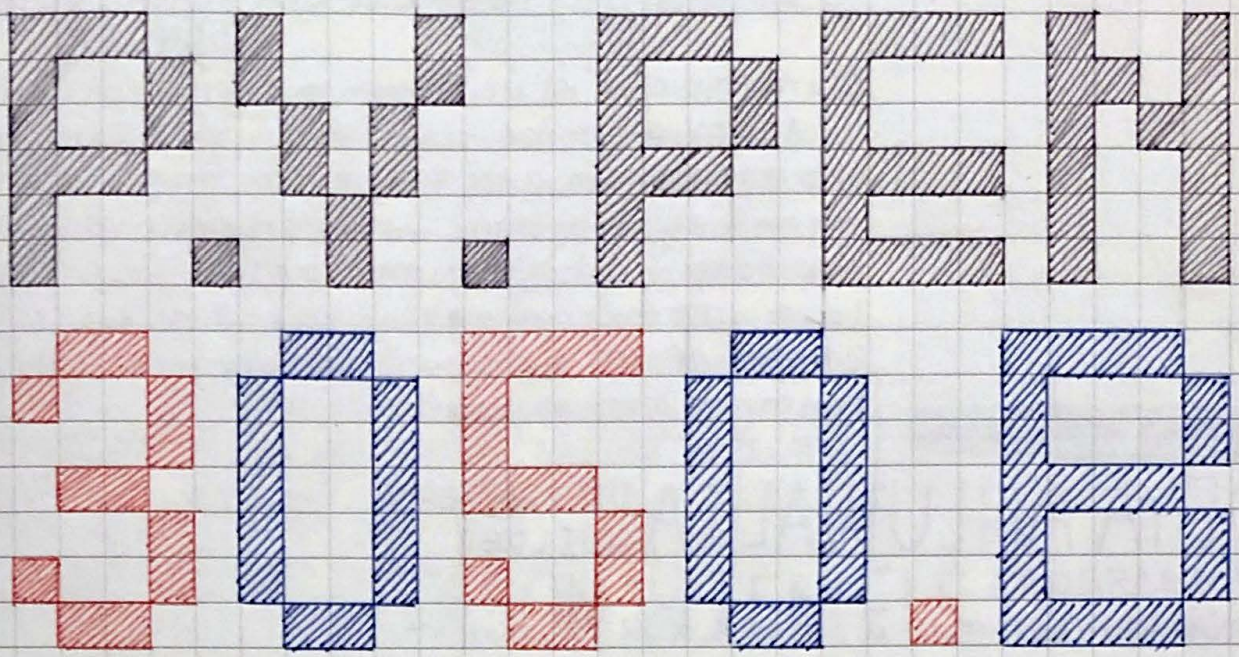

Our high school, P.V Peninsula High, has a S.M.E.R.T. building dedicated to teaching students in multiple fields of computer technology, building, and coding, including V.E.X robotics. The 3050B Vex Robotics crew has 8 people contributing to this robot. There is 1 sophomore, 6 juniors, and 2 seniors working together on this team. Each week we meet up 2-3 times for about 2 hours where we discuss what we need to work on, what has to be discussed, etc. With our persistant hard work we have set our goal to get into state championships. With each person's dedication to the team we are confident that we will be able to qualify in the future.

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TITLE Team Introductions **PROJECT**

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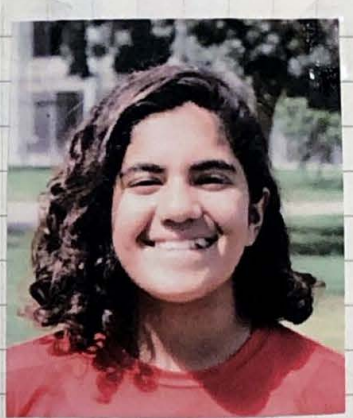
CIARAN NIMICK

DESIGN TEAM
TEAM LEADER
DRIVER

Ciaran Nimick is a sophomore that has been doing VEX for three years. He is returning to the 3050B team and strives to make sure that everything gets done. In his previous years he has done coding, CAD, and building for his team with an outstanding record of success. Outside of VEX he does cross country for the Peninsula school team

DEYA AHLUWALIA

DESIGN TEAM
BUILDER



Deya Ahluwalia is a junior and it is her second year in VEX. She is a builder and a part of the design team for 3050B. She has a wide range of knowledge about designing and building from when she participated in TSA. She is a hard worker that is dedicated to helping everyone on the team while learning new things about VEX. Outside of the program she plays for the PEN softball team, girl scouts, and TSA

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TITLE Team Introductions **PROJECT**

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RYAN BYRNES

BUILDER
DESIGN TEAM
DRIVER

Ryan Byrnes is a junior that has been doing VEX for four years. He is a builder and a part of the design team. With his vast knowledge in leading the famously known 3050C Peninsula team, he hopes that he can push the team into the state championship. Outside of VEX Ryan plays for the Peninsula tennis team and participates in the model united nations program at our school.

JASON WIEMELS

PROGRAMMER
MECHANIC

Jason Wiemels is a junior that has done VEX for three years and is a programmer for the 3050B team. He previously worked as a coder for the 3050C team. As a new member to the B team he strives to do the best he can to get us into the championships. He recently took a break from VEX but he is excited to return and put his utmost effort in programming. Outside of the team Jason does cross country for the peninsula team and tutoring on the side.

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MICHEAL CHIN BUILDER ELECTRICAL

Micheal Chin is a junior that has participated in VEX for four years. He is one of the main builders for the 3050B team and was previously known as the builder for the 3050C team. He is excited to be back and strives to do the best he can. Outside of VEX Micheal plays for the peninsula tennis team and works outside of school.

DREW PETERS BUILDER ELECTRICAL

Drew Peters is a junior that has done VEX for about four years. He used to be on the 3050C team as a builder and was known for his skills on designing. This year he is excited to rejoin VEX after taking a break due to Covid. Outside of the team Drew works at a minimum wage job.

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ASHLYN TERASAWA

ENGINEER
NOTEBOOKER
PHOTOGRAPHER

AshlynTerasawa is a senior that has been doing VEX for the past three years. In previous years she has been an engineer notebooker, builder, and team leader for the peninsula high school 3050B team. As the oldest 3050B team member she hopes to see her team reach the state championships before she leaves for college.

HANNAH HOLDEN

DESIGN TEAM

Hannah Holden is a senior that has been doing VEX Robotics for two years. Before VEX Holden was a part of the speech and debate team. Currently she is a certified red cross lifeguard and she puts her skills in the Peninsula swim team. This year, she was accepted in Link Crew, which helps freshmen and transfer students have a smooth transition into high school. Hannah is also a member of the Jack and Jill of America where she volunteers.

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NOTEBOOK SET-UP (1)

notebook reference

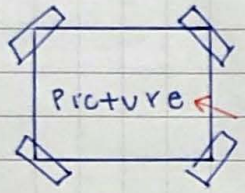
Example notebook page

Every meeting log will be labled with meeting # and date:

Log #____

____/____/____

underneath will be the description of what happened at the meeting including pictures and sketches



- descriptions of pictures will be beside it in bullet points,
- arrows will be drawn to point at specified areas

Pictures will be taped on with tape including a signature and date. This is to prevent tampering

SKETCH

- descriptions and lables will be added beside the sketch

When refering to other pages it will be in Red, EX: " refer to pg. 1-1"
The first number is the book and the second number is the page.

Mistakes will be slashed through and the corrected version will next to the mistake.
EX: VEX ~~Robotis~~ Robotics is cool.

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TITLE Notebook Set-Up (2) PROJECT

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NOTEBOOK SET-UP (2)

Judges manual

Example notebook page

QR code

QR codes will be printed and taped to the top of pages including a description of what it leads to, or it will be in the description of the "log".

At the end of the page the entry writer and supervisor must sign, including date of when the page was finished.

When there are open spaces on the bottom of the page there will be a red line slashed through and signed.

signature, date

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TITLE Game Description (1) **PROJECT**

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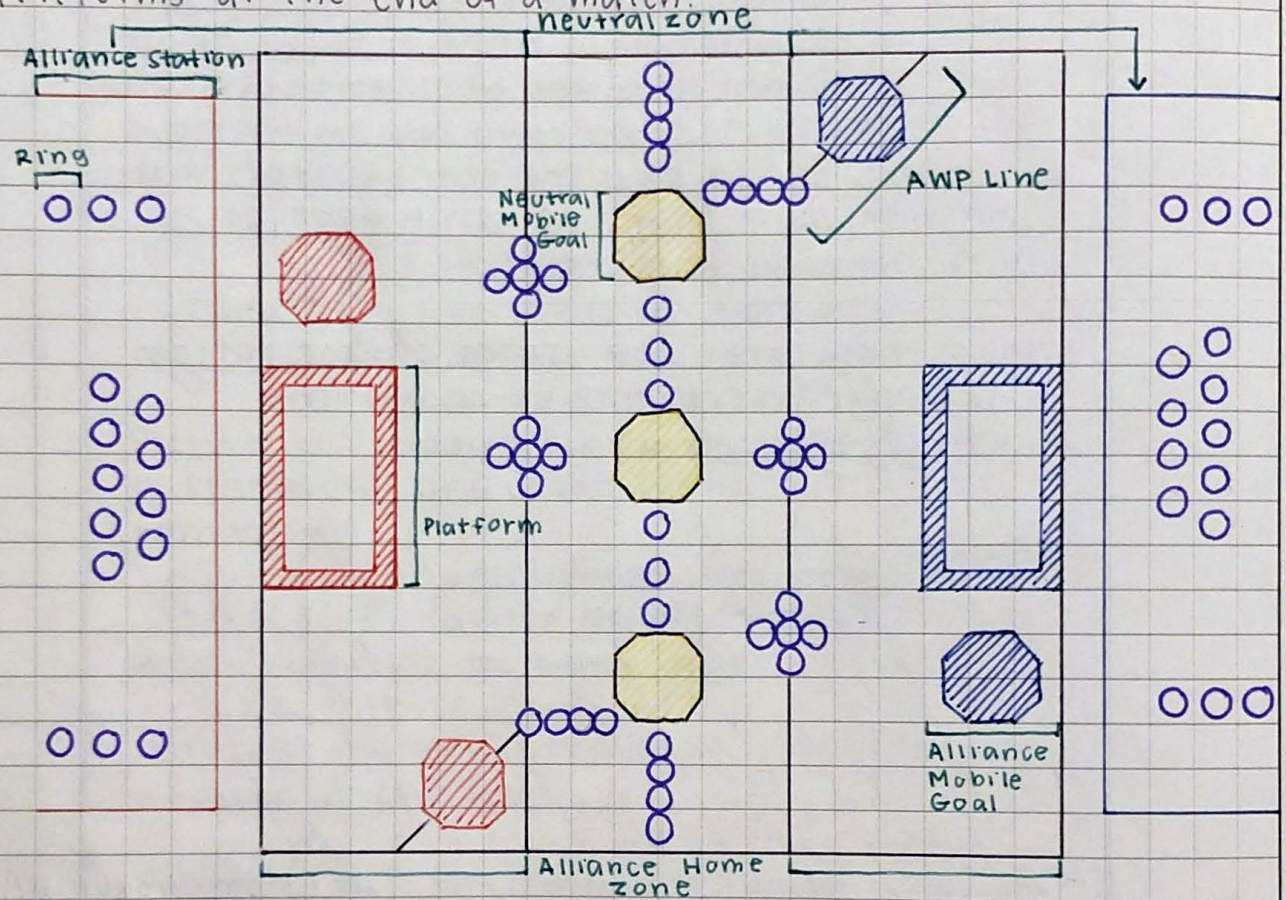
GAME DESCRIPTION (1)

Matches are played on a field as illustrated bel. w. Two alliances- one "red" and one "blue" - composed of two teams each competing in each match. The objective of the game is to attain a higher score than the opposing alliance by scoring rings, moving mobile goals to alliance home zones, and climbing platforms at the end of a match.



An autonomous win point is awarded to the alliance that has cleared their APW line and scored at least one ring on each alliance mobile goal at the end of the auton. period

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TITLE Game Description (2) PROJECT

Continued from page

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The VEX Robotics Competition Tipping Point field consists of the following:

- Seventy-two (72) rings
  - Twelve (12) that begins as preloads, six (6) per alliance
  - Eighteen (18) that are used as match loads, nine (9) per alliance
  - Fourty-two (42) that begin on the field

- Four (4) alliance mobile goals, two (2) per alliance
- Three (3) neutral mobile goals
- Two (2) platforms, one per alliance

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GAME SPECIFIC DEFINITIONS (1)

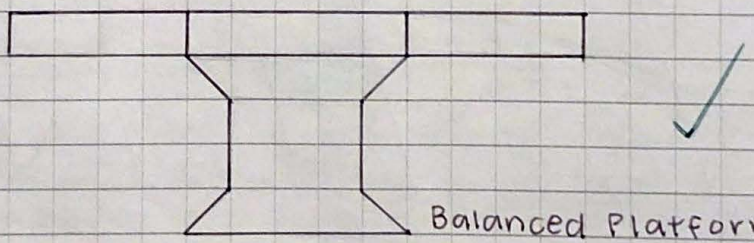
APW Line - The white tape line, one(1) per alliance home zone that starts the match with one(1) alliance mobile goal on it.

Alliance Home Zone - One of two(2) areas of gray foam tiles, one(1) of each alliance, where robots begin the match and defines the location where neutral mobile goals can be scored.

- The alliance home zones are defined by the inner edges of the playing field walls and the designated white tape lines.
- The platforms are considered part of their respective alliance home zones

Balanced - a platform state. A platform is considered balanced if all of the following criteria are met at the end of a match:

1) The platform is roughly parallel to the field
2) Both flat surfaces of the platform hinges are contacting the platform base
3) Robots and/or scoring objects contacting the platform in their alliance home zone are not also contacting any other field elements, such as foam field tiles or the field perimeter.



Balanced Platform

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TITLE Game Specific Definitions (2) PROJECT

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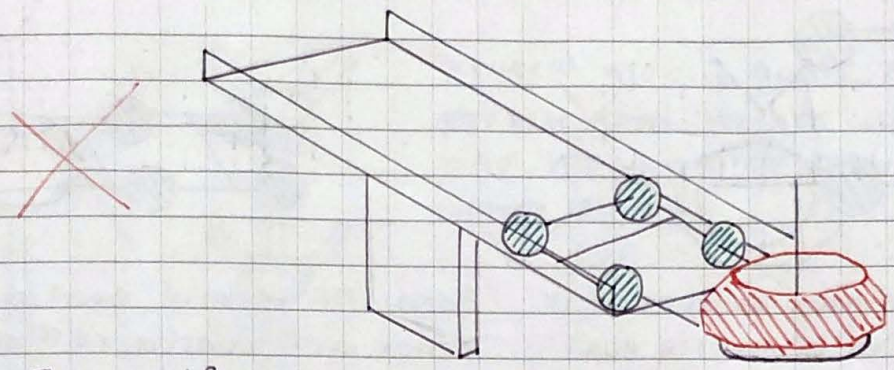
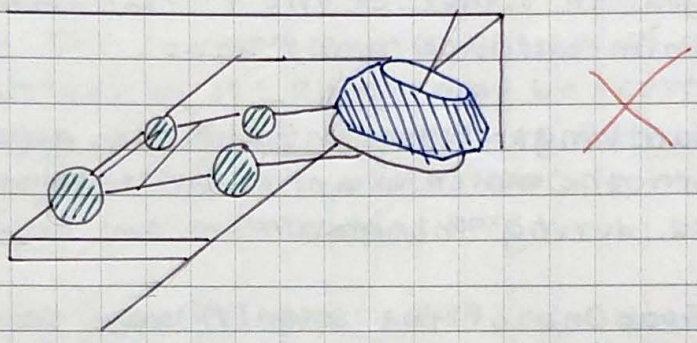


This platform would not be considered balanced, because the platform is not leveled, and a robot is in contact with a mobile goal that is not elevated.



Even though this is level, this platform would be considered balanced, because a robot is in transitive contact with a mobile goal that is contacting the field perimeter

Cleared - An alliance mobile goal state. An alliance mobile goal is considered "cleared" if, at the end of the auton period, it is not contacting its

Elevated - a robot/mobile goal state. A robot or mobile goal is considered elevated if all the following criteria are met:

1) A robot or mobile goal is contacting their alliance platform
2) The platform meets the definition of balanced
3) The robot or mobile goal is not contacting any other field elements, like foam tiles or the field perimeter

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TITLE Game Specific Definitions (3) **PROJECT**

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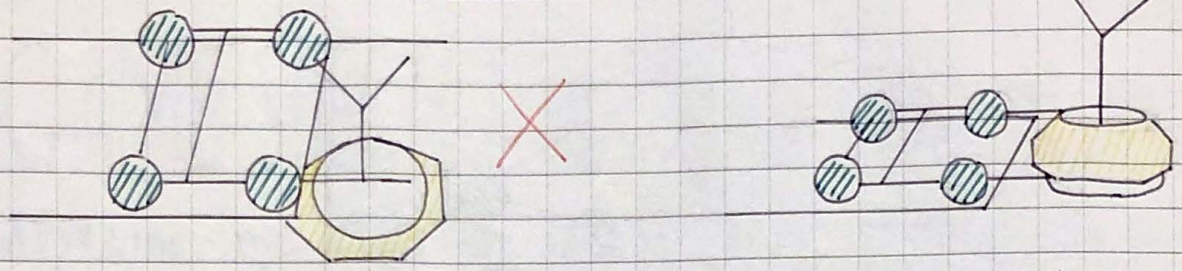


This is not elevated because it is in contact with a mobile goal that isn't elevated

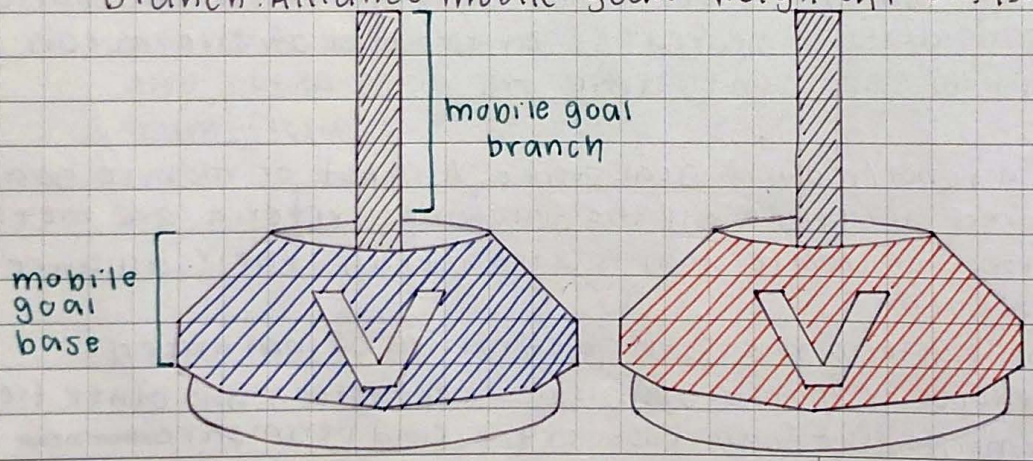
Both the mobile goal, and the robot, are considered elevated

Hoarding- A robot is hoarding if it is in possession of any mobile goal in either of the two(2) corners of the field in their own alliance home zone

Match Load Rings- Eighteen(18) rings, nine(9) per alliance, that begin the match in an alliance station and may be introduced during the match

Mobile Goal- One of the seven(7) large scoring objects made up of a mobile goal base and mobile goal branch(es). All mobile goals have a maximum base diameter of 13"

Alliance Mobile Goal- The two(2) red and two(2) blue mobile goals which begin each match in their respective alliance home zones, and have only one mobile goal branch. Alliance mobile goals weigh approx. 1520 grams



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TITLE Game Specific Definitions (4) PROJECT

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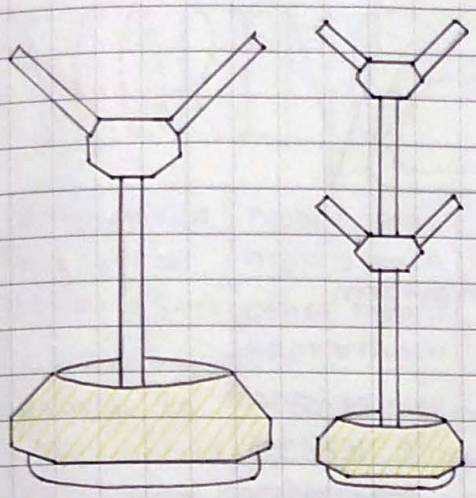
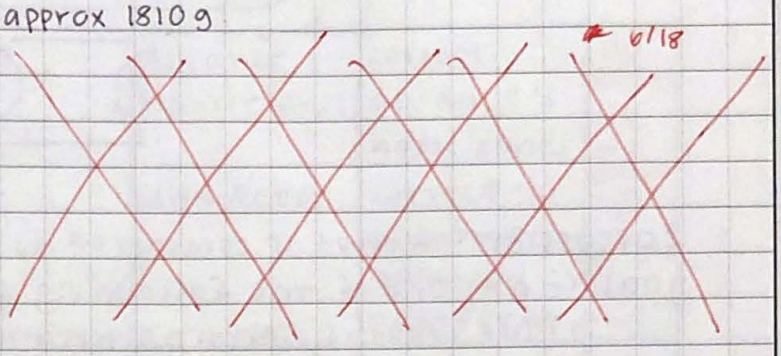


Neutral mobile goals. The 2-branch mobile goal weighs approx. 1560g, and the 4 branch mobile goal weighs approx 1810g



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Mobile Goal Base - The 7-sided plastic bottom of a mobile goal is max diameter of 13". Rings may be scored in the "bowl" of a mobile goal base for points. Both the yellow, blue, red "upper" portion, and the black "lower" portion, are considered parts of the mobile goal base

Mobile Goal Branch - Gray PVC pipes, 0.84" in diameter

Neutral Zone - The area of the field in which all 3 neutral mobile goals begin.

- The neutral zone is bounded by the inner edges of the playing field walls, and the single tape lines which run the length of the field
- The neutral zone is defined as the gray foam tiles

Platform - The 53.0" x 20.1" hinged polycarbon device and the attached red or blue PVC pipes, located in each alliance home zones, that sits 9.5" high off of the ground when balanced. The platform is attached to a double hinge that allows it to tip towards the field in either direction

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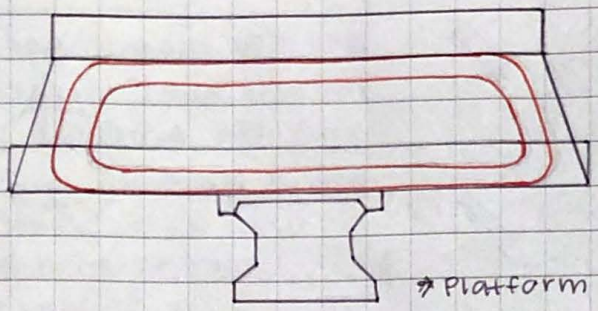


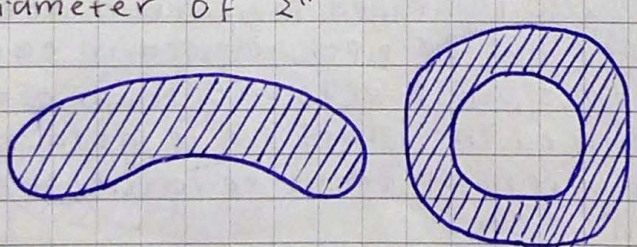
* Platform

Possession - A robot is considered to be in possession of a mobile goal if any one of the following criteria are met:

1) The robot is carrying, holding, or controlling the movement of a mobile goal such that if the robot changes direction, the mobile goal moves w/ the robot. Using concave portions of your robot count as possession
2) The robot is actively blocking opposing robot access to mobile goals, such as by expanding horizontally and restricting access to a portion of the field
3) Robots of the same alliance working in tandem to block access to mobile goals would share the possession of said mobile goal

Preload - The rings, 3 per robot, placed prior to the start of each match. If used, these rings must be placed such that they satisfy the conditions in <SG1>

Ring - One of seventy-two (72) small scoring objects. Rings have a maximum outer diameter of 4.125" and minimum inner diameter of 2"



* rings

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TITLE Scoring PROJECT

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SCORING

Ring on/in a Scored Mobile Goal	mobile goal high branch	10 points
	Other mobile goal branch	3 points
	mobile goal base	1 point
Neutral Mobile Goal	alliance's home zone	20 points
	balanced platform	40 points

Alliance Mobile Goal and Robot	correct alliance's home zones	20 points & 40 points / 30 points
	correct alliance's balanced platform	
Alliance	wins autonomous bonus	6 points

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TITLE Game Thoughts (1) PROJECT

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GAME THOUGHTS (1)

Ryan Byrne - This year's game is one of the more complex games in recent memory. The wide variety of potential strategies not only makes for a challenging design process, but makes for an incredibly competitive season. Because of the lack of a proper hoarding rule for mobile goals, the importance of the autonomous phase to secure neutral goals increased dramatically. In a similar vain, the ability to hold multiple goals should be a cornerstone of many competitive designs.

Ashlyn Terasawa - I can already see that auton will play a very important role this year, so seeing what teams will come up with will be very interesting. There's also a lot of variables that we would have to keep a close eye on, like how to sucessfully pick up the donuts and transfer it, and how to sucessfully get the robot on the platforms smoothly. This also makes driving really important. So, in my opinion, it is going to be important to focus on the lower branches rather than the taller mobile goals, therefore stationary bots sound like a better plan rather than the ones that extend.

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TITLE Game Thoughts (2) PROJECT

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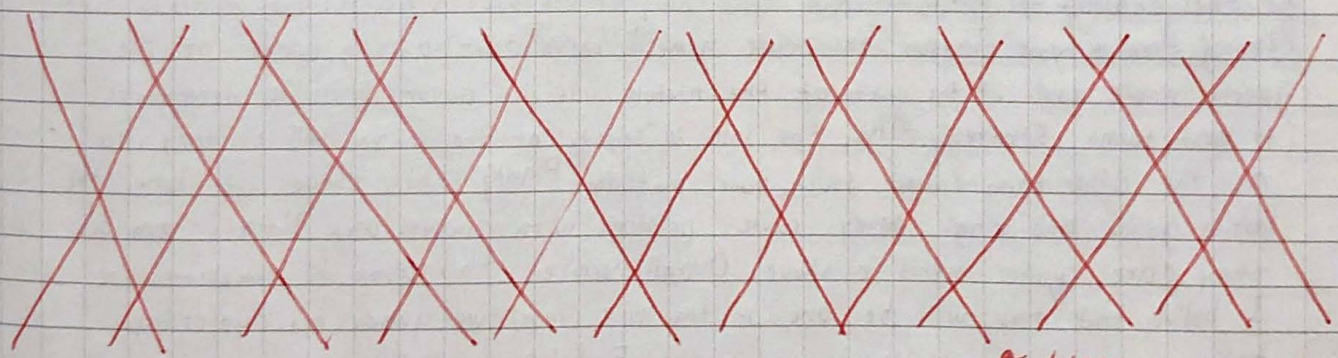
Drew Peters — I think it will be interesting to see how the designs of this game develope over time. I've seen a lot of different approaches to the game and it's hard to tell which one will be the most successfull. The game this year reminds me of both the mobile goals of In the Zone and the platform and game from Turning Point.

Michael — I think that this years game will be very interesting as there are many new and complex components to the game. An interesting component, or lack thereof, is the absense of the hoarding rule. This will change the gameplay and its dynamic drastically, possibly introducing a more aggressive play style. One component that intrigues me is the new stationary platforms. This year, teams are able to place mobile goals on the stationary platforms whilst perking their robots on them as well. This is bound to score a plethore of points, but will require an immense amount of coordination. I am super exited to get into this year's game!

Hannah Holden: The tipping point game is very interesting. The game is complicated and seems difficult. When I did VEX in the past, the games were much simpiler so this year, the game, tipping point, will be a definite challenge.



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SIGNATURE Hannah Holden DATE 6/22

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TITLE Research (Base) **PROJECT**

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The main focus of the bot that we want to have for the base would be spacing. Due to the many parts that we need to add for picking up mobile goals or intaking the rings, spacing is very important.

H-shaped base:
- due to the rectangular/square shape the structure will be sturdy enough while using less metal
- allows operation from both front and back
- spacing is adequate
- will allow space for rings to go under and spacing for mobile goal lift
- might get stuck on game peices

U-shaped base:
- due to the outweigh of metal parts, the structure integrity will be lacking
- there will be a lot of room in the front, although it will be concerning for the back
- loads of space in the front that could be applied for the intake and mobile goal both in the front

Holonomic-shaped base:
- not a lot of spacing in general due to angled wheels
- would be very structurally strong
- allows movement from all sides
- beneficial for possible future autonomous
- faster due to freedom of movement
- although strong, propobly not reccmmended for our bot this year

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TITLE Research (Intake) PROJECT

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Plunger (no intake):
- ability to take rings and place them on branches at the same time
- unstable due to the outreach to grab rings
- no need to make any conveyer
- unsure about ability to secure rings every time
- may not take in rings as fast as we want
- is sketchy and loose, will be an unlikely design due to the multiple variables that could go wrong

Intakes w/ flaps (under):
- has ability to smoothly move donut to conveyer
- has ability to quickly take rings in
- has ability to take donut every time
- will take some space, but not too much that it will get in the way of other parts
- will take some time designing, building, and making sure that the flaps will be able to reach donuts
- will have plexiglass to help lead donut up

No intake (only conveyer):
- doesn't need to spend time building, only focusing on conveyer and its ability to move
- possibly allow bot to take rings in from both the front and back
- unsure about design in general

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TITLE Research (Conveyer) **PROJECT**

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Straight Conveyer:
- Will pick up and drop donuts into branches / mobile goals
- would need a branch of sorts to transfer donuts, would take time building seperatly
- would need to figure out if will hold onto the donuts when picked up
- need to figure out how high we want it to reach for the branches, collaboration with donut claw
- divided into 2 parts, may take time building in general

No Conveyer (just plunger/claw):
- since it will only be using the claw or plunger it isn't a 100% sure about the ability to pick up the donuts everytime
- don't need to spend time building conveyor, the main focus will be elsewhere, further advancing bot
- will have the ability to go for the taller branches (theoretically)
- won't really need an intake, will solely rely on the claw/plungers ability

Angled Conveyer:
- basically like the same thing as a straight conveyer but it can put donuts on the lower branches without the need for the branch to transfer the donuts.
- concerning about spacing
- concerning about how donuts won't drop at the bottom part of the angled conveyer
- will take less time to build, depends on how much time we would spend figuring out the correct angling

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TITLE Design Brainstorm (Base[1]) **PROJECT**

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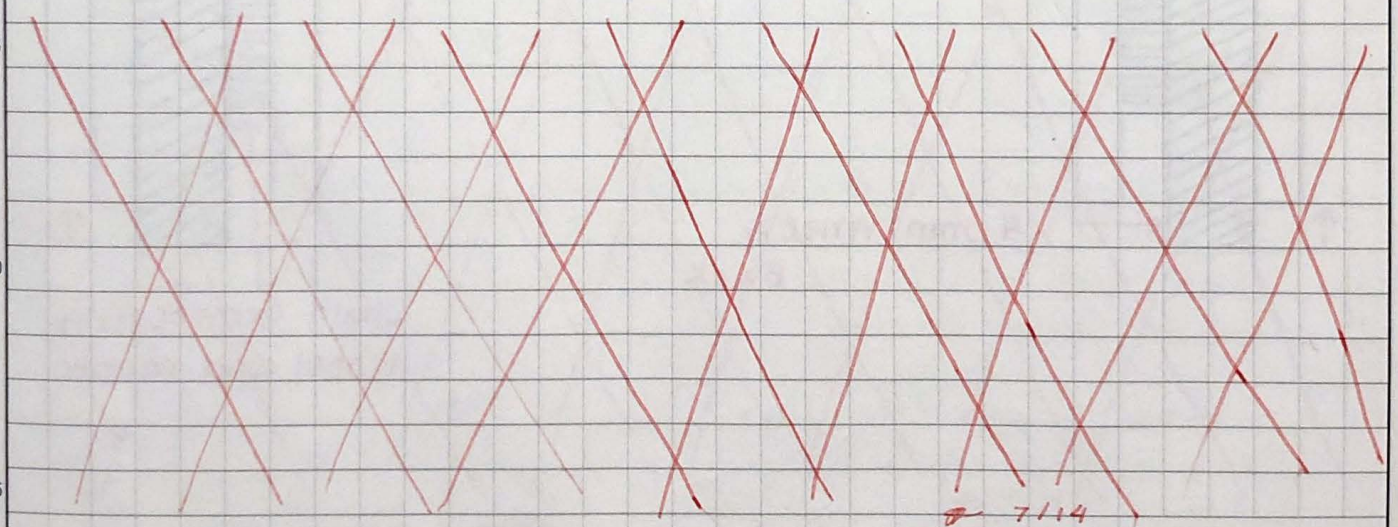
DESIGN BRAINSTORM (Base[1])

Design	Speed	maneuver/5	Build Space	Torque	Total
X-drive	3	5	2	3	13
H-drive 2 motor	2	2	5	1	10
H-drive 4 motor	5	4	4	4	17
U-drive 2 motor	2	3	5	2	12
U-drive 4 motor	5	4	2	5	16



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TITLE Design Brainstorm (Base [2]) **PROJECT**

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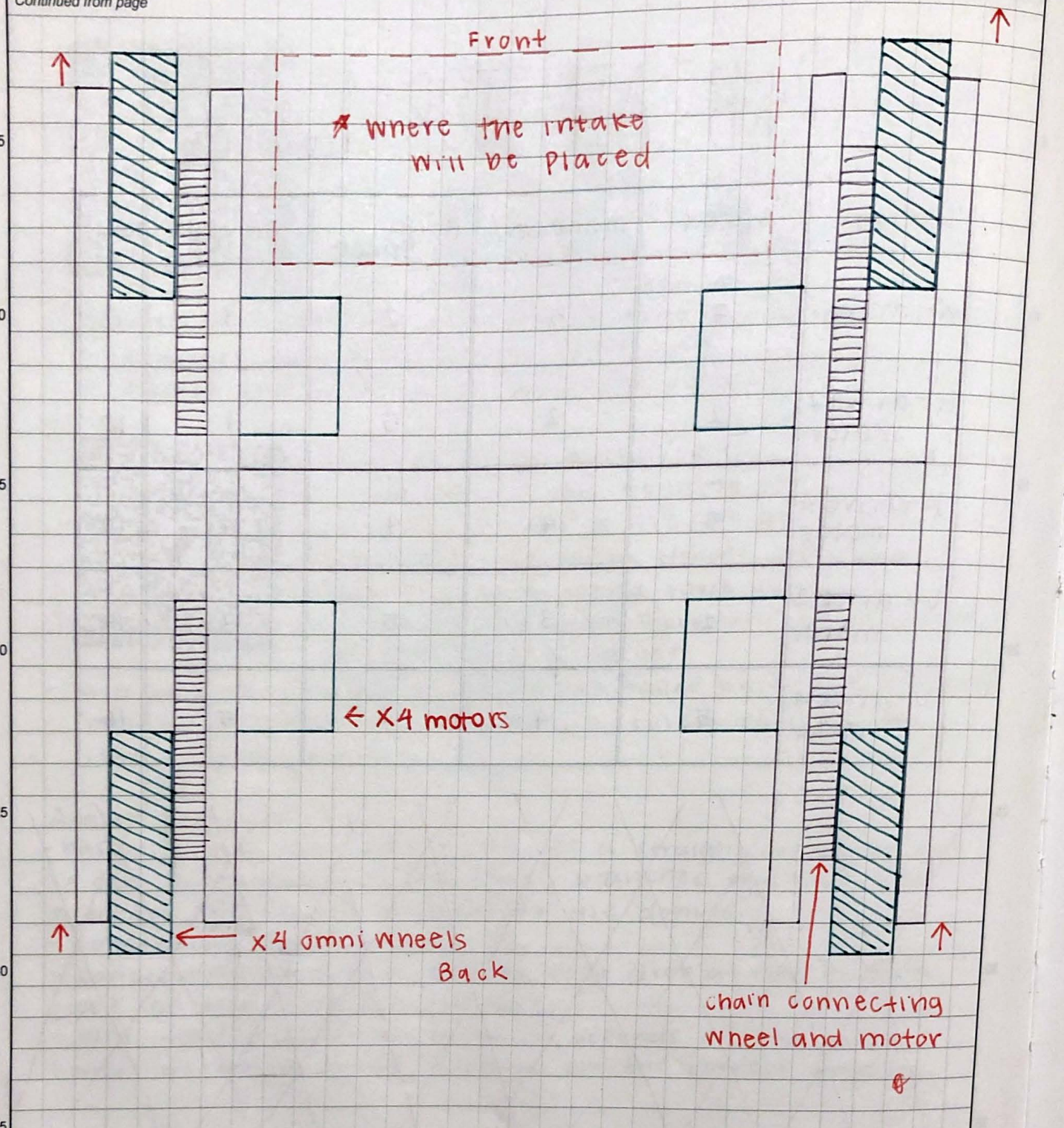

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TITLE Design Brainstorm (Intake[1]) **PROJECT**

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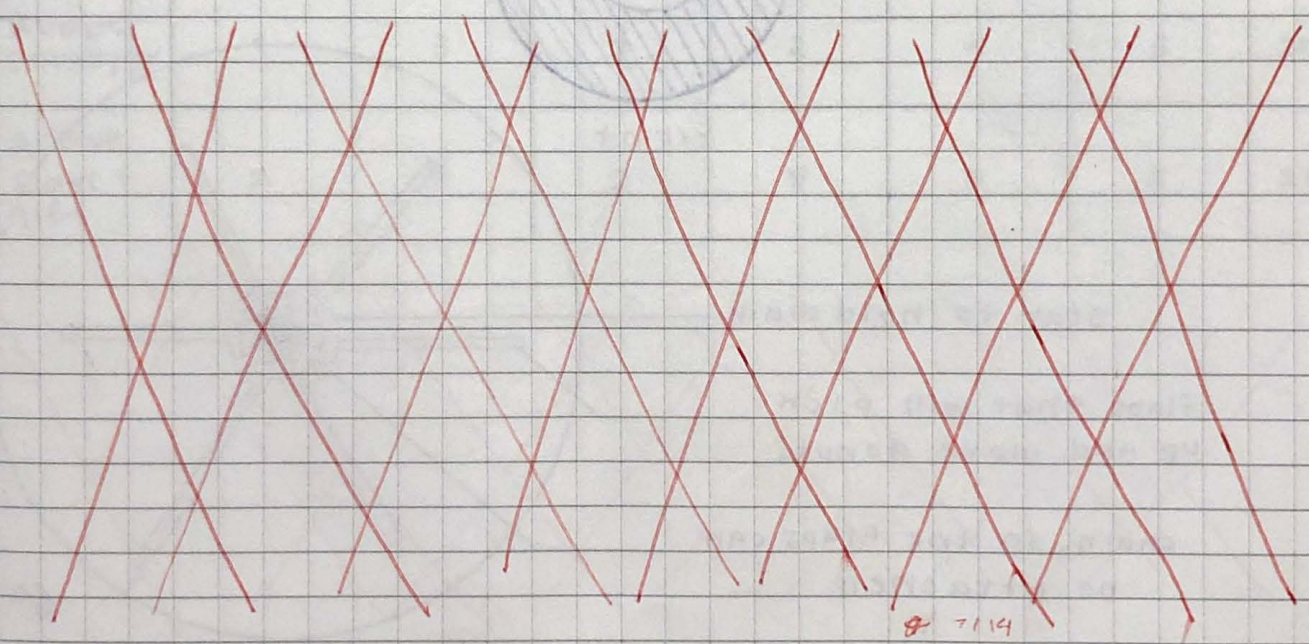
DESIGN BRAINSTORM (Intake[1])

~~Design~~	Time	Complex	W/1	Desirability	Durability	FOP	FIAT	TOJ
per%	0.3	0.65	1	1	0.4	0.5	1	
Shute	2	2	2.5	4	1	2	4	13.8
Tray	1	4	4	4	3	2	0	13.1
Plunger	2	3	2.5	4	2	3	4	15.75



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TITLE Design Brainstorm (Intake[2]) **PROJECT**

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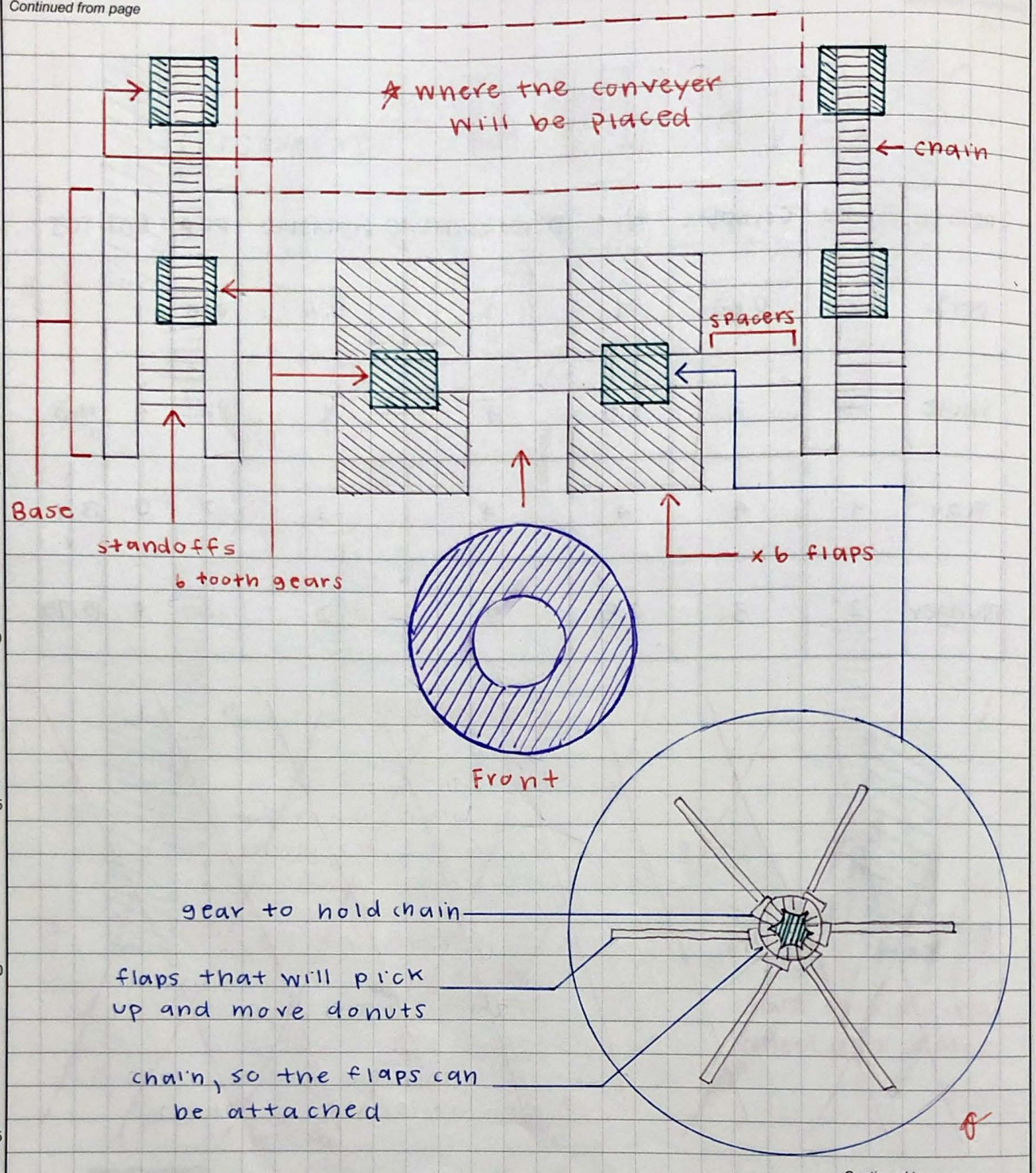

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PROPRIETARY INFORMATION

TITLE Design Brainstorm (conveyer[1]) **PROJECT**

Continued from page

DESIGN BRAINSTORM (Conveyer [1])

Design	High Goal Capability/3	Versitility /10	Efficiency /10	Reliability /5	Build Simplicity/5	Ease of Use /3	Total
Chainbar +Dr4b+	3	10	3	2	2	1	20
Dr4b+ Plunger	3	5	4	3	2	3	20
chainbar +plunger	2	7	5	3	4	2	23
Standoff conveyer	1	3	10	4	3	3	24
Rubber conveyer	1	3	7	2	4	3	20
Active Claw + lift	2	5	2	5	5	2	21

7/14

Continued to page

SIGNATURE

DATE 7/14

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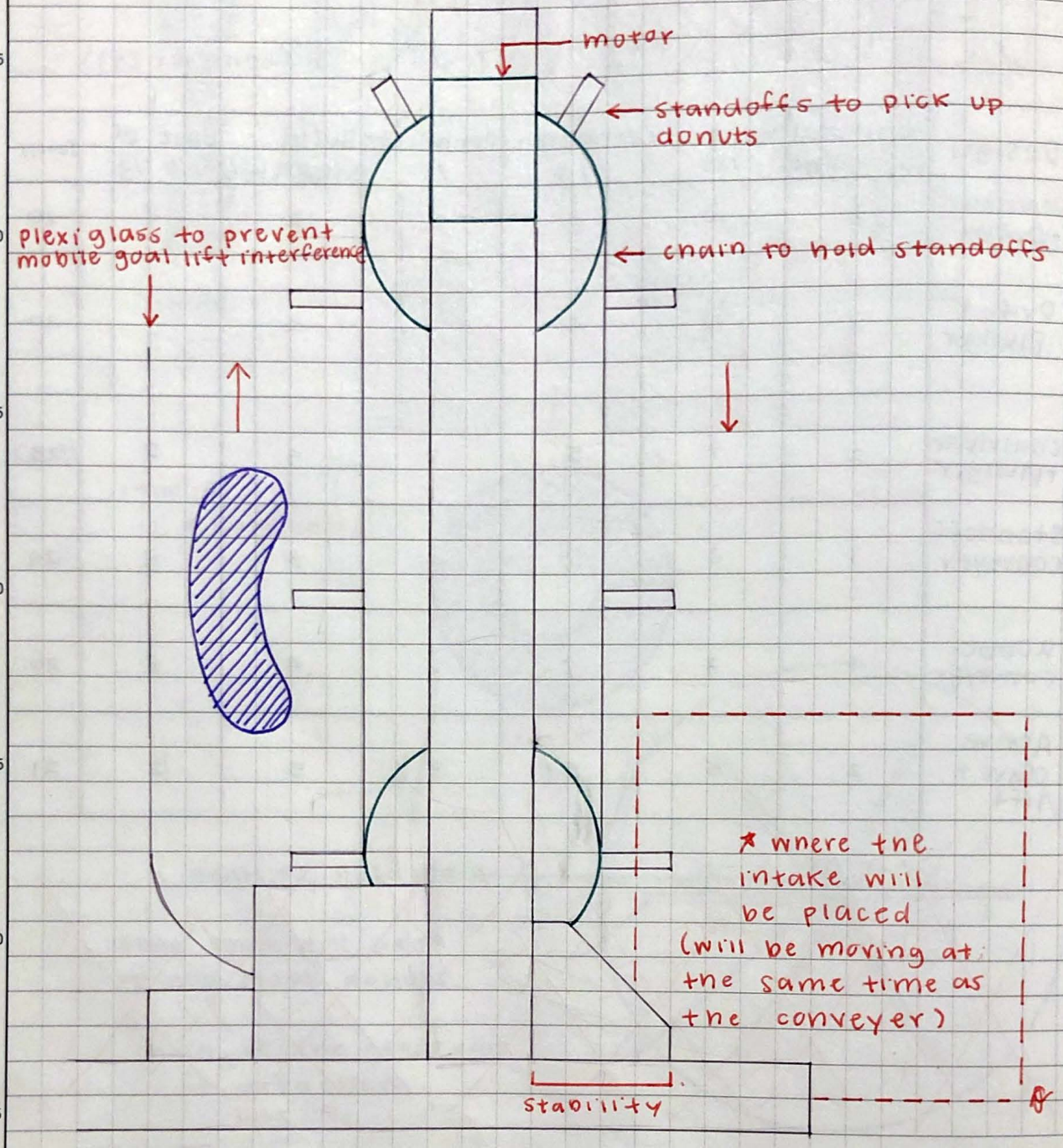
DATE 7/14

PROPRIETARY INFORMATION

TITLE Design Brainstorm (conveyer[2]) **PROJECT**

Continued from page



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DATE 7/14

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DATE 7/14

PROPRIETARY INFORMATION

TITLE Design Brainstorm (conveyer[3]) PROJECT

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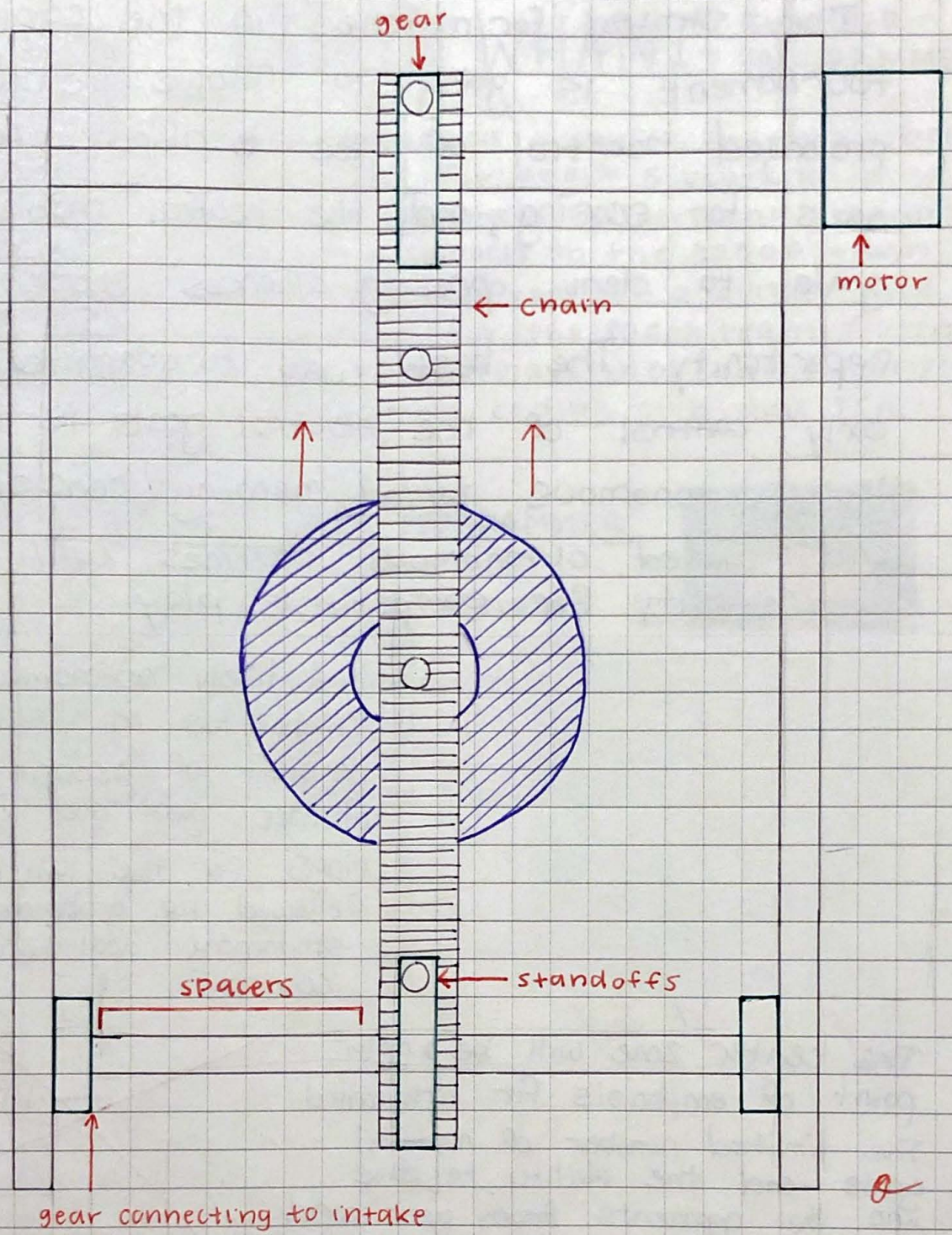

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DATE 7/14

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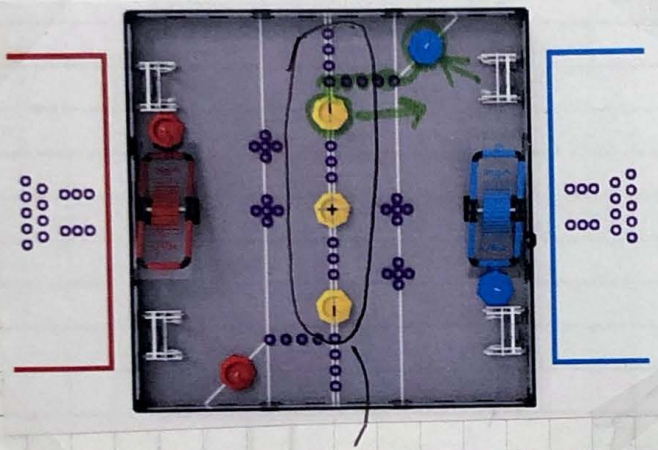
DATE 7/14

PROPRIETARY INFORMATION

TITLE Competition Strategy **PROJECT**

Continued from page

The strategy for matches in the coming tournament is going to revolve around prolonged control of the 4 alliance mobile goals for scoring, and the neutral mobile goals to deny opposing alliances' scoring opportunity. The best way to guarantee early control of the neutral goals is through the autonomous period, meaning consistent and varied autonomous routines will be a necessity for competitive play.



A likely autonomous pathing (highlighted in green) will consist of securing the alliance goal and collecting rings for the win point, followed by grabbing the stationary goal for early control.

The center zone will be a major point of emphasis for early control. The limited number of neutral goals and the ability to zone off the opponents from your scored goals mean controlling the center is very important.

RB 8/18

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SIGNATURE [signature] DATE 8/18

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TITLE Team Introduction (new) PROJECT

Continued from page

KAILYN WHANG BUILDER PROGRAMMER

Kailyn Whang is a junior that has been doing VEX for about 5 years as a engineer notebooker, builder, and programmer. She was previously on the 3050A team and joined this year as a builder and programmer for the 3050B team. Outside of VEX Kailyn plays the piano, participates in the schools coding club, and TSA.

ALEX LINDEMAN VICE PROGRAMMER

Alex Lindeman is a junior who was previously a member on the 3050C team. He is known for his programming skills an hopes to implement his talent for this years bot. Outside of VEX Alex plays soccer for the Peninsula team and participates in cyber patriots

9/1

Continued to page

SIGNATURE

DATE 9/1

DISCLOSED TO AND UNDERSTOOD BY Hannah Holden

DATE 9/1

TITLE Documentation Log #1 **PROJECT**

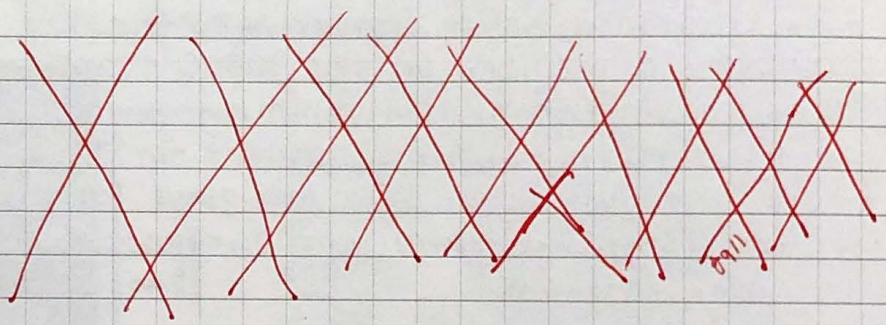
Continued from page

Log #1
09/01/21

Today is the first day back in the VEX room. We mainly spent most of the time cleaning out of the room due to other clubs using our room previously. After we finished that we dismantled our bot from last year and discussed possible stratagys for the upcoming game. Due to an interference with communication between the students and teachers, field parts and materials ordered have been delayed until further notice. Because we didn't have a notebook during summer meetings, everything was recorded in a temporary engineering notebook on a google doc.

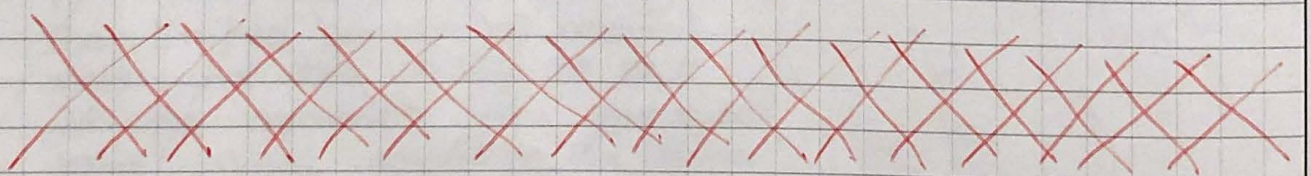
← online EN 6/23 - 8/31

9/11



Log #2
09/08/21

We started to build the base and discussed the width. There was a debate over the pros and cons of utilizing the specs and seeing if having a smaller base would be better for mobility. We decided to use a 35 by 5 c-channel because it would be easier to cut the bar after testing



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DATE 9/1

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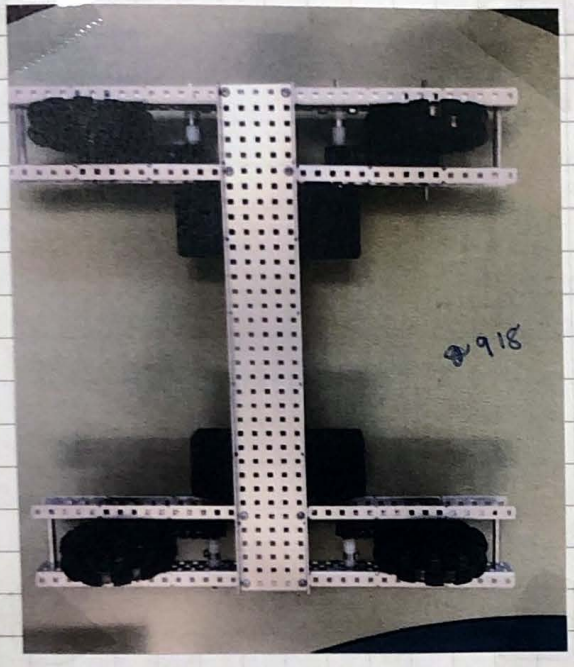
DATE 9/1

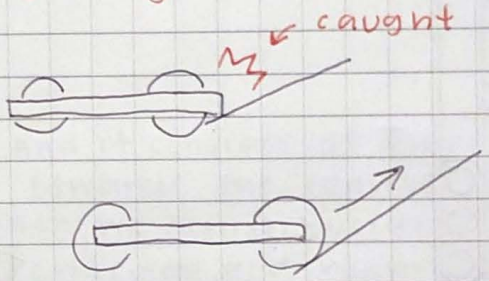
TITLE Documentation Log #2 PROJECT

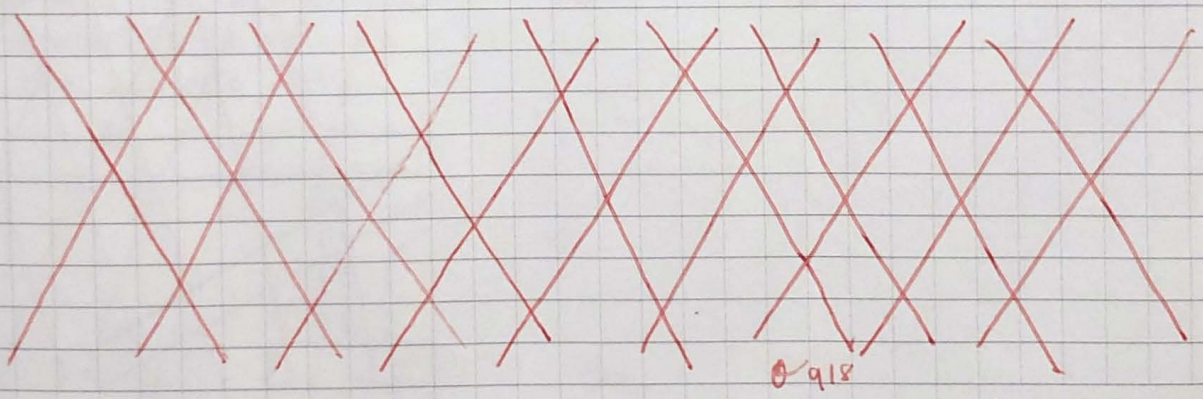
Continued from page

Log #3
09/11/21
We finished building our first replica of the base, we will change it later but this is what the current skeletal form will be. We also started to build one of the mobile lifts.



← We will have to shift the wheels further apart and shortened the base. Wheels will be moved because we were having trouble with getting onto the platform.





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SIGNATURE
DATE 9/18

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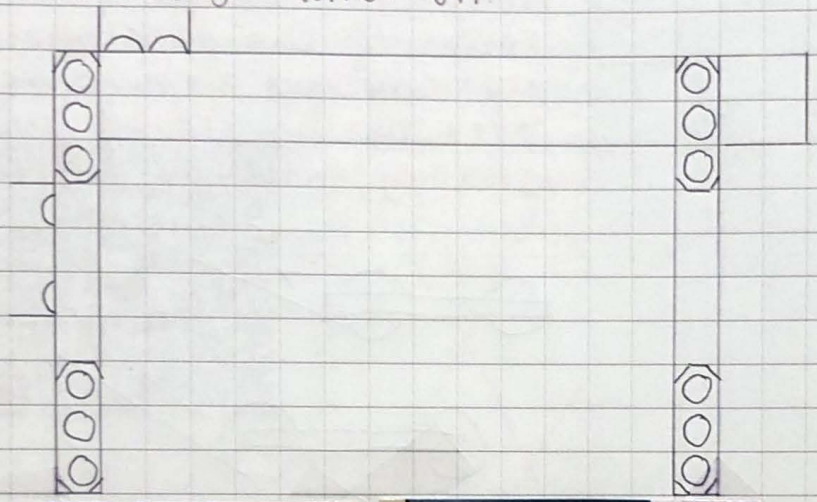
DATE 9/8
PROPRIETARY INFORMATION

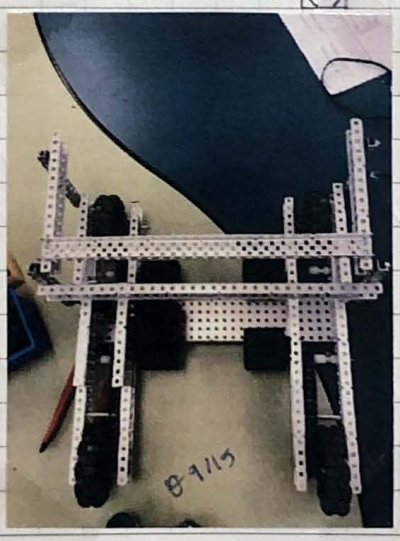
TITLE Documentation Log #3 **PROJECT**

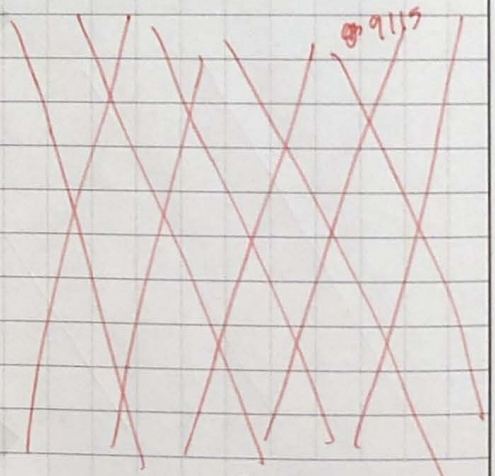
Continued from page

Log #4
09/15/21

We continued on working on the mobile lift. It will be a 4-bar that will go down and foward to reach the mobile goal. The under part of the goal is about 2" so we have to build something that drops down at least 3" in order to pick it up. The only problem that we are having is that it is taking up too much space (at least half of the bot) and we aren't too sure on how that will effect all the other parts that we have planned to build. Therefore, we might have to change the design later on.







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SIGNATURE

DATE 9/15

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DATE 9/15

PROPRIETARY INFORMATION

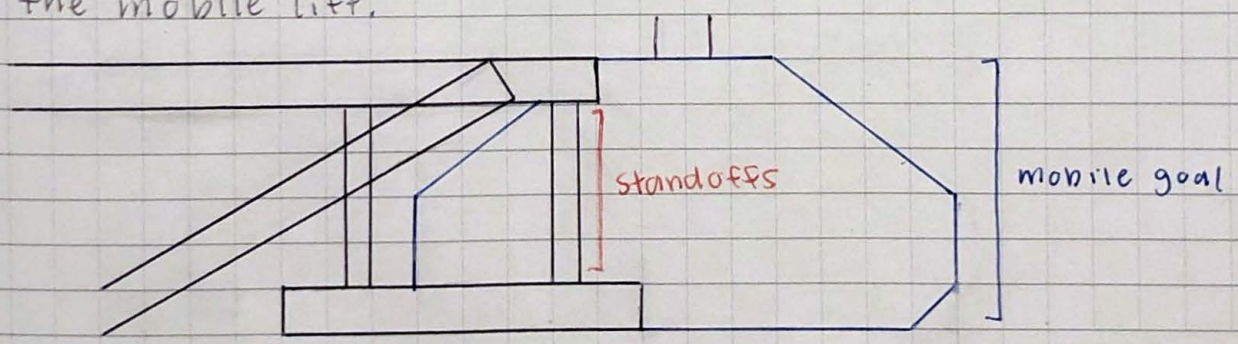
TITLE Documentation Log #4 PROJECT

Continued from page

Log #5
10/02/21
The mobile lift is having problems with getting in the way of the wheels so we might have to change the wheels or change the length of the lift so we have to think of a way around that. We also made a calander to keep track of our work.

Log #6
10/06/21
We decided that we need a practice ~~base~~ base for the drivers so we started to build it. We want it to be finished by next week so that our drivers can have as much practice as they can before our first competition. We also designed the intake and conveyor so that we could grab an understanding of what it will look like

Log #7
10/09/21
The intake has been added in and it consists of flaps in order to move the donuts towards the conveyer. We wanted to do the testing when we finish building the conveyer because it will be connected and running both at the same time. Until then we are revising the mobile lift to become more stable by adding bars and standoffs. It will be the lower part that will pick up the mobile lift.



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SIGNATURE [signature] DATE 10/2

DISCLOSED TO AND UNDERSTOOD BY Hannah Holden DATE 10/2

TITLE Calander (October 2021)

PROJECT

October 2021 3050B

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1	2 9:00-12:00 meeting Conclude Research
3	4	5	6 2:45-6:00 meeting Build intake and practice base	7	8 2:45-6:00 meeting	9 9:00-12:00 meeting Finish build of the intake and practice base
10	11	12	13 2:45-6:00 meeting Drivers practice and work on lift	14	15 2:45-6:00 meeting	16 9:00-12:00 meeting Practice driving, finalize lift
17	18	19	20 2:45-6:00 meeting Work on conveyor	21	22 2:45-6:00 meeting	23 9:00-12:00 meeting Finish conveyer
24	25	26	27 2:45-6:00 meeting Work on donut transfer lift	28	29 2:45-6:00 meeting	30 3:30 meeting Finish transfer lift

10/2

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PROPRIETARY INFORMATION

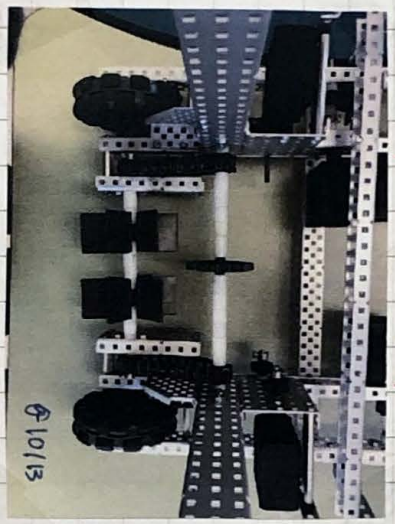
TITLE Documentation Log #5 PROJECT

Continued from page

Log #8
10/13/21

will shorten later

This is the revised view of the mobile lift. After the game parts arrived we had the mobile goal to test the capabilities of the lift. It was too high so we had to lower it. It is also unstable so we have to figure out something for that.



added to reach down and pick up mobile goals

added intake, may have to put plexiglass under

@10/13

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DATE 10/13

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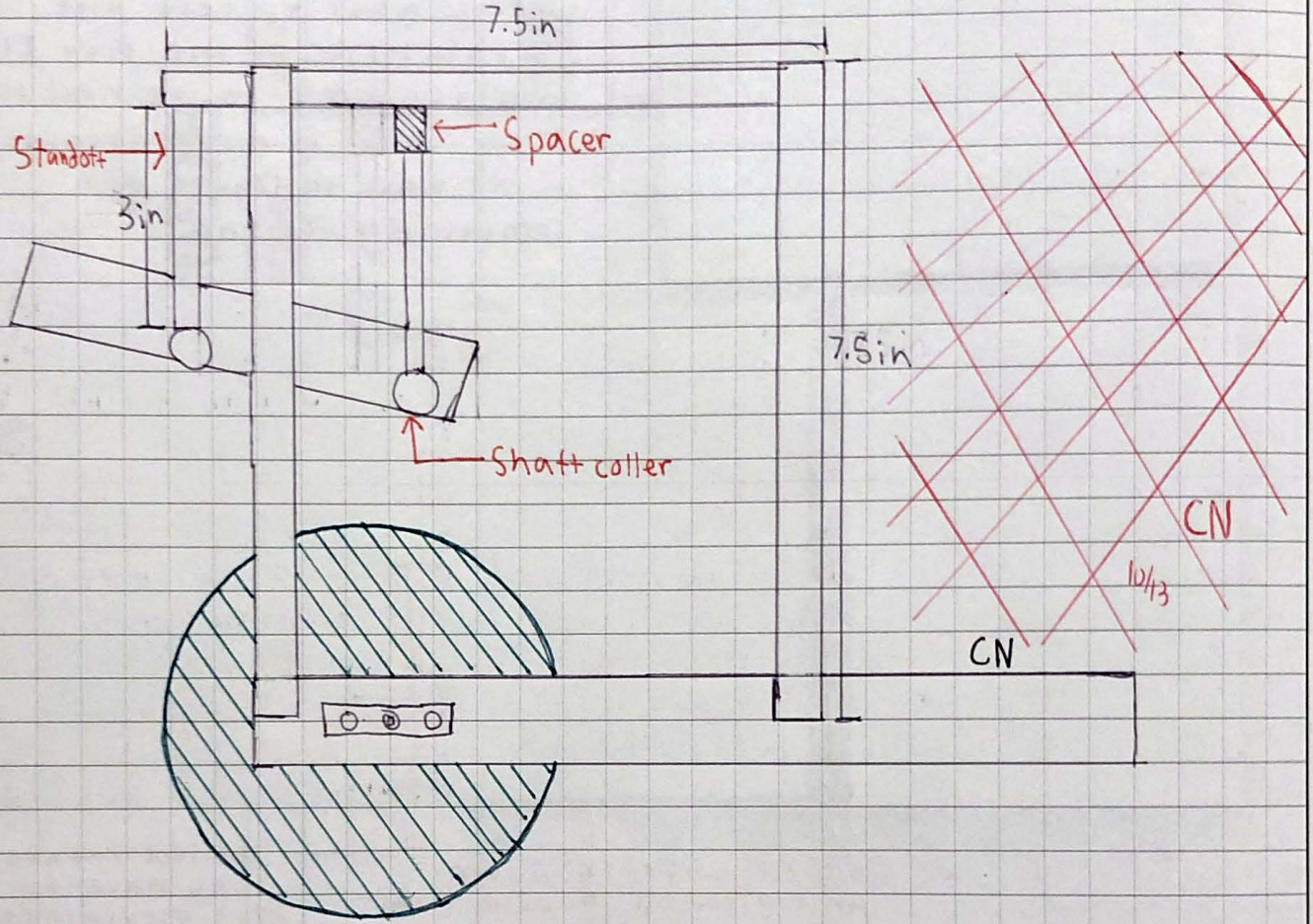
DATE 10/13

PROPRIETARY INFORMATION

TITLE Documentation Log #5 (continued) **PROJECT**

Continued from page

The mobile goal was extented from 10 holes at 5in to 15 holes at 7.5in for the reasons stated ~~below~~ on page 37. Spacers are also going to added ~~at the~~ in the area coming down ~~from~~ the top. This will Increase the angle that the mobile goal will sit at an angle when going up the platform causing them not to fall out.



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SIGNATURE Clara Mirick DATE 10/13

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PROPRIETARY INFORMATION

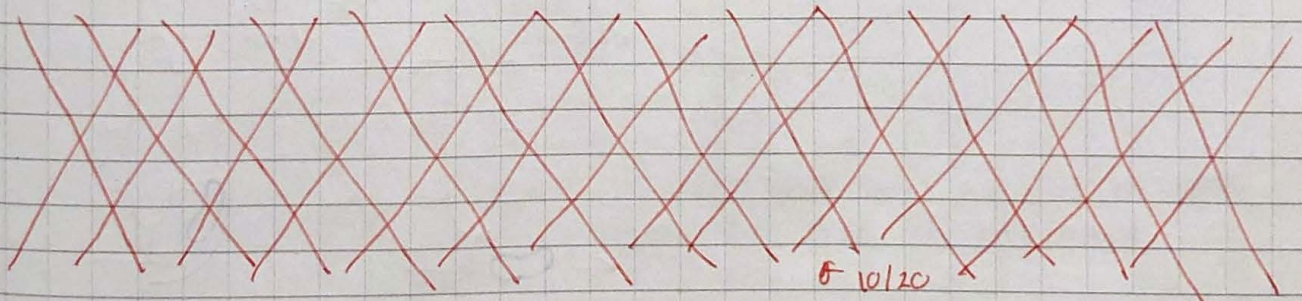
TITLE documentation Log #6 PROJECT

Continued from page

Log # 9
10/15/21
Since the game parts arrived we spent most of the day setting up the field. Ciaran, Ryan, and Deya worked on perfecting the intake while Micheal and Jason finish building our second base. This base is for our drivers to practice and gain more familiarity with the controls.

Log #10
10/16/21
We tested the mobile goal using the cortex and it works. We had to lift the mobile lift 5" above the ground and it seems to be the right sizing. Although, we did find some problems with the motors so we had to fix it. Now we are working on the conveyor and we are doing everything as planned. We have signed up for a competition which will be on November 6th at McBride Highschool, so we have extended our meeting time on Fridays.

Log # 11
10/20/21
Today was mainly spent working on the conveyor and second mobile lift. This lift will be in the front, although we are unsure about how it will fit with the intake in the front. The concept should look like this: Continue to next pg.



10/20

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DATE 10/20

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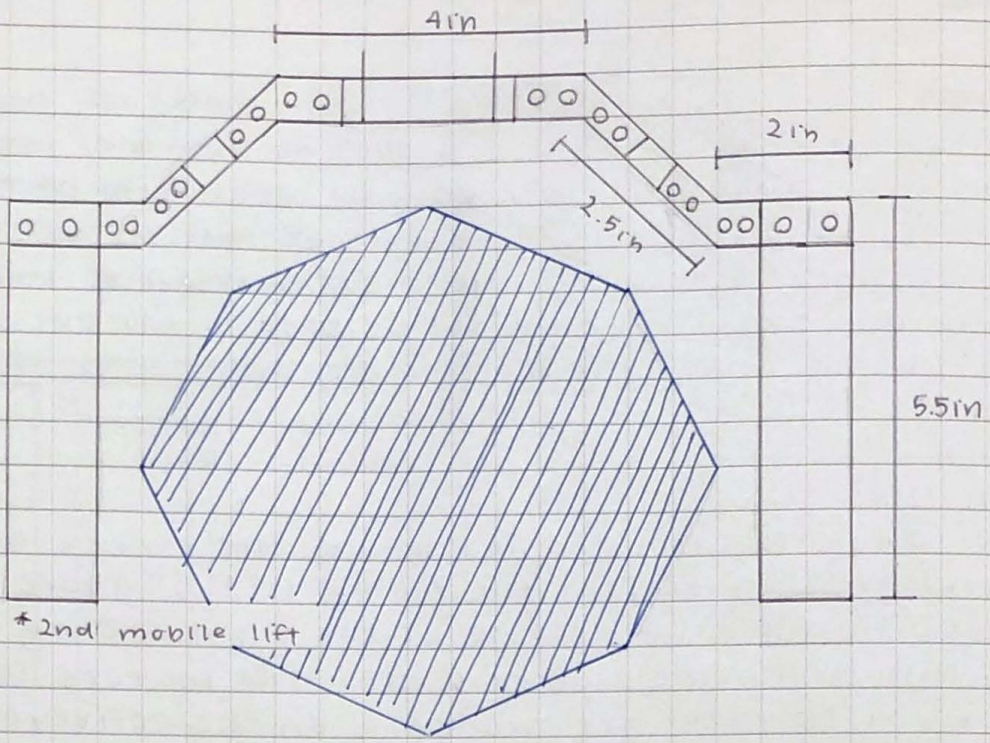
DATE 10/20

PROPRIETARY INFORMATION

TITLE Documentation Log # 7 **PROJECT**

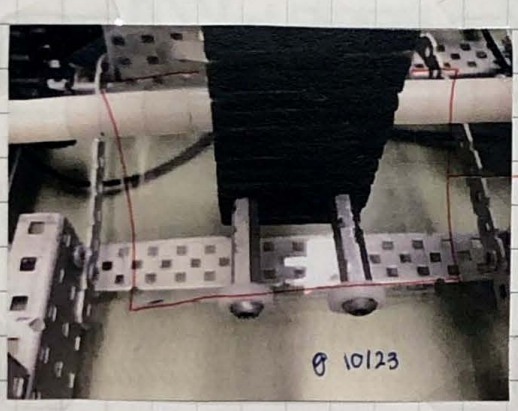
Continued from page



Log # 11
10/20/21

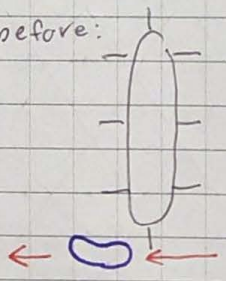
Log # 12
10/23/21

We fixed the indirect gearing of the base and moved the conveyors motor to the top. In order for there to be a smooth transition when picking up the donuts to the conveyor we added a plexiglass ramp at the bottom. A funnel was also added for the intake.

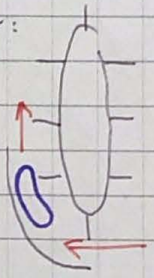


vague, but the red should be outlining ~~the plexiglass~~

before:



after:



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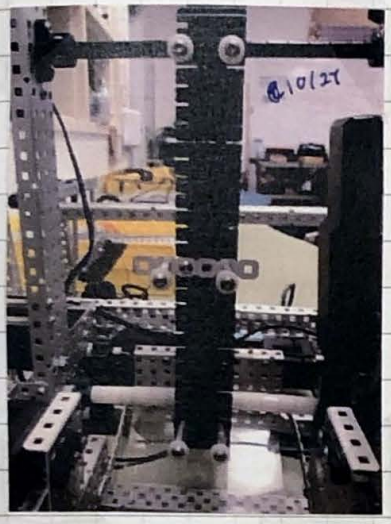
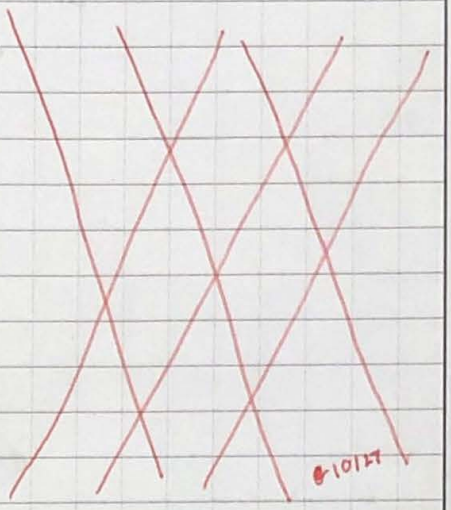
TITLE Documentation Log #8 PROJECT

Continued from page

Log #13
10/27/21

The quartex and battery were added to the side of the bot. The bot was also wired since we have no plans on moving any of the motors. We also planned where we will put the mobile lift which will be troublesome because of the intake in the way. Other than that, we finished the conveyer





Log #14
10/29/21

We did some testing with the conveyer to see if the donuts would get picked up, found out that the intake was unnecessary and the conveyer could pick the donuts by itself. We decided to remove it so that we could have more spacing for the front mobile goal lift. There are also complications with the the mobile lift, even without the intake we are still unsure how we are going to put it in. There isn't enough space and we need it low enough for it to even pick up the mobile goal. If we do lower it the bot will be out of spec so we might have to change the size of the base.

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DATE 10/27

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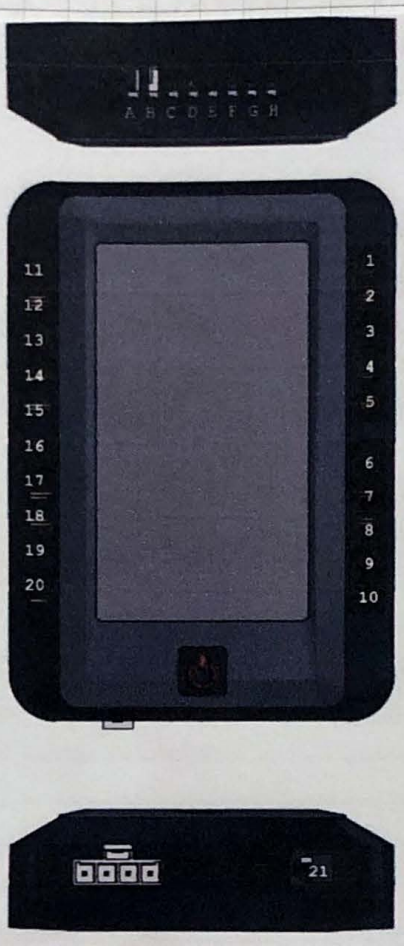
DATE 10/27

TITLE Wiring Layout **PROJECT**

Continued from page

There are 3 100 rpm Torque Motors and 5 200 rpm standard motors, on the ~~b~~ robot. The 3 Torque Motors are the Front Right Lift Motor, Front Left Lift Motor, and the Back Lift Motor. We have also been using the Vex Crimping tool to make our own wires.

1		11	
2		12	
3		13	
4	Front Right Lift Motor	14	Back Right Motor
5	Front Left Lift Motor	15	
6		16	Back Left Motor
7		17	
8	Front Right Motor	18	Conveyer Motor
9		19	
10	Back Left Motor	20	Front Left Motor



21	A	B	C	D	E	F	G	H
Radio								

Continued to page

SIGNATURE Alex Sudduth DATE 10/27

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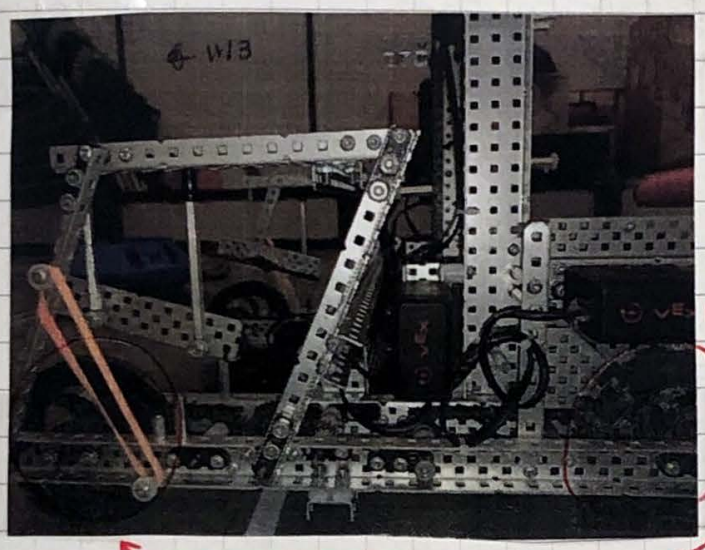
TITLE Documentation Log #9 PROJECT

Continued from page

Log #15 11/3/21 We continued testing the primary subsystems and making adjustments. One of these was the switch from omni-directional wheels to traction wheels in the rear drive, for several reasons. The main reason is to increase our platform efficiency as the added traction reduces slipping on the slick platform. Traction wheels also increase our pushing power, which gives us better defensive power when controlling the center of the field. The only downside is a decreased turn radius, which is remedied with practice



(Poor quality Print) but on the right is the original omni-directional wheels,

and on the left are the new higher traction wheels

Log #16 11/5/21 We Finalized preparations heading into the McBride competition, including packing our competition boxes, mounting license plates, Finalizing our display, and performing final specifications checks. We made some minor structural tweaks to the Font MoGo during testing, then packed up to ship out.

Continued to page

SIGNATURE [signature] DATE 11/3

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TITLE Pre competition Bot **PROJECT**

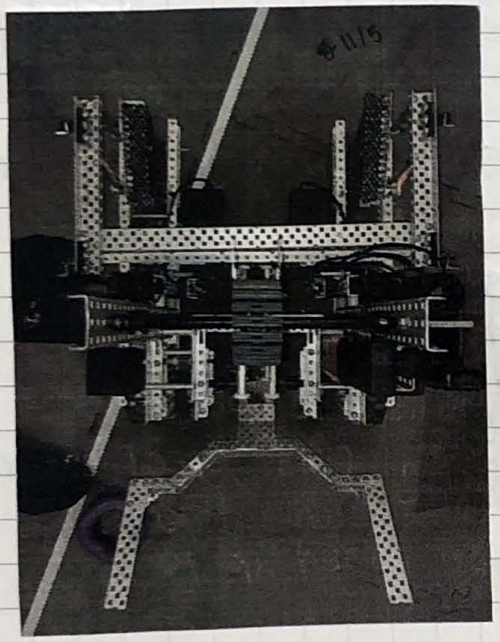
Continued from page

The compition at Mcbride High School is tomorrow, November 6th, and our robot is largely completed and tested. Both mobile goal lifts are executing as designed and the new rear traction wheels make using the platform significantly less challenging.

Recent Tweaks: Realligned base drive motors to remove the need for sprockets

Increased Length of angled mobile goal lift For added convenience

Capabilities: Two mobile goal capacity
Parking capable w/ two mobile goals
Semi-Consistent donut scoring



Top and side profile of robot - RB 1115

Continued to page

SIGNATURE [signature] DATE 11/5

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TITLE Relevant code to-date PROJECT

Continued from page

```
#include "main.h"
#include "portdef.hpp"
#include "chassis.hpp"
#include "conveyor.hpp"
#include "lift.hpp"
#include "screen.hpp"
#include "file.hpp"
#include "opcontrol.hpp"

// Datastructures for recordable autonomous
int instInputs[7];

// Datastructures used for console and screen diagnostics
double buffer[12];
char chassisData[400];

extern int selection;

pros::Controller master(pros::E_CONTROLLER_MASTER);
pros::Controller partner(pros::E_CONTROLLER_PARTNER);

}

void opcontrolLoop(void * param) {
    while (true) {
                pros::Mutex mutex;
                mutex.take(25);

                instInputs[0] = master.get_analog(ANALOG_RIGHT_X);
                instInputs[1] = master.get_analog(ANALOG_RIGHT_Y);
                instInputs[2] = master.get_analog(ANALOG_LEFT_X);
                instInputs[3] = master.get_analog(ANALOG_LEFT_Y);

                if (partner.get_digital(DIGITAL_R1)) {
                        instInputs[4] = 1;
                }
                else if (partner.get_digital(DIGITAL_R2)) {
                        instInputs[4] = -1;
                }
                else {
                        instInputs[4] = -0;
                }
                if (master.get_digital(DIGITAL_L1)) {
                        instInputs[5] = 1;
                }
                else if (master.get_digital(DIGITAL_L2)) {
                        instInputs[5] = -1;
```

The upper snipped shows vital datastructures for recordable autonomous that are filled during opcontrol. The second snippet takes digital and analog information from the controller and populates the aforementioned datastructures.

Continued to page

SIGNATURE Jason Wrenels DATE 11/5

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PROPRIETARY INFORMATION

TITLE Relevant code to-date PROJECT

```
}
else {
        instInputs[5] = -0;
}
if (partner.get_digital(DIGITAL_UP)) {
        instInputs[6] = 1;
}
else if (partner.get_digital(DIGITAL_DOWN)) {
        instInputs[6] = -1;
}
else {
        instInputs[6] = -0;
}

mutex.give();

processInput(&instInputs[0]);

// Get data from module functions
getChassisDiag(buffer);
sprintf(chassisData,
"Fn R Mtr V: %f -- T: %f -- E: %f\n"
"Fn L Mtr V: %f -- T: %f -- E: %f\n"
"Bk R Mtr V: %f -- T: %f -- E: %f\n"
"Bk L Mtr V: %f -- T: %f -- E: %f\n",
buffer[0], buffer[4], buffer[8],
buffer[1], buffer[5], buffer[9],
buffer[2], buffer[6], buffer[10],
buffer[3], buffer[7], buffer[11]);
```

Second half of digital module control is here. These lines take information from the controller and pass it into data structures for processing down the line.

JG 11/5

The last couple lines here take data from the motor and package them all into a single char[] buffer. This buffer is used later to display information on the screen.

```
void startRecordThread() {
    clearVectors();

        pros::Task recordThread(recordLoop);

        std::cout << "record loop started" << std::endl;
}

void recordLoop(void * param) {
        int startTime = pros::millis();
    char countdown[20];
    sprintf(countdown, "press A");
    master.set_text(1, 1, countdown);
    while (pros::millis() < startTime + 15000) {
        if (master.get_digital(DIGITAL_A)) {
            break;
        }
                pros::delay(20);
    }

    sprintf(countdown, "recording");
    master.set_text(1, 1, countdown);
    startTime = pros::millis();
        while (pros::millis() < startTime + 15000) {
                pros::Mutex mutex;
```

RB 11/5

Continued to page

SIGNATURE Jason Wiemels		DATE 11/5
DISCLOSED TO AND UNDERSTOOD BY	DATE 11/5	PROPRIETARY INFORMATION

TITLE Relevant code to-date PROJECT

Continued from page

```
                mutex.take(5);
                recordInput(&instInputs[0]);
                mutex.give();

                pros::delay(20);
        }

    master.clear_line(1);
    char filename[20];
    sprintf(filename, "/usd/RecAuton%i.txt", selection);
        std::cout << "record loop finished -- " << getVectorSize() << filename << "
elapsed time: " << pros::millis() - startTime << std::endl;

        writeToFile(filename);
    finishRecording();
}

void processInput(int * arrInputs) {
        // Create easily mutable versions of struct members
        int rightX = arrInputs[0];
        int rightY = arrInputs[1];
        int leftX = arrInputs[2];
        int leftY = arrInputs[3];

        if (abs(rightX) < DEAD_STICK) rightX = 0;
        if (abs(rightY) < DEAD_STICK) rightY = 0;
        if (abs(leftX) < DEAD_STICK) leftX = 0;
        if (abs(leftY) < DEAD_STICK) leftY = 0;
        rightX = (rightX * SCALING);
        rightY = (rightY * SCALING);
        leftX = (leftX * SCALING);
        leftY = (leftY * SCALING);

        if (DRIVE_MODE == 1) {
                // We want to do X-Drive TANK control

                setIndividualMotor((rightY - average(rightX, leftX)),
                                                        (leftY + average(rightX, leftX)),
                                                        (rightY + average(rightX, leftX)),
                                                        (leftY - average(rightX, leftX)));
        }
        else if (DRIVE_MODE == 2) {
                // We want to do X-Drive ARCADE control

                setIndividualMotor((rightY - leftX - rightX),
                                                        (rightY + leftX + rightX),
                                                        (rightY - leftX + rightX),
                                                        (rightY + leftX - rightX));
```

The above code contains our most instrumental method- processInputs. This method is called both during opcontrol and by the recordable autonomous control loop. Changes made here will be reflected in both situations.

Continued to page

SIGNATURE Jason Woenicke DATE 11/5

DISCLOSED TO AND UNDERSTOOD BY Greg Byrne DATE 11/5

TITLE Relevant code to-date PROJECT

Continued from page

```
int leftY;

if (master.get_digital(DIGITAL_UP)) {
        leftY = 200;
}
else if (master.get_digital(DIGITAL_DOWN)) {
        leftY = -200;
}
else {
        leftY = 0;
}

if (master.get_digital(DIGITAL_LEFT)) {
        leftX = 200;
}
else if (master.get_digital(DIGITAL_RIGHT)) {
        leftX = -200;
}
else {
        leftX = 0;
}

int rightX = master.get_analog(ANALOG_RIGHT_X);

if(abs(rightX) < DEAD_STICK) { rightX = 0; }
if(abs(leftX) < DEAD_STICK) { leftX = 0; }
if(abs(leftY) < DEAD_STICK) { leftY = 0; }

setIndividualMotor((rightX - leftX - rightX),
                                        (rightX + leftX + rightX),
                                        (rightX - leftX + rightX),
                                        (rightX + leftX - rightX));
```

```
if (arrInputs[4] == 1) {
        conveyorMove(100);
}
else if (arrInputs[4] == -1) {
        conveyorMove(-100);
}
else {
        conveyorStop();
}

if (arrInputs[5] == 1) {
        frontLiftMove(127);
}
else if (arrInputs[5] == -1) {
        frontLiftMove(-110);
}
else {
        frontLiftLock();
}

if (arrInputs[6] == 1) {
        backLiftMove(127);
}
else if (arrInputs[6] == -1) {
        backLiftMove(-110);
}
else {
//backLiftMove(0);
        backLiftLock();
```

RB 11/5

```
        }
        else if (DRIVE_MODE == 3) {
                // we are wanting to do standard TANK Control

                setIndividualMotor(rightY, leftY, rightY, leftY);

        chassisLockDrive(rightY, leftY, rightY, leftY);
        }
        else if (DRIVE_MODE == 4) {
                // We are wanting to do standard ARCADE control

                setIndividualMotor(leftY - leftX, leftY + leftX, leftY - leftX, leftY +
leftX);
        }
        // else if (DRIVE_MODE == 5) {    // decomissioned until further testing and/or
demand for it to actually be made
        //      int leftX;
```

Drive mode 3 is our most commonly used, standard Tank control.

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SIGNATURE Jason Wremels DATE 11/5

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TITLE Pre-Comp Scouting PROJECT

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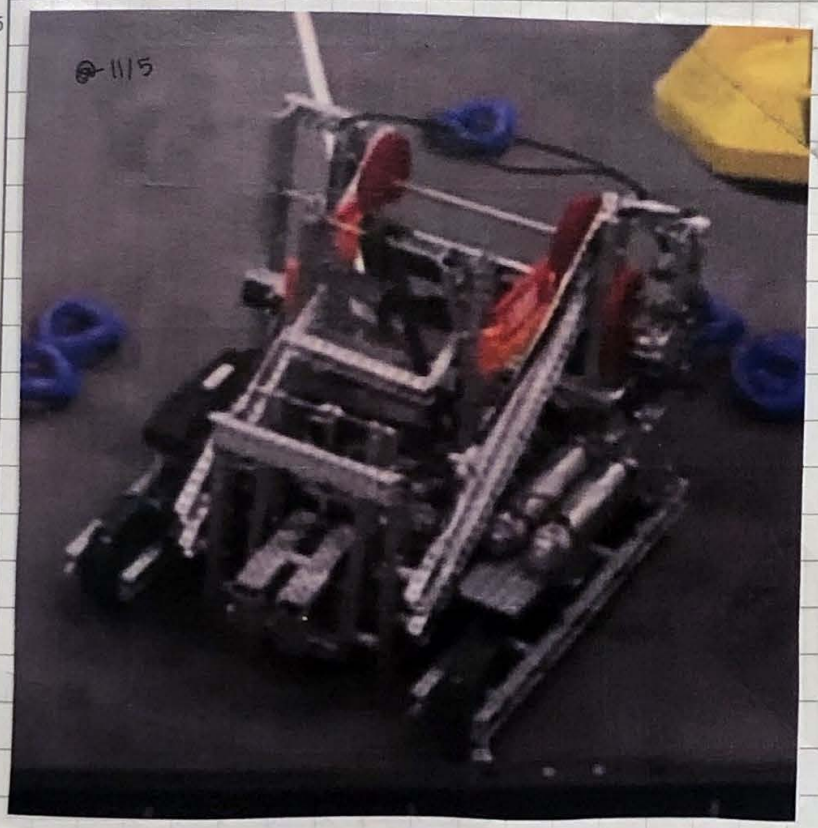
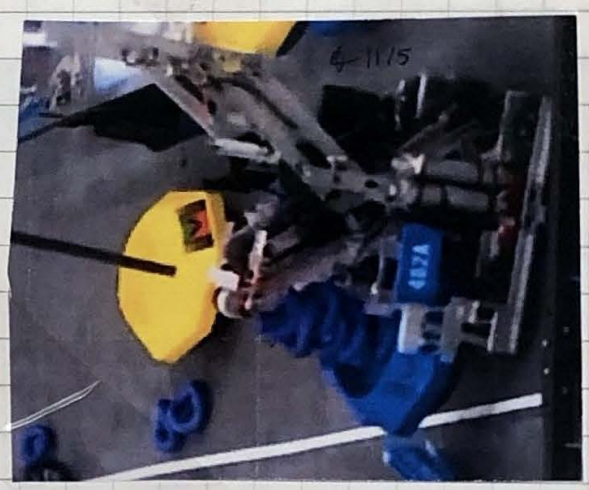
Prior to the competition a significant amount of scouting was done. Nearly 3/4 of the teams there ~~were~~ had gone to several competitions already and by accessing recordings of their matches we were able to have a solid idea of who we were up against before even arriving at the competition. We determined that our biggest competition at the event would be teams 462A and 1138A as they've already been to 3 competitions this season and have won awards.

1138A



462A



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DATE 11/5

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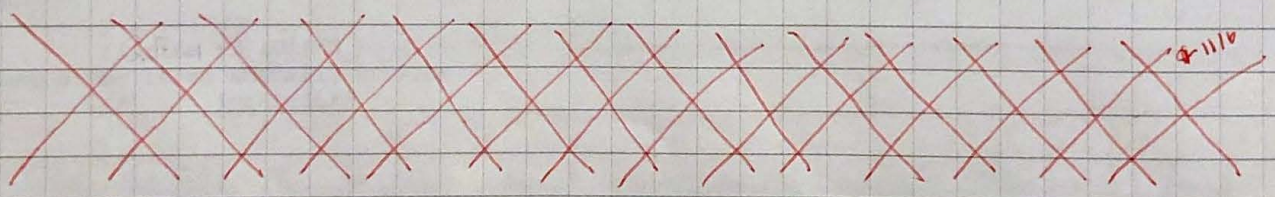
PROPRIETARY INFORMATION

TITLE Competition (11/6) **PROJECT**

Continued from page

MCBRIDE TOURNAMENT #7

Q4	1138X 3050B	180	127	999999D 40471A
Q7	79089A 1138A	48	83	3050B 8771Y
Q14	99999V 687B	193	70	3050B 687D
Q20	8771Y 687A	69	96	5026A 3050B
Q29	99999C 3050B	88	150	462X 3324Z
Q34	687G 3050B	46	130	1138Z 404Z
R16 4-1	687B 3050B	136	121	99999C 99999E
QF 2-1	462X 3324Z	166	40	687B 3050B



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TITLE competition (11/6) PROJECT

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OVERALL:

Our overall placement in the competition was 18th. Everything seemed to have gone well as we got the design award. Because of this we were able to qualify for state competition. Our judges meeting also went very well as we were able to talk about everything that we wanted, now we wanted.

Although things went well, there were also some problems with the bot that we need to fix when we return. The base wasn't working correctly, the turn radius was really off so we have to find the problem. We also figured that the conveyer was dead weight and should be removed with something else more convenient and suitable for the build. We also need to work on driver skills so that our driver is more familiarized with the fields format when competing. There was also the lack of communication throughout the team that we have to discuss.

11/6

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DATE 11/6

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DATE 11/6

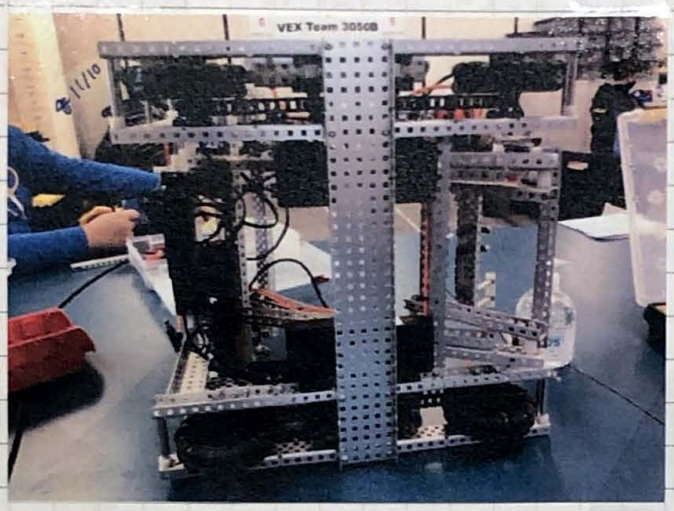
PROPRIETARY INFORMATION

TITLE Documentation Log #10 PROJECT

Continued from page

Log #17
11/10/21

Due to complication with our bots base at the competition, we decided to change the design. Instead of the 1:1 gear ratio we changed it to a 3:5 gear ratio with only gears running the base since the conveyer was useless we decided that it would be best that we take it off. There was also mentions of making a second bot for the skills we also want to use it for drivers practice. If we make a skills bot then we need to prioratize on scoring with the mobile goals. We saw other bots use this method at the comp with high scores so we thought that we should implement those ideas when building.



11/10

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DATE 11/10/21

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DATE 11/10

PROPRIETARY INFORMATION

TITLE Documentation Log #11 PROJECT

Continued from page

Log #18

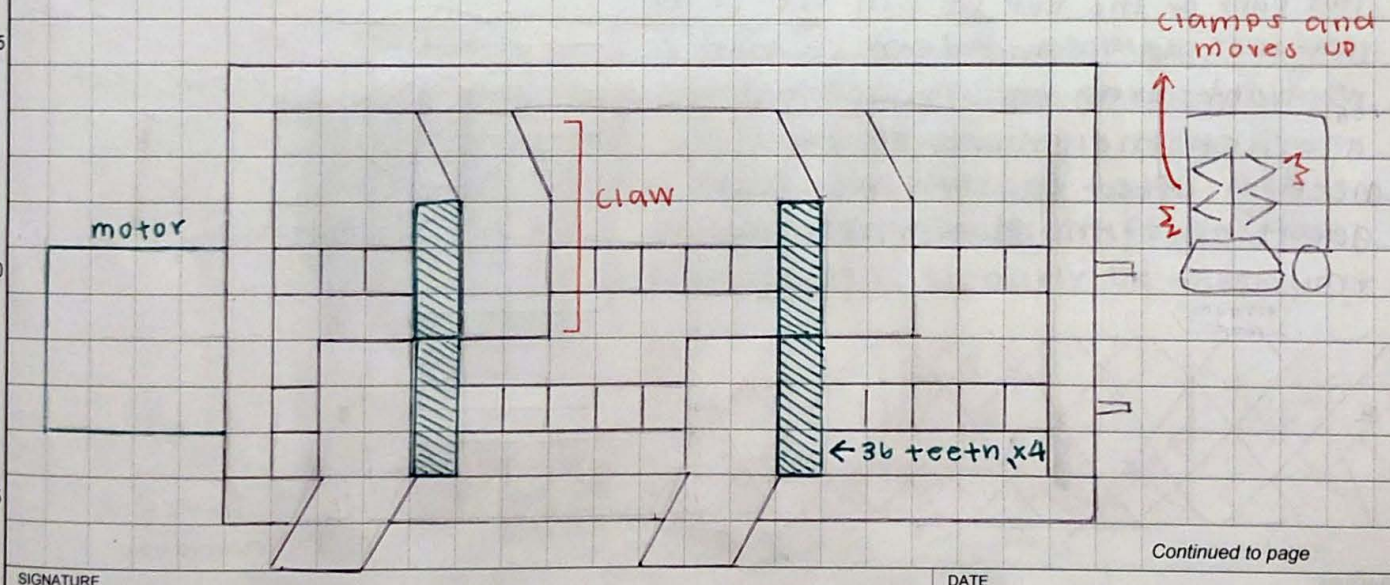
11/13/21

We wanted to revamp the entire bot so we are going to use the second base that we are building as the main bot. The previous build will be used for the skills bot. Since we decided that the skills bot will main with mobile goals we are going to build another mobile lift on the other side. Since we took off the conveyer we have a lot more space to work with. We started building the second base and tried planning out how we should make the mobile lift and claw (for the donut). We also want to focus on scoring with the mobile goals, but picking up the donuts would be nice. Other than that, we wanted to use pumatics on the new bot due to the rules change.

Log #19

11/17/21

We wanted the design for the skills bots mobile lift to be different than the one that we currently have. Mainly to make sure that we are in spec, but also to show off. It will lift it by the main branch on the mobile goal, pick it up, and etc. Basically it's like a claw.



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DATE 11/10

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DATE 11/10

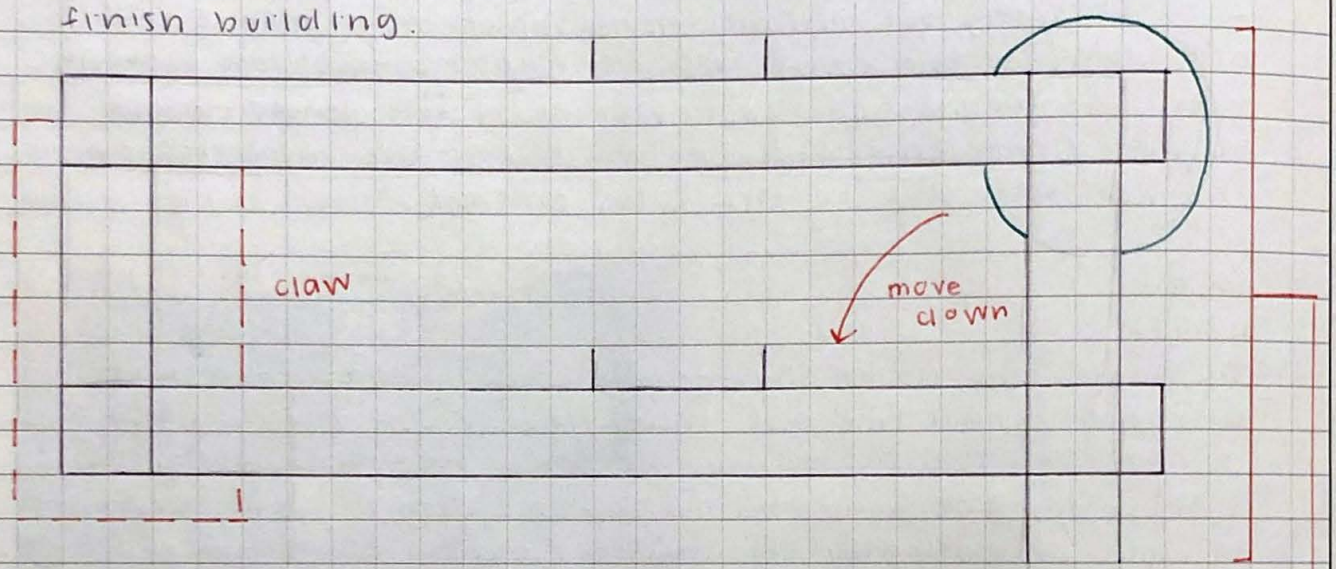
PROPRIETARY INFORMATION

TITLE Documentation Log #12 **PROJECT**

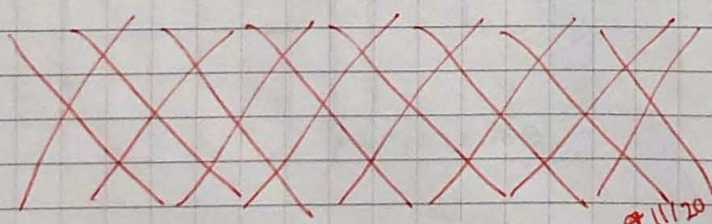
Continued from page

Log # 20
11/20/21

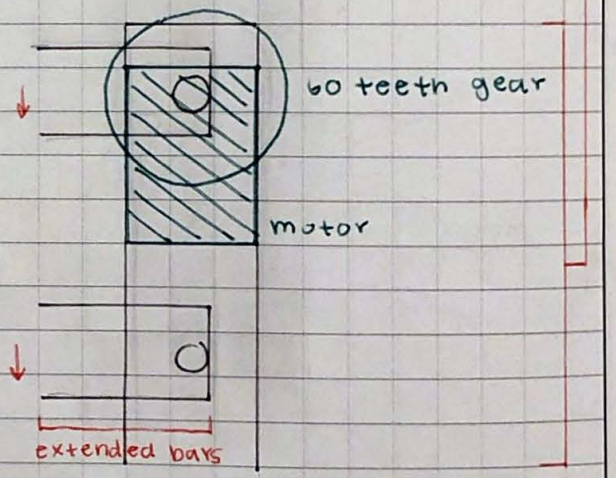
Other than continuing to build the base for the main bot and the claw for the skills bot, we also are working on the lift for the claw. It should be fairly simple and fast to build, so we may finish earlier than we expect. The possibility of the weight effecting the bot is a little worrisome, but we wanted to test it after we finish building.



This part of the bot we will use it to lift the claw up and down so that we won't drag the mobile goal against the ground. We also need it lifted so that we could get it onto the platform without trouble.



@ 11/20



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TITLE Documentation Log #13 PROJECT

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Log #21
11/24/21
Chains were a really big problem at the competition. We wanted to avoid using them so instead it will be a torque gear ratio so that it'll be strong enough to carry the mobile goals. We also had to remember that the base has to be low to the ground so that the donuts don't get stuck underneith. So, we started to build the base.

Log #22
11/27/21
We continued to build the base and we started to theorize the possibilities for the build of the claw. We wanted it to be similar to the 99999V's claw. Its a pnuematic claw that will be able to conserve motors. We have an idea for what the lift will require so we will be using the pneumatics so the lift can use 4 motors. The base is already using 4 motors, so this would be the saftest option to go for.

Log #23
12/1/21
The lift will most likely be a 4-bar that will be high enough to lift the mobile goals on the platforms. It'll be a collapsable passive lift in order to save a motor and tilt mogo. There will be 4 motors used. Other than that, we are finishing building the base, then we will work on the lift. The last thing that we will be designing will probably be the intake for the rings.

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November 2021 3050B

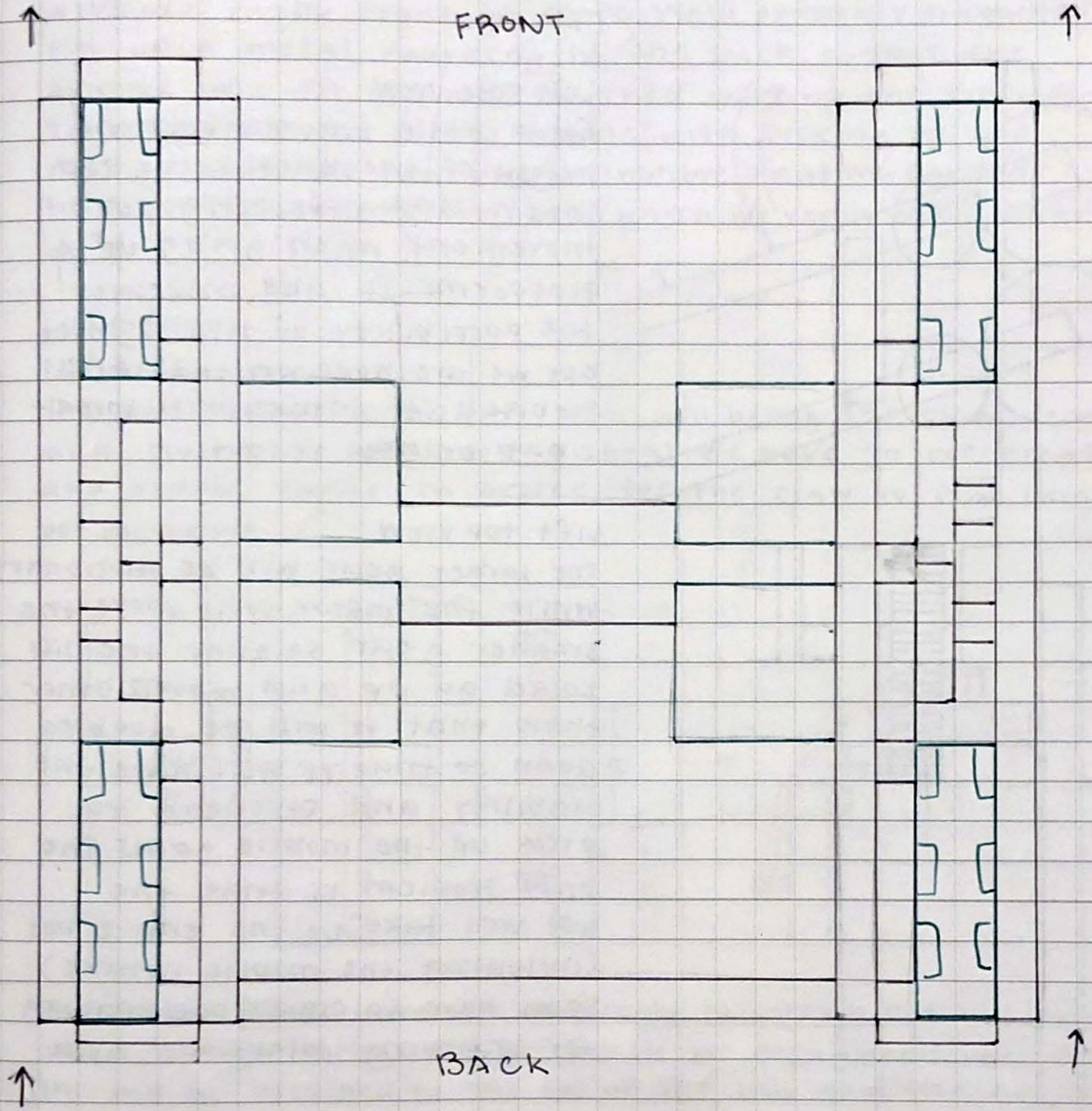
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6 McBride Comp
7	8	9	10 2:45-6:00 meeting Recoup	11	12 2:45-6:00 meeting	13 9:00-12:00 meeting Fix the base and brainstorm
14	15	16	17 2:45-6:00 meeting Start build on skills bot	18	19 2:45-6:00 meeting	20 9:00-12:00 meeting Work on the claw and lift for the skills bot
21	22	23	24 2:45-6:00 meeting Build base for new bot	25	26 2:45-6:00 meeting	27 9:00-12:00 meeting Finish building base
28	29	30				

TITLE Documentation Log #14 PROJECT

Continued from page

Log #24
12/4/21

Today we were able to finish building the base. Since that is finished Drew started to build the lift. Currently the base looks like this:



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PROPRIETARY INFORMATION

TITLE Documentation Log #15 PROJECT

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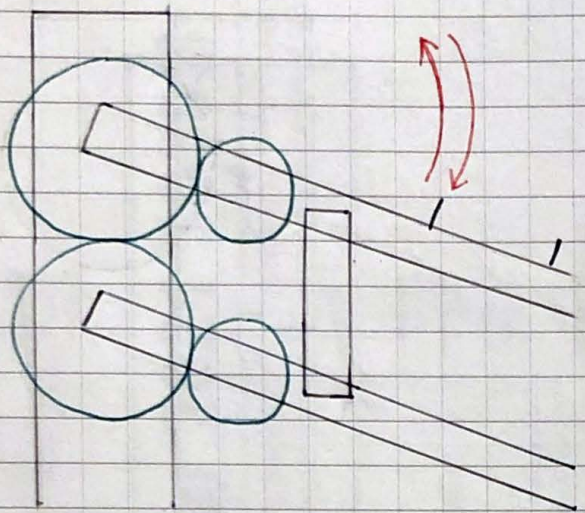
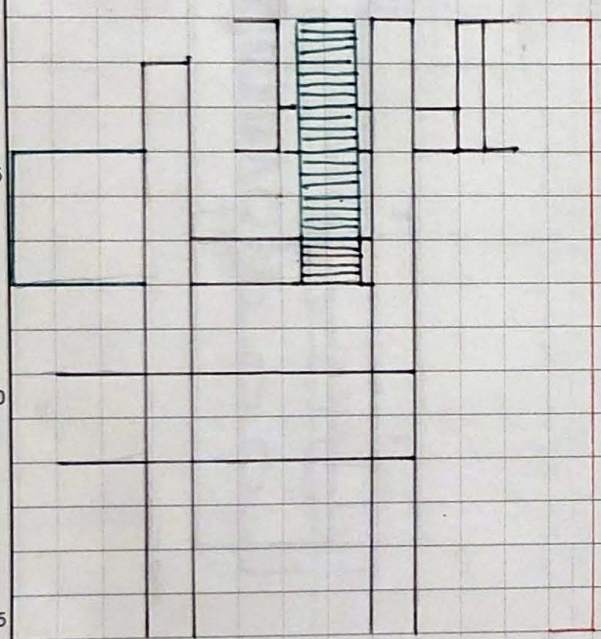
Log #25
12/8/21

since we finished building the base we started to build the lift. It was slightly inspired by a video that we saw so we wanted to implement those design to our bot. It should look like this:



Lift side view
It's a little unsure about the weight of the back being too much and effecting our movement when going up platforms. It also increases the possibility of tipping over but we are hopeing that the mobile lifts intake will somewhat balance it out.



Lift top view
The larger gear will be stationary while the motor will move the smaller gear so that the lift could go up and down. Other than that it will be doubled down so that it will have the stability and strength to pick up the mobile goals. The only problem is that the lift will take up the entire bot (including the mobile intake) So we have to figure out spacing for the ring intake.

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DATE 12/8

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PROPRIETARY INFORMATION

TITLE Documentation Log #16 PROJECT

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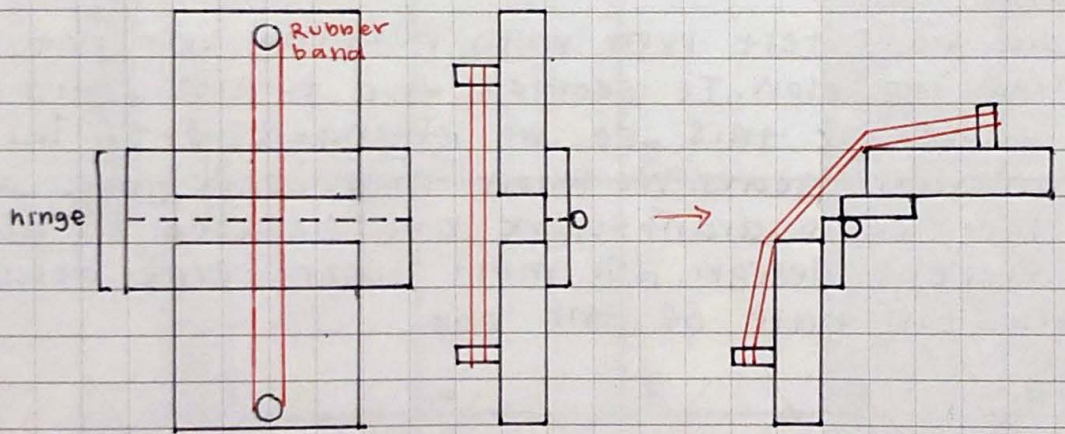
Log #26
12/11/21
Most of the day was spent on building the lift for the bot. After we have to work on the Pnuematic claw and find a place for the air ~~canaster~~ canister because we are already really tight on space. We'll probably have to put up a metal boarding in the back so that the quartex will fit. We also finished making the claw for the skills bot, but it has trouble with picking up the mobile goals. We can either improve what we already have or design another idea (which we really don't want to do).

Log #27
12/15/21
The Pnuematics is the part that will bring the claw down and clasp onto the mobile goal. We have to use hinges and rubber bands in order for the claw to stay intact but moveable.



The rubber bands have the elasticity to stretch out but also allow enough resistance to stay in its elongated version. This will be attached to the top of the lift and the top of the claw part.

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PROPRIETARY INFORMATION

TITLE Documentation Log #17 **PROJECT**

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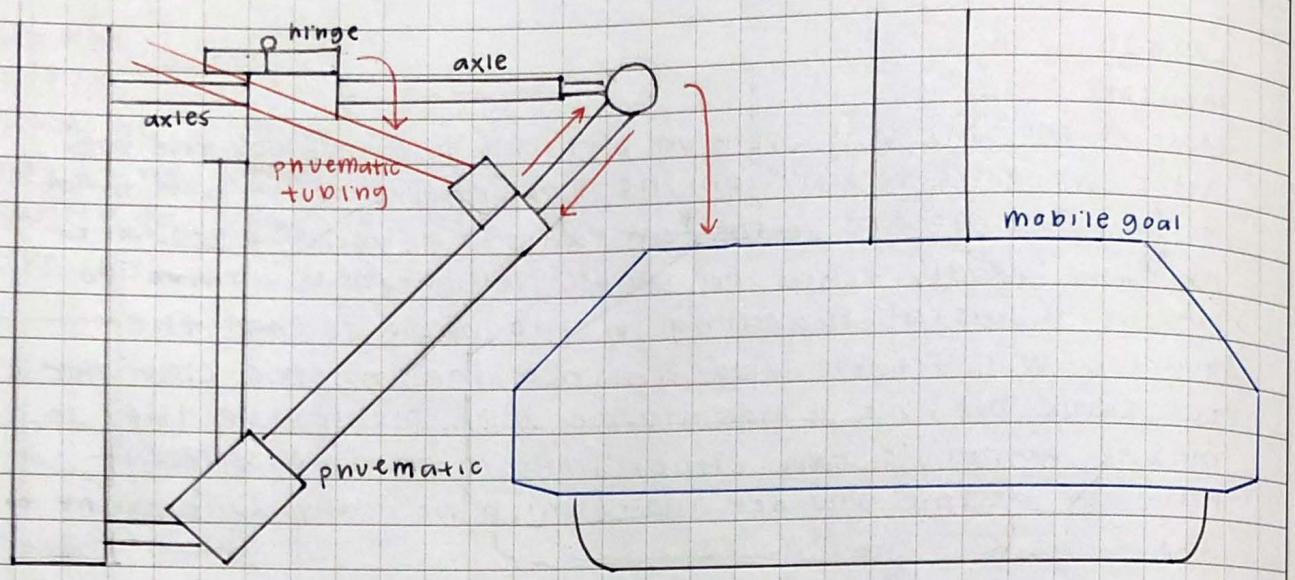
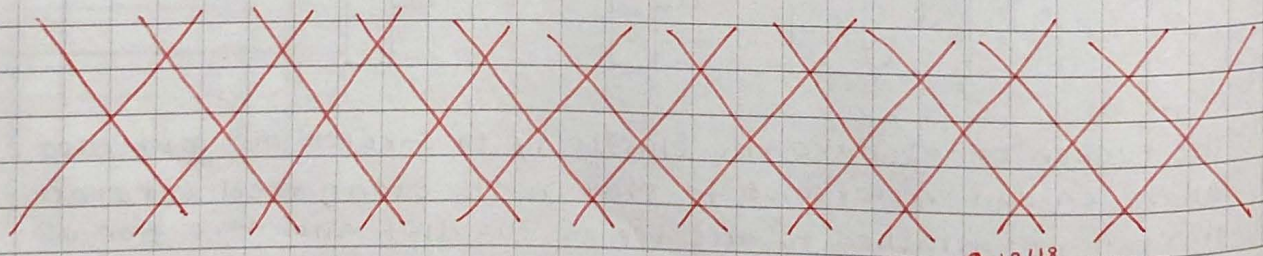


The phuematics will put pressure and bring the claw down to clasp onto the mobile goal. It gives us the ability to hold and pick up the goals and possibly drop the rings onto the branches with an intake.

Log # 28
12/18/21
We did some test runs with running the bot, but it was too slow. It seemed the torque ratio was the cause for this so we changed it to 1:1 again with gears. We know that using gears at the last comp didn't work but because we have a different design it'll most likely fine because of the top half of the bot.



12/18

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SIGNATURE
DATE 12/11
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DATE 12/11
PROPRIETARY INFORMATION

TITLE Calander (December 2021) PROJECT

December 2021 3050B

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4 9:00-12:00 meeting Conclude Research
5	6	7	8 2:45-6:00 meeting Build intake and practice base	9	10 2:45-6:00 meeting	11 9:00-12:00 meeting Finish build of the intake and practice base
12	13	14	15 2:45-6:00 meeting Drivers practice and work on lift	16	17 2:45-6:00 meeting	18 9:00-12:00 meeting Practice driving, finalize lift
19 ←	20	21	22 WINTER BREAK	23	24	25 →
26 ←	27	28	29	30	31	→

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PROPRIETARY INFORMATION

TITLE Documentation Log #18 **PROJECT**

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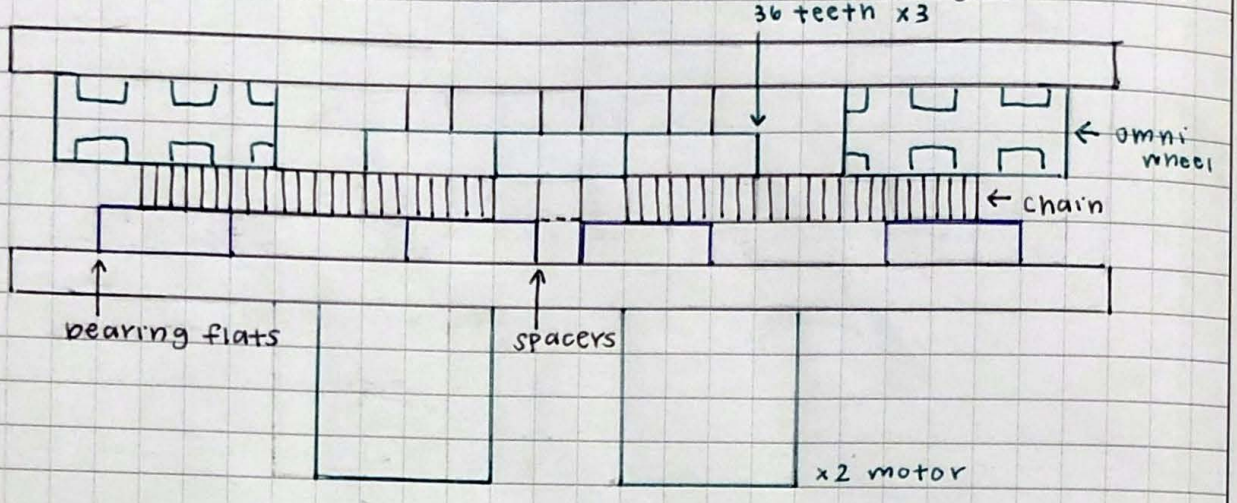
Log # 29
1/7/22

After finishing winter break we returned to completing the claw and attaching it to the main bot(including the completion of the lift). The base of the bot has also been finished and it looks something like this:



Log#30
1/12/22

Hannan has started to work on a spread excel worksheet on the total cost of the bot. Other than that Deya worked on the mobile lift (mainly the claw part) because the weight of the mobile goals were too heavy for the claw to grip on. We also figured out that we got into nationals from our last comp. so we discussed with our teacher about getting sponsorships so that each person wouldn't end up spending $700. The problem is that our school is known for being in the area of a higher income neighborhood, so convincing businesses to sponsor us will be difficult. We will have to approach smaller businesses. We also wired and attached pnumatics to the bot.

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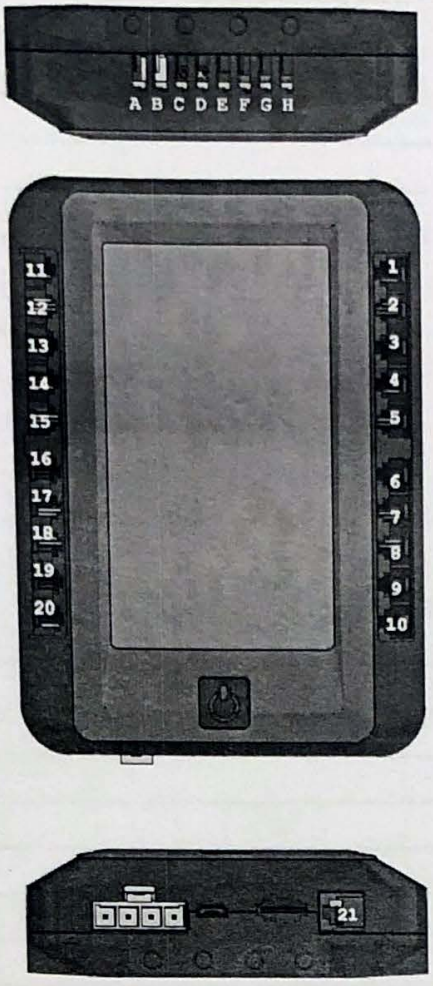
TITLE Wiring Layout (Main Bot) PROJECT

Continued from page

1	Bottom left Lift
2	Top - left Lift
3	top - right Lift
4	Bottom - right Lift
5	
6	
7	
8	Front - left Base
9	
10	



11	
12	
13	
14	Back - left Base
15	
16	Back - Right Base
17	
18	
19	
20	Front - Right Base

21	A	B	C	D	E	F	G	H

In the VEX 2022 season we have had limitations on how may motors we can use to provide motion to our robot. To the additional 8 motors on our robot we have been able to utelize pneumatics into our robot. This enabled us to have a pneumatic driven claw providing us with the action of gripping the mobile goals with out the power of a motor. With the change in rules this season we have been very excited to use pneumatics with out any penalties on our team.

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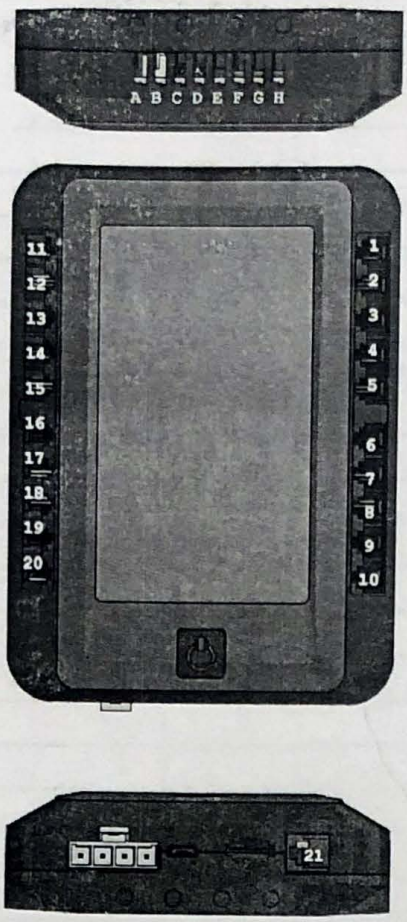
PROPRIETARY INFORMATION

TITLE Wiring Layout (Skills Bot) **PROJECT**

Continued from page

1	Top Left Lift
2	Bottom Left Lift
3	TOP Right Lift
4	Bottom Left Lift
5	Trans Motor
6	Grabber Motor
7	
8	
9	
10	Claw Motor



11	Inertial Sensor
12	
13	
14	
15	
16	
17	Front Right Drive
18	Front Left Drive
19	Back Right Drive
20	Back left Drive

21	A	B	C	D	E	F	G	H

~~Throughout~~ Throughout our VEX career, we have acquired the materials and the equipment to create wires at our desired length. This process is extremely beneficial as it allows the robot to have neat wiring that will not get caught on any moving parts. The process is also quite easy to replicate. All a team would need is V5 wiring from VEX, wire cutters, wire strippers, as well as a crimping tool. We highly recomend that teams do this as it prevents any damage to wires during play.

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SIGNATURE Michael Lee DATE 1/12

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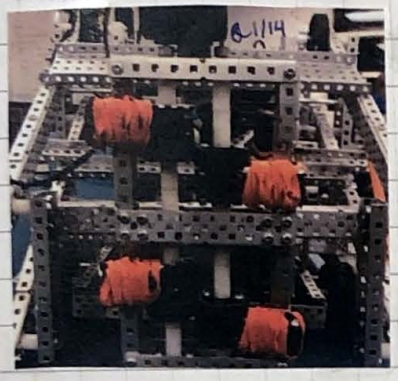
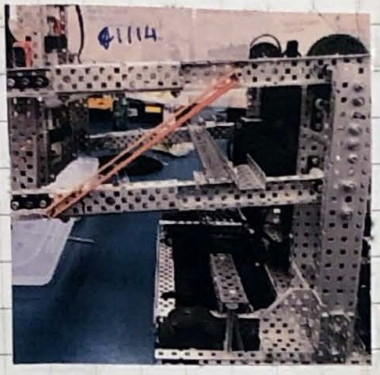
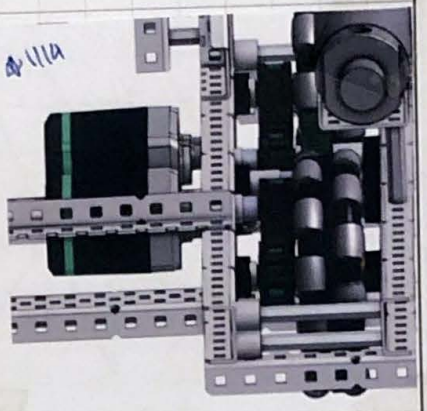
TITLE Documentation Log #19 PROJECT

Continued from page

Log # 31
1/14/22
We continued to fix the claw on the skills bot by adding spacing inside the claw so that the mobile goal wouldn't get caught in the metal. We also added some machanical stops & rubber bands to the claw so that it could properly pick up the goals. We added cross bracings to the main bot to prevent bending in the back and guards around the wheels on the base so that the rings don't get stuck in-between.







Log # 32
1/15/22 ~ 1/19/22
Most of the day was spent on building the raised platform and rearranging the room for more space. We mainly got the parts from office depot and self built everything. We changed the layout of the tables and storage. We are now able to put supplies under the platform so we have even more space.

@ 1/19

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PROPRIETARY INFORMATION

TITLE Documentation Log # 20 PROJECT

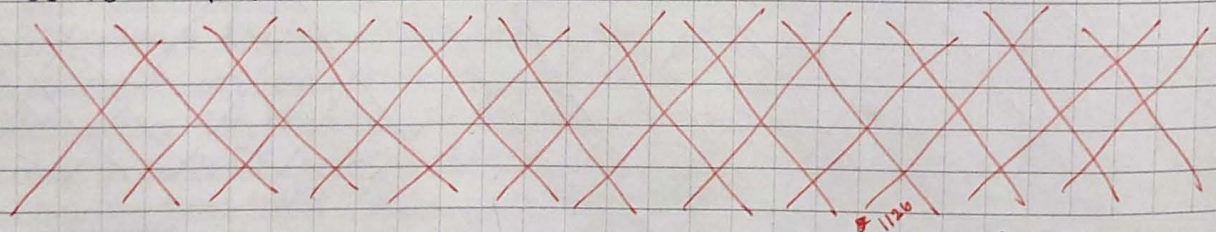
Continued from page

Log #33
1/22/22

In this meeting we decided to work with our encoder as you can see in our picture to our left we have a half omni-wheel to track our auton movement. Since the base omni-wheels have a hard time registering on our sensors we added this extra piece to create a more efficient and more accurate autonomous. From this piece we have been able to code a more consistent autonomous that we have been working on by our coders Juan and Alex. As the center of our robot would be the most accurate place we have decided to mount it there.

Log #34
1/26/22

Most of the day Ryan worked on practicing driving the skills bot. We checked to see if the bot was in the correct spacing, but apparently someone added too many spacers in-between the attachment between the lift and the claw so that had to be fixed. It wouldve been out of spec if we didnt check. Other than that we tested out the main bot but found a leak in the tubing. We had to figure that out and make the tubing longer because it was restricting the lift from moving all the way up. We also added the auton to the skills bot and it should be able to score 80 pts.



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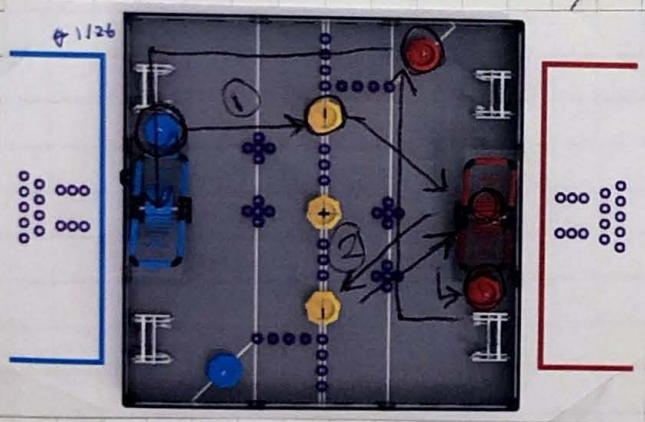
TITLE Skills Competition Strategy **PROJECT**

Continued from page

Our skills competition strategy for the driver and autonomous skills runs will involve recordable autonomous. When we are able to clock in our maximum feasible score, we can duplicate that in autonomous after recording it. Our ideal run path will be minimizing exess movement to stack goals directly onto a balanced platform. our run will end by possessing two mobile goals and parking on an empty platform. The biggest obstacle to avoid in our runs are the rings, which we will do by pushing the rings out of our drive pathe before going for game objects. Our full drive path is detailed below.



① Grab Alliance Mogo & balance red platform

② Grab neutral mogo & stack neutral & alliance on red

③ Grab both red Mogos & Park on blue platform

Continued to page

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DATE 1/26

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DATE 1/26

TITLE Calander (January 2022)

PROJECT

January 2022 3050B

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1
2	3	4	5 2:45-6:00 meeting	6	7 2:45-6:00 meeting Finish Base	8 9:00-12:00 meeting
9	10	11	12 2:45-6:00 meeting Finish Wiring	13	14 2:45-6:00 meeting	15 9:00-12:00 meeting Finish Tubing
16	17	18	19 2:45-6:00 meeting	20	21 2:45-6:00 meeting Finish CAD	22 9:00-12:00 meeting Finish skills claw
23	24	25	26 2:45-6:00 meeting Drivers practice	27	28 2:45-6:00 meeting Drivers practice	29 Rolling Robots Skills Comp
30	31					

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TITLE Documentation Log #21 PROJECT

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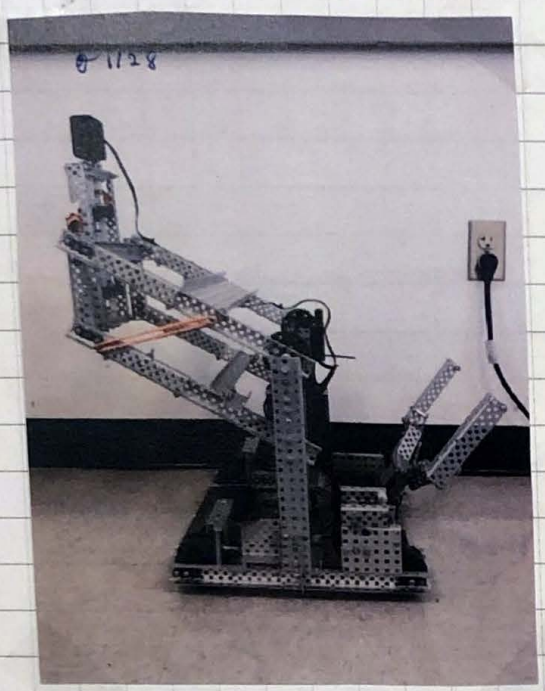
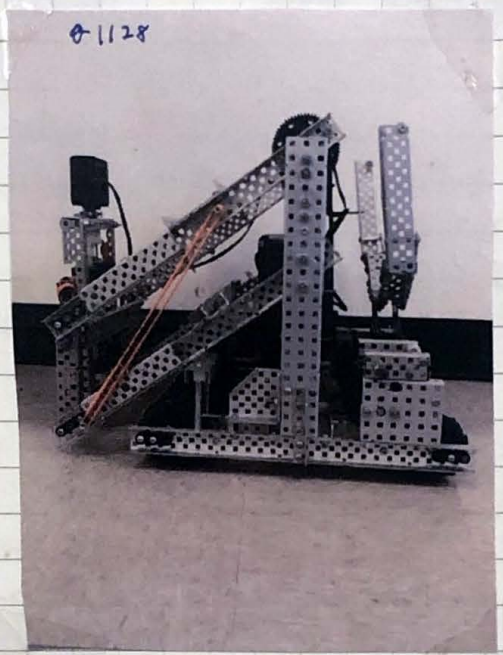
Log #35
1/28/22

The gap spacing in the middle of the bot will be where the intake will be. It is a conveyer that intakes rings in the back of the bot and disposes it in the front onto a lower branch of a mobile goal that we picked up. Since the mobile goal is picked up at an angle, it should be able to reach the area for the donuts to drop.





We want the skills bot to be reliable on the auton and it could theoretically score up to 80pts. The bot itself has the ability to pick up 2 mobile goals at the same time. The front is a claw that picks up the goals by the center branch. It reaches high enough to place the goals on the platform from the ground. The back is a simpler design and it picks up the goals by the bottom. Meanwhile we use the front claw to drop the platform for us to drive onto it.

Continued to page

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DATE 1/28

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PROPRIETARY INFORMATION

TITLE Rolling Robots Skills Competition (1/20) **PROJECT**

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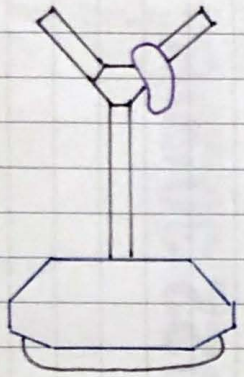
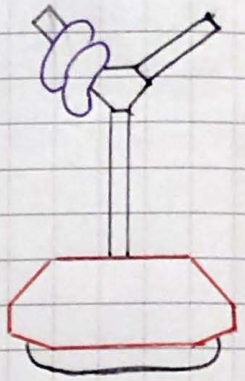
ROLLING ROBOTS SKILLS TOURNAMENT #1



RUNS	AUTON	POINTS
1	40	160
2	20	120
3	80	~~130~~ 230



In this rolling robot competition we had a few different strategys we decideed to work out during practice a few weeks before our competition. As we got closer to the competition we decideed to narrow down our routes on the field to work out the least route with the most points obtainable with the least amount of time to travel between mobile goals. As we testeed with our robots. Our drivers were able to come up with the strategy of pushing the 4 mobile goals using a zig-zag route to optimize our time using the zig-zag route allowed us to obtain a total of 80 points in our skills rounds at this competition. We were able to get consistant results from a few weeks of driving and testing. With all our testing our 3050B was able to gain 3rd place at this competition.

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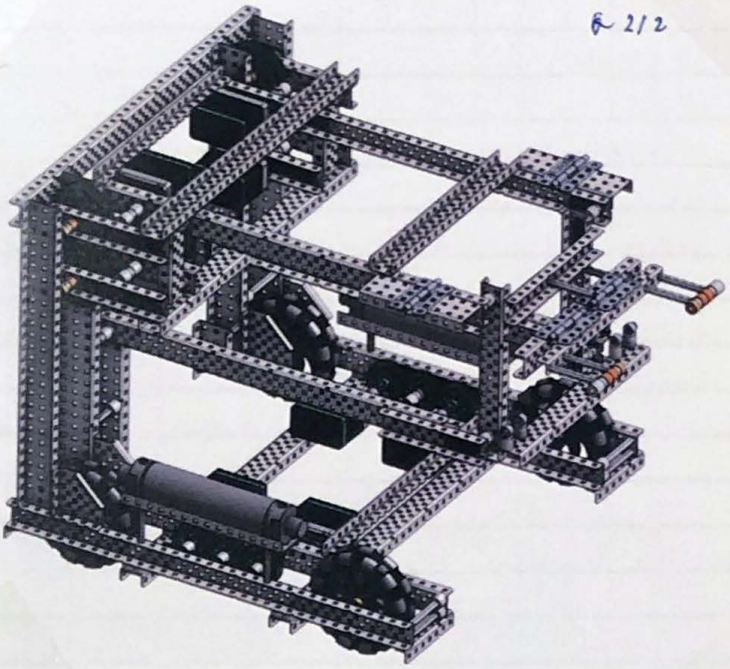
DATE 11/29

TITLE competition Bot CAD

PROJECT

Continued from page

First, the team decided and researched what design was wanted. Then, using the program OnShape, the structure was built. The structure of the base was built, then the lift and the lift and the base were connected. The metal structure was completed so the axels, wheels, gears, chain, and pneumatics was added. There was lots of trial and error on structuring everything because some pieces did not fit as expected.



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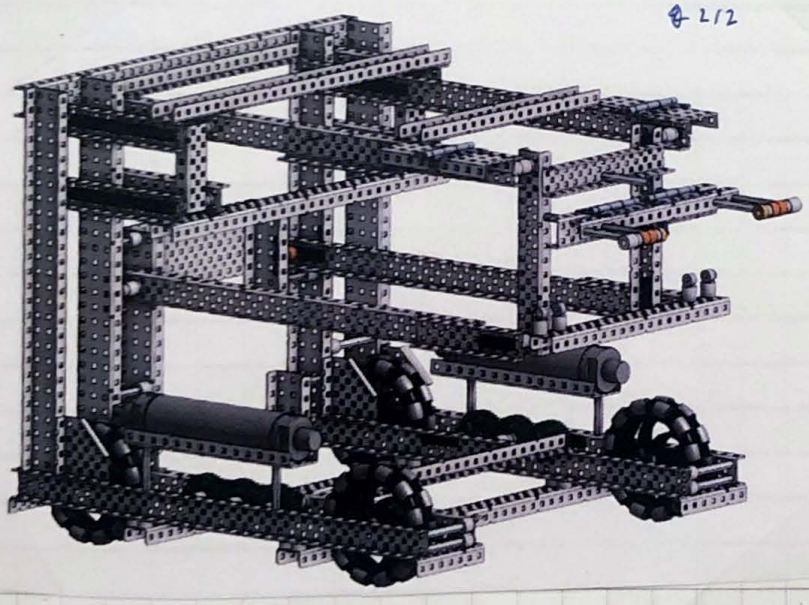

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Hannah Holdem

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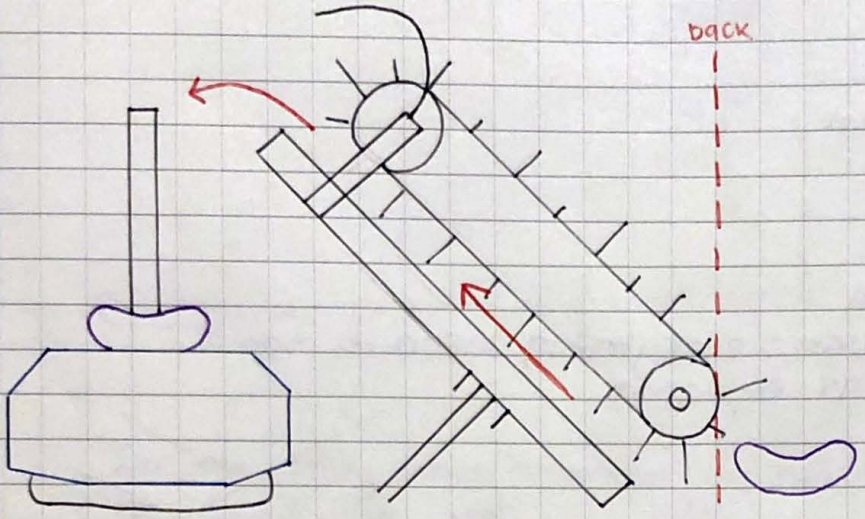
PROPRIETARY INFORMATION

TITLE Documentation Log #22 **PROJECT**

Continued from page

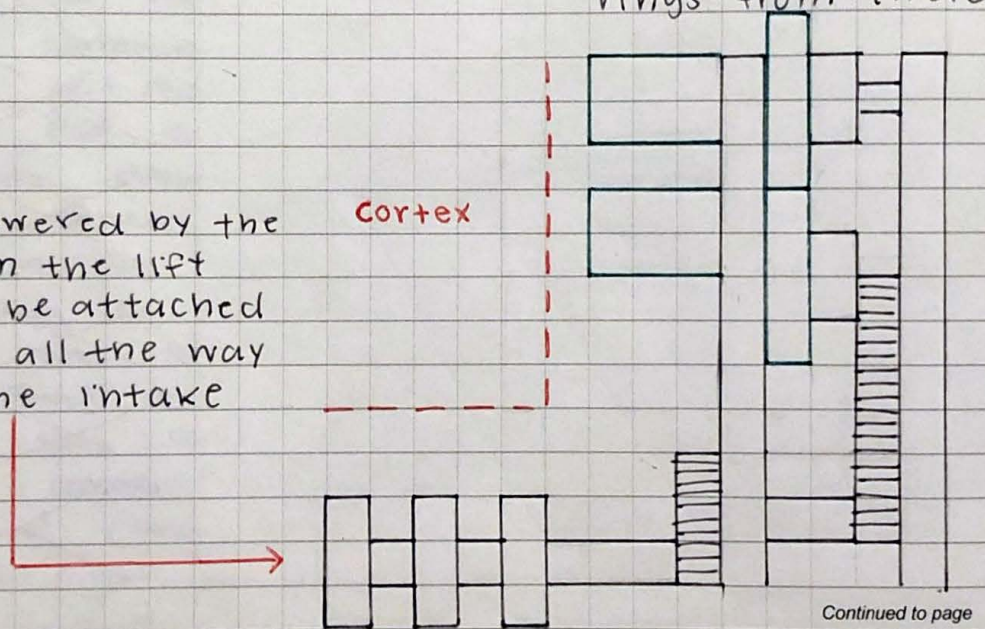
Log#36
2/2/22

We wanted to design a ring intake in the middle of the bot so that we could place the rings on the mobile goal that we'll pick up in the front. It will be connected to a motor from the lift where the bot will have a lock code to differentiate the movement from the intake and lift.



The design is almost exactly like the tray design from tower takeover except for a few tweeks to fit our bot. Theoretically, when the pnuematics claw grabs a mobile goal, it will bring it to the tray + transfer the rings from there.

It will be powered by the motors from the lift which will be attached by chains all the way down to the intake



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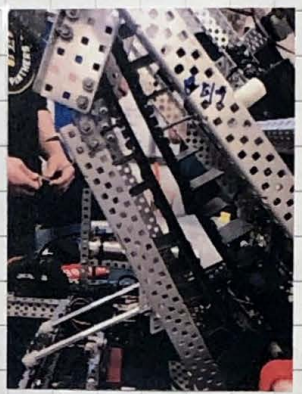
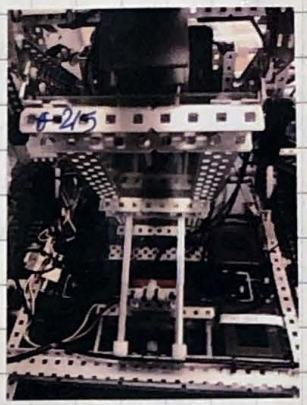
TITLE Documentation Log # 23 PROJECT

Continued from page

Log # 37
2/4/22

We figured that since the intake was having trouble w/ taking in the rings then we would add in a funneling of plexi-glass so that the rings wouldn't get stuck & smoothly move from one place to another. We also practiced driving the bot and finished the intake/tray. There were also some plans to make a hook that would extend during auton and grab 2 mobile goals and bring it back to our zone.





Log # 38
2/5/22

Most of the day was spent in preparation for the comp tomorrow at Rolling Robots. That means go over the packing list, look over the scouting, practice driving, and filling in entries. We also did some last minute scouting.

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TITLE Precompetition Bot **PROJECT**

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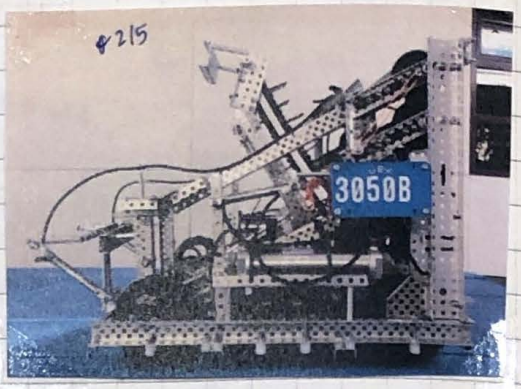
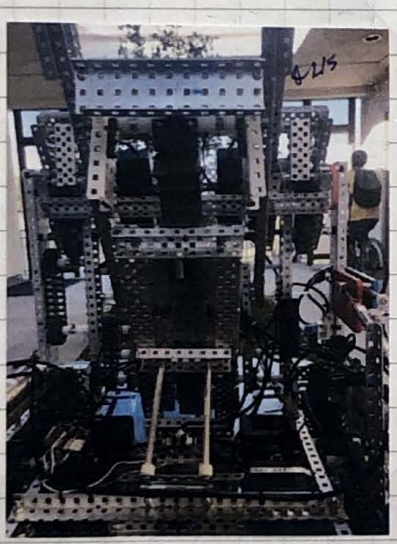
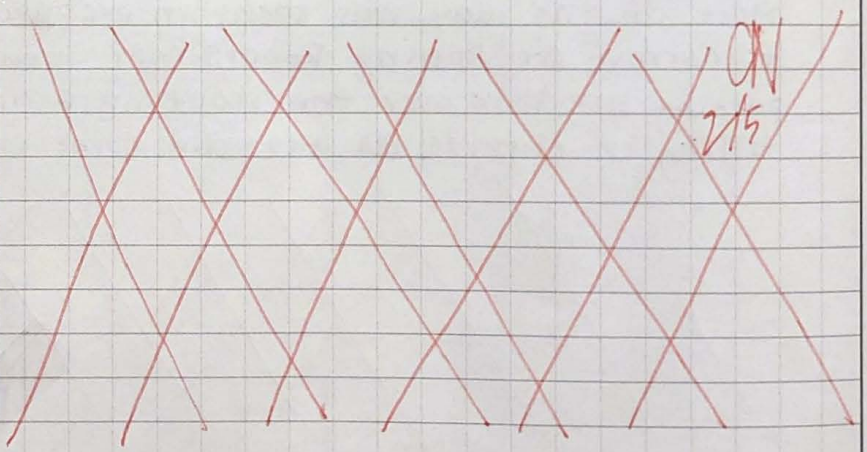
The competition bot is ready and completed for the event tommorow. The vast majority of our system are tested an in working order for tomorrow's competition. These tested subsystem include the base, the litt, and the Intake. The untested subsystems include the kickstands and the wings. Coming into this event we have confidence in our basic systems like our litt and our Intake as well as our Claw/Clamp.



Our strategy entering this event is to grab a nuetral mobile goal and place it into the courner. We should then be grabbing a alliance mobile goal and loading it with rings. Placing this alliance goal ontop our of plat form then will not allow the opposing alliance to tip the platform as they run the risk of descoring rings, an automatic Disqualification.

As of now we are capable of holding one mobile goal and placing it ontop of the plat form from the ground level. We are also able to score rings on alliance mobile goals & we are able to climb onto platform with our robot with one mobile goal.





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SIGNATURE Ciacan Nemick DATE 2/5

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TITLE Pre-Comp Scouting (1) PROJECT

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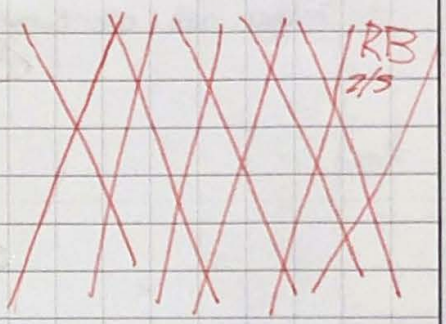
In preperation of the Rolling Robots competition on February 6th, we did an extensive amount of scouting. There was a variety of of competitive teams with an extensive match histories and diverse skill sets. A few teams that we made a point to look out for were:

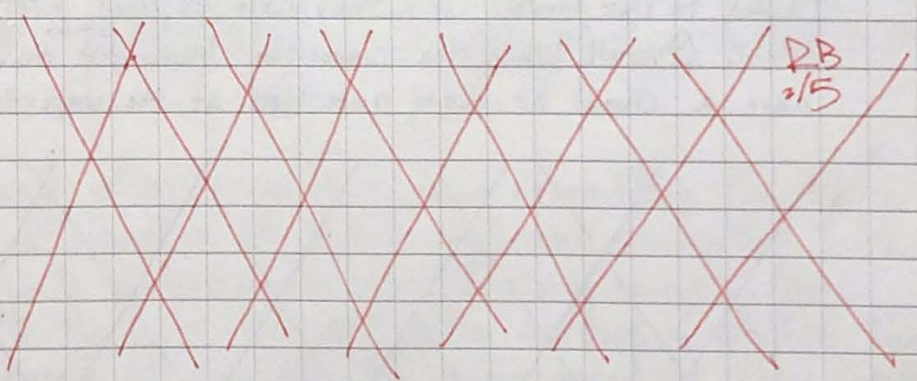
847X:

This highschool team has attended OC Robo Bonanza and placed nineteenth out of 34 teams. While they have not won any awards, nor have they placed in World skill ranking, their robot boasts a highly efficient ring intake, and a lock-on grip to mobile goals.



884B:

This highschool team has attended many prior competitions and performed extremely well. Not only did this team place top 10 in their comps, and even winning exellence, but they are also 89th in the World Skills Ranking.



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PROPRIETARY INFORMATION

TITLE Pre - Comp Scouting (2) **PROJECT**

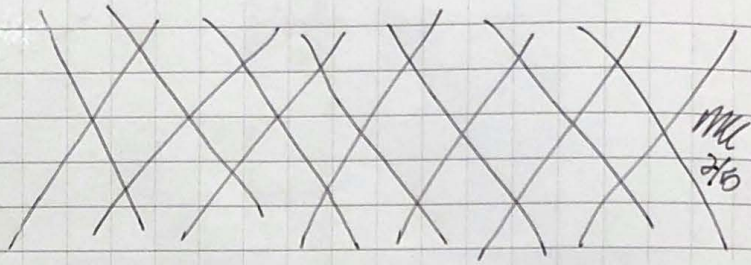
Continued from page

884A:

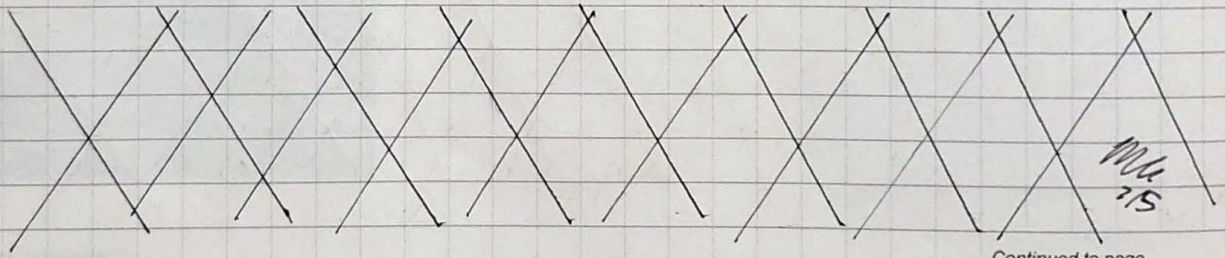
This High School team has attended multiple events including Mt SAC, The Orange County Robo Bonaza, and the excalibur Robotics Challenge. While they place mid feild in these events they currently have the 5th highest skills score in the world. Therefor They are a team to be on the lookout for.

742X:

This High school team has attended multiple events including Mt. SAC & The excalibur Rotics challenge. They have placed high in these tough events. In the Mt. SAC competition they placed 9th and in the Excalibur Robotics challenge they placed 11th. They have also won Judges and are currently placed 782nd on the World skill Ranking.



The majority of the other teams have either not been to an event this year or ~~have not been to an event this year.~~ are not listed in the list of teams on the event list. We are expecting 7700 (Rolling Robots) and 6201A (Sea kings) due to the fact they are local and we have talked to their mentors and they have expressed interest in joining the event. Overall, While the competition looks ~~hard~~ stiff we belive that we have a chance of doing quite well at the competition tomorrow.



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PROPRIETARY INFORMATION

TITLE Recordable Autonomous **PROJECT**

Continued from page

Recordable autonomous (RecAuton) refers to the practice of recording driver inputs in real time, saving them, and then playing them back under identical conditions. The goal is for the robot to do exactly what it did when recording. This can be implemented in a variety of ways, below is detailed roughly how we implemented it.

The first step in recording an input is to load the state of both controllers into an array we call instInputs. inst stands for instantaneous.

Next, this array is used to increment a series of std::vectors, which we opted to use because of their variable heap storage size and ability to be lengthened during runtime. This series of vectors will continue to grow until the recAuton record loop exits. The vector elements are signed 8-bit integers, with range -127→127. This is ideal as motor voltages are also set on a -127→127 scale. Most vector elements refer to controller buttons however, and only need to be a 1 or 0.

In this table, vectors go top to bottom, int array goes left to right.

⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
91	0	85	0	0	1	0	0	0	0	0	0	1	0	0	127	0	127	0	0	1	0	0	0	1	0	0	0
108	0	105	0	0	1	0	0	0	0	0	0	1	0	0	127	0	127	0	0	1	0	0	0	1	0	0	0
127	0	125	0	0	1	0	0	0	1	0	0	1	0	0	109	0	111	0	0	0	0	0	0	1	0	0	0
127	0	127	0	0	1	0	0	0	1	0	0	1	0	0	84	0	91	0	0	0	0	0	0	1	0	0	0
127	0	127	0	0	1	0	0	0	1	0	0	0	0	0	21	0	25	0	0	0	0	0	0	1	0	0	0
127	0	127	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

instInputs[28] write head Vector indexes, 0 to 27

If the SD card is accessed after recording, data resembling the above table can be found in at least of of the 6 program generated files. When the robot is put into autonomous mode during competition, the file corresponding to the user-selected auton routine is loaded. The values are then processed at exactly the same speed as they were recorded, resulting in, theoretically, a perfect recAuton.

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SIGNATURE Jason Wiemels DATE 2/5

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TITLE RecAuton Record Loop PROJECT

```
void recordLoop(void * param) {
    int startTime = pros::millis();
    char countdown[20];
    sprintf(countdown, "press A");
    master.set_text(1, 1, countdown);
    while (pros::millis() < startTime + 15000) {
        if (master.get_digital(DIGITAL_A)) {
            break;
        }
        pros::delay(20);
    }

    sprintf(countdown, "recording");
    master.set_text(1, 1, countdown);
    startTime = pros::millis();
    int duration;
    if (selection == 6) {
        duration = 60000;
    }
    else {
        duration = 15000;
    }

    // right y cord, left y cord, lateral x
    double cords[] = {0.0, 0.0, 0.0};
    int index = 0;
    while (pros::millis() < startTime + duration) {
        index++;
        mutex.take(5);
        trackSpeed(&cords[0]);
        recordInput(index, &instInputs[0], &cords[0]);
        mutex.give();

        pros::delay(20);
    }

    master.clear_line(1);
    char filename[20];
    sprintf(filename, "/usd/RecAuton%i.txt", selection);
    writeToFile(filename);
    clearVectors();
    finishRecording();
}
```

Driver is prompted by controller LCD

input from master controller causes wait loop to exit

Driver can be certain of wait loop ending

duration is in milliseconds
60000 for skills
15000 for auton phase

odometry information

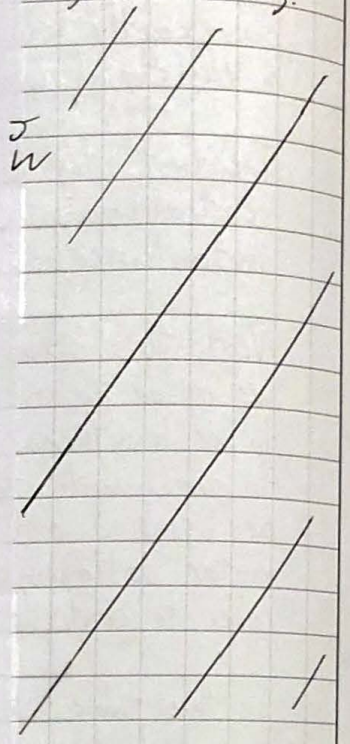
← mutex obtained

← mutex relinquished

Controller LCD is cleared

Filesystem helpers called here

User input by the driver required to begin recording.



← true loop beginning

Record loop is multithreaded, so Mutex is required

Data is written to SD card immediately following recording.

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SIGNATURE Jason Wimmler DATE 2/5

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TITLE Filesystem Helpers PROJECT

```
vector<vector<int>> vectors;
vector<vector<double>> cordVectors;

void recordInput(int index, int * instInputs, double * cords)
    vectors[0].push_back(index);
    for (int x = 0; x < 28; x++) {
        vectors[x + 1].push_back(instInputs[x]);
    }
}

bool readFromFile(const char * filename) {
    clearVectors();
    ifstream infile(filename);
    string buffer;
    getline(infile, buffer);
    cout << buffer << endl;
    if (buffer == "none") {
        return false;
    }
    string line;
    while (getline(infile, line)) {
        stringstream ss(line);
        for (int x = 0; x < 29; x++) {
            int temp;
            ss >> temp;
            vectors[x].push_back(temp);
        }
        for (int y = 0; y < 3; y++) {
            double temp;
            ss >> temp;
            cordVectors[y].push_back(temp);
        }
    }
    infile.close();
    return true;
}
```

RecAuton Datastructures

Data from vectors is returned as int array

Data from SD card is held in std::string buffer

Data is parsed 1 line at a time

signifies file was empty

loop runs till end of infile

buffer is parsed into vectors

cordVectors hold odometry information in doubles

signifies file was read successfully

Continued to page

SIGNATURE Jaxon Wiemuke DATE 2/5

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TITLE RecAuton Playback Loop PROJECT

```
extern int selection;
extern pros::Mutex mutex;
bool recAutonActive;

void recordableAuton() {
    recAutonActive = true;
    pros::Task recAutonThread(recAutonLoop);

    while (true) {}
}

void recAutonLoop(void * param) {
    std::cout << "recAutonLoop started" << std::endl;
    char filename[20];
    sprintf(filename, "/usd/RecAuton%i.txt", selection);
    readFromFile(filename);

    int interations = getVectorSize();
    int recOutputs[28];

    double cords[3];
    int starttime = pros::millis();
    if (interations > 0) {
        for (int index = 0; index < interations; index++) {
            updateVecs(index, &recOutputs[0]);
            updateLocation(index, &cords[0]);

            mutex.take(25);
            courseCorrect(index, &recOutputs[0], &cords[0]);

            processInput(&recOutputs[0]);
            mutex.give();

            pros::delay(20);
        }
    }
}
```

brings mutex into scope

This function is called when the competition switch is flipped

Begin thread then wait till autonomous phase ends

Data read from file before loop begins

Iterations is 15000 for auton phase, 60000 for skills

Vectors are read and then processed here.

The same function that is called during opControl

20 ms delay, same as when recording

The theoretical result of the above playback is the same behavior by the robot that the driver recorded. The timings are kept exactly the same to maximize the accuracy of the playback.

Continued to page

SIGNATURE Jason Wimels DATE 2/5

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TITLE Read from Controller PROJECT

```
void readController(int * instInputs) {
    instInputs[0] = master.get_analog(ANALOG_RIGHT_X);
    instInputs[1] = master.get_analog(ANALOG_RIGHT_Y);
    instInputs[2] = master.get_analog(ANALOG_LEFT_X);
    instInputs[3] = master.get_analog(ANALOG_LEFT_Y);

    if (master.get_digital(DIGITAL_R1)) instInputs[4]++;
    if (master.get_digital(DIGITAL_R2)) instInputs[4]--;
    if (master.get_digital(DIGITAL_L1)) instInputs[5]++;
    if (master.get_digital(DIGITAL_L2)) instInputs[5]--;

    instInputs[6] = master.get_digital(DIGITAL_UP);
    instInputs[7] = master.get_digital(DIGITAL_DOWN);
    instInputs[8] = master.get_digital(DIGITAL_LEFT);
    instInputs[9] = master.get_digital(DIGITAL_RIGHT);

    instInputs[10] = master.get_digital(DIGITAL_X);
    instInputs[11] = master.get_digital(DIGITAL_B);
    instInputs[12] = master.get_digital(DIGITAL_Y);
    instInputs[13] = master.get_digital(DIGITAL_A);

    instInputs[14] = partner.get_analog(ANALOG_RIGHT_X);
    instInputs[15] = partner.get_analog(ANALOG_RIGHT_Y);
    instInputs[16] = partner.get_analog(ANALOG_LEFT_X);
    instInputs[17] = partner.get_analog(ANALOG_LEFT_Y);

    if (partner.get_digital(DIGITAL_R1)) instInputs[18]++;
    if (partner.get_digital(DIGITAL_R2)) instInputs[18]--;
    if (partner.get_digital(DIGITAL_L1)) instInputs[19]++;
    if (partner.get_digital(DIGITAL_L2)) instInputs[19]--;

    instInputs[20] = partner.get_digital(DIGITAL_UP);
    instInputs[21] = partner.get_digital(DIGITAL_DOWN);
    instInputs[22] = partner.get_digital(DIGITAL_LEFT);
    instInputs[23] = partner.get_digital(DIGITAL_RIGHT);

    instInputs[24] = partner.get_digital(DIGITAL_X);
    instInputs[25] = partner.get_digital(DIGITAL_B)
    instInputs[26] = partner.get_digital(DIGITAL_Y);
    instInputs[27] = partner.get_digital(DIGITAL_A);
}
```

The purpose of this function is to "package" all possible controller inputs into a single integer array of length 28.

JW

Continued to page

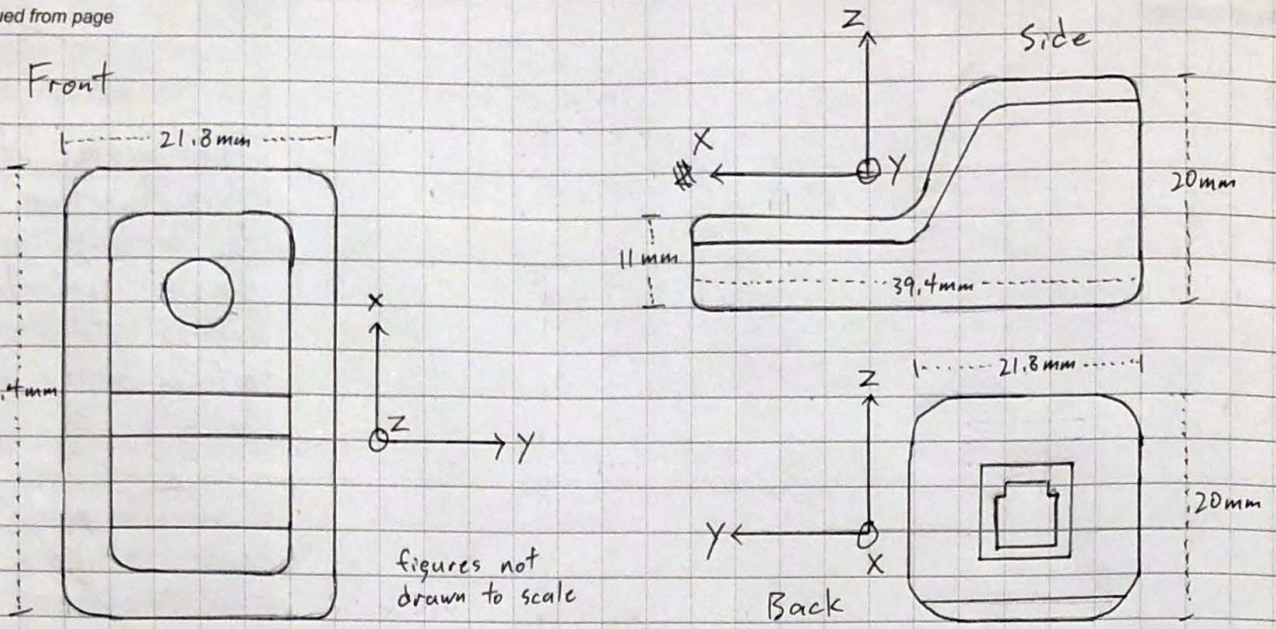
SIGNATURE Jason Wiemke DATE 2/5

DISCLOSED TO AND UNDERSTOOD BY [signature] DATE 2/5

PROPRIETARY INFORMATION

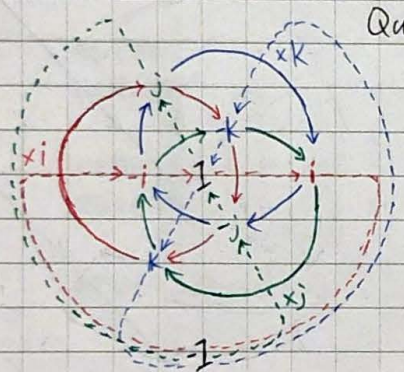
TITLE Inertial Sensor **PROJECT**

Continued from page

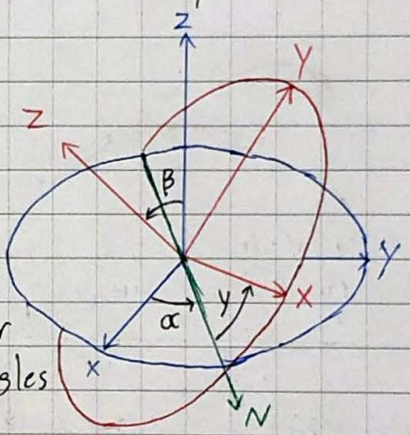


The Inertial Sensor contains an accelerometer and a gyroscope, both operating in 3 dimentions. The accelerometer measures linear motion, ex. side to side or up and down. The gyroscope measures rotation about the 3 axes relative to a fixed starting orientation. Testing has confirmed the gyroscope to be highly reliable, while the accelerometer should only be used secondarily to other forms of displacement measuring.

Quarternion



Quarternions are, in short, three dimentional imaginary numbers. Fast for computers but hard for humans to understand.



Euler Angles

Euler Angles are easy to read by humans but slower for computers. They also suffer from gimbal lock, which can be catastrophic.

Continued to page

SIGNATURE Jaron Wiemke DATE 2/5

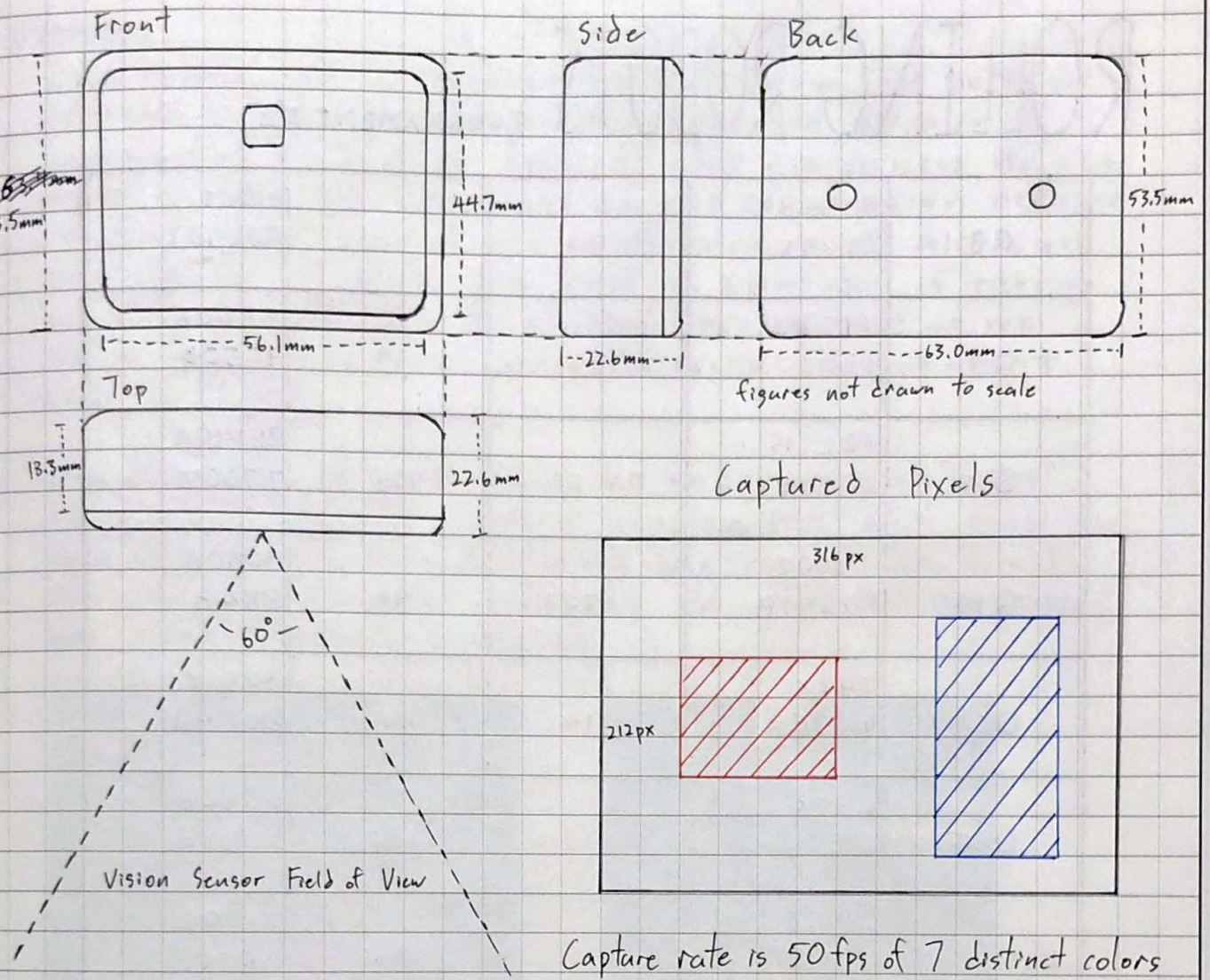
DISCLOSED TO AND UNDERSTOOD BY DATE 2/5

PROPRIETARY INFORMATION

TITLE Vision Sensor

PROJECT

Continued from page



figures not drawn to scale

Capture rate is 50 fps of 7 distinct colors

The Vex Vision Sensor enables computer vision and object detection by the robot. This sensor is the only one capable of distinguishing a colored object's location for an autonomous operation. As exact pixel dimentions can be used to calculate an object of known size's distance, this sensor is effective in guiding an autonomous route towards a mobile goal. Testing has proven the sensor can reliably find distance and displacement. Further testing and implementation is becoming a major focus for the team's programmers.

Continued to page

SIGNATURE Jason Wiemels

DATE 2/5

DISCLOSED TO AND UNDERSTOOD BY [illegible]

DATE 2/5

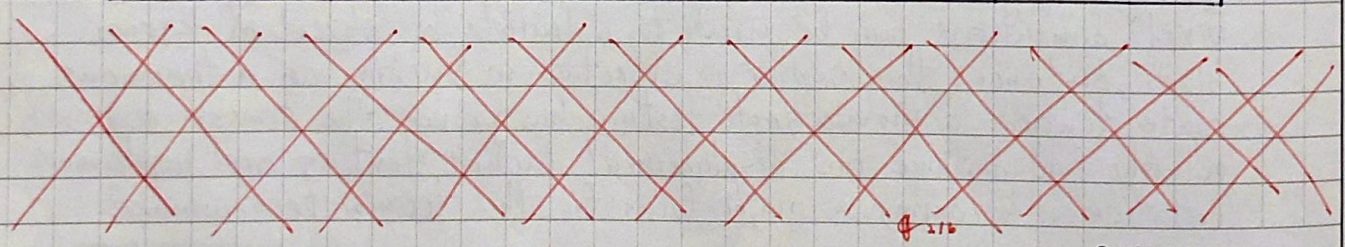
PROPRIETARY INFORMATION

TITLE Rolling Robots Competition (2/6) PROJECT

Continued from page

ROLLING ROBOTS TOURNAMENT #2

Q3	3050B 2969X	44	123	2150S 90241T
Q7	742X 53000X	176	79	7700E 3050B
Q16	90241S 3050B	102	120	96140A 7700Z
Q19	7700Z 90241B	170	46	3050B 884B
Q27	742X 7700R	216	56	3050B 8054A
Q30	847X 2150C	125	124	3050B 2150A
R16 8-1	2150C 7700C	110	114	2150D 3050B
QF 4-1	884A 884B	166	41	2150D 3050B



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SIGNATURE

DATE 2/6

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DATE

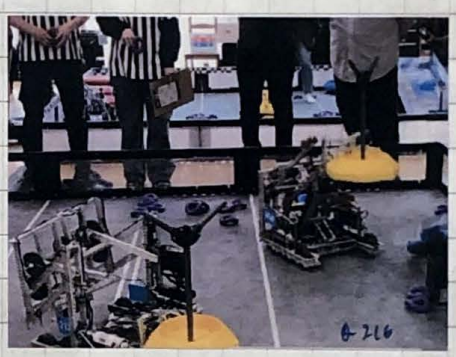
TITLE Rolling Robots Competition (2/6) PROJECT

Continued from page

OVERALL:

Even though this competition didn't show our best, we learned a lot. First, we need to improve on our communication because everyone was everywhere. We also had to take off the wings at the competition because it got in the way of the base working. We also saw that a lot of other bots used a stratagy of taking all the mobile goals at the last minute so we have to come back and redesign to out-beat this stratagy.

Overall, when we come back to the room, we want to build a second mobile lift on the bot and stop focusing on intaking the rings too much. We also wanted to improve on the auton and get more drivers practice



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DATE 2/6

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DATE

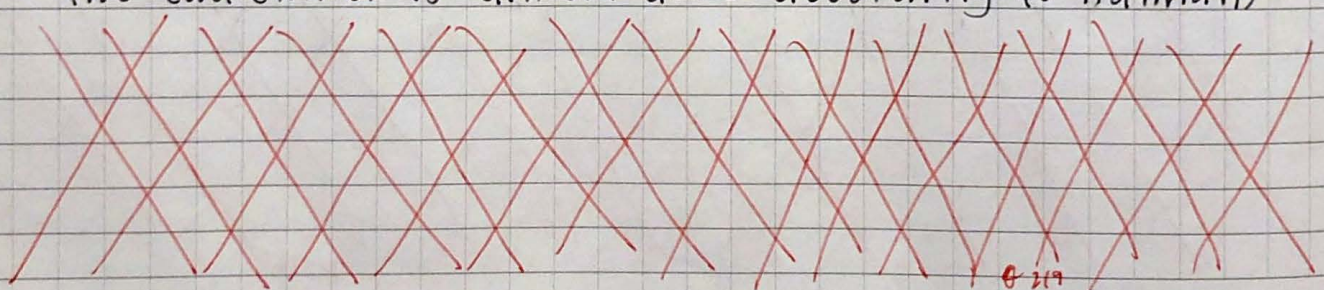
PROPRIETARY INFORMATION

TITLE Documentation Log #24 PROJECT

Continued from page

Log #39
2/9/22

At the competition we noticed that our bot wasn't fast enough during auton. Other teams were able to recieve the mobile goal faster so we were thinking we make a kickstand underneith the bot so that we get a 4inch head start. We'll use a 12tooth gear to push us. There were also thoughts on moving the lift foward to make more space for the second mobile lift that we are planning to put in the back. We also think that moving the motors (on the lift) outside so that we could make more room for the redesign of the tray inside. It was also suggested that we use torque motors so that instead of 4 there would be 2 motors on the lift. Also, maybe change the base to 1:2 gear ratio or 3:5 for increased speed. For the intake's design Ryan suggests that we put it in the front, move the lift foward, and add another mobile lift in the back. Drew suggests that we keep the original design for the intake and build on what we currently have. Ultimitly it has been decided that we'll go with Ryans design, although, it will take us longer to finish. Other than that, Jason suggests that we use a PID loop to get the the neutral goals faster. He's going to do testing on our skills bot and work on that. Ciarian will do a scematic drawing of the possible pneumatic's layout and finish up the cad (which is almost done according to Hannah)



2/9

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SIGNATURE [signature] DATE 2/9

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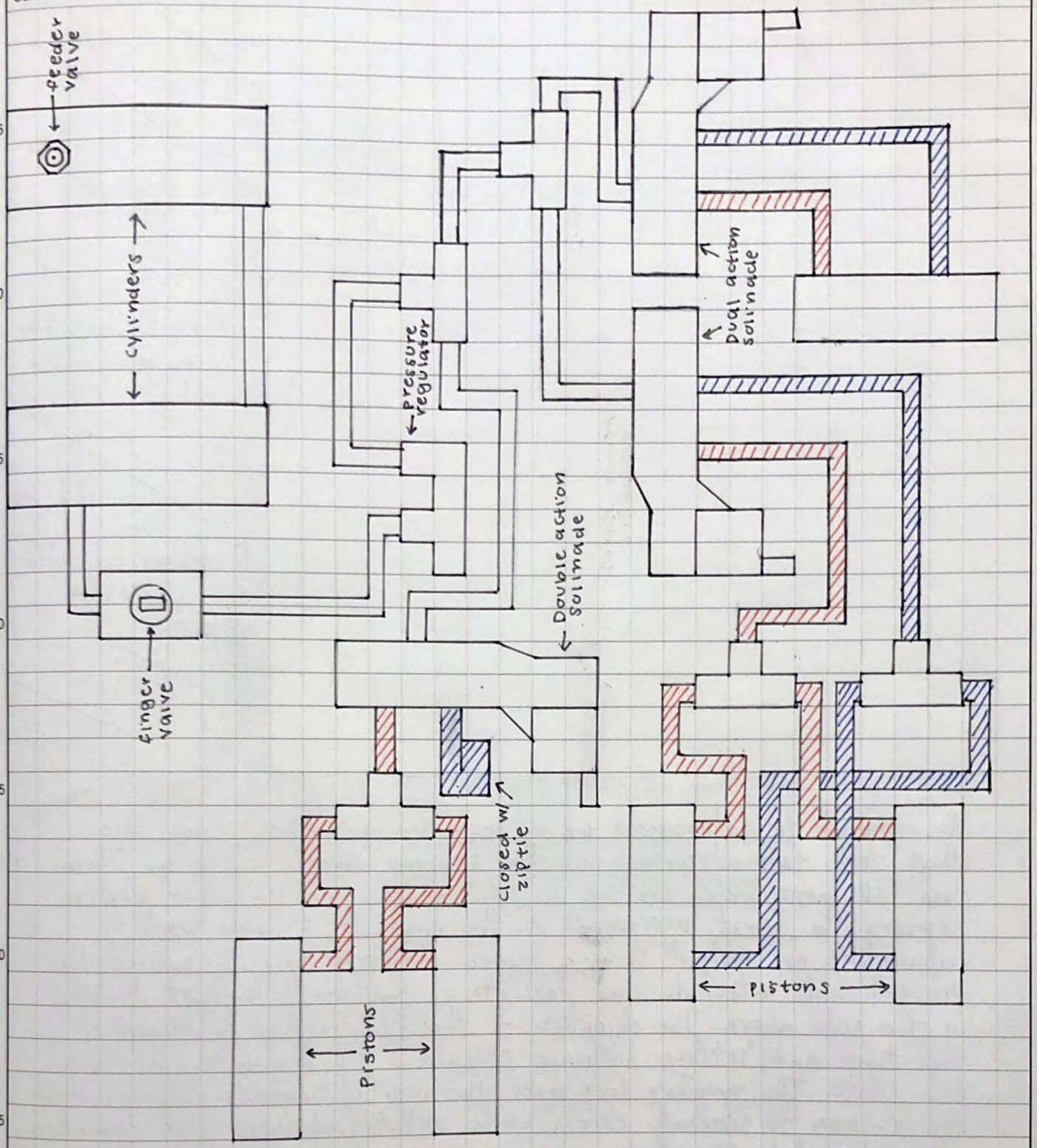
TITLE Pneumatics Layout PROJECT

Continued from page



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SIGNATURE

DATE 2/9

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DATE 2/9

TITLE Gyro PID **PROJECT**

```
void gyroTurn(int turnAngle, int time) {

    while (intertialSensor.is_calibrating()) {
        pros::delay(5);
    }                                   Wait until done calibrating

    intertialSensor.set_rotation(0);    reset inertial sensor
                                        rotation point of reference
    double error = turnAngle;
    double pidSpeed, derivitive, totalError, previousError = 0.0;
    float p = 3.0;
    float i = 0.1;                      values for P, I, D obtained
    // float i = 0.01791;               through trial and error
    float d = 0.012;

    for (int x = 0; x < time; x += 20) {
        error = fabs(turnAngle) - fabs(intertialSensor.get_rotation());
        totalError += error * 0.02;
        derivitive = (error - previousError) / 0.02;

        int direction;                  Direction extracted
        if (turnAngle > 0) direction = 1;
        else direction = -1;

        pidSpeed = p * error + i * totalError + d * derivitive;

        frontRightDriveMotor.move_velocity(-direction * (pidSpeed * 200));
        frontLeftDriveMotor.move_velocity(direction * (pidSpeed * 200));
        backRightDriveMotor.move_velocity(-direction * (pidSpeed * 200));
        backLeftDriveMotor.move_velocity(direction * (pidSpeed * 200));

        previousError = error;          Save error for next loop
        pros::delay(20);
    }
    chassisStopDrive(pros::E_MOTOR_BRAKE_BRAKE);
}
```

JW Math for magnitude done in absolute values

Direction re-added and scaled for velocity

SW

An approach to autonomous we've neglected until now was one that took full advantage of the sensors available to us. These two PID loops were written to utilize the inertial and vision sensors to direct movement of the robot. PID loops work by calculating an output from a source of error and 3 values, the proportional, integral, and derivetive. The math is best described in the code above. The objective of the PID loop is to minimize the time and "settling distance" required to reach a desired end state. The gyroTurn loop uses the inertial sensor's rotation about the x-axis to generate error, while visPathfind uses the dimentions of a detected signature.

Continued to page

SIGNATURE Jaeun Lhimele DATE 2/12

DISCLOSED TO AND UNDERSTOOD BY DATE 2/12

TITLE Vision PID

PROJECT

```
void visPathfind(int sig, int time) {

    if (sig == 1) visionSensor.set_led(COLOR_RED);
    else if (sig == 2) visionSensor.set_led(COLOR_TEAL);
    else if (sig == 3) visionSensor.set_led(COLOR_GREEN);

    int turn_Error = 160;
    double turn_PidSpeed, turn_Derivitive, turn_TotalError, turn_PreviousError = 0.0;
    float turn_P = 0.7;
    float turn_I = 0.18;
    float turn_D = 0.05;

    int dist_Error = 250;
    double dist_PidSpeed, dist_Derivitive, dist_TotalError, dist_PreviousError = 0.0;
    float dist_P = 1.2;
    float dist_I = 0.15;
    float dist_D = 0.01;

    for (int x = 0; x < time; x += 20) {

        pros::vision_object_s_t object = visionSensor.get_by_sig(0, sig);

        if (object.signature != 255 && object.width > 10) {

            turn_Error = 160 - object.x_middle_coord;
            turn_TotalError += turn_Error * 0.02;
            turn_Derivitive = (turn_Error - turn_PreviousError) / 0.02;
            turn_PidSpeed = turn_P * turn_Error + turn_I * turn_TotalError
                            + turn_D * turn_Derivitive;

            dist_Error = 250 - object.width;
            dist_TotalError += dist_Error * 0.02;
            dist_Derivitive = (dist_Error - dist_PreviousError) / 0.02;
            dist_PidSpeed = dist_P * dist_Erro + dist_I * dist_TotalError
                            + turn_D * turn_Derivitive;

            turn_PreviousError = turn_Error;
            dist_PreviousError = dist_Error;

            frontRightDriveMotor.move_velocity(turn_PidSpeed + dist_PidSpeed);
            frontLeftDriveMotor.move_velocity(-turn_PidSpeed + dist_PidSpeed);
            backRightDriveMotor.move_velocity(turn_PidSpeed + dist_PidSpeed);
            backLeftDriveMotor.move_velocity(-turn_PidSpeed + dist_PidSpeed);
        }
        else {
            frontRightDriveMotor.move(0);
            frontLeftDriveMotor.move(0);
            backRightDriveMotor.move(0);
            backLeftDriveMotor.move(0);
        }
        pros::delay(20);
    }
    visionSensor.set_led(COLOR_WHITE);
}
```

set vision sensor LED to correct color

values obtained from trial and error

values obtained from trial and error

math for turn vector

math for distance vector

save error for next loop

turn and distance vectors combined

reset LED color to white

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SIGNATURE Jaron Wiemke DATE 2/12

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

PROPRIETARY INFORMATION

TITLE LCD draw functions PROJECT

Continued f

```
void drawAuton() {
    resetDatastructures();
    lv_scr_load(autonScreen);
    lv_obj_t * buttons[7];

    buttons[0] = createBtn(lv_scr_act(), 45, 10, 100, 50, 100, "1", redBtnStyle);
    buttons[1] = createBtn(lv_scr_act(), 335, 10, 100, 50, 101, "2", blueBtnStyle);
    buttons[2] = createBtn(lv_scr_act(), 45, 68, 100, 50, 102, "3", redBtnStyle);
    buttons[3] = createBtn(lv_scr_act(), 335, 68, 100, 50, 103, "4", blueBtnStyle);
    buttons[4] = createBtn(lv_scr_act(), 45, 126, 100, 50, 104, "5", redBtnStyle);
    buttons[5] = createBtn(lv_scr_act(), 335, 126, 100, 50, 105, "6", blueBtnStyle);
    menuButton = createBtn(lv_scr_act(), 20, 184, 140, 48, 0, "Menu", yellowBtnStyle);
    buttons[6] = createBtn(lv_scr_act(), 170, 184, 140, 48, 106, "Skills", yellowBtnStyle);
    recAutonButton = createBtn(lv_scr_act(), 320, 184, 140, 48, 10, "RecAuton", yellowBtnStyle);

    if (DEFAULT_RECAUTON) {
        recAuton = true;
        btnSetToggled(recAutonButton, true);
    }
    if (DEFAULT_SELECTION > -1) {
        selection = DEFAULT_SELECTION;
        btnSetToggled(buttons[DEFAULT_SELECTION], true);
        toggledBtn = buttons[DEFAULT_SELECTION];
    }

    LV_IMG_DECLARE(field_image);
    lv_obj_t * imageObj = lv_img_create(lv_scr_act(), NULL);
    lv_img_set_src(imageObj, &field_image);
    lv_obj_set_size(imageObj, 170, 170);
    lv_obj_align(imageObj, NULL, LV_ALIGN_IN_TOP_MID, 0, 8);
}

void drawRecordable() {
    resetDatastructures();
    lv_scr_load(recordScreen);

    selection = -1;
    recordableBtn = createBtn(lv_scr_act(), 0, 0, 160, 50, 211, "Record", yellowBtnStyle);
    lv_obj_align(recordableBtn, NULL, LV_ALIGN_IN_TOP_LEFT, 10, 70);

    recordableLabel = lv_label_create(lv_scr_act(), NULL);
    lv_obj_set_style(recordableLabel, &whiteShapeStyle);
    lv_label_set_text(recordableLabel, "click buttun to record");
    lv_obj_align(recordableLabel, NULL, LV_ALIGN_IN_TOP_LEFT, 10, 140);

    tempButton = createBtn(lv_scr_act(), 240, 10, 100, 50, 200, "1", redBtnStyle);
    tempButton = createBtn(lv_scr_act(), 340, 10, 100, 50, 201, "2", blueBtnStyle);
    tempButton = createBtn(lv_scr_act(), 240, 68, 100, 50, 202, "3", redBtnStyle);
    tempButton = createBtn(lv_scr_act(), 340, 68, 100, 50, 203, "4", blueBtnStyle);
    tempButton = createBtn(lv_scr_act(), 240, 126, 100, 50, 204, "5", redBtnStyle);
    tempButton = createBtn(lv_scr_act(), 340, 126, 100, 50, 205, "6", blueBtnStyle);
    menuButton = createBtn(lv_scr_act(), 20, 184, 140, 48, 0, "Menu", yellowBtnStyle);
    tempButton = createBtn(lv_scr_act(), 300, 184, 140, 48, 206, "recSkills", yellowBtnStyle);
}
```

These methods run during the initialize() once at the beginning of the program runtime. They draw buttons and other UI elements to the screen and set up callback functions. drawAuton() and drawRecordable(), more specifically, initialize and draw the screen for auton selection and auton recording.

JW

Continued to page

SIGNATURE Liam Ubernite DATE 2/12

DISCLOSED TO AND UNDERSTOOD BY Nathan Thomas DATE 2/12

TITLE LCD draw functions PROJECT

Continued f

```
void drawVisionLoop(void * param) {
    while (visionInUse) {

        int redSigs, blueSigs, yellowSigs = 0;
        int sigCount = visionSensor.get_object_count();
        int rectsSize = rects.size();

        if (rectsSize > sigCount) {
            for (int x = 0; x < rectsSize - sigCount; x++) {
                lv_obj_set_pos(rects.at(rectsSize - 1 - x), 200, 200);
                lv_obj_set_size(rects.at(rectsSize - 1 - x), 1, 1);
                lv_obj_del(rects.at(rectsSize - 1 - x));
                rects.pop_back();
                lv_obj_set_top(visionWindow, true);
            }
        }
        else if (rectsSize < sigCount) {
            for (int x = 0; x < sigCount - rectsSize; x++) {
                lv_obj_t * rect = lv_obj_create(lv_scr_act(), NULL);
                rects.insert(rects.begin(), rect);
            }
        }

        for (int x = 0; x < sigCount; x++) {

            pros::vision_object_s_t detectedObject = visionSensor.get_by_size(x);

            if (detectedObject.signature == 1) {
                lv_obj_set_style(rects.at(x), &redShapeStyle);
                redSigs += 1;
            }
            else if (detectedObject.signature == 2) {
                lv_obj_set_style(rects.at(x), &blueShapeStyle);
                blueSigs += 1;
            }
            else if (detectedObject.signature == 3) {
                lv_obj_set_style(rects.at(x), &yellowShapeStyle);
                yellowSigs += 1;
            }

            lv_obj_set_pos(rects.at(x), 145 + detectedObject.left_coord,
                           12 + detectedObject.top_coord);
            lv_obj_set_size(rects.at(x), detectedObject.width, detectedObject.height);
        }

        sprintf(textBuffer, "Red Sigs: \n%i\n\nBlue Sigs: \n%i\n\nYellow Sigs: \n%i\n\n",
                redSigs, blueSigs, yellowSigs);
        lv_label_set_text(signatureLabel, textBuffer);
        redSigs = 0;
        blueSigs = 0;
        yellowSigs = 0;

        recCount = sigCount;
        if (!visionInUse) return;
        pros::delay(20);
    }
}
```

This method is similar to the previous in structure but with a very unique purpose. It is used exclusively to debug the vision sensor. Similarities to the vision PID loop also exist as it reads data from the sensor in the same way

JW

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SIGNATURE Jason Wilmoth DATE 2/12

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

TITLE LCD onclick Action PROJECT

Continued

```
static lv_res_t btnOnclickAction(lv_obj_t * btn) {
    uint8_t id = lv_obj_get_free_num(btn);
    switch(id) {
        case 0:
            lv_obj_clean(lv_scr_act());
            diagLabel = NULL;
            if (visionInUse) visionInUse = false;
            drawMenu();
            break;
        case 1:
            lv_obj_clean(lv_scr_act());
            drawAuton();
            break;
        case 2:
            lv_obj_clean(lv_scr_act());
            drawDiag();
            break;
        case 3:
            lv_obj_clean(lv_scr_act());
            drawRecordable();
            break;
        case 4:
            lv_obj_clean(lv_scr_act());
            drawVision();
            break;
        case 10:
            if (recAuton) {
                recAuton = false;
                btnSetToggled(recAutonButton, false);
            }
            else {
                recAuton = true;
                btnSetToggled(recAutonButton, true);
            }
            break;
        default:
            if (id >= 100 && id < 112) {
                if (selection != id - 100 && toggledBtn != nullptr) {
                    btnSetToggled(toggledBtn, false);
                }
                if (recAuton) {
                    clearVectors();
                    char filename[20];
                    sprintf(filename, "/usd/RecAuton%i.txt", id - 100);
                    bool success = readFromFile(filename);
                    std::cout << "success?  " << success << " " << filename << std::endl;
                    if (!success) {
                        return LV_RES_OK;
                    }
                    printVectors();
                }

                selection = id - 100;
                toggledBtn = btn;
                btnSetToggled(btn, true);
            }
            else if (id >= 200 && id < 300) {
                if (selection != id - 200 && toggledBtn != nullptr) {
                    btnSetToggled(toggledBtn, false);
                }
                if (id == 211 && selection >= 0) {
                    clearVectors();
                    startRecordThread();
                    sprintf(textBuffer, "see controller");
                    lv_label_set_text(recordableLabel, textBuffer);
                }
                else {
                    selection = id - 200;
                    toggledBtn = btn;
                    btnSetToggled(btn, true);
                }
            }
            break;
    }
    return LV_RES_OK;
}
```

SIGNATURE Jason Wiens DATE 2/12

DISCLOSED TO AND UNDERSTOOD BY [illegible] DATE 2/12

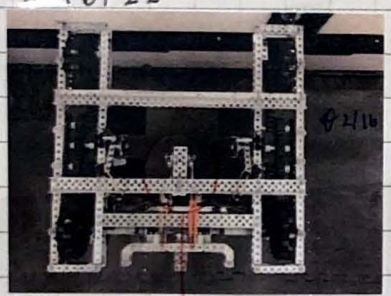
TITLE Documentation Log #25 PROJECT

Continued from page

Log #40
2/12/22

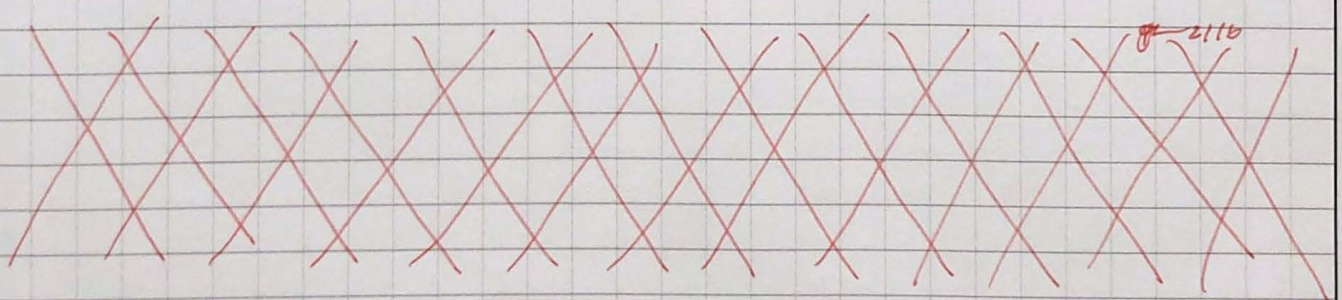
Most of the day was finalizing our plan for the building time frame. We decided that we'll use pneumatics for the lift in the back. It'll basically be like the current design that we have but smaller and more compact. Ciarian is reworking on the wings for the front since we took it off at last comp and he is designing the kickstand underneith it. We also took off 2 motors on the lift so that we could possibly use it for something else. Drew said that we'll probably use the lift less often so he thought that we wouldn't need it.

Log #41
2/16/22



Kickstand

The kickstands have been finished. Basically when the bot is stationary it has these tongs that stick out underneith and they are held with rubber bands. When the bot moves, it'll flip over the stands and push our bot outwards allowing us more time to grab the neutral goals faster. We also made the front lift thinner so that we can fit the wings to the side. We discussed judges strategy and the possibility of making a poster board.



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SIGNATURE

DATE 2/16

DISCLOSED TO AND UNDERSTOOD BY

DATE 2/16

BOOK 1 - 94 PAGE

TITLE Calander (Febuary 2022)

PROJECT

February 2022 3050B

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2 2:45-6:00 meeting Drivers Practice	3	4 2:45-6:00 meeting Drivers Practice	5 9:00-12:00 meeting Drivers practice
6 Rolling Robots Comp	7	8	9 2:45-6:00 meeting Recoup	10	11 2:45-6:00 meeting Start building Mobile lift	12 9:00-12:00 meeting Continue building
13	14	15	16 2:45-6:00 meeting Finish building Lift	17	18 2:45-6:00 meeting Build Intake	19 9:00-12:00 meeting Continue building lift
20	21	22	23 2:45-6:00 meeting Finish building lift ~open night~	24	25 2:45-6:00 meeting Turn in notebook	26 9:00-12:00 meeting
27	28					

SIGNATURE DATE 2/16

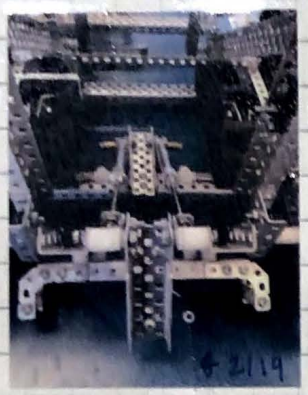
DISCLOSED TO AND UNDERSTOOD BY DATE 2/16

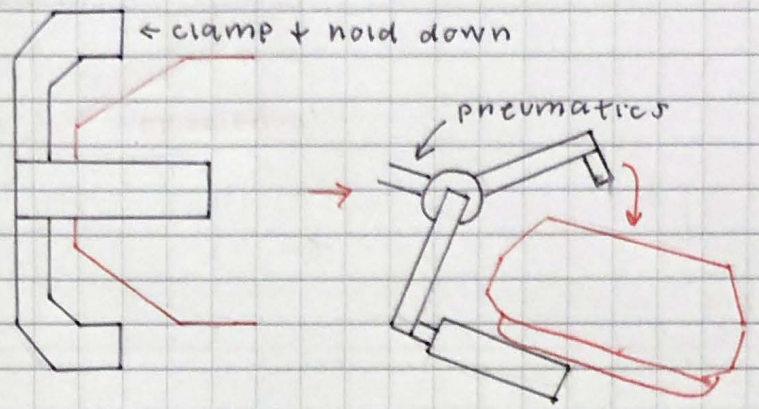
PROPRIETARY INFORMATION

TITLE Documentation Log #26 PROJECT

Continued from page

Log #42
2/19/22
The motors have been moved outside, so we now have more space inside. We decided that we'll intake rings from the front so we'll have to move the front lift up before we can intake any rings. The rings (instead) will be transfered to the mobile goals lifted from the back. Other than that, Ryan finished building the pneumatics lift in the back.





Log # 43
2/23/22
We started to work on the tray, so we cut the plexiglass and build the intake from the front. We also did some testing with the lift and found out that without the 2 motors the lift will be too weak to pick up mobile goals. Therefore, we reattached the motors and it started to work again. The tray has been built so all we have to do is find the right angle to attach the tray from so that the rings will smoothly transfer from point A to Point B. After, we spent the rest of the night setting up for opening night where we introduce incoming freshmen to the program and hopefully attract new members for next year.

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