

ENGINEERING NOTEBOOK SUBMISSION

1022A

Johnny Meng

Zach Zhao

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TEAM PROFILE

Zachary Zhao

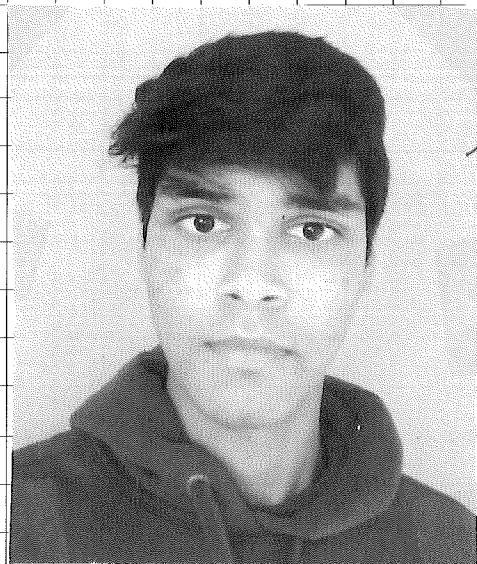


• YEARS OF EXPERIENCE = 2.5 YEARS

• ROLE(S) = PROGRAMMER & NOTEBOOK

jm
jm

Muntasir Haq



• YEARS OF EXPERIENCE = 0 YEARS

• ROLE(S) = BUILDER

jm
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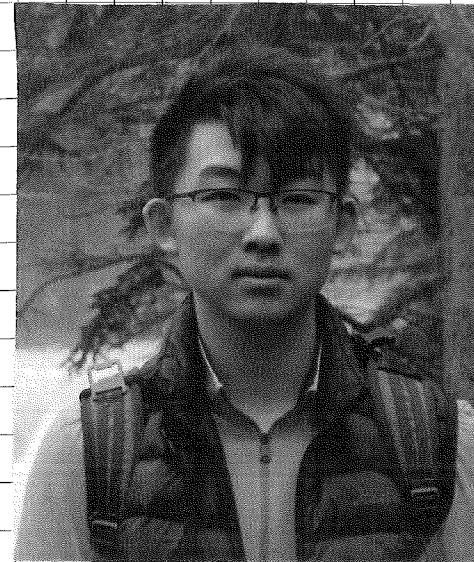
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TEAM PROFILE CONTINUED

Johnny Meng



• YEARS OF EXPERIENCE = 2.5 YEARS

• ROLE(S) = BUILDER & DRIVER

jm
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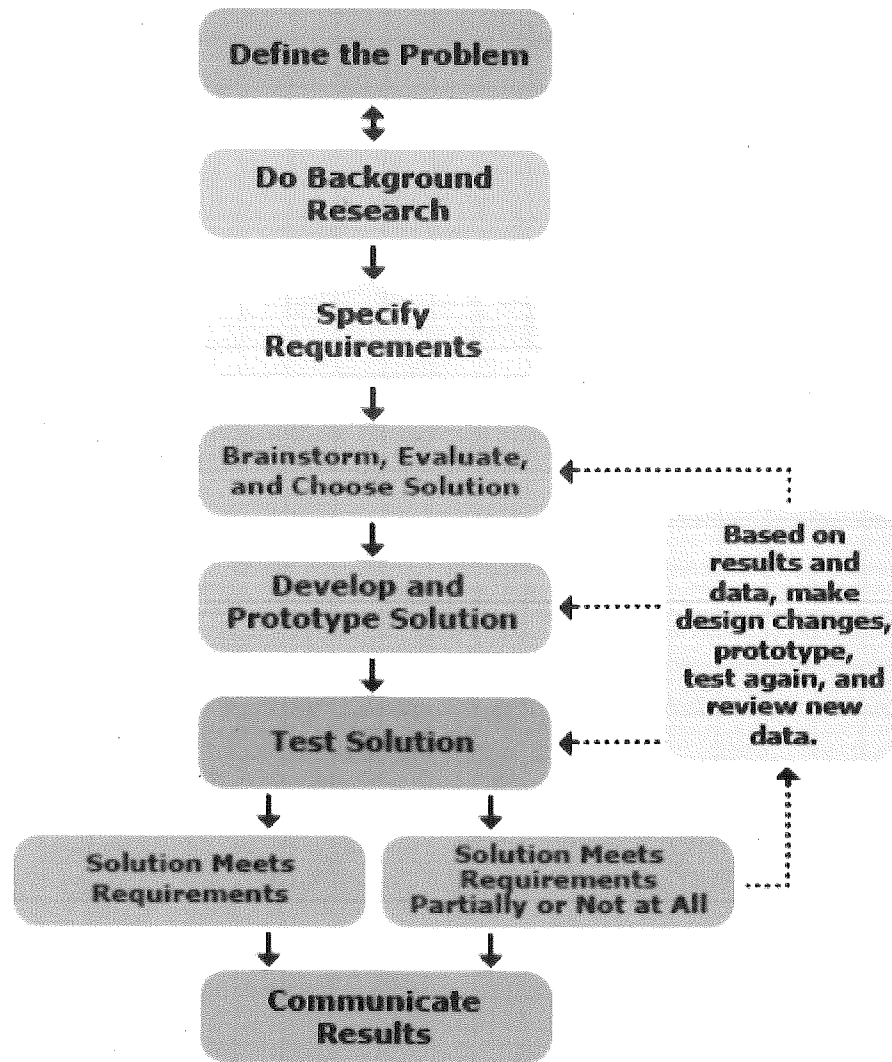
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ENGINEERING PROCESS



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GAME OUTLINE: 2021-2022 VEX TIPPING POINT

- VEX TIPPING POINT is played on a 12' x 12' field with two alliances - one red, one blue - composed of two teams each.
- Each match is 2 minutes long. The match begins with a 2 min 15 second autonomous period, where robots score points by themselves, followed by a 1 minute and 45 second driver controlled period where teams score as many points as possible.

HOW TIPPING POINT IS PLAYED

- The objective of each alliance is to score and obtain a higher score than the opposing alliance. This can be done by scoring Rings, moving Mobile Goals to Alliance Home Zones and by climbing Platforms at the end of a match.

GAME ELEMENTS

- 72 Rings
 - 12 are preload, 6 per alliance
 - 18 are match load, 9 per alliance
 - 42 rings begin on the field
- Four alliance mobile goals, 2 per alliance.
- 3 neutral mobile goals
- 2 platforms, one per alliance.

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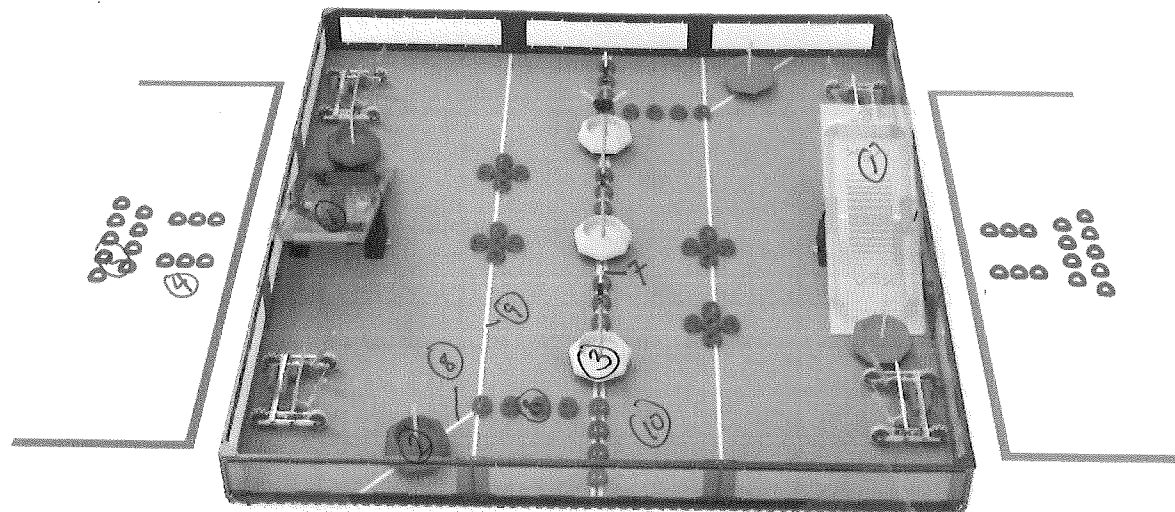
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GAME ELEMENTS

- ① Platforms
- ② Alliance Mobile Goals
- ③ Neutral Mobile Goals
- ④ Preload Rings
- ⑤ Matchload Rings
- ⑥ Field Rings
- ⑦ Middle Zone
- ⑧ Autonomous Win Point Line
- ⑨ Alliance Home Zone Line
- ⑩ Neutral Zone

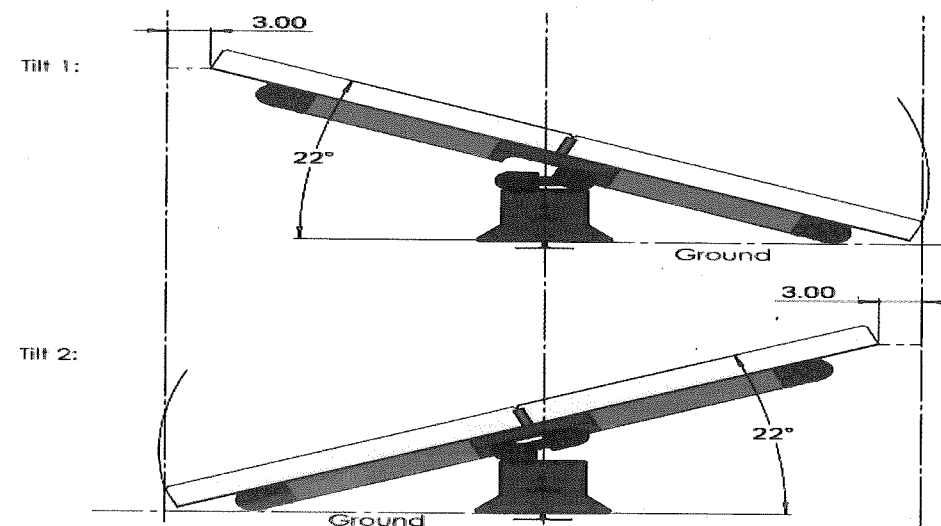
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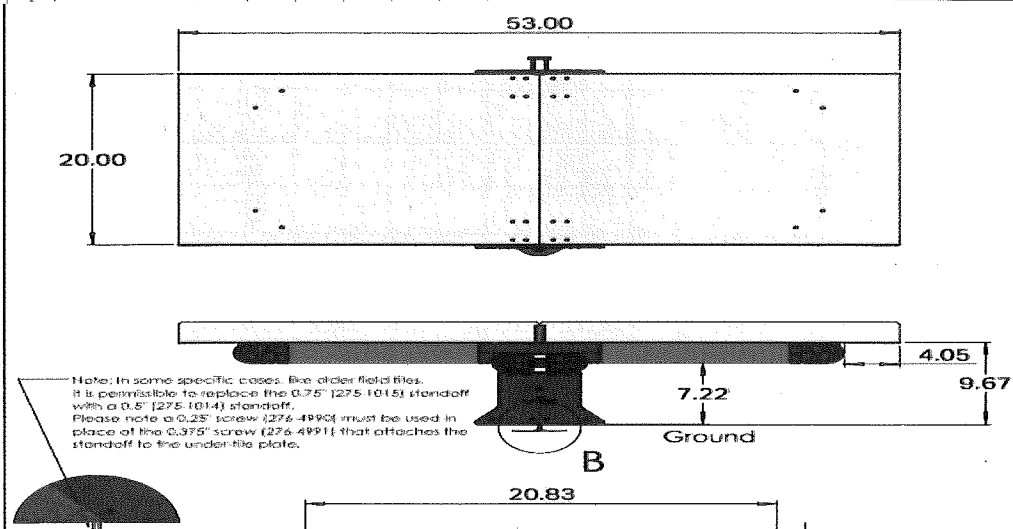
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GAME ELEMENTS CONTINUED
 PLATFORMS



Platforms are made of a 53.0" x 20.1" (1,346.2mm x 511mm) sheet of polycarbonate and are attached to either Blue or Red PVC pipes. They are located in Alliance Home Zones and sit 9.5" (241.5mm) off the ground when balanced. The platform is attached to a double hinge that allows it to tip in either direction.



Note: In some specific cases, five older field files, it is permissible to replace the 0.75" (275-1015) standoff with a 0.5" (275-1014) standoff. Please note a 0.25" screw (276-4990) must be used in place of the 0.375" screw (276-4991) that attaches the standoff to the under-tilt plate.

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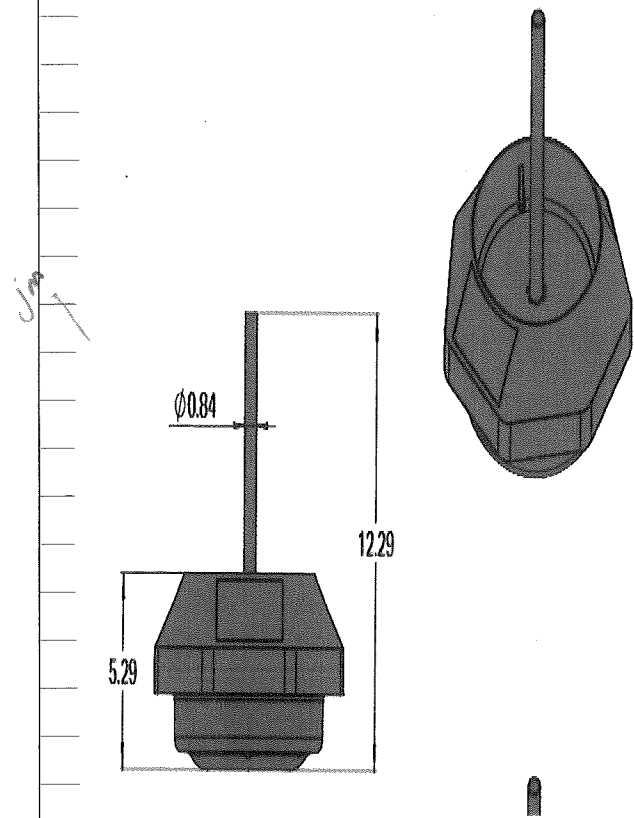
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GAME ELEMENTS CONTINUED

Alliance Mobile Goals



- Alliance Mobile Goals are 12.29" tall, with a 5.29" tall base.
- They are approximately 1,520 grams in weight and are in the shape of a heptagon.
- The cup in the mobile goal is 2" deep and a maximum of 8.63" wide.
- The Mobile Jim single Mobile Goal Branch is 7" tall and 0.84" wide and is in the center of the mobile goal.
- Mobile Base Goals^{Jim} have a maximal diameter of 13".

• There are four Alliance Mobile Goals, 2 red and 2 blue.

• The grey bottom portion of the mobile goal is 2.04" tall and a maximum of 10" in diameter.

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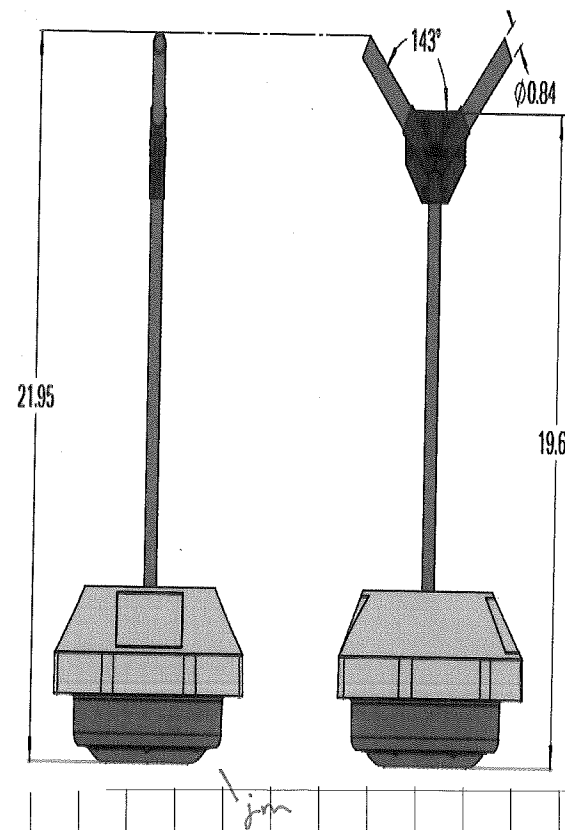
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GAME ELEMENTS CONTINUED

Neutral Mobile Goal



- Neutral Mobile Goals are 21.95" or 40.01" tall, with a 5.29" tall base.
- They are either 1,560 grams or 1,810 grams in weight and are in the shape of a heptagon.
- The cup of the Mobile Goal is 2" deep and a maximum of 8.63" wide.
- The 2 Goal Branch Mobile Goal Jim has a Goal Branch that is 16.66" tall with Branches that are 0.84" thick and at a 143° angle from the connecting bracket.
- The 4 Goal Branch Mobile Goal has a Branch Height of 34.72", one at 16.66" and one at 34.72". The branches are at 0.84" and are at a 143° angle from the connecting bracket.
- Mobile Goal Bases have a maximum diameter of 13".

• There are 3 Neutral Mobile Goals, 2 two branch goals and 1 four branch goal.

• The grey bottom portion of the mobile goal is 2.04" tall and a maximum of 10" in diameter.

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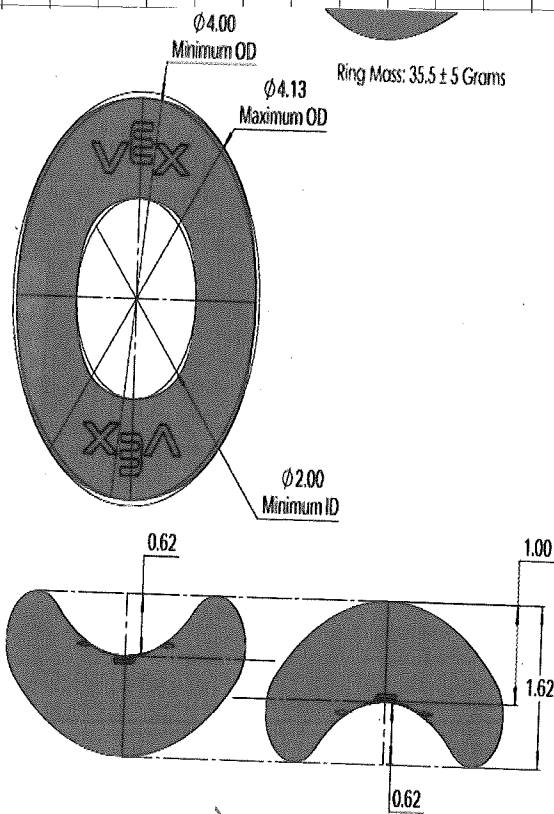
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GAME ELEMENTS CONTINUED

RINGS



• VEX TIPPING POINT RINGS are 35.5 ± 5 grams in weight.

• RINGS have a maximal diameter of 4.13" and a maximal inner diameter of 2".

• RINGS are 1" thick and are 1.62" tall when resting on the ground.

• A maximum of 8 rings can be stacked on the mobile Goal Branch of the Alliance Mobile Goal and a maximum of 4 rings can be stacked on the Goal in each Goal Branch of the Neutral Mobile Goal.

jin

jin

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GAME OUTLINE

AUTONOMOUS

• The Autonomous period is 15 seconds long. Robots will attempt to score without the input of a driver.

• The autonomous period-jin winner of the autonomous period (the alliance that has scored the most) is awarded 6 additional points, in the case of a tie, each alliance is awarded 3 points.

• A win point can be won by ~~scoring jin~~ during the autonomous period by ~~scoring~~ at least one ring on each alliance Mobile Goal clearing the autonomous win point line.

jin

AWP Line - The white tape line, one (1) per Alliance Home Zone, that starts the Match with one (1) Alliance Mobile Goal on it. See the Scoring Section for more details.

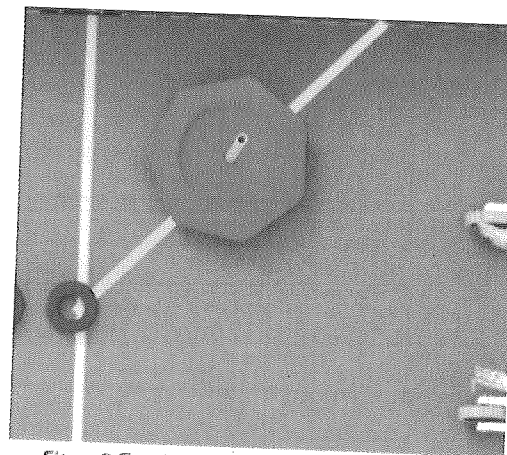


Figure 5: Top view of the field with an AWP Line highlighted.

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GAME OUTLINE

SCORING

Ring on/in Scored Mobile Goal	Mobile Goal High Branch	10 points
"	" Any Other Mobile Goal Branch	3 points
"	" Mobile Goal Base	1 point
Neutral Mobile Goal	Either Alliance's Home Zone	20 points
"	" Elevated on a Balanced Platform	40 points
Alliance Mobile Goal	Correct Alliance's Home Zone	20 points
"	" Elevated on Correct Alliance's Balanced Platform	40 points
Robot	Elevated on correct alliance's Balanced Platform	30 points
alliance	Wins Autonomous Bonus	6 points

IMPORTANT NOTES

- A Ring is considered scored in a Mobile Goal Base if it is not touching a Robot and is at least partially in within the 3-dimensional vertical projection formed by the "bowl" of the Mobile Goal Base.
- A Ring is considered scored on a Mobile Goal Branch if it is not contacting a Robot and the Ring surrounds the Branch.

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SCORING CONTINUED

- A mobile Goal is considered scored in an Alliance Home Zone if, at the end of the match, any part of the Mobile Goal Base is at least partially within the Alliance Home Zone.
- Rings scored on or in an Elevated Mobile Goal count for points to the alliance elevating the Goal. Additionally, an Elevated Mobile Goal does not receive points for being scored in an Alliance Home Zone.
- Alliance Mobile Goals only count for points when scored in the same colour Alliance Home Zone. Points scored in Rings scored on/in an Alliance Mobile Goal are worth points for that colour Alliance regardless of where it ends the match.
- Orientation in contact with foam tiles, platforms and or robots does not affect whether a Mobile Goal is scored or not, however, contact does affect whether a Mobile Goal is Elevated or not.

Each Ring Scored on a Neutral Mobile Goal High Branch	10 Points
Each Ring Scored on any other Mobile Goal Branch	3 Points
Each Ring Scored in a Mobile Goal Base	1 Point
Each Mobile Goal Scored in an Alliance Home Zone	20 Points
Each Robot that is Elevated	30 Points
Each Mobile Goal that is Elevated	40 Points
One Ring scored on / in each Alliance Mobile Goal and a Cleared AWP Line in Autonomous	1 Win Point

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DESIGN BRIEF

DESIGN CONSTRAINTS

- Robot must fit in a 18" x 18" x 18" cube at start of match.
- Robots can have a maximum of 8 motors.
- Robots can only be made of VEX official parts.
- Robot cannot be greater than 36" horizontally after the match has begun.

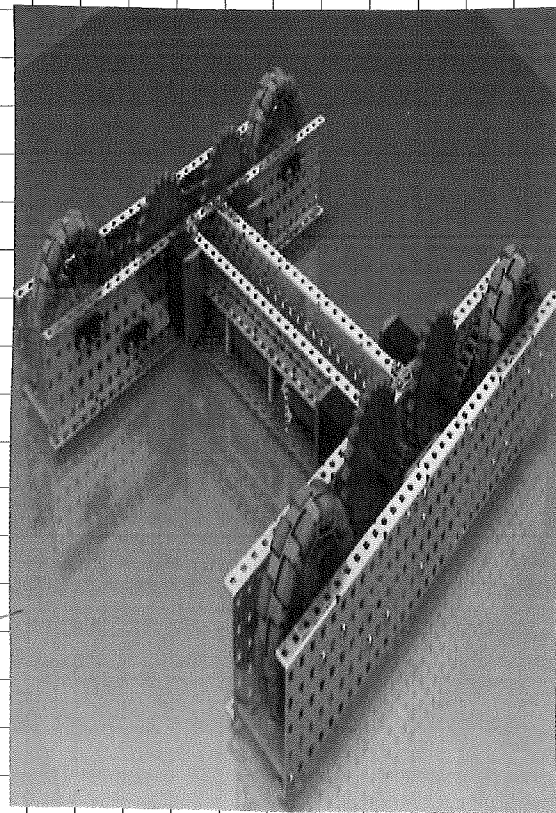
BASE DESIGNS

TANK DRIVE

- PROS:
- Easy to build
- Easy to build on
- Easy to drive & program

CONS:

- No strafing
- Limited speed & mobility
- If w/ omnis can be pushed easily.



TANK DRIVE

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BASE DESIGNS CONT...

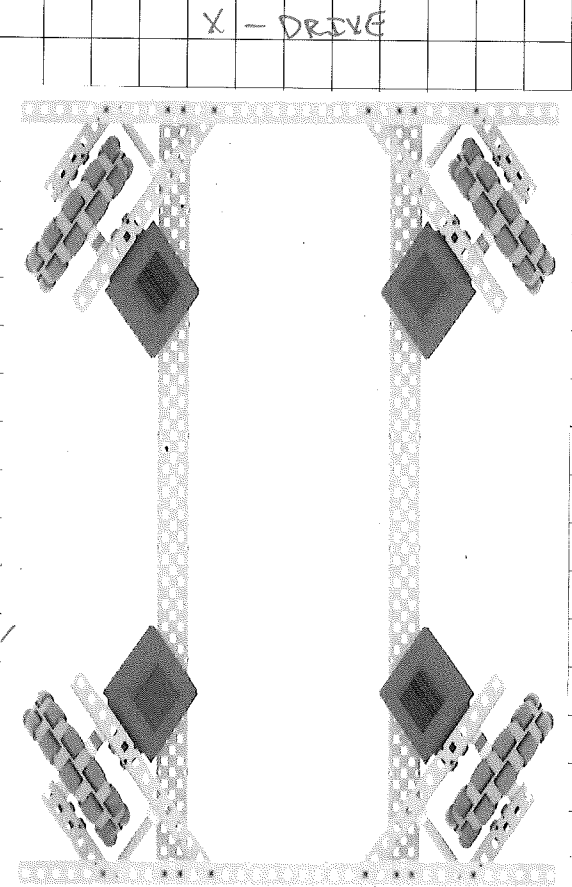
X-DRIVE

- PROS:
- STRAFES
- Great ~~see~~ speed & maneuverability
- Good for auton
- CONS:

- Hard to build
- Harder to program
- Hard to build structures on
- Can get pushed around

MECANUM DRIVE

- PROS:
- Can strafe
- Less likely to be pushed around
- Good for auton



X-DRIVE

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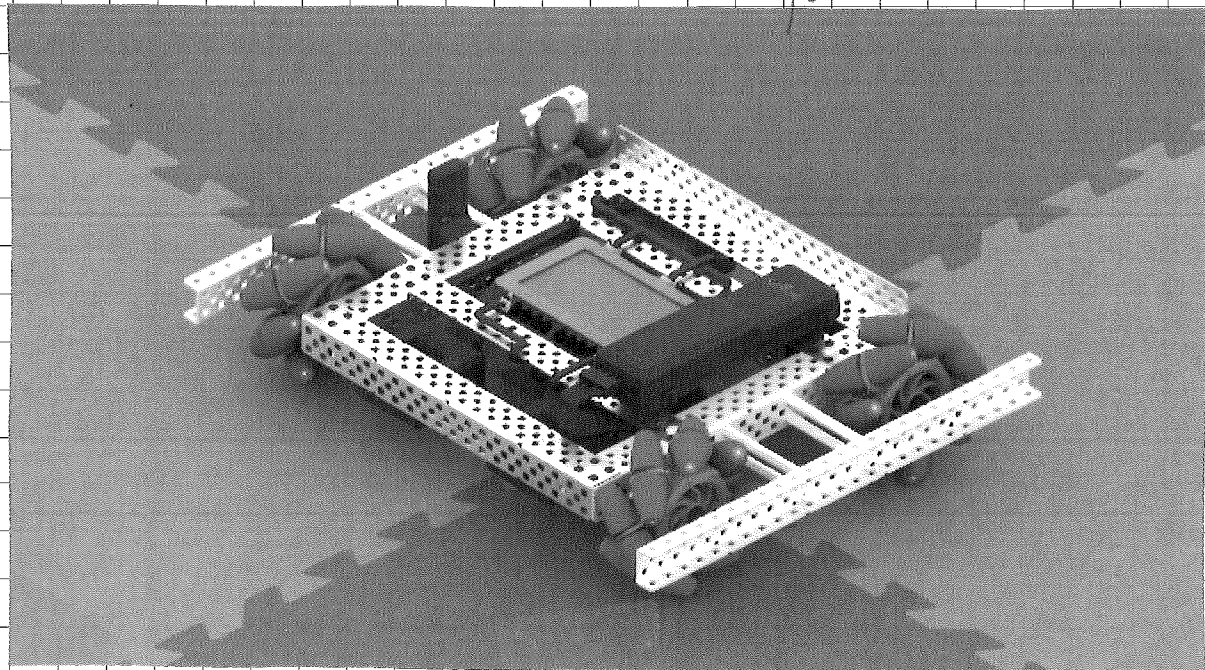
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BASE DESIGNS CONT...

CONS:

- Harder to program
- Not as much mobility as x-drive
- Will only have 71% of speed of tank drive diagonally.



MECANUM DRIVE

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BASE DESIGNS SUMMARY

TANK DRIVE = Good solid base design with good pushing power (useful for Tipping Point, to fight for goals). However, it lacks the maneuverability that the tank or x-drive can provide. It's also easy to build and to build in to add other structural components on the base.

X-DRIVE = Great base design for maneuverability.

The ability to strafe & "Pivot" (360, & strafe same time) is great when speed is key and makes auton more efficient as robot can strafe instead of having to turn, move forward, and turn again. However, it is harder to build as frame will have to accommodate wheels that are at a 45° angle. Also the x-drive is $\sqrt{2}$ (41%) faster than tank drive forwards & sideways but with $\sqrt{2}/2$ (71%) of the pushing power. The diagonal movement of the ~~tank~~^{jm} x drive is equivalent to the speed of the tank drive but will only have $1/2$ (50%) of the pushing power. Great mobility but could be bullied when fighting for goals.

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BASE DESIGNS SUMMARY CONT...

MECANUM DRIVE: Good base, does not have the design constraints that you come with a x-drive base. The mecaum drive has the same speed as a tank drive forwards and sideways with the same pushing force. The diagonal movement has $\sqrt{2}/2$ (71%) of the speed of the tank drive and $\sqrt{2}/2$ (71%) the pushing power. The mecaum is a good middle ground between tank and x-drive, and is a good option for Tipping Point due to its pushing power and strafing, which would help w/ auton. However, one down side of the mecaum drive is that the wheels have limited friction as surface area is given up to make space for the rollers on the wheel.

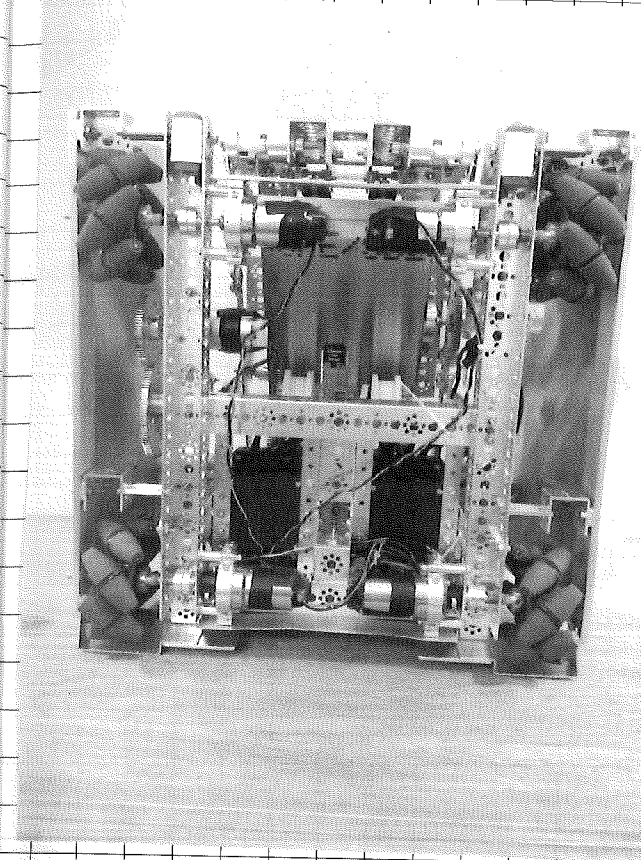
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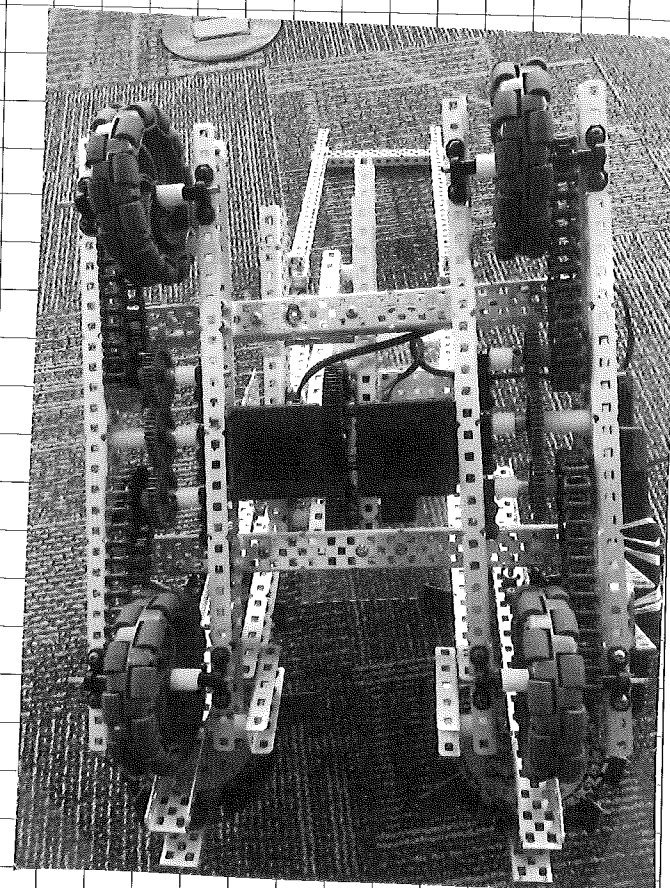
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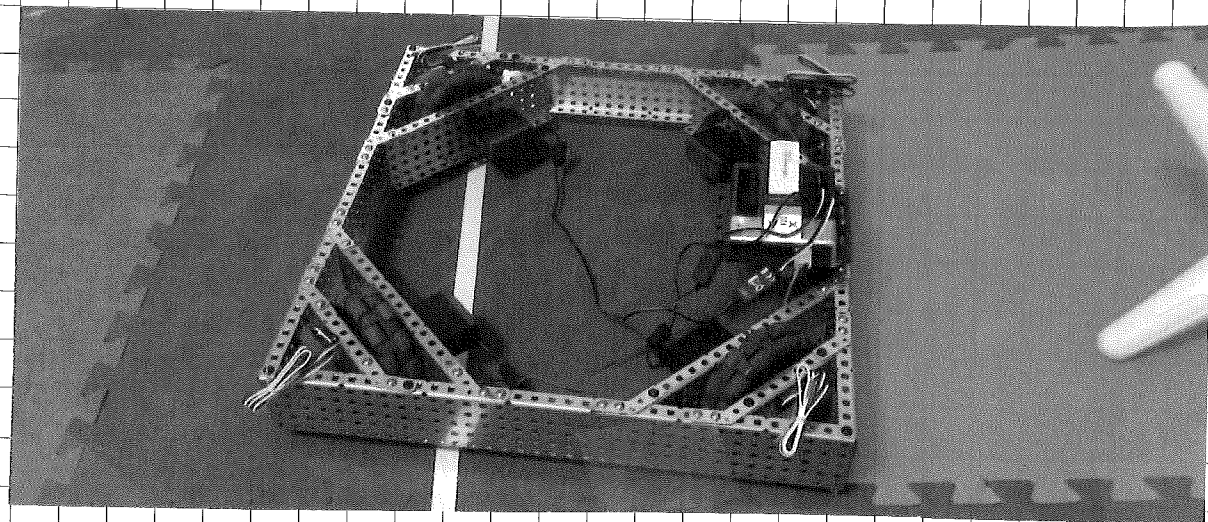
BASE DESIGNS



MECANUM DRIVE



TANK DRIVE



X-DRIVE

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INTAKE DESIGNS: RINGS

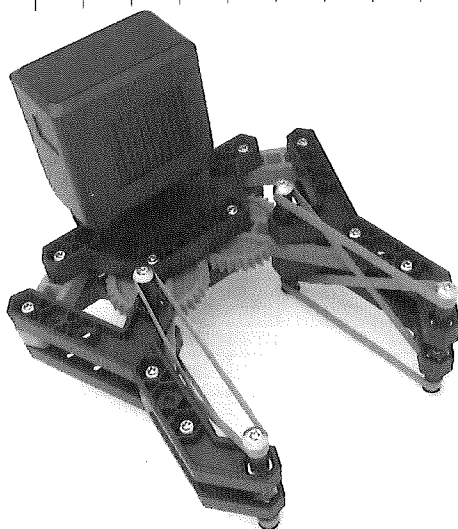
CLAW:

PROS:

- Easy to build
- Reliable
- Good range of motion & in x, y & z axis.

CONS:

- Very slow, as has to pick each ring individually & bring them onto goal branch.
- Claw that is on arm that claw is attached to can cause robot to be flipped over.
- Arm that claw is attached to takes up a lot of space on chassis.
- Uses multiple motors to power claw and arm.



INTAKE DESIGNS: RINGS ELEVATOR

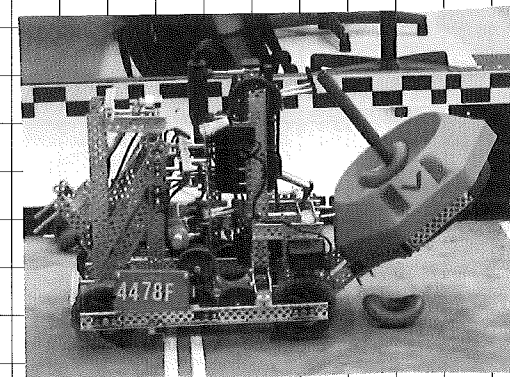
ELEVATOR:

PROS:

- FAST at scoring rings on goals
- Reliable as rings only have one place to go.
- Elevator structure is attached to chassis so less likely to be tipped by other bots.

CONS:

- Funnel is needed to position rings such that the elevator mechanism can lift them.
- Elevator mechanism takes up a lot of space on chassis.
- Mobile Goal must be placed in the same spot every time to ensure that the rings land on the goals consistently.
- Goal must be brought under elevator, not the other way round.



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INTAKE DESIGNS: ^{RINGS} PLUNGER_{in}

PLUNGER:

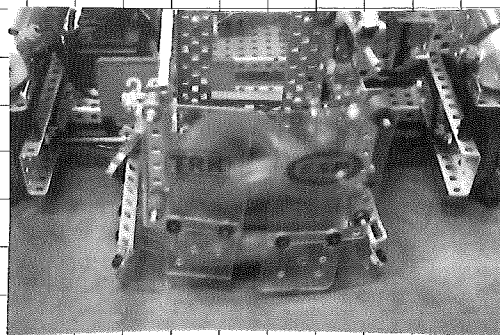
PROS:

- Ample range of motion
- Can score on upper goal branches on neutral Mobile Goals.

- Can store multiple rings on plunger before scoring on goal.

CONS:

- Robot can be easily tipped when arm is fully extended.
- Can be unreliable as plunger has to be lined up on mobile goal branches.
- Plunger has to go around and pick up each ring individually = slow.
- Takes multiple motors for arm and plunger.



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INTAKE DESIGNS SUMMARY

CLAW: The claw is a very basic design. It lacks the specialization and efficiency that other designs can offer. The claw takes a lot of time to score on mobile goals and it can't score more than 1 or 2 rings at a time.

ELEVATOR: The elevator is a much more refined and efficient design. By storing a mobile goal within the bot, the elevator can quickly score rings as it does not have to line up the rings to score. Additionally, scoring on neutral mobile goals, especially the tallest mobile goal, has little return; as they can be knocked over by enemy alliance members, unlike Alliance Mobile Goals. However, the elevator takes up a lot of room on the chassis and is unable to score rings on goals other than the Alliance Mobile Goal.

PLUNGER: The plunger is an intermediate between the elevator and the claw. It has the same basic arm design of the claw but it uses a more efficient claw design specialized

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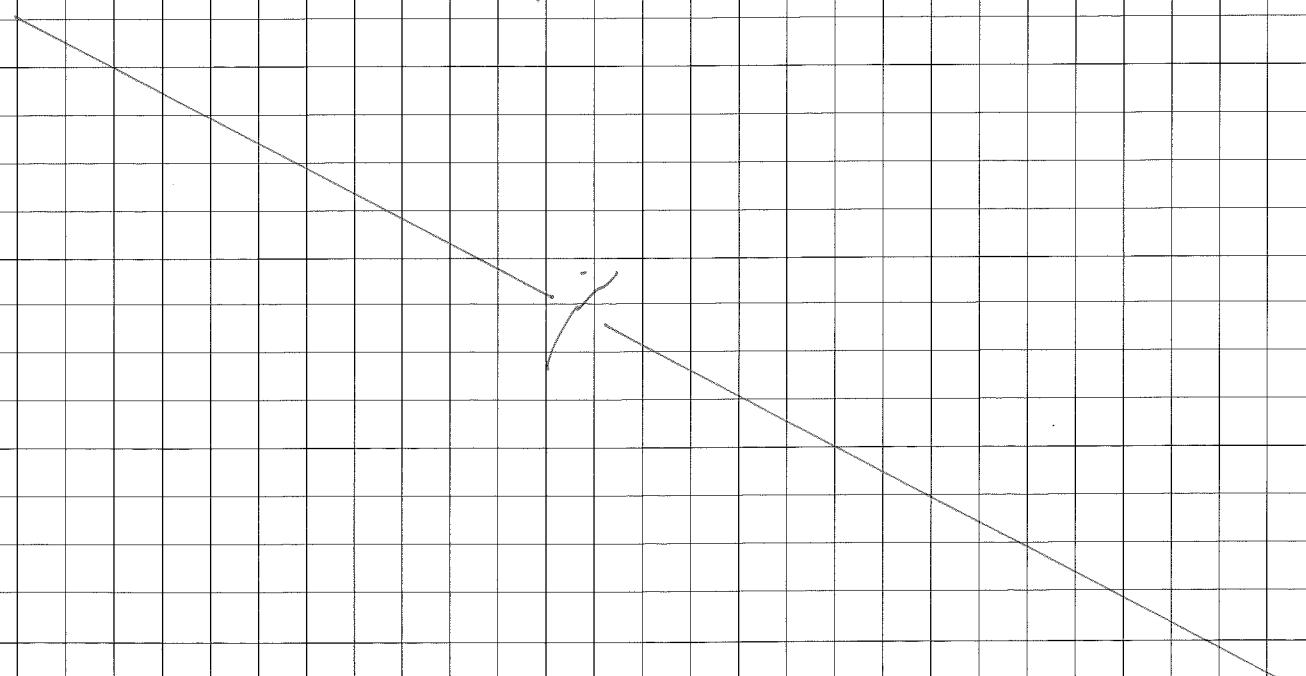
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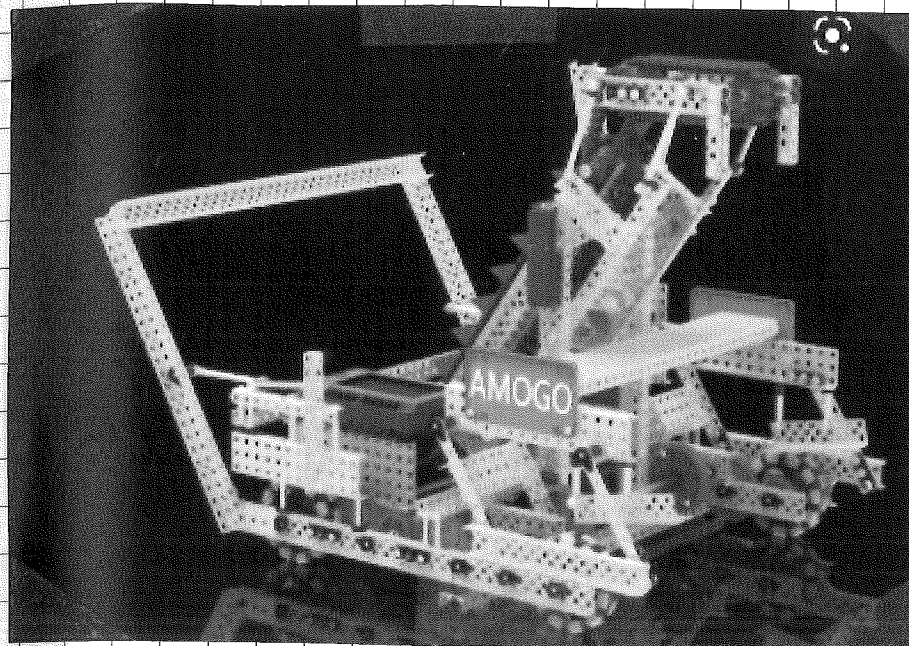
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PLUNGER CONT..

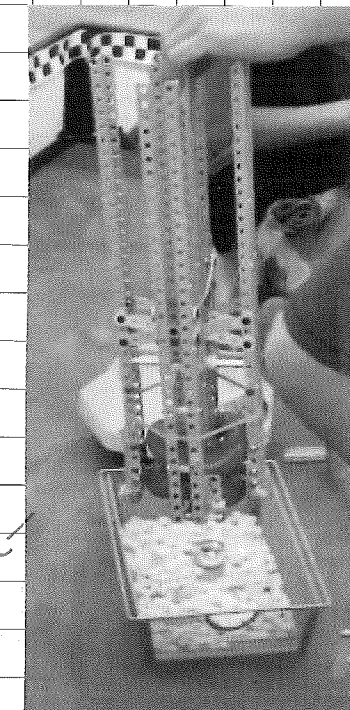
for picking up rings in Tipping Point. However it has the same arm that a claw design has, and the jin therefore has the same flaw that the claw has (easy to tip, have to line up plunger with mobile goals, etc). One other benefit of the plunger is that it would jin can score on higher rings of the central goals, but these benefits are counteracted by the number of motors the plunger uses and the cost benefit of the jin of scoring on the higher goal branches.



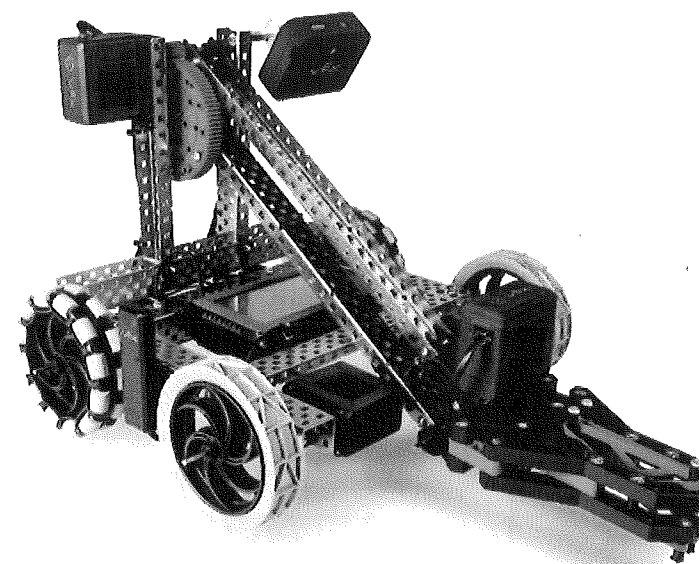
INTAKE DESIGNS



ELEVATOR



PLUNGER



CLAW

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BOOK NO. 1

INTAKE DESIGNS: Mobile Goal

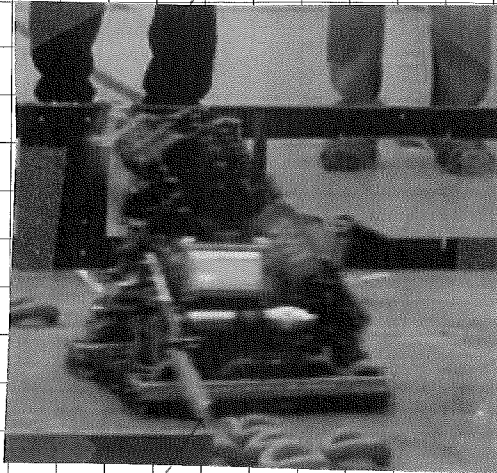
RAKE

PROS:

- Can carry multiple goals.
- Doesn't take up room on chassis.
- Uses the movement of bot to move around goals.

CONS:

- Goal can be knocked off bot by opponent's ramming into goal.
- Rake not compatible with elevator ring intake.
- Since rake causes goals to scrape on mats, slows the movement of the bot and can cause bot to tilt backwards.



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BOOK NO. 1

INTAKE DESIGNS: MOBILE GOAL

LIFT

PROS:

- Can carry a single goal within the safety of the chassis.
- Works with elevator design (intake).
- Can easily and quickly pick up and put down mobile goals.

CONS:

- Can only carry one goal at a time.
- Can have trouble lifting neutral mobile goals due to their increased height.
- Vulnerable when lift is fully extended to pick mobile goal off of the ground.
- Not able to score on platform.

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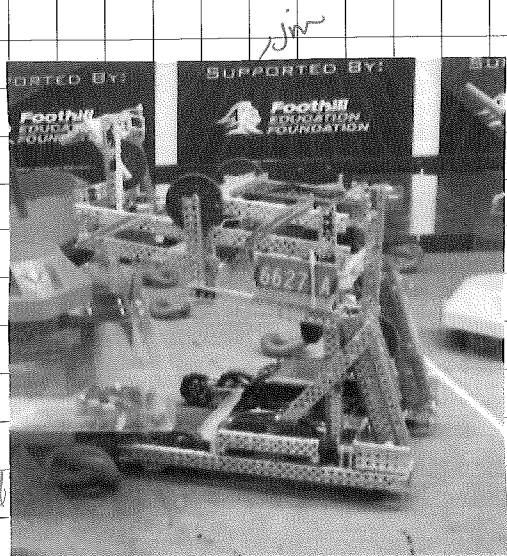
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INTAKE DESIGNS: MOBILE GOAL

LIFTING ARM

- PROS:
 - Simple, reliable design that only uses 1 motor
 - Can be an additional intake attached to one side of the chassis to pick up
 - Can pick up neutral mobile goals
- CONS:
 - Sign Rings cannot be easily scored on when picked up w/ this lift.
 - Goal can be knocked out of arm if an opponent runs goal.
 - Can shift center of gravity making it difficult to balance on platform.

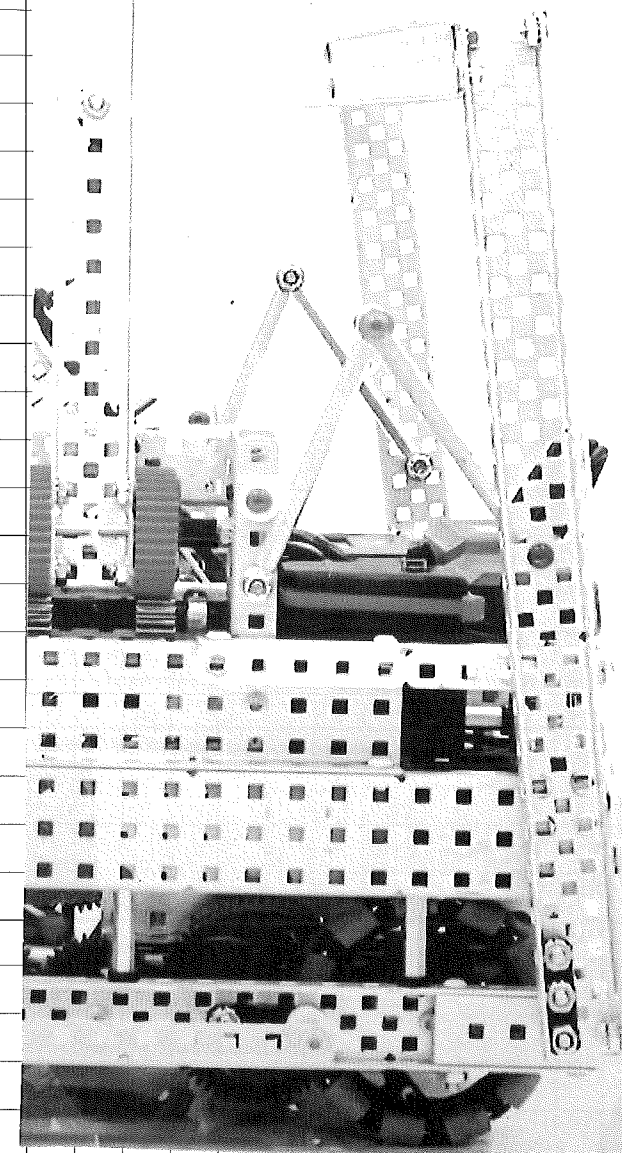


LIFTING ARM

PLATFORM MECHANISM

WEDGE

- PROS:
 - Can be attached to chassis and easy to build.
 - Does not require any motors to use.
- CONS:
 - Fatigue Takes up a lot of vertical space on chassis.
 - Can get stuck on other robots or game elements.
 - Can possibly fail to deploy as it uses the robot movement to lock in place.



WEDGE

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BOOK NO. 1

PLATFORM MECHANISM

LIFTING ARM

PROS:

• Already used for other tasks, no need to build separate mechanism

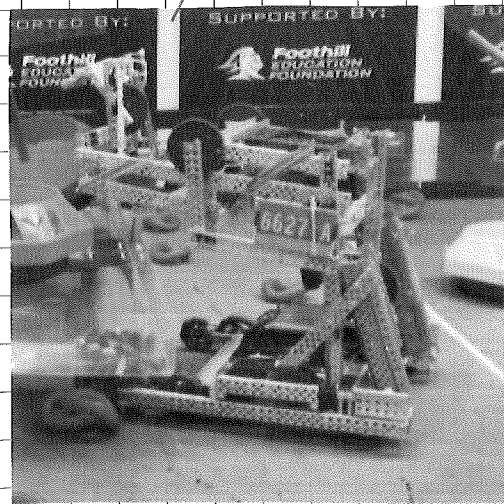
• Very reliable

• Can help other bots balance on platform as well.

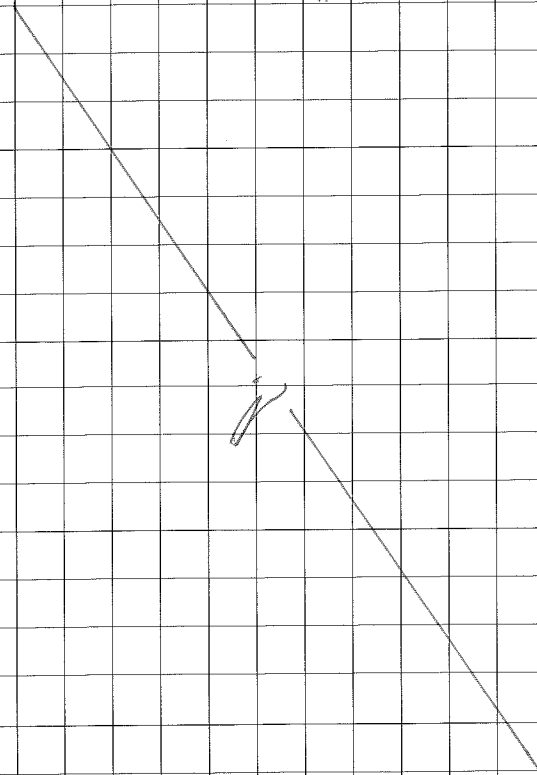
CONS:

• Have to line up arm w/ platform in order to get on top

• Arm has to be made long enough to push platform down.



LIFTING ARM



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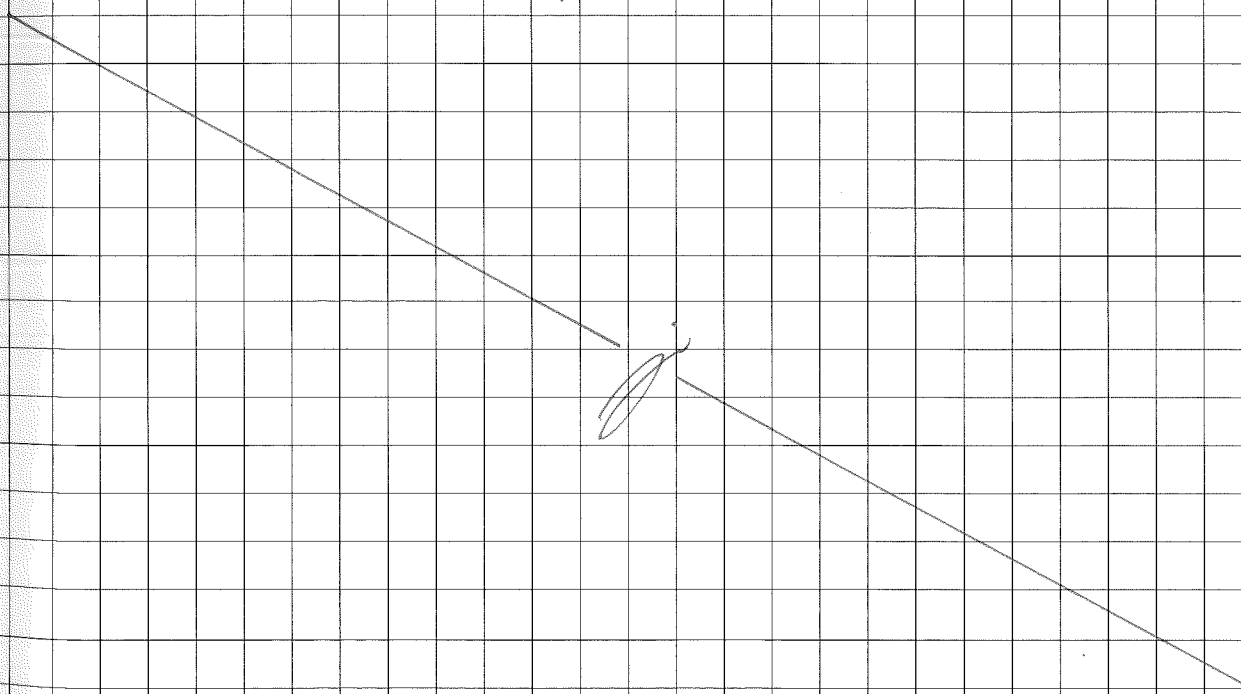
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PLATFORM MECHANISM SUMMARY

• WEDGE = A non-powered wedge that attaches to the chassis of the robot. It is attached to either the front or the back of the robot and made out of c-channel. The wedge will fold out at such an angle, such that when the robot drives towards the platform, the wedge pushes the platform down, allowing the bot to drive on the platform. Main downside of wedge is getting the mechanism to fold down and ^{lock} ~~lock~~ in place consistently.



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PLATFORM MECHANISM SUMMARY CONT...

LIFTING ARM - The lifting arm is good as it recycles a mechanism that is used for scoring goals and rings. It is also able to push the platform down to a desired depth, help other robots get on the platform. However, the lifting arm is slow as it has to line up with the platform, and the speed of the arm may need to be adjusted to ensure that the arm has enough torque to push the platform down, which may affect its ability to pick up and score rings and mobile goals.

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BOOK NO. 1

COST - BENEFIT ANALYSIS

The most important aspect of tipping point is the ability to control Mobile Goals as each one they are worth 20 points, or 40 points when elevated. Additionally being able to efficiently score rings is important as they 3 points when scored on the mobile goal branch, thus when combined with an Alliance mobile goal they could be worth a total of 50 points when in proper Alliance Zone or 30 points when not in the correct Alliance Zone (assuming 10 rings are scored on the branch). Additionally, Tipping Point will perform to the 2 versus 2 format, so a balanced drive base with both speed and torque is important to be able to collect game elements and push others around.

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BOOK NO. 1

DRIVE BASE: COST-BENEFIT ANALYSIS

Higher is better	TORQUE (50%)	SPEED (30%)	TURNING (15%)	Ease OF BUILD (5%)
TANK	$3 \cdot 0.5 = 1.5$	$2 \cdot 0.3 = 0.6$	$2 \cdot 0.15 = 0.3$	$3 \cdot 0.05 = 0.15$
MECANUM	$2 \cdot 0.5 = 1$	$2 \cdot 0.3 = 0.6$	$1 \cdot 0.15 = 0.15$	$2 \cdot 0.05 = 0.1$
X-DRIVE	$1 \cdot 0.5 = 0.5$	$3 \cdot 0.3 = 0.9$	$3 \cdot 0.15 = 0.45$	$1 \cdot 0.05 = 0.05$
TOTAL SCORE (Higher is better)	TANK = 2.55	MECANUM = 1.85	X-Drive = 1.9	TANK is WINNER

- An important aspect for the Tipping Point drive base is to possess enough torque to fight other robots for the possession of game elements, thus I believe torque is worth 50% of the total points allotted.
- Speed is worth 30% as being able to quickly move around the field.
- Turning is worth 15% as being able to quickly change directions in the 12' x 12' field is essential.
- Being able to build on the drive base is important for additional mechanisms, thus it is worth 5%.

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INTAKES: COST-BENEFIT ANALYSIS

RINGS	EFFICIENCY (70%)	VERSATILITY (10%)	EASE OF BUILD (10%)	SIZE ON CHASSIS (10%)
CLAW	$1 \cdot 0.7 = 0.7$	$3 \cdot 0.1 = 0.3$	$3 \cdot 0.1 = 0.3$	$2 \cdot 0.1 = 0.2$
ELEVATOR	$3 \cdot 0.7 = 2.1$	$2 \cdot 0.1 = 0.2$	$1 \cdot 0.1 = 0.1$	$3 \cdot 0.1 = 0.3$
PLUNGER	$2 \cdot 0.7 = 1.4$	$2 \cdot 0.1 = 0.2$	$2 \cdot 0.1 = 0.2$	$2 \cdot 0.1 = 0.2$
TOTAL SCORE (HIGHER = BETTER)	CLAW = 1.5	ELEVATOR = 2.7	PLUNGER = 2	ELEVATOR WINS

- The most important part of the ring intake is to be able to quickly pick up and score w/o rings, without having to spend too much time lining up / picking up single rings at a time. The claw and plunger require the bot to prism line up and then pick up each ring individually whereas the elevator can pick up multiple rings at once as the mechanism can continuously collect rings.

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BOOK NO. 1

INTAKES: COST-BENEFIT ANALYSES

MOBILE GOAL	EFFICIENCY (60%)	# OF GOALS HEID (20%)	GOAL PROTECTION (10%)	SIZE ON CHASSIS (10%)
RAKE	$2 \cdot 0.6 = 1.2$	$3 \cdot 0.2 = 0.6$	$2 \cdot 0.1 = 0.2$	$3 \cdot 0.1 = 0.3$
LIFT	$3 \cdot 0.6 = 1.8$	$2 \cdot 0.2 = 0.4$	$3 \cdot 0.1 = 0.3$	$2 \cdot 0.1 = 0.2$ in
LIFT in LIFTING ARM	$1 \cdot 0.6 = 0.6$	$2 \cdot 0.2 = 0.4$	$1 \cdot 0.1 = 0.1$	$1 \cdot 0.1 = 0.1$
TOTAL SCORE (HIGHER=BETTER)	RAKE = 2.3	LIFT = 2.7	LIFTING ARM = 1.2	LIFT WINS

The lift is the most efficient design as it allows the bot to quickly pick up goals in the arena and gain early control. The lift also pairs well with the elevator, allowing the bot to ~~simultaneously~~ simultaneously score goals and pick up goals at the same time. Additionally, you don't have to line up to pick up goals like the rake & lifting arm. However the lift lacks the ability to move on the platform but we believe that being able to control the location of goals is more important than elevated goals.

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BOOK NO. 1

PLATFORM: COST-BENEFIT ANALYSES

PLATFORM	MOTORS (33%)	EASE OF USE (33%)	SIZE ON CHASSIS (35%)
WEDGE	$2 \cdot 0.33 = 0.66$	$2 \cdot 0.33 = 0.66$	$2 \cdot 0.35 = 0.70$
LIFTING ARM	$1 \cdot 0.33 = 0.33$	$1 \cdot 0.33 = 0.33$	$2 \cdot 0.35 = 0.70$
TOTAL SCORE (HIGHER=BETTER)	WEDGE = 2	LIFTING ARM = 1	WEDGE WINS

The wedge is the best way to get on top of the platform as it does not require the use of any motors, takes up minimal space on the chassis, and does not require the driver to input any controls with the exception of driving forwards and balancing on the platform. The lifting arm requires the driver to push the platform down with the left while driving forwards. Thus the wedge is the most efficient.

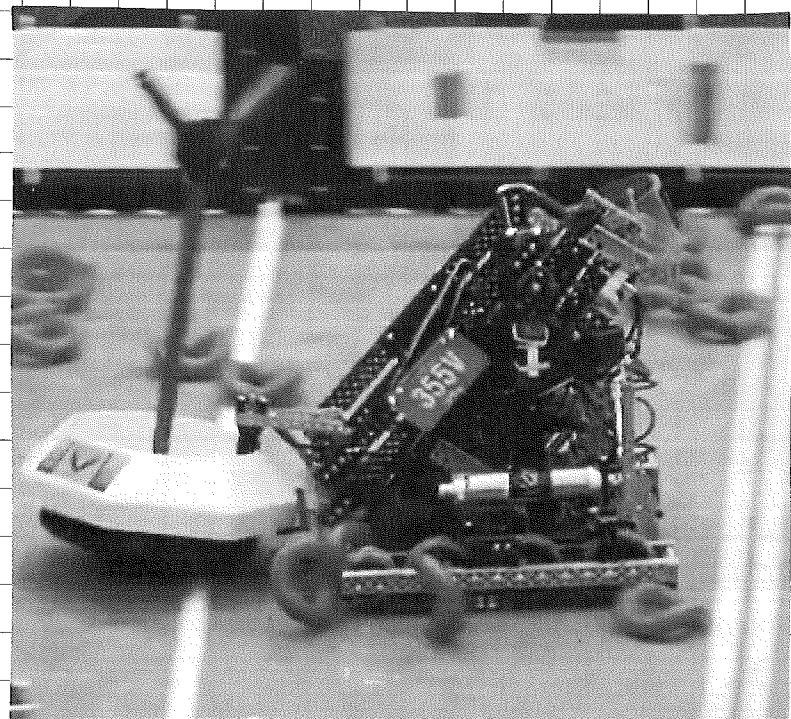
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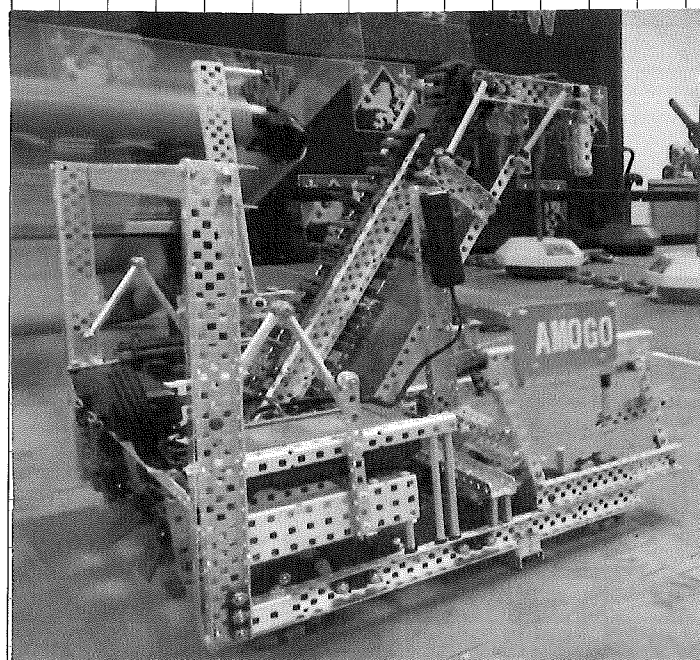
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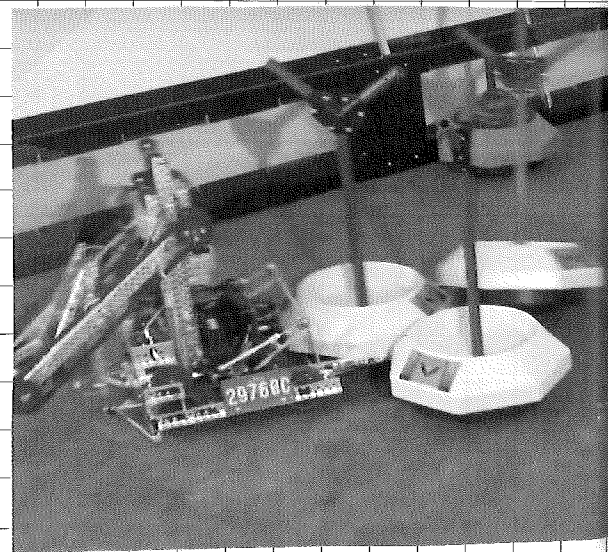
MOBILE GOAL INTAKE SUMMARY



LIFTING ARM



LIFT



RAKE

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BOOK NO. 1

SEPT 9, 2021 - BRAIN STORM

Based on our initial research we decided to go with a tank drive base, that is 30 x 33 holes as our Charge UP robot, was very close to being over sized. To save us the stress of worrying about sizing we decided to make our robot a bit smaller. For our primary intake we decided to go with a lift as we believe being able to quickly transport mobile goals around the arena is essential. For our secondary mechanism we decided to go with a ring elevator so we were able to store rings on the mobile goal while transporting them. Additionally, the rings scored on the Alliance Mobile Goal count towards the Alliance total, regardless of where it ends the match. Rings scored on the Alliance Mobile Goal are also not allowed to be removed/dropped.

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BOOK NO. 1

SEPT. 10, 2021 - BRAIN STORM ^{Jim} STORM

Today we ~~discussed~~ discussed the best way to implement our ~~solo~~ ^{Jim} designs together. And finalized our roles. Zach is coder, and Muntasir and I will build.

Sept. 13, 2021 - BUILD DAY

Today we began construction on ~~our~~ ^{Jim} car drive base. We have a 30 long x 33 wide tank drive, but we have 1 hole pieces of c-channel sticking out on each side as we were not able to cut the 35 long c-channel this early in the season. Additionally, we took apart our base to test what a 35 long x 35 Jim 33 wide c-channel base would look like, but we believed it to ^{be} too close to the 18" x 18" x 18" build limit.

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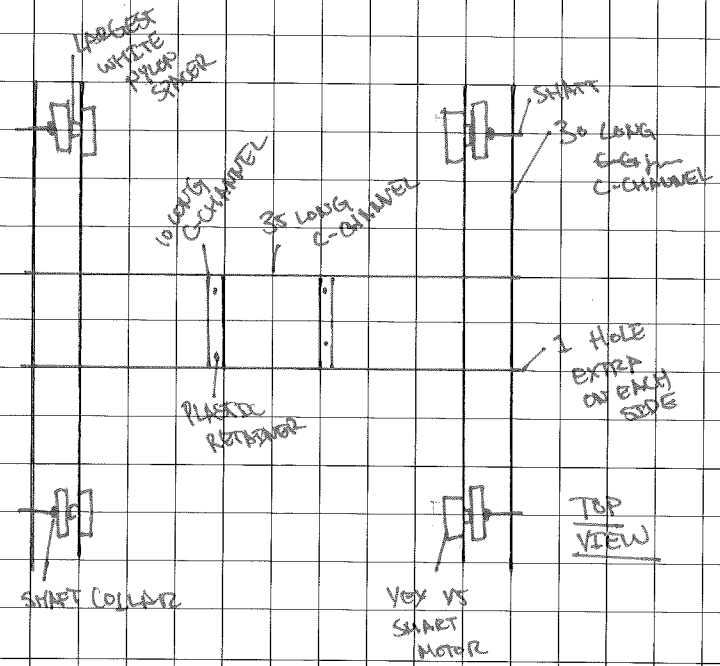
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BOOK NO. 1

SEPT. 14, 2021 - BUILD DAY - CHASSIS

Work on finishing tank drive base. We used the largest nylon spacers against the inside of the wheel to ensure they are all equally spaced and used an "H" brace in the center of the base to ensure the base remains straight. H-base was made with 10 hole c-channel running vertically and 35 hole c-channel running horizontally. The two are connected together with 9 Jim nylocks and plastic retainers that go into the holes to ensure its strength as possible.



- 2 x 35 hole c-channel
- 2 x 10 " "
- 4 x 30 " "
- 4 x VEX VS Smart motor
- 4 x nylon spacers
- 4 x shaft
- 4 x shaft collar
- 4 x plastic retainers.

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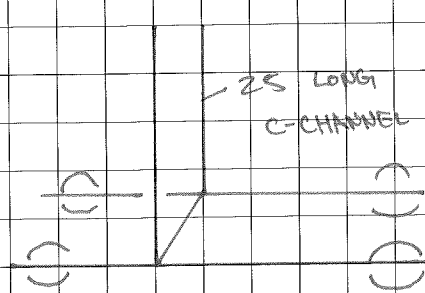
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BOOK NO. 1

SEPT. 15, 2021 - BUILD DAY - CHASSIS

- Strengthened connections between c-channel. Additionally we made sure to pull on each c-channel, so they would be equally distanced. We also added structural jms the supporting beams that will be used to connect the elevator to the chassis.

SIDE VIEW



- 2x 25 hole c-channel
- 4x 5mm 8x 50mm stand off
- Various spacers.
- Various screws

- The 25 hole c-channel was connected to the chassis using 50mm stand offs and various spacers.

- Added 1x5x1x5 c-channel in anticipation of attaching entans into them.

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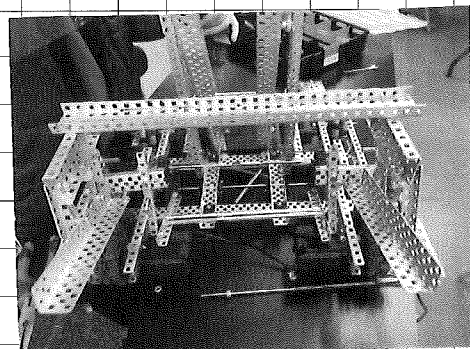
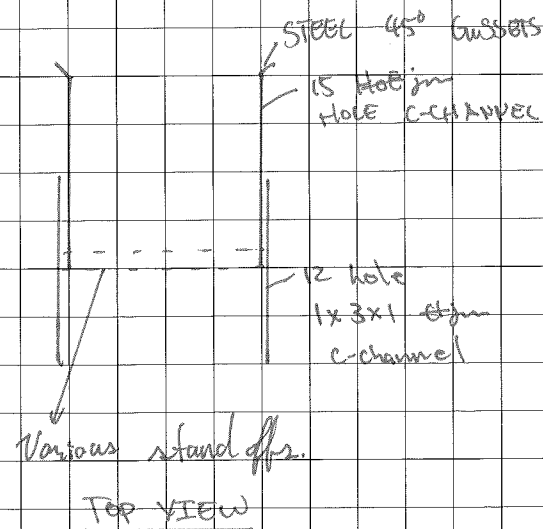
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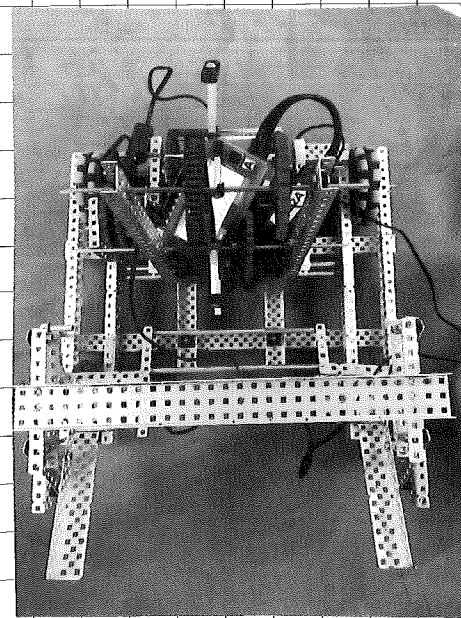
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SEPT. 16, 2021 - BUILD DAY - MOBILE GOAL INTAKE

Tested various methods to intake jam failed an intake to scoop the goal. ended w/ a "hook" type lift that uses friction of jam between 2 c-channels to pick up the goal.



- 2 x 45° steel gussets
- 2x 15 hole c-channel
- 2 x [1x3x1] c-channel
- Various stand off



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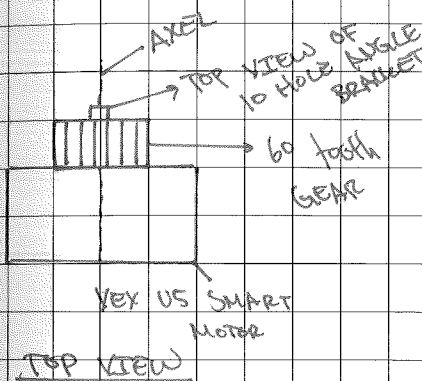
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SEPT. 17, 2021 - BUILD DAY - MOBILE GOAL INTAKE

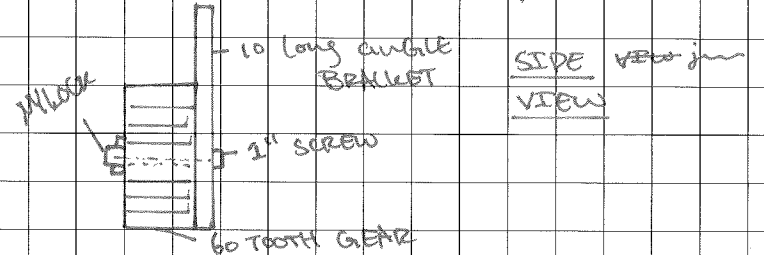
Dropped yesterday's "friction hook lift" method, and build a lift that used 4 x 10 long angle bracket that pivoted around a fixed point.



Side View



- 2 x 15 hole long angle brackets (2x2)
- 2 x [1x3x1] c-channel (10 holes)
- 4 x [1x1x0] 10 long angle brackets
- Various screws and spacers.



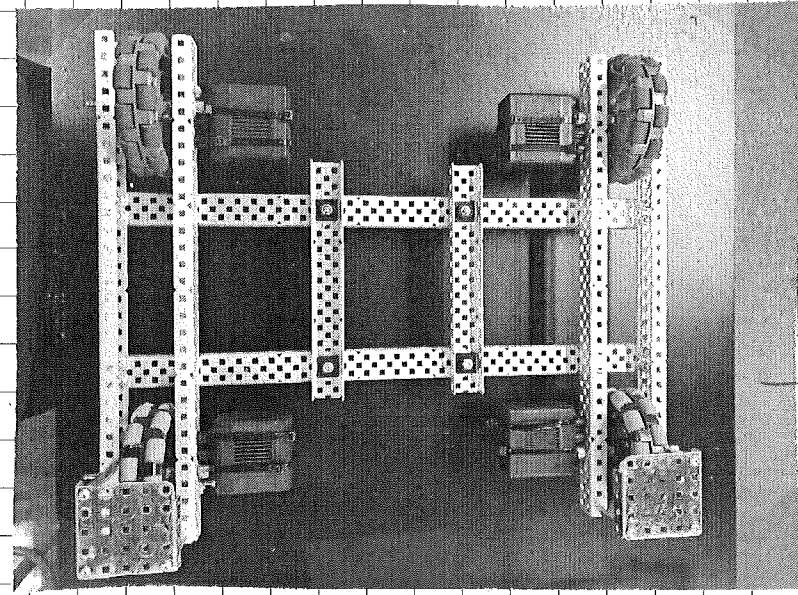
Angle bracket is connected to gear with screw and nylock, such that when the gears turn, the angle bracket also moves. the 2 angle brackets not connected to the gear are able to pivot freely as they are attached to chassis using screw joint.

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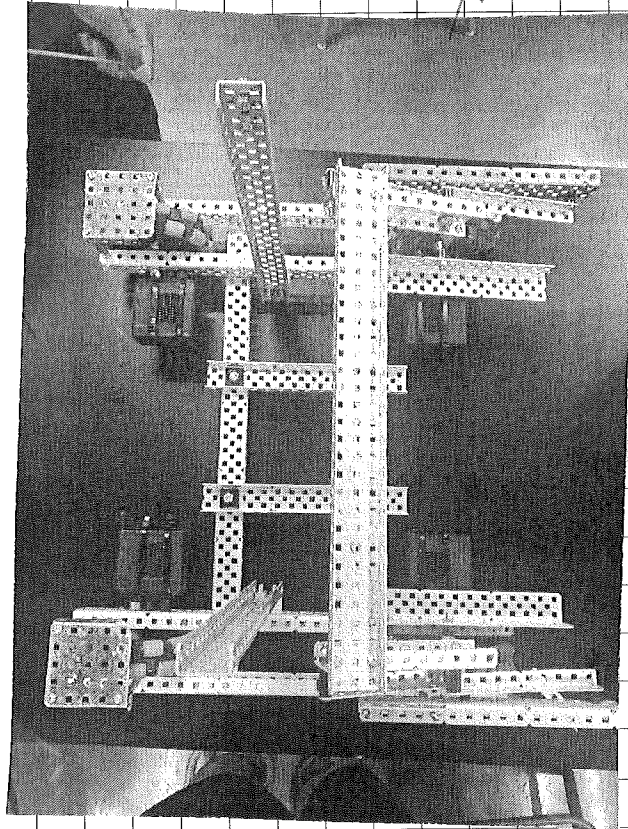
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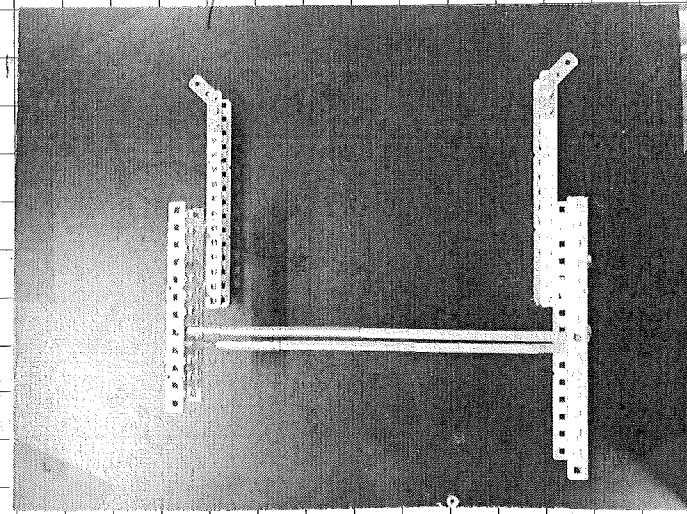
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BOOK NO. 1

SEPT. 20 - 24, 2021 - SICK WEEK

From 20-24th of September, I was sick, thus I was unable to attend school and work on the robot. However, our team members Mustafa and Zach worked on the elevator mechanism as shown in the photos.

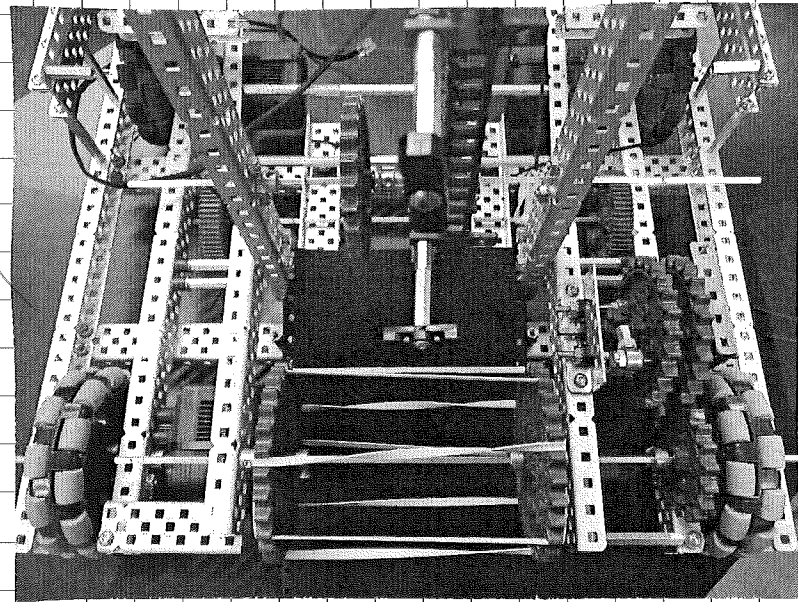
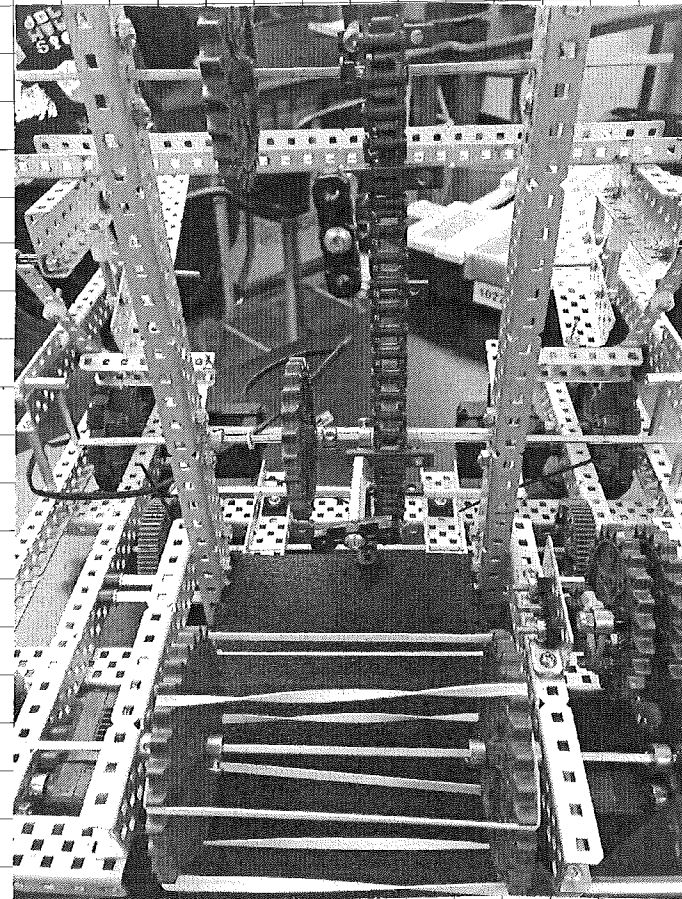
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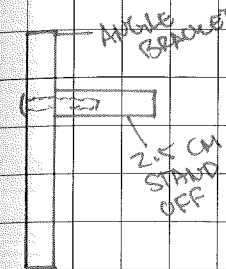
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SEPT. 28, 2021
~~2020~~ - DTD NOT ATTEND SCHOOL (SUN)

SEPT. 29, 2021 - BUILD DAY - MOBILE GOAL INTAKE

Worked on adding a hard stop to limit the range of motion of the Mobile Goal Lift, was made using 1x1 angle bracket and a 2.5 cm long stand off. Hard stop was



• 2x angle bracket (1x1)

• 2 x 2.5 cm stand off

• Various screws.

attached onto the elevated structure that the lift is attached to. Additionally, today was the first day looking at what the other team members built while I was sick. They made a vertical elevator using sprockets and chain and stand offs, however it will need to be rebuilt as the elevator system is unable to ~~some~~ ^{some} move on the mobile goal when it is ~~attached~~ ^{intake} by the Mobile Goal Lift.

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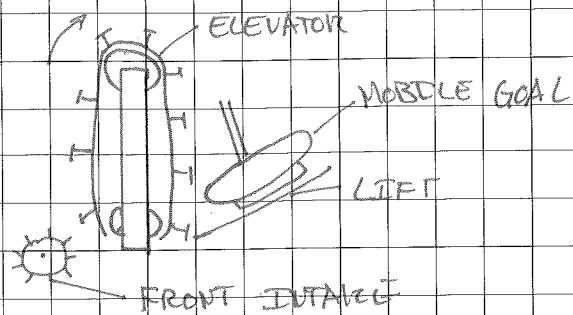
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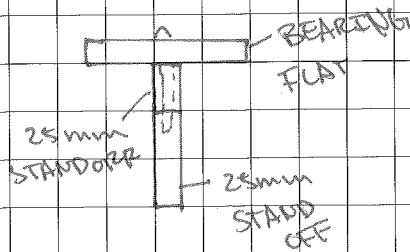
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SEPT. 29, 2021 - CONTINUED



- 2 x 20T High strength sprockets.
- 10 x 25mm & 10 x 12.5mm stand offs
- 10 x bearing flats.
- 2 x 30T high strength sprockets
- Various axels
- Enough chain



The current elevator is inefficient as it some times hits the goal branch and it take too much time to bring the rings up and the rings would rarely land on the goal ring.

The bearing flat catches the rings and brings them up to the mobile goal.

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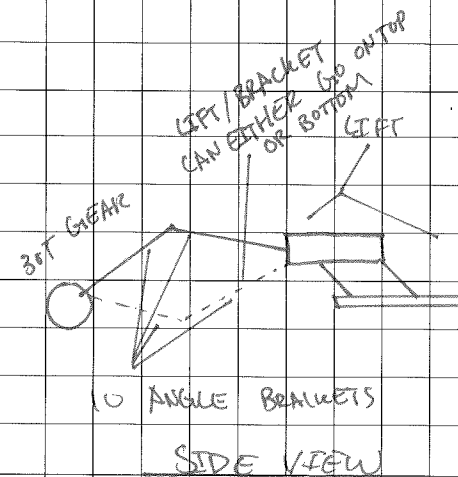
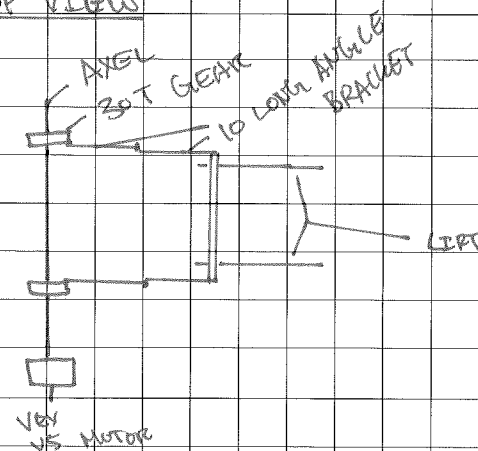
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OCT. 1, 2021 - BUILD DAY - MOBILE GOAL INTAKE

Worked on mobile goal intake. Tried to come up with solutions to power the lift only jms by only using a single motor. However, I am having trouble as the distance between the lift and the angle bracket that power the lift changes in a non-linear manner. Thus it is not possible to mount the jms power the motor using a fixed piece of c-channel. Current attempt uses an axel running across the base of the bot powered by a motor. the lift is attached to angle brackets that are attached to 30 tooth gears that are on the axel.

TOP VIEW



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OCT. 4, 2021 - BUILD DAY - MOBILE GOAL LIFT & ELEVATOR

Tested different variations to try to get the "seissor" mechanism for the mobile goal lift to work without success. The lift gets stuck at certain points due to the angle that the angle brackets make when retracting. Tried to use rubber bands to reduce the torque required to retract, didn't work.

OCT. 5, 2021 - BUILD DAY - ELEVATOR & MOBILE GOAL LIFT

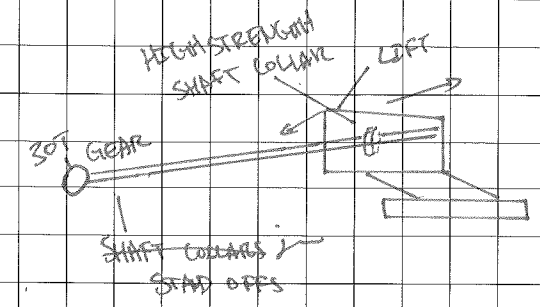
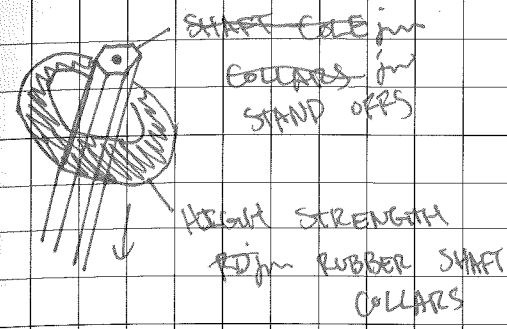
We took apart the previous elevator and built the structure for the new one. Additionally, I tried to power the lift using high jim high strength self jim rubber shaft collars, that would slide along stand off rails, however, the mechanism was too prone to error, and had trouble at the very bottom and top of its range of motion. Additionally, Munster was dropped the class and so jim is no longer a part of the team.

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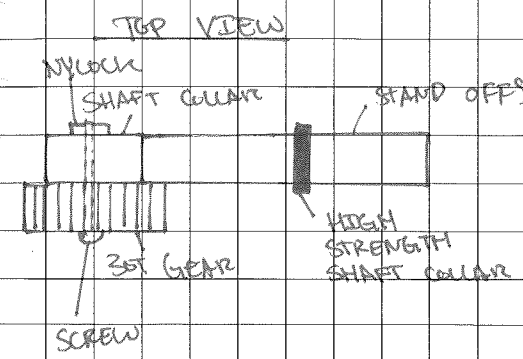
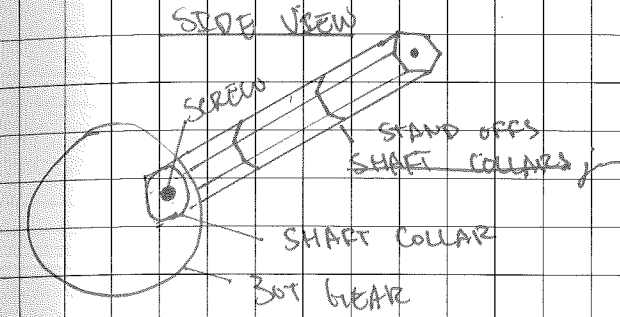
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When the motor causes the gear to turn the lift moves as the shaft collar is allowed to freely pivot around but has to follow the path of the shaft collars.

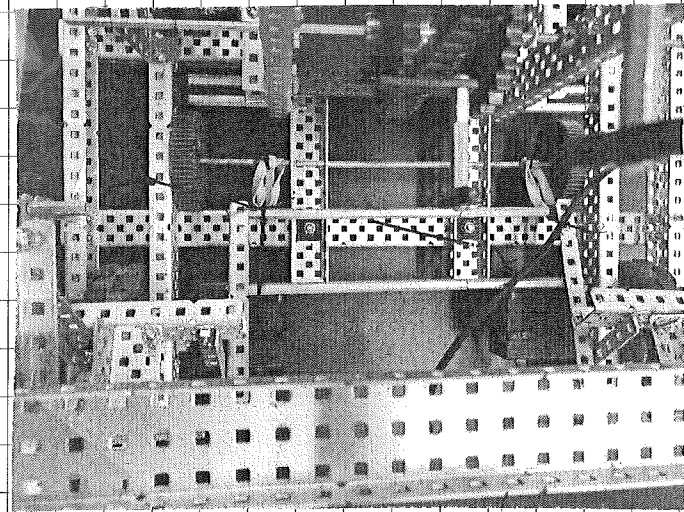
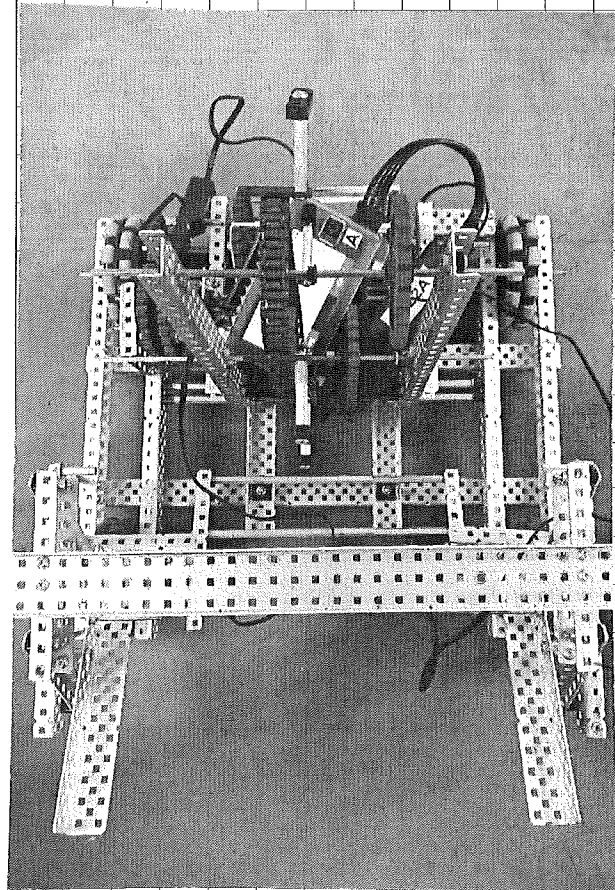
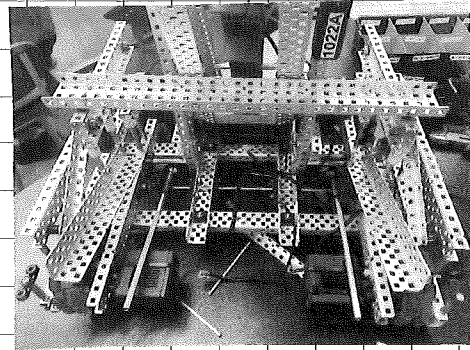
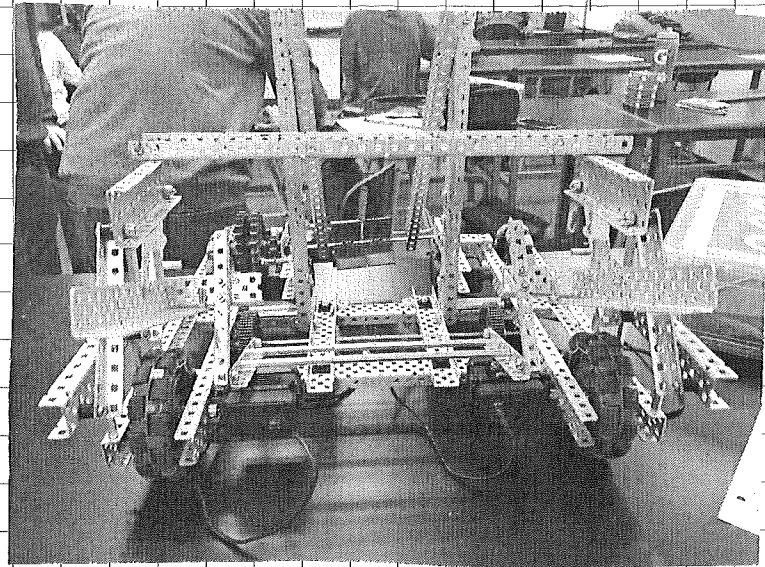


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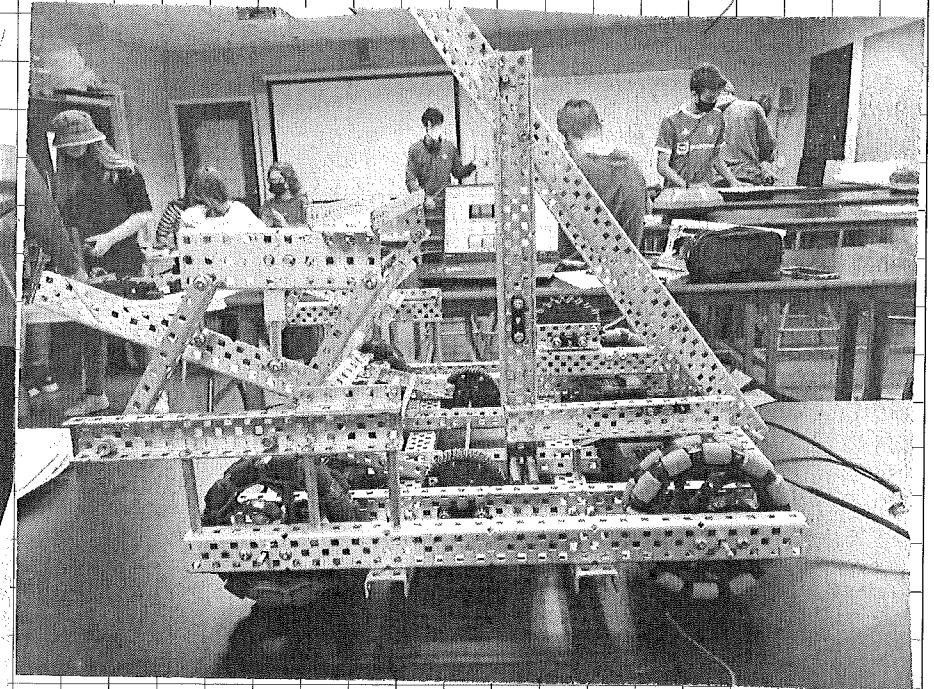
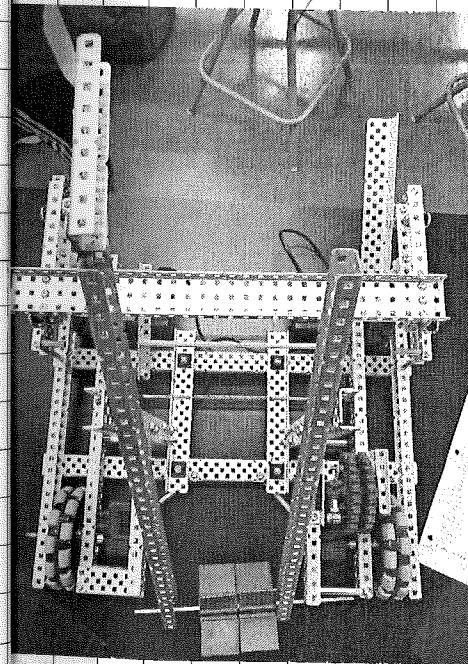
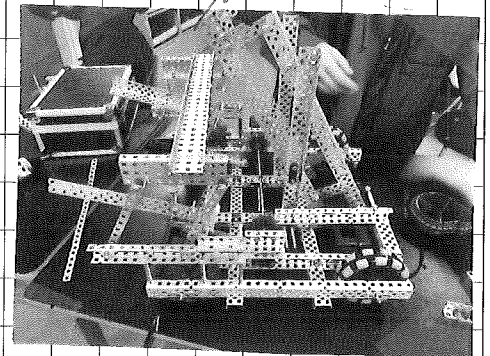
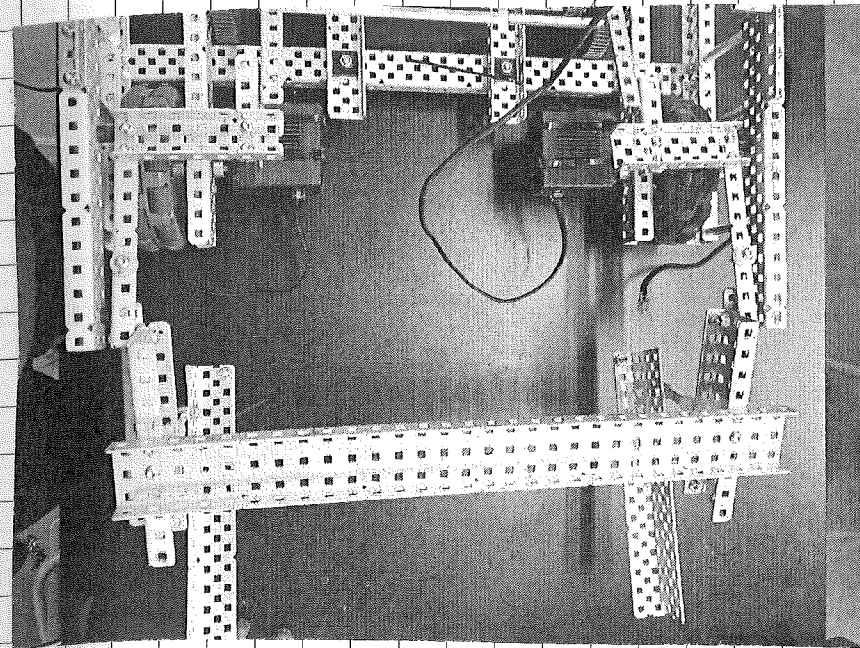


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BOOK NO. 1

NOV. 4, 2021 - BUILD DAY & ~~Brain~~ BRAIN STORM

Repair damages to robot and brain storm new designs for new bot. Our ~~robot~~ old bot was quite heavy and big. For our new design, we plan on having a more compact design, with a 4-bag left in the front, ~~an~~ an elevator to score rings and a "claw" in the back that catches the top of the mobile goal, pinning it between the frame in frame. and in

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NOV. 5, 2021 - BRAIN STORM

We want our robot to be similar to 355V's (Orange Mamba) robot as it is a good combination of size, speed, and scoring ability. However, they have access to pneumatics so we will have to make changes and maybe omit certain functionalities to make it work w/ 15 smart motors (namely the rake type mechanism that is used during auton to attempt to score/grab the 2 ~~neutral~~ in 2 of the 3 neutral mobile goals in the center). Also, that mechanism had limited success, as shown in the videos).

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Nov. 8, 2021 - BRAIN STORM

We brainstormed over the weekend. We considered using a ~~mechanism~~ base as strafing would ~~again~~ allow more opportunities during autonomous, but ultimately ~~settled~~ ~~against~~ ~~in~~ against it as it added considerable weight to the chassis and there were not many teams using such a configuration in the tournament videos we reviewed.

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BOOK NO. 1

Nov. 9, 2021 - BRAIN STORM

We also ~~considered~~ ~~in~~ decided to not include a wedge for our new robot. ~~Most~~ ~~in~~ It's possible to get on top of the platform using the lifting arm, also ~~if~~ ~~we~~ ~~are~~ ~~able~~ to elevate mobile goals efficiently, then ~~than~~ ~~in~~ the points from elevated goals would out way any points we may gain from an elevated robot.

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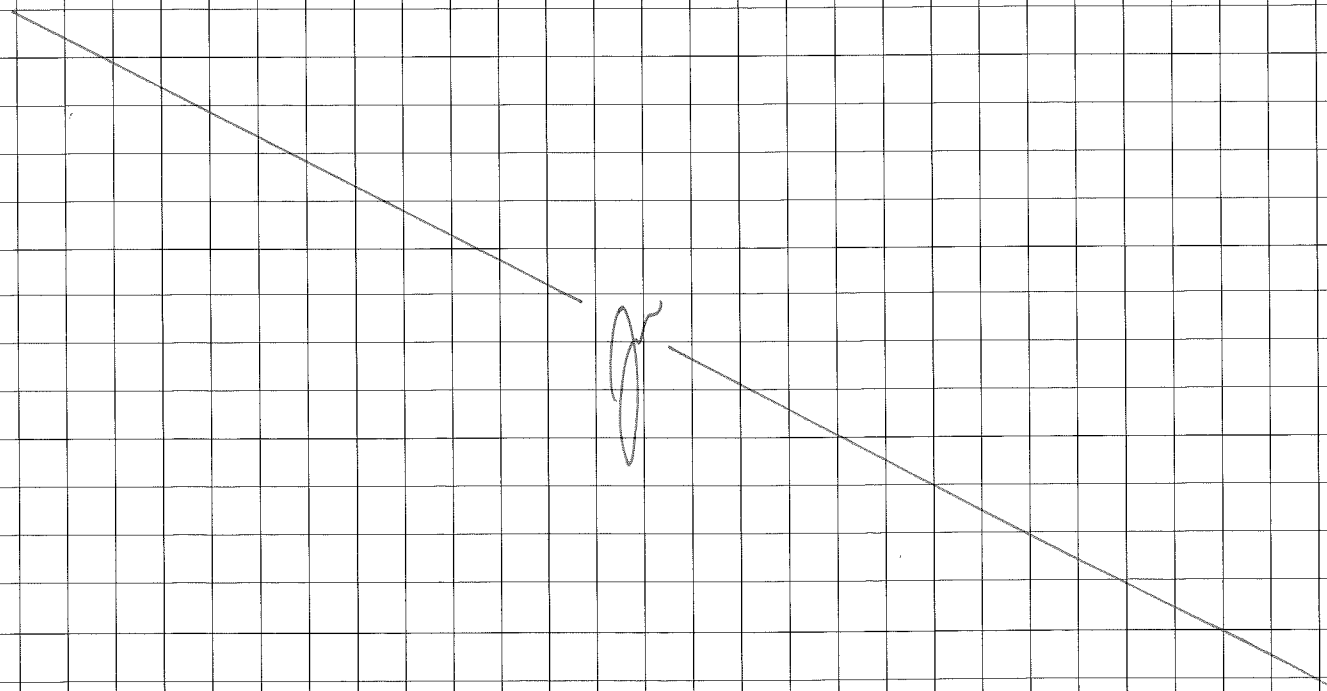
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BOOK NO. 1

Nov. 10, 2021 - BRAINSTORM

We also stumbled across 60883D's robot. We liked the use of a LEXAN plate to get under the lip of the mobile goal and ~~sample~~ in the C-channel piece used to secure the goal. Also we like the compact design and limited travel of the lifting arm, reducing the time it takes to score, although we will make our robot slightly bigger, as we believe they are using a 25 hole C-channel base which ~~is~~ in we believe is a bit too small.



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BOOK NO. 1

Nov. 15, 2021 - ROBOT DISASSEMBLY

We ~~too~~ in took our robot apart.

ROBOT #1: ~~RICHARD~~ in RICHARD in RICHARD - ANALYSIS

Our first robot consisted of a 35 hole long by 35 hole wide tank drive base w/ 3 in 9" omni wheels that were directly powered by the motors. ~~It~~ in To score, we had an elevator to score rings (35 hole long @ ~45° angle, connected to chassis w stand offs), a mobile goal lift to ~~move~~ in position the mobile goal ~~on~~ in ~~up~~ in under the elevator hood, finally, we had a wedge @ ~140° angle used to push the platform down. Overall, our first ~~robot~~ in robot was alright. We ~~got~~ in ended w/ an unofficial skills score of 176, the main thing holding our robot back was the speed of ~~an~~ ~~back~~ in ~~to~~ in our back lift. We had a ~~5~~ in 1-5 gear ratio w/ red cantilevers and a large travel distance, hence it took ~3 seconds to lower the lift which added up over time.

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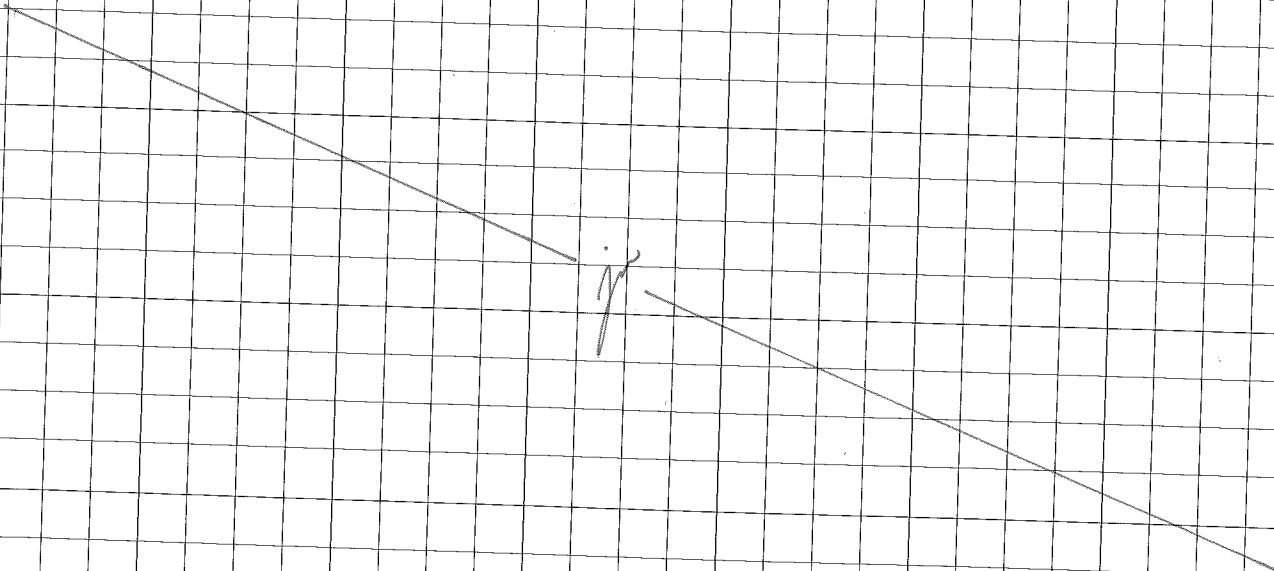
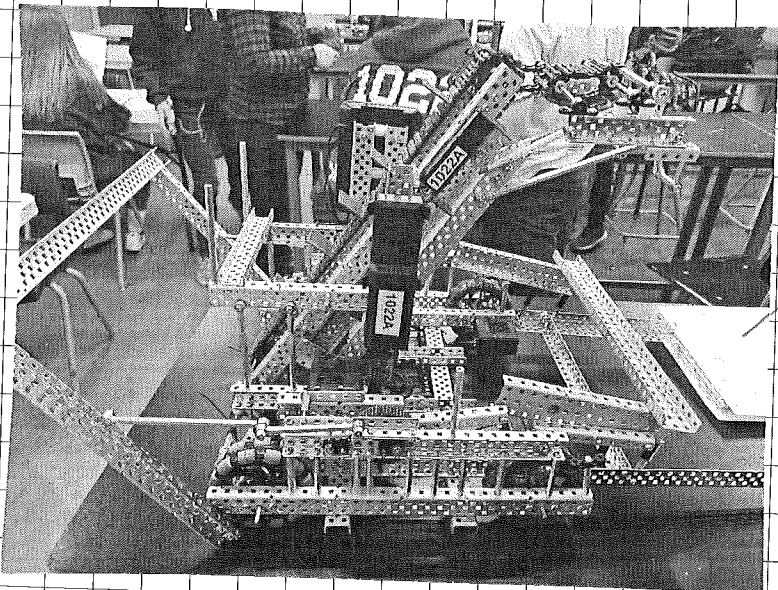
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ROBOT #1 ANALYSIS - CONTINUED

We hope with our new back intake we can significantly reduce the time it takes to pick up/move mobile goals.



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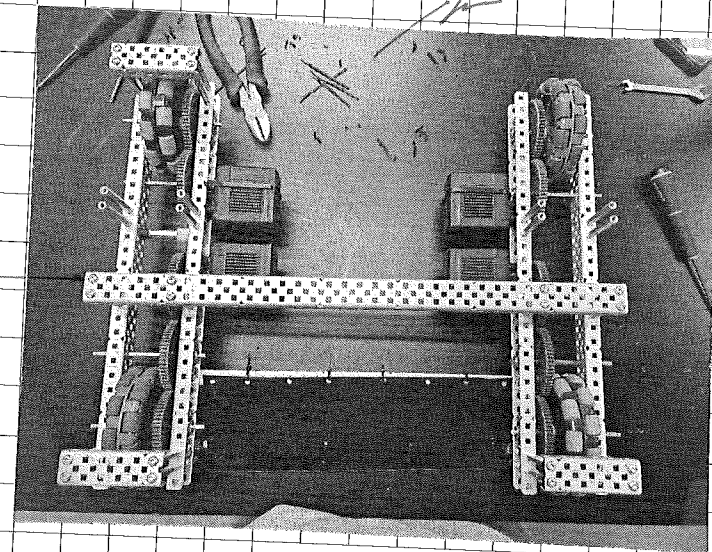
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BOOK NO. 1

NOV. 16, 2021 - BUILD DAY - CHASSIS

Bob built new drive base. 30 holes long by 35 holes wide. Some our last robot had some 20 pin issues with the game elements making contact with the motors, so we used 60T gears to power the wheels w/ the motors in pin near the center of the chassis. We had 3 gears in the back (side w/ mobile goal intake) and 2 gears on the front (side w/ lifting arm). We supported the chassis w/ a 35 long c-channel on the bottom and another 35 long c-channel on top w/ 50mm stand offs on top. C-channels were mounted on top and below where the motors were mounted.

new base

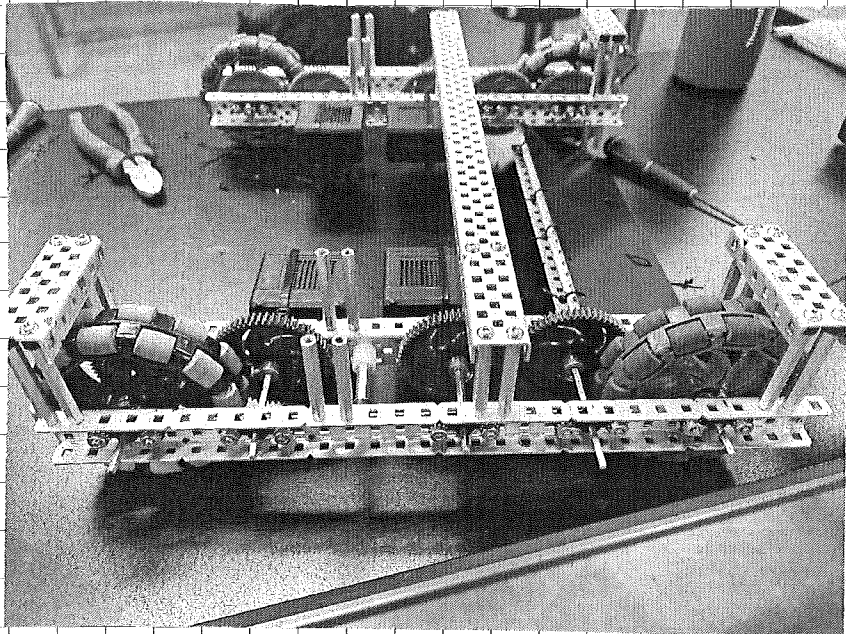


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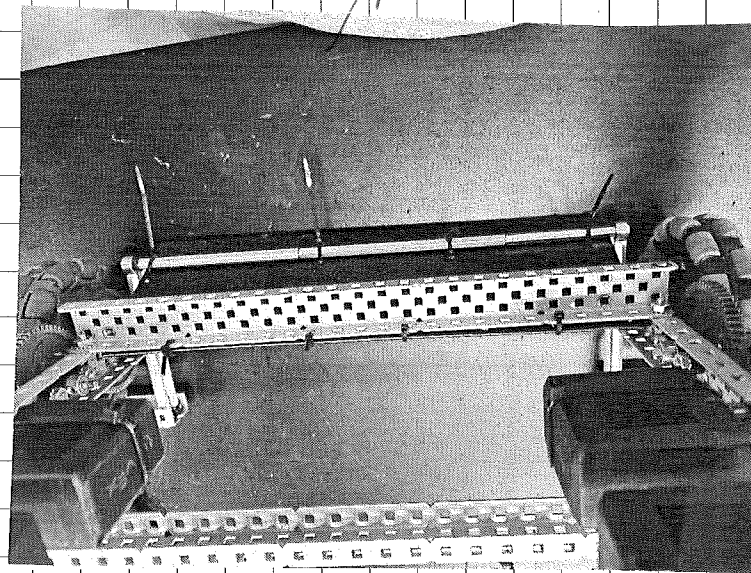
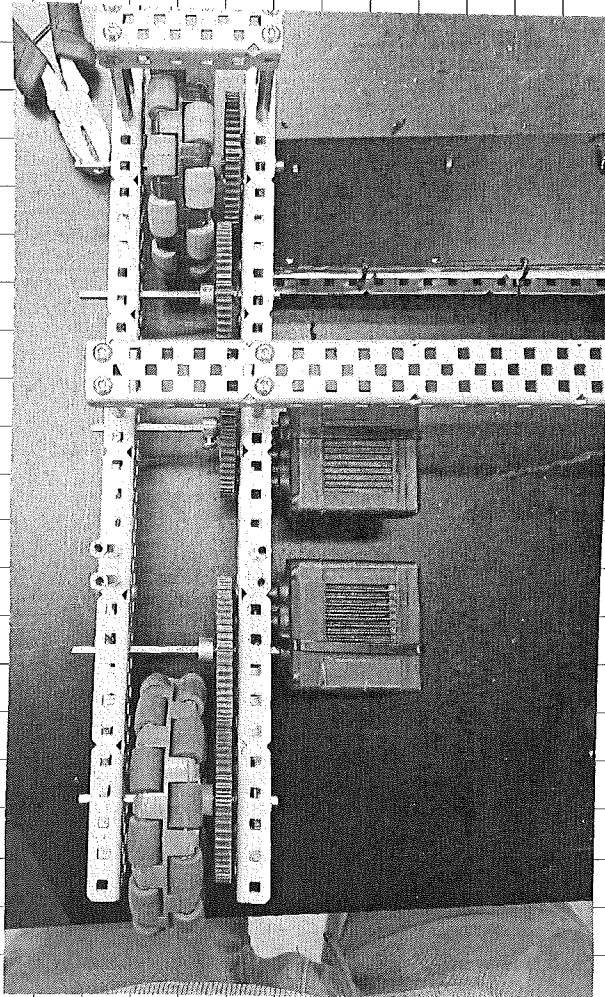
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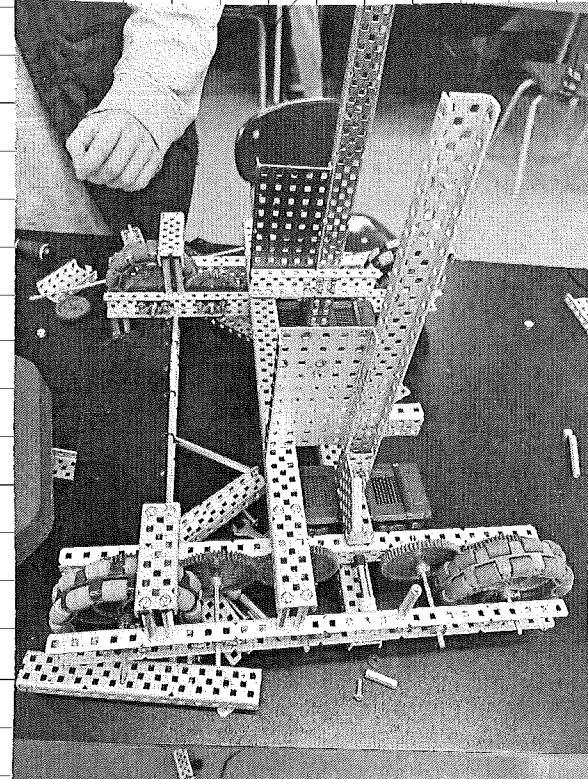
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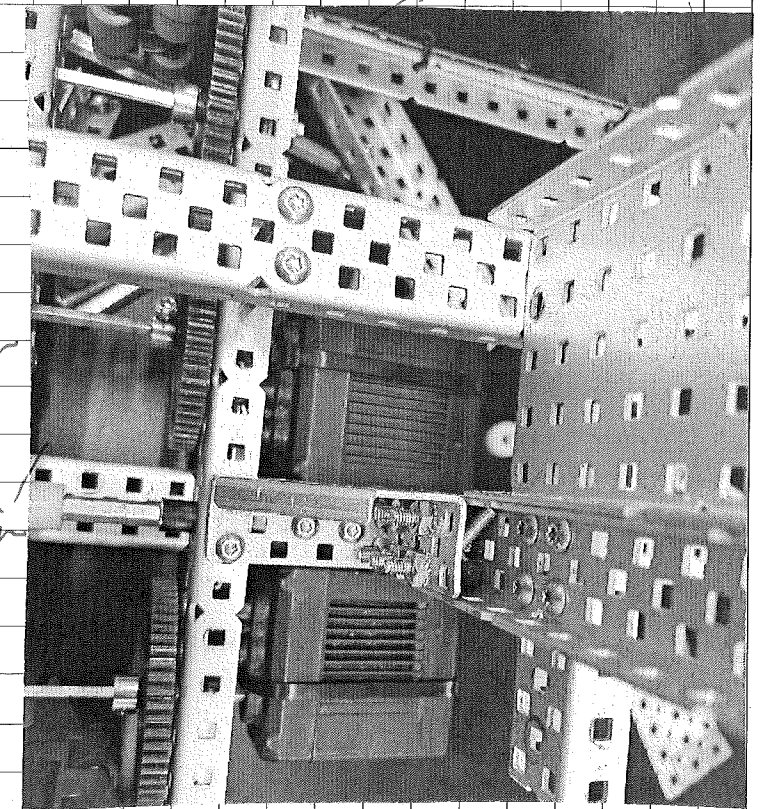
BOOK NO. 1

NOV. 17, 2021 - BUILD DAY - CHASSIS

Added vertical c-channel structures for elevator and mobile goal intake. Used 30 long c-channel and mounted to chassis using standoffs (25mm) and 43pin 45° mounting bracket. Also cut a 285mm long by 95mm wide piece of c-channel for the pin from LEXAN for the ramp used for the mobile goal intake. 43pin Used 25 long c-channel & various stand off to connect c-channel to chassis & LEXAN to c-channel.



SUPPORT



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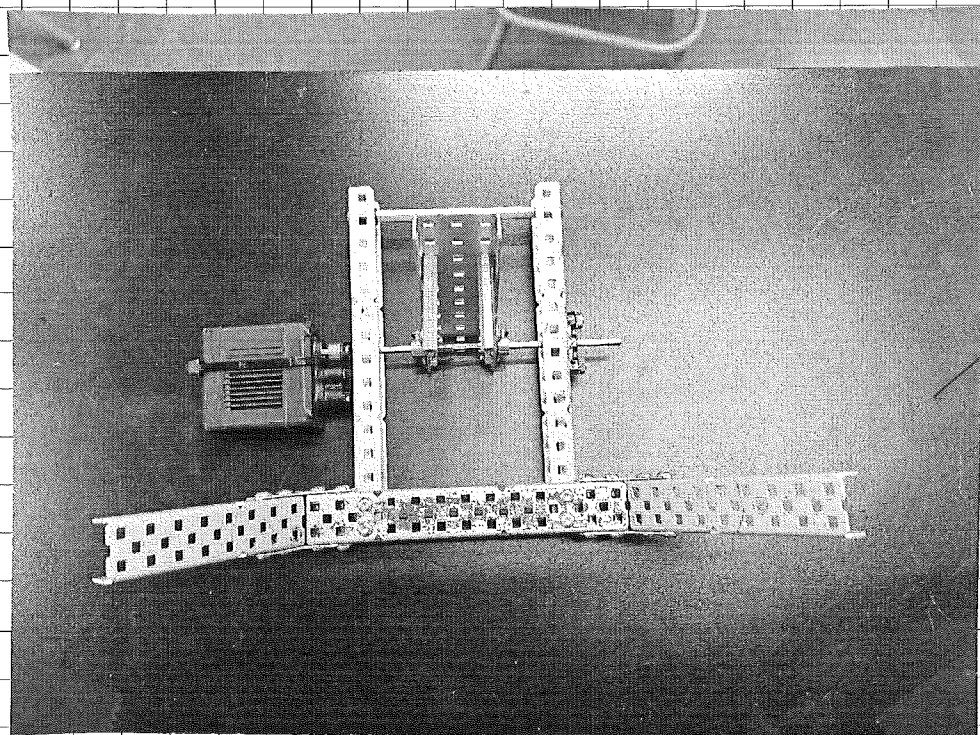
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Nov. 18, 2021 - BUILD DAY - CLAW

- Built claw used to grip mobile goal. Used 15 long c-channel w/ 8-jm connected-jm with 8 long c-channel connected on each side using 45° angle brackets as a way to correctly position mobile goal for claw. 2x15 long c-channel mounted on back vertically to house motor and moving part of claw. Moving part made from 3 wide - 10 long c-channel with 2 75mm long stand offs in the 8th hole to grip onto the bowl of mobile goal.



CLAW

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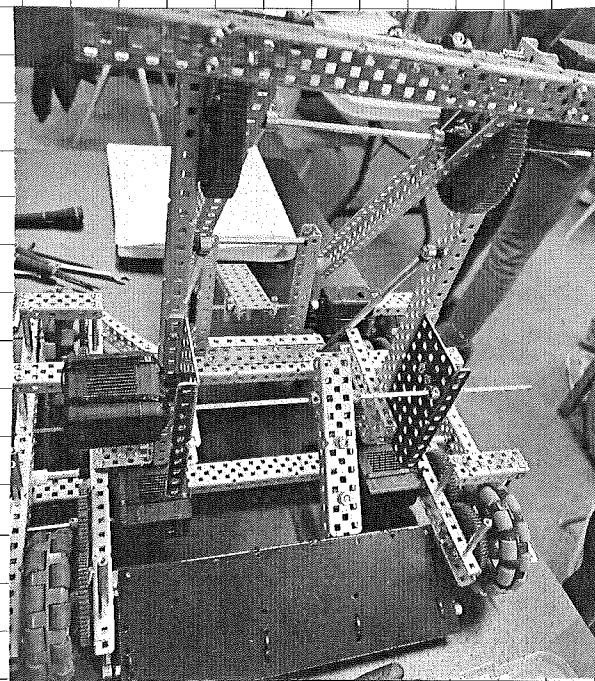
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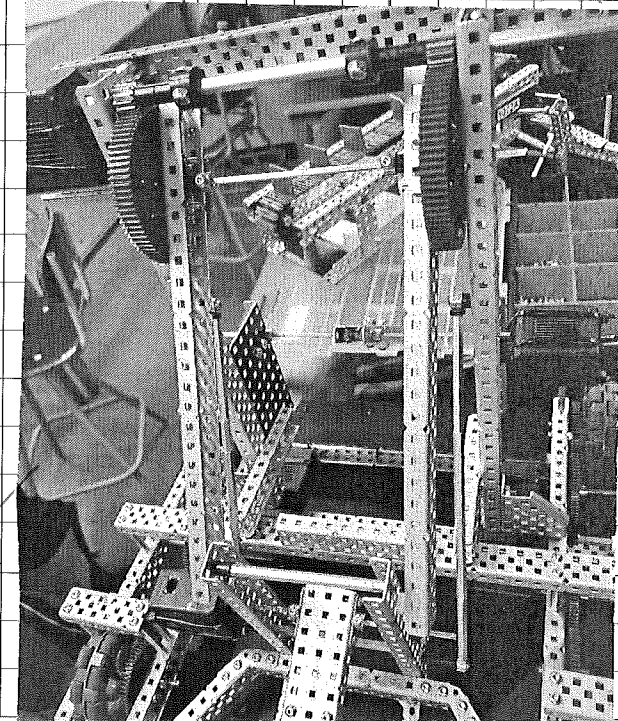
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Nov. 19, 2021 - BUILD-jm BUILD DAY - LIFTING ARM

- Added 85-jm 84T gear to end of 30 long c-channel and mounted on 5th middle hole (from top) of vertical c-channel. Drilled hole in top most middle hole of c-channel & mounted 12T metal gear w/ high strength axel to power 84T arm. Stand offs mounted w/ shaft collars onto 12th hole from top. The 30 long c-channel & stand offs mounted onto claw. Also flipped orientation of lifting arm (originally was on side w/ 2 60T gears-jm gears). Top of vertical c-channels supported using 25 long c-channel.



ARM



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NOV. 22, 2021 - BUILD DAY

- Adjusted components of lifting arm to mesh gears together better. Replaced the 25 long c-channel used to support the vertical structure w/ 25 long angle bracket.

NOV. 23, 2021 - BUILD DAY - ELEVATOR

- Atjm attached elevator from previous robot into jim in between the vertical c-channel. Fits pretty well. Need to make another LEXAN sheet to funnel rings towards elevator. Rebuilt elevator to make it fit better inside robot and cut ~2 holes off of elevator.

NOV 24, 2021 - BUILD DAY - ELEVATOR

- Adjusted eleva jim elevator to fit within size limit, & tweaked tap down. Need / jim consider redesigning back hood, as inconsiste jim inconsistent w/ getting rings onto mobile goal branch.

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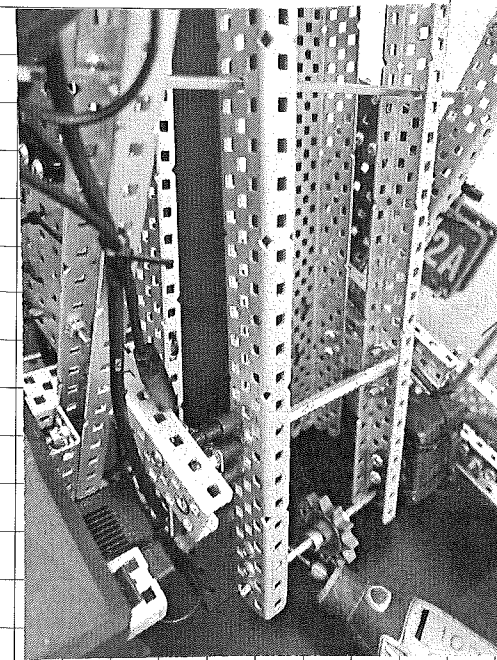
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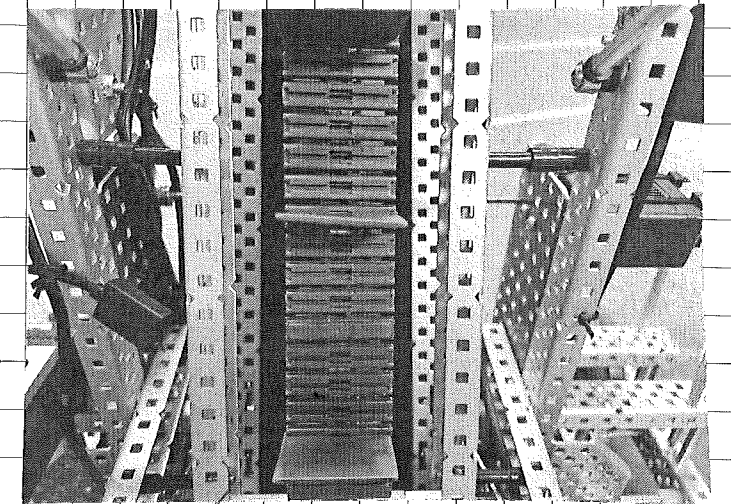
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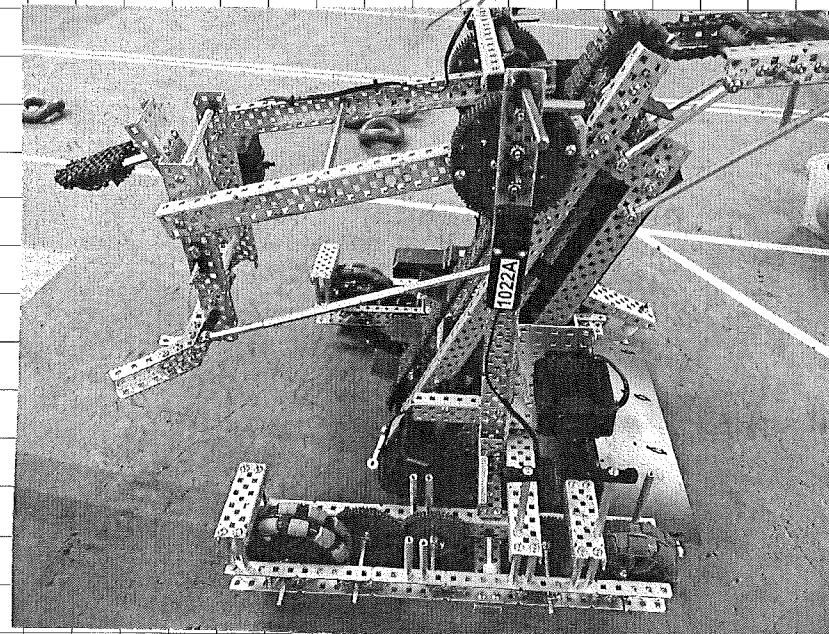
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ELEVATOR STRUCTURE



ELEVATOR w/ CHAIN



COMPLETE BOT

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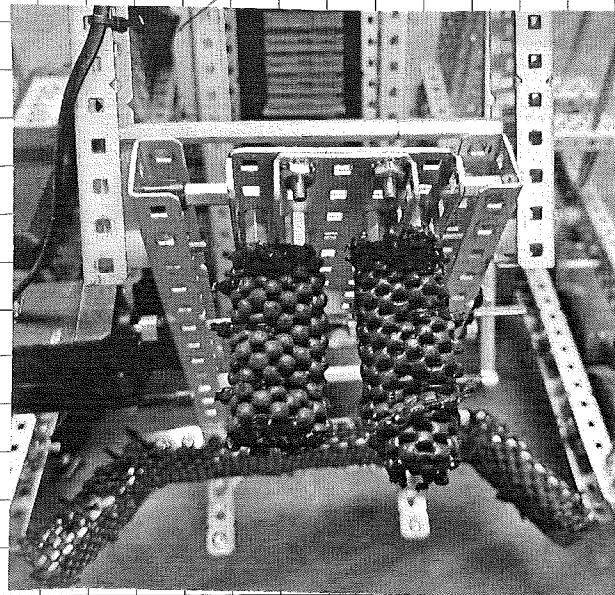
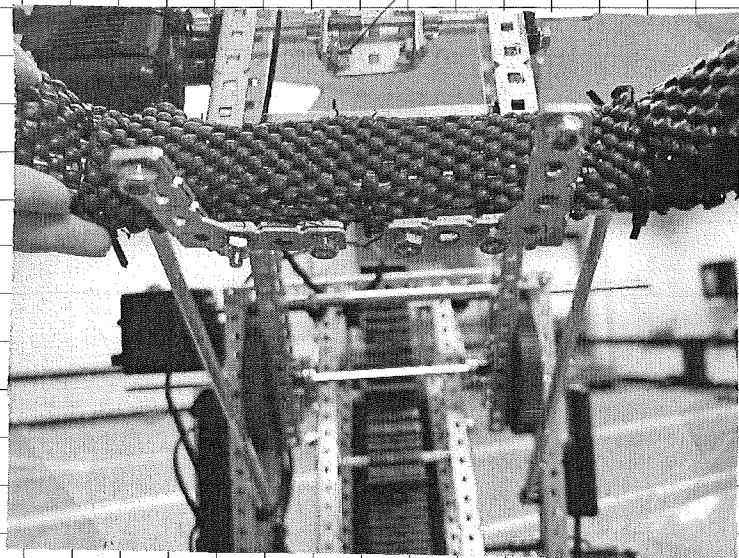
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NOV. 25, 2021 - TEST / CABLES

- Managed cables & wired motor. Tested robot, need to fix speed of lift & change bearing brake type to hold. Attached inertial sensor & battery mount.

NOV. 26, 2021 - CLAW

- Some times claw would lose grip of mobile goal, added friction fabric to the ^{win} in alignment c-channel & stand off. Improves but still sometimes drops. Consider redesign.



CLAW WRAPPED w/ FRICTION FABRIC

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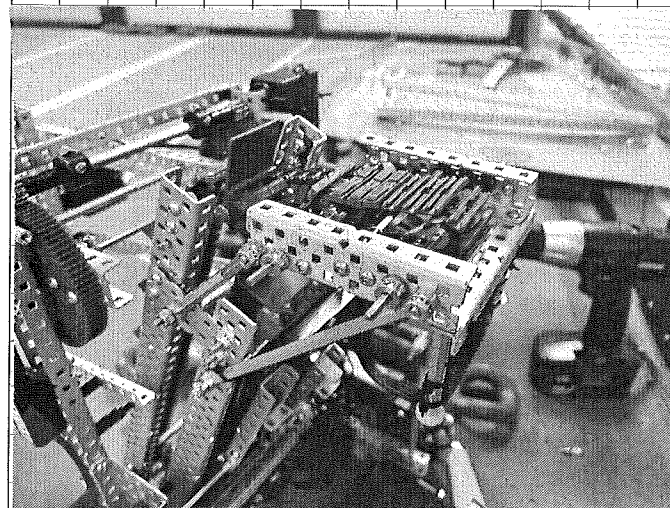
NOV. 29, 2021 - RINGS / ELEVATOR

- Work on elevator. Ring doesn't score consistently (~60%). Switched stand offs to ~3.75" + ~2.5" ^{win} LEXAN.

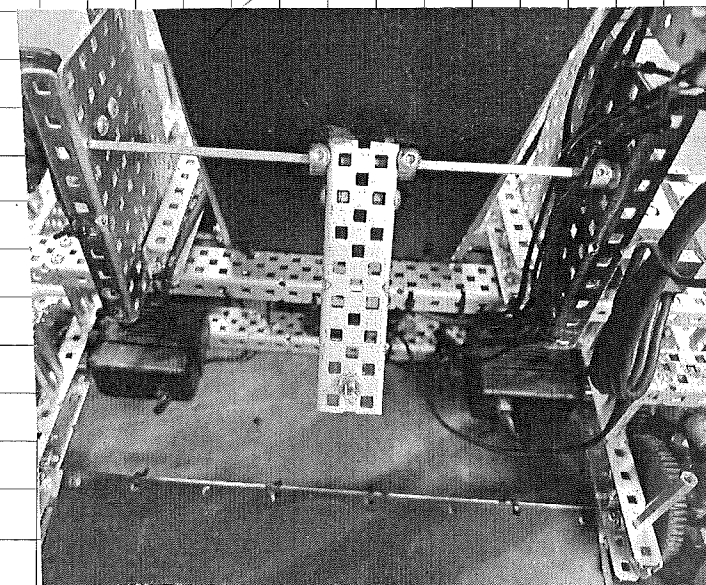
Rings have too much space, ^{win} by the time they hit the LEXAN, they are no longer parallel. Tried cutting LEXAN elevator didn't help.

NOV. 30, 2021 - ELEVATOR

- Worked on elevator & cable management.



CUT TAPE DOWN



ZIP-TIED CABLES

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Dec. 1, 2021 - ELEVATOR

- Worked on elevator, tried different solutions for top down, none are satisfactory.
- Changed claw design to angled prongs made from 45° gaskets and 5 long c-channel.

DEC. 2, 2021 - ELEVATOR

- Tried different designs for top of elevator (moved top of chain 3 holes down). Reduced the speed/randomness of rings but problem not 100% fixed.

DEC. 3, 2021 - AUTON

- Worked on auton & tried to fix elevator. Made top c-channel shorter and moved the chain 1 hole forwards & down and reduced friction.

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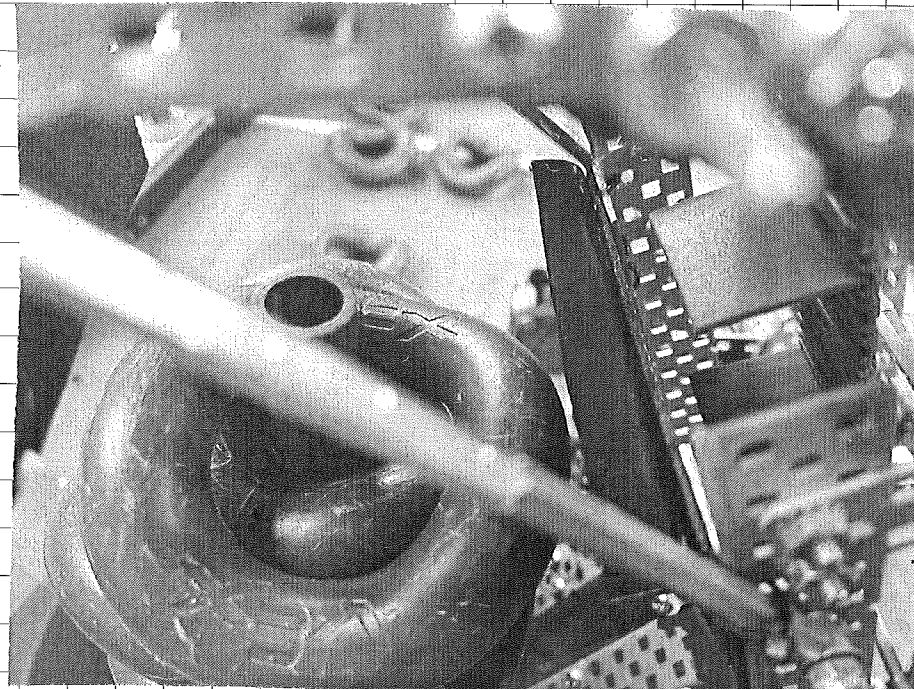
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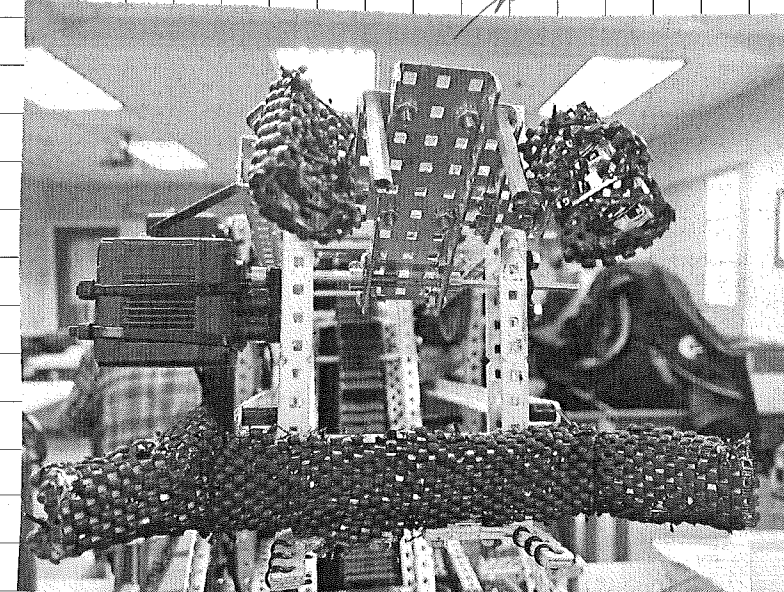
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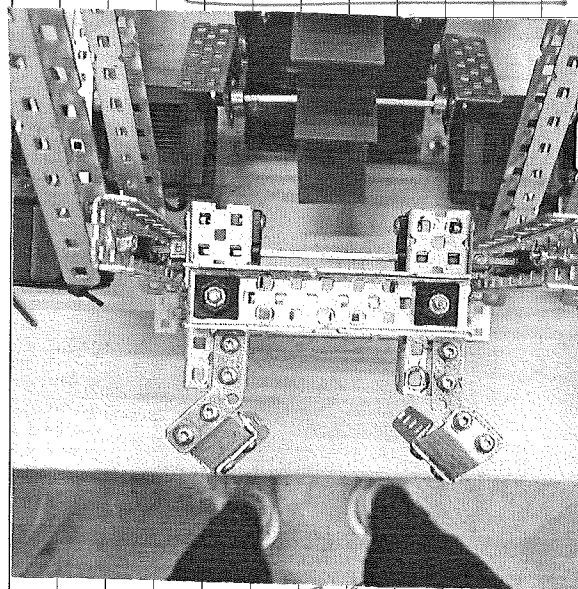
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ELEVATOR w/
LEXAN LDR



CLAW w/ Hooks (V2)



NEW CLAW w/ FABRIC (V3)

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DEC. 6, 2021 - ELEVATOR WORK

Practiced driving, worked on auton & tried to fix elevator. "Randomness" still persists. Changed the kegs to nylocks for end jrm stand offs attached to hood.

DEC. 7, 2021 - AUTON & ELEVATOR

Worked on auton & tried to fix elevator. Moved LEXAN Rjm ramp on back I hole inside of the chassis to lift the goal higher within the elevator, to minimize minimize the room the ring has to move. Worked but elevator is still not satisfactory.

DEC. 8, 2021 - AUTON

Worked on auton. Made tool using 3 35-long c-channels that aligns robot with yjrm neutral mobile goal. Plan on having auton grab a neutral goal, pick up an alliance mobile goal, and then move back and forth to pick up and score the match load rings during auton.

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DEC. 9, 2021 - ELEVATOR WORK

BENT a ~4" x 3" LEXAN sheet to be perpendicular when attached to elevator. Changes most of vertical energy to horizontal which is jrm, so when the ring hits the hard stop, it goes straight down instead of sideways or diagonal.

DEC. 11, 2021 - SHAWNIGAN TOURNAMENT

Adjusted elevator lip before matches as gaps in tiles @ shawnigan sometimes caused robot to get caught.

MATCH # 1 1022A & 1264A V. 7842C & 7842H = 100:60

Match went pretty smoothly. Rjm Robot would get stuck on rings. We added zip ties & screws across base to minimize chance of robot getting caught. Auton didn't work.

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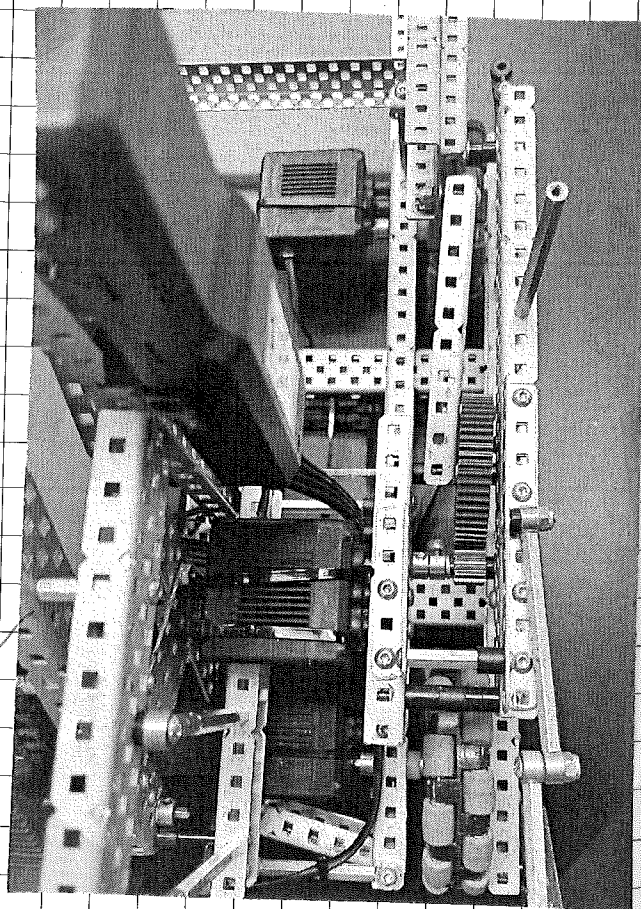
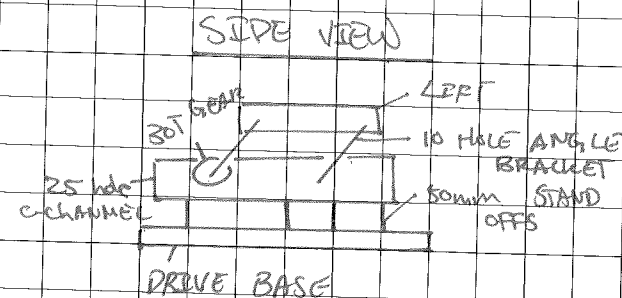
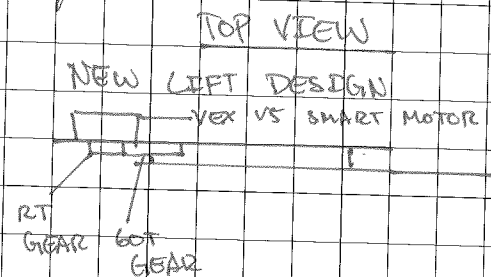
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OCT. 6, 2021 - BUILD DAY & TOURNAMENT

We had a tournament between the teams in the robotics class. We competed in one match, however, we pulled out after as it was a better use of time to continuing building the robot, as we did not have any working scoring mechanisms built. We also scrapped the previous lift design and decided to just use 2 motors to directly power the lift.



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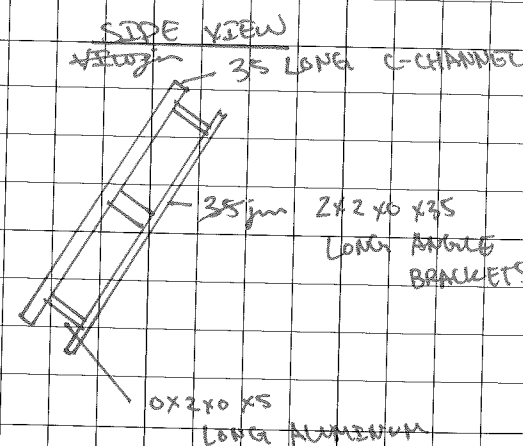
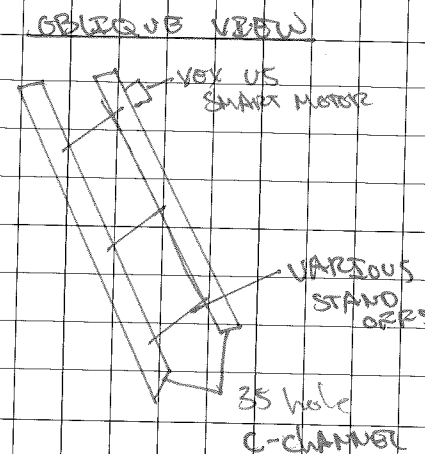
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OCT. 7, 2021 - BUILD DAY - ELEVATOR

We finished the main structure of the elevator. We used 2x2 angle brackets to join, 2 on the bottom and 2 C-channel on top to form a "funnel" for the rings to travel up. The C-channel piece is connected to the 2 supporting 25 long C-channel we had previously built using stand offs. The C-channel is then spaced slightly wider than the width of the rings using stand offs between the 2 C-channel pieces. The 2x2 angle brackets are then attached under near underneath the C-channel using 5 x 2x0 pieces of aluminum.

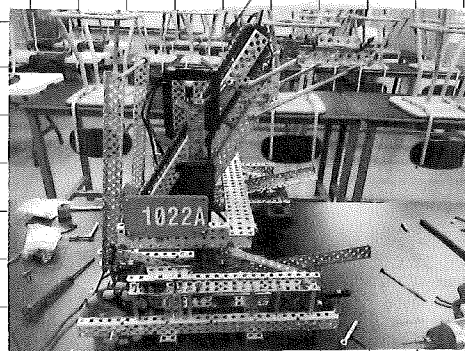
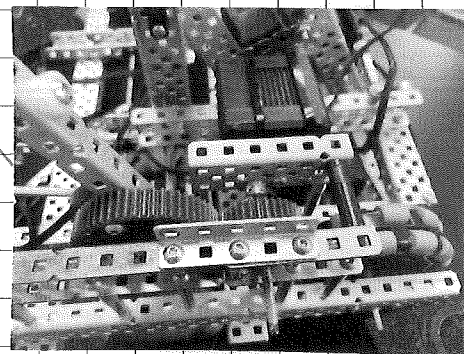
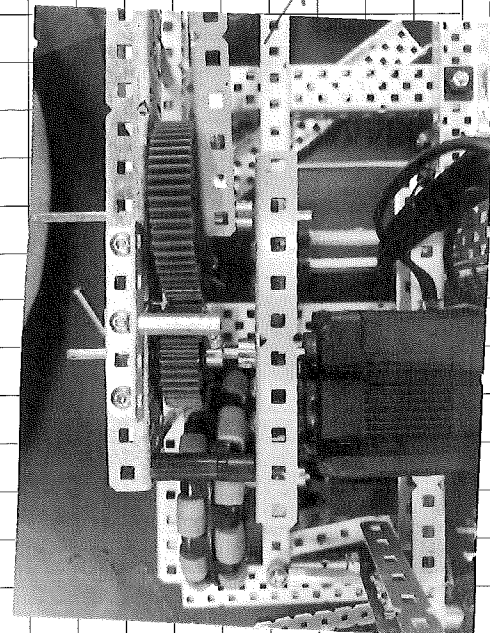
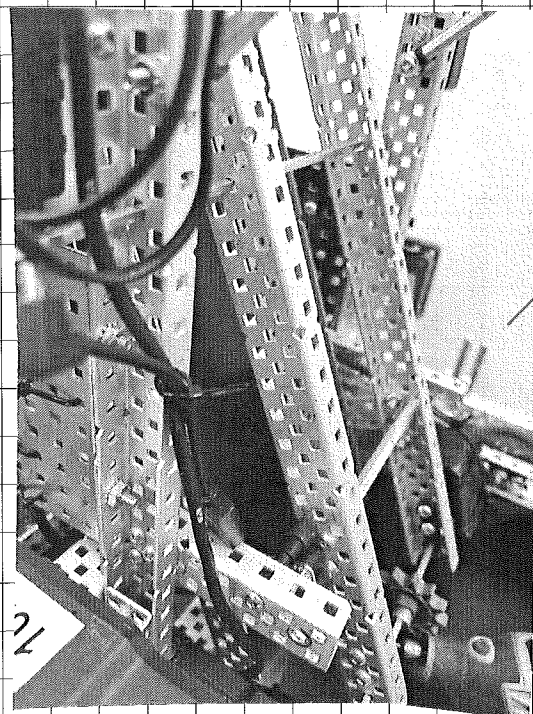
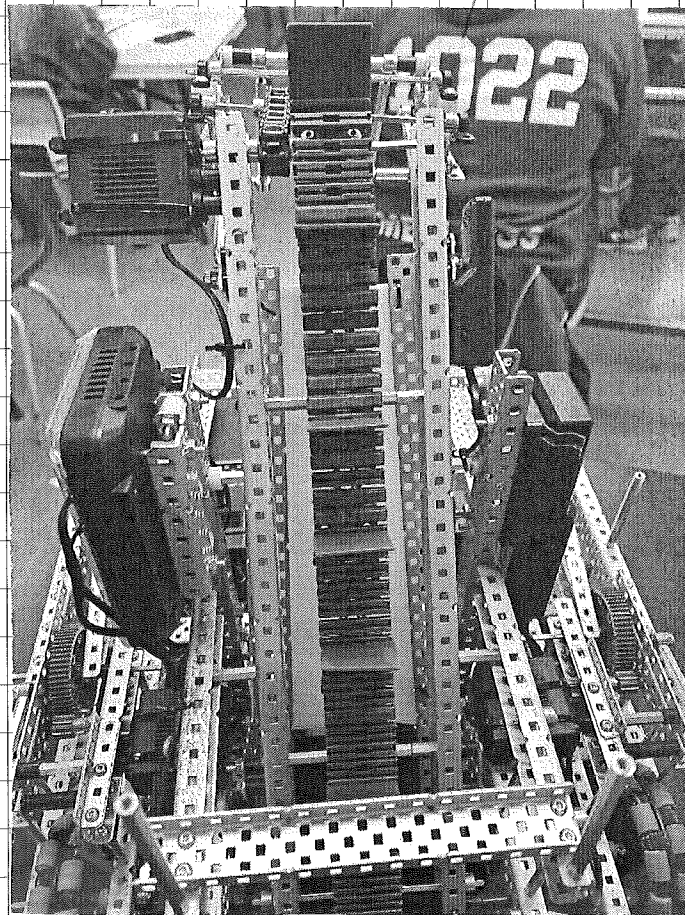


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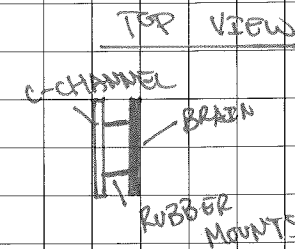
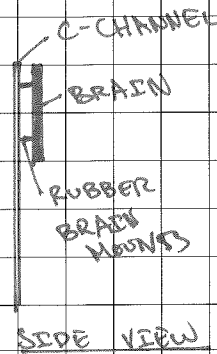
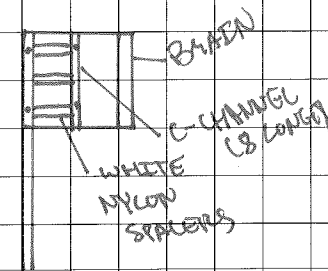
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BOOK NO. 1

OCT. 8, 2021 - BUILD DAY - ELEVATOR & MORELS GOAL LEFT

Added rubber tread with rubber flippers spaced about 6 pieces apart. Flippers catch the rings on the divots and bring them up the funnel. Tested optimum placement for the left such that it is as low to the ground as possible, also fine for in tunnel spacing. Added brain using c-channel attached to 25 long c-channel support and largest white nylon spacer connecting the 2 pieces of c-channel together.

BACK VIEW



- 1 x 1x2x1, 8 long c-channel
- 1 x VEX VS BRAIN
- 4 x Rubber brain mounts
- 3 x Largest white nylon spacers.

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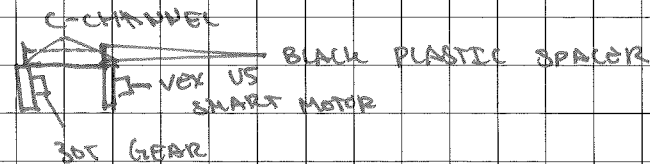
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BOOK NO. 1

OCT. 12, 2021 - BUILD DAY - MOBILE GOAL LIFT

Finished building new mobile goal lift, tested and works but not enough torque to pick up mobile goal, so will switch green cartridge to red. Also need to add additional support to the c-channel around the gear.



OCT. 13, 2021 - BUILD DAY - MOBILE GOAL LIFT & ELEVATOR

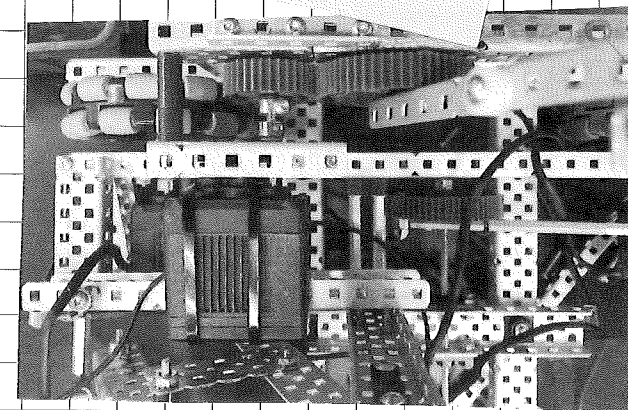
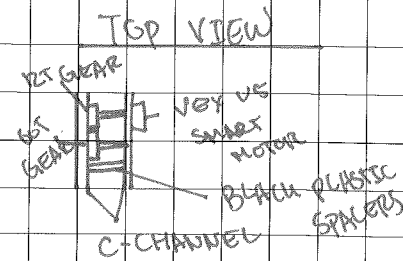
Red cartridge still not enough torque, so changed 30T gear to a 12T gear that drives the gear that the axle bracket is connected to. Also switched screw joints used to connect gear to the c-channel to axle and spacers. Axle connects across the joint to connect with c-channel that motor is mounted on. Used various black plastic spacers to ensure that the gear doesn't shift out of place.

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BOOK NO. 1



OCT. 14, 2021 - BUILD DAY - LIFT

Worked on fine tuning position of lift, so it is roughly in proper spot for the elevator, also added hard stops at top and bottom to limit range of motion. 1x3x1x30 long c-channel that ran across the lift to make sure they ran parallel also acted as a hardstop for the goal in mobile goal.

OCT. 15, 2021 - BUILD DAY - ELEVATOR

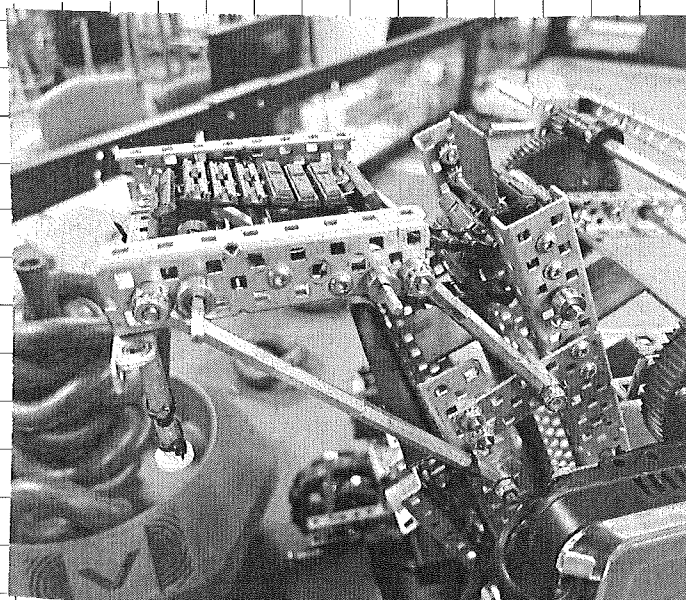
Added hood for elevator, so when the rings go up and bottom hit it, they land on the mobile goal branch. Hood is made using 8 shaft collars, 4 in stand offs of various lengths and a ~4" x ~4" of LEXAN.

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BOOK NO. 1



OCT. 18, 2021 - BUILD DAY - ELEVATOR

Adjusted hood. We need a stand off to go across the hood to ensure that the hood remains straight and the ~~the~~ ^{both} ~~both~~ ^{both} sides will be at equal height. However, ~~some~~ ^{the} top of the mobile goal gets stuck/hits the stand off. So we used 1x1x0.25 long angle brackets to mount the stand off above the LEXAN hood.

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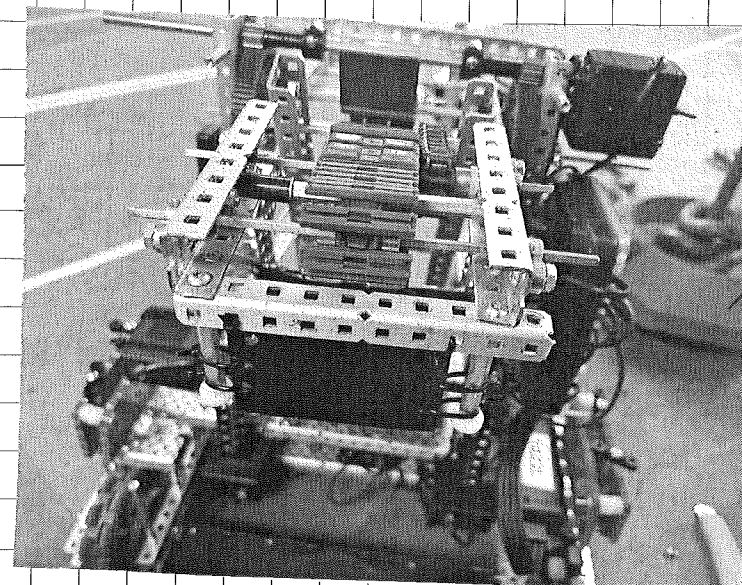
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BOOK NO. 1

OCT. 19, 2021 - BUILD DAY - ELEVATOR

Some times the ropes would slip in between the gap between the angle brackets, so we made a ~~zip tie~~ ^{zip tie} between the gap. ~~The zip tie~~ ^{The zip tie} only proved to be a partial solution as there were still gaps for the ropes to fall into, so we cut a ~3.5" x ~12" piece of LEXAN and drilled holes into the corners and attached the LEXAN to the angle brackets. This completely fixed the problem as there were ~~no~~ ^{no} longer any gaps.



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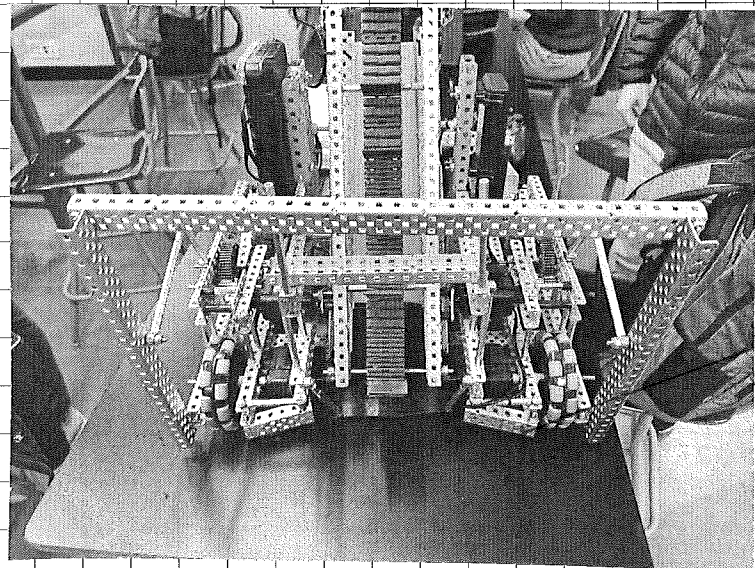
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BOOK NO. 1

OCT. 20, 2021 - BUILD DAY - WEDGE

- Tested multiple designs for the wedge. 1st was mounted onto the horizontal c-channel that supports the elevator. It used 2 25 long c-channel pieces that were connected together using stand offs and black plastic spacers. During testing the 1x2x1 5 long c-channel pieces would hit against the edge of the platform, as the wedge didn't push the platform low enough. Wedge was mounted onto c-channel using a screw joint.



Platform would hit c-channel

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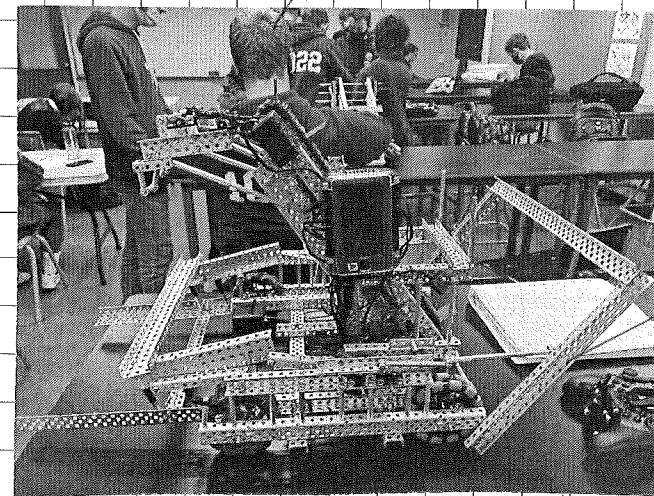
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BOOK NO. 1

OCT. 21, 2021 - BUILD DAY - WEDGE

- Tested new variation of wedge. Instead of connecting onto horizontal supports for elevator, we now connected the c-channel onto the return piece of c-channel used for the drive base. Bearing flats were attached to 30-long c-channel using a screw joint connecting in connected joint was used to connect the pieces to the chassis. The c-channel pieces were connected using stand offs and various plastic spacers.



Worked consistently

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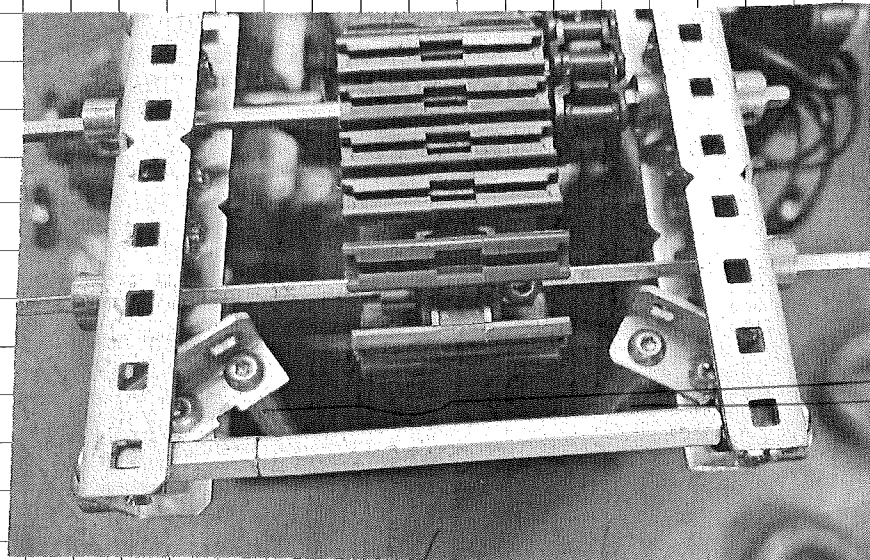
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BOOK NO. 1

OCT. 25, 2021 - BUILD DAY - ELEVATOR

• Added vertical stand offs to hood as a hard stop for the rings. When the rings hit mobile in stand off the pressure in momentum is then directed downwards and onto the mobile goal branch. Additionally, we switched the LEXAN hood with rubber tread, so there is more space for the mobile goal. The axel holding the sprocket and in that the rubber tread is connected to is connected onto the hood using the largest size of nylon white spacers and the pillow bearings.



stand off

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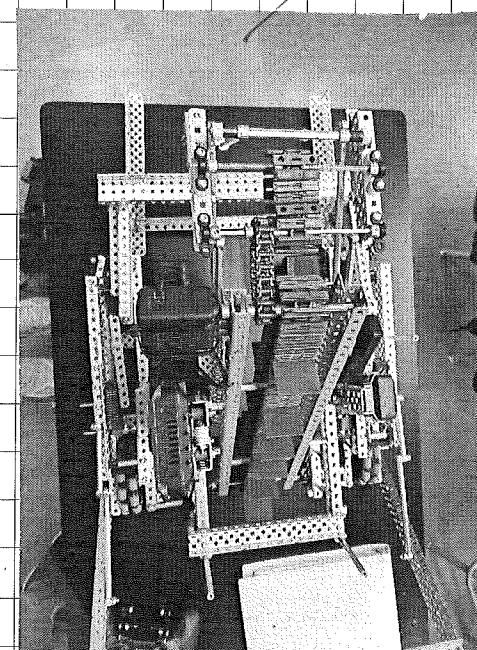
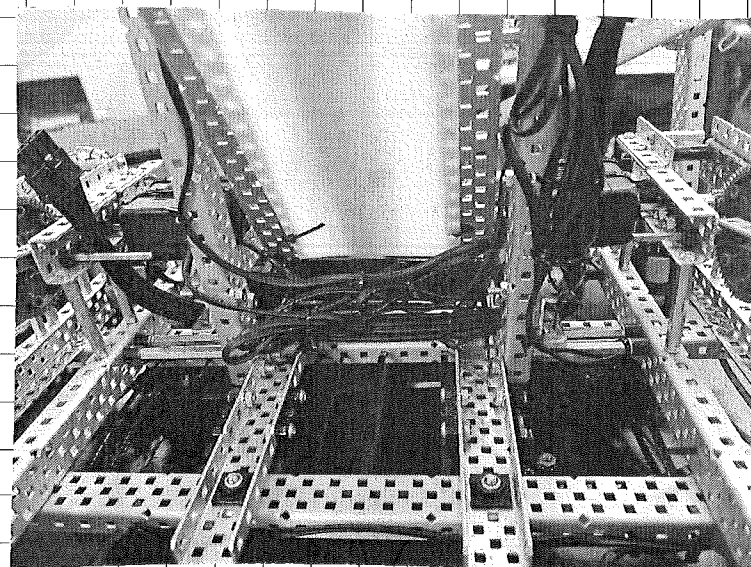
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BOOK NO. 1

OCT. 26, 2021 - BUILD DAY - MOBILE GOAL LIFT

• Added in lowered mobile goal lift by doubling number of spacers in spacers used to attach the "firm" "lifting" part of the mechanism to the "moving" part of the lift. We also added a metal C-channel piece across the "lifting" portion of lift to position the mobile goal properly under the elevator.



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BOOK NO. 1

OCT. 27, 2021 - BUILD DAY & TESTING.

• First day testing all the scoring elements together.

Elevator sometimes missed rings (~15-20% of time) so will redesign the top down mechanism. Mobile goal lift in jir travel takes too long, so will definitely have to rebuild for next tournament. Takes approx. 2-3 seconds to fully lower to pick up goal. Additionally, sometimes while stop very quickly or turning 360°, the mobile goal slips off the lift. So added 2 1" screws to the 6th hole from the tip of the lift to act as handstops to prevent the goal from moving around too much. Spent ~30 mins practicing picking up goals.

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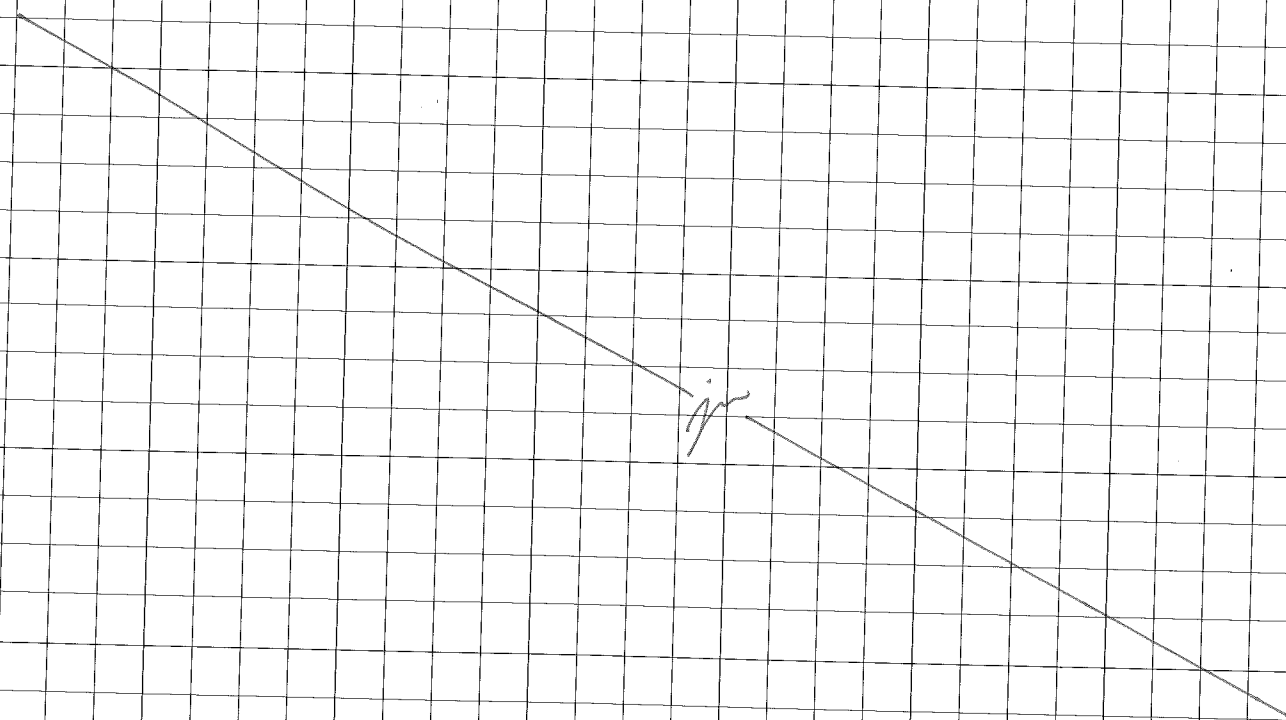
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BOOK NO. 1

OCT. 28, 2021 - DRIVER PRACTICE & PLATFORM

• Tested platform mechanism. To get on top, you have to slowly push w/ wedge. Works pretty well, only issue in jir issue is that it is quite difficult to line up the wedge perpendicular to platform, as since we are using tank drive, when turning one side slides more than the other. Hence the jir one of the sides will make contact before the other, hence we need to slowly push against the platform.



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BOOK NO. 1

OCT. 29, 2021 - PLATFORM & LIFT PRACTICE

Tested lift w/ neutral mobile goals. Works fine, ~~along jms~~
 although you can't retract the lift all the way as the longer
 mobile goal branch hits the hood/fap down (retract to ~50%).
 Also added hand stop for wedge to rest against before
 match starts. ~~At jms~~ Made from 2 stand offs attached to
 the C-channel used to support the elevator. Also added
~~no jms~~ more points of connection between elevator
 and chassis as hitting other robots/sudden movements
 caused lift to jms elevator to shift violently. Additionally,
 a con of wedge is that it adds a lot of ~~addition~~ ~~jms~~
 area to the footprint of the robot, making it almost
 impossible to collect rings near the walls of the arena.

However, this won't be an issue as at the start of the
 match, the rings are in the center of the arena ~~jms~~ arena,
 and we only have to put rings on 1 or 2 Alliance
 Mobile Goals.

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BOOK NO.

Nov. 1, 2021 - BUILD & DRIVER PRACTICE

- Fixed ~~long~~ in loose screws and bolts in anticipation of class tournament on 3rd. Managed cables and practiced driver.
- Jim practiced efficiency by seeing how fast ~~in~~ I could push all the goals to one side and bring them back.

Nov. 2, 2021 - BUILD & DRIVE PRACTICE

- Practiced and performed maintenance in preparation for ~~tomorrow~~ in tomorrow class for in tournament. Practiced goal drill and getting on top of platform.

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BOOK NO.

Nov. 3, 2021 - CLASS TOURNAMENT

MATCH # 1: 1022A & 1022Z v. 1022C & 1022X = 41:161

- Spent much of the match linked together w/ 1022X as our platform wedges got stuck on each other. Also, when our lift is fully down it is vulnerable to other robots. Got hit and the aluminum 90° angle bracket got snapped, affecting our ability to control Mobile Goals. Also ~~some times~~ some times goals would get stuck on lift. I drove.

MATCH # 2: 1022A & 1022Q v. 1022B & 1022E = 55:124

- Similar to events that occurred in Match # 1. Also ~~the~~ in Also some times gets ~~in~~ stuck on rings, immobilizing our robot and wasting time. Zach drove.

Match # 3: 1022A & 1022E v. 1022X & 1022Z = 66:122

- Similar events to match 1. Lift can also get easily damaged by other bots due to the length of the angle brackets and ~~the~~ in slow operation. Jim Needs rebuild. I drove.

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BOOK NO.

Nov. 3, 2021 - CLASS TOURNAMENT CONT...

MATCH # 4: 1022A & 1022C V. 1022Z & 1022B = 82:83

• Very close. King got stuck between elevator & hood, preventing the scoring of rings. Also, should consider focusing on scoring rings onto Alliance Mobile Goals, then taking in Lake the neutral mobile goal from the opposition. Additionally, we have not had a chance to balance on the platform yet.

MATCH # 5: 1022A & 1022E V. 1022X & 1022C = 139:145

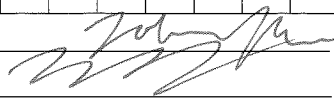
• Need to make reliable auton for tournament.

MATCH # 5: 1022A & 1022X V. 1022Z & 1022Q = 99:43

• Implemented new game plan, focus on scoring wings for first 30-45 seconds, before to jin then go for neutral goals. Worked quite well. Still haven't gotten chance to balance robot on top of platform.

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Nov. 3, 2021 - CLASS TOURNAMENT CONT...

MATCH # 6: 1022A & 1022Z V. 1022C & 1022Q = 134:43

• Game plan worked well.

MATCH # 7: 1022A & 1022X V. 1022E & 1022Z = 132:85

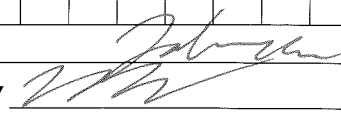
• Still haven't gotten chance to balance.

TOURNAMENT ANALYSES:

• Need to redesign lift. We plan on rebuilding robot as Shannigan Lake Tournament is moved back to Dec. 11. We are considering adding a double reverse 4-~~an~~ to to jin allow us to score elevated goals, as the rule prohibiting touching the opponent's platform for the final 30 seconds of the match allows for a lot of time to elevate goals. So we want a bot that can quickly move mobile goals to our zone then use the last 30 seconds to elevate the goals we have collected.

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MATCH # 2: 1022A & 7842A v. 6264D & 7842E = 148:20

• Pretty ~~we~~ ~~in~~ uneventful. Didn't have as much troubles w/ getting caught on rings, added more sp fire to prevent rings from getting other.

MATCH # 3: 1022A & 6264F v. 1022B & 1290B = 55:78

• Robot got stuck on ring half way throughout match. Immobilizing bot.

MATCH # 4: 1022A & 1022C v. 6264F & 7842J = 89:62

• Got stuck ~ 40 secs into match, thankfully 1022C was able to score.

MATCH # 5: 1022A & 7842P v. 1022W & 1290A = 131:60

• to ~~in~~ 7842P had a very fast bot that was able to quickly steal neutral ~~in~~ goals. This allowed us to stack goals & prevent risk of getting stuck on rings near center of arena.

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MATCH # 6 = 1022A & 7842D v. 1022X & 6264E = 86:101

• Need to focus on undefended goals instead of fighting for goals.

QUARTER FINAL # 2 = 1022A & 1022W v. 1022C & 6264A = 60:89

• Got stuck on rings ~ 50 seconds into match, preventing us from scoring.

ANALYSIS:

Need to build base that is ring resistant. Also rear mobile goal intake should be changed as it is not often utilized, would be better if we switched it to carry a mobile goal to prevent opposition from stealing an alliance goals. Also elevator often not used, so should swap.

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DEC 14, 2021 - NEW ROBOT

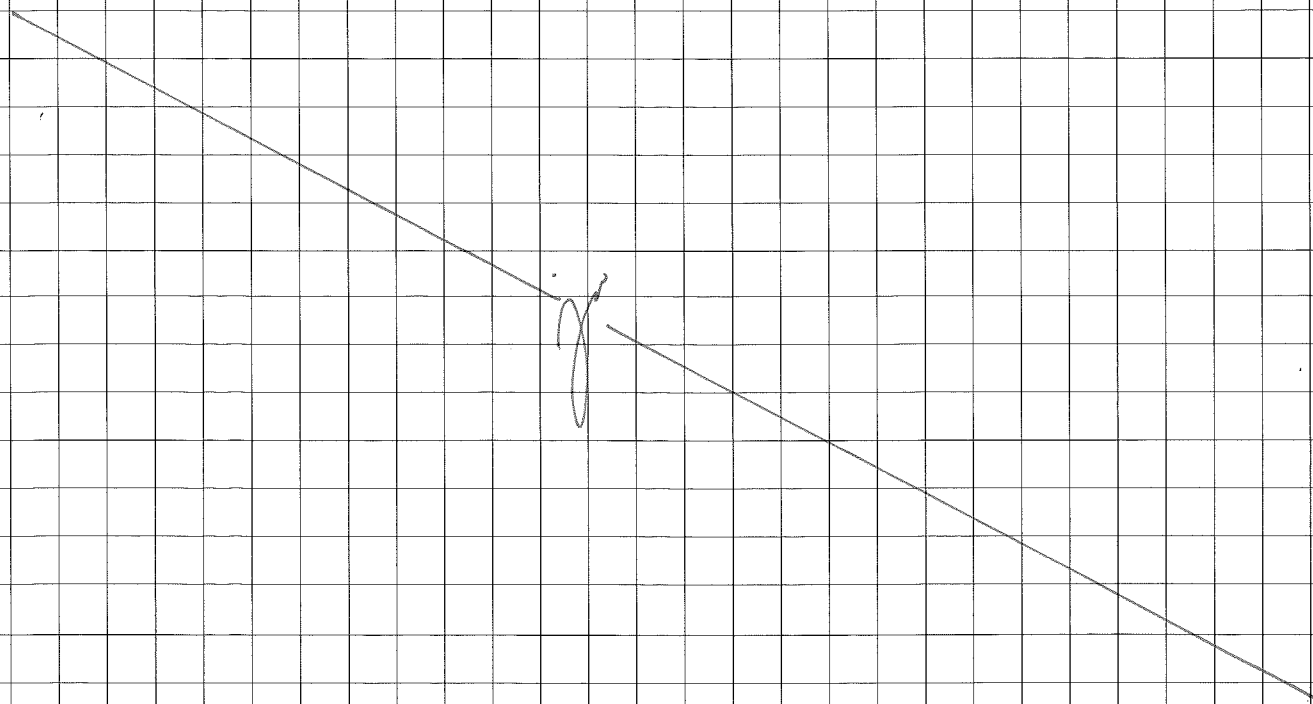
We plan on rebuilding the base, something similar to 1022 X's / G2 null. 6 wheel drive w/ 2.7" wheels.

We believe the smaller wheels & 6 wheels will help prevent rings from getting stuck underneath

the base. We plan to keep the lifting arm

the same and Jim make another "claw" that

hangs off the side of the robot in platform to elevate the robot.



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DEC 15, 2021 - NEW BASE

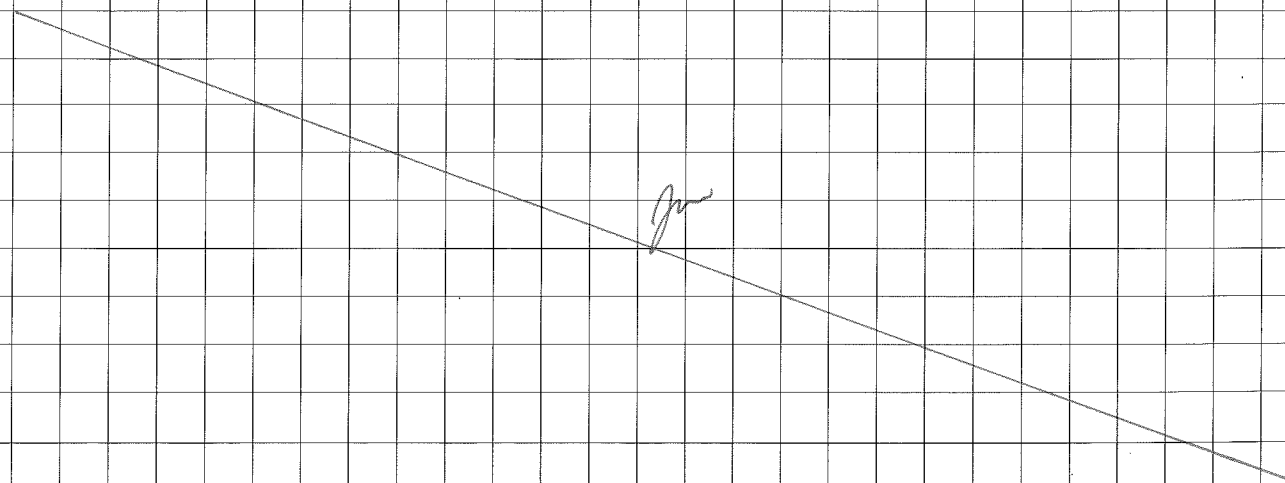
STARTED BUILDING NEW BASE. 33 wide and 35 long.

DEC 16 2021 - BASE

Added bearing flats / gears. Used 36T high strength gears reversed onto wheels and 60T wheels on gears to connect motors and wheels.

DEC 17, 2021 - BASE / REAR GOAL INTAKE

Greased and added rear goal intake to base. Uses 12T metal gear attached to 100 RPM motor. 12T is then attached to 60T high strength gear to move "lifting claw".



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JAN. 10, 2022 - VERTICAL STRUCTURE

Added supporting structure for lifting arm and elevation claw. Switched steel support to aluminum.

Added 1/2 in aluminum c-channel across chassis near motors to add rigidity.

Zach got 140 for shells, I got 200. Robot in shell. Old robot got stuck on rings every match wanting at least ~10 sec, if not ruining whole run.

JAN. 13, 2022 - CLAW / LIFT

Used claw from previous bot and added it to lifting arm. Added 1x1 x 25 angle brackets to each side, attached to front of base and on vertical c-channel used to support claw to minimize movement.

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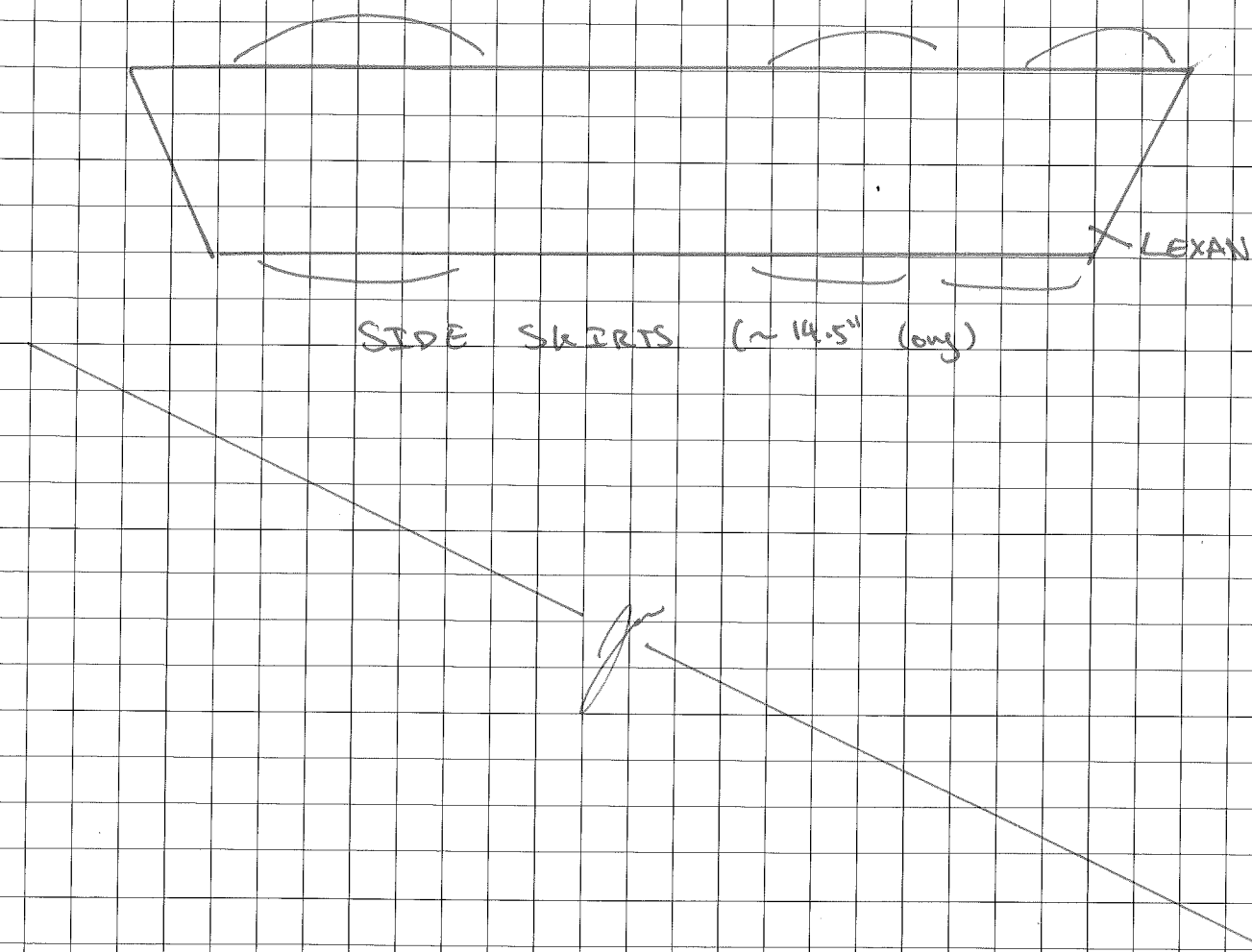
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JAN. 17, 2022 - SIDE SKIRTS & VERTICAL C-CHANNEL

CUT LEXAN side skirts to go on sides of robot to prevent rings from going under robot.

Didn't work too well, needs to be redesigned.

Changed 20 long c-channel on-jm used for back "elevation" claw to 30 long.



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JAN. 19, 2022 - CLASS TOURNAMENT

Still working on finishing bot. Side skirt would cause bot to get stuck on rings so decided to scrap.

JAN. 21, 2022 - 8th MOTOR

Researched ~~in~~ possible options for use of last motor. Either use to lift bot off of jrm and elevate on platform using claw or use it to ~~save~~ a jrm be able to hold a 3rd goal on the robot.

JAN. 25 - 2022 - ROBOT LIFT

Tested possible gearings/designs for lift however our robot is too heavy and the motor is not jrm not able to provide enough torque.

JAN 30 - 2022 - ~~LIFT~~ LIFTING ARM

Optimized length of c-channel as before, the claw head was not parallel w/ ground, causing the ~~claw~~ mobile goal to sag and sometimes drop the mobile goal.

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BOOK NO. 1

FEB. ^{06 jrm} ~~06~~, 2022 - 8th Motor

Began building lever arm to collect mobile goal. C-channel extends from bot and pins shaft of mobile goal against bot.

FEB. 08, 2022 - AUTON

Began work on competition auton. Improved upon previous auton by speeding up the collection of the 1st mobile goal across from bot and attempts to collect large neutral mobile goal in center. Auton currently 20pt, 90% consistent.

FEB. 10, 2022 - AUTON

We adjusted the angle for the robot to collect the large neutral goal, it still only 10% consistent, mostly just luck rather than the program that would help collect central goal.

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FEB. 14, 2022 - CLAW & CODE

I improved the claw design by changing 5 long chain-jin c-channel teeth to 4 long. This helped increase grip on the large mobile goal as its weight ~~to~~ would sometimes cause the robot to tip over. The PID, motor Brake mode was also improved and aids in gripping rocks & preventing dropping.

FEB. 15, 2022 - SKILLS (DRIVING)

I did research on TIPPING POINT skills pathing. ~~for~~ Due to us not having pne-jin pneumatics it limited the possibilities of our pathing. Ultimately, I decided to copy 21417B's path. To collect a re-jin stack the 2 small low-jin neutral goals followed by the 2 Alliance Mobile goals for the intended color platform then collecting the 2 remaining Alliance Goals and elevating the robot w/ the 2 Alliance Goals and-jin on the empty platform.

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BOOK NO. 1

FEB. 16, 2022 - DRIVER SKILLS PRACTICE

Skills practice highlighted some flaws in my multitasking. Due to the extra time our robot only having 1/5 smart motors it takes additional time to score goals especially using the rear folding lift intake. Hence it is required to lower the rear intake while lifting mobile goals to save time. 240 pt Drive.

FEB. 18, 2022 - DRIVER & RING GUARDS

Cut 2.5" x 1.5" ZEXAN pieces to cover front of wheels. These help push rings out of the way as previously, they would occasionally get stuck underneath the chassis & reducing efficiency. The jin worked on not tipping large mobile goal when stacking. Learned that stacking mobile goal large mobile goal last helped reduce dropping chances. So both alliance goals & neutral goals will be stacked before the large neutral goal is stacked.

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BOOK NO. 1

FEB. 22, 2022 - RING GUARDS & ROBOT ELEVATION

The ring guards ~~some~~ ^{some} ~~in~~ would get stuck on the belts used to attach the polycarbonate platform to the tilting mechanism about 30% of the time. We shaved the LEXAN on the bottom ~ 5mm to help robot clear the belts.

FEB. 23, 2022 - LIFTING ARM SUPPORT

When picking up the large mobile goal, the weight would cause the lifting arm to swing around and be inconsistent.

Additional ~~in~~ ⁱⁿ additional supports were ~~to~~ ^{to} added to the supporting structure to prevent the upper chassis from shifting when picking up goals. More practice for down skills.

We can get 280 consistently, we hope to replicate this result for ~~in~~ ⁱⁿ skills for our next competition.

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BOOK NO. 1

FEB. ²⁴ ~~24~~ ⁱⁿ ~~in~~ 2022 - TOURNAMENT PLANS

We believe that 1022X & 7842X are most likely to partner together & win the tournament. Hence ~~in~~ ⁱⁿ additionally, it is very likely that 7842X will also place on the top for skills. Hence, it is likely that there will be double qualifiers. We aim to come in the top 3 for skills to aim for skills qualifying place to worlds. ~~or~~ ⁱⁿ We are also planning to come within the top 2/3 for tournament competition.

This way we have possibilities to win Design or Build award or qualify for worlds through our skills score. We have also made agreements to alliance w/ 1022B for our competition as we believe that we are 3-4 in terms of standings and to reduce the confusion/stress that caused many teams to make poor decisions during alliance selection.

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FEB. 25, 2022 - SKILLS AUTON

We began working on our skills auton. We plan on scoring 140 pts. (approx equivalent to pushing all of the mobile goals to their respective parts of the field). Therefore w/ our predicted driver skills, we would have a total skills score of 420-450 pts positioning us, most likely, within the top 3 for the upcoming tournament. Due to the reliability of our rear intake we plan on intaking an alliance goal, and bring it to the other side while stacking a neutral goal along the way. After stacking and dropping the alliance goal, we push the remaining neutral goals to a side and push the other alliance goals to their respective side, using the rear intake. Also practiced driver skills out of the 10 runs we performed, the average score was 270pts. The main issue we face is that the motors need to be cool to ensure the robot has the ability to climb, as since we don't have pneumatics, we don't have the luxury/reliability of 6 motor drive.

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BOOK NO. 1

FEB. 28, 2022 - TOURNAMENT PLAN

- Majority of points scored during a match is from stacking goals. Since there are 7 goals, and 1022B and us can hold a theoretical maximum of 5 goals, if we keep possession of our goal & wait until the 30 second no-plot from touch rule, we will have a chance to safely stack the 1022B mobile goal on our possession, and providing us with a win.

- During practice we have some reliability issues w/ our back intake. Approx. 10 runs every 10 runs the sensor holding the 1022B mobile goal hardware would loosen, in loosen, changing the positioning of our mobile, thus we have to check before each run.

jkr

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BOOK NO. 1

MAR. 01, 2022 - AUTON SKILLS + COMP.

Our auton currently transports 1 alliance goal to the specific side, pushes ~~all~~ mobile ~~in~~ neutral mobile goals to an Alliance Zone and stacks the fina (normal size) neutral goals.

So we have a predicted auton score of 100 pts. We hope to increase the consistency of our auton program, and improve the consistency of our tournament auton and its ability to score 40 points (win the 2 neutral in neutral goals in goal across the bot as well as the large neutral goal.

Practiced Driver skills need to spend more time practicing on how to park on the platform.

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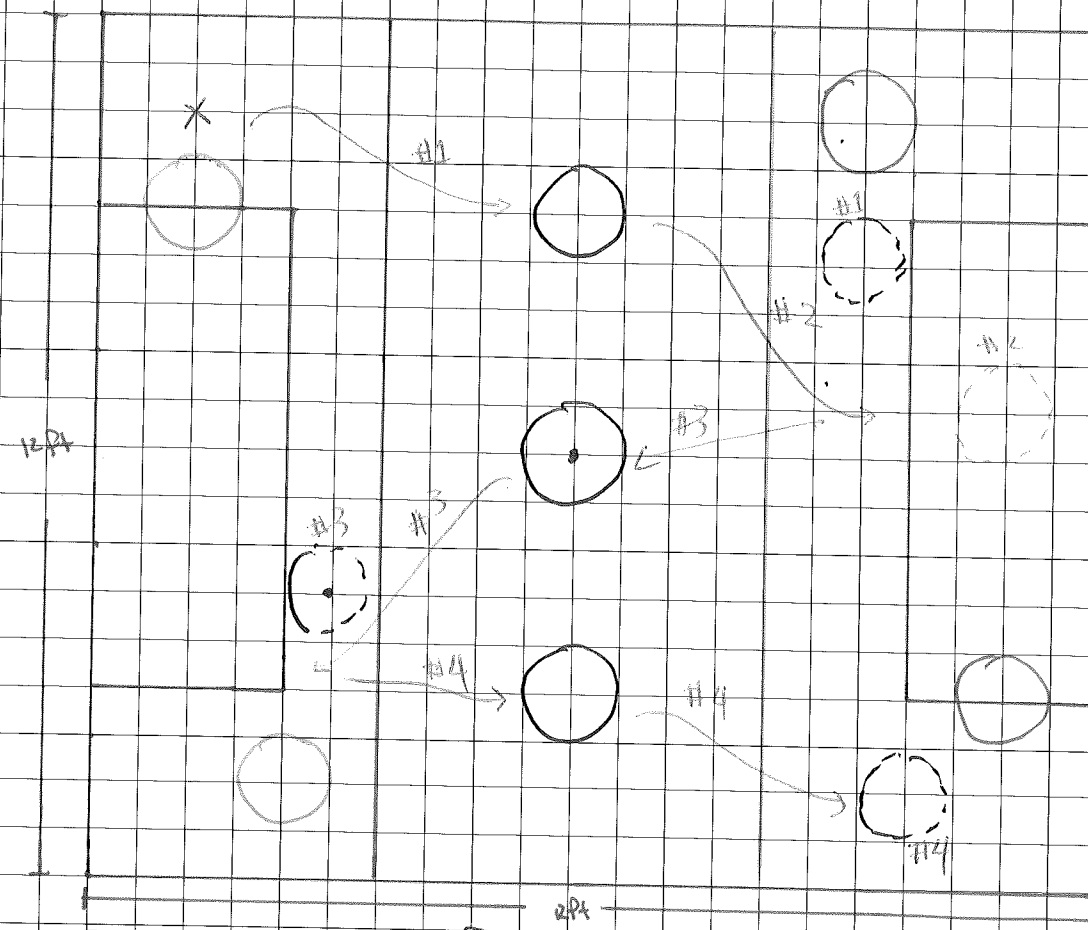
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DATE 03/01/22

BOOK NO. _____

MARCH 03, 2022 - AUTON SKILLS PATH

AUTON SKILLS PATH



○ = NEUTRAL GOAL ○ = LARGE NEUTRAL GOAL
 ○ = RED ALLIANCE GOAL ○ = BLUE ALLIANCE GOAL
 * = ROBOT STARKY

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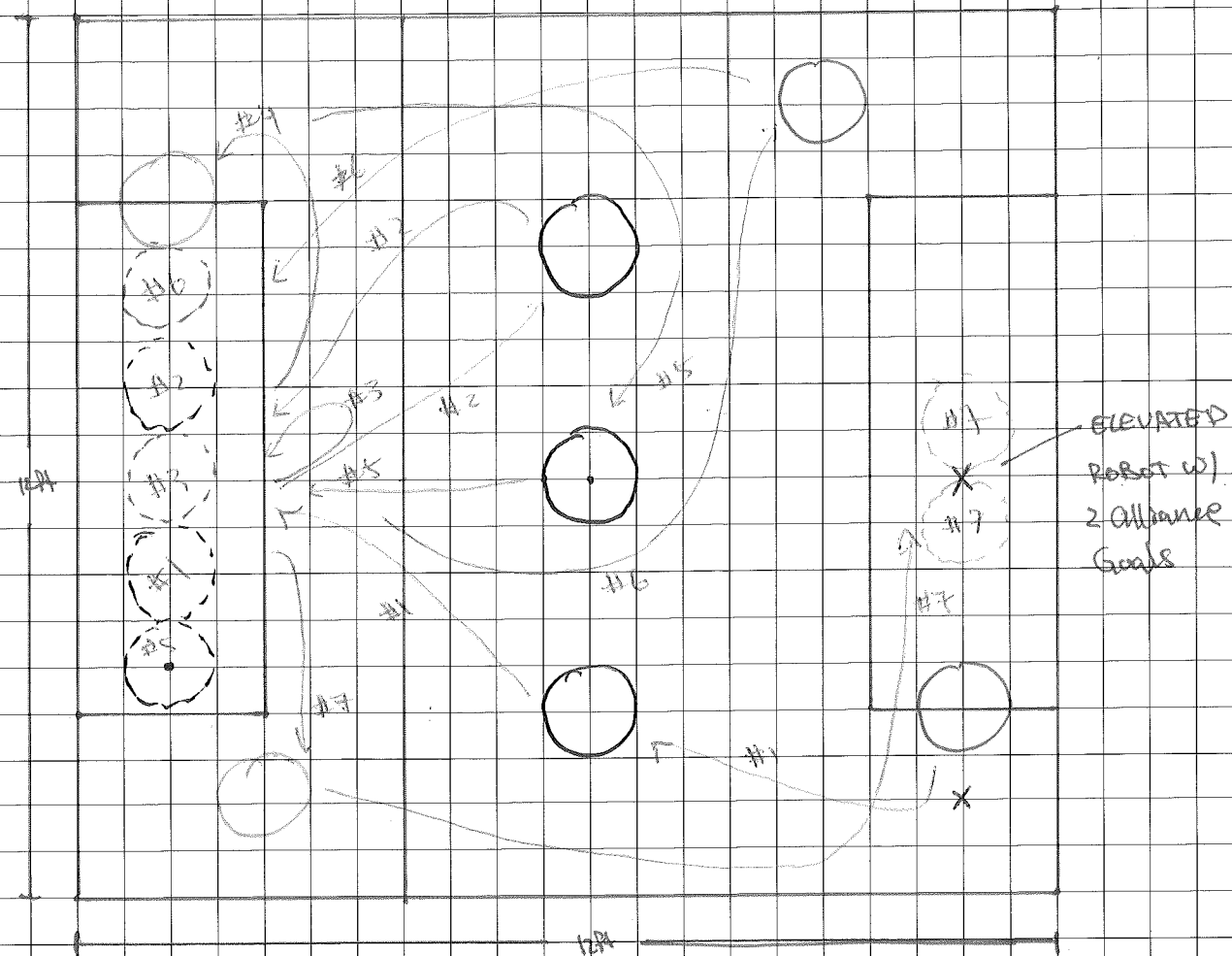
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MAR. 03, 2022 - DRIVER SKILLS PATH

DRIVER SKILLS PATH



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Mar. 4, 2022 - TOTAL CONSISTENCY

We worked on improving the consistency of our skills & comp. autos. Some we have an error that prevents an initial sensor from reading leftward rotations. We had to put different angles to properly balance a mid-air goal on the platform. Our auton works ~65% of the time, we hope that this will be reflected during the tournament tomorrow. We predict the lowest skills score we should get will receive is 240 driver + 60 auton = 300 pts. However we predict a much more realistic skills score of 280-310 driver + 80 auton = 360-390 pts, with 80% confidence. Our predicted maximum skills score is 310 driver + 100 auton = 410 pts in 410 pts total. We predict that we will end up top 4 for skills and top 3 for tournament qualification, thus likely qualifying us for a spot to qualify for worlds.

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MAR. 4, 2022 - AUTON CONSISTENCY

We have a 40 pt (2 neutral goal) competition auton that is 95% consistent at scoring the neutral goal across format and a 50% chance of scoring the large neutral goal in the center. Additionally, we have different speeds for in for our auton that slows down the robots speed to increase accuracy against opponents whose autons are not as strong and a full out auton whose speed is most crucial in scoring mobile goals. We hope that this feature will help us win matches. Additionally, the auton grants us 6 additional points as well as a head start w/ the mobile goals within our alliance zone.

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