Robo Rally Project

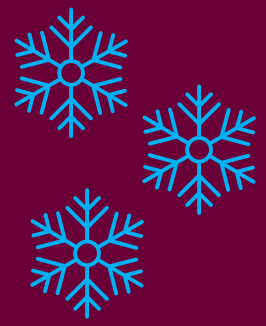
By Robotics Team Blocky Road

(Charlene, Alexander, Joshua, Julianna, and Brent)

Engineering Design Process

Brainstorming

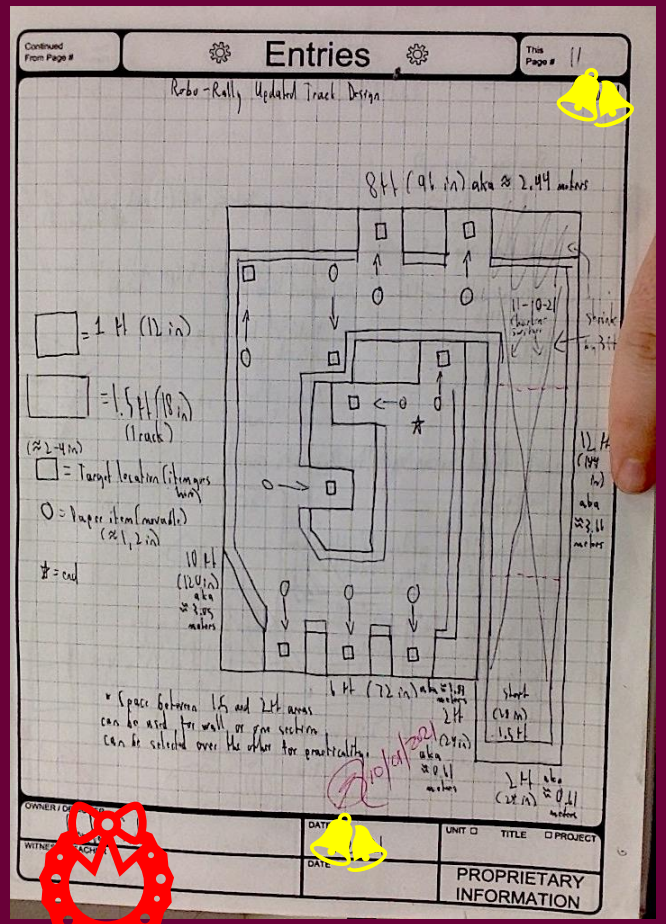
Design Brief

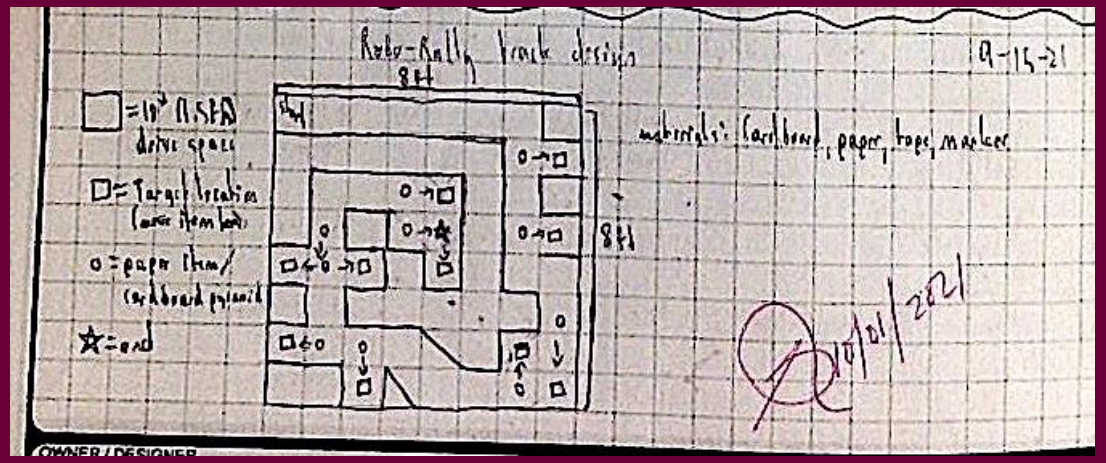


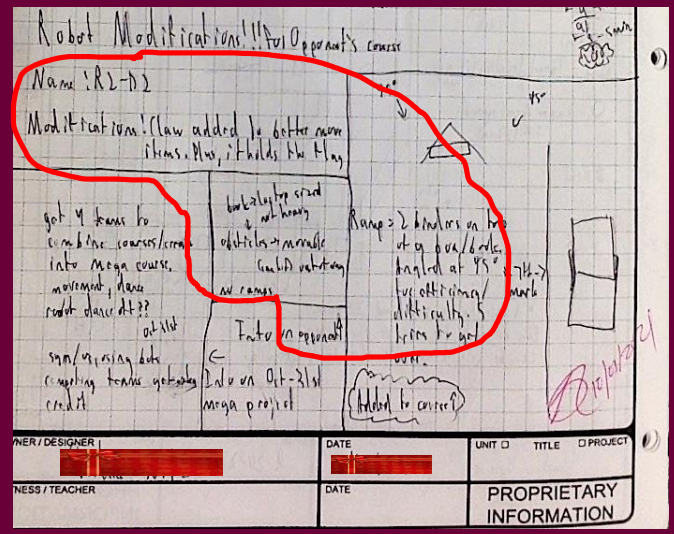
Process of Completion

What We Learned

Brainstorming







Above: Original 8-by-8-foot plan
Left: Modified 8-by-12-foot plan, with multiple edits made as the project progressed.
Right: Modifications needed to drive our robot successfully through our opponent's racetrack (i.e., the claw).

Decision Matrix

Name of course	Difficulty (for us to run)	Time needed to construct	Space used	Difficulty (for opponents to run)	Visual appearance	Total score
Treasure Run	4	4	4	4	4	20
Ramp Rally	1	2	3	3	2	12
Tournament of Champions	2	3	2	2	3	14
Blocky Road	3	1	1	1	1	7

Scoring Rubric: 1=worst/easiest
4=best/hardest
Highest score wins

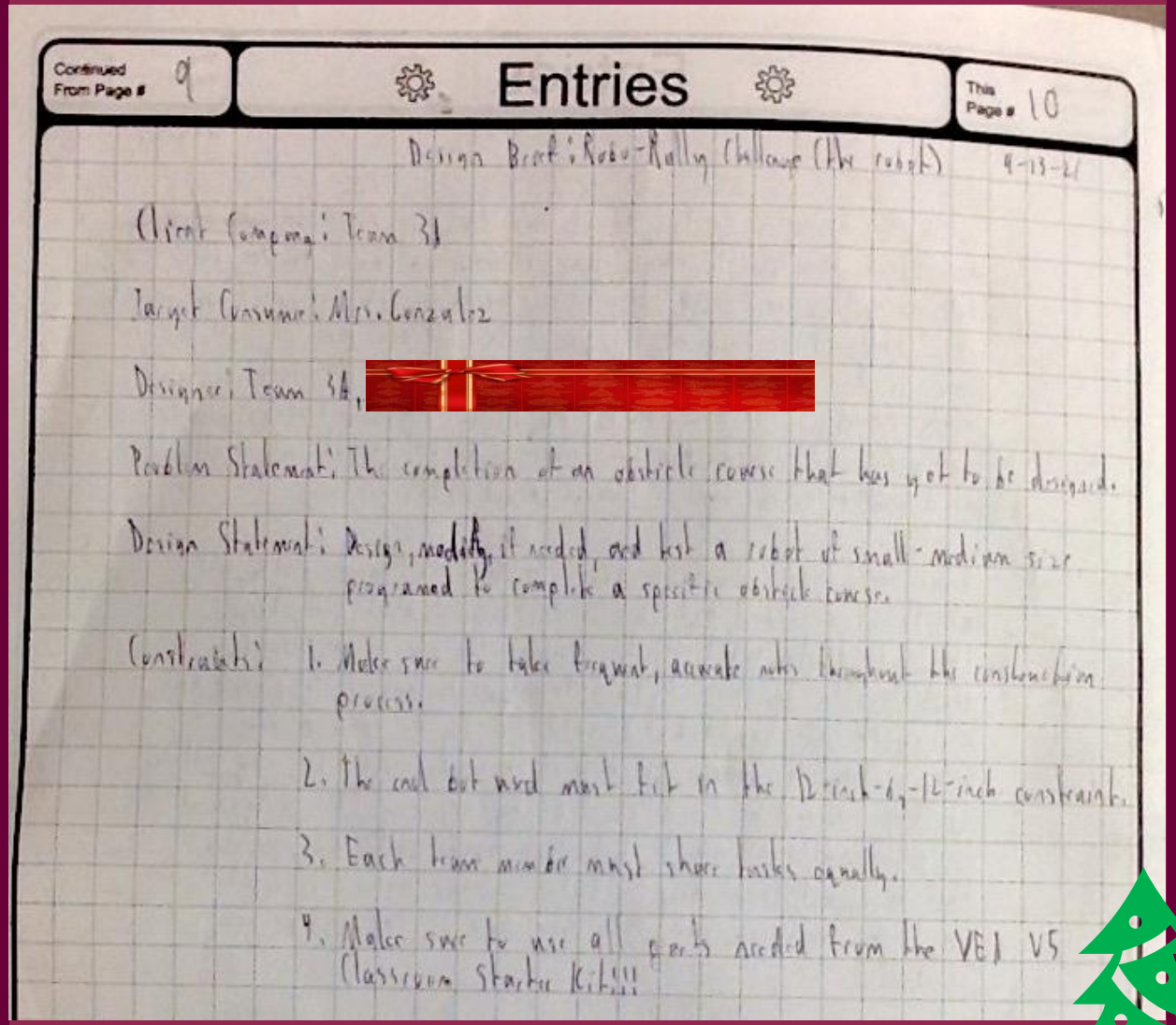
Victorious Design: Treasure Run

Bonus Fact: Blocky Road came in last for this stage,
but we liked the name so much we made it our team name!

Design Brief

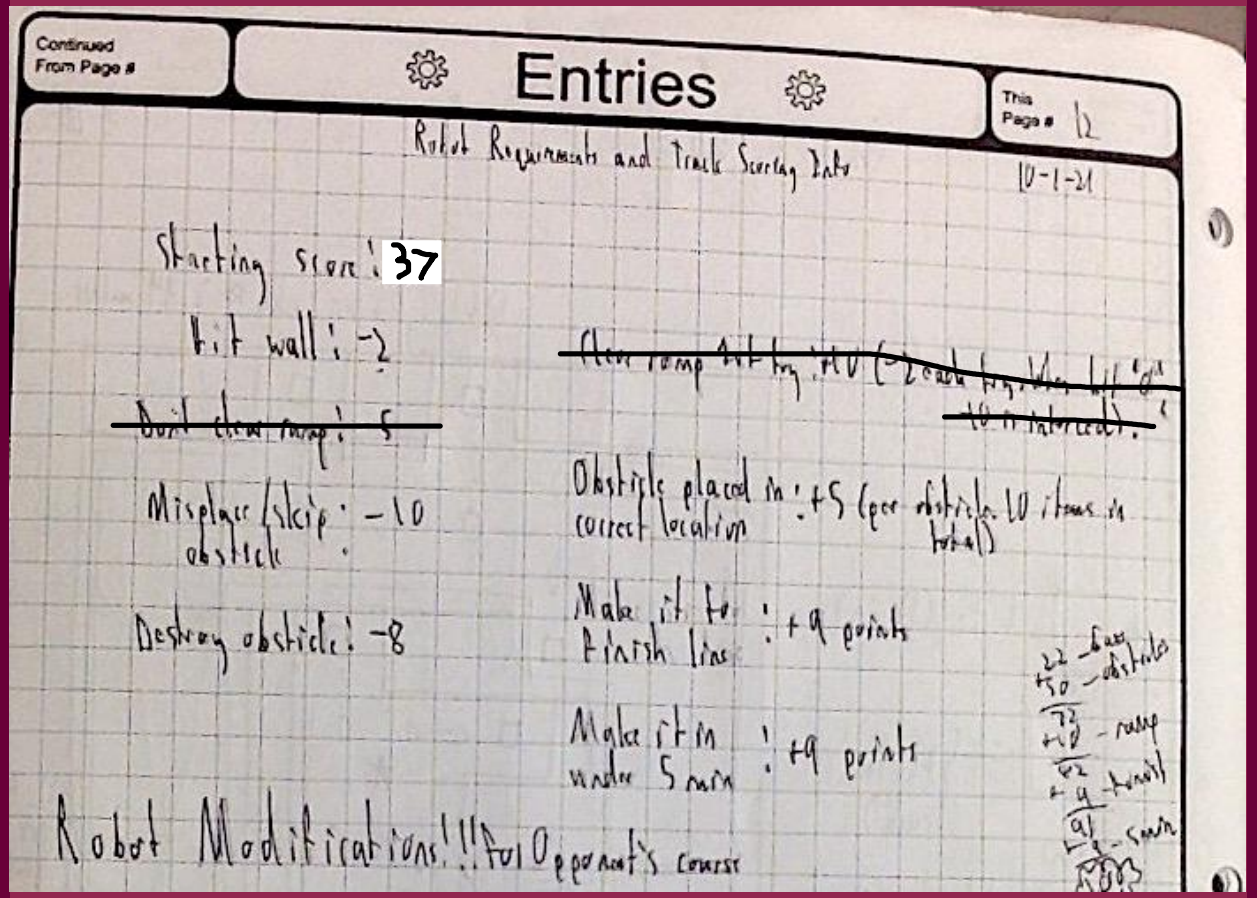
- Client Company: Team 3A
- Target Consumer: Mrs. Gonzalez
- Designer: Team 3A (Shared, group effort)
- Problem Statement: The completion of an obstacle course that has yet to be designed.
- Design Statement: Design, modify, if needed, and test a robot of small-medium size programmed to complete a specific obstacle course.
- Constraints:

1. Make sure to take frequent, accurate notes throughout the construction process.
2. The end bot used must fit in the 12-inch-by-12-inch constraint.
3. Each team member must share tasks equally.
4. Make sure to use all parts needed from the VEX V5 Classroom Starter Kit!!!

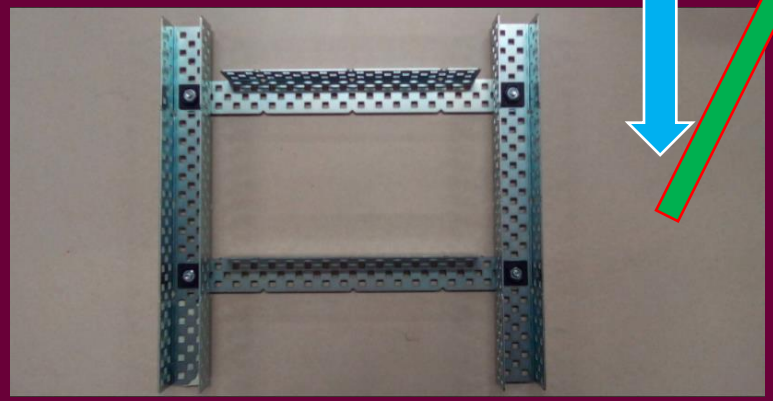


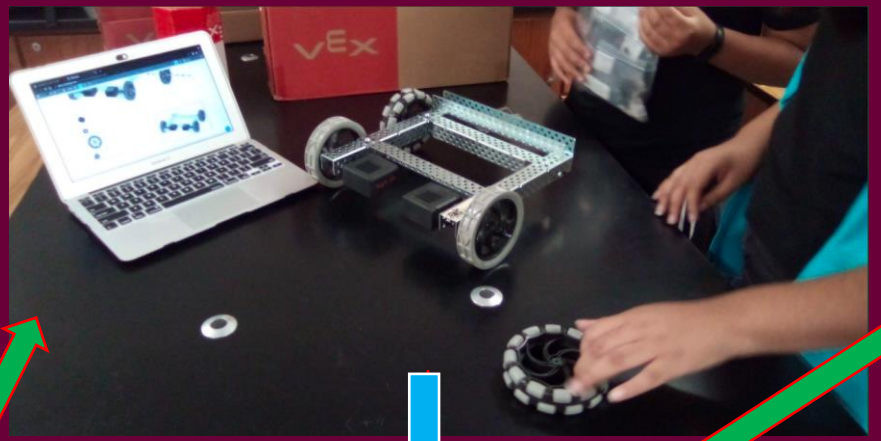
Scoring Criteria

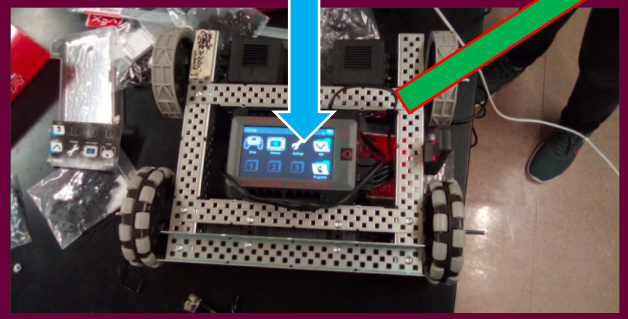
- Starting score: 37
- Hit wall (or go off track): -2
- Misplace/skip obstacle: -10
- Destroy obstacle: -8
- Obstacle placed in correct location: +5 (per obstacle; 10 obstacles in total)
- Make it to finish line: +9 points
- Make it in under 5 min: +9 points
- As a heads up, we initially thought that we'd be adding a ramp to the track, but we scrapped that idea when we needed to remove our starting runup. That's the reason that there's digital modifications on this page.

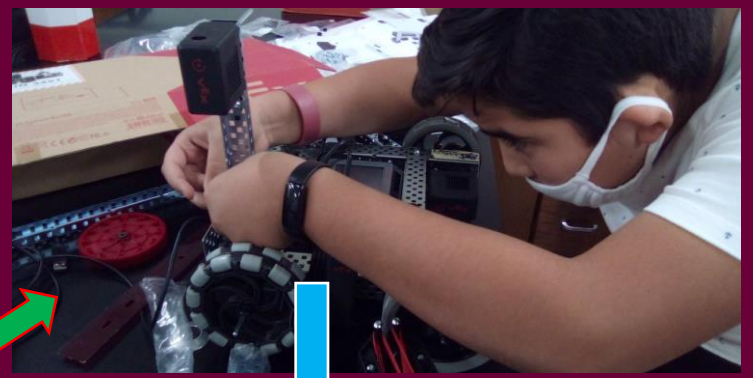


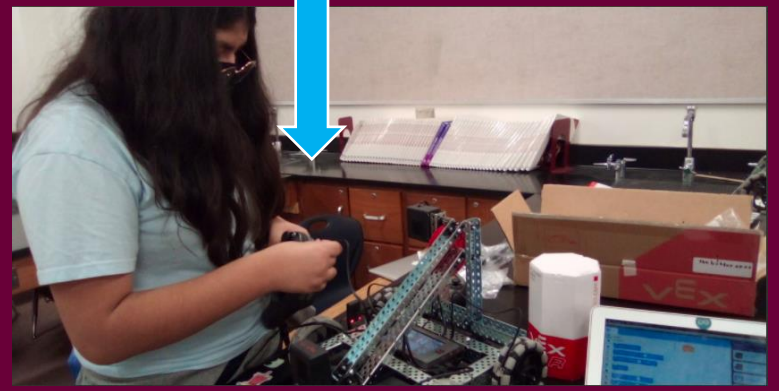
Process of Completion Part 1











The Construction of the Robot

It took us about a week (in terms of class days where we could work on the bot) to get the main body of our robot completed, and even so it took us another day or so to complete the grabbing arm that would serve as a way for us to move any obstacles contained on our opponent's racetracks. However, improvements are always there to be made, and we're doing our best to make sure our robot can operate at maximum efficiency.

Process of Completion

Part 2

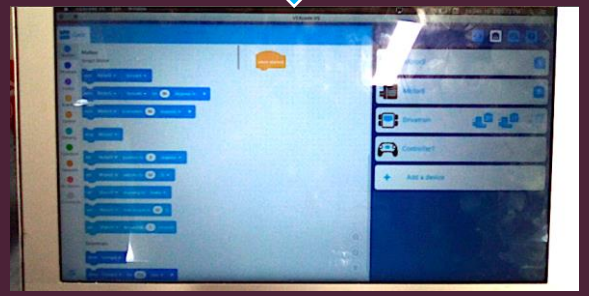
After we designed our robot, we started developing our racetrack out of cardboard we retrieved from the recycling bin. While half our group worked on that feature, the other half programmed our robot to be able to synch up with our controller, that way we could control the robot to maximum efficiency. Several key constraints ended up being added or changed throughout the construction process, resulting in the removal of our primary drive track and walls, but in the end, things worked out all right.

1

Needed to be removed with about a month until the deadline.

2

3



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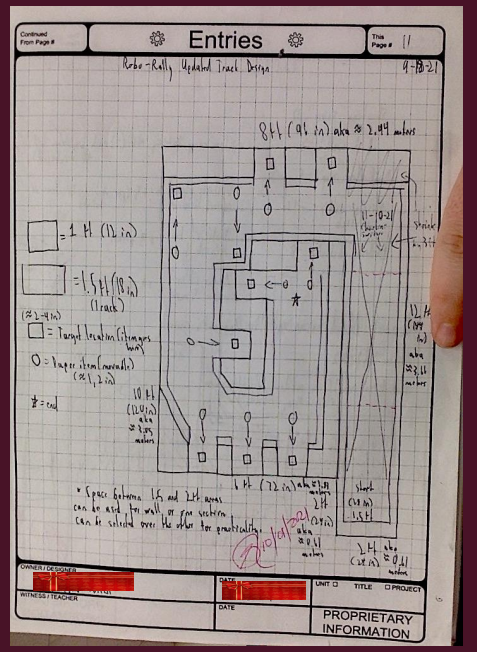
Trial-and-Error; Course Design Edits and Technical Difficulties

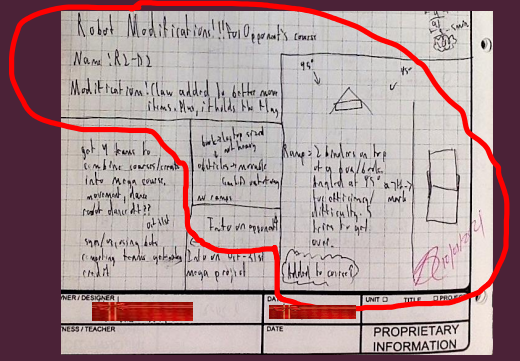
Not everything goes according to plan, and we ended up experiencing a lot of that. We ended up modifying our track a minimum of five times, due to changing dimensions for the track to work in as well as needing to change our origami props three times due to inefficient size and then too dull a color.

On top of this, when the time came to test our robot, we ran into motor issues where our axil bent, as well as connection issues regarding controlling the grabbing claw arm, the robot not driving in a straight line, the need to replace the robot's ***brain*** because it was no longer receiving signals from the controller, and the battery being dead then draining quickly when the time came to test the bot. By the time it came to take the test runs for the video, we were only able to video the first two clips, with a single attempt each, before our battery died first in our controller and then in the robot. Neither run went well, with our drive malfunctioning in the first run and our claw arm acting up the second time, and by the time we finished the two less-than-desired runs, it was already thirty minutes past the time class was supposed to end. Then, when we tried to assemble the video with what little we ended up with, my iMovie wasn't working! If you haven't noticed, this project threw practically everything it had at us, and we're mostly just glad we have what we have.

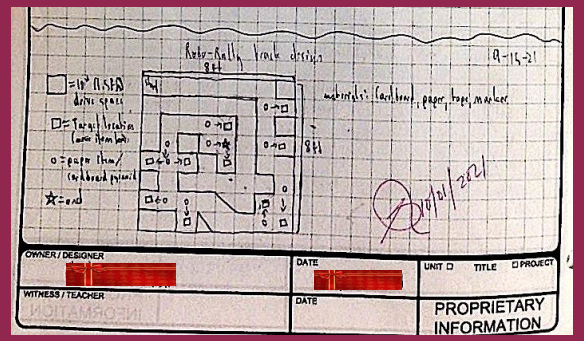
Original Blueprint (Measurements and Modifications included the removal of our ramp, walls, and initial walkway, and the color change of the obstacles from purple/yellow to brown to green.)



Modifications to the robot for our opponent's track (claw needed to be added)

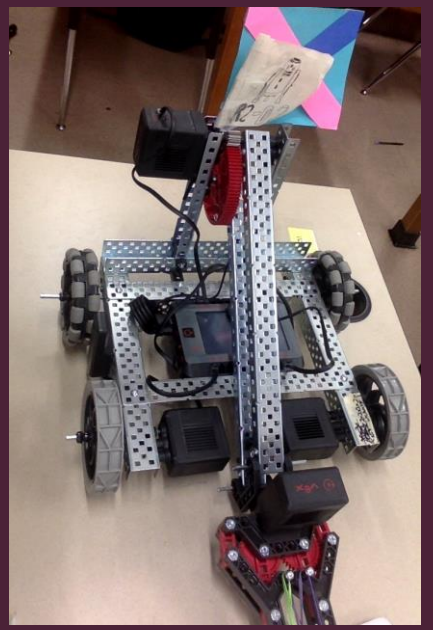


Original 8-by-8-foot Blueprint (Measurements included; but dimensions were later changed to 8-by-12 and modifications needed to be applied.



Finished Products

- After all the chaos, we ended up with our final robot design (as shown below), and our final track model (as seen above). With the final track, our robot should be able to move each green origami obstacle over and onto its corresponding target, then stop at the finish line at the inside of the curl. Mission accomplished!



What we learned

- How to build, program, and control a VEX V5 robot, claw arm included.
- How to work together as a (relatively) cohesive unit.
- How to manage parts and materials for large, complicated projects.
- How to use various metal construction items such as screws, nuts, washers, and other related materials.
- How to construct a racetrack out of cardboard, and make all the needed calculations before hand.
- How to use a boxcutter.
- It really *is* possible for a robot to need a brain transplant…
- …And finally, it's ok if you don't get it right the first time! As long as you can figure out where you messed up, fix it, and learn from it, everything'll eventually work out.