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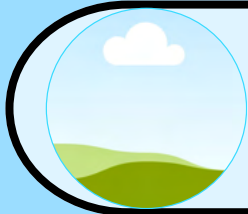
Wolves Robotics 2



Engineering Portfolio

Meet the Team

Coach's



Mr. Matteson
Head Coach

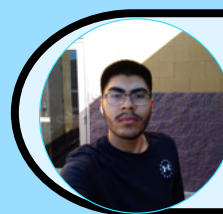


Mr. Lynch
Assistant Coach

Team Players



Elijah Lugo
Junior
Build Team, Driver 1



Jordy Andino
Senior
Build Team



Sather Holmes
Freshman
Code



Matilde Carrero
Freshman
CAD, Build Team/Coach



Alejandro Flores
Junior



Mario Mottola
Freshman
Human Player



Hope Mossberger
Sophomore
Build Team, Driver 2



Xochitl A. Varela
Sophomore



About the Team

Since the start of the year, the JV team has had a rocky start. We are working hard to get things done and learning how to work together. We are ready for competition. During the last few weeks, we have seen a few great students step up to the table and help out a lot more. We have had some hard moments, however, we have had more moments where we have worked around the problem. As a team, we decided that we will push past the hard moments and focus on the goods. Overall, our team has helped each other out by communicating with one another. Without failure, we would not have come as far as we did together.

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Team Improvements

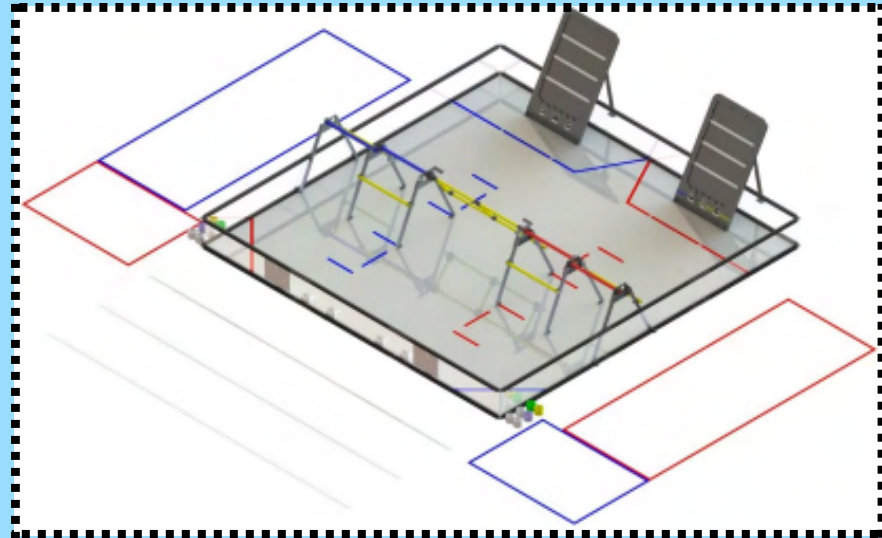
During the competition that took place on November 18th, at Gilbert Christan High School, there were many lessons learned. We learned the value of working together and how much we can get accomplished if we all do our part and work as a group. We worked on our communication skills. It's been a very large step for our JV team and to see how far we have come is actually amazing. Although at first, we didn't work so well together, we were able to exceed our goals and soon pressure our goals. We learned it was more effective if we didn't get mad over the person who made a mistake but instead, we learn for it and make sure it doesn't happen again. There is a point of being just prepared enough and not being prepared at all, the last competition we were not prepared, not as a team and not individually. It was stressful since we didn't have everything working on the robot that should have been done but due to procrastinating it made it difficult. Now since after that competition we are working on the task in front of us and not pushing it off until the last second where it becomes rushed and done improperly. We have gotten better at talking and communicating with one another. When one person has an idea the rest listen, and we find a way to use that idea in our future plans. Even if it's not the best idea we still listen, and it helps a lot. Being more supportive and looking out for each other is another big thing.

Sometime people can't make it to robotics meeting, but we still make sure to keep them informed and making sure we still work as a team. The last thing I think the team needs to work on is being there. Being at the meetings and showing up to events as a team. There are two images or the JV team from our last competition.



Game Strategy

Our team came up with a few different ideas for this game. Our main idea and what we are focusing on is getting pixels from one end of the field to the other. We have Hope and Elijah as our drivers, Hope is controlling the claw & arm, while Elijah is controlling the wheels. Since Mario is the player, our idea was that he would stack two pixels on top of each other and then set them on the field in a way that the claw can easily grab the pixels. We want our robot to be a push bot getting the pixels from the corner to the backboard: so that way whoever we get paired up with, all they would have to do is place the pixels on the backboard. If by any chance the other team is using the same strategy as our team, our claw should be able to grab the pixels and place them on the backboard. The goal is if we can all work together then this idea will work just fine. We have the two drivers practicing everyday so they can get comfortable with each other and with the robot. Matilde is the coach so she will help us with anything else if something unexpected happens on the field. Other than that we should be okay.



For the pre setup we will be having some sort of autonomous. We will have the team prop lined up with the pusher on the robot and the autonomous will push the team prop to the first line. When the autonomous is done we will have our player place two pixels in the crease of the claw that way we can be able to place pixels on the backboard. If for some reason our claw does not decide to work, we will resort to the original idea of being a push bot. We will place the pixels in front of the robot where we can push them to the backboard. We hope that if we use that method the other team will be able to put the pixels on the backboard.

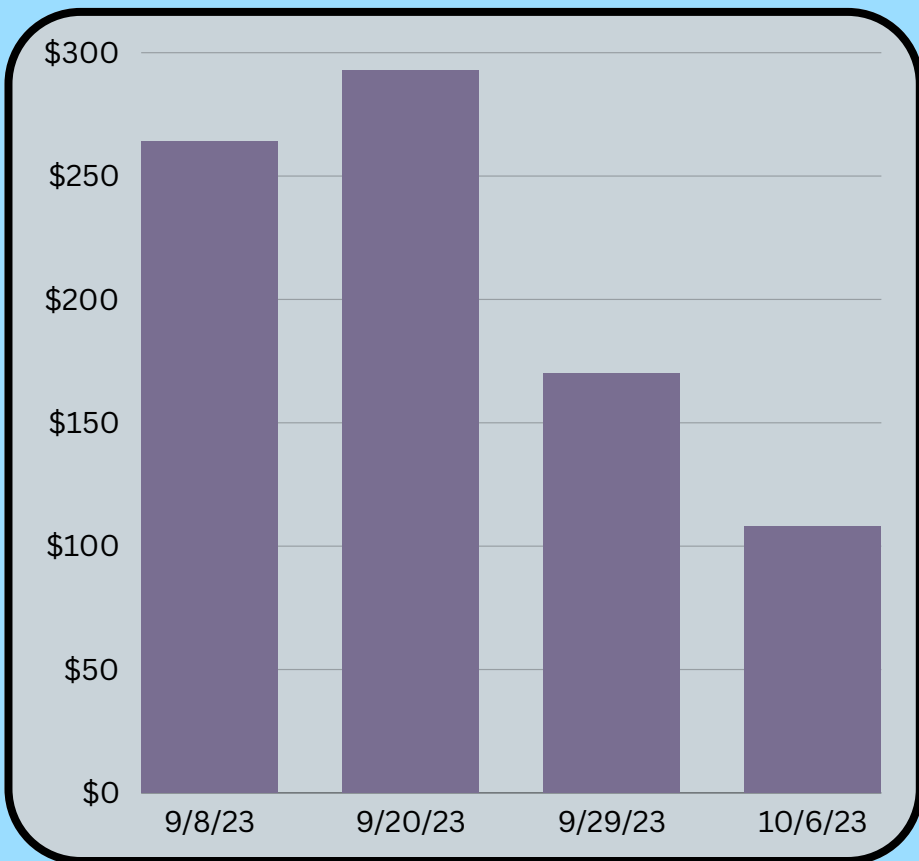


Budget Plan

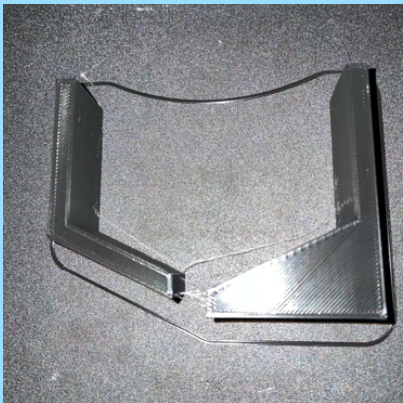
For our budget plan I have put together a graph to hopefully make it easier to see what we have made over the course of the beginning of the year. So far, the only thing we have done has been concessions for the JV Football games and the Varsity Football games. We have done a good job at keeping track of the dates that we have helped out. And as far as the parts go, the JV team do not order the parts. We have the Varsity team do that for us since they deal with the fundraising and other aspects of dealing with money. Its very helpful that we have the varsity team to help us out especially with buying parts. JV more so focuses on teamwork and getting what we need to done.

Budget Goals

Our goals are that we would like to do more as far as making money. The money that is made goes to the varsity as well as the JV because it is shared between the two teams. The idea was that if we start helping out more, and doing more fundraisers than we would have more money for the two teams. When we think about budgeting its not only JV we think about, we think about varsity as well and making sure we have enough money for both teams is important. If we start helping out more and we put all of our efforts in, we have a good chance at making more money. There are so many things we can do to fundraise money. We can make something new and sell it at school or we could help out at school with other events going on. Thats why right now varsity takes care of buying things, they help us with what we need so it works out better for all of us.

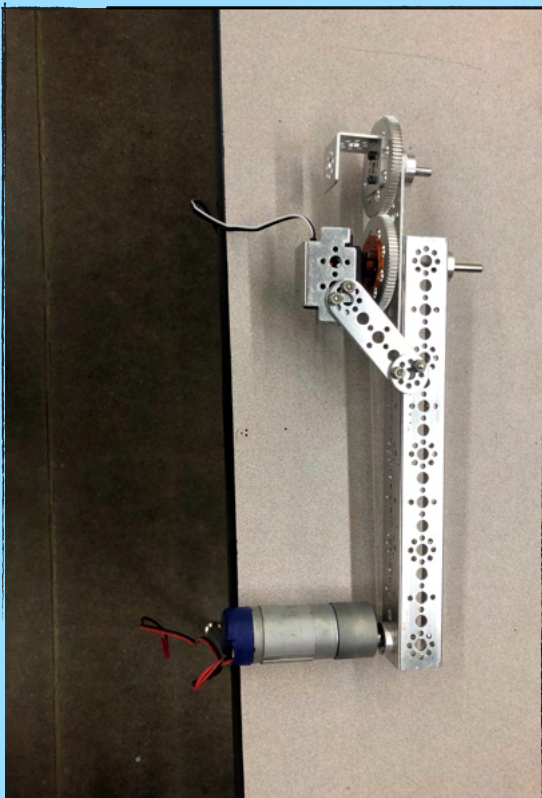
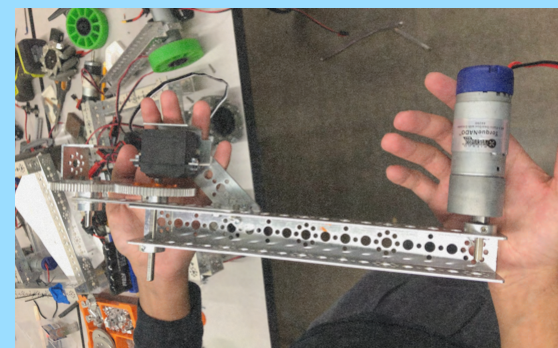
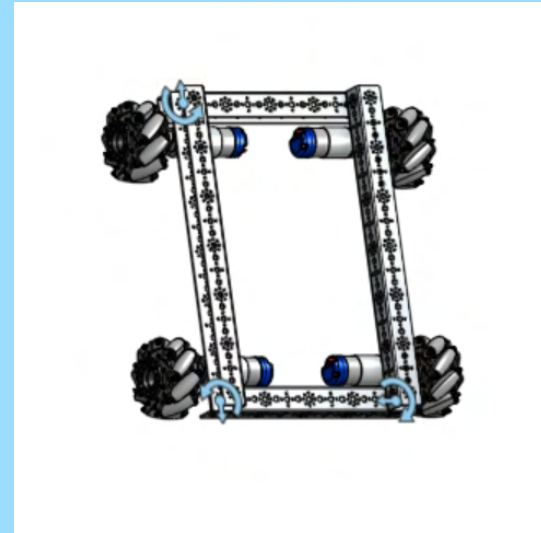


Structure / Build



For the structure and build, it's broken up into three different parts to give you more of an idea on how the parts work and how they look not attached to anything. It should be easier to look at.

The claw is on the top left-hand corner of the page, you can see where it's supposed to connect to the arm. The arm is located on the bottom left corner, there is a piece where the claw is going to connect to the arm. As for the body of the robot it's located on the top right-hand corner. The picture is a picture of what the robot looks like on CAD. Unfortunately, we don't have the robot CADed due to last minute changes. We moved the battery and the motors further back so we have space for the arm to be attached to the robot.

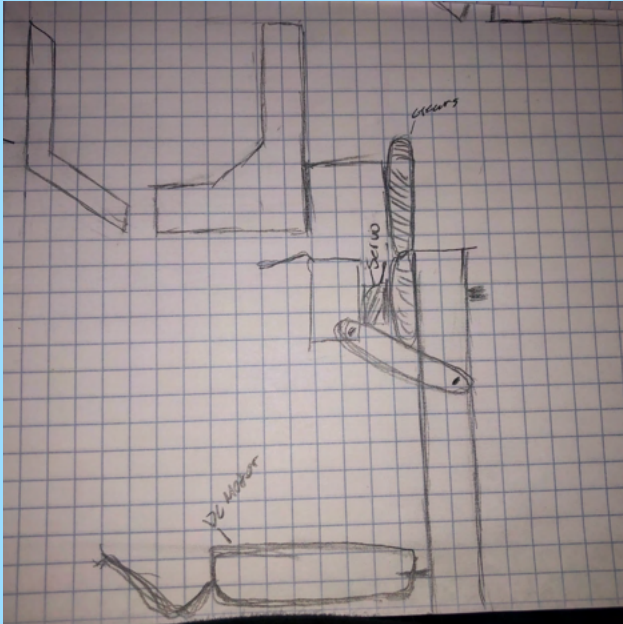


The way we have the arm working we used a DC motor to be able to lift up the arm and we have a servo working with the claw. In total we have 5 DC motors and 2 servos. From last competition we made some changes.

First, we have most of the arm coded were as last competition we didn't have anything. We also have a bar on the front of our robot to use for a pusher mechanism for extra points. If y any chance something happens with the arm, we can use the pusher as a backup. It will be very useful to have more than one plan just in case one fails. We have new side panels that were 3D printed that has our teams number and our team name. We had re done all of our 3D prints before the competition.



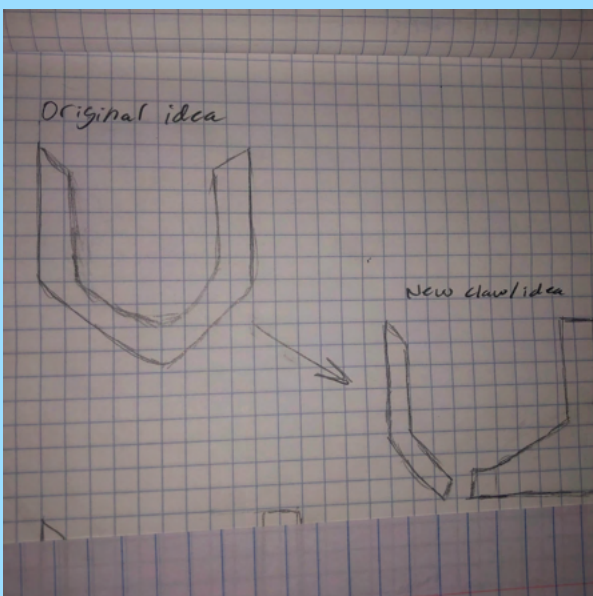
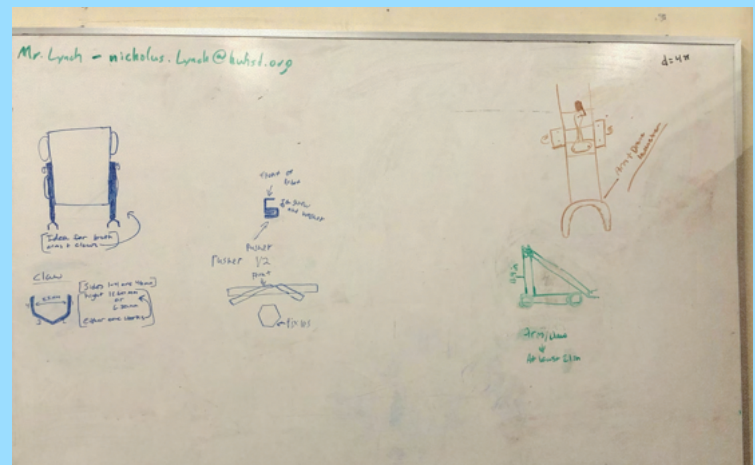
Skeches / Planning



The image on the left is showing you the sketch of the arm and claw connected. We made sure to label Where the Servo, DC motor and the claw. This should provide a little more insight on how we made the arm. The claw is attached to the squared U shape it's connected to a gear which is connected to the servo so it can move the claw. The claw was made off of CAD and as for the arm, that was made from old pieces from other robots. The arm is made completely from scratch.

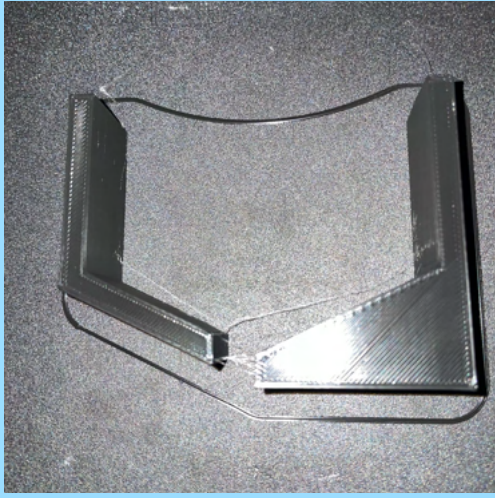
The image on the right is showing the whiteboard that we use for storing ideas and plans. We also use this if there is announcements or anything coming up. It is a reminder on what we need to work on or it to show us wat we have already accomplished.

There are a few other ideas up there that would not work in this case, but it shows our thinking process.



The image on the left shows the sketch of the claw design we came up with. It's not much different than the CAD sketch but it's good to have it on paper to. If you want more information on the claw and what all went into the design process, you should go to slide 8. It will go more into depth on the work and thinking process. There are two different claw designs in that image, one was the original idea and the other one is the new idea that we came up with. The original one had some complications, so we made some changes to accommodate the issues.

Claw

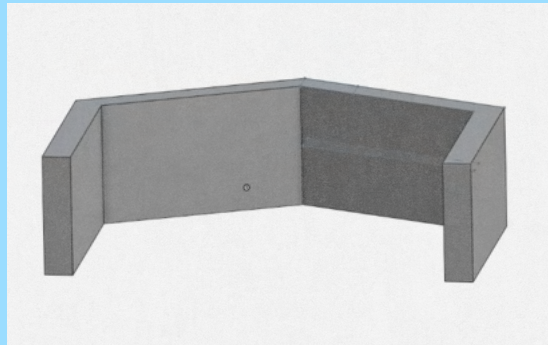


This is the piece that Elijah 3D printed, and this is what we are going to use for the claw.

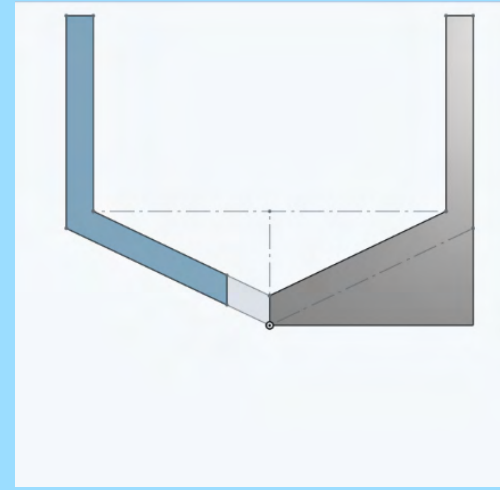
It's in two different pieces because the piece on the left is the piece to move in or out to grab the pixels. The larger piece on the right is the piece that is stationary to the robot arm. We only want one part to move so it can easily pick up pixels and move them. It's not as much as a scooper

any more since we made some adjustments to the original idea. This claw will present better work since we don't have to rely on the wall to help us during the match. We had help from a varsity student that knows more about CAD than any of the JV team. He helped Elijah with CADing and the new design.

It took a total of 3 prints including this one to get it right. We plan on having a servo to be able to move the pieces in and out. We have a motor to support the arm itself but as for as the claw we are going to use a servo. The plan is that we can either have one controller for the arm and another one for the claw. But that would mean we would need another driver, so we are working out a way we don't have to use another controller.



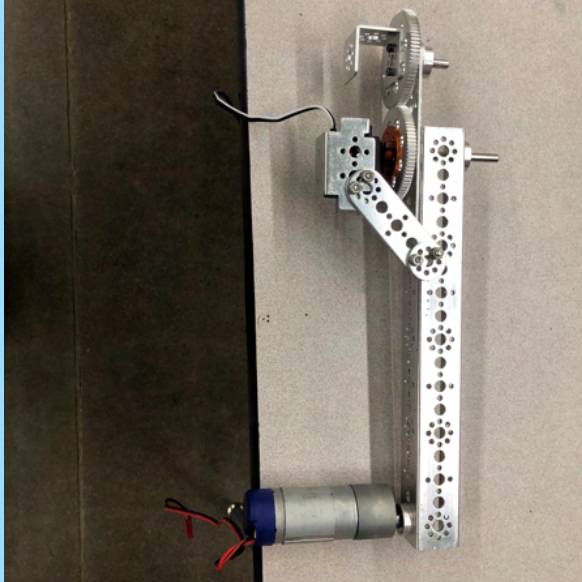
We made the part of the claw that's staying still longer as in longer in height. We increased the height so that when we go to pick up the pixels they don't fall through. We want them to stay in the form we grab them in. By adding height to that part, it will decrease our chances of dropping the pixel.



To facilitate the grabbing motion of the claw, we decided to remove a 0.44-inch section on the left side of the claw, creating two main pieces: one fixed to the arm on the right and another that could be moved by a servo to grab pixels. Lastly, we added more room to the back of the fixed end of the claw in order to attach it to the arm more easily.

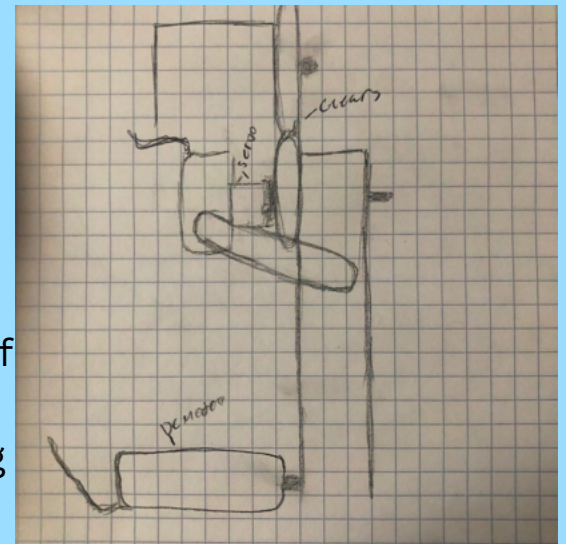


Robot Arm



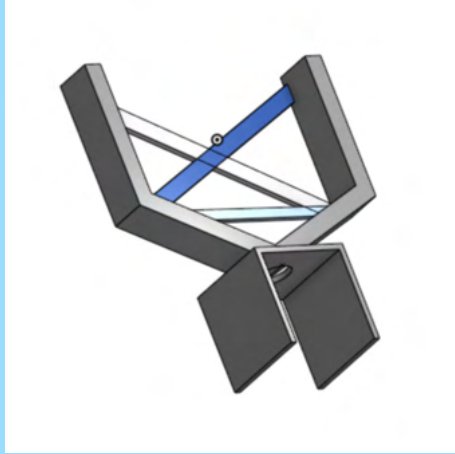
There are three different pictures. The one on the top left-hand corner is the front side of the arm. The one in the middle right-hand side is a sketch of the arm which has the most important parts labeled. Lastly the one in the bottom left-hand corner is the back view of the arm. There is a servo located next to the second gear down, that's going to be used for the claw. We have a DC motor at the bottom of the arm because if we used a servo, it wouldn't support all that weight.

The arm would have two joints where one would move the entire arm up and down, while the second would move the main claw up and down as well. We want the claw to be able to move up and down so it can be easier to grab pixels. It would also make it a whole lot easier for the drivers for transportation the pixels without having to worry about dropping them. If they can tilt the claw backwards and have the arm at an angle it should decrease our chances of something happening.



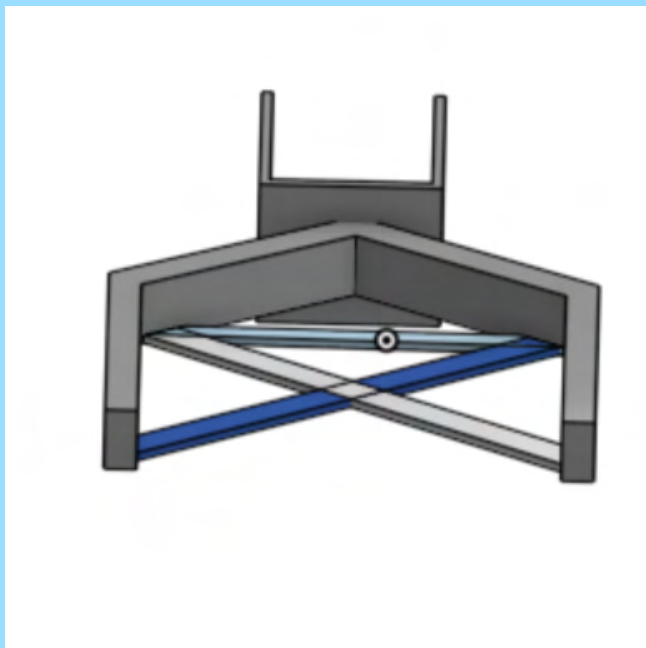
From the back view you can see how hollow the rest of the arm is. The most weight is going to be the DC motor at the bottom of the claw. We want to make sure that the arm is fluent, so it doesn't call any problems with the claw and pixels. The arm isn't too long so it should fit in the box without a problem. Instead of having the arm on top on the robot at an angle going down we chose it to be located in the front of the robot. It would be more efficient and that way we don't need to adjust the arm length.

CAD Part 1

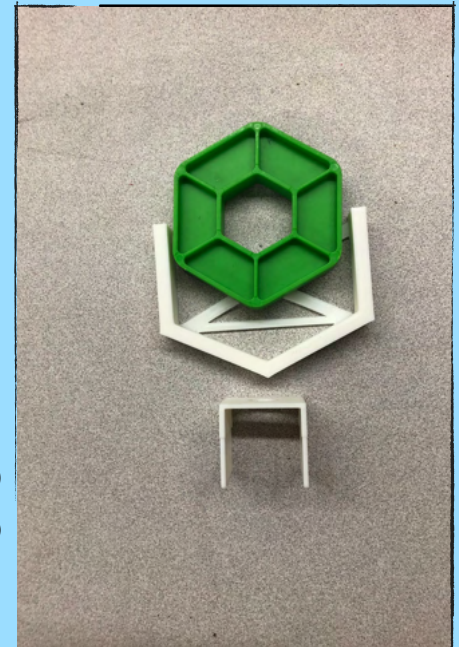
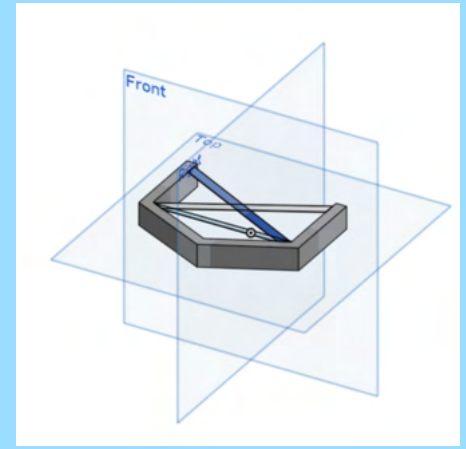


This was the original idea for the claw/ scooper. After printing out the parts we tried putting them together but soon realized they wouldn't work. The X was too high and even then, it was still a struggle to get the pixels onto the claw. We designed a new claw that would fit the purpose for this competition.

There has been a lot of trial and error trying to figure out what would be the best design for this competition. One big problem we came across was that we didn't have a clear way to put pixels on the claw and being able to transport them to the needed location. It's important that we be able to pick up pixels with no problem and not have to worry about the time running out. Since we are tight on time taking out the X from the bottom would make it easier for the two drivers to pick up pixels rather than ramming it against the wall. This design also wouldn't work due to the way it would have to attach to the arm. There wouldn't be enough space for the gears to turn.



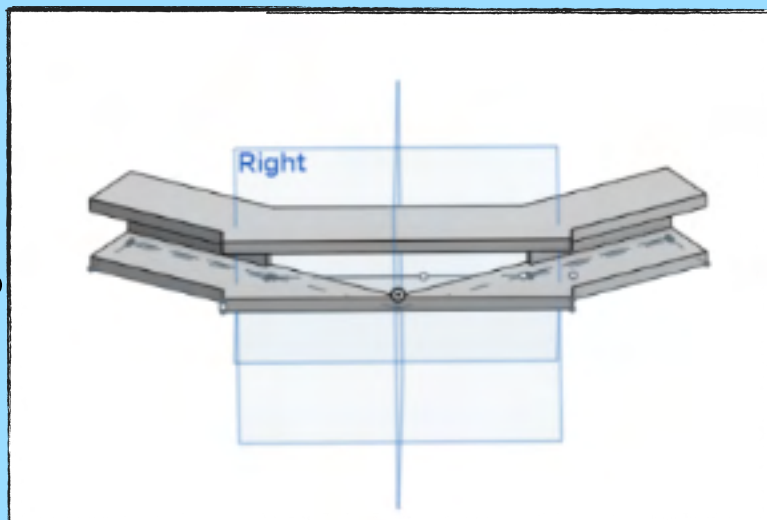
The idea is to have this claw scooper attached to an arm, and the joint connecting the claw to the arm, it's supposed to be able to tilt forward and backwards. That way we can scoop up the pixels or dump them on the board if it comes down to that. We should be able to scoop up two pixels at a time with this claw design. It's the shape of the pixel so it would fit it better while we try to scoop up pixels from the playing field. There is an X on the bottom to add support so the pixel doesn't just fall straight through. The point of this design is to get pixels from one end of the playing field to the other end.



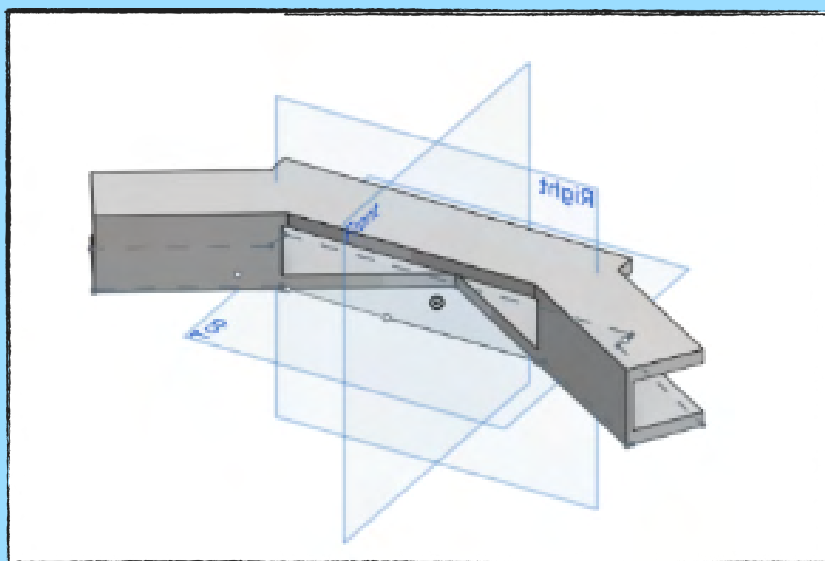
CAD Part 2

Why did this idea not work?

Well, you see this was our original idea and the goal was that we make a device that acts like a bulldozer to put pixels from one end of the playing field to the other. This would have been a good idea but the number of problems we ran into was too much. First off when we attached the design to the front of the robot there was a complication with the hole in the middle of the device. It was too big of a gap and one wrong move the pixel went through the hole and under the robot. Another problem we ran into was when we drove the robot the front end would lift up, the device we had wasn't tall enough so when the robot went forward the device went over the pixel. It totally defeated the purpose of pushing the pixel across the field. This was just one of many ideas we thought about but just wouldn't work for this competition



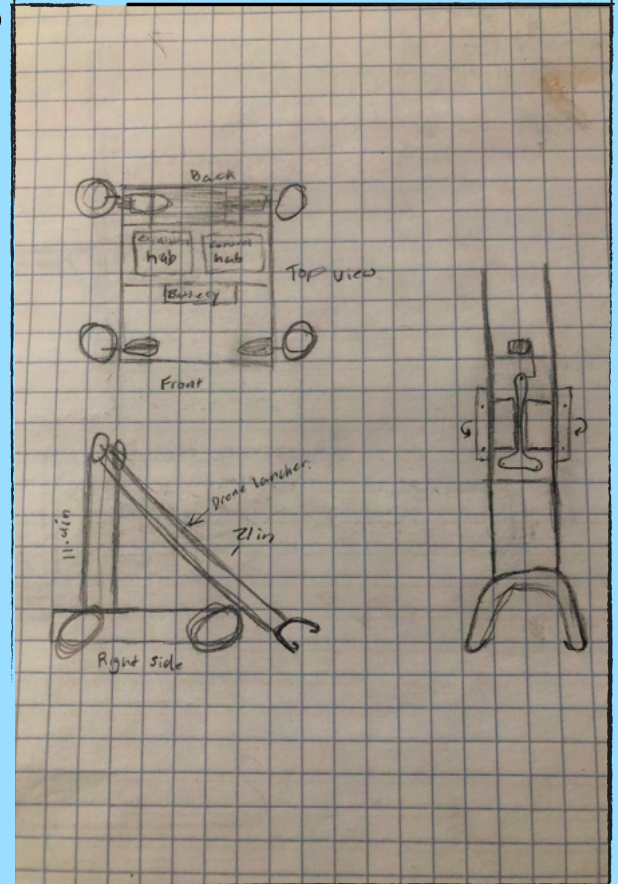
We started to design a pusher device to go on the front of the robot in order to be able to push pixels around the field for our arm to pick up. It was designed as a solid C shape bar with drilled out holes to be able to fix it to the front bar of the robot. While the design works when it comes to pushing pixels around the field the design fails at pushing pixels towards the center of the robot to be in line with the claw. In the design we cut a 2-inch-deep part on the front bottom of the pusher which will help align pixels on the field as our robot pushes them in addition to this, we decided to extend the v shape out an additional 2 inches diagonally in order to be able to scoop pixels in a wider range. This was the idea until we found out that the robot lifted when we drove it first. This was a good idea but not for this competition. That's why we came up with the new claw and arm design instead of going with this design. It probably would have worked if we had more time and if the length of the device was longer as in higher.



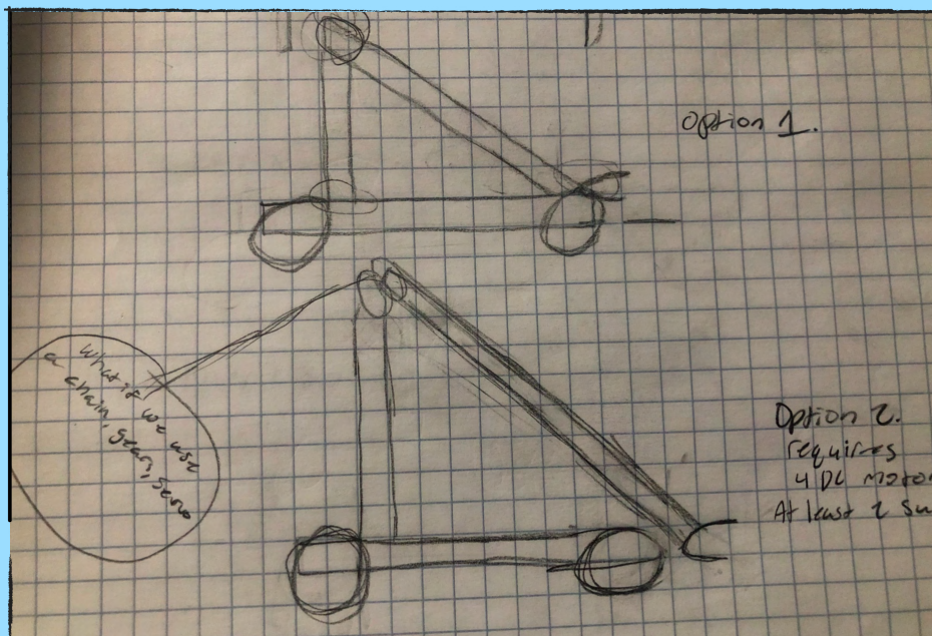
Robot Design 1

Why did this design not work??

This is one of the first ideas the team had come up with. We all really liked this idea but there were a few flaws with the way this was planned. Number one, the bar going straight up that had the arm attached to it, it was too tall to fit under the bar. We would have needed a shorter bar but the only problem with that was if we got a shorter bar, the arm wouldn't have been long enough to reach the floor to pick up pixels. Another reason why this didn't work was because we couldn't find a way to attach the gears to the top of the bar to connect the arm. There would have been no way we could move the arm up and down the way it was supposed to. There is a size requirement for the robots, they have to fit into an 18 x 18 x 18. The robot wouldn't have been able to fit since the arm and claw was in front of the robot, it stuck out too much and it was out of the box.



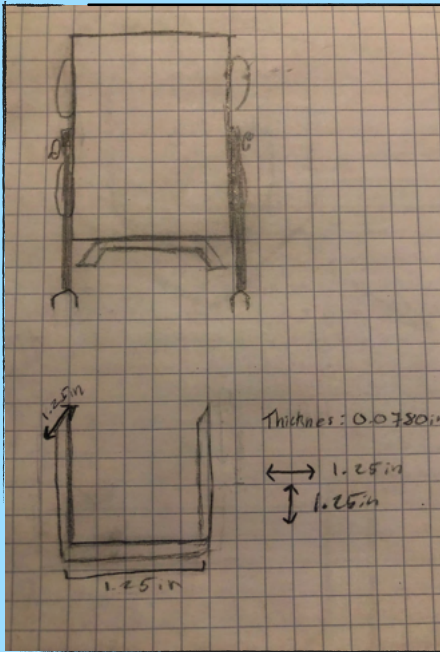
There could have been a way to fix all these flaws, but we didn't have enough time. Since we started late, we were a little rushed to come up with some ideas. Although this was a great idea it just wasn't suitable for this competition. If the bars were higher up and we were able to attach the arm to the bar it probably would have worked. I'm saying this because this can help you understand why we went with the design we did. This was one of our mistakes.



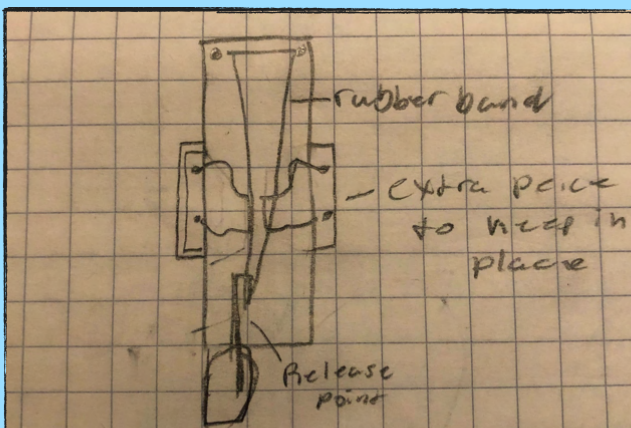
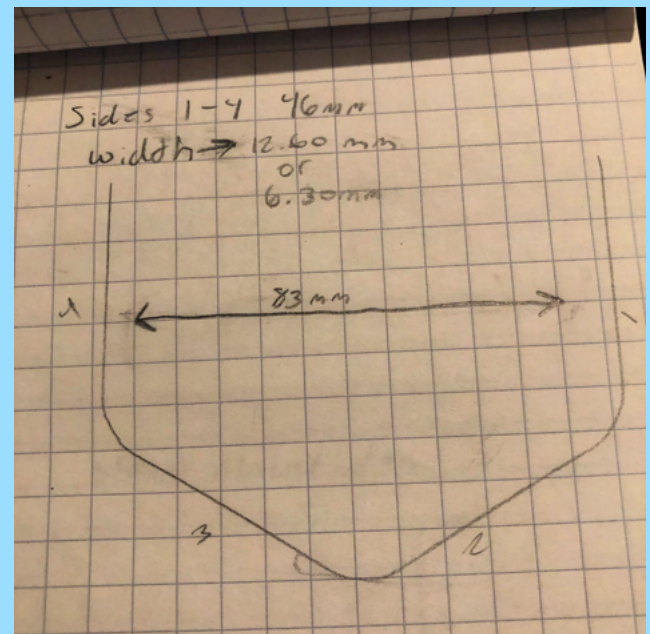
Robot Design 2

Why did this design not work out??

Well for starters this wouldn't have worked out because of the wheels and the 18 x 18 x 18. For the two arms on the side, we would have needed to put them either on top of the wheels or in their spot. We could have moved them forward but then that would affect the way the robot fits in the box. If any part of the robot is sticking out or touching the sides, then that is an automatic penalty which can quickly change into disqualification. That is why we are so careful on what all we add to our robot. We don't want to take any chances.



In order for the two arms to be able to move up and down we would have had to use 2 DC motors and that would have brought us up to a total of 6 DC motors, not including if we needed to use an extra one for the claws. If we had started this way before we started working on planning and ideas, we could have used this idea. It just would have taken a lot longer to get to where we wanted to be. The image in the middle on the right, that is what the bottom half of the pixel is, and it also has the measurements. We made the claw based off of the pixels size so it would fit perfectly.



The image on the bottom left-hand corner is showing the idea we had for the drone launcher. That was supposed to be connected to one of the arms that way we could angle the way we wanted to launch the drone the way we wanted.

We had a few different ideas for the drone launcher but the design we have right now it wouldn't go with the design. There wouldn't be a spot to put the drone launcher.

Software

Using android studio, we were able to code the robot to do all it does now. Although the code is not fully done, the robot can still do a lot for our team and every other team participating. The arm cannot move yet, but the claw can move on multiple Y positions and can open and close to pick up and drop the pixel. We are going to start using road runner to get the arm to move up and down into any position we desire.

Outreach

We had the Fall Advisory on December 18th, so we represented the JV team. The varsity team was there too, and we talked about our robots, and we got feedback on what we need to do to improve. We talked about how we did at the last competition and what our concerns were on how we should proceed with upgrading our robot to make it better in upcoming competitions. The meeting that was held Timothy Matteson, from Metrology Programming Engineer, Nathan Fritz from Mechanical Engineering, and Jack Morris from Computer Science. There were a few more people that came but I don't know their names. It was a very productive night!



Accomplishments



For the Gilbert Christian High School competition, we won third place got our design award. We didn't have the best-looking robot, but it was very creative. Since we did most of the work on the day of and the day before the competition we rushed. We had wire tape on one side of our robot for numbers. It was funny and we had a lot of fun. In the future though we will have a better designed robot and would have put more time and effort.

3 out of our 5 rounds we had won. In one of our matches, our front right wheel had fallen off but we were still able to get the robot to the backboard so we got the extra points. We ended up winning that round fortunately before the next round we got the wheel back on and were ready. Point is, we had complications through the rounds, but we didn't give up, we still worked as a team, and we landed in 8th place.



Qualification 4 of 32

WINNER	80	37	
2844	4	10	22256
7156	3	10	202
		10	
		10	
		0	
		30	
		0	

Autonomous: 0
Driver-Controlled: 7
End Game: 0
Penalty: 30

FIRST TECH CHALLENGE AZ Roadrunner - Gilbert Qualifier

Qualification 10 of 32

WINNER	59	45	
5661	4	30	9095
7156	2	25	18420
		0	
		7	
		10	
		0	
		28	

Autonomous: 28
Driver-Controlled: 7
End Game: 10
Penalty: 0

FIRST TECH CHALLENGE AZ Roadrunner - Gilbert Qualifier

