Team Members & Roles:

Builders -
Lacey Robinson (Lead builder/Logo designer/Portfolio/Organizer)
Dakota Cernak (Lead Idea Man/Assistant Builder/Logo designer/Strategy)
Levi Taylor (Assistant Idea Man/Assistant Builder)

Designers/Builders -
Isaac Wiedenhoft (CAD Assistant/Assistant Builder)
Nathaniel Goodrich (Lead CAD Designer/ Assistant Builder/Strategy)
Tyler Norman (Assistant Idea Man/Assistant Programmer)

Programmers -
Jack Ploof (Lead Programmer/Strategy)
Aiden Smith (Assistant Programmer)

Miscellaneous -
Chase Whitrock (Included in Everything and Helped With Everything)

Introduction:

The team is composed of 9 members from Yadkin Early College, NC, with branching variety between Freshman up to Seniors. We have been an active team for a total of 4 years. Throughout our previous years, we have been through many challenges. A major challenge that we are still facing to this day is our lingering effects of the pandemic. Most of our previous members have graduated and are now off to college, so most of what we accomplish is made from scratch.

Outreach:

We are committed to inspiring the next generation of builders and doers. We have gotten to present and talk to middle schoolers at Forbush and Starmount about the opportunities of Robotics. Our goal is to show the generations to come about the challenges and successes that come packed into Robotics. Our presentations are a way to open the minds of the middle schoolers about the technical and mechanical aspects of things as simple as robots completing challenges.
Austin Enclosures is another one of our outreach programs. Austin Enclosures is a manufacturing company that helps with the main component of our robot, metal. The designers of our team send CAD files of a robot base or arm designs. They are then cut and folded into a usable base or arm. Austin Enclosures is an outreach program because it not only gets our name out there, it also shows us how our tasks of programming or building can contribute to the real world.

Fundraising:

In the light of fundraising challenges we faced last year, we opted to accept donations from the personal funds of team members as an alternative to raising funds externally this year. Each member who was willing and able to donate contributed $20 to support expenses related to our equipment and team registration.

Brainstorming:

At our first meeting, after the kickoff event, everyone had ideas on what we could do. We spent the first couple of meetings discussing our **strategy** on how to get points and reading the rules and regulations. After watching the released video of this year's game, Into the Deep, and reading over the rules, our team was ready to start designing what was in our heads.

Our team did individual research on things to help boost our ideas and get the ball rolling with the actual building and drafts of our designs. We **went through videos and past inventions** to come up with what we currently have.

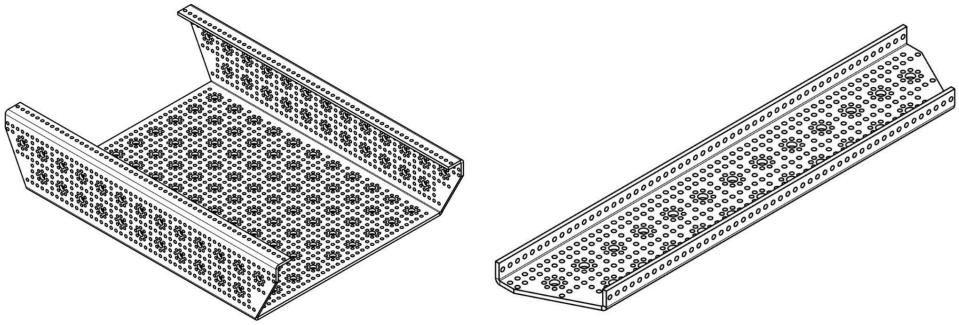
A recurring problem in our planning processes from past years is that we spend **too long** on it. Because of this, if we need parts, it's too late to order some. This year we kept our planning short and didn't overthink on any of the aspects of drafting a robot. We made multiple drafts and edited or changed it after a draft was finished. Because of this planning we were able to get parts for our robot before the week of competition.

Designs: Drafts & Finals

This is about our first trials of the main components of our robot, which is the base and the claw/ arm.

Base Concepts (with CAD)-

Our main plan for the base is to make one that can be reused,



Draft #1 (Base plate on the left, side panel on the right)

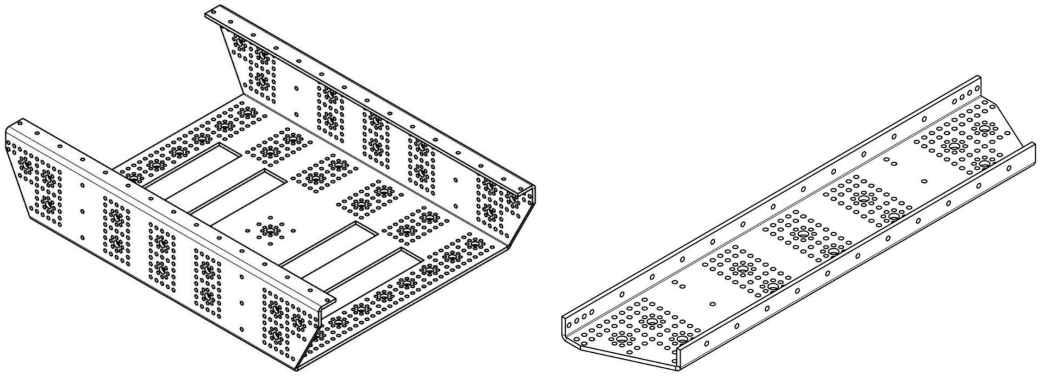
Our thought process:

- With all the holes within the base and side, we could place whatever we need onto the base, without trouble.

- The holes would make the majority of our robot light, if we were to try ascending our robot in the ascend zones.
- The shape provided a good sleek look whilst making a spot for wire management.

Problems:

- When our metal providers went to manufacture the CAD design, the holes made the manufacturing time extremely long. Because of this long manufacturing time, it would have been a hindrance to their work productivity. They contacted us and informed us of the time issue, and we changed our design.



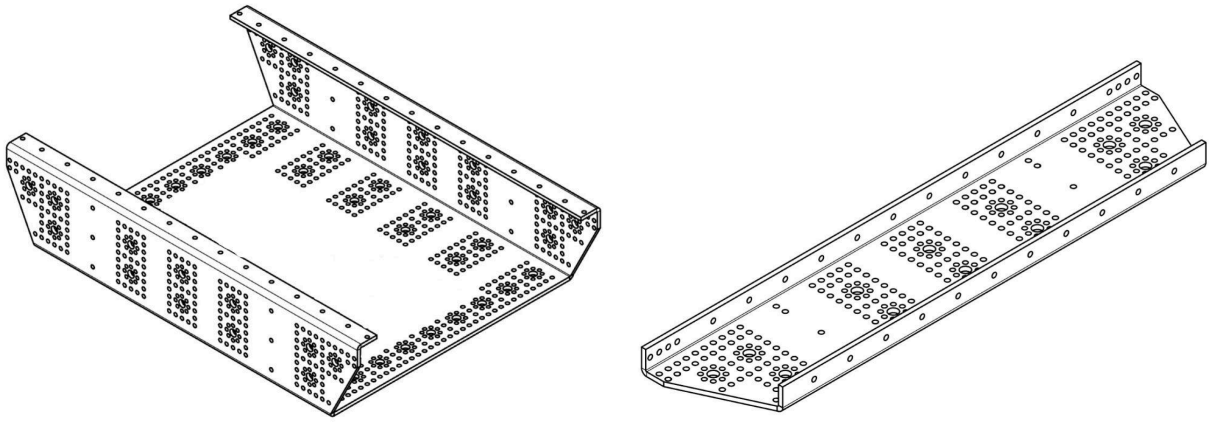
Draft #2 (Base plate on the left, side panel on the right)

Our thought process:

- Not as many intricate holes to cut out, so it should help with the time problem for Austin Enclosures
- The side panel matched the side pieces of the base plate and is did very well to hide the wheels and gears (we ended up using this side panel in our final design)

Problems:

- The rectangular cutouts were to accommodate for the light weight like the previous draft, but it doesn't provide support for our; battery, control hub, expansion hub, or motors.
- The rectangular cutouts in the base plate made it too flimsy to hole the weight of the necessities for the robot to work



Final Draft (Base plate on the left, side panel on the right)

Our thought process:

- The lack of holes made the base plate be able to hold the necessities for the robots basic mechanics to work.
- The plain clean metal in the center made it easy to drill any necessary holes for supporting and strapping down things like the control hub or battery.
- The side plate in the 2nd draft did well to cover the mechanics of the omni directional wheel, so we are using it in the final design; but with the alterations of some pieces being removed.

Problems and Solutions:

- A recurring problem is the base not being able to support the weight of the other components of the robot. The bottom of the base plate was bowing inwards causing screws and holes to line up incorrectly.
    - Our solution to this problem was to brace the side pieces of the base plate with a rod through the center.

<u>Claw/Arm Concepts (mostly CAD)-</u>

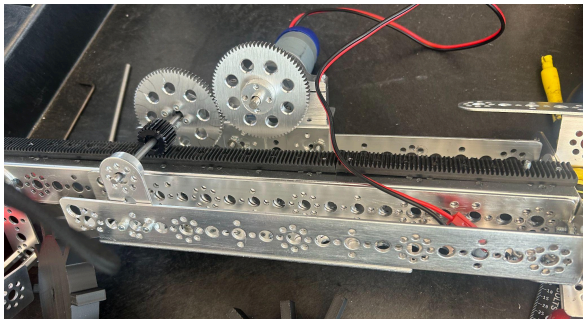
Clamp Draft -

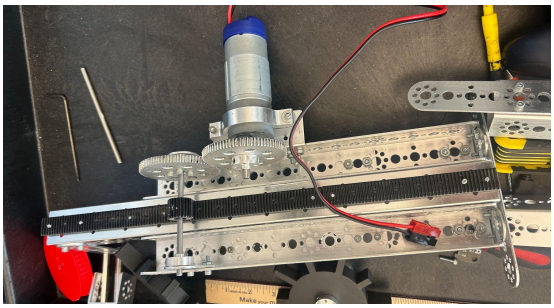
Our thought process:

- A claw or grabbing mechanism would be the best approach for the challenge of lifting the samples and placing them into the baskets

Problem:

- We do not have the parts to make a functional claw (opens and closes with buttons) without the cons outweighing the pros of a claw.
- We did not have a way to lift the claw nor attach it.





Hook and Line -

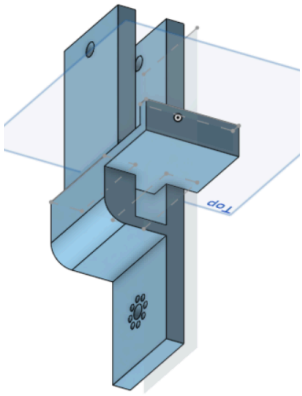
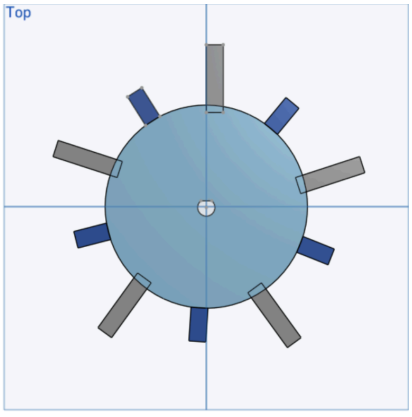
Our thought process:

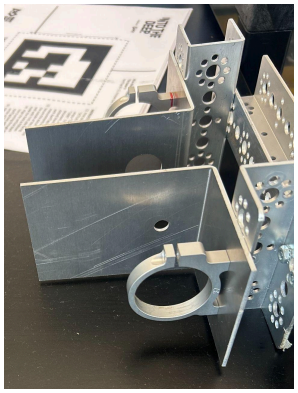
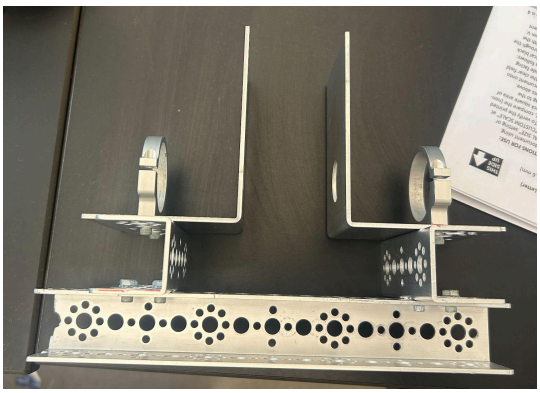
- Our goal with the hook and line is to hook the specimen and raise/lower it by a string to hook the specimen onto the rungs (high or low?)

Problems:

- A huge problem is letting the piece go. Because it is just a rod sticking out to hook onto the specimen, it is hard to ‘drop’ or release it. We’d have to shake it until it falls on its own, which takes up time that could be used for more efficient point gathering.

- All of our points would have to be from specimens. Because of that then that means all of the other samples on the playing field would be useless (in the sense of using the hook and line)
- **Even though the hook and line is a tedious, slow process; it is going to be one of our back ups in case our final draft breaks or fails to work as intended.**

Flywheel & Mount - (flywheel on the left, mount on the right)

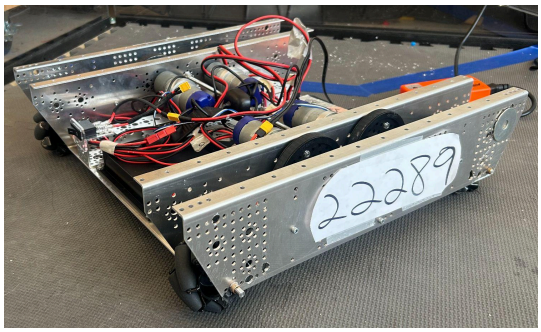
Our thought process:

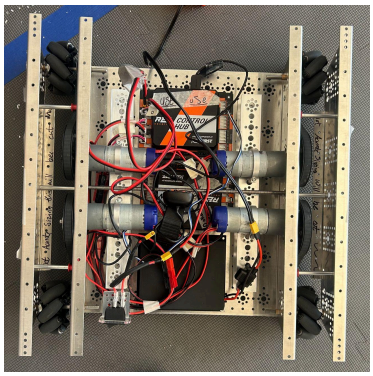
- Last year's game, we saw another team use a sort of vacuum mechanism to pick up the pixels. We decided to try it, but we made some modifications to be able to pick up the samples of this year's game.
- Both the flywheel and mount were 3D printed, allowing us to make the hole placement wherever we needed in order to give us the accommodations we needed to fit the parts we had available.

Problems & Solutions:

- One recurring issue we ran into was that when the holes were measured, they were measured to the exact size of the screws.
    - We had to remake the flywheel and drill out the holes on the mount.

Final Design -





Our final design can push any pieces because of its height off of the ground. The arm is able to

Programming:

Jack add anything you see fit for the programing and it'll be made neat and tidy.
Ive printed the first 5 pages (with their touch ups) so DO NOT PRINT THE FIRST 5