

IA FTC ROBOTICS

RISHABH RAJORIYA, WILLIAM SUDARMAN, AAYUSHI MAHINDRAKAR, RUHI KHANNA, SAHASRA POKALA

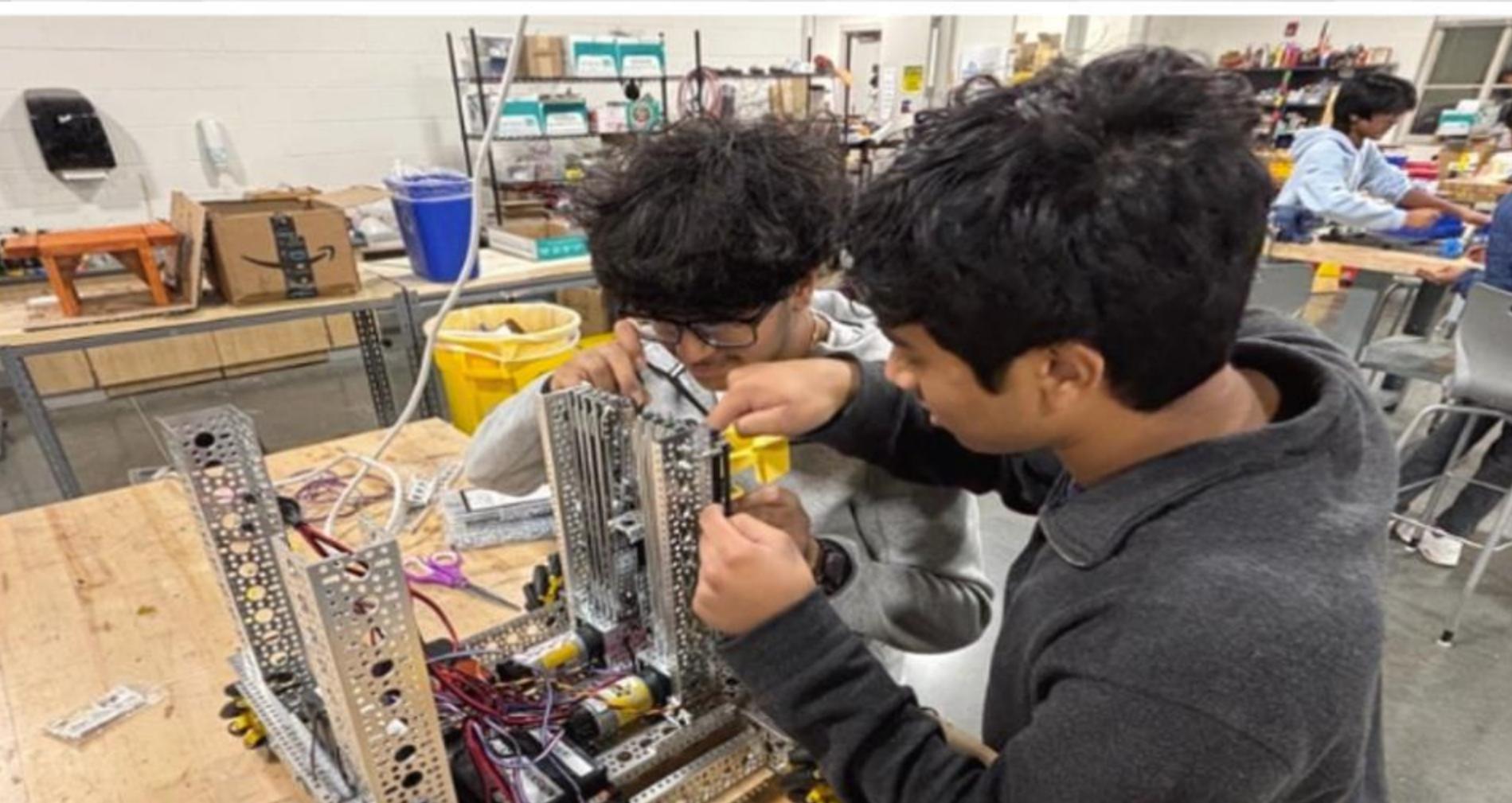


Innovate: IA Project Showcase

Our Team: Our team was founded this school year. It was created for freshman and sophomores that wanted an introduction to robotics. Throughout the year, we have learned and developed many different concepts. Our progress and evolution throughout the year is shown here. We have had to make many tough decisions, ones that have define our teams in a special way and allowed us to develop analytical skill, critical level thinking, and pure passion for the club.

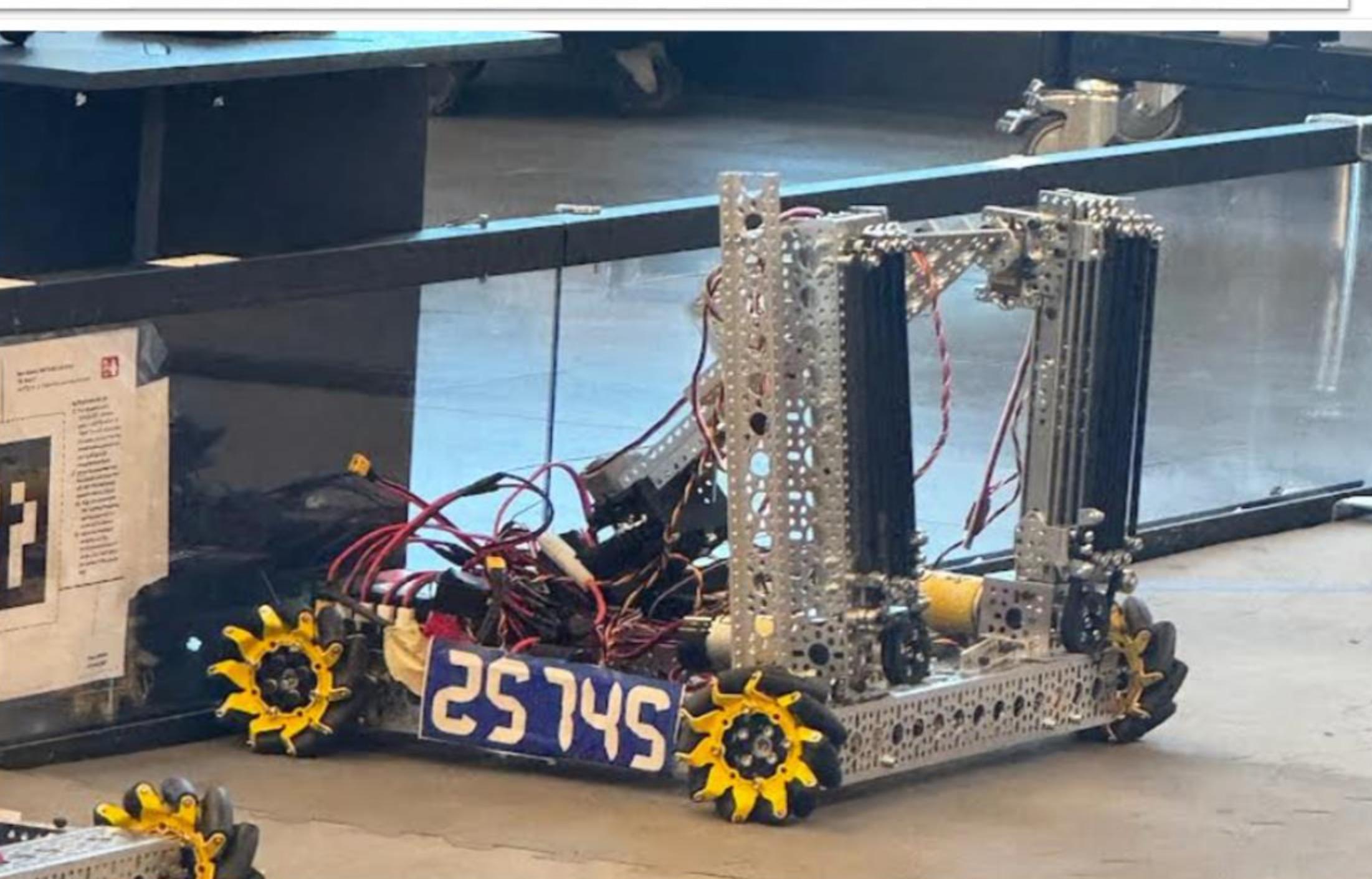
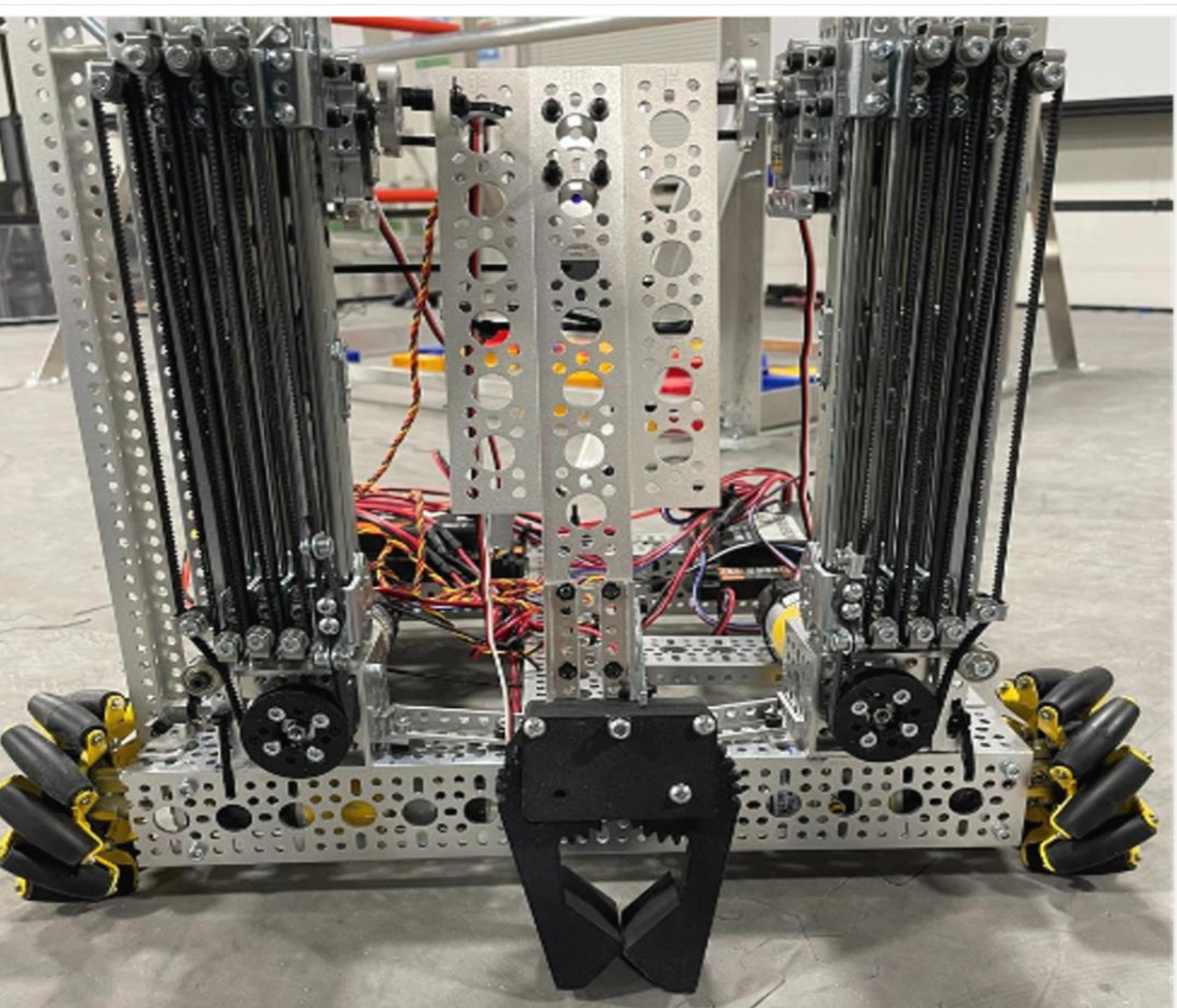
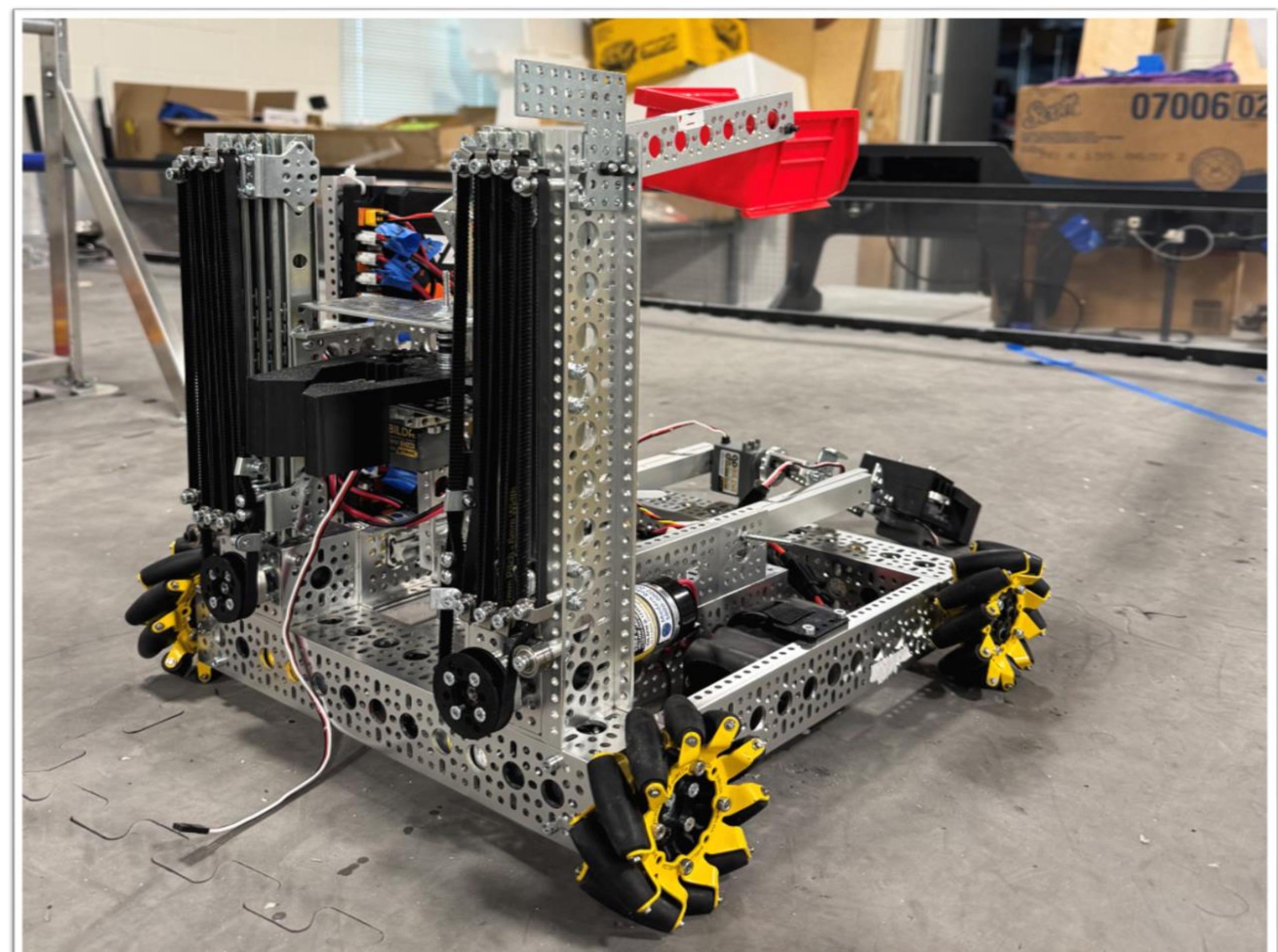
Problems Faced

- A problem that we had was with a physical piece of the robot. Our 3D printed belt clips from the viper slide kept falling off and breaking. 3D printed Belt clips keeps the slide held and allows the chain to move.
- Throughout the competition season, the team decided to prioritize gaining points from clips and hanging the robot. During the time-period when we used the U-channel design, we realized the arm was too long to generate enough torque and force to pull the clips and hang them.



Solutions

- We realized that the 3D printed clips, which were made due to a lack of available parts, were too fragile and caused the entire slide to break constantly.
- The teams also learned that the robot produces the most force when the arm is closer to the block and shorter, due to the concept of torque.



Evolution

- Started with the FTC GoBilda Starter Bot
- Switched from U-Channels to X-Rails for improved stability.
- X-Rails provided the intended stability boost.
- However, attaching hardware became extremely difficult.
- Required more custom parts and design work.
- Issue worsened because the X-Rails were from the school's metal shop, not standard FTC ones.
- Despite the enriching experience of designing custom parts, we switched back to U-Channels for easier future attachments.



Prototype and Test

We prototyped each stage as it was our first time. After successfully testing each part we assembled, we then tested our designs in house and during competitions. We iterated this engineering process almost 3 times to build our best robot yet.



Cost Based Analysis: Innovative Ideas

Option 1: Use Custom 3D-Printed Parts

Pros: Fully customizable, lighter weight, can iterate designs quickly, and potentially lower long-term cost.

Cons: Requires a reliable 3D printer, filament/material costs, print time, risk of durability issues, and possible design errors.

Option 2: Use Pre-Made Commercial Parts

Pros: High durability, proven reliability, no printing wait time, and easier assembly.

Cons: Limited customization, higher cost per part, and may require modifications to fit specific needs.

Ultimate Decision:

In the end we decided to use pre-made commercial parts. However, if there was a part that's needs could not be met, we did not hesitate to use CAD or 3D printing. This is seen through our claw, as its special design is made specifically for the blocks.

Next Steps

Since this was our first year, the team still feels there are many ways we can improve. This year taught us a lot about our mistakes, but also our accomplishments for next year. There are many next steps we plan to take.

- Get an early start
- Focus more on outreach
- Teach new members parts and their functions
- Teach proper coding
- Have drive practice days
- Organization