Bell, CA

CYBER-NAUTS #24176
Engineering Portfolio

EST 2023

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MEET THE CYBER-NAUTS

Maya
Captain / CAD

Elizabeth
Co-Captain / Outreach

Isaac
Software Lead

George
Mechanical

Yael
Electrical

Amanda
Software / Outreach

Hazel
Mechanical

Abraham
Mechanical

Who Are We?

The CYBER-NAUTS is a FIRST Tech Challenge robotics team founded in Bell, California. Our team includes 8 members, ranging from middle school to high school, consisting of 6 Seniors, 1 Junior, and 1 Seventh grader coming different parts of Southeast Los Angeles. Ultimately, ***it's our first year*** competing in a robotics competition as well as being part of a FIRST Tech Challenge Team.

Our Mission

Our mission for the CYBER-NAUTS team is to represent FIRST in our local Southeast Los Angeles community by…

- Promoting inclusivity and diversity within the STEM field by encouraging participation from underrepresented groups in the community, including minorities, females, and individuals from low-income backgrounds.
- Cultivating a culture of continuous learning, improvement, and innovation within our team and inspiring others to pursue excellence in STEM and beyond.
- Providing opportunities for hands-on learning and skill development in robotics, programming, engineering, and problem-solving.
- Encouraging our sister FLL teams to continue participating in robotics.

Our Mentors

Meet our coach, Marian

This is her first year coaching an FTC team, but she has experience from mentoring Southeast Community Development Corporation's FLL teams since 2022.

Having a BA in Computer Science, she helps us with our code. With the mechanical side, she tends to point us in the right direction when things go astray. It's a learning experience for all of us!

Our Sponsors

TEAM ORGANIZATIONAL STRUCTURE

Every team member has to choose at least one sub-team to be a part of. The CYBER-NAUTS are organized into 5 main sub-teams: mechanical, software, electrical, outreach, and drivers.
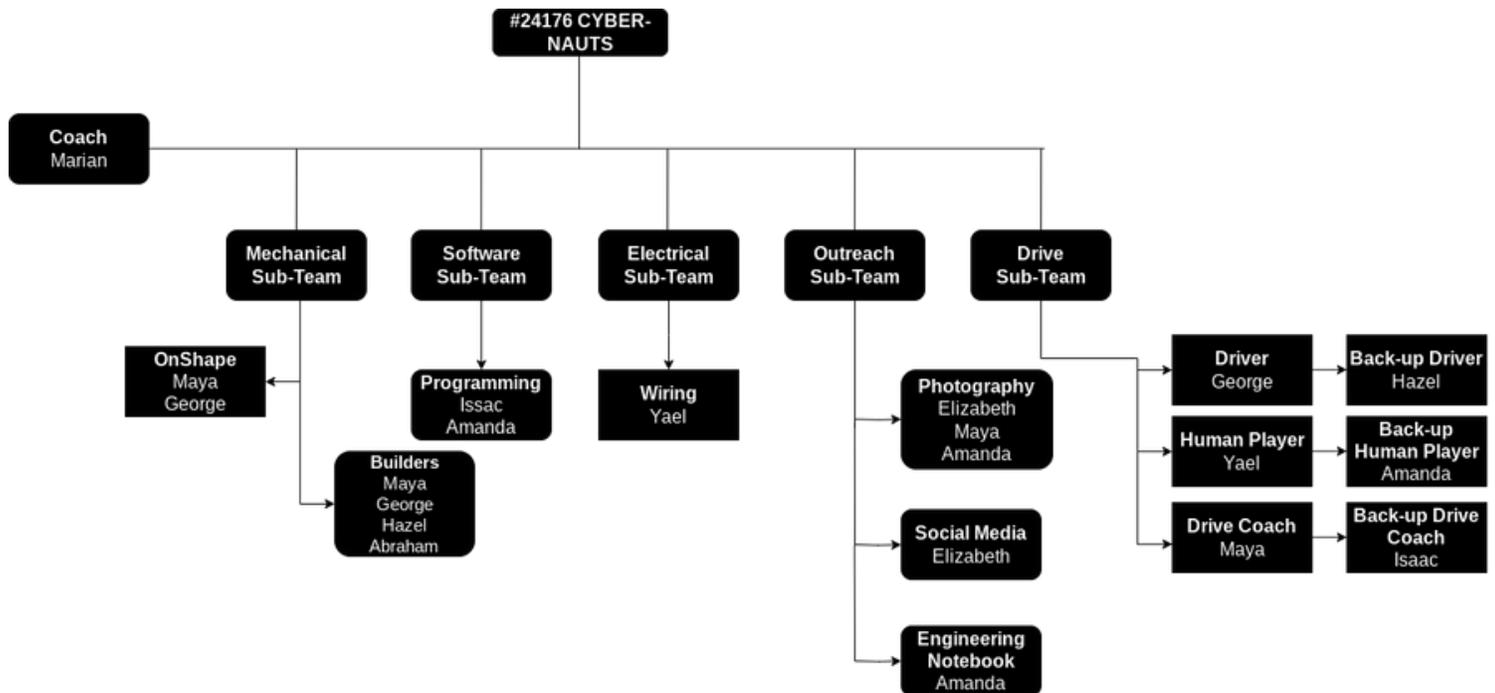
As a rookie team, we had to specialize the task to people who had experience in each field. Each member is important because they help expand what the other team members didn't know and help teach each other in subjects some of the team were accustomed to. We meet two times a week on Wednesdays and Thursdays to build the robot and brainstorm ideas.

To spread out accomplishments and help bring interest to our team, we created a website where we keep the community up to date with our work. In addition, we use Instagram to stay connected to the FTC and FIRST communities. In the future, we plan to expand our website and include an interactive and digital version of our Engineering Notebook.

- We lost two team members, but gained two new members who greatly contribute to the team with their skills.
- Instead of just prototyping when a new idea emerges, we brainstorm and model our ideas in OnShape before constructing them.
- Isaac guided Amanda to code the robot in Java. Both enjoyed making the robot move in different ways.

- We need to improve on meeting our milestones on time
- In our design process, we sort through various ideas and choose the best idea with a majority vote.
- Our building progress was often stifled since the shipping of our parts we purchased would delay to arrive.

BUSINESS PLAN

What does our team hope to be in a year?

- Developing plans and strategies to ensure the sustainability of your team, including securing funding, recruiting new members, and establishing partnerships with sponsors or mentors.

- Engaging in more outreach activities to promote STEM education in your community, such as demonstrations at schools, participation in local events, or mentorship programs for younger students.

- Strengthening collaborations with other teams, both within our community and with teams from different schools, through knowledge sharing, or cooperative strategies during competitions.

Fundraising

If we. wanted to purchase more parts than simply having the base kit, we need to fundraise!!!

- Held a car wash, receiving $200.

- Some members sold World's Finest Chocolate boxes at their schools and raised $130.

- Sold snacks and drinks at our community's Trunk or Treat event collecting $600.

- Some members volunteered to take photos for Metro LB-ELA's community events and were paid $180 for each event; we received $540 in total.

CYBER-NAUTS robotics team at car wash fundraiser

Fundraise Type	Earnings
Car Wash	$200
Trunk-o-Treat Fundraise	$600
Metro LB-ELA Photography Event	$540
World's Finest Chocolate Fundraise	$130
Total	$1,470.00

CYBER-NAUTS taking photos at Metro LB-ELA event

Community Events

CYBER-NAUTS team meet up with Downey FRC team, City of Bell's Mayor Fidencio J. Gallardo, and Congressmen Robert Garcia

Southeast Los Angeles Christmas 100 toy giveaway at Bell Tech Center

Open Radio Workshop for Students

Friendsgiving with Bell Tech's Center FRC Team and FLL Team's the Corrupted Owls and Spider Bites


Volunteering at SCDC'c Annual Toy Drive

Team Budget

TRegistration includes the fees associated with participation in the competition, access to game materials, and other resources provided by FIRST. The robot parts encompasses the expenses for components, such as motors, sensors, controllers, and wheels. The "game set" refers to the field and game elements required to set up the playing field for the FTC competition. Spirit gear includes items such as T-shirts, banners, stickers, and more to help promote the CYBER-NAUTS team.
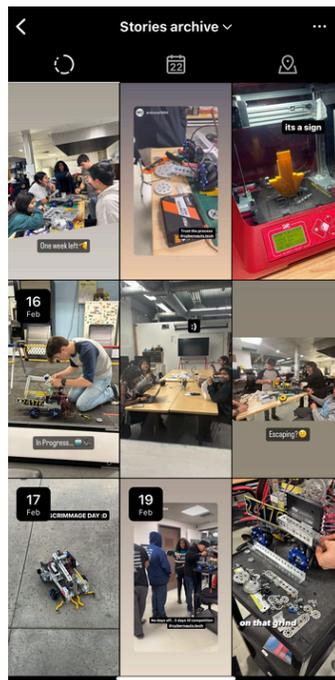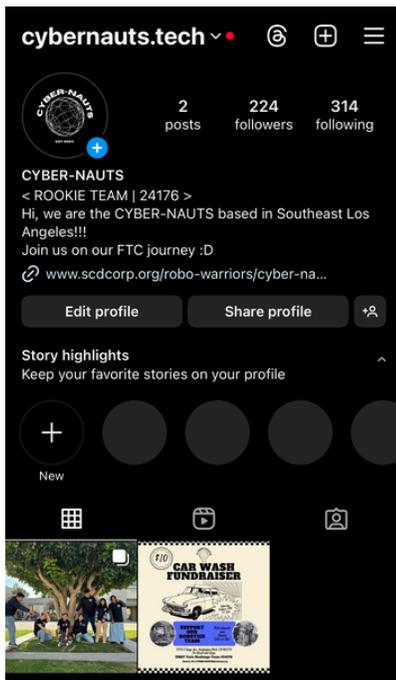

Team Costs

Spirit Gear ($420.00)
Registration ($595.00)
Game Set ($696.48)
Robot Parts ($2055.34)
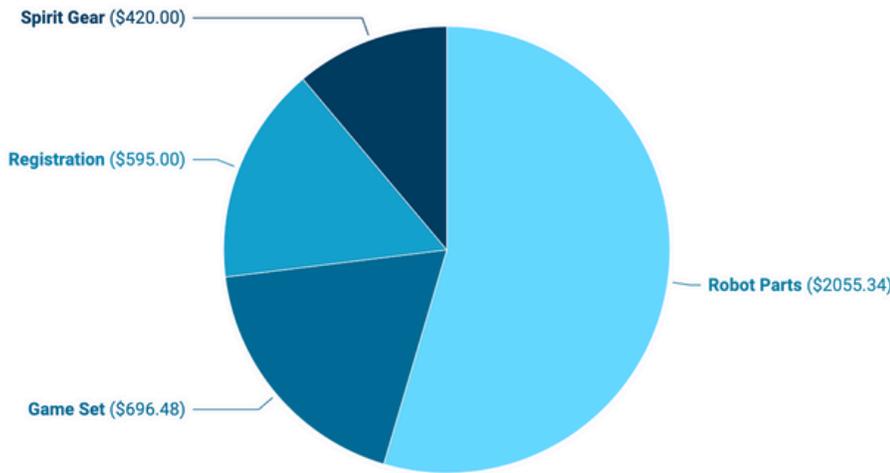
Description	Cost
Registration	$595.00
Robot Parts	$2,055.34
Game Set	$696.48
Spirit Gear	$420.00
Total	$3,766.82

Social Media

cybernauts.tech

2 posts   224 followers   314 following

CYBER-NAUTS
< ROOKIE TEAM | 24176 >
Hi, we are the CYBER-NAUTS based in Southeast Los Angeles!!!
Join us on our FTC journey :D
www.scdcorp.org/robo-warriors/cyber-na...

Edit profile   Share profile

Story highlights
Keep your favorite stories on your profile

New

We launched our instagram back in October 2023, however, we really didn't do much in terms of engagement until this year!

We've recently begun to post stories about ourselves to showcase our efforts on our upgraded robot and update our followers on our current progress.

We have 200+ followers, whom are other robotics teams and our community members since we are one of the few public/community FTC teams in Southeast Los Angeles.

STRATEGIC PLAN

How We Execute Goals as a Team

Goal
Be specific

Purpose
What are the benefits?

Challenges
What are the challenges to overcome? What resources and skills are necessary?

SMART Goals blank template

We ask ourselves if our goal is...

Specific

Measurable

Goal
Be specific

Finish prototyping claw on onShape, 3-D print claw, and assemble on robot arm by February 1st.

Purpose
What are the benefits?

A claw is necessary to grab the pixel and place it on the backdrop.

Challenges
What are the challenges to overcome? What resources and skills are necessary?

The delivery of the parts we ordered for the claw was delayed, conflicting with our wishes to complete the claw within our time frame. Fortunately, we completed the claw before the deadline. Maya needed to learn onShape, a CAD software she never formerly used, to build the claw design prototype; she explored the fundamentals of onShape through video tutorials.

Attainable

Relevant

Time-bound**?**

SMART Goals template utilized to clarify exactly what is expected and the measures used to determine if the claw is achieved and successfully completed

Goal Progression

We have a to-do, in-progress, and done list to keep track of our tasks. We do this by using a pillar in our area and using sticky-notes to state what task we need and its status.

to-do list   *in-progress list*   *done list*

Robot Game Plan

Autonomous
Pre-load the pixels into our robot's claw. By using distance sensors, our robot will detect where the white pixel has been placed. Once detected, our robot opens it's left pincer depositing the yellow pixel on the marker. Then it will traverse to the backstage and place the purple pixel onto backdrop. There will be four different codes depending our placement on the field.

Drive-Controller "Tele-Op"
Have our robot collect two pixels with a claw mechanic added to the robot. Then move to the backdrop and place the pixels on the board. Try to aim for the mosaic extra points!

End Game
During the last 30 seconds of our match, we try to to launch an airplane to the landing zone. Finally, in the last 10 seconds we park in the backstage.

COMPUTER AIDED DESIGNS

Our team members had limited knowledge about Computer Aided Designs. Yet, our Captain, Maya, and Mechanical member George decided to tackle this problem!
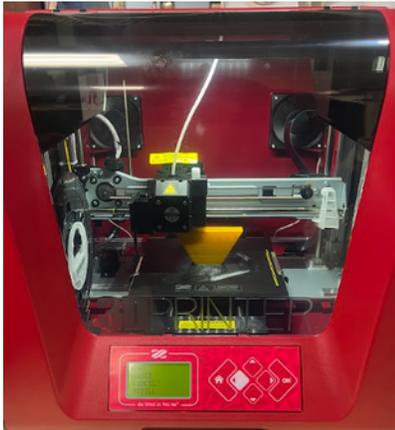
da Vinci Jr. Pro Xe+ 3D printer

CYBER-NAUTS uses a da Vinci Jr. Pro Xe+ 3D printer.

Maya and George utilized onShape as their CAD design software for our number plate and our robot's claw. Our team uses this 3D printer because it is crucial to the design of our robot. It allows us to be innovative since we can create custom designs.

With the 3D printer, we do not have to rely on purchasing and ordering pre-made parts, which saves us time and money because parts are expensive and take awhile to be delivered.

NUMBER PLATE DESIGN

Before George transitioned fully to the Mechanical Sub-team, he worked on our number plate.

We went through a total of 5 different versions of our number plates. Either our numbers were too small or not wide enough. In addition, we had to make sure that we were able to screw our plates onto our robot with ease and that took precise measurements to ensure that any holes we had on our plate aligned with those on the robot channels.

For meet 0, we used a green marker to write our number on a white piece of paper, while giving it a laminated feel by using clear tape. To attached it on the robot, we used electrical tape!

Now we have a 3D printed number plate that has been spray painted with our team color!

Meet 0 Number Plate

Number Plate CAD

Final Number Plate

# CLAW SUBSYSTEM ENGINEERING AND DESIGN

DESIGN DECISION: A pivoting arm and grasping mechanism that picks up pixels by with its claw and place it on the backdrop to create a mosaic.

ASSIGNED TO: Maya

DESIGN HISTORY:
 We organized a meeting with FIRST Robotics Competition (FRC) Team #5851 Striking Vikings from Downey High School to bounce claw design ideas off each other. We leveraged their insights and experiences to enhance our claw design and overall robot performance. The initial design discussed during the meeting didn't end up being utilized, but the brainstorming session with Team #5851 sparked creativity and innovation within our team, which led to our final claw design.
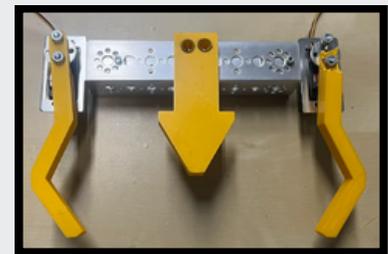
Claw Design History
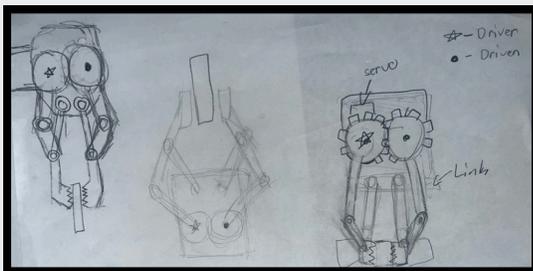
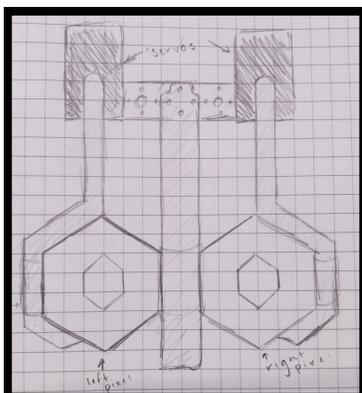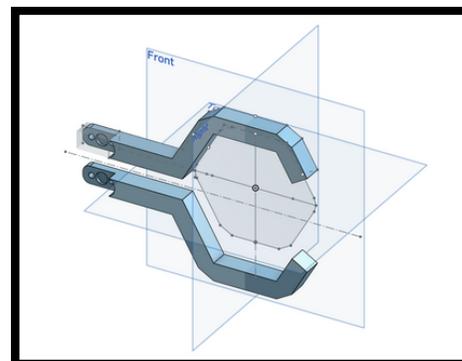*Maya's initial claw design sketch*
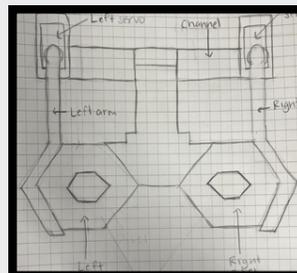
Secondary design sketch

Early 3D-printed claw

Final Claw Design

This final claw design offers distinct advantages over Maya's initial idea because it grabs more pixels, easier to fix if the pincers snap, and is narrow enough to pass through our robot.

Final claw design sketch

Final Claw CAD

SOFTWARE SUBSYSTEMS ENGINEERING AND DESIGN

DESIGN DECISION: Development of Java software in the Android Studio environment that allows the robot to navigate during Autonomous and allows the drive team to operate during Teleop.

ASSIGNED TO: Isaac and Amanda

LEARNING AND MENTORING:
The student assigned to work on the software subsystems this season was Isaac and Amanda. They already had some experience with Python, but had no experience with Java, programming FTC robots, or with Android Studio. Isaac, Amanda, and mentor (Marian) were provided with an on-line resources about the basics and fundamentals of Java. They worked closely with their mentor to study these resources. From this work, they became familiar with how to add and control hardware through software.
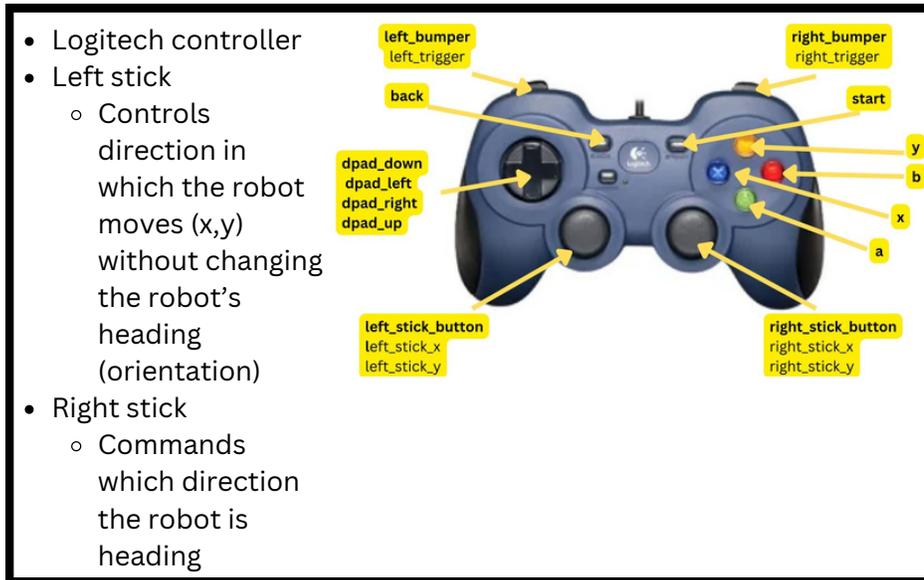
DESIGN HISTORY:
Early software design work focused on learning Java, then building basic but very useful Teleop OpMode. The Teleop OpMode allowed driver control of the bare robot Drive Train, using the joysticks on the game controller as inputs. The programming team presented the following charts as their software review:
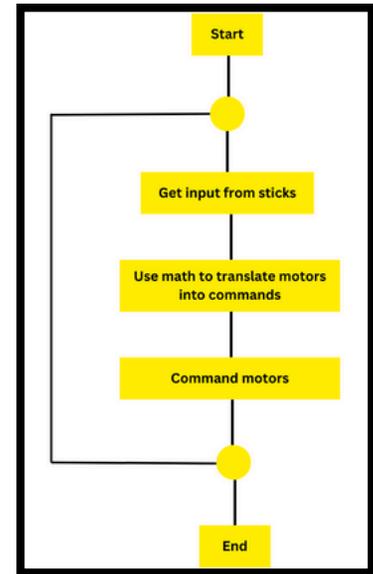
CONTROL

Teleop (Driver remote control)

- Logitech controller
- Left stick
  - Controls direction in which the robot moves (x,y) without changing the robot's heading (orientation)
- Right stick
  - Commands which direction the robot is heading

Software Design

Game Controller: During the design review, an initial set of controller button assignments were proposed to the team. As more hardware subsystems were added to the robot, button assignments were added and reassigned based on feedback from the drive team.

Claw Arm Subsystem: The controller operates the arm motor and a button toggles a servo to open and close the claw. The software limits the travel of the arm to prevent the arm from going too far back and striking the robot or too far forward to strike the ground.

AIRPLANE LAUNCHER ENGINEERING AND DESIGN

DESIGN DECISION: Build a motorized launcher to propel the airplane to the designated landing zones.
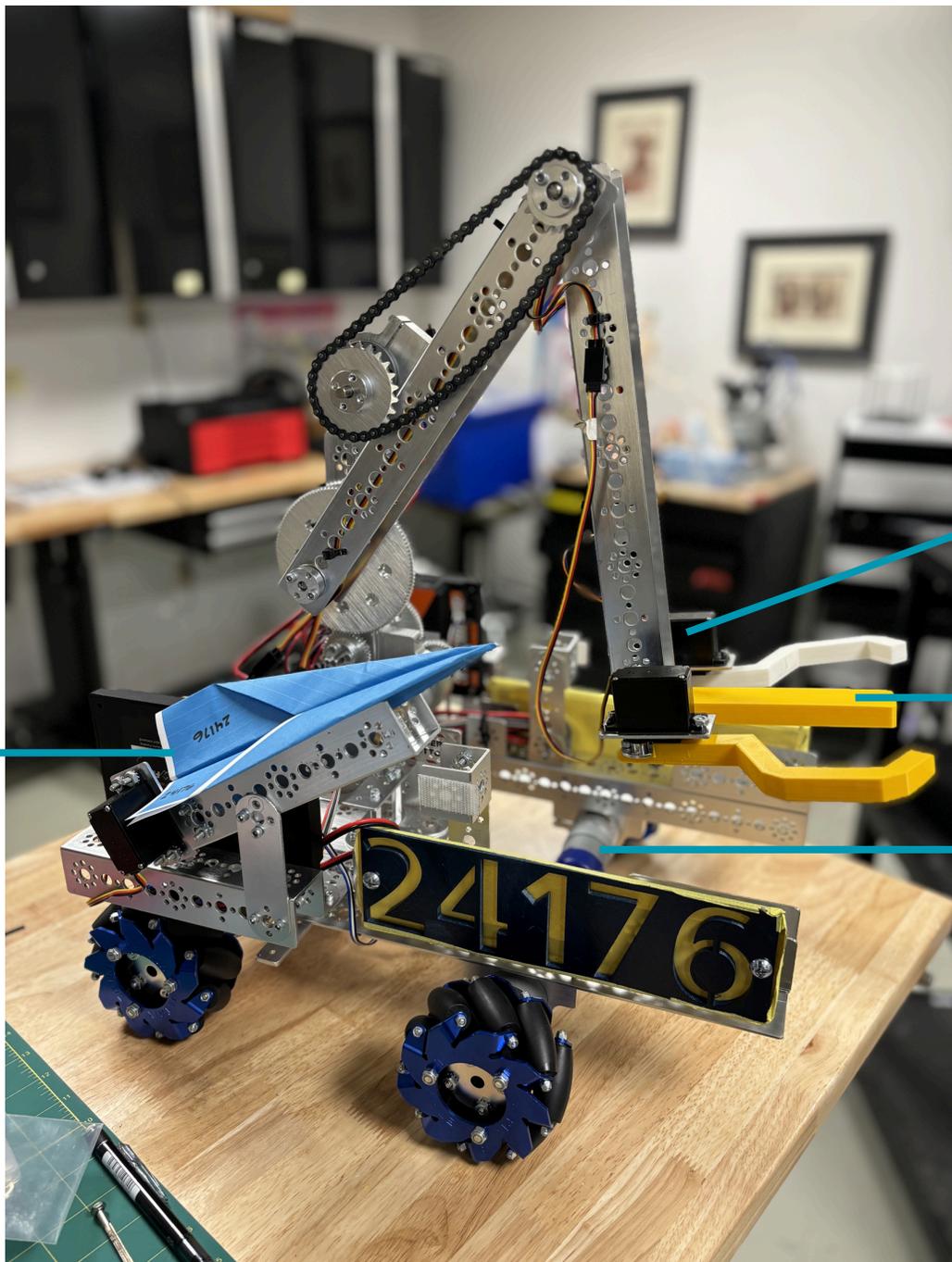
ASSIGNED TO: Hazel

Design History: Went through many different iterations of paper airplanes, 20+ overall. For the launcher, we decided to attach a rubber band to a channel and adding a servo to the end of the channel.
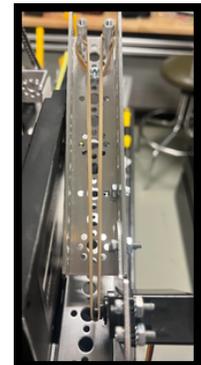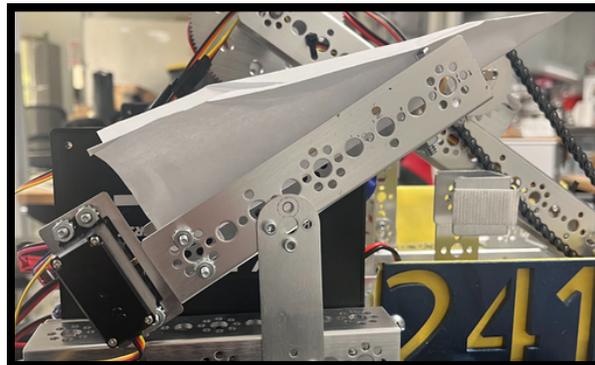
Airplane launcher installed on robot

Robot Overview

Hitec HS-485HB Karbonite Gear Servo

3D printed claw

TETRIX® MAX TorqueNADO® Motor

Airplane launcher