2025-2026

CYBER-NAUTS #24176

Engineering Portfolio

DECODE

PRESENTED BY RTX

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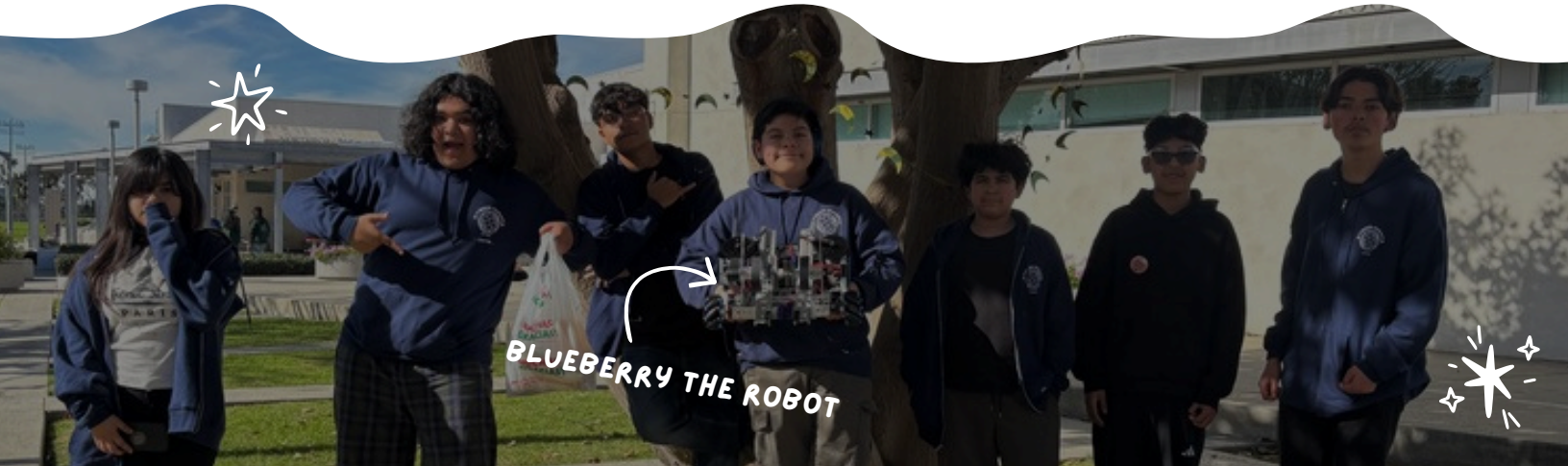
INTRODUCTION

CYBER-NAUTS #24176 is a community-based FIRST® Tech Challenge (FTC) robotics team based in Bell, California. Our team is made up of two seniors, one sophomore, one freshman, one eighth grader, and two seventh graders who are all passionate about learning and innovation. This marks our third year designing, building, and competing in the FTC program!

While we have only two returning members, the rest of our team is made up of motivated rookies who are eager to learn, collaborate, and take on new challenges in robotics.



Meet the 2025-2026 CYBER-NAUTS

12TH GRADE

Matthew
"Team Capital"

Team Captain / Build Lead

12TH GRADE

Aaron
"Zyphern"

Jack of All Trades

9TH GRADE

Ashlynn
"Get Off Of Roblox, Lynn"

Mechanic

10TH GRADE

Edgar
"Alex"

Software Lead

7TH GRADE

DJ
"Other Kudi"

JR Software

10TH GRADE

Issac
"Seister"

Social Media Lead

8TH GRADE

Yurem
"Kudi Father"

Mechanic

7TH GRADE

Pedro
"Lil' Kudi"

CAD Lead

CS GRAD

Marian
"Ms. Robotics Boss"

Lead Mentor

COLLEGE

Michael
"Mich"

Mechanical Mentor/Referee

OUR MISSION

Our mission is to make STEM more inclusive by engaging underrepresented students in our community. We foster a supportive environment where we learn, innovate, and take advantage of opportunities not available to our parents. Through hands-on experiences in robotics, engineering, programming, and problem-solving, we build skills, confidence, and a passion for technology.

Team Plan

Finances and Sponsors

FINANCES

Our team operated without a formal budget but managed $2,510 in expenses through careful tracking, resource management, and strategic spending. Expenses were allocated across robot components, tools, event participation, and miscellaneous needs:

Description	Cost
Registration	$625
Robot Components	$400
Game Set	$485
General Food	$650
Spirit Gear	$350
Total	$2,510

The team's general food expenses are relatively high because we meet immediately after school and often work late into the evening. Providing food helps prevent fatigue and distraction, keeping members focused and productive during critical build and practice sessions. Additionally, during competitions, we aim to support the team independently rather than relying solely on parents, which contributes to higher overall food costs.

Cost Management & Efficiency

We implemented strategies to maximize efficiency and minimize costs:

- Reusing parts from previous seasons wherever possible.
- Prioritizing purchases for components that directly improved robot performance.
- Making sure we finished all of our snacks before requesting new ones!

SPONSORS

Southeast Community Development Corporation
CITY of BELL
SoCalGas
WRD
NewStart Housing Corporation
SOUTHERN CALIFORNIA EDISON
Kiwanis HUNTINGTON PARK

AND OUR SELA COMMUNITY

We want to give a very big thanks to our community.

We have received more than $150 dollars in donations!

OUTREACH

Social Media

Our social media presence the prior years was quite muted, so we decided to kick it up a notch. We started posting regular updates about events we attended, whether it was just a regularly scheduled robotics meet or just fooling around (while still being responsible) in the makerspace.

INTRO

MEET 0

MEET 1

MEET 2

We also worked on making our posts look better with graphics and fun stories. Plus, we added a lil twist by hiding our team mascot, Pineapple the Space Dinosaur, in posts and stories.

Keeping our updates consistent and creative helped show off our team's personality and the community we're building.

This also allowed us to gain traction in our own schools!

2400 TOTAL VIEWS

APPS USED

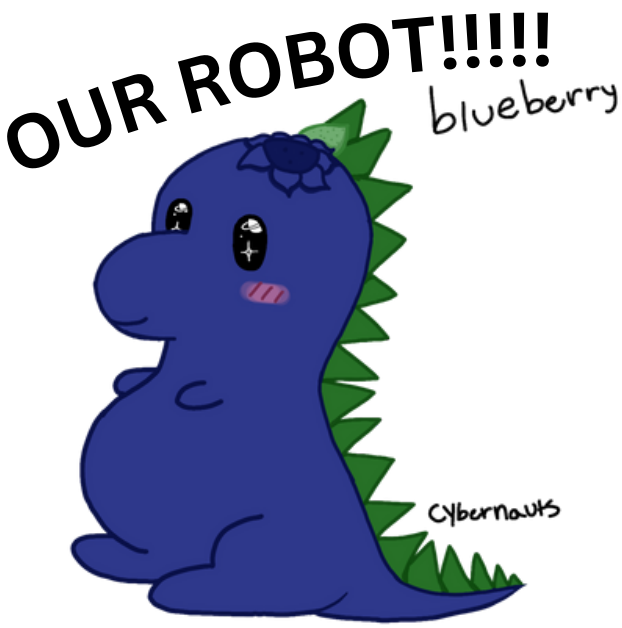
Our "Pass the Phone Challenge" reel garnered a particularly high view count. Trends like these not only increase our teams social media presence, but also are a ton of fun!

OUTREACH

TEAM IDENTITY

Last year we attempted to integrate a sense of identity into our team by creating a mascot. The yellowish green dinosaur, Pineapple, was perfect for this.

Next, we sought to improve our team spirit, by adding a personal touch to our robot. By comparing our robot to a blueberry, as it is small and packs a punch, which brought out a sense of pride in our team. Our robot takes the role of the underdog in this year's FTC challenge since more than ¾ of our team is doing FTC robotics for the first time.



Blueberry is not just an accomplishment of the engineering and coding teams, but a shared creation.

Through this collaboration, we grew more connected as a team, with every member contributing to making Blueberry a reality.

Don’t worry though, we haven't forgotten about Pineapple. Our lead mentor, Ms. Marian, made some amazing pixel art of both dinosaurs, following the DECODE theme!

APPS USED

OUTREACH

Motivate

Peer Outreach:

- **FLL 39853 & 45360 -** At our shared tech center, we collaborate with two 4th-6th grade FIRST® LEGO League teams, the CYBER-NAUT Novas and the CYBER-NAUT Stars. Our team regularly supports them by assisting with building their robot. This mentorship has been especially rewarding, as many of the students are enthusiastic about joining FTC in the future. *Actually, DJ, a former FLL team member, was inspired by these interactions in the past to join our FTC team as a 7th grader.*

Event Outreach:

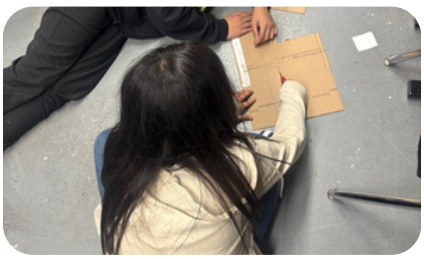
- **LEGO Booth Fundraiser:** We pitched the idea to our Lead Mentor, Ms. Marian, about potentially having a fundraiser at the City of Bell's Halloween Carnival, and she helped make it come true! We had a blast helping prep for the event, and fundraised over $200 dollars. We also had a basketball game booth so people in the community could play and have fun together.
- **Holiday Gift Giveaway:** To spread some holiday cheer, we helped decorate the Bell Tech Center for their Holiday Gift Giveaway. We got creative with "Grinch"-themed decorations and even built a working mailbox. It felt amazing to see our work bring smiles to families and make the community's holiday celebration extra special.

Assisted our sister FLL teams

+14 LITTLE ONES

Held a LEGO fundraiser at the City of Bell Halloween Carnival

REACH +2K PEOPLE



Helped prepare for the Holiday Gift Giveaway

IMPACTED +80 FAMILIES

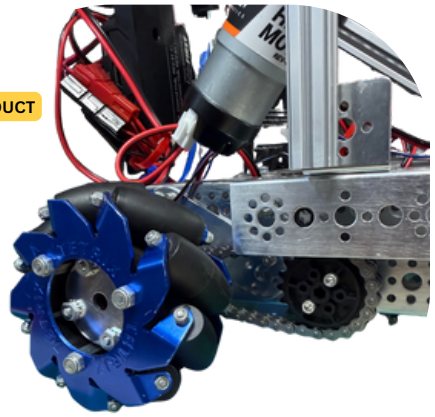
Design

Our team's design process for the FIRST Tech Challenge starts by identifying a problem and brainstorming ways to solve it.

After choosing a strong idea, we sketch designs on a whiteboard or write pseudocode to plan how the solution will work. Once the solution is built, we continue improving it to better handle the challenge we are facing. Finally, we evaluate our work to see if any changes, improvements, or setbacks need to be addressed to keep everything running efficiently. After all, *balancing cost and reward is an important part of the design and development process!*

DRIVE TRAIN

FINAL PRODUCT

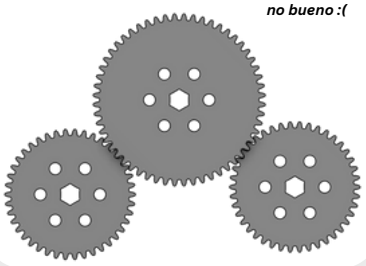


Last season, we used a **3-gear drive system** for our robot's wheels, in order to achieve speed and control. This high speed came at a **HIGH COST**. The gears would loosen due to the weight and caused a lot of chipping.

This season, we opted to have a **chain-sprocket drive system** to increased the overall security and stability in *Blueberry*.

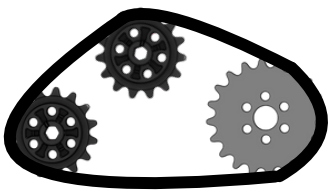
Our **initial design utilized a 3-sprocket configuration**. However, the spacing between the sprockets made it difficult to achieve proper chain tension. It was either one link too long or short to maintain a secure fit, so our performance wasn't that great.

OLD GEAR DRIVE
no bueno :(

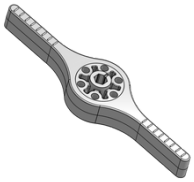


For this reason, we pivoted for a 2-sprocket mechanism. This allowed for more chain tensioning and better alignment.

1ST ITERATION - CHAIN DRIVE



ARTIFACT INTAKE



At first, we thought about having a human player manually insert artifacts into our robot. But we realized there would be too many artifacts on the field for that to work.

So, we switched to our current intake/outtake system, which uses **six medium-density flap wheels** attached to a REV HEX Motor.

We noticed that it is easier to intake the artifacts easier when the wheels are angled differently instead of all facing the same way, so they can grab artifacts more effectively and feed them onto the ramp for our shooter.

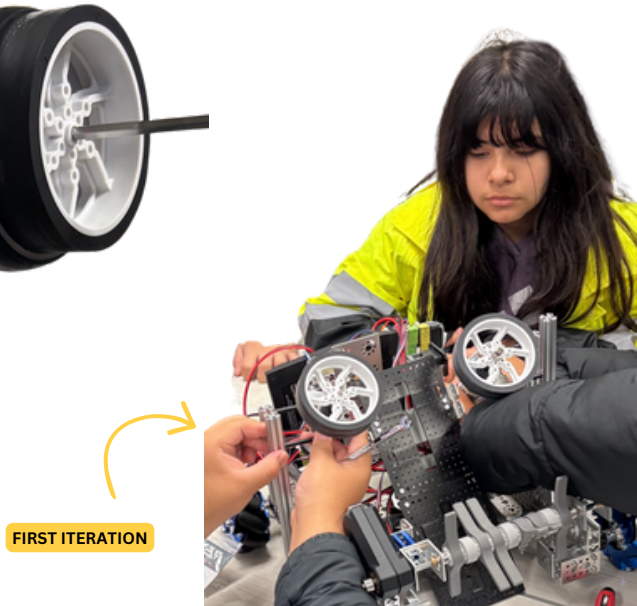
Using spinning flaps instead of a claw makes the intake faster and more reliable, without pinching or jamming, which happened to us last year.

FLYWHEEL MECHANISM

Our outtake initially struggled with range and consistency. We started with **two wheels at the top of the ramp**, inspired by Hot Wheels boosters, but this design couldn't reliably reach the goals. After testing DIFFERENT gear orientations and increasing power, we realized we had to switch it up.

We decided to switch over to a **single flywheel system that we attached to chains and sprockets**, boosting speed and allowing the motor to be mounted under the ramp for compactness.

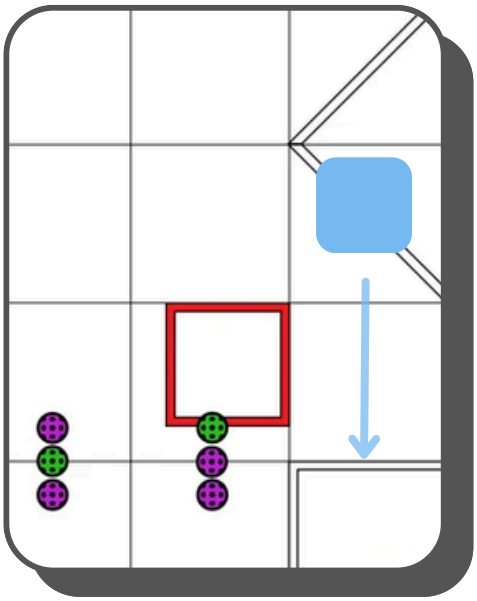
We also included a make-shift conveyor belt with flap wheels to push the balls into the flywheel!



Programming

Once again, we used **block-code** to program our robot! Our Lead Programmer from last season decided to be a part of the Engineering Team, so we started from scratch again. Even though Edgar and DJ knew the basics of JAVA, we decided to still commit to block code so that he could used to the new methods and classes for next season!

AUTONOMOUS



Autonomous Path

1. Place *Blueberry* into the shooting zone closest to the audience
2. Shoot the artifacts into our Alliance Goal
3. Move to the parking area!

We didn't get to test our autonomous program as many times as we wanted because the robot was in rough shape for most of the season.

But we didn't let that stop us! We counted it as a success when the program ran three times in a row without failing to park outside the shooting zone.

TELE-OP

Before coding directly to the control hub and while the robot was being constructed, we tested our code in the FTC Simulator! Most of our initial tests were based on pseudocode designed around what our drivers wanted.

Our TeleOp mode only calls for one controller, in which our drivers have direct control of the drive train, using the joysticks to move the robot. We have trigger buttons for the intake and outtake of artifacts, as well as for our Flywheel!

GAME STRATEGY

Our game strategy for success is rooted in strong teamwork. This means clear communication, trusting one another, and fostering amazing friendships. Regardless of the outcome, we stay focused on keeping our heads held high!

Additionally, we need to maintain open communication with our alliance teammates to debrief and strategize on what we can improve to win the next match.

ROBOT MATCH STRATEGY

AUTO

Scoring

Shoot artifacts into the goal and then leave the launch line!

TELE-OP

Scoring

Gather artifacts and shoot them as quick as possible.

If our shooter malfunctions, we can play defensive to make it harder for other teams to shoot.

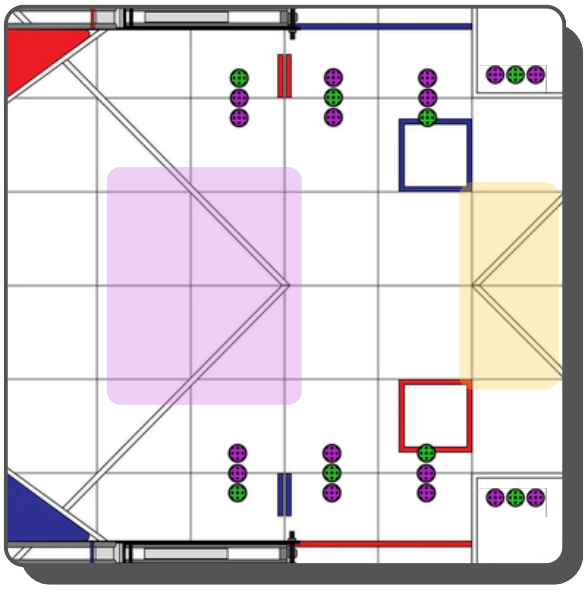
END-GAME

Scoring

Deposit any artifacts on depot, and shield until parking.

Parking

Aim for partial-park!!!

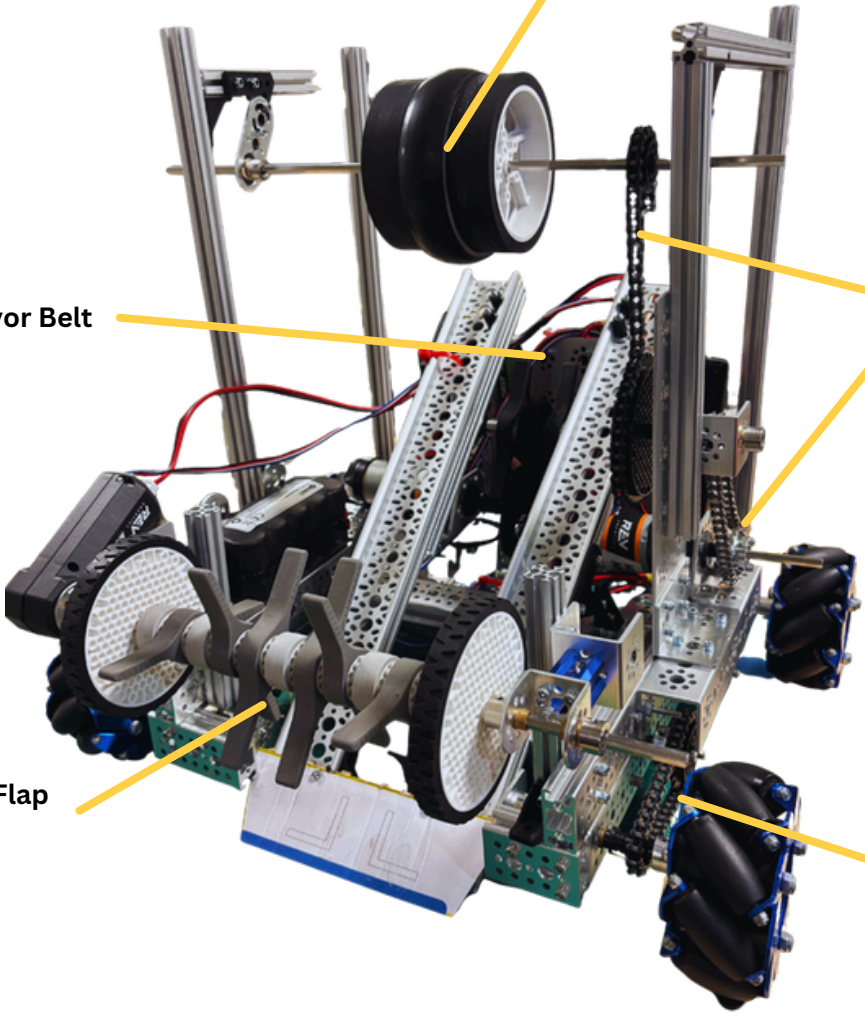


After multiple attempts, our drive team has deduced that the best location for us to score points is in the orange region, when our flywheel shooter does work.

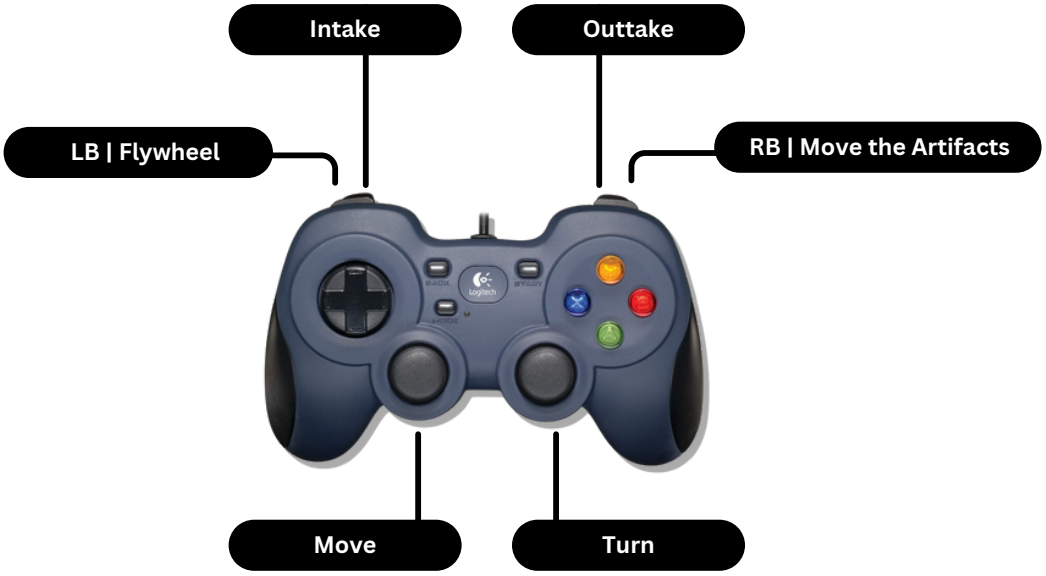
If our flywheel shooter fails multiple times during the match, we can play defensively in the purple region.

From our previous meets, we noticed that a lot of teams shoot from this area. So it would be best to play hard here!

Our Robot Overview



CONTROLS



The Future and Student Reflections

WHATS NEXT?

- Enhancing communication with local schools: Many classmates began to show interest in our team late in the season (January), so we plan to establish stronger connections with nearby schools to increase awareness and recruit more members.
- Expanding community outreach: We aim to further promote STEM education through school demonstrations, participation in local events, and potentially hosting summer sessions!

STUDENT REFLECTIONS

“I learned how to help out whenever my teammates needed it. I even learned a lot from my peers, I enjoyed being i robotics especially since this team has always made me laugh and smile. I enjoyed robotics, being an engineer, and having a great time around my teammates. I hope I can improve n my engineering skill and have more fun with my team. ^_^ ” ***- Lynn***

“I would like plan something for the future like getting better at Java And I mean BETTER. Also I have learned how to do things that are actually important and I learned a bit of Java and the most important thing I have learned is being more funny >:] and be a better team player >:)”
- DJ

“Thanks to the CYBERNAUTS, I have expanded my horizons with engineering and computer science, giving me the opportunity to truly discover what path I want to take for my future career, and to this group I thank you yet again, for the cherishing moments and time I spent with you guys, may you build your dreams for the years to come! ”
- Aaron

“Thanks to this season I was able to condition my skills in creating a robot from scratch, however there could have been so many more ways to have this experience improved”
- Mateo

“In this robotics team, I was able to pursue my interest and passion in coding. Learning first the basis of block coding through the simulation while refreshing on java. At times, java was slightly complex and confusing, but I kept striving for success and understanding.”
- Edgar

“Working with the team to make this engineering portfolio and creating reels and meet recaps of the team has improved my skills in group work by a significant margin. I can better communicate with group members about what needs to get done respecfully, which is really valuable to me.” **- Issac**

“Robotics was a nice place where I could chill with my friends while still learning. Only wish I could have worked more on the robot.”
- Yurem

“It was fun.”
- Pedro