

HACKFISH 29659



SPONSORS



MOTTO: BUILD IT, BREAK IT, FIX IT, IMPROVE IT, REPEAT

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Note: This portfolio was written by FTC Team 29659. We used tools like Grammarly and ChatGPT to help us check our writing and make our ideas clearer, but all of the ideas and content came from our team.

WHO WE ARE

<p>Hazel (10th) Build/Programming/ Co-Captain ANSEP(UAA)</p>	<p>Everyn (8th) Build/Programming/ Co-Captain Frontier Charter</p>	<p>Seneca (6th) Build/Driver Frontier Charter</p>	<p>Wyatt (7th) Build/Driver Central Middle</p>
			
<p>Frankie (7th) Build/Programming Holy Rosary</p>	<p>Oliver (7th) Build Central Middle</p>	<p>Weston (7th) Build Grace Christian</p>	<p>Desmond (8th) Programming Grace Christian</p>
		<p>we</p> 	
<p>Owen (6th) Driver/Human Player Goldenview</p>	<p>Jack (8th) Build Grace Christian</p>	<p>Ian (7th) Build/Driver Goldenview</p>	<p>Christiana (7th) Build/Driver Frontier Charter</p>
			

COACHES & MENTORS

Coach Heather (Technical)	Coach Jeanette (Build)	Coach Britany (TLI Administrator)	Coach Tanya (TLI Administrator)
			

Dimond Robotics

A special thank you to Dimond Robotics for creating and supporting our community teams.

Ψ Lynx 3825

- Avery S (Programming)
- Chander (Build)
- Hunter (build)
- Kanna (business)
- MJ (build)
- Avery D (build)
- Luke (build)
- Riley (Programming/Build)
- Ryan (Build)
- Shamus (Build)



Δ Lynx 3208

- Max (build)



Thank You to Our Parents

For the rides, support, and encouragement that make being on this team possible.

Thank You to Our Community

Thank you to our sponsors and supporters, and to the Alaska Museum of Science & Nature for providing our build space and giving our team a home.

SUSTAINING OUR COMMUNITY

This year our goal was to give everyone on our team a chance to try different parts of robotics such as driving, coding, and building. That is why we do not have set roles, we want people to get excited about robotics and find what they are good at.

Our team is made up of students from seven different schools, different parts of town, and different activities like sports, band/orchestra, and other clubs. Most of us would

not have met without robotics. Being on this team helped us find a place where we belong and learn how to work together. That is why we care about protecting the community we have helped build and keeping it open for the next group of students who want to join.



Planning for the Whole Year

Our team meets year-round. During the summer, we meet once a month to work on fun projects or learn new things, like how Arduinos work. Meeting outside of competition season lets everyone try different parts of robotics, have fun, and take some pressure off competition. It also helps new members feel more comfortable before the season starts. From August until February, we meet every Sunday from 2–5p at the Alaska Museum of Science & Nature in Anchorage, Alaska.

Because most of our team was new, we did mock kickoffs by watching old game reveals, talking about strategy, and sketching robot ideas on paper. We compared our ideas to robots used by top teams at Worlds, which helped us understand how strategy connects to design and made us feel more prepared for the real season.

We noticed gaps between FLL and FTC because we have three FLL students on our team. They hadn't worked much with tools or drivetrains yet, which showed us how hard the jump to FTC can be. **Together with Ψ Lynx, we are creating a Robot Ready program that introduces basic tooling, drivetrain fundamentals, and programming. Students build and program goBILDA drivetrains like we use on our robots, making the transition into FTC easier.**

After kickoff, we planned our work week by week:

- Build the drive base
- Decide on ground intake or player load
- Tested launchers
- Practiced driving
- Worked on autonomous
- Improved wiring

After each league meet, we talked as a team about what went wrong and what we could do better next time.

Using Our Resources Wisely

Item Description	Cost
Gene Haas Grant	2,000.00
Hardship Grant	935.00
Season Registration	-325.00
Qualifier 1 Registration	-50.00
Qualifier 2 Registration	-50.00
State Registration	0.00
New batteries, controllers, GoBllida, Mechanum wheels	-1,500.00
Half the cost of Season Elements	-438.78
Electronics Kit	-362.29
Driver kit	-325.00
Total	-116.04

\$116.04 received from TLI general funds.

For most of us, this is our first year in FTC, so we needed help getting started. Our season was paid for with a FIRST Hardship Grant, a Gene Haas Grant, and support from The Lynx Initiative. We tracked our budget carefully and only needed \$116.04 from the general fund.



Team Captains Hazel & Everyn recruiting new members for team 29659.

We try to keep costs low by reusing parts from the lab and sharing parts with other teams, especially Team 3825 and 25625. We also get creative with what we have. We use a lot of duct tape, and this season our build coach taught us how to weld plastic. She donated the plastic we used to make our intake, which turned out really cool. Learning how to build this way helps us solve problems without spending a lot of money.

Next season, our goal is to pay for our entire season on our own and put money into the

general fund to help other teams. **For us, sustainability means making sure money never stops someone from joining robotics.**

Our team captains have some fundraising experience from last season, including earning a sponsorship from DataFlow Alaska Inc. We are learning from our mentors on Ψ Lynx FTC Team 3825, who helped us create a sponsorship packet to share our story and explain why robotics matters. Having a group to lean on helps us learn how to be responsible, plan ahead, and build a program that lasts and grows into the future.



Keeping Track and Learning from Mistakes

One thing our captains learned from last season is that it is hard to remember everything we worked on when it is time to make our portfolio. **We created a team logbook where we write down what we did, what problems came up, and what we learned after each meeting and competition.**

Everyn also keeps a personal list to help us remember matches and reflect on how we handle competition. Writing things down helps us learn from mistakes instead of repeating them and helps new team members catch up faster.

We learned that building a robot is not a one-time thing. Our motto is *build it, break it, fix it, improve it, repeat*. When our robot's intake was crushed at League Meet 3, we worked together after the meet to fix it and are continually improving our robot. Even when things are frustrating, we keep going.

Making Robotics Last for New Students



Hazel explaining this seasons game to Mt. View FLL student and a Wendler student

One of the most exciting things about our team is that three of our members were FLL students watching us through the window last season. Being able to see FTC up close helped them feel ready to move up instead of being nervous. They chose to join FTC instead of staying in FLL.

Our team has one high school student, the rest of us are in middle school. Many teams we compete against are made up of only high school students, but our teamwork helps us stay competitive. Students are not assigned to specific community robotics teams. They get to choose between Hackfish and the Mechalodons based on what they enjoy working on.



FLL watching FTC teams on the field.

The Mechalodons are more playful and energetic, and Hackfish focuses more on technical work, strategy, and avoiding penalties. Even though our teams are different, we share parts, ideas, and support so everyone can succeed.

Growing Ourselves by Supporting Each Other

On our team, leadership means helping others, not being in charge. We encourage people to try new things, even if they feel nervous. Seneca, a 6th grader, is the youngest driver in the league. Driving at a competition can feel scary, but she had a lot of support from the team and our coach, who reminded her that league meets are a place to learn and try, just like a practice.

Seneca decided to drive at League Meet 2 and helped her alliance win the match. This showed us that with the right support, anyone can step up and succeed. By creating a team where people feel safe trying new things, we are building confidence and growing as future leaders. Because we support

each other like this, people don't feel rushed or pushed, and it makes them want to keep coming back and trying again.



Youngest Driver



Helping Each Other Through Challenges

As a mostly middle school team, we faced challenges while learning new skills and competing at the same time. We have dealt with getting crushed by other robots, our ramp breaking, and having our codes overwritten. **Not everything went smoothly, but instead of getting discouraged, we focused on helping each other and staying positive.**

We believe people are more important than robots. If someone needs to step away because of school or other reasons, they are always welcome back. By supporting each other and learning from our mistakes, challenges become chances to grow instead of reasons to quit. That's how our team keeps going, by making robotics a place you can come back to, even if things get hard or life gets busy.



Learning With Our STEM Community



Our robotics program is housed at the Alaska Museum of Science & Nature (AK SCI), which gives us a place to meet, learn, and work together. Being in a science museum also means we are surrounded by people who care about learning and discovery.

One of the unique parts of being at AK SCI is getting to talk with experts who work there. This season, we talked with the museum's resident archaeologist, Dr. Yesner, about the game challenge and how it connects to real-world problem-solving. This helped us see that robotics is part of a bigger STEM community.

Members of the IBEW Local 1547 also support our team. At League Meet 1, they noticed we were cutting zip ties with scissors. At League Meet 2, they brought ten bags of flush cutters and asked us to help share them with other teams. This helped us learn safer cutting and wiring practices and showed us how our community looks out for each other.

Having a place to belong and people to learn from helps make our program strong and sustainable for the teams that come next.



Sharing Support Across Teams

Hackfish grew out of our sister team, the Mechalodons, and the two teams are still closely connected. By practicing together, we learned what makes a good alliance partner. We saw how other teams focused on shooting close, so we decided to push ourselves and learn to shoot from the far triangle instead. That decision came from learning alongside the Mechalodons and wanting to build a strategy that worked well together. When they chose us as their alliance partner at the league qualifier, it showed how shared learning turns into trust.

Across The Lynx Initiative, six FTC teams share parts, ideas, and time. Even when students move to different teams or graduate, the support doesn't disappear. That makes it easier for new students to join and helps robotics keep going for the teams that come after us. We're excited to be part of that and to help now that it's our turn.



Looking Ahead

Through robotics, we've all found a place where we belong. We go to different schools and have different interests, and most of us wouldn't have met without this team. **Robotics brought us together and taught us how to work as a community.**

We want future students to have the same chance we did. By planning ahead, helping each other, and sharing what we learn, we're making sure this team doesn't end with us.



Everyrn saying goodbye to Shark Bait and team 25625 to help co-captain 29659.

Our Engineering Process

Our engineering process is based on teamwork, learning from mistakes, and improving over time. We know that building a robot is not a one-time task, but an ongoing process. That is why our motto is **build it, break it, fix it, improve it, repeat.**

1. Understand the Challenge

We start by learning the game and understanding what the robot needs to do. As a team, we talk about the rules, the field, and what would make us a good alliance partner. We use this to create a clear goal for our robot.

2. Learn from Experience

We look at past designs from Dimond Robotics and other teams to learn what has worked before. We talk about these ideas together and use tools like decision matrices to compare options and choose ideas that fit our goals.

3. Set Team Goals

Before building, we agree on what matters most to our team, like reliability, simplicity, and staying within the rules. We look at what we want, what our priorities are, and what is achievable. This helps us make smart choices and avoid overcomplicating our robot.

4. Brainstorm as a Team

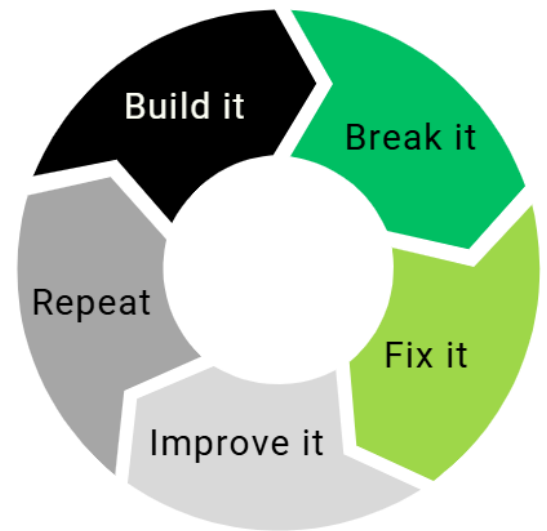
We split into small groups to come up with ideas. We sketch designs, explain how they would work, and get feedback from everyone. No idea is finished on the first try, and teamwork helps make ideas better. We also take into account what parts we have so our designs are realistic and we know we have the resources needed.

5. Choose and Build

After discussing our ideas, our whole team agrees on a design and starts building. We create simple prototypes and test them to see what works before making final parts.

6. Test, Fix, Improve

We test our robot often. If something works, we keep it. If it doesn't, we change it and try again. This cycle continues throughout the season, even after competitions, as we learn from every match. The robot has been broken so many times. At one meet, the ramp that guides the balls snapped. Luckily, we had an extra piece. Another time, our code was overwritten. We had to start from scratch, we took what we liked about the old code, and changed what we disliked. Our code has also gone through many iterations. We have eight different autos and five of them work. We were experimenting and learning about what was the most helpful. Making a robot is a process, and nothing comes out perfect.



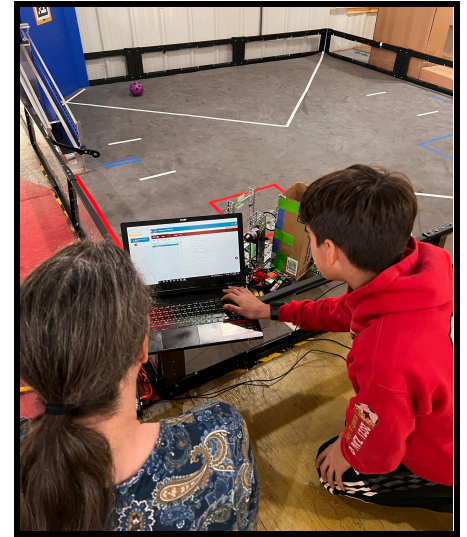
Our Season's Progress

- September 6 - FTC Kickoff
- September 7 - Strategy Session, building the drive base
- September 14 - Building the drive base, discussing whether to use an intake or player load
- September 21 - Starting the teleop code, working on bumpers
- September 28 - Brainstorming on the ball launcher and holder, starting design
- October 4 - Working on the ball holder, testing out different wheels for the launcher
- October 5 - Working on mounting the launch ramp and wheels
- October 11 - Working on mounting the launch ramp and wheels
- October 12 - Working on the lever to push balls into the flywheel
- October 18 - Finishing up the launcher and ball holder, driving practice
- October 19 - Mounting and labelling power button, wire management, working on autonomous mode, driving practice
- October 25 - Replacing the old mecanum wheels with new, better ones
- October 26 - Working on autonomous mode, driving practice
- October 29 - First league meet at West High- needed to fix robot after a crash caused our robot to lose control
- November 2 - Talking about the first meet, discussing game strategy and how to avoid fouls, driving practice
- November 8 - Replacing the plex ramp with an aluminum ramp after two plex ramps broke
- November 9 - Expanding autonomous mode options, driving practice
- November 14 - Second League Meet at Dimond High - Seneca DROVE!!!
- November 16 - Added a webcam, started working on AprilTag detection
- November 23 - Driver practice, teleop camera control, attempt shooting from small triangle
- November 30 - Driver practice, camera control, lost the code for camera - recovering
- December 5 - Third League Meet at East High - Intake crushed by another team
- December 6 - Working on our presentation boards and our engineering portfolio
- December 7 - Working on our engineering portfolio and fixing damage from having a robot land on our robot at the East High League Meet- robot crushed by another team, needed to fix aiming mechanism
- December 13 - Building and adding in our new intake.
- December 20 - Fixing code and adding the camera back in
- December 27 - Hooked up the light and realized we didn't know if anyone on the team is color blind.
- January 3 - Worked on our judging and portfolio final edits. Drivers practice.
- January 4 - Drivers practice, fine tune shooting from small triangle.
- January 11 - February 1 - Final tuning on our autos

CONTROL BUILT FOR TEAMWORK

We have written multiple programs for our robot, including two teleop programs and eleven autonomous programs. We even wrote one that moves out of the way for high scoring auto teams. Having multiple programs allows us to test ideas, learn what works best, and adapt to different match situations while improving our coding skills.

Our **first teleop is fully driver-controlled** with simple, reliable code. The driver controls movement and shooting without automation. We designed this mode so that anyone on our team can drive, even if they are new or missed meetings. Our goal is that someone unfamiliar with the robot could still be successful.



Our **second teleop integrates encoders, a camera, and LED feedback to assist the driver.** Pinpoint odometry, using two tracking wheels to continuously track the robot's X and Y position on the field. Using this field position data, the robot utilizes the camera to detect when the AprilTags are in the correct relative position for shooting. When those conditions are met, the LED turns solid, indicating the robot is ready to score. This system supports the driver without taking control away and helps us score more consistently, especially from the small triangle.



When designing the LED feedback, we focused on accessibility. Instead of using color-based signals, the LED provides a clear solid on indicator when the robot is in the correct position, ensuring all drivers receive the same information. **To make this work, our team recorded hundreds of position measurements, driving the robot to specific spots and comparing real field locations with odometry data.** These calculations were used to fine-tune both teleop assistance and autonomous starting positions.

We also learned that the goBILDA LED behaves more like a servo than an Arduino-style light, with position values controlling its output. Understanding this helped us better connect our software logic to our hardware.

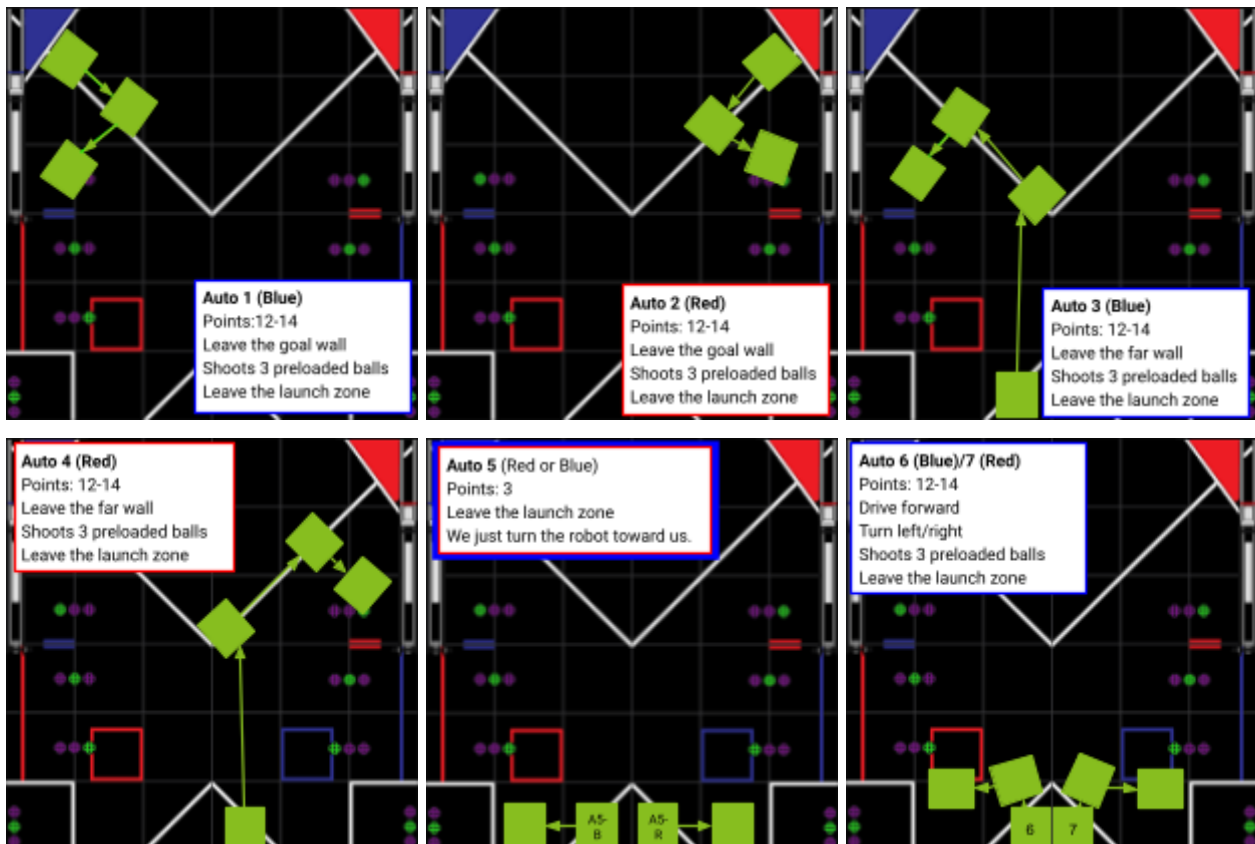
Our code is written to be easy to understand and easy to continue working on. Since not everyone can attend every meeting, this structure allows the team to keep moving forward even when members are absent. After losing camera code earlier in the season, we now regularly back up our work to prevent setbacks.

We are also developing autonomous programs that shoot from the far launch area instead of driving into the other alliance's space. We noticed many robots collide during autonomous while trying to score preloaded balls. Our autos are designed to avoid interference, play smarter, and support our alliance partners.



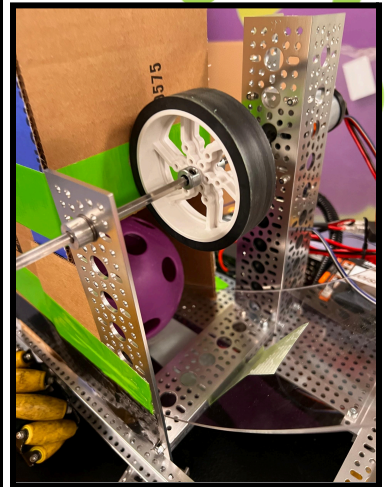
Autonomous Programs

Our autonomous programs use different paths depending on where we start and how we want to support our alliance. These images show the path our robot follows and the points each program can earn. Auto programs 1–4, 6 & 7 point totals change based on if we correctly guess the motif when preloading and shooting our three balls, which adds a 2-point bonus.



As we improved our controls, we also had to rethink how our robot was built. The next section shows how our design and build choices supported everything our robot does on the field.

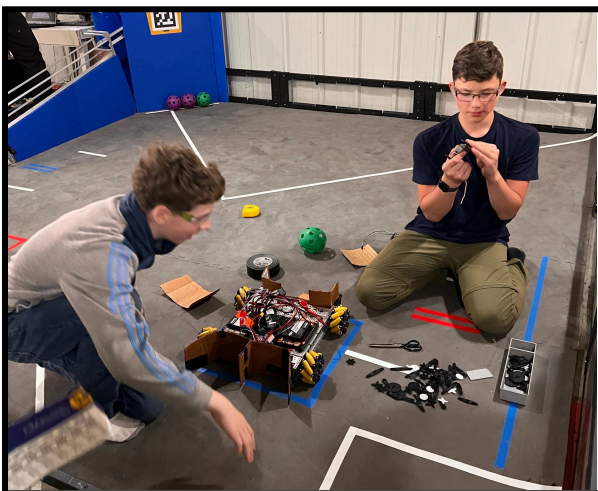
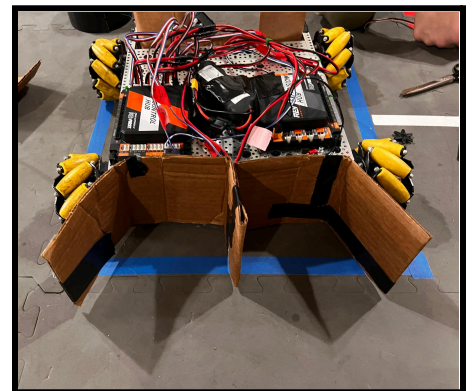
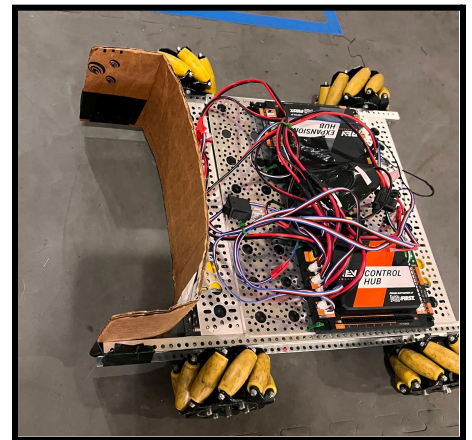
DESIGNING WITH PURPOSE



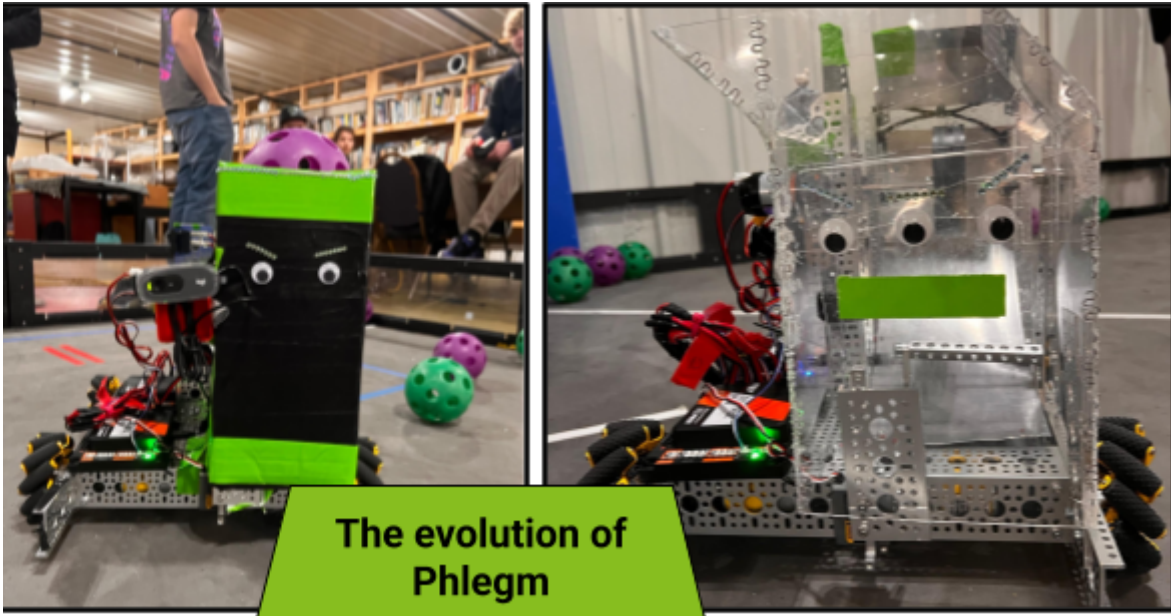
When designing our robot, our team focused on a clear strategy: shooting balls into the goals in a way that worked well with our alliance partners. We chose to focus on shooting from the smaller triangle because fewer teams were using it. This saved time, reduced traffic near the goals, and allowed our alliance partners to play closer if needed.

Early in the season, we learned how important it is to have a plan. We realized that we could not add every idea we had and still build a robot that worked well. Keeping our design simple helped everyone on the team understand how the robot functioned and made it easier to fix problems quickly when something broke.

We were careful to stay within the 18-inch cube size requirement. As our robot evolved, we worked to reduce its overall size so other robots could still share the scoring area with us during endgame. This allowed our alliance to earn more park points instead of blocking teammates.



The design feature we are most proud of is our ability to shoot from both the small triangle and the large triangle. This flexibility allows us to work with almost any alliance partner and adjust our role depending on the match.



During the season, Coach Jeanette mentioned she wanted to learn how to plastic weld, and that led us to a new idea. We thought it would be cool to build a clear intake. This allowed us to see how many balls we had, made it easier to debug problems, and helped keep drivers motivated because they could see the robot working in real time.

Throughout the season, our robot went through many changes due to testing, competition damage, and new ideas. We experienced crashes, broken ramps, a crushed intake, and even losing and recovering code.

Each time, we used those challenges to improve our design, strengthen our build, and better connect our hardware with our controls. By the end of the season, our robot reflected not just our strategy, but everything we learned along the way.



Saying goodbye to old Phlegm



What We Learned

As a completely new team we learned that one could not just cut materials and throw a robot together. **We learned that building a fully functional robot is a process.** One that keeps on going after meets. Hence, our motto “build it, break it, fix it, improve it, repeat”. Once we finish our robot and complete our first meet, there are more changes we made to our robot to improve it.



Our team values perseverance. After almost each meet, something has gone wrong, such as our ramp snapping and us having to replace it, our robot losing control, and our robot's aimer being messed up after another robot fell on top of it. After each of these difficulties, we felt frustrated but then picked ourselves up and learned what to do when unexpected issues arise leading to us improving our robot.

We also value teamwork. We want everyone to feel included and part of the team. Our design demonstrates this because everyone worked together to build the robot. From discussing what design to do, to building the robot itself, everyone on our team had an equal part in creating our robot.



Thank you for reading our portfolio!