FIRST TECH CHALLENGE

TEAM #252

INTO THE DEEP presented by RTX

ELECTRIC QUAHOGS

2024-2025 SEASON ENGINEERING PORTFOLIO

Diving deep on team 252

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Hi! We're the Electric Quahogs, a team of 12 high schoolers from Providence, Rhode Island. We pride ourselves on our wide array of skills and interests along with our dedication to FTC robotics. From design and programming to operations and outreach, we strive to improve at the activities we love, all the while embodying FIRST values.

We practice both during and after school, with 50 minutes on Tuesdays solely dedicated to outreach, operations, and research. This ensures all our members work on more than just robots. Practices after school are more bot-heavy, with members focusing on CAD, building, programming, and driving, but also provide time for various outreach events and meetings.

WHO ARE WE?

Daniel Duarte-Baird '25
Programmer

Charlie Shea '25
Designer

Aaron Felzenszwalb '25
Programmer

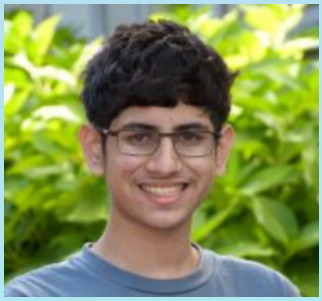
Sabrina Gonzalez'26
Operations

Luyao Lei '26
Designer

Miles Harrison '26
Designer

David Battle Cardemil '26
Programmer

Arjun Dasari '27
Designer



Kailash Saxena '27
Builder

Kilian Maddock '27
Designer

Amelia Collins '27
Builder

Eric He '28
Designer

Sustainability

Pre-Season Robotics Workshops

As a soft entry to the season, we held Pre-Season Workshops during the last week of summer break. During this time, new and returning members established a learning-friendly environment where they were able to equip interested students for the upcoming season. Our veterans, and those on our sister team, **introduced them to fundamental skills like programming, building, CAD, fundraising, and operations**. Preseason also acts as a head start for returning members to begin working on outreach and expand their technical knowledge. With over 20 students participating, we **ensured that our knowledge was passed on to future members** of our team and that the Electric Quahogs will remain strong even after some of our veterans graduate.

Recent Alumni

Luc - *Computer Science, MIT '25*
Henry - *Aeronautics, Embry-Riddle Aeronautical '26*
Will - *Economics, Colby '26*
Myles - *University of Illinois Urbana-Champaign '28*
Mayte - *Psychology, Vassar College '28*
Beatrice - *Mechanical Engineering, Carnegie Mellon University '28*
Zoe - *Architecture, Brown University '25*

Mentors

Dylan Ryder
Director of Design Innovate Build Lab, Wheeler School

Zoe Rudolph-Larrea
FTC #252 Alum

Henry Zamore
FRC #1915 Alum

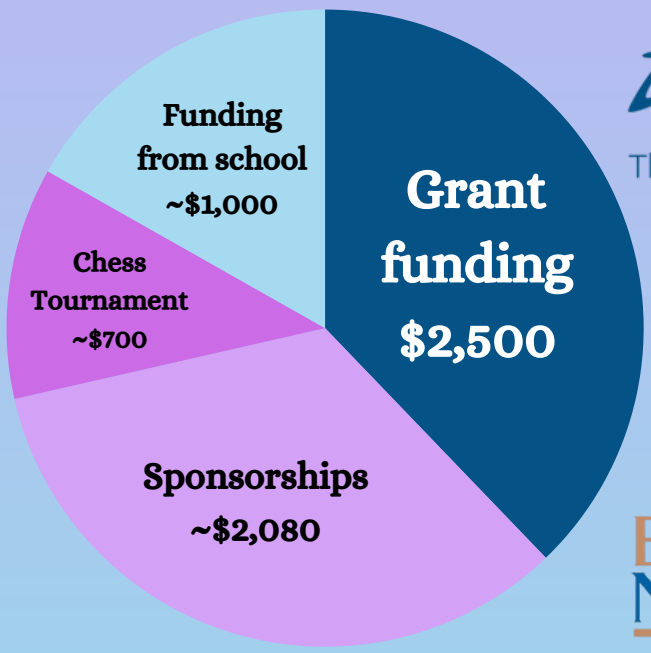
We are beyond grateful for our past and current mentors! Their advice and knowledge has helped us design our robot, fine-tune our outreach work, and understand where we might go after robotics. In order to continue to have knowledgeable mentors, we've established a strong alumni network, and stay in touch with recent graduates from our team. We also have talked with many students from Brown University and regularly reach out to other industry professionals to expand our mentor network and be the best robotics team we can possibly be.

Overall Season goals

1. Create a welcoming and inclusive space for all members, while cultivating a fun and positive team culture.
2. Ensure that every member feels proud and satisfied with their work.
3. Challenge ourselves in terms of design and techniques; learn to use new fabrication methods
4. Form professional partnerships to enhance our knowledge and obtain sponsorships.
5. Help increase the number of FLL & FTC teams in the region

Financing

After having sent numerous funding requests, we are very grateful to have received sponsorships and grants from the organizations below! For a financial sustainable plan, we built relationships with companies to get recurring sponsorships, and communicated with other members of our community to learn about prospective grants



Chess Tournament

$750+

Raised

45+

people reached

As part of our fundraising efforts, we organized a chess tournament with Ocean State Chess where in addition to playing chess, we talked to kids and parents about FIRST and discussed how to start a FIRST robotics team!

Connecting With The STEM Community

Dan Harris (11/4)

Associate Professor of Engineering at Brown University, PhD in Applied Mathematics

We met early on in the season with Professor Harris and two of his students to receive feedback on our preliminary robot design. They gave us a lot of insightful suggestions which we implemented, especially regarding linear slide rigging and how to best tension them. We also learned more about his work in fluid dynamics and toured his lab.

Discusions With Peer-Experts From Around The World

During our calls with other FTC teams, we exchanged robot designs, outreach efforts, game strategies and more. These different ideas widened our perspective and broke down assumptions we had about optimal game strategies. We loved meeting fellow engineering enthusiasts!

Teams Met:
#23460 Cyber Sparks (8/16) from California
#18422 Wizards (11/26) from Libya
#15341 Leo Robotics (9/15) from Oregon
#16058 REV Atom (10/29) from Brazil
#21455 RoSophia (12/4) from Romania
#20625 Soces Knights (12/11) from California
#28473 SLAP Seals (2/5) from Kazakhstan
#15643 The 'Rock Bots (2/5) from Massachusetts
#13848 The 'Rock Bots 2.0 (2/5) from Massachusetts
#28473 Slap Seals (2/5) from Kazakhstan
#19061 BoogeyBots (2/6) from Romania

Katie Scancarello (5/24)

Senior Geotechnical Engineer at AECOM

Our team invited Ms. Scancarello to our school to speak with her about her career track. We learned a lot about geotechnical engineering, the factors that civil engineers have to consider when building infrastructure, and the way climate change has affected her work

John Schecter (12/2)

Warehouse Robotics Expert at Amazon BEng, MBA

During our conversation with Mr. Schecter, we learned about his career in engineering and dove into the fascinating world of warehouse engineering. He shared helpful advice regarding our robot, emphasizing the importance of rigorous testing to improve our design.

Animesh Ramesh (12/12)

Senior Software Engineer at Google, MS in Computer Vision

We discussed the computer vision work Mr. Ramesh did on Google Streetview and the direction ML and AI is going in. We also got advice on algorithms to detect samples and specimens, deciding, with his help, that a color masking algorithm would be more efficient than an ML vision model on the hardware our code is running on. We also discussed localization using AprilTags, getting tips on camera placement and possible field of view optimization employing lenses.

Goals

- **Meet with professionals working in various sectors of the STEM field**
- **Gain insights and advice regarding our robot to further enhance its functionality and robustness**

Connecting with STEM community

Dr. Tejal Desai (11/13)

Team members were able to have an in-person conversation with the Dean of Engineering at Brown University, Dr. Tejal Desai. We discussed gender inequality in the STEM field and also heard about her career trajectory. Dr. Desai also shared insights on some of her many patents and engineering projects.

BROWN

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STEM CONTACTS

Brown Formula Racing (9/16)

We met with multiple students at Brown University who participate in their Formula Racing team! During our visit, we learned about their design, manufacturing, and building processes for their Formula SAE racecar. The students also shared advice as to how to obtain sponsors!

BROWN FORMULA RACING

Conversations about gender inequality in STEM

To learn more about the experiences of women in STEM fields, our team visited Brown University's Society of Women Engineers (9/13) and Brown University's Women in STEM and Engineering group (10/6). During these meetings, the female college students shared with us their experiences of being women in a predominantly male field. We also gained valuable insights and advice on how to combat those issues.

Polymershapes

Olivia Koperek (11/14)

General Manager at PolymerShapes

During our meeting with Ms. Koperek, our team gained new knowledge about the plastics industry, the differences between plastics, and the applications for each kind. This meeting led to a partnership with their company and a plastics manufacturer, who gifted our team with sheets of acetal plastic.

SICK
Sensor Intelligence.

Kevin Welsch (10/16)

Industry Marketing Manager at SICK Sensor Technologies

Our conversation with Mr. Welsch spanned across several topics. He talked about the process of manufacturing sensors and their different uses, ways we can promote our team and events better, and gave us valuable advice as we begin to think about our years after high school.

PARE CORPORATION

Annelise Boylan (11/6)

Engineer II at Pare Corporation

During our meeting with Ms. Boylan, we learned about site planning and civil engineering. She also showed us the various projects she and her team have worked on and explained some complexities specific to working on large scale engineering projects.

Design Process

Strategize

After researching and determining our game strategy, we created a **building plan** and **timeline** for this season.

Ideate

Our ideation process started with **brainstorming** ideas for robot functions. After coming up with several candidates, we **discussed** the pros and cons of each function and decided what would best fit our strategy. Then, we started making **concept drawings** to start our prototyping process

Prototype

We then created **models** of robot subsystems using **basic materials** like cardboard and wood. After making sure they worked for the goals we wanted to achieve, we began drafting CAD models.

CAD

Using our research, drawings, and physical models, we designed our robot in **Onshape**. We assigned each robot subsystem to a group of team members to ensure maximum design efficiency.

Build

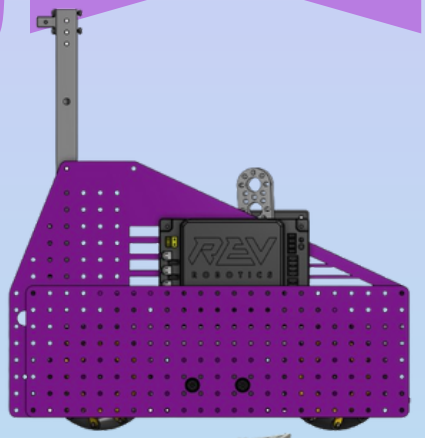
Once we had our first robot design, we **3D printed** and **laser cut** our custom parts and built individual robot mechanisms using our CAD as a reference. Eventually, all subsystems were built and we began testing.

Test

When testing, we **isolate individual mechanisms** to find any issues. We also **film our robot** to closely review malfunctions, specifically when testing our intake mechanism (pictured to the right). We then use these test results to generate new ideas to solve the identified problems.

Goals

- **Use our game strategy to inform our design decisions**
- **Make many iterations of mechanisms out of cheap materials; don't be afraid to discard of 3d prints/laser cut plates if they can be improved**
- **Ensure all designers are proficient with CAD and can model their ideas**
- **Include programmers in design process to ensure mechanisms work with software**



Game Strategy

At the beginning of the season, we decided to figure out which methods of scoring were most efficient. Using an old robot chassis, we estimated the average cycle time for both High Chamber Specimens and High Basket Samples, then created our design goals (shown on the right) based on our findings.

Samples

6-8 second cycles

1-1.3

Points per Second (PPS)

Specimens

8-10 second cycles

1-1.25

Points per Second (PPS)

Our Decision

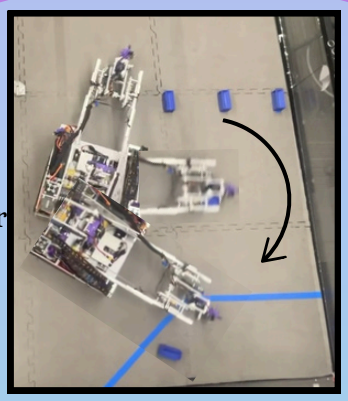
With both strategies resulting in roughly equal PPS, focusing on either scoring option was viable. Planning for a competitive robot, we chose to focus on samples since the many alliance neutral samples would make it more likely for them to be positioned favorably for a quick intake and deposit, especially in the late game.

Resulting Design Goals

- **Score High Basket Samples efficiently**
- **Have the ability of scoring specimens for partner compatibility and autonomous**
- **Have a level 3 ascent within 15 seconds or level 2 within 7 seconds which does not interfere with other subsystems**
- **Have a small and fast robot for partner compatibility**

Autonomous Strategy (Read more on page 13)

During autonomous we decided to primarily score specimens, with a backup sample autonomous to be a flexible alliance partner. Since our robot is more than fast enough to score all 3 yellow samples provided on the field, in addition to one preloaded in the robot, we decided the best way to further push our point total would be by scoring specimens. We tested various options and found that using our intake to push the alliance-specific samples into the observation zone is fastest, which we do to score 5 specimens. Since our robot has time to spare after parking, we slow its movement down to ensure consistency each time our program is run.



Explored Strategy: "Factory Bot"

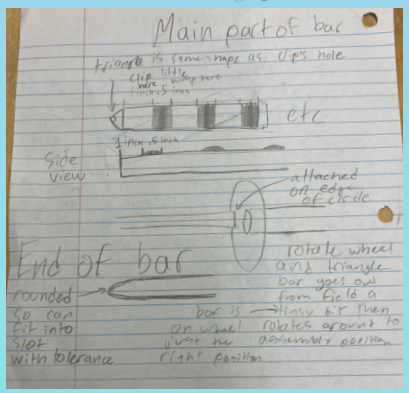
"Factory Bot" Concept

While strategizing early on, we realized that there was no limit on the number of specimen clips the robot was allowed to hold. This spawned the idea for a robot that could create specimens itself, like a factory, and in doing so greatly reduce specimen cycle time. We gave two of our members time to prototype this idea for three weeks, but by the end, it seemed like it would be too much of a gamble to pursue since the complexity of a design for quickly storing a lot of clips and attaching the clips would create inconsistency, offsetting any potential point gains.

Match Plan

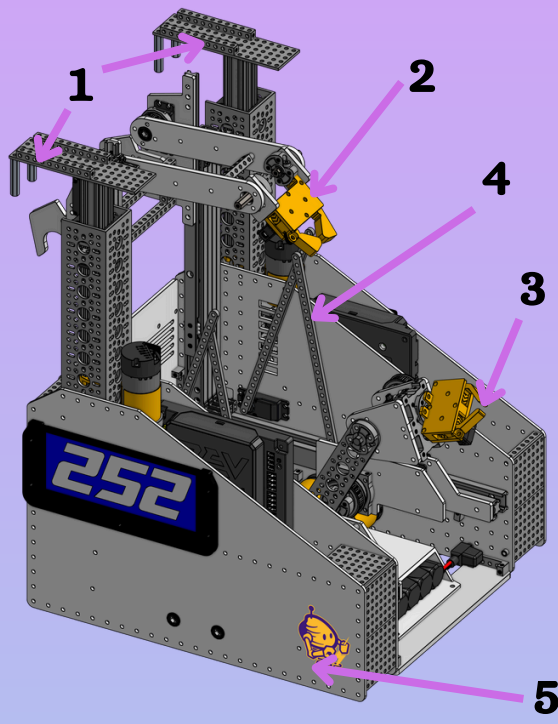
1. Pick up 10-15 clips ->
2. Store all 10-15 clips in the robot
3. Intake sample into bot
4. Attach clip to sample within the bot using a clipper.
5. Clip the specimen on the high chamber
6. Repeat steps 3-5

Factory Bot Design Sketches



Robot Overview

300+
Hours in CAD



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Custom Parts

Important Mechanisms

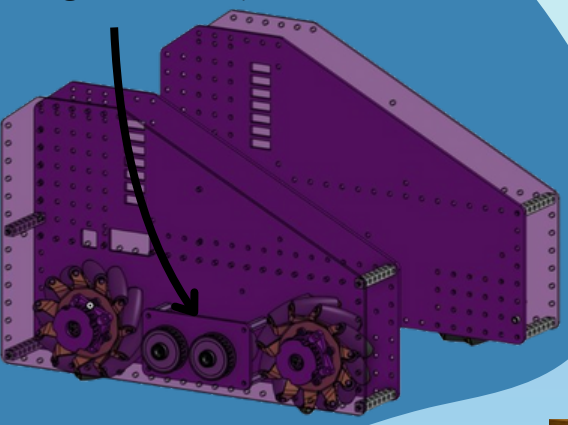
- **Coaxial Active Intake**
  Able to pick up samples at many angles and distances
- **Through-Bot Design**
  Can intake + deposit samples and specimens without turning around

Key

1. Ascent hooks
2. Deposit claw
3. Intake claw
4. Intake extension slides
5. Custom chassis plates

Chassis

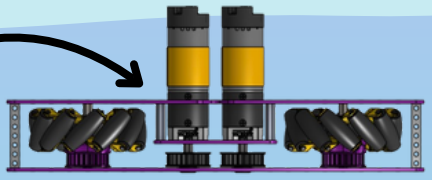
Custom drivetrain pulleys for gear ratio adjustment



H-Chassis Design

We use an H-shaped chassis with a belt-driven Mecanum drivetrain. This gives us plenty of room for an extending intake at the front, deposit at the back, and ascent hooks above the rear wheels. This let us build a very space-efficient, functional, and drivable robot.

Motors sunken 35mm for a thinner chassis



Material Choice

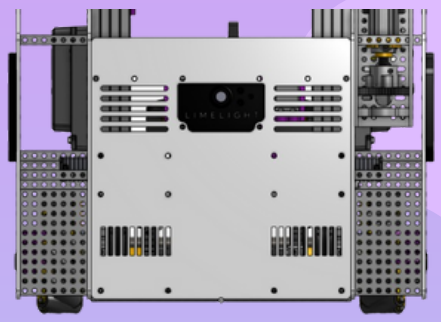
Using laser-cut MDF plates for our first two chassis iterations let us make fast and cost-effective changes. We later switched to acetal plastic plates to maximize durability and minimize weight.

Broken MDF plate 😖

MDF Chassis

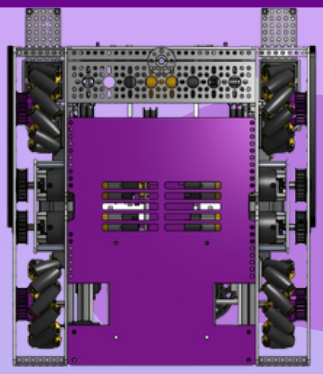
Acetal Plastic Chassis

Back And Skid Plates



Back Plate

- stops samples from entering our robot from the back
- stiffens the chassis
- helps with wire management



Skid Plate

- holds battery box
- stiffens the chassis
- odometry pod cutouts
- wire management and protection

Intake

To create an intake that could easily reach and pick up from the submersible, we created a coaxial system to both raise and lower our claw and control its pitch. We also adjust the claw's rotation during pickup, allowing us to quickly pick up samples in any orientation.

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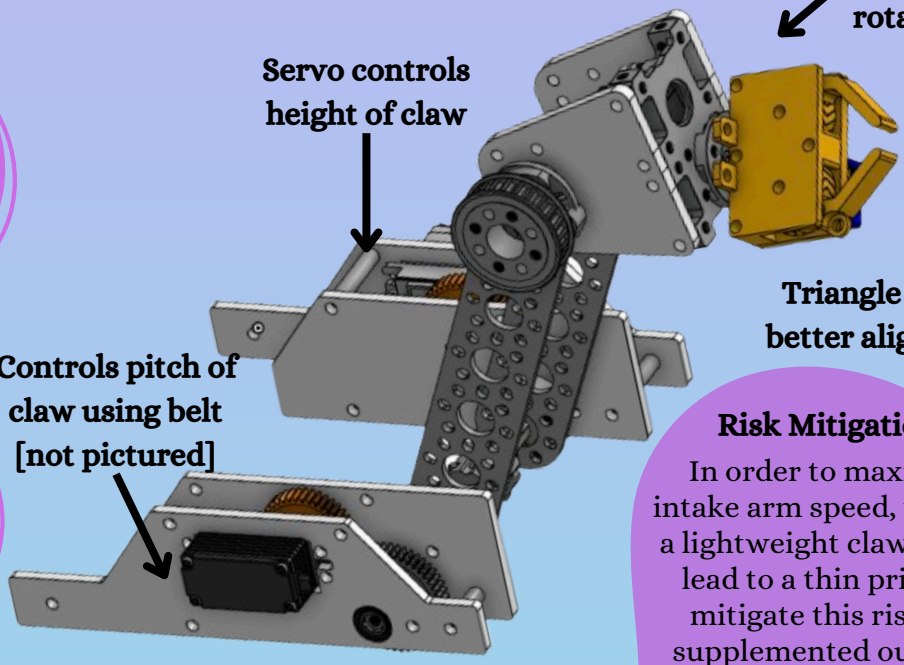
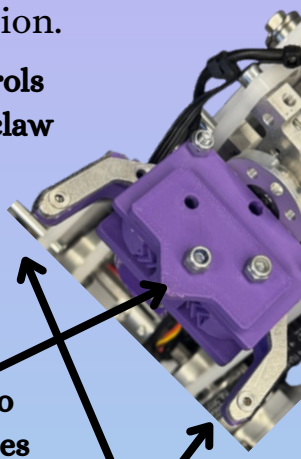
Intake Iterations

4
Degrees of Freedom



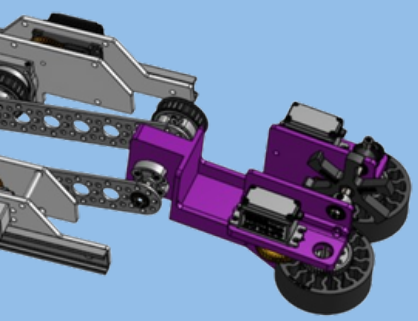


Risk Mitigation

In order to maximize intake arm speed, we used a lightweight claw, which lead to a thin print. To mitigate this risk, we supplemented our claw with aluminum to reduce breakages

This assembly is on 2 stage Misumi slides and is linkage-driven on each side by Axon Mini Servos

Previous Intake Iteration



We used an active intake with 2 horizontal compliant wheels and a vertical boot wheel at qualifiers. Though we put a lot of work into its 3 full iteration and hours of testing, we analyzed its pros and cons after competition and made the switch to a claw intake.

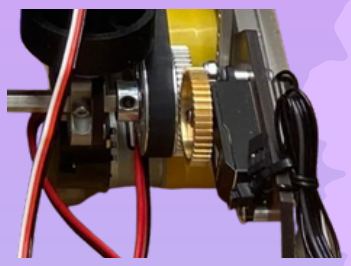
Wheel Intake Pros and Cons

- Easy to pick up from any orientation
- Extra reach
- Easy for drivers

- Can't pick up from clumps
- Can't pick up close to submersible barrier
- Can't pick up specimens

Intake Gear Drive Issues

1st Iteration



Unconstrained gears mounted on MDF

- MDF plates would flex
- Gears would skip whenever under load, throwing off our servos' positions

2nd Iteration

Steel axle constrainer prototype

- Added a steel band connecting both gears' axles to keep them aligned
- Worked well but was not viable on both sides of the coaxial system

3rd Iteration *(current)*

Acetal plastic gearboxes

- Switched MDF out for more rigid 3/16" acetal plastic
- Added a secondary reinforcement plate to prevent flexing
- Holds the gears together by creating a stiff superstructure that firmly constrains the gear axles
- Viable on both sides of the coaxial system

Ascent

Lead screw

Hooks onto low rung

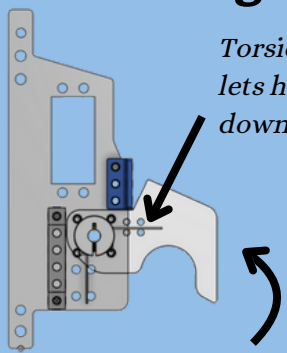
goBILDA linear actuator kit

goBILDA 5.2:1 motor

Level 2 Ascent

Using a dual lead screw design we hook onto the second rung, and our deposit slides brace against the top rung with another set of hooks.

Slide Bracing



Torsion spring lets hooks flex down but not up

Hooks to stay parallel to the ground mounted between deposit slides

Torque Calculations

Efficiency · 5.2:1 Motor Torque

$$\frac{2\pi\,(0.4)\cdot 0.53\text{Nm}}{0.009\text{m}} = 148.00\text{N}$$

Lead Screw Pitch

**per motor*

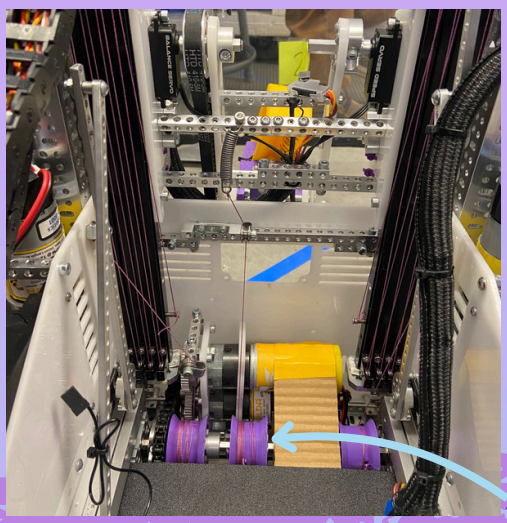
After determining the efficiency of our lead screw to be around 40%, we calculated that two 5.2:1 goBILDA motors could generate 296.0N of thrust (about 66.5lbs). Since goBILDA's next lower torque motor is 1:1, it would not generate enough thrust to lift our 28.7 lb bot, and thus we decided to use 5.2:1 motors.

66.5 LBS OF THRUST

1.4s ASCENT

Deposit

Slides



String vs. Belt

The first question we considered for the deposit subsystem was ***how we wanted to drive our slides***.

String

- **Pro:** strong under tension
- **Pro:** faster than belted slides
- **Con:** difficult to work with, tangles easily
- **Con:** needs to be re-tensioned often

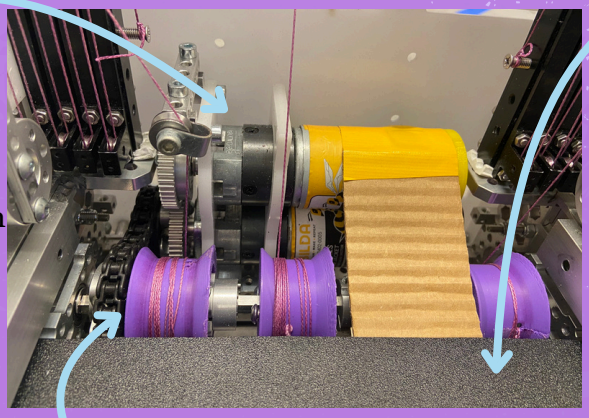
Belt

- **Pro:** easy to rig
- **Pro:** we have experience with them
- **Con:** skips easily under tension
- **Con:** slower than stringed slides

We chose **stringed slides** because they allow for a more powerful robot when executed well

Improvements After Qualifiers

Double Motors: We almost tripled our slides' speed by replacing a single 415 rpm deposit motor with two 1150 rpm motors mechanically linked with gears. We designed custom acetyl plates to hold them together, allowing us to increase speed while maintaining sufficient torque.

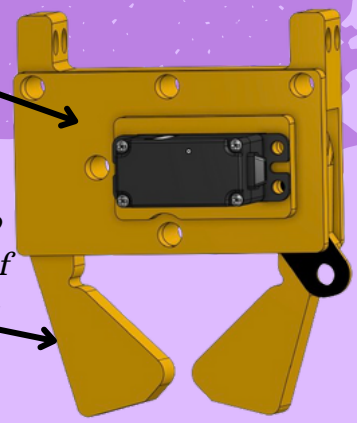


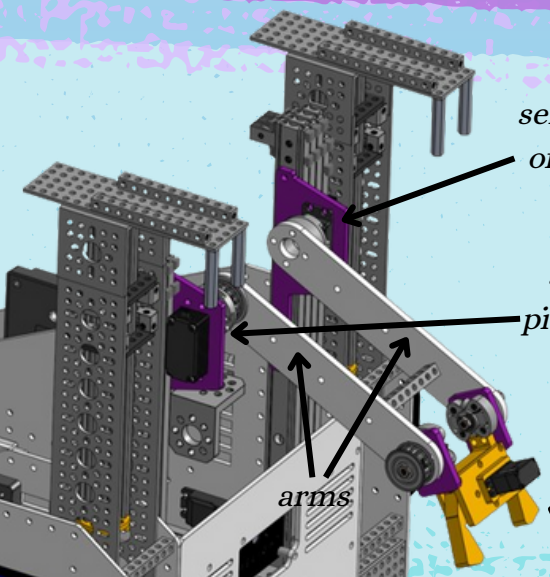
Pixel Blocker: we added a thin sheet of precision cut ABS plastic under our intake to ensure no samples get stuck inside our robot.

Custom pulleys: When using goBilda spools, our string kept falling off during gameplay, so we designed custom pulleys larger spools and slanted walls We also fixed small wheels to our chassis and plates to ensure the string enters the spool at a favorable angle.

Deposit Claw

- 56mm x 42 mm for easy robot packaging
- Double Helical Gears
- Easily Swappable
- Can quickly and easily score both Specimens and Samples





Deposit Coaxial System

We wanted to split the intake and deposit systems so that the deposit claw can also act as a single claw to pick up specimens. Using a co-axial virtual 4 bar linkage, we can rotate the claw over 300 degrees while simultaneously controlling the arms' position

Programming

Goals

- **Create the most efficient and consistent auto that we can**
- **Develop robust and flexible code in tele-op to optimize performance**
- **Share our programming knowledge with other FTC teams**

Plan

- **Utilize as much sensor input as possible**
- **Communicate with designers to ensure robust programming**
- **Create a reliable macro system**
- **Build relationships, take initiative to connect with other teams, and actively share our code and knowledge**

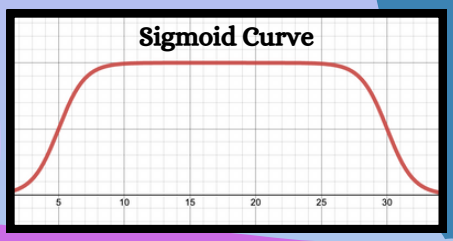
Sensor Input

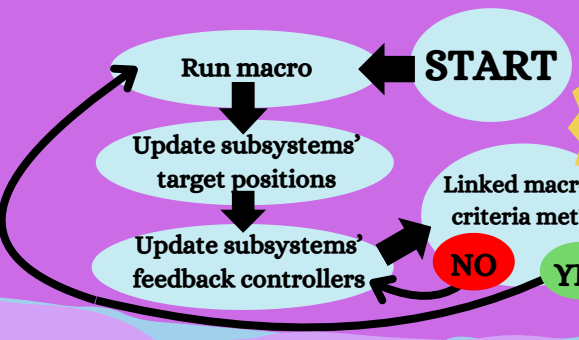
We use a combination of **8 sensors!**

- Limelight Camera
- Logitech c270 camera
- Odometry Pods (x2)
- GoBuilda Pinpoint IMU
- Linear Slides Motor Encoder
- Ascent Motor Encoders (x2)

Preventing Slide Wear

Using Linear Slide **Motor Encoders** combined with our **custom PID algorithm** utilizing a **Sigmoid curve --> smooth and quick slides operation**





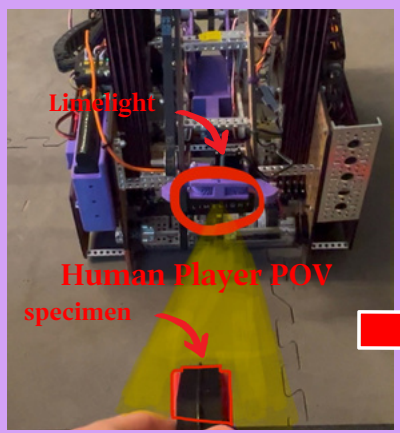
Our largest macro links ten robot positions!

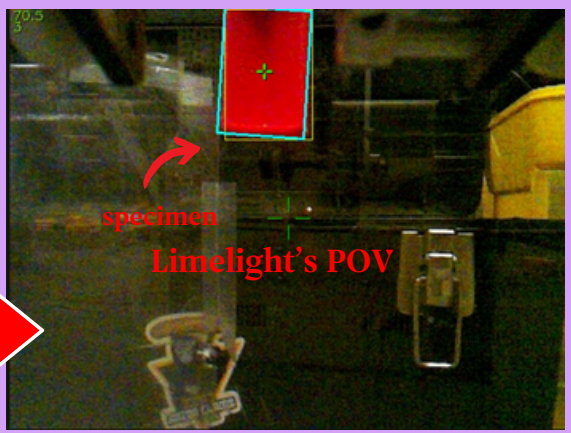
Macro System

A macro holds many preset positions for all our robot's servos and slides. Macros can link to other macros, allowing smooth transitions and complex motions. Our custom developed macro system improves efficiency and simplifies coding, allowing faster and easier tele-op and autonomous scoring. **With one press of a button, 9 servos and one motor can complete a desired task.**

We found it difficult to align with specimens quickly in tele-op. Therefore we **created a detection pipeline and developed an algorithm** to quickly detect the positions of specimens on the field wall, **using advice from computer vision expert Animesh Ramesh** (see page four for more). Through our custom PID algorithm, we can now align smoothly and efficiently.

Specimen Detection





Programming

Localization Testing

We use a combination of <u>three</u> techniques

While the SparkFun Optical Odometry system was easiest to work with, we found GoBilda Pinpoint + dead wheel odometry to be the most reliable especially when combined with camera feedback to mitigate any accumulated error.

Dead Wheel Odometry

- FTC standard
- Easy to integrate with Road Runner
- Mountable anywhere on the robot.

- Low refresh rate
- Loses position if airborne
- Hard to replace

GoBilda Pinpoint Computer

- Highly precise
- 1500Hz odometry
- 0.002% IMU error

- Less built-in code
- Loses position if airborne
- Must face up

Sparkfun Optical Odometry

- Co-processor for position
- 20kHz refresh
- Easy to mount

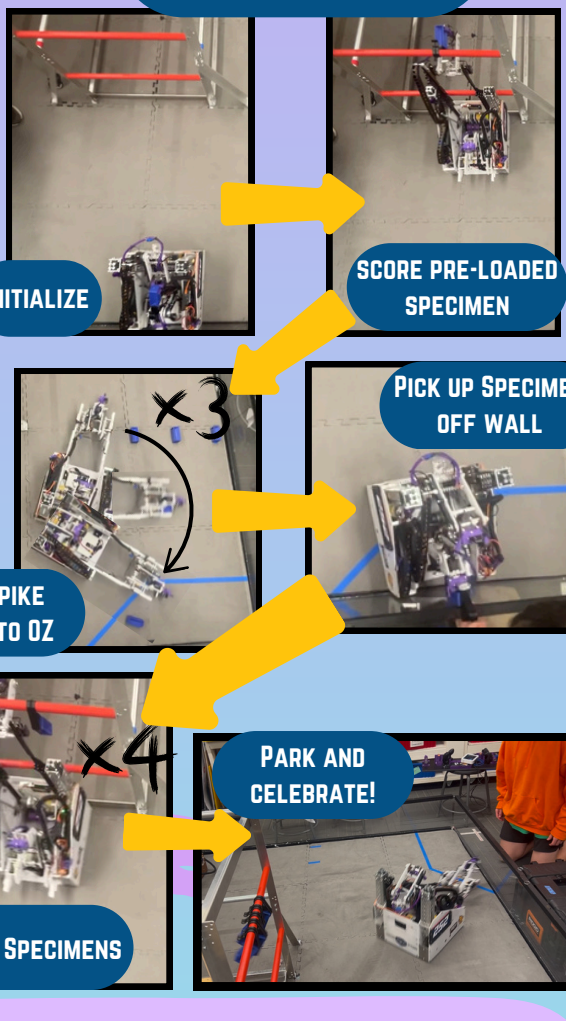
- Less built-in code
- Errors from surface imperfections
- Struggles with fast acceleration

Specimen/AprilTag Localization

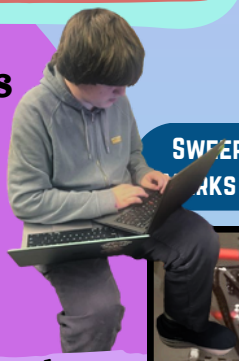
- Highly precise with coprocessor
- "Absolute" positioning

- Hard to see multiple tags
- Tricky camera placement
- Slow

Five Specimen + Park Autonomous: 103 points!



Programming Mentoring - 40+ hours



We helped **7** different FTC teams develop their code and autonomous systems and introduced **40** fifth graders to robotics programming. **After our qualifier, we reached out to teams we had met there from Shea High School and DownCity Design** and over the course of the four weeks, **met with them a total of 7 times,** teaching them advanced autonomous algorithms like Roadrunner, PID, and more. In addition to this, we've spent the year teaching our 3 sister teams programming all the way up from fundamentals, and video called with Mount Hope High School's Team #652, "Underdogs", to get their code up and running at the beginning of the season.

Students impacted: 12

Teams Taught:

#6152 Oysterminators
#15073 Autonomussels
#636 Occam's Razor Clams
#652 Underdogs
#7093 Raider Bots
#8413 Bucket Bots
#27508 DownCity Design

Autos

Our primary auto is our **five specimen + park (shown above)**, which counts to **103 points** once tele-op begins. We plan to use this auto most matches. If our partners only have an auto on the specimen side, we also have a **backup five sample auto + park,** which totals to **83 points** once tele-op begins. Our two autos allows us to be **flexible partners with anyone.**

Hour Counting Note! *Our hours account for the total time our team contributed to an event, not multiplied per individual members (except for volunteering at competitions)!*

Outreach

40,000+ People Reached

270+ People Impacted

13 First Programs Mentored

180+ Hours

Vartan Gregorian FLL Program - 10+ Hours

Throughout the past 3 years, we have cultivated a strong relationship with the Vartan Gregorian Elementary School. This season, with our sister FTC team, we started an FLL after school program for six students. We went in-person to help on 9/21, 10/28, 11/6 & 11/18 and wrote lesson plans for the days in which we couldn't make it. Our team also participated in the school's STEM Night, in which we helped the students showcase their fully functioning FLL robot and we were able to speak to families about FIRST.

Students impacted: 5

People reached: 60

Vartan Gregorian STEM Workshops - 4+ Hours

We hosted three STEM workshops (5/13/24, 5/20/24, 5/29/24) for third and fourth grade students, in which we introduced them to STEM activities by teaching them how to make popsicle stick bridges and dancing cup robots.

Students impacted: 27

Robotic Terriers FLL Team Mentorship - 30+ Hours

After winning the RI State FLL Championship last year, 4 of 6 members graduated out of the Robotic Terrier team. We helped rebuild the program, teaching rookies various skills, helping them improve parts of their robot and guiding them as the thought deeply about their innovation project, winning the innovation project at the RI State Championship

Students impacted: 6

Sophia Academy FLL Program - 7+ Hours

This year we formed a partnership with Sophia Academy (a local school for girls from low-income families). Last Monday, January 6th, we hosted the first of six workshops in which we will teach four students how to build and program an FLL robot!

Students impacted: 4

Volunteering at FIRST Competitions - 55 Hours

Our team members have volunteered at the FLL qualifier at Portsmouth High School (12/8), the FTC qualifier at North Kingstown (1/4) and the FTC qualifier at the Wheeler School (1/18). Through these events, we have been able to connect with other volunteers and teams. We were so happy to help!

People reached: ~100

Goals

- **Consistently make meaningful contributions to the local STEM community by connecting deeply with as many people as possible**
- **Establish and continue long lasting relationships with schools and local organizations**
- **Increase the number of FLL and FTC teams in the region**

Outreach

Providence Public Library Robot Demonstration - 2 Hours

We have established a strong connection with the Providence Public Library over the past couple of years. On 2/19, we will be visiting their STEAM club and will be talking to the young students about FIRST, robotics and their STEM interests. We will also show them how to operate our robot!

Students impacted: 20

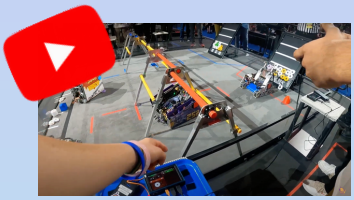
Robotics Presentations - 3.5 Hours

One of our members visited a school in rural India and introduced robotics and FIRST to 50 students (12/24). He also talked about how robotics empowers students and encouraged them to participate in their own STEM projects. Also, our team gave two presentations (11/19 & 11/26) to the entire 5th grade (40 students) at our school! We talked to them about FTC and the design/coding process for robots. To make our presentations more interactive, we brought our robot and encouraged students to ask questions. It was a great introduction for their upcoming unit on inventions!

Students impacted: 120

New England Menstrual Equality Ambassadors

An FTC team from Connecticut invited us to be an FTC New England Menstrual Equality Ambassador! To ensure that everyone has the supplies they need, we will be providing menstrual products during FTC events.



Youtube Channel & Instagram Account

We post content often on our Instagram and Youtube accounts, and use the platforms to not only connect with fellow FTC and FRC teams, but to also help promote FIRST and its values. We post interviews, showcases of our robot, match videos and team content for other to learn from, comment on, or otherwise enjoy. We've amassed over 20,000 views on our videos (posted on both accounts) this season.

People reached: 40,000+

16+ Events

To ensure that we keep **improving our outreach events,** we created the **Outreach Feedback Form.** We ask that all members complete the form so that we can use their advice to enhance future events. For example, we created syllabi for our FLL workshops after a teammate suggested we organize our plan better.

WaterFire - 7 Hours

For the second year in a row, we were invited to showcase our robot to the entire Providence community during a WaterFire event hosted by FRC Team #6328. During our time there, we were able to meet other FTC and FRC teams that had their own booths, and we conversed with over 50 people from the Providence community who were curious about FIRST and our robot. Next year, we will assign team members roles regarding the set up of our space, to maximize the time we spend with the community.

People impacted: 50+
People reached: 250

Wheeler FLL Program Mentorship - 20 Hours

This year the Wheeler School created two new elementary school teams and an all rookie middle school team. We were able to mentor these teams helping with all parts of the competition, with members of our team who previously competed in FLL sharing their experience and wisdom. The middle school team was able to qualify for the State competition!

Students impacted: 15