Engineering Portfolio

Junior Varsity Roboclovers

Team 21721

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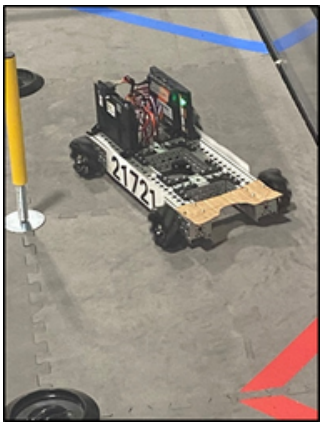
Meet the Team

Pictured from left to right, top to bottom: Aveion, Stacey, Ethan, Cedar, Will, Gabe, Phillip, Eric, and Madi

Team Structure

Business and Communications	Building and Logistics	Programming and Strategy
Madi -President of FTC JV; Rookie-Outreach(As well as Logistics), “Coach Coach”, Portfolio Porter	Cedar (Head B&L) Rookie-Creative, Builder, Future Artist, Fruit Roll-Up	Will (Head P&S) FTC Rookie- Main Programmer, “Java Juicer” "Kevin"
Stacey- (Head of B&C) Rookie-Coach(Game), Outreach, “Emotion Coach”	Ethan Puskar Rookie-Creative, Builder, Future Game Designer "Baby grinch" "Muscle Man"	Eric Rookie- Programmer, Creative, Human Player "Generic Eric"
Gabe FTC Rookie-Outreach, FLL Human Player(Game) "Lego Luminary"	Phil- Rookie, Driver, Former FLL Member, Engineer, Builder "Fill-Up"	Aveion Rookie-Driver(Game), Future Architect "Speed Demon"

Building and Logistics



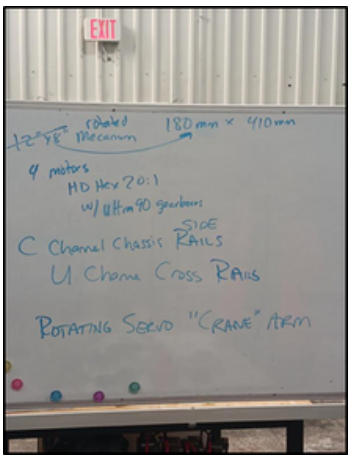
"The Little Pushbot that could"

We make a name for ourselves every time we set our bot on the field.

The build team started off with absolutely no idea how to build anything without instructions, but now we have an ultramodern robot. When we were deciding what to build our chassis with, we decided to use the U-channel, rather than the C-channel, because of its stability and space for the motors. Even though it took us a long time to build the chassis, I feel confident in saying that all those attempts acted as a learning experience. Even though our newer model needed improvements --such as more brackets-- with the correct tools and the correct mindset, we achieved a state of completion.

We produced a multitude of arm designs before settling on the one we have now. Our first arm was noticeably short and barely worked-- but from this experience, we learned how long it really needed to be. After some research and even more arm design iterations, we found the arm we needed: the linear motion arm. When we got it to work, this arm proved itself the correct model to use.

Not only did we plan and execute multiple arm designs, but we did the same for our intake as well. With efficiency and simplicity in mind, we finally achieved the wonderful intake we have now.



--Ethan Puskar,
Member of the
Building and Logistics
Team

Programming and Strategy

The beginning of the season was a bit tough since we had to learn a completely new programming language from scrap—Java. Although, with help from CodeHS.com and the Varsity team to mentor us, we're all decently fluent in the language.

Our bot meticulously measures just under 18in x10in. The bot is one of the smallest robots we've seen so far, which is something we take pride in; this proves that we don't need a large, complicated, and fancy bot to work well.
Paired with our double-dozer setup (A scoop used for positioning the cones) and slim build, we can traverse the board with ease and speed.

As a pushbot, to be successful in placing cones, you must be fast. Measuring 10' in width, and accounting for cones' 2' in radius, our bot can traverse the diagonal with an inch or so to spare. .707(Mathematically) the time, and the only one in the space.

Being a rookie team, the autonomous section proved very difficult to master. Maneuvering the field and placing cones via timestamps were a hit or miss. So, we decided to focus on detecting the signal sleeve, which would garner us a solid 20 every time. Rev's Color sensor was the go-to option since none of us were familiar with the tensor flow or had the time. RGB Values fluctuated too much in different lighting, and the bot couldn't get close enough, so we decided to scrap it. Autonomous could only gain us 3 points a game by strafing to the terminals and parking. That wasn't enough. So we brainstormed. Now, we take a gamble: Move forward into parking slot #2 every round. This gives us a 1/3rd chance of getting a game-changing 10 points rather than a guaranteed 3. A worthy trade-off.

-Will Rhinehart, Head of Programming and Strategy
-Eric Gossling, Programmer

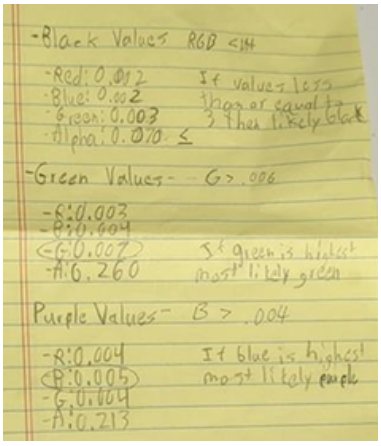
Programming and Strategy

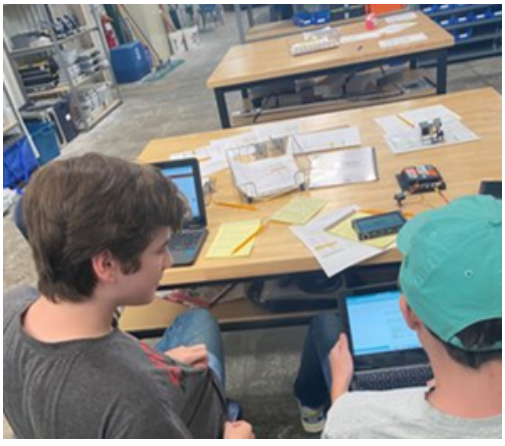
When the time came to armor our robot with the linear motion arm and intake, more code was required. The programming team would have gotten nowhere without help from Varsity, our coaches, and hours of YouTube and web browsing. We successfully coded upward, and downward movement for the arm, and servo positioning for the intake by the third league meet. Not only could our bot maneuver the mat quickly, but it could score ground, low, medium, and high junctions.

The chassis was equipped with two dozers. One to align the cone for the arm intake, and another for push-bot manipulation.

-Will Rhinehart, Head of Programming and Strategy

-Eric Gossling, Programmer

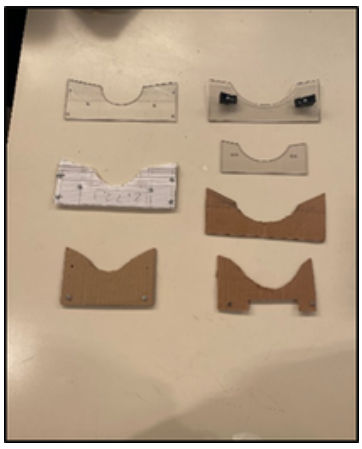


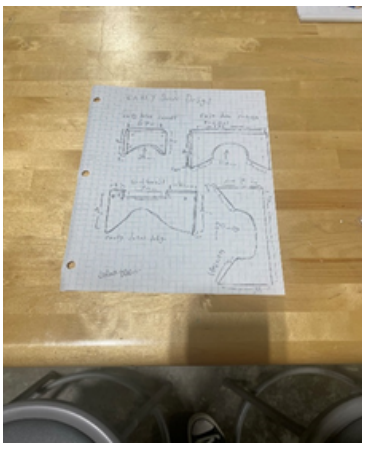


CAD and 3D Printing

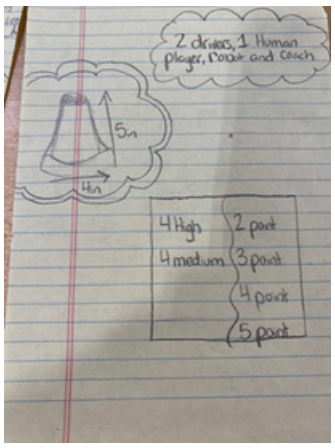
We used Tinker Cad to print prior intakes and our team beacons. We could not print a dozer. However, we are still learning about cad and 3d printing, so we asked a varsity member, Logan, to help make a 2D drawing on Onshape and teach us about on shapes; this is very beneficial in the next year's robotics season; we will be able to use onshape to print any further intakes or dozers. This was done so we could use the CNC router to cut out our new and improved dozer, made with the material Lexan (Polycarbonate). We did run into a multitude of issues, like the Lexan dozer not being compatible with the arm of the robot, or the 3d prints getting ruined in the printing process, so we had to revise our dozer design up to seven total times! But we are using two of the seven created in our current robot design.

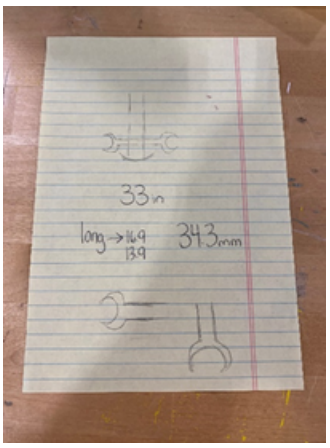
--Cedar Alden, Head of Building and Logistics





Our iterations of our dozer





Layout on the field

Sketch of the claw/arm

League Meets

In total, we had five league meets this season. Throughout each meeting, we learned from mistakes and took notes on other teams to see what their goals were and what we could do if they were assigned to be our alliance partners. We also got ideas for our own robot and to see what to do since we are a first-year team. We also had worries about whether we were going to pass the robot inspection. From what we saw, most robots were big and bulky, but that did not mean that they were the best robots in the field. Most of the bigger robots either malfunctioned or something broke off during the matches. This taught us that the bigger the robot you have does not necessarily mean you have a better chance of winning the matches. Our goals were to get most of the ground junctions, and our alliance partner's goals were to get most of the Low, medium, and high junctions. If we were lucky enough during the match, we were able to make a circuit. Another advantage we had during the matches was the center ground junction on the opposing team's side. When we put a cone on the junction, it would most likely be knocked off, causing the alliance team to lose points. At the first league meet, we only had a push bot that mostly did most off-the-ground junctions, and now we have a robot with an arm to score all the low, middle and high junctions.

At the end of each league meet, we were able to learn something and fix and correct our mistakes. We also had help from the Varsity Roboclovers and our mentors, Mr. Lee Bane and Mrs. Tiffany Coles. Without their help, we would not have the team we have today.

--Madi Landress, Coach and Team Captain

Outreach

For this year's big Outreach project, we hosted the FLL Tournament at Arts and Innovation Magnet Program in Winder, GA. This project helped us with leadership skills and taught us to do more for the community. Four out of the nine of us were on an FLL team in the past, so this, in turn, helped us know how the tournament should be run. The night before the tournament, we helped with setting up the tables, obstacles, and the snack stand; then, on the day of the tournament, twenty-one teams showed up from around Barrow County. We ap: running pointed roof p peace and flow of the tournament, which were running tables, judging presentations, and running the snack stand. In Barrow County, we had three FLL teams, and all three of them ended up going to the regional tournament! We enjoyed this opportunity and hope to do it again next season.

Throughout the season, members helped the FLL teams by giving the teams advice for programming and building for the robot. We also did mock matches to give the teams a better understanding since most FLL members have never been to a tournament. This season was a highly successful one for the FLL teams in Barrow!

Another opportunity we had was mentoring at the FLL Regional tournament. Our Business and Communications team went to Trickum Middle School to help and mentor our 3 FLL teams. We and the Varsity Roboclovers were assigned to a team since we really did not have that many adult volunteers. Throughout the day, we encouraged them when something went wrong or didn't go the way they planned. At the end of the day, awards were presented, and even though none of the Barrow FLL teams came home with a trophy, we are still very proud of all the teams for a wonderful season!

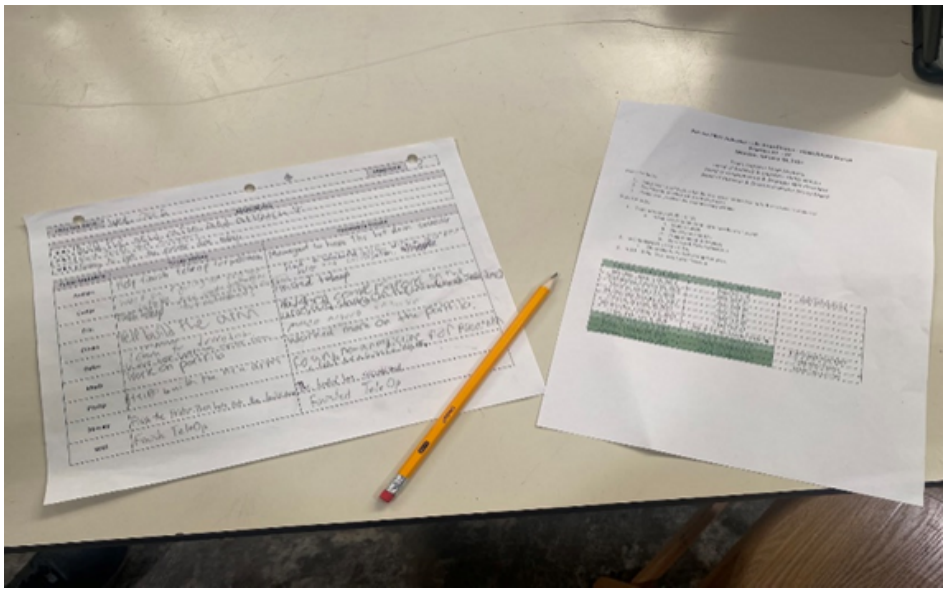
-- Madi Landress, Coach and Team Captain

Madi and Stacey
Mentoring FLL Teams
3085 and 56542 at Super
Regional Competition

Documentation

We are the Roboclovers Junior Varsity Team 21721. The Barrow Robotics FTC community consists of Varsity and a Junior Varsity Team and three FIRST LEGO LEAGUE Teams. As the business and communication team, we keep and organize the documentation for our engineering notebook for the season. Our Varsity Team helped our team create a documentation system this year based on their knowledge from earlier seasons; we have improved by Roboclovers JV team standards. Our team implemented the use of a simple, printed template in which each team member writes down what they will do during the practice at the beginning of the day and what they have carried out at the end of the day, improving documentation efforts. At the beginning of the season, we tried to use a virtual documentation system requiring each member to log in and document their process at the end of practice. This virtual system was proven to be completely ignored and forgotten by most, as most members did not want to go through the hassle of dealing with the poor mobile UI that Microsoft Teams has. Though, compared to last year's documentation system in which team members wrote down things as they happened on a notepad, which had proven inefficient as it disrupted work, they show obvious signs of better documentation systems.

On the left, the paper template in which team members have written down what they will do on practice 30.
On the Right, the binder which has all practice schedules and written plans from earlier practices.



Documentation

Continuing documentation during competitions has stayed the same, but there have certainly been some improvements. For instance, putting rough time stamps next to events, such as a qualification, has helped with being able to understand what happened linearly during the competition. In addition, an increased effort to talk to other teams to both learn and speak to them about their robot has allowed for better strategic planning during qualifications.

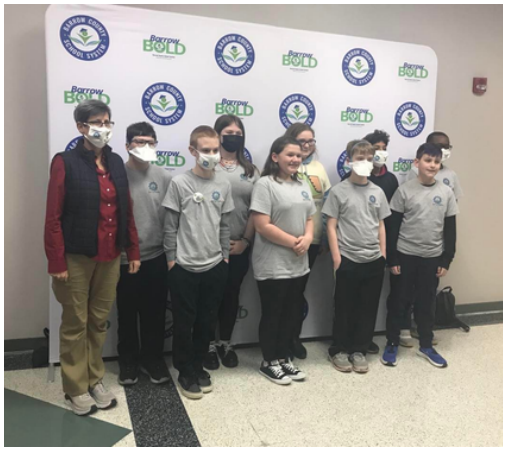
-- Stacey Mizell, Head of Business and Communications

Motivate

Several team members from our junior varsity team 21721 were motivated to join the Barrow Robotics FTC Program after watching the FTC 18597 last season while we were on the Barrow Robotics First Lego League. They worked with us during our season competition, where both of our teams went to the State Lego Competition. This season we worked with the Barrow Robotics First Lego League teams Cloverbots 3085 Archers, 48816 Bulldoggs, and 56542 Wildcats. There were 25 6th and 7th graders on the three teams. We had our rookie team member Gabe work closely throughout their season to help them learn how to work the Spike Legacy coding programs, help with strategy, and with designing their attachments for the robot table runs. All three teams made it to the Super Regional Competition. We hope that we inspired and motivated them to continue in the Barrow Robotics FLL or FTC Program again next season!

-- Madi Landress, Coach and Team Captain

-- Stacey Mizell, Head of Business and Communications



FTC Rookies last season in FLL

Connect

This season we connected with mentors and industry professionals to help us connect this year's FTC Theme to the work we are doing this season. Power Evans from SK Battery came to talk with us about careers in STEM and Innovative energy solutions here in our community. Matt Keen with Muddog Trucking brought one of his semi-trucks by and talked with us and one of our FLL Teams about new technology on semi-trucks that help reduce emissions and ways that the industry could reduce the use of nonrenewable resources. We also had a video conference with former Barrow Robotics Senior Instructional Lab Coordinator at Perdue's College of Engineering in the area of Electrical and Computer Engineering. He explained his role at Perdue University and how the skills we are currently learning and using are what several college students are currently learning. Our coach and mentors, Mr. Lee Bane, is the Barrow County School District Innovative Teaching Director, and Mrs. Tiffany Coles is with the University of Georgia Cooperative Extension Service Barrow County CEPA. They both have shared their knowledge and experience in FIRST Robotics and STEM Programming.

-- Madi Landress, Coach and Team Captain

-- Stacey Mizell, Head of Business and Communications

Power Evans, SK Battery

Varsity and JV with Coach Bane and Coach Coles

Team Plan

For the 2022-2023 Season, We met every Monday and Wednesday from 4-6 PM. We spent Mondays working on our own robot as well as mentoring our FLL Teams. We ran scrimmages at the end of each practice for all three FLL teams, where we trained to be FLL Referees, as well as scrimmaged with the Varsity team to practice with our push bot. Our team plan was to create a working robot using JAVA programming. We created a push bot that was able to score ground junctions as part of our strategy to own junctions that other teams were not actively seeking as often and gain penalty points should the other teams knock over our cones. As we strived to continue to innovate and iterate our design to be able to be more competitive, we created a linear motion arm that we use during autonomous. We also needed to fundraise to help fund the FLL Teams that we mentor, along with buying materials for our robots. Friends of Barrow County 4-H assisted us in hosting a raffle for a Nintendo switch. We raised $4,000 with this fundraiser. Our future goals include continuing to host a regional FLL Tournament, hosting a robotics summer camp for recruiting potential FLL Members in 5th and 6th grade, and getting sponsors for professional development training for teachers that are interested in becoming Barrow Robotics coaches and mentors.

-- Madi Landress, Coach and Team Captain

-- Stacey Mizell, Head of Business and Communications

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