DROID RAGE

3035

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Introduction:

Mission Statement:

Our robotics program's motto is to work hard while having fun. Our aim is to motivate student learning in science technology, engineering, and mathematics that goes beyond the classroom. As a mentor-based program, veteran team members build partnerships with new team members to foster the future leadership of their team successors. Robotics provides students an exploration opportunity through all dimensions to discover their interests and gain necessary skills stimulated by creativity and critical thinking. At this day and age, we believe that these skills are more important than ever in preparing our youth for endless possibilities and support the technology demands of industry.

Vision Statement:

Although we strive to be the best at everything that we do, the Collegiate High School Robotics Program does not believe that winning defines our success. Our achievements as a program are defined by the legacy that we leave for future members. We recognize team success when every team member contributes their efforts to bring forth individual creativity, demonstrate their diverse abilities, work hard, and maintain perseverance to ultimately showcase the team's achievements. The lessons that we learn as a result of working in a fast-paced environment which challenges us to critically think is the best reward to make our program even better in both the FIRST Tech Challenge and in the FIRST Robotics Competition. Be that as it may, executing the impossible is "no sweat" for us.

Team Information:

Coach: Sandy Riggs & **President**: Ricky Tiet

Team Roster

Eva Hernandez	9th
Mike Tran	9th
Jasmine Satterwhite	9th
Austin Dominguez	9th
Paris Saucedo	9th
Lauren Hutchinson	9th
Christine Satterwhite	9th
Leo Santos	10th
Christopher Van Cleave	10th
Orlando Gomez	10th
Gema Rodriguez	10th
Miles Hernandez	10th
Mark Avila	10th
Emiliee Clark	11th
Sai Chinnasani	11th
Katie Nguyen	11th
Vincent Le	11th
Isaac Vasquez	11th
Noah Cantu	11th
Daniel Hernandez	11th
Jorge Valdez	11th
Janie Ramirez	12th
Ricky Tiet	12th
Hector Piris	12th
Andrew Arreola	12th
John Casso	12th
Isabella Gutierrez	12th

Engineering:

6 WEEK BREAKDOWN

WEEK 1: On the very first day we held a kickoff meeting to brainstorm possible designs and strategies. Our designs were based around the strategy of assisting with controlling the switches after we had gained and ensured control of the scale. There were three designs that branched from this idea, a vertical lift with motorized wheels for intaking, a pneumatic grabbing arm, and a hybrid of the two, an arm which grabs the cube with motorized wheels in addition to grabbing. In this week we began experimenting with the pneumatic and motor setups that would be required for the scoring designs.

WEEK 2: During the second week, we primarily worked on two chassis. One chassis was the chassis which was new and would be used as our primary competition robot. Its structure needed to be built in addition to wiring the electronics and only the structure was finished this week. The other chassis that we worked on is our secondary test bot, this bot was built previously for the 2016 game and only required basic maintenance and wiring fixes to function.

WEEK 3: After the creation of the bumpers were made to the specifics of our secondary bot's chassis. The dummy bot's chassis was finished within week two, the drive train for the dummy bot is larger than the main robot's chassis. When creating the main robot, the chassis was measured and the previous bumpers were modified to fit the main robot. The main robot's chassis was made shorter and tighter than the dummy bot's chassis; the main robot's chassis has been reinforced with more churros. This was done because with the speed that the robot will preform will need the entire chassis to be stable and hold up to our desired weight.

WEEK 4: This week the team discovered the bucket design to load power cubes off the portals, which would be faster to score on the opponents switch. Also, by using this bucket design a wide bucket we will be able to reach a wider range when we are using the portal. This proved to be a better overall design for our intake. We made this intake using one by ones and other C-channels as our material.

WEEK 5: This week we started to work on the basket's outtake system. We also started to wire the robot and ensure the components are wired correctly and in the proper locations on the robot. This week we also started and finished the middle-front intake system's ramp and pair of motors.

WEEK 6: This week we tied all the loose ends pertaining to the robot. This week we finished the bucket mechanism by using 2x1s and plexiglass. We also made and made final adjustments to the bucket mechanism and its components along with testing the mechanisms. This was also the week of bag so on the tuesday of that week the robot was bagged and tagged.

Robotic Components

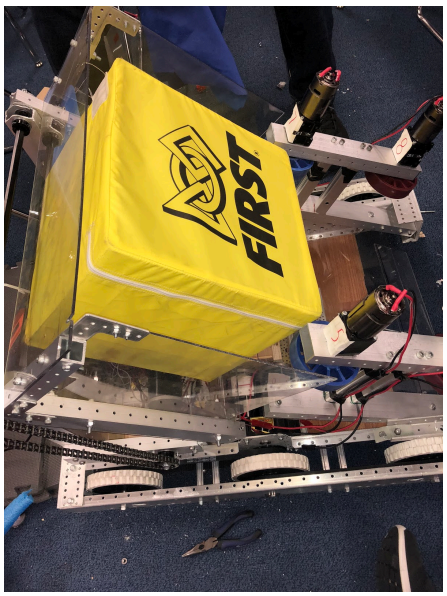
Drive Train:

After the game released we opted for the kit of parts chassis that we used previous years because we wanted to focus on the mechanisms that go on top of the drivetrain. It was a chassis that we know would work for the game because we wanted speed and pushing resistance since we are a small switch robot. We used 6 *AndyMark* 6-inch double threaded wheels for our drivetrain with belts and pulleys that are running on 8:11:76 ratio. The other reason we chose this drive is because this drive can be built in one day which allows a lot of time for our drivers to get practice on.

Since we wanted to optimize the drivetrain for this year's game, we made some few adjustments to the size of the drivetrain. We took out the front plate on the drive and used two 6-inch end plates to have space in the front for the cubes to go into the robot with ease. We also shortened the drive train to 27 inches according to the rules. And the rest we kept it consistent to how the drivetrain was. We also added extra churros in the middle for more stability.

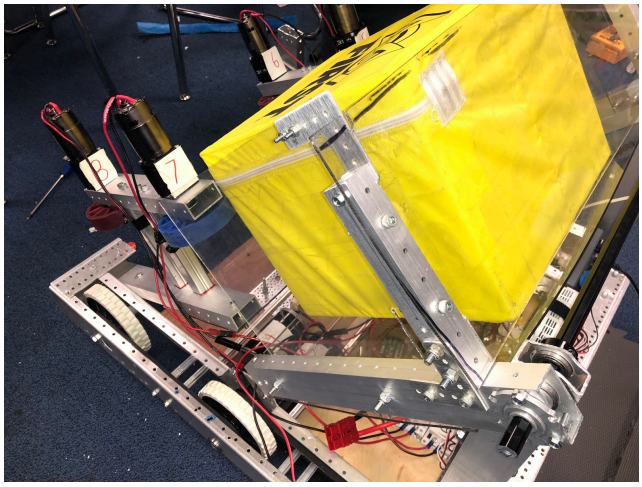
Scoring Mechanisms:

Initial Game Plan



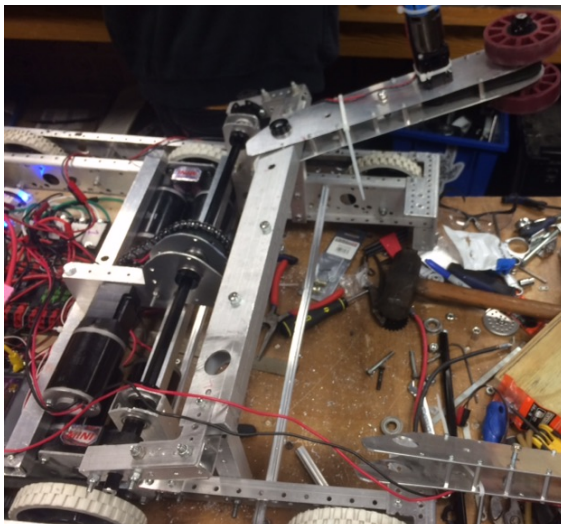
Switch: One of our original ideas was to have an intake system that both intakes and outtakes from the same location. This would simplify the robot and lessen the amount of weight. This would have allowed us to use less materials to prototype and build. In more depth, this intake would use a 3:1 gear ratio on a 775 pro, so it would go at about 4000 max speed. Running at 4000 speed would allow us to have the amount of speed that would help us intake and effectively outtake the power cube. It became a A two-part system which consisted of a fixed intake and a rotating box which contains the power cube. The intake takes the cube from the

ground to inside the box. The box has an open side and top. It rotates to toss the cube out of the top into the switch.



Scale: For the scale, we wanted to prototype an elevator arm that could lift to 7 feet tall, so we can deploy the cube on the scale. We really wanted to go for the scale because we thought that it would set us apart from other teams Originally, we thought of buying the elevator from vex because it was already tested, and it was proven to work. We also brainstormed about what is going to go on with the gearbox for the elevator for it to go fast and have the torque to pull the elevator with the intake up to the feet height that we wanted. Eventually, we decided against the scale and focused solely on the switch.

Updated Game Plan



Switch: The intake system is built to instantly capture cubes and transport them to the switch. The design we decided to go with were two arms that move independently from each other. Attached to each arm are Vex's 775pros, geared 3:1. We decided to gear each motor 3:1 so the wheels can be used for receiving the cube, and launching it as well.

The arms are ran on a shaft that allow the arms to be suspended by latex-tubing. The latex-tubing applies a constant force that pulls the arm in at a default position. The default position yields a 10-inch distance from each wheels, allowing the cubes to be taken in from any position. When the wheels come in contact with the cube, it will expand due to the shaft, and the latex tubing will secure the cube to the robot.

The robot was built to be light and agile, therefore, it relies only on a intake system. The fast speed that the robot is able to reach allows the robot to dominate the field, taking control of the enemy switch and quickly cycle the cubes into the vault.

Programming:

Autonomous: The goal for this year's program is to create an autonomous capable of scoring the pre-loaded power cube into our alliance's switch. We also planned to create an autonomous in all of the major FRC programming languages made to drive straight, in order to guarantee we get an extra ranking point in the qualifiers.

A major factor in our autonomous working correctly is our nav-X MXP intelligent motion sensor. Mounted directly to the RoboRio, this gyro allows us to turn precisely. This is especially important given that turning without it would be very difficult otherwise. The competition robot currently does not have wired encoders, and our autonomous is based on driving by a certain time, which changes depending on the battery voltage. The gyro allows us to mitigate a few of the major issues related to that, such as entirely missing its mark later in the competition.

We would need such accurate turning because our preferred placement in a match is in the center starting position. In a perfect match, the alliance partners we gave a "Drive Straight Autonomous" to, would be placed on either side of us in order to run the autonomous without any obstacles, while we would use our intelligent turning and game information to score into the switch. We, of course, also have worked on a scoring autonomous on either side as well.

The finished autonomous is planned to run in response to the information from the "gamedata", which is a string of three characters sent out by the Arcade, and a signal sent by us that tells it which one of the three starting positions it is located in. The gamedata's characters, or letters, represent which switch, scale, and opposing switch bears our alliance's color, respectively. Since we are a switchbot and going into the opponent's side of the field is illegal, only the first letter is important. For example, if the gamedata sent out the signal "LRL", and we told the robot that we are starting in the center starting position, that would mean that our program would run the section of the autonomous code that matches up to both of those conditionals, dubbed "centerAndLeft".

Tele-OP: As for the TeleOperated period, we had significantly more options and had a lot more fun with it because of it. We had bagged our competition robot on time, but our testing bot lacked the same subsystems. This meant that driver testing would have to effectively be through a pushbot. We thought that this could be advantageous, given that we had more of a reason to guarantee the drivers had maximum control of the robot. We had several drivers trying out, all of which with unique approaches to driving.

There were two main styles of driving we were able to toggle between at the press of a button to cater to these drivers. Tank Drive and Arcade

Drive were the two main driving styles. Tank Drive is a drivestyle that involves both sticks of the Logitech controller controlling the respective sides of the drivetrain. It isn't necessarily accurate or easy to control, but most of the veteran drivers had a lot of experience with it. Arcade Drive involves one stick moving the robot forward and back, and the right stick controlling the turning. This allows for a much more fluid drive than Tank Drive, which is important given our limited West Coast drivetrain.

We were also testing 90 degree turning using button control. We are able to have one button reset the gyro and another button that turns it to a right angle.

SAFETY:

Safety is our #1 Priority!

Droid Rage conveys safety in many ways such as having each team and even individual people sign in and out when they use the workshop. Each teams is required to put tools and safety equipment back in their respected place to maintain the organization of the workshop. To maximize safety and ensure that this routine is kept up, we have a rule set in place: If a team leaves the workshop unorganized, they will not be permitted into the workshop for a week. In doing this we make sure the workshop stays clean and neat. It is made clear when machines are going to be used and ear muffs are offered to everyone in the room. Our members utilize the goggles, gloves, and earmuffs that are present and accessible in the workshop. We have designated baskets for all safety equipment such as goggles, gloves, earmuffs, etc. .The first aid kit is easily accessible to everyone and we are proud to say that it is almost never needed.

STRATEGY:

COMMUNITY OUTREACH:

As a FIRST team, we make it a priority to spread the visions of FIRST to as many people as we can, and as much as we can. We believe that STEM awareness is crucial for communities to thrive, as well as create a spark of ingenuity within the minds of young students, knowing that they will be future leaders. Droid Rage's efforts go beyond STEM awareness, however, since outreach is more than just STEM; it's also about giving back to the community in times of need. Whatever way we can donate our time to make a difference, we will go out of our way to do it.

Event Volunteering

During the FIRST Tech Challenge Gulf Coast League events, Droid Rage takes the time to help other teams that need assistance with their robot. Regardless of whether they are a rookie team or a veteran team, we believe that mentoring other teams during these events help them improve and be successful within FIRST.

Mentoring

Within our school district, there are many that aspire to become successful FTC teams. For them to do so, veteran teams like Droid Rage seek to help mentor other teams from schools in our local school district and beyond.

STEM Showcases

When an opportunity arises for us to spread the awareness of STEAM to our community, we believe that we should take it. During these showcases, we interact with students and the public in the hopes of piquing their interest in STEAM and all that it has to offer through showcasing our robots and our program. Through doing this, we raise awareness of FIRST and recruit new coaches, mentors, and teams.

Hurricane Harvey

Droid Rage got together to see the aftermath of Hurricane Harvey in Aransas Pass, Rockport, and Port Aransas. After such devastation, we knew we needed to lend a helping hand to the community. To aid in the recovery process, we helped clean up the destruction, hand out necessities such as clean water and supplies, and assisted in giving out food to displaced residents



ACCOUNTING:

Sponsors: American Electric Power, HEB Tournament of Champions, Cheniere Energy, Texas Workforce Commission, Sign Xpress, Transynd Media, Keller Williams Realty - Lulana Cain, Big Tex Trailers, Armstrong Lumber, Dream Team Realtors - Sandy Riggs, Two the T, Whataburger, Del Mar College & Collegiate HS