

ROBOWRANGLERS



ROBOTS

WHO WE ARE



SENIORS:

Logan, Kaden, Kolton, Hunter, Martin

JUNIORS:

Aidan, Breanna, Carlos, Carlos III, Coleman, Corey, Danielle, Garrett, Gavin, Hannah, Jessica, Katie, Madison, Nic, Nick, Ryan, Will, Zachary

SOPHOMORES:

Berkley, Brett, Ethan M, Kacie, Reese, Yeonsoo

FRESHMEN:

Corbin, Faith, Francisca, Heaven, Joshua, Noah, Wyatt, Kylie

MENTORS:

Adrienne, George, Grant, Art, Jessi, Ricky Q, James, JVN, John H, Eric, Justin, Monty, Kevin, Adam R, Adam F, Dillon, Brandon, Niklas, Nikki



CONTINUOUSLY
ITERATING SINCE
1992

Started over
100
competition robotics teams
in our district
in the past 3 years

LEAD: PEOPLE OF ALL INTERESTS
COMMUNITY MEMBERS
YOUNGER STUDENTS
TO STEM
USING: FRC DEMONSTRATIONS
VEX REGIONALS
VEX & VEX IQ MENTORING

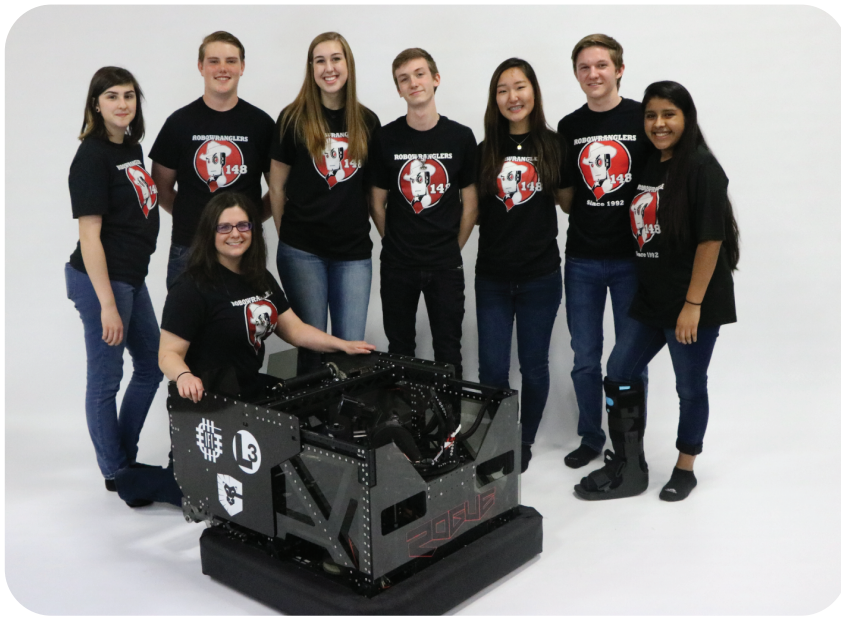
100% OF
SENIORS
IN THE
PAST 5
YEARS
ATTENDED
COLLEGE

EXPANDED
DISTRICT ROBOTICS PARTICIPATION
FROM **29** TO
500+ STUDENTS
IN 5 YEARS

FOUR
ROBOWRANGLER
ALUMNI HAVE
HAVE BROUGHT
THEIR EXPERIENCE
FULL CIRCLE
BY BECOMING
MENTORS
BASEBALL
PLAYERS,
DANCERS,
ARTISTS,
VIDEOGRAPHERS,
BAND
MEMBERS,
AND
SO MUCH
MORE

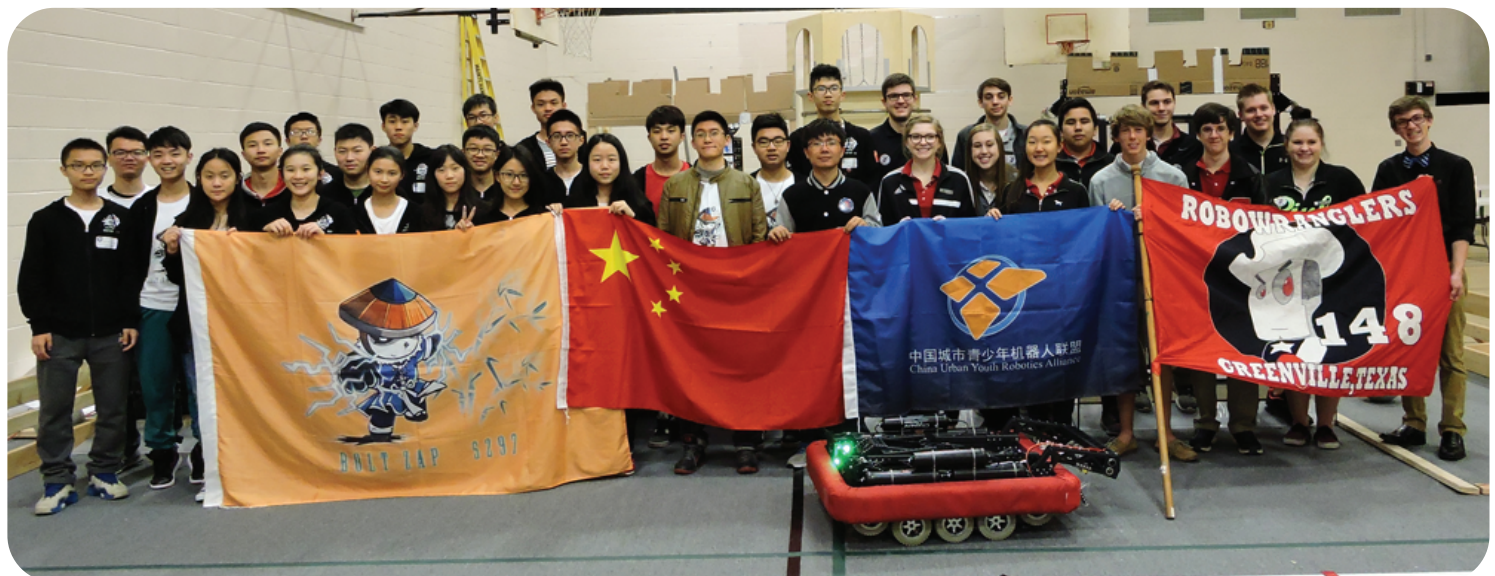
OUTREACH

When Team 148, the Robowranglers, was founded twenty-six years ago, no one could have imagined the impact it would have on our school, community, and most importantly, team members. Since its inception, our team has been on a mission to spread a passion for STEM throughout our hometown of Greenville, TX. During the past few years, our pursuit has expanded both nationally and globally. From small demos in our cafeteria to FRC events halfway across the world, we demonstrate our commitment and passion for FIRST and STEM.





Through our partnerships with our sponsors, school district, and community, we believe we successfully spread FIRST's values of inspiring young people to be leaders. Our efforts drive students of all ages to develop and explore their interests in science and technology. Our exciting and engaging, vertically aligned robotics curriculum ensures team members enter high school with overwhelming amounts of knowledge and passion. Our students go on to pursue STEM careers, which rallies the entire community to fund robotics education. Whether in our own school or across the globe, we leave everyone we meet with qualities that FIRST values most: confidence, vision, and the tools to shape their own future.



DESIGN PROCESS

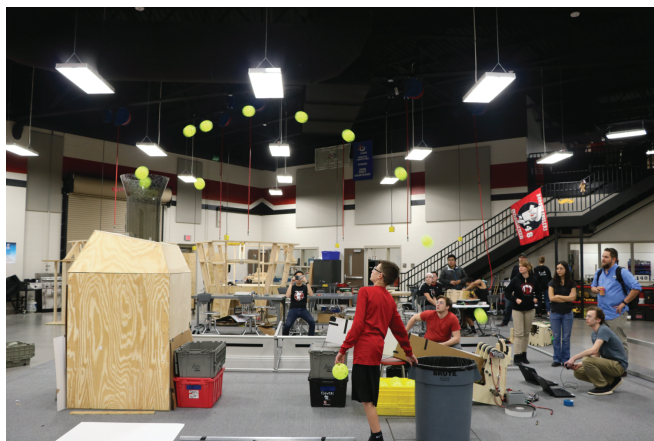
Design is an iterative process. Every Robowrangler has heard these words countless times, and it has become a mantra on Team 148. We celebrate failure, for failure brings us to create bigger and better ideas and designs. We want to fail quickly and often to find the most effective way to play this year's FRC game, Steamworks.

Following our successful design motto of "Trust the Process. Keep Iterating. Chase Excellence.", we decided to spend a large majority of this season completely dedicated to prototyping and quick iteration.

Due to the complexity of this year's game, the team spent quite a bit longer than usual designing a shooter and agitator that would meet our needs and standards.



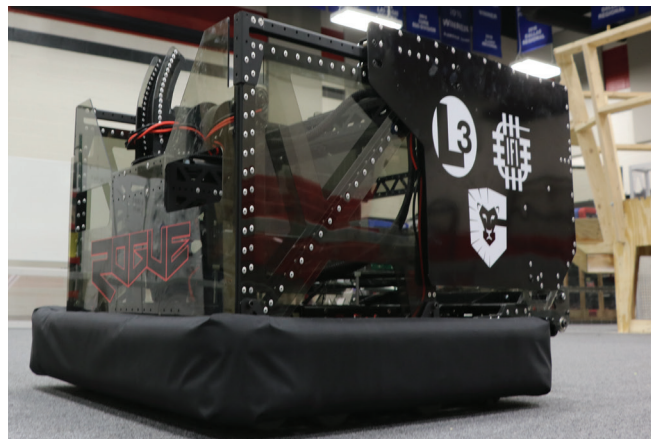
After a few days of debating early in the season, we came to the easy conclusion that we wanted our robot to score both gears and fuel. While we came up with an effective gear scoring mechanism in the first week of the build season, it took us quite a while longer to design a ball shooter that met our expectations. After designing no less than 5 different shooter concepts, we finally came to the conclusion that we wanted a large flywheel, shooting a single stream of balls. In our prototyping, we found that shooting balls from a "double wide" shooter severely hindered our accuracy. This was caused because of balls colliding in the air, therefore causing a chain reaction of bounces, and balls missing their target.

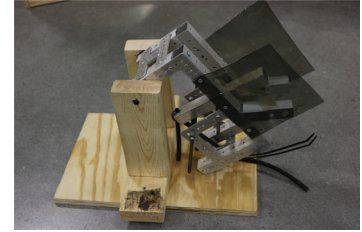
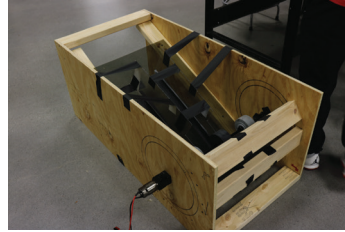


Once we finished CAD and had sheet metal back from our sponsor's metal stamping shop, we began assembly of both our practice and competition robots. By building a separate practice robot that we keep in our shop, we are able to continue the design process in between competitions.

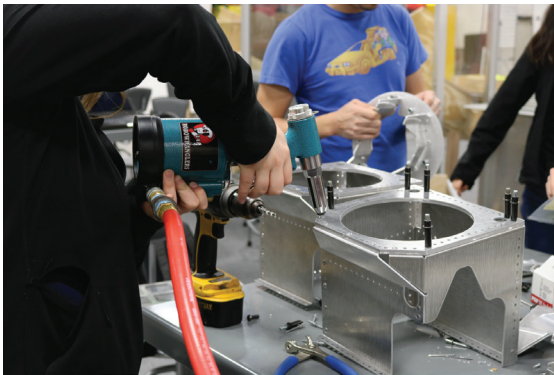
After assembly is complete, we test the robot as a whole. If the team discovers issues or possible improvements, we revisit the initial designs. You can see the applied iteration first hand through the constant evolution of our robot each season.

Our next big challenge stemmed from delivering balls from our hopper, to the shooter itself. Our first prototype consisted of a number of rollers, which would move the balls backwards, and to one side of the hopper for feeding. However, we experienced numerous problems with the design, as it was extremely slow, and jammed often. We then decided to look back at our 2009 FRC robot, Tornado for design inspiration. This robot used a large drum spinner that quickly spin balls in a cylinder, to a set location. We then further refined this by implementing our new "9" feeder after our first regional. This systems consists of a spinning object that scoops balls into a central location, up into the shooter.

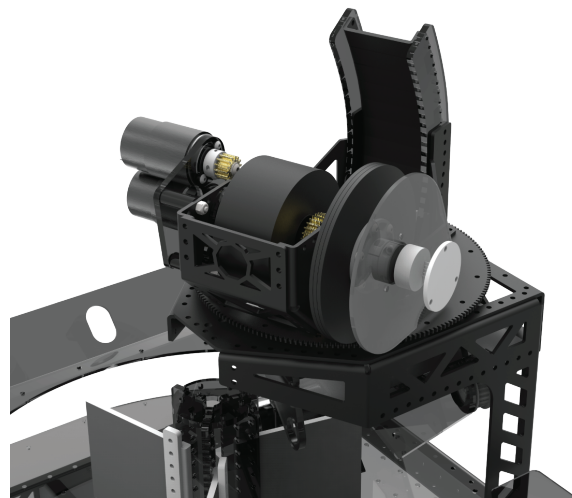




Initial Prototypes: When we began prototyping our shooter for this season, we quickly came up with multiple unique designs mainly made out of wood and other materials laying around our shop. These included a “flicker” design that quickly popped the balls forward, and multiple flywheel shooters, in various orientations and styles.



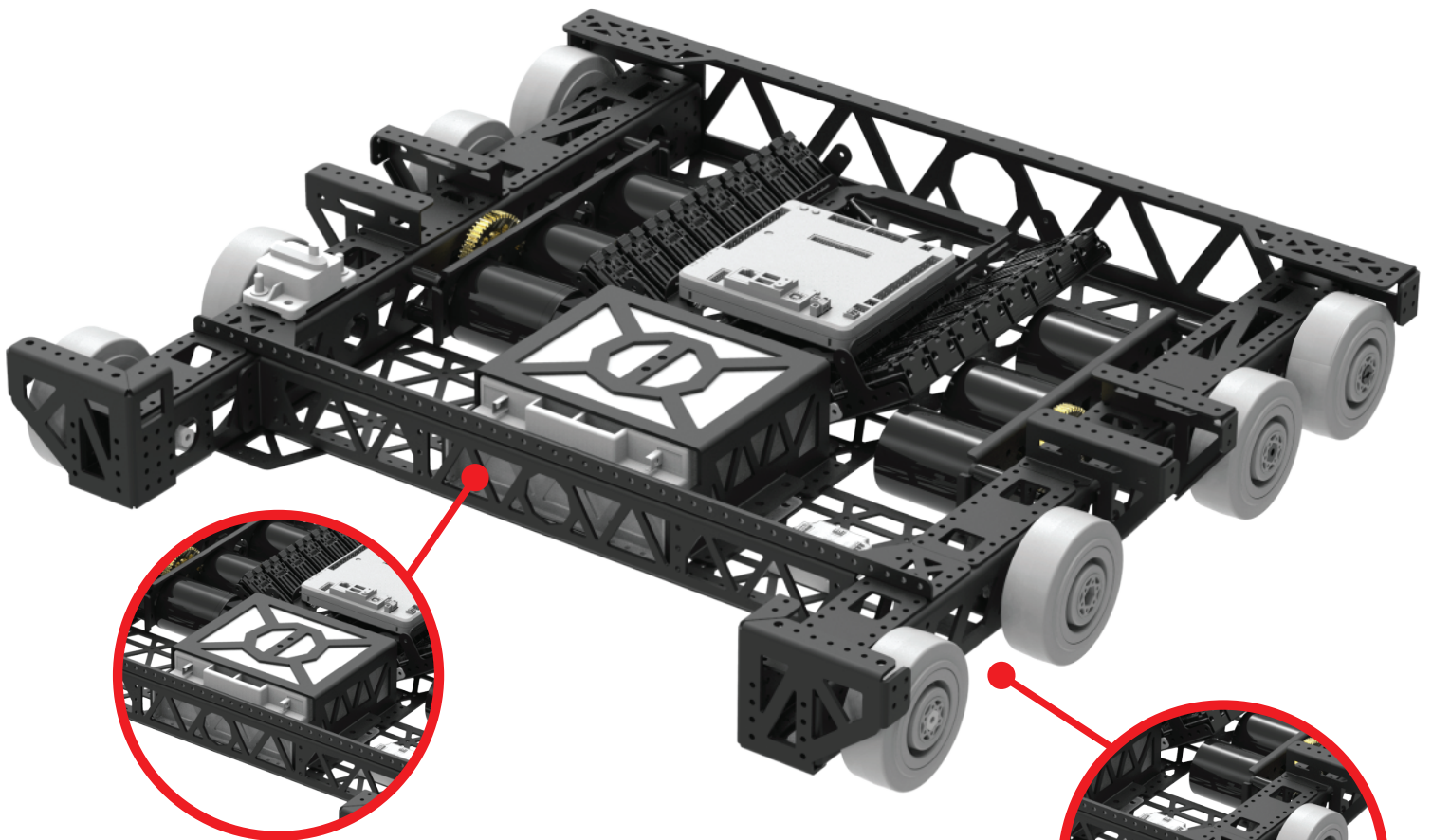
Simplicity Is Key: Soon after we made these initial prototypes, we quickly realized that ball collision in the air could severely hinder shot accuracy. This was dependent on the exit angle, orientation, and velocity. As such, we made the decision that we would settle for a single stream shooter, with the ability to shoot as fast as the robot would allow.



Final Design: After deciding on a single stream shooter, we made the easy decision to make our shooter a turret. This allows us to aim the shooter, without having to reposition the entire robot. The turret moves a full 180 degrees, thereby allowing us to shoot from a number of orientations.

DRIVETRAIN

This year's drivetrain was designed to be easily configurable, and easily accessible. Our "West Coast" style drivetrain places each of the eight wheels on the outside of the robot, which allows us to quickly swap them out if they are damaged. The chain-in-tube design makes chain a low service item with maximum reliability.



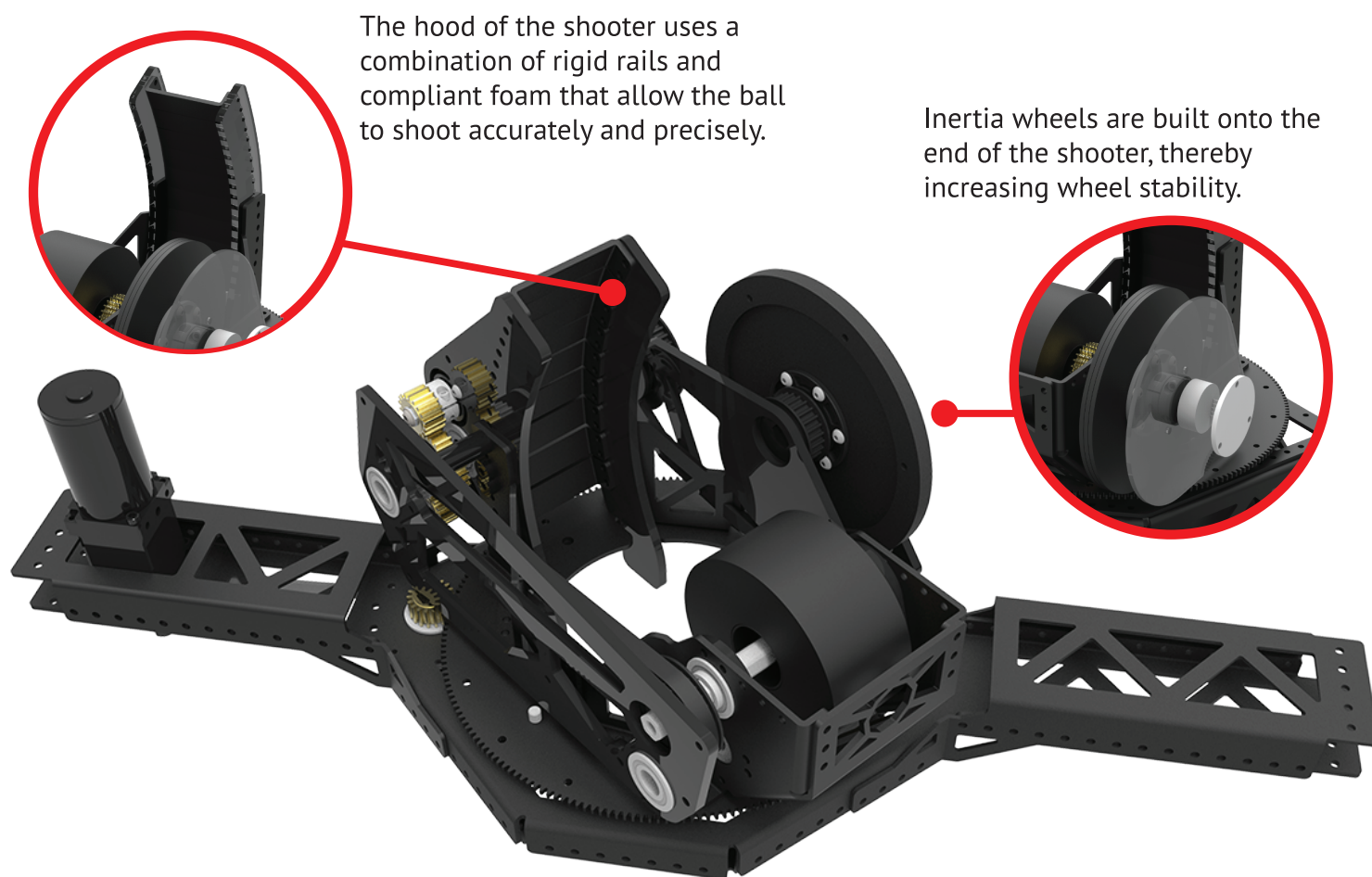
Low vertical height maximizes ball capacity by minimizing how much space the motors, gearboxes, and drive pontoons occupy

Drivetrain is configurable to work as a 4, 6, or 8 wheel drive. We are currently configured as a 4 + 2 wheel, with a powered wheelie, for improved pushing power in the event of a collision

SHOOTER



Once we determined that we would use a single stream shooter, the team decided to also add a turret. The turret enables the robot to park in a “locked down” location with a known range to the boiler, then aim the shooter independently from the drive base position. This allows for Rogue to be more effective against defensive robots and enables it to score fuel while scoring gears.



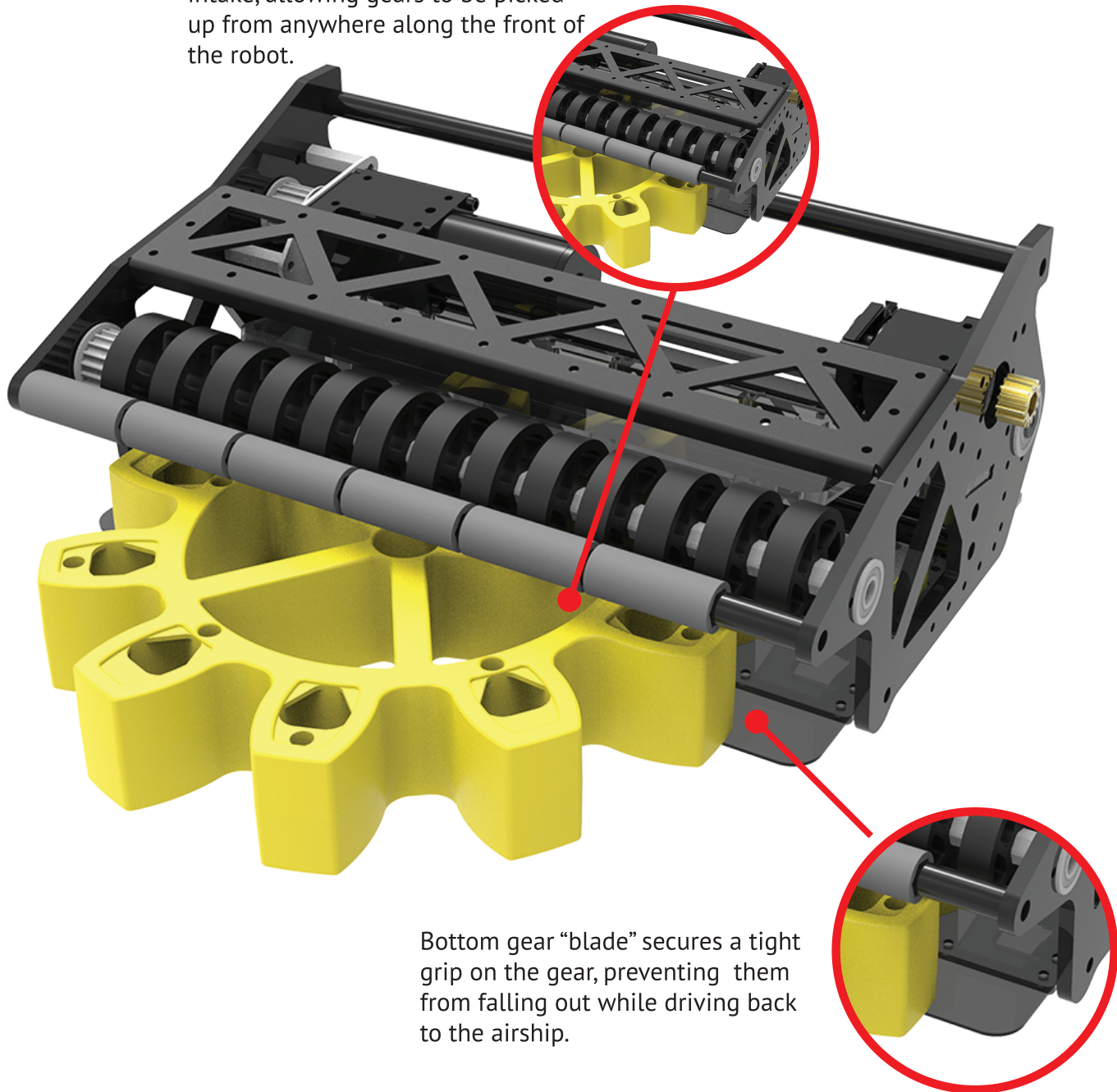
The hood of the shooter uses a combination of rigid rails and compliant foam that allow the ball to shoot accurately and precisely.

Inertia wheels are built onto the end of the shooter, thereby increasing wheel stability.

INTAKE

Rogue's intake is designed to pickup gears quickly and effectively without any need for driver or robot adjustment. This allows for quick pickup and scoring of gears during cycles. This is our 9th intake iteration of the season!

Rollers span the full length of the intake, allowing gears to be picked up from anywhere along the front of the robot.



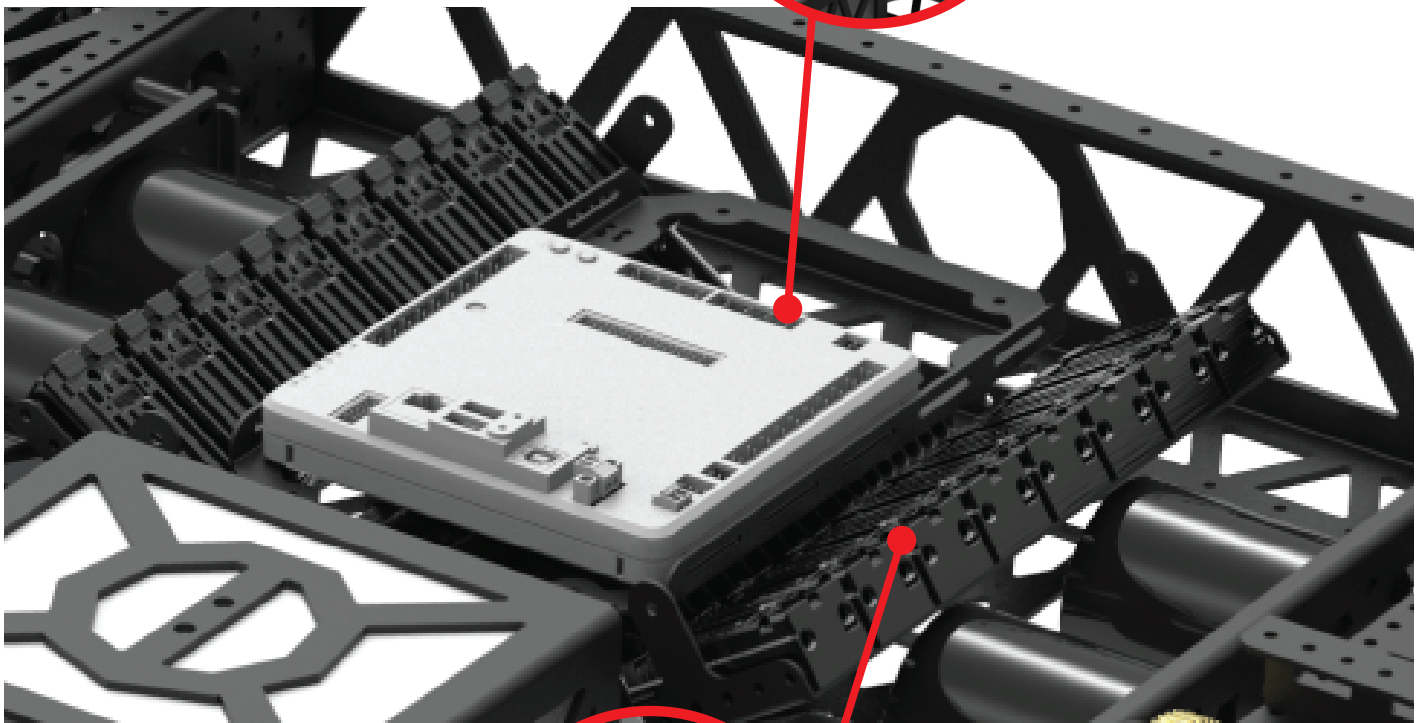
Bottom gear “blade” secures a tight grip on the gear, preventing them from falling out while driving back to the airship.

ELECTRICAL / PROGRAMMING



Rogue uses a variety of sensors throughout the robot to make our driver's jobs easier, and to assist in autonomous mode. For example, our shooter utilizes an off board kangaroo PC to acquire and lock-on to the target of the boiler.

Efficient electrical control system layout. Our PDP is located directly underneath the RoboRIO to take up as little space as possible.



16 Talon SRX's arranged in a V shape, to minimize the electrical footprint of the robot.

AGITATOR

The agitator, or as we call it “The 9” funnels balls into the shooter. It sits in the middle of the robot, and as balls are gravity fed into it, it spins around, scooping the balls as they fall. A set of wheels then redirects the balls upwards into the shooter for a fast, consistent stream of shots.

“Scoop” like structure spins in a cylinder, grabbing fuel as it falls downwards.

Stationary roller grabs balls as they are scooped in, and kicks them upwards into the shooter.



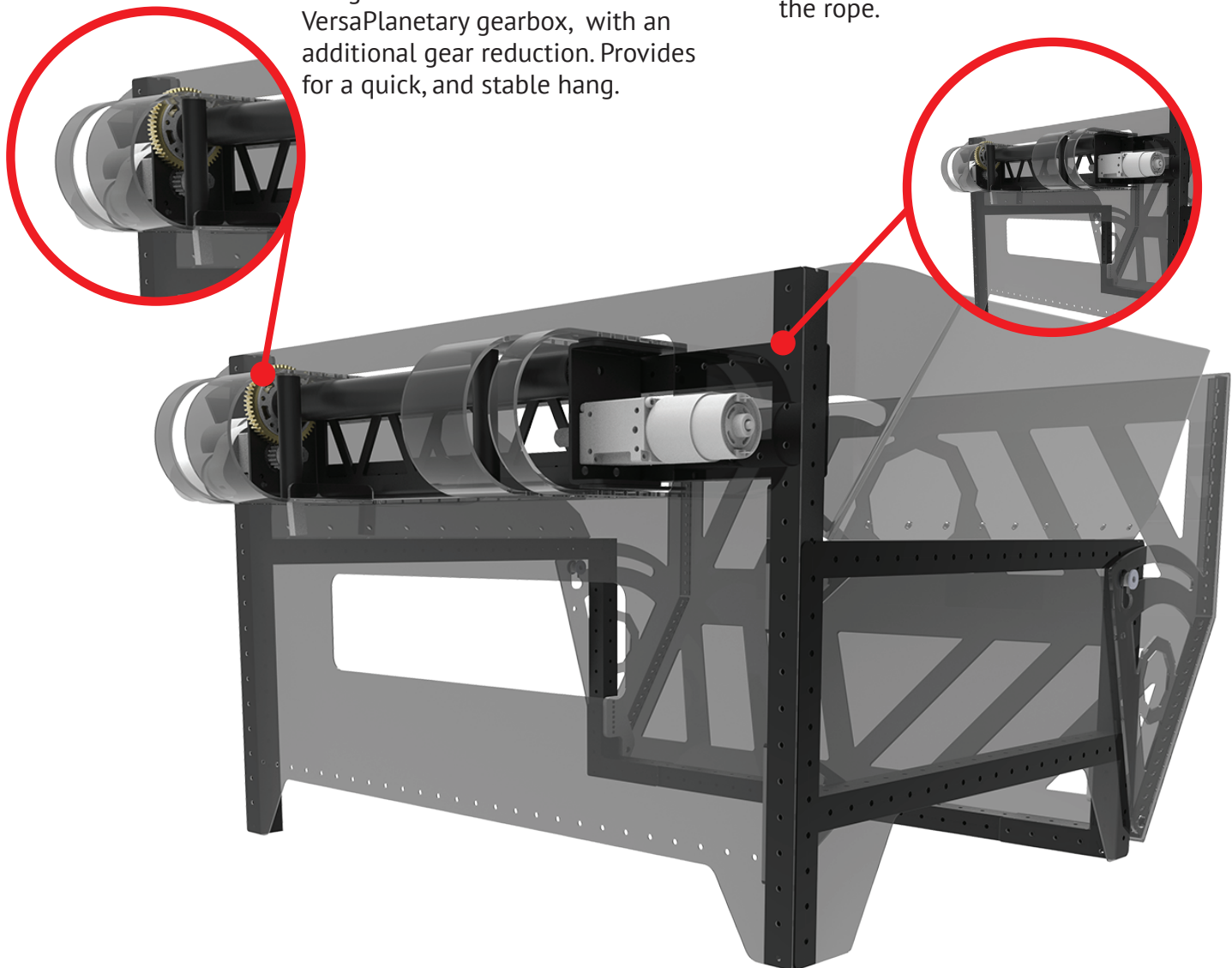
HANGER



Rogue's climber engages with the rope using two simple features. First, hook and loop fastener is used to allow the winch to "catch" the rope and begin winding it up. Second, a slip knot at the top of the rope enables the winch to complete several rotations before supporting any of the robot's weight. This means that when the rope engages, it will fully secure itself before starting to lift.

Roller is covered in hook and loop fastener. This ensures a quick and easy way for our hanger to "catch" the rope.

Hanger runs via a 25:1 VersaPlanetary gearbox, with an additional gear reduction. Provides for a quick, and stable hang.



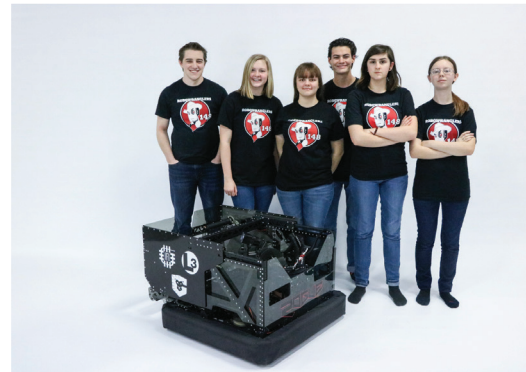
SUB-TEAMS

Drive Team



The Drive Team is made up of five people. We have a driver, operator, two human players and a drive coach. The responsibility of the Drive Team is to operate the robot during a match. It is crucial to our team that these people are the best at what they do.

Marketing Team



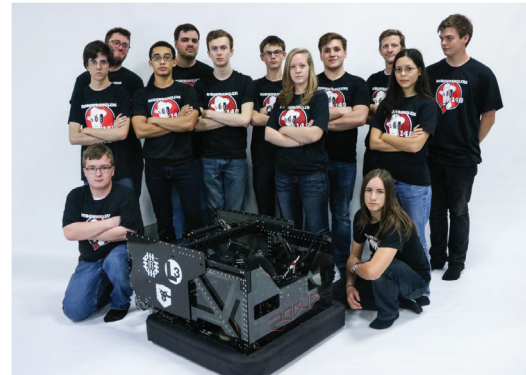
The Marketing Team is in charge of documenting everything we do at events, and furthering the Robowrangler brand. Some of their tasks include posting on social media, taking pictures and video at events, creating our robot reveal video, and this book.

Pit Crew



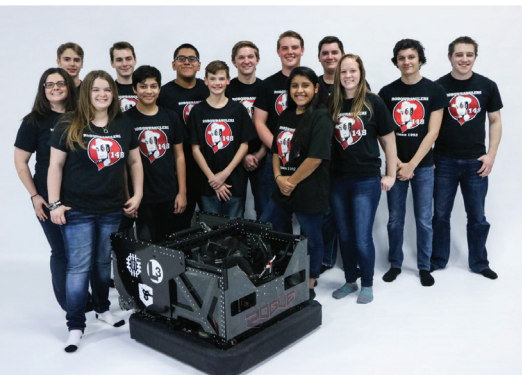
Our Pit Crew plays a key role in the functionality of our robot at competition. They are constantly adjusting and repairing, depending on our robot's needs to ensure that it operates to the full potential every match.

Ninja Crew



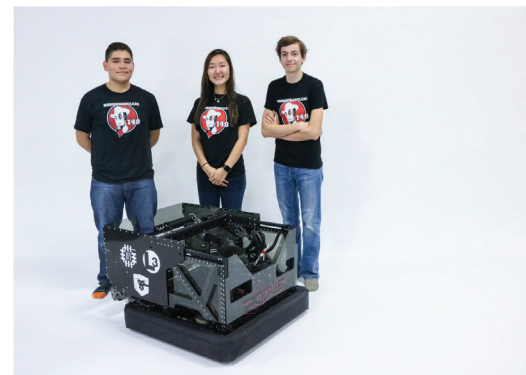
Our Ninja Crew plays a vital role at competition. If we see another team in need, we offer our resources and man power to assist in fixing their robot. It is one of our goals to help as many teams as we can at competitions.

Scout Team



Our scout team is steadily working during build season and at competitions to help us determine what kind of robots we are with during qualification matches and what robots we would like to pair with in the elimination matches.

Strategy Team



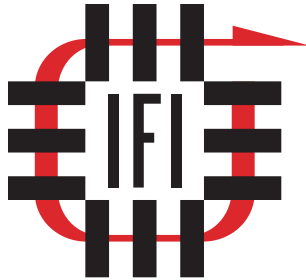
Our strategy team is responsible for our match strategy for each and every match. They work closely with our scout team and alliance partners to determine the best way to win each match.

SPONSORS



Greenville ISD

Greenville ISD, which encompasses the city of Greenville, Texas and the surrounding five to seven-mile radius, is a school district that has something to offer for just about everyone. Large enough to offer progressive programs, yet small enough to allow teachers the chance to cultivate a personal, active interest in each student. Greenville ISD encourages students to seek enrichment while also reaching out to those with unique learning needs. Greenville ISD, in keeping with its mission statement, "prepares, inspires, and empowers students in a safe and nurturing environment to become responsible citizens who successfully compete in a global society."



Innovation First International

Innovation First International (IFI) began by producing electronics for autonomous mobile ground robots, and is now a leader in educational and competitive robotics products, and a growing developer of consumer robotics toys. Incorporated in 1996, Innovation First International is a privately held corporation that was founded on the belief that innovation is necessary very early in the design process to produce simple and elegant product designs. Though they are now also known for producing the HEXBUG line of toys, IFI initially gained recognition as the creators of the VEX Robotics Design System. They also produced the control system used in FRC events until 2008. IFI is our largest sponsor; they employ many of the engineers that serve as team mentors, and their industrial sheet metal manufacturing capabilities help our robots maintain an iconic presence on and off the field.



Mission Integration

L-3 Mission Integration

L-3 is a prime contractor in Command, Control, Communications, Intelligence, Surveillance and Reconnaissance (C3ISR) systems, aircraft modernization and maintenance, and government services. L-3 is also a leading provider of a broad range of electronic systems used on military and commercial platforms. Their customers include the U.S. Department of Defense and its prime contractors, U.S. Government intelligence agencies, the U.S. Department of Homeland Security, U.S. Department of State, U.S. Department of Justice, allied foreign governments, domestic and foreign commercial customers and select other U.S. federal, state and local government agencies.



ROBOWRANGLERS

EST. 1992

SIXTEEN REGIONAL WINS

2 REGIONAL
WOODIE
FLOWERS

FOUR DIVISION
WINS

ONE REGIONAL
CHAIRMAN'S

2 CHAMPION **CHAIRMAN'S**
FINALISTS

32 TECHNICAL
AWARDS

6 REGIONAL
FINALISTS

ONE DIVISION
FINALIST

2
WORLD
CHAMPIONSHIP
TITLES

ROBOWRANGLERS148.com