



TEAM MAGAZINE

FRC TEAM 2485 / TEAM OVERCLOCKED



INTRO

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We are Team Overclocked, FIRST Robotics Competition Team #2485 from Francis Parker School in San Diego, California.

OUR MISSION

As part of our FIRST® involvement, we are dedicated to spreading our message on a national and international scale. We are determined to provide our team members with the skills they need to succeed in future STEM endeavors.

OUR VISION

Our vision is to become an inspiration within the FIRST community by exciting other teams with our technical prowess and community impact. We strive to assist our community—both local and global—in expanding their STEM programs, so that their students can in turn benefit others.

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XERXES - OVERDRIVE, 2008

Xerxes was a lap running robot; it would move around the course in order to score points. It was a very simple robot because it did not have many functions. Xerxes originally had a bar on its front in order to herd balls, but this broke during our first match.

AUTO VON BISMARCK - LUNACY, 2009

Named after the Warlord Otto Von Bismarck, Auto collected balls off of the floor then shot them through a moving target or dumped them into a trailer. Auto was originally overweight and in order to fix this problem, the team drilled holes into the panels, giving it an appearance similar to Swiss cheese.

CIXI - BREAKAWAY, 2010

Cixi used two different air based mechanisms in 2010. It used a vacuum to capture balls and used pneumatics to shoot the balls into the goals. Cixi was named after the Empress Dowager Cixi, and its official theme song is "Don't Stop Believing" by Journey.

IVAN IV - LOGOMOTION, 2011

Ivan picked up inflated tubes using a claw on a vertically extendable shaft. We custom built Ivan's mecanum wheels to allow for strafing across the field. At the end of the match, we would release a smaller robot named Feodor which would climb up a metal pole as quickly as possible. Ivan was our first robot that incorporated carbon fiber, a material that has since been incorporated into all of our new robots.

YAROSLAV - REBOUND RUMBLE, 2012

Yaroslav fired basketballs into hoops using a catapult and finished the match by balancing on a bridge. Its catapult shooting mechanism was unique among its competition. It was also built with a custom gearbox and a camera on the very top in order to detect the hoops. Yaroslav faced off against our school mascot in a basketball shooting competition.



OUR HISTORY 2008-2012



OUR HISTORY 2013-2015

SUN TZU - ULTIMATE ASCENT, 2013

Sun Tzu shot frisbees at approximately 40 miles per hour and could complete a ten point climb to finish the match. Equipped with a California Drive and our trademark molded carbon fiber, Sun Tzu brought our team to Championships in St. Louis for the first time. Sun also had a Kinect sensor used to track targets more effectively than normal cameras, and a functioning thirty point climb that was never implemented in competition.

ODIN - AERIAL ASSIST, 2014

Named after the head of the Norse gods, Odin featured a powerful shooter and a fast drive train. It accomplished the goal of passing the ball over a center truss to a human player for extra points. Odin made it to the Championships in Saint Louis after winning the Las Vegas Regional, and set the world high playoff score without penalties.

VALKYRIE - RECYCLE RUSH, 2015

Valkyrie, named after a mythological Norse winged creature, is able to manipulate totes and recycling containers.

Valkyrie has a welded drive base and “strongback”, welded by students on our team. Our “strongback” is coded to automatically tilt to keep the totes parallel to the ground when we intake them. We have “clappers” with intake wheels to help us take totes into the belly of the robot. Our carbon “claw” can pick up containers while making stacks of totes underneath. We decided to use an H-drive with omni wheels as our drivetrain, allowing us to drive sideways. Our center wheel is pneumatically suspended giving a constant pressure on the floor while allowing us to drive over the center bump easily. This year we have two IMUs (Roll and Yaw), allowing us to measure two access points.

ORION - STRONGHOLD, 2016

Our 2016 robot, Orion, derives its name from the constellation with its iconic belt.

To traverse the obstacles that Stronghold provides, Orion drives with a tank drive. Orion's boulder intake mechanism uses a set of rollers that funnel the boulder towards a teeter-totter, where it rests until shot with the single fly-wheel or ejected back out through the intake. Due to the need to accommodate twelve-speed while still leaving room for the boulder to rest and shoot, Orion's electronics panel is U-shaped. Orion's frame is made up of 90 wall aluminum powder-coated yellow. Our sponsorship panel locks on to the top of the robot and is detachable for the best access to the electronics panel. Orion's autonomous allows it to cross through the low bar, in addition to the B and D category defenses. Its lidar and vision processing allow it to shoot through the high goal.

KAMEHAMEHA - STEAMWORKS, 2017

Kamehameha is named after King Kamehameha, the first ruler to unite all of the Hawaiian islands under common leadership.

DESIGN

Kamehameha uses an active gear mechanism that intakes gears from the human loading zone and delivers them to the airship. Debuting at the Las Vegas Regional, Kamehameha can also make use of a newly added ground intake on the opposite side of the robot. Kamehameha can intake fuel from the hoppers and feeds the fuel into a double flywheel shooter that aims for the high-efficiency boiler, and our 6-wheel pneumatic West Coast Drive allows for a sturdy and reliable drive system.



OUR HISTORY 2016-2017



OUR HISTORY 2018-2019

NEO - POWER UP, 2018

Neo is named after the main protagonist from the Matrix, the final boss from Final Fantasy V, and the Greek root “neo” for new.

STRATEGY

FIRST Power Up is a game that requires maneuverability and a fast drive train. We prioritized scoring via the scale, then scoring via the switch and lastly getting power ups.

DESIGN

Our robot uses an intake arm to take power cubes from all parts of the field and put them on or in the scale, switch and exchange. Neo has a very straight-forward design. We wanted a low center of gravity and used a 9lb steel plate at the bottom of the robot. To accommodate the extra weight we had to design the robot without pneumatics.

ONIZUKA - DESTINATION: DEEP SPACE, 2019

This year's robot is Onizuka and named after the astronaut Ellison Onizuka.

STRATEGY

The bot features a fast drive train and an elevator, both of which allow us to efficiently score hatches and cargo on both the cargo ship and the rocket.

DESIGN

Onizuka is designed to be able to pick up cargo from the ground and hatch panels from the loading station. It can place them both on all scoring on the field. Both game element intakes are on a two-stage cascaded elevator. The cargo intake utilizes mecanum wheels in order to intake cargo balls and center them reliably within the intake. The polycarbonate plates as well as the foam lining provide compression in the system to account for variation in cargo diameter. The four-bar linkage pivots the cargo intake between the ground intake position and the eject position. The four-bar provides for a large angular displacement with minimal end effector rotation. The hatch mechanism can pivot to stow itself out of the way of the cargo intake.

ARTEMIS - INFINITE RECHARGE, 2020 & 2021

Our robot for the 2020 and 2021 FRC seasons is named Artemis, after the Greek goddess of the hunt and the moon.

STRATEGY

For the Infinite Recharge game, we prioritized being able to shoot in the high goals, having a high versatility of where we can shoot from, and having the ability to climb.

DESIGN

Artemis can rapidly intake power cells with her mecanum wheel intake. The flat belting magazine allows Artemis to store up to 5 power cells. Artemis is able to shoot power cells into the high goal with a double flywheel shooter, and is able to accurately from a wide variety of locations on the field thanks to a turret and the shooter's adjustable pitch angle. The three stage, spring-extending climber allows her to climb on the generator switch.

MAVERICK - RAPID REACT, 2022

Maverick is named after the character played by Tom Cruise in the hit movie *Top Gun*, which is scheduled to release a sequel, *Top Gun: Maverick*, in May 2022.

STRATEGY

This year's challenge of Rapid React requires a versatile shooting mechanism able to launch game pieces into hoops from across the arena. Additionally, robots need to reach for the skies and climb on to a series of bars in the hangar, with the highest one over 7 feet off the ground.

DESIGN

Maverick can intake cargo with his ground intake, and his indexing magazine allows him to store two pieces of cargo at once. Maverick's turret-mounted shooter rotates and has an adjustable hood to aid in accurately shooting into the upper hub using a single flywheel shooter. Maverick's climber is equipped with two stages—one vertical and one rotating—which enable him to climb to the traversal rung of the hangar.



OUR HISTORY 2020-2022



OUR HISTORY 2022-2024

NIGHTINGALE - CHARGED UP 2023

Our robot Nightingale is named for Florence Nightingale, the founder of modern nursing.

STRATEGY

FIRST Charged Up requires a robot to pick up various irregular items. This was one of our main focuses when designing Nightingale, as well as creating a versatile drivetrain, as the game requires lots of movement to transport pieces to the community.

DESIGN

Nightingale has the ability to score both cubes and cones at all three levels of the grid. The gripper—located on the end of a 3-stage telescoping arm—utilizes a wrist to flip knocked over cones to be lifted and enables versatile and precise positioning for scoring. Cones, therefore, can be lifted from any orientation on the ground, and can also be gripped from the double substation platform. The single-stage elevator, coupled with the multi-stage telescope, provides two-axis movement for scoring at any height in the Community Zone and Nightingale achieves maneuverability through SDS swerve modules. Utilizing an over-the-bumper intake, Nightingale rapidly intakes cubes from the ground of the Loading Zone.

VIVALDI - CRESCENDO 2024

Our robot Vivaldi is named for Antonio Vivaldi, a world-renowned Italian composer who is known to be one of the greatest Baroque composers of all time.

STRATEGY

We placed a primary emphasis on the robot's adaptability—making sure to provide a consistently accurate shot despite varying angles or distances on the playing field. To achieve this goal we utilized a swerve drivetrain with a fully protected intake.

DESIGN

Vivaldi has the ability to score notes from close and mid-range spots into the speaker with a reliable downward dunk shot into the Amp based on an intake-to-shooter mechanism. The pivot positions the shooter for highest accuracy, utilizing specific hardstops in optimal locations to ease software development and to increase efficiency.

NESSIE - DIVE, 2025

Nessie is named after the Loch Ness Monster, which our robot partially resembles.

STRATEGY

Our team prioritized scoring coral on all levels and climbing the deep cage. We believe maneuverability is key in this year's game, so we used a swerve drive train.

DESIGN

Nessie has the capability to score L2, L3, L4 Coral, take Algae off the Reef, Score Algae in the Net and in the Processor, and to climb the Deep Cage. Game piece scoring is achieved through a 1 stage angled elevator with an arm and rotating end effector --which holds Coral on one end and holds Algae on the other-- attached to the end of this arm. Coral is fed into this end effector through a completely passive ramp that takes in Coral through the Coral Station. Algae is directly taken by the end effector. Our custom elevator paired with the arm allows for various scoring positions and takes up less space on the robot than a traditional WCP elevator might. Power transmission uses just two dead axles chained to motors that minimally move to power the elevator, arm, and end effector. This system is very simple and reduces moving mass and moving wires. The climber consists of a simple arm with two prongs that pivots back and uses friction between the prongs and the cage bar to pull the robot up. It is powered with a winch rather than directly pivoting the arm's axle to reduce torque needed.



PRESENT 2024-25

SCOUTLORDS

The Team 2485 Scoutlords Scouting Alliance, now in its 8th year, hopes to provide teams with accurate match data who would otherwise be unable to obtain this. At the 2019 Houston Championship, we worked with 20+ teams across all 6 divisions, collecting thousands of data points in the process in order to provide this data. We target primarily smaller and rookie teams, and plan on continuing/expanding this program in the coming seasons.

REACH

Team 2485 started Reach (formerly WOW) in 2013 to recruit, retain, and engage females in FIRST, creating a safe environment for girls to engage in STEM. This year, the mission of Reach has expanded to create a safe environment for minorities of all kinds. Led by female FIRST team members, the Reach network hosts a variety of interactive discussions, events, and other opportunities that empower girls and other minority groups to take risks and increase their confidence.

In 2023, Reach began a partnership with SWEnext, enabling our team to expand our outreach even more. Reach hosts NowWOWs, events hosted both in-person and over google meets where female leaders in STEM fields share their experiences and answer questions from attendees (which have seen a 541.67% attendance increase this year!). Reach also hosts tri-annual elementary school outreach events, where chemistry, biology, and physics experiments are performed in a co-ed environment, ensuring young girls are able to experience STEM from a young age.

INTERNATIONAL OUTREACH

Team 2485 strives to make an impact both in our local communities and also abroad. Team Overclocked has worked very closely with Team 5993 from Türkiye and Team 9030 from Azerbaijan to provide them consistent technical support and parts from American manufacturers. We meet regularly with Team 5993 to provide assistance in other departments too, including Impact submission assistance, sending CAD models, and sharing our design practices.



COMMUNITY IMPACT



COMMUNITY IMPACT

LOCAL COMMUNITY

Team 2485 collaborated with the program Horizons at Parker to help lead a free summer camp for underprivileged students across the San Diego community. At this week-long camp, we developed an FLL game that mimics the true competition to allow campers to test their knowledge and learn the basics of STEM. Students worked in small groups to maximize their ability to hone their skills and get hands-on experience.

In addition, members of our team have attended the SWENext Summit—an event hosted by the Society of Women Engineers to teach high school girls leadership skills and provide an opportunity to network with other like-minded individuals. Our female team members shared their experiences on our team with the attending partner organizations and other FIRST robotics teams.

FLL & FTC INVOLVEMENT

Our team founded and currently mentors 4 FLL teams and 2 FTC team. Team Overclocked has a mentorship program for these teams where different members pair with a team providing them with advice and teaching them multiple skills. Almost 100% of our team has participated in either mentoring or volunteering at the FLL & FTC events we aid in hosting and many of our FLL team members continue onto Team 2485. Additionally, we also host two community-based FTC Teams (10092 and 14195) on our campus. The mentorship program has greatly benefitted students and prepared members of all teams to pursue activities in STEM, including Team Overclocked.

For the past few seasons, we have run FTC & FLL events hosted on our campus through volunteering, setting up, and cleaning up at each event. Our students fill many of the volunteer spots, especially at the FLL tournaments, acting as judges, referees, queuers, and more!

LOCAL FIRST ASSISTANCE

This year we worked very closely with Team 10586 from San Diego High School. After providing them a tour of our shop before the start of competition season, we have repeatedly visited their campus to help construct their shop, assemble their robots, and instruct them how to operate some of their machines. The assistance has come from a variety of our students and mentors, sharing our techniques and knowledge in constructing a robot to this rookie team.

After a flood in their shop last year, we helped rebuild Team 2827's 2024 competition robot just before their first competition of the season.

We provided lots of expertise and mentors to many other teams including 9573, 9452, and others. These teams have benefited greatly from our safety documents, CAM standards, and other documentation releases that have helped guide their teams' development beginning in their rookie season.

We are very proud to have helped Team 8119, TigerBotics, by providing them a mentor at PHR'24 and other technical assistance, and our logo is featured on their team banner.

CADATHON

Our CADathon challenges participants to design a robot in 2 weeks for a mock FRC game that we design, offering valuable pre-season experience. Over the last 2 years, we've hosted 3 CADathons, receiving 80 robot submissions from 5 countries across 3 continents. The most recent edition of the event had the theme Casino Clash! We are excited to continue hosting CADathons and enjoy reviewing the awesome submissions we received!



COMMUNITY IMPACT



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BATTLE AT THE BORDER

In 2010, we partnered with Hall of Fame Team 1538 to host and run the inaugural Battle at the Border, which has since become Southern California's longest-running off-season event. During construction on our campus in 2018, we partnered with FRC Team 5025 to ensure a greater opportunity for attendance by both FRC Teams and members of the local community. We now co-run the event with these two teams, with our members assisting with planning, setup, clean up, and volunteering as event staff.

ROBOT SHOWCASES

In the last year, we have attended 9 robot showcases, including: La Jolla Christmas Parade, DIA (Drug Information Association) Conferences, Green Transportation Expo, Linda Vista Multicultural Fair, and the La Jolla Arts Night. These allow us to spread the message of FIRST to various communities, and interact with the community around us.

SHARED RESOURCES

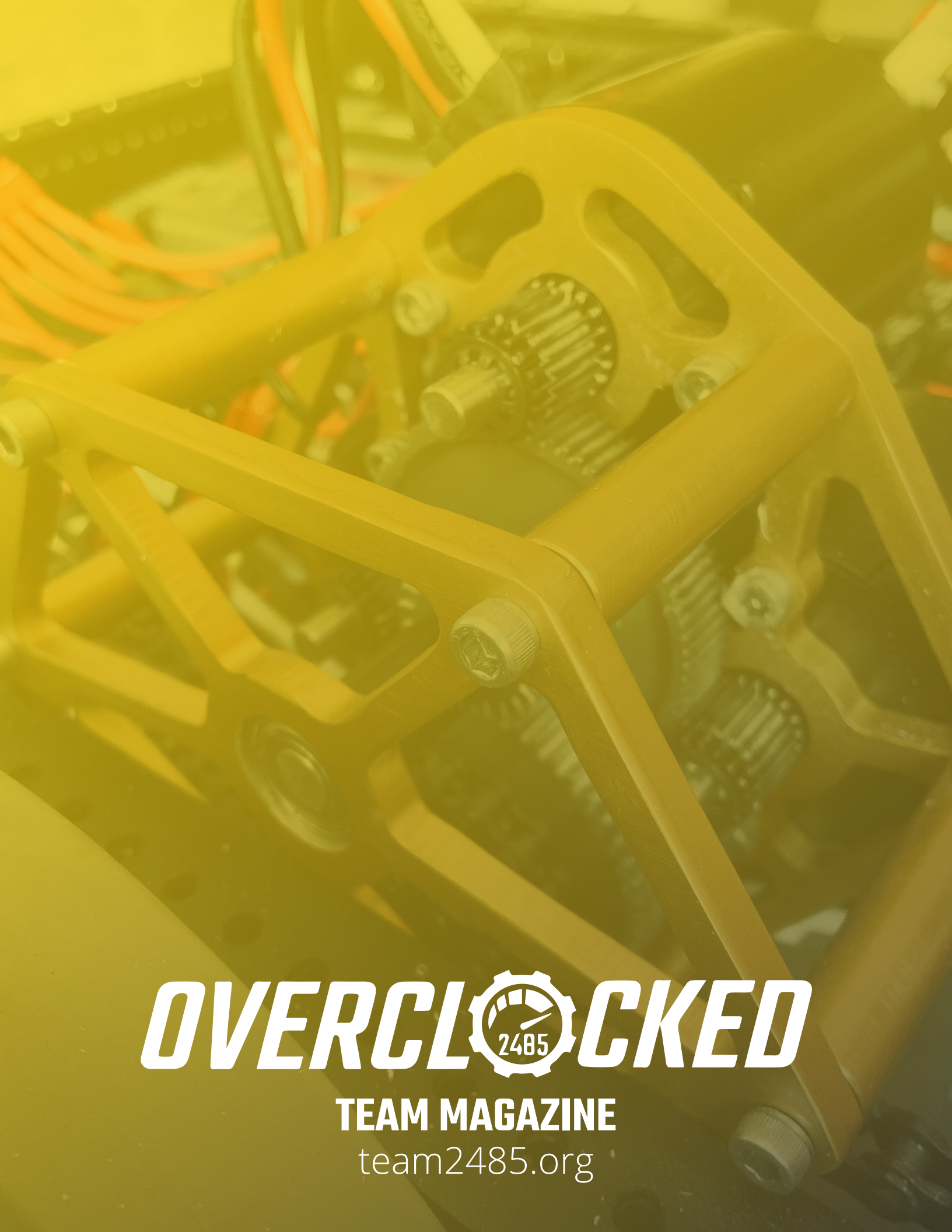
We released our CADtoons software this year, which is a Parametric CAD Library that is an alternative to KrayonCAD for teams that use Solidworks. Even though we moved from Solidworks to Onshape this season, we still finished and released this software due to the sheer amount of time it can save teams. With pre-designed, easily modifiable subsystems, it streamlines robot design, eliminating the need to start from scratch.

We've made our CAM safety standards—over 50 pages of detailed instruction—publicly available on ChiefDelphi. These cover safe CNC mill and router operation, along with instructions for manufacturing universally necessary parts.

To help preserve battery lifespan, our Controls department developed a comprehensive battery training program on proper use and handling. This training was given to all of our pit members and released on ChiefDelphi, making it easy for teams worldwide to educate their members and keep their robots running at full strength.







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