2019 PIT MAGAZINE

WHO WE ARE

We are the Francis Parker W.A.R. Lords, Team 2485, a FIRST Robotics Competition team from San Diego, California. Over the past eleven years, our team has developed unique techniques that strengthen us and promote our growth as leaders in the FIRST community. Foremost among these is our commitment to students building our robot. As a team, we believe that it is important to have a student led project, operating under the philosophy of “student led, mentor guided.” This means that students take leadership roles in designing, building, and programming the robot, as well as in fundraising and community outreach. We believe this better equips us for the future of both the team, as it continues to develop, and the students, as they enter college and the industry. We take pride in our team, and hope for our team’s continued success in the years to come.

WHERE WE CAME FROM

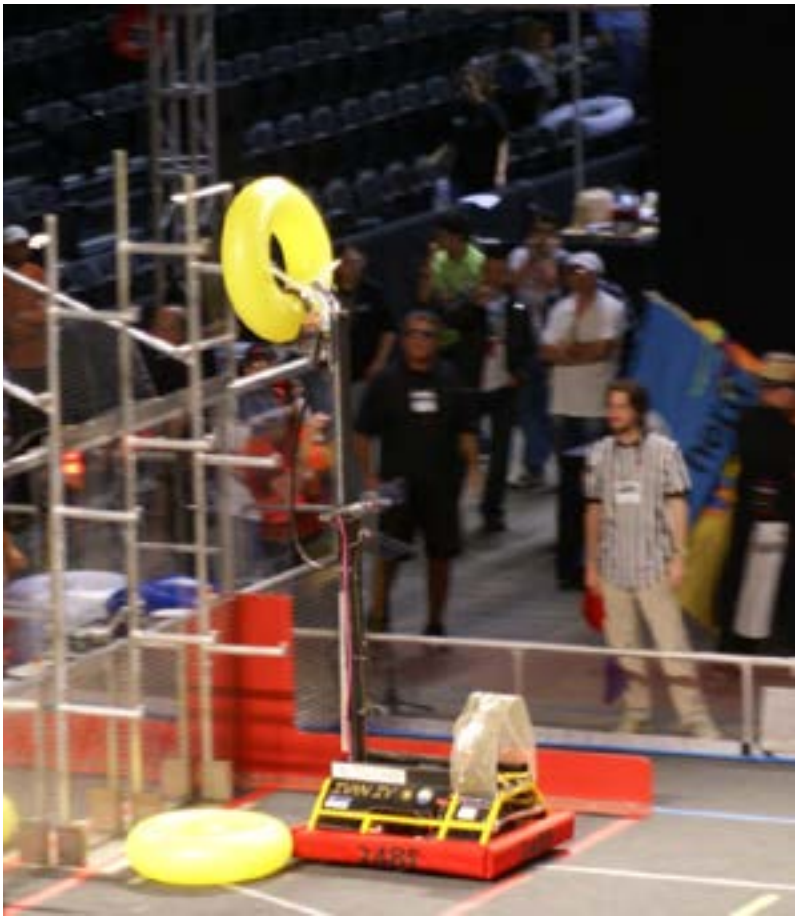
When we first started, Team 2485 was comprised of 10 students from Francis Parker High School and Helix Charter School, and only one mentor. Today we have 71 students from Francis Parker and over 30 mentors. We would not be where we are today if it was not for the support of our school, sponsors, other FRC teams, our mentors, and volunteers. We stress the importance of service through continual expansion in focus and scale of community service projects within San Diego county.

2008 - XERXES

Eleven years ago, Team 2485 was founded with the hopes of building a functioning robot, and with the assistance of Team 1538, The Holy Cows, and Team 1266, The Devil Duckies. Both teams provided us with ideas, organizational tips, tools, and helped us throughout the entire FIRST competition season. Xerxes was a lap runner in the game Overdrive. At the San Diego Regional, we were ranked 21 with a record of 5-5-0.

2009 & 2010 - AUTO VON BISMARK AND CIXI

Our 2009 robot, Auto Von Bismark, was built to pick up balls off of the ground and shoot them through a moving target, or into trailers, in the game called Lunacy. The robot was severely overweight, so large holes had to be drilled out of the sides, making it look like Swiss cheese. Our team ended the season 10-13-0, placing 14th at our San Diego Regional (8-6-0), and 43rd at the Las Vegas Regional (2-7-0). We were semi finalists at the San Diego Regional, winning only one of the three matches. In 2010 our robot, Cixi went 4-14-4, placing 48th at the San Diego Regional (0-7-3), and 20th at the Las Vegas Regional (4-7-1), losing both matches in quarterfinals. Cixi was built for the game Breakaway, and vaccumed the balls in and “kicked” them by using a pneumatic kicker.



2011 - IVAN

Our 2011 robot, Ivan the Fourth, was built to play LogoMotion. Ivan scored square, triangular, and circular tubes in the shape of the FIRST Logo. This was a breakout year for us - we ranked 3rd in the San Diego Regional and had a qualification performance of 16-5-0 an overall performance of 17-9-0.

2012 - YAROSLAV

Our 2012 robot, Yaroslav the Wise, brought us to our first time playing in the finals of a regional, with our alliance partners 2034 and 3187. Yaroslav collected basketballs and scored them into a series of hoops on the far side of the field, utilizing a catapult mechanism that made it unique from the more common flywheel shooters of the year. Yaroslav had a record of 19-12-0.

2013 - SUN TZU

2013 was the first year we made it to the World Championships. We ranked 33-11-0 at the end of the season, ranking fourth at the San Diego Regional (14-4-0), and second at Inland Empire (16-2-0). We were the regional finalist at the San Diego Regional, and received the Creativity Award sponsored by Xerox, and at the Las Vegas Regional we were the regional winners and received the Excellence in Engineering Award sponsored by Delphi. At Champs we were ranked 69th and had a record of 3-5-0. Sun Tzu was built for the game Ultimate Ascent. Sun Tzu was able to shoot frisbees at 40 mph. We were able to make a full court shot, and some of our closers shot were so strong that they broke the chains at the back of the net, as well as dented a wall, broke through plywood and styrofoam while testing. This was also the first year that we used California or west coast drive. The six wheels allowed us the turn quickly and more precisely.

2014 - ODIN

Our 2014 season was our most successful season yet, robot-wise. We made it to the semi-finals of our division at Championship, and had an overall ranking of 40-10-0. At the San Diego Regional, we were ranked first with a record of 14-3-0, at the Las Vegas Regional we were ranked first with a record of 16-1-0. At the World Championships, we were ranked 17th finishing with a record of 10-6-0. At the San Diego Regional, we were awarded the Quality Award sponsored by Motorola, the Woodie Flowers Award for our mentor Ken Collins, Dean's List Finalist for student Camille Considine, and were regional finalists. At Las Vegas, we were given the Excellence in Engineering Award sponsored by Delphi, and were regional winners. At the World Championship we set the World record for highest unpenalized score, 370 points, in our first Quarterfinal match. 2014 was also the first year we built a practice robot, Loki. Odin had a pneumatic powered catapult shooter, with a variety of preset distances and angles, as well as a popper to push the ball into the lower goal. Our reliable shooter allowed us to perform a three ball auto with confidence.

2015 - VALKYRIE

Valkyrie, named after a mythological Norse winged creature, was able to manipulate totes and recycling containers. Valkyrie had a welded by students on our team. The drive base and “strongback” were also carboned in our shop by students with guidance from some of our mentors. Our “strongback” was coded to automatically tilt to keep the totes parallel to the ground when we intake them. We had “clappers” with intake wheels to help us take totes into the belly of the robot. Our carbon “claw” could 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 was pneumatically suspended, giving a constant pressure on the floor while allowing us to drive over the center bump easily. The software on our robot continues to improve each year. We had two IMUs (Roll and Yaw), which allowed us to measure off of two access points. The first, mounted sideways, measuring the angle at which our strongback is, annd the second measures if we are straight. At Inland Empire, we made it to the quarterfinals and won the Innovation in Controls Award, as well as Dean’s List Finalist for student Anoushka Bose. At the San Diego Regional, we were ranked 14th and made it to semifinals, receiving the Excellence in Engineering Award.

2016 - ORION

Our 2016 robot, Orion, derives its name from the constellation with its name from the constellation with its iconic belt. Orion was presented with the design challenge of being able to fit under the low bar; to accommodate this, its single flywheel shooter has the ability to fold down into the base of the robot. To traverse the obstacles that Stronghold provides, such as the rock wall, rough terrain, and moat, 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 shooted with the single flywheel or ejected back out through the intake. Because it has to accommodate twelve speed while still leaving room for the boulder to rest and shoot, Orion's electronics channel is U-shaped. Ryan's frame is made up of 90 wall aluminum powder-coated yellow. Our sponsorship panel locks onto the top of the robot and is detachable for best access to the electronics panel. This panel is made up of our signature carbon fiber, which we have used on every robot since our 2011 build season. Despite its stout stature, carbon-fiber panel, and thoughtfully built frame, Orion nearly ran over the weight limit of 120 lbs. Orion's autonomous allows it to cross through the low bar, in addition to the B and D category defenses. It's LIDAR and vision processing allow it to shoot through the high goal. Are 2016 season marked our largest team, with nearly 70 students and over 20 mentors. This allowed us to take on challenges that we had not in the past including a summer robot, Grace, and run events like our very first hackathon, Hack to the Future. We also continued to host robo.camp with Team 987, host Battle at the Border with the help of Team 1538, and participate in Project Mercy.

2017 - KAMEHAMEHA

Kamehameha, our 2017 robot, is named after King Kamehameha, who was the first ruler to unite all of the Hawaiian islands under a common leadership. We chose this name because, as our team has grown, we have made it our mission to integrate and unite all of our students together into a team that has become a family. Our design process for Kamehameha consisted of deliberating on priorities for robot tasks on Kickoff day: climbing and gear handling were prioritized, followed by high goal shooting. Proposing mechanisms to achieve these goals and then prototyping them, CADing these designs to mock up the final robot before we're able to build it, assembling the robot using the CAD files we created, testing and tuning the complete robot and its identical practice robot. 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. Our 6-wheel pneumatic West Coast Drive allows for a sturdy and reliable drive system.

2018 - NEO

This year's robot is Neo and named after the main protagonist from the Matrix, the final boss from Final Fantasy V, and the Greek root "neo" for new. This name signifies the new beginnings we have made this year because of the new members that have joined and new leadership structure. Our team decided together that we wanted to have a fast drive train and a lot of maneuverability. We prioritized scoring via the scale, followed by scoring via the switch and getting powerups.

Neo used an intake arm to take power cubes from the "pyramid" and put them on the scale and then the switch, in respective order of priority. Our west coast drive system allows for a sturdy and reliable drive system. The arm was designed so that it could be able to extend to all planes of the switch, scale, and ground all while staying within 16" from the frame perimeter. The first stage of the arm was a 2" x 2" x 1/8" tube. The second stage of the arm was a 2" x 1" x 1/8" tube with the intake bolted on at the end. The intake utilizes 4" compliant wheels with the front two on a hinged spring. We prototyped many intakes and narrowed it to a compact design that can grip the power cubes reliably with no pneumatics. It intakes very well and grips from any side because the wheels are malleable which pressuring the power cubes to stay. When designing our drivetrain, we wanted it to be easy to assemble, allow us to be able to meanuever around obstacles on the field, and all while being easy to maintain. These requirements led us to selecting a West Coast drive system.

2019 - ONIZUKA

This year's robot is Onizuka and named after the astronaut on space shuttle mission STS-51-L Ellison Onizuka. Onizuka was the first Asian-American in space, and signifies the strides we made this year in an overhaul of our CAD team. 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.

Onizuka is designed to be able to pick up cargo from the ground and hatch panels from the loading. It can place them both on all scoring positions on the field. Both game element intakes are on a 2 stage cascaded elevator. The cargo intake utilizes mecanum wheels in order to intake the 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 4 bar linkage pivots the cargo intake between the ground intake position and the eject position. The 4 bar provides for a large angular displacement with minimal end effector rotation. The hatch intake consists of a 1" width hook that fits with the inner diameter of the hatch panel and clamps it against the back board. Pushers then eject the panel when the hook is released. When placing on the rocket, the backboard is slid forward to compensate for the lack of a rocket bumper cutout. The hatch mechanism can pivot to stow itself out of the way of the cargo intake.

ONIZUKA

COMMUNITY OUTREACH

FIRST is about more than building a robot: it is about inspiring students and helping those both inside and outside of the FIRST community. Team 2485 has always pushed its students to their knowledge and skills to help other and others and be gracious professionalists. As a team we have logged more than 1000 hours of teams community service work in the past 6 months, with even more projects planned in the near future. In order to travel with the team each team member must complete 10 hours of community service through the team. Aside from helping those in our immediate community, Team 2485 recognizes the importance of helping those out outside as well, reaching out on a global scale.

PROJECT MERCY

During the fall, students and mentors from our team, with other members of our school, traveled down to Mexico to help build homes for two families. Aside from building the houses, team members also brought Legos for the children to play with. The experience changed both the families that the houses were built for and the people that helped build them. For the past 6 years, we have helped build 13 homes. This year, we built 3 homes.

OrionEd

OrionEd is a three tier educational outreach program split up into OrionEd: The Secret to a Better Robot; OrionEd: How to Be a STEMinist; and OrionEd: Hands-On Robotics. We have already assisted 80+ high school level FIRST teams globally through The Secret to a Better Robot improv team building workshop, and, for the third year in a row, we will be presenting this at Houston Championships. How to Be a STEMinist instills confidence and collaborative skills in middle school girls which enables them to fully engage in STEM. Hands-On Robotics is our elementary school program that sparks initial interest in STEM and FIRST robotics. We have run this workshop for over 2400 students across more than 10 elementary schools.

ROBO.CAMP

Robo.Camp is a week long summer camp for kids grades 3 through 10 the W.A.R. Lords co-host with Hall of Fame Team 987. This program has been running for 5 years. This year, 39 campers learned basic building and programming skills with Lego and VEX robots with the mentorship of our team members. W.A.R. Lords also provide 3 full tuition Robo.Camp Scholarships to students each year who otherwise would not be able to attend.

HACKATHONS

We have hosted a hackathon on our campus for the past three years, and have helped run it for the past four years. Qualcomm has been the primary sponsor for the Da Vinci Code hackathon, where seven teams spent twelve hours programming, and created games that were judged on their concept, execution, and originality. Our hackathon reaches students inside and outside of FIRST. We have had 30 students from 7 different FIRST teams take part in this fun event.

WOW

Six years ago, we noticed a lack of engagement from female members. To address this, we founded WOW to increase female member retention and engagement. We have seen measurable successes in the past six years: in WOW's founding year, there were 29% women on our team, compared to the present 34%. Furthermore, 93% of our female graduates major in STEM fields at universities such as MIT, Cornell, and UC Berkeley. This year, because of our successes, WOW is expanding nationwide with the support of Qualcomm and 3M. We have launched seven pilot chapters so far, including Hall of Fame Teams 16 and 1538, and aim to launch 25 more by the end of 2019. To learn more about WOW and how to start your team's chapter, join us at Houston and Detroit Championships this year for our seminar entitled, Twice The Power: How to Boost Female Engagement through WOW.

BATTLE AT THE BORDER

Battle at the Border is an off-season FIRST Robotics Competition, co-hosted by Teams 1538, 2485, and 5025. This competition serves several valuable purposes. Veterans can attend Battle at the Border to continue the fun of the past year's game, while new team members can get a first look into the exciting year to come. Students considering forming an FRC team can attend to see how competitions are run and gain a sense of the community and spirit of FIRST.

OUR SPONSORS

We have a dedicated team of students that work tirelessly to secure funding for the team, learning important pitch-giving and grant-writing skills along the way.

We are incredibly grateful for the support of our generous sponsors for making this year's competition possible. Their support, including financial contribution, in-kind donations, and/or mentoring, allows us to build a better robot, pay entry and travel fees for competitions, reach more students, and effect positive cultural change by encouraging excitement about STEM in our community and beyond.

We would like to especially thank Qualcomm and 3M for funding our expansion of WOW, and NewBlue, Inc. for taking in 9 W.A.R. Lords interns over the past 5 years.

AWARDS

2011: 2
-San Diego Regional Creativity Award
-Las Vegas Regional Imagery Award

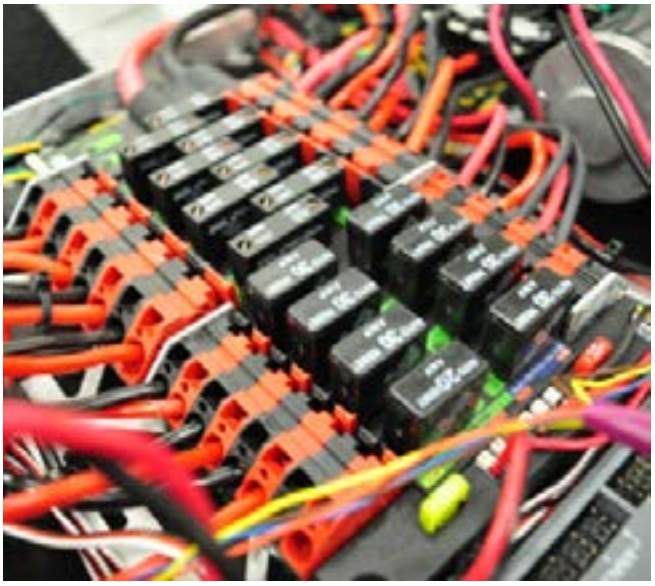
2012: 3
-San Diego Regional Creativity Award
-Las Vegas Regional Finalists
-Quality Award sponsored by Motorola at Las Vegas

2013: 4
-San Diego Regional Creativity Award
-San Diego Regional Finalists
-Inland Empire Excellence in Engineering Award

2014: 6
-FIRST Dean's List Finalist (Camille Considine, 2015)
-Woodie Flowers Finalist Award (Ken Collins)
-San Diego Regional Finalists
-San Diego Regional Quality Award
-Las Vegas Regional Excellence in Engineering Award
-Las Vegas Regional Winners

2015: 4
-FIRST Dean's List Finalist (Anoushka Bose, 2016)
-Inland Empire Regional Innovation in Control Award
-San Diego Regional Excellence in Engineering Award
-San Diego Regional Hard Hat Safety Award

2016: 5
-San Diego Regional Engineering Inspiration Award
-San Diego Regional Hard Hat Safety Award
-Orange County Regional Engineering Inspiration Award
-Orange County Regional Hard Hat Safety Award
-Championship Industrial Design Award



2017: 5
-Las Vegas Regional Chairman's Award
-Las Vegas Regional Safety Award
-Las Vegas Regional Hard Hat Safety Award
-Championship Hard Hat Safety Award
-Championship Gracious Professionalism Award

2018: 3
-San Diego Regional Chairman's Award
-Las Vegas Regional Engineering Inspiration Award
-Las Vegas Regional Hard Hat Safety Award