

## Chairman's Award - Team 585

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2018 - Team 585

### Team Number

585

### Team Name, Corporate/University Sponsors

NASA/Lockheed Martin Skunkworks/United Technologies Corporation/Boeing/Northrop  
Grumman/NDEP/sPower/National Instruments/Society of Women Engineers & Tehachapi High

### Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2017/2018 year and the preceding two to five years

Members of FIRST Team 585 become skilled, confident leaders. Our industry partners have provided paid and unpaid internships to team members still in high school and to those who are recent graduates. Through team training, team members become well versed in industrial safety and are CPR and FIRST AID Certified. Experiences obtained through FIRST have enabled students to gain scholarships and admission to competitive programs, including the Air Force Academy for two of our Dean's List Finalists.

### Describe the impact of the *FIRST* program on your community with special emphasis on the 2017/2018 year and the preceding two to five years

With funding from Air Force Research Labs, we purchased, installed, and support Maker Space technology in each of our elementary schools - a \$50,000 investment that includes 3D printers, HP Sprout computers, and LEGO and Dash & Dot robots. Since 2015, we've grown our Junior Robotics program from 15 to over 170 community children in after school and evening FLL Jr., FLL, and FTC teams. Our free science expo and LEGO summer camps are community staples that encourage family engagement in STEM.

### Team's innovative or creative method to spread the *FIRST* message

Industry mentors have impacted our own development, goal setting, and confidence. We seek the same benefits for younger students by peer-mentoring them in STEM exploration and activities in their schools. We facilitate the Hour of Code for over 2,000 1st-5th graders each year, lead Dash & Dot programs for 3rd graders, teach copper tape circuits to upper elementary and middle school students, and present assemblies. Through peer-mentoring, we want to help kids envision their own future in STEM.

### Describe examples of how your team members act as role models and inspire other *FIRST* team members to emulate

Our team is mentor-guided but decisions and designs are developed through student collaboration, communication, and implementation of the engineering design process. We develop skills and responsibilities through apprentice-master and peer-mentoring relationships in a supportive but challenging atmosphere. Our culture of responsibility, respect, and resilience enables and encourages all team members to take ownership of the development of our robot, our community outreach, and themselves.

**Describe the team's initiatives to help start or form other FRC teams**

As members of the Robotics Advisory Board for the new Robotics Pathway at the Kern County Regional Occupancy Center, run by the Kern High School District, we are collaborating with their teachers and administrators to start one or two FRC teams that would operate as part of their curriculum. We are coordinating with these teachers and others to provide a guided visit to the inaugural Aerospace Valley Regional this spring to provide a better understanding of the process and outcomes of FRC.

**Describe the team's initiatives to help start or form other *FIRST* teams (including Jr.FLL, FLL, & FTC)**

Since 2015, we have started, run, and funded 12 new FLL Jr., 11 new FLL, and 1 new FTC teams. We write grants and seek mentors for these teams, and are working with our district to build capacity at elementary sites so that every student has access to FIRST. We use peer mentoring for all the 170 students in this program. The connection between students teaching other students is a unique way of learning where teenage mentors model behaviors and other characteristics for the younger students.

**Describe the team's initiatives on assisting other *FIRST* teams (including Jr.FLL, FLL, FTC, & FRC) with progressing through the *FIRST* program**

We understand the struggle of transporting all necessary materials to competition, so we reach out to foreign teams offering our assistance such as bringing batteries, making bumpers, and providing tools. At one regional we had team members helping a rookie team in their pit to ensure that they had their robot together to pass inspection. We offer a helping hand to other teams because everyone deserves to have the best experience possible at each event.

**Describe how your team works with other *FIRST* teams to serve as mentors to younger or less experienced *FIRST* teams (includes Jr.FLL, FLL, FTC, & FRC teams)**

We participate in weekly NASA webconferences during build season with new and veteran teams - discussions include ideas, best practices, software and system preferences, and team management. Our programming team participated in the LabVIEW Beta Test of the control system and hosted an open house to share our findings. We're happy to help any team that needs support and have allowed teams to shadow us, conducted web-conferences across the country, and often lend out team members at competitions.

**Describe your Corporate/University Sponsors**

FIRST Team 585 has been a NASA Home Team since its inception in 2000. We've enjoyed long partnerships with Northrop Grumman, Lockheed Martin, and the Air Force Research Labs and have secured additional sponsors (Boeing, UTC, National Instruments, HP, NVIDIA) in the past couple of years thanks to new mentors and student achievement in technology. Our corporate sponsors offer mentors, resources, software, and experiences that enrich our students' experiences and build industry relevant skills.

**Describe the strength of your partnership with your sponsors with special emphasis on the 2017/2018 year and the preceding two to five years**

We love our mentors and our industry partners! Our team is happy to assist at and coordinate outreach events with sponsors: in 2017, this included a NASA Education - Women of NASA webconference; STEM tents at the LA County Fair and Antelope Valley Air Show; Bakersfield and AV STEMposiums; AFRL visits to elementary sites; and more. We are proud to partner with HP to research the impact of the Sprout Pro on FIRST Teams and are excited by Northrop Grumman's support of our peer mentoring programs.

**Describe how your team would explain what *FIRST* is to someone who has never heard of it**

FIRST is a network that connects students to their abilities to critically think, lead, collaborate, and communicate. It provides students with the opportunity to work with industry mentors and learn the basics of engineering through solving open-ended design challenges. FIRST emphasizes that the outcome is really about the experience for the students and it leads us to become community minded visionaries who are ready to tackle the challenges of tomorrow.

**Briefly describe other matters of interest to the *FIRST* judges, if any**

Although our robotics program is strongly supported by our community and school board, our high school engineering program was nearly eliminated due to lack of staffing. Team members rallied engineering students to prepare and present data to the school board on the importance of STEM careers and the benefits of the program. The board gave a directive to invest in the engineering program, grant funding was obtained to secure faculty and two new engineering teachers were placed as a result.

**Team Captain/Student Representative that has double-checked this submission.**

Rocky Ramirez

## Essay

When cavemen roamed the earth, we had little technology. That shortage of technology drove innovation as individuals created devices to assist with their daily lives. Today, we find that the type and amount of available technology is almost unfathomable. With a limited understanding of or exposure to the world, the possibility of creativity regarding science and technology appear to be limited, but the ingrained thirst for innovation is still thriving in people, especially our youth. Through FIRST, we are providing opportunities for the youth of Tehachapi to express their creative side while becoming critical thinkers, innovators, effective communicators and collaborators. We take Dean's words to heart, and we are working towards "growing FIRST faster" by transforming the culture of our town.

Parents are more than role models to a young child: they are the child's sole basis for understanding what adults are. Parents are the first impression of adulthood for their children, who will one day consider career paths through the filter of their own parent's example. In our small, rural town of Tehachapi, California, the education levels of adults are below the county and state average. According to 2017 California state testing data, 72% of the parents in our district have less than a bachelor's degree (Kern Cty: 66%; CA: 57%). In fact, 27% of Tehachapi parents have a high school diploma or less. Overall, in the City of Tehachapi, less than 10% of the adults over the age of 25 have a bachelor's degree. With lower aggregate education levels, it shouldn't be a surprise that our community's median household income is \$43,000 (CA: \$61,000; US: \$53,000). The traditions of our community do not place high value on education or career preparation, hindering career exploration. A large portion of our students focus on employment options in sales or service, with a small portion seeking military enlistment. With limited views of careers available to them, it is not surprising that only 27% of our graduating seniors met the minimum requirements to apply to a four year university in the University of California system in 2017.

Ignorance of career paths is not equal to inaccessibility of career opportunities. Tehachapi is in the southern mountains of the Central Valley, at least a 50-minute drive in any direction to a center of industry. Certainly, our small rural town is isolated, but taking that drive to the southeast reveals the Aerospace Valley, where innovation at dynamic private and government aerospace firms is ongoing. A similar drive to the west yields Bakersfield, host to energy giants and a burgeoning health care industry, and beyond, the fertile Central Valley demands innovation in food handling, packaging, and transportation. Additionally, the high desert and mountains surrounding Tehachapi are bustling with activity as alternative energy finds optimal conditions for solar and wind generation. Unfortunately, most students in our community are oblivious to this and all the opportunities that are available to them through these industries. We want to introduce them to each other.

When cavemen discovered and controlled fire, it was a game changer. For the members of our team, joining FIRST was the fire that sparked a passion for seeing and pursuing opportunities. Our industry partners have helped us build a vision of careers beyond the usual of Tehachapi, and our interactions with mentors and experiences on the team have provided us with invaluable life skills. Students on the team communicate and collaborate with each other to come up with enterprising approaches for any challenge, not just on the field and on the robot, but in everyday life. Having realized internships, scholarships, industry relevant skills, and leadership and communication capabilities, our team members recognize the significance of the strengths they've gained from participation in FIRST. We are ready to seize the opportunities that are growing around Tehachapi, and we want our peers to be able to do the same. To build that capacity in our peers, we must expand their frame of reference and expose them to experiences that shed light on the careers they'd never considered.

We offer free programs to students and their families in our community to increase awareness of STEM careers, engage families in hands-on explorations, and provide the benefits of cooperation. Our newest and growing program, Junior Robotics, features FTC, FLL, and FLL Jr. teams, run by members of FIRST Team 585. As community activity, Junior Robotics is open to all students of Tehachapi, whether they are in public, charter, or home- school. After a pilot of three FLL Jr. teams with 15 students in 2015, we offered all FIRST programs in 2016, yielding 140 student participants and one participating elementary school. In this, the third year, we grew to 170 students, with two elementary schools. We anticipate continued growth in 2018 through the addition of more teams and participation from our third elementary school. The Junior Robotics program offers flexibility in meeting times and locations to accommodate family needs. As our program matures, we are evaluating and refining our practices in the quest for quality and equity through conversations with parents, students, and administrators, building a community around the provision of the engaging and empowering programs of FIRST.

Additional free programs that we offer include Super Science Saturday and our LEGO Summer Camps. These legacy programs were established in 2012 and 2010, respectfully, by cyberpenguins of teams past. As has become a tradition in our team, the leadership at those times evaluated the needs of our community and their own capabilities and sought to address needs with outreach programs. We continue that tradition today, examining the progression of students through our district, as they mature into being able (or not) to attain the opportunities that surround our small town. As we stand upon the shoulders of giant cyberpenguins before us, our team is able to refine our programs to focus on the needs of our younger peers.

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For both cavemen and cyberpenguins, over time, innovations continue to be developed, to meet needs not met prior technologies. Although our legacy programs meet a need and help cultivate our culture, gaps and inequities are still apparent. Regardless the quality of our free programs, they still require transportation and extra steps that not all students are able to take. Since 2014, we have made a concerted effort increase equity for all students in our district by bringing STEM opportunities to them where they are - at their schools.

We deliver STEM opportunities to our schools to ensure that no student is left out. In 2017, in partnership with the Air Force Research Labs, we invested \$50,000 to establish elementary Maker Spaces in each of our elementary schools, featuring LEGO and Dash & Dot Robots, 3D printers, and HP Sprout computers. We visit the elementary schools to work with the students (and their teachers), teaching them how to use their equipment. Since 2014, we annually spend one hour in every class from first through fifth grade, teaching them code online through Hour of Code, reaching over 2,000 students each year. We give assemblies (and some swag) during National Engineers Week. We reach out to every child in our community because we believe - and we want them to believe - that they can do what we are doing.

The strength of both our community programs and our "push-in" programs lie in the connections between our team members and the younger students. These young students look up to members of FIRST Team 585 and a different kind of learning experience happens. Our team members are relatable, relevant, and accessible examples that model patience, investment, engagement, a passion for STEM, and how to apply the Engineering Design Process. Through peer mentoring, the students start to learn the basics of engineering, do research, communicate and collaborate. One of the most important lessons is about resilience. They learn it's not about winning or beating a rival team. It's about identifying mistakes, fixing those mistakes, and moving forward. They learn resilience through programing, while exploring hands-on activities, even while listening to the story of the robot design and build. This is such an invaluable character trait that each student involved in FIRST takes on with them forever. The sooner that we can help them learn resilience, the more we can encourage them to keep trying to achieve new things because setbacks only mean you've discovered an approach that doesn't work.

Our programs and activities bring STEM to everyone while encouraging students to get excited about their education and the options they have for their future. The same skills that we are seeking for our younger counterparts are the skills that we are continuing to develop through our own participation in FIRST. So many of our alumni are achieving great things after just four (or less) years in FIRST. Imagine what a child can do with 10 years of FIRST experiences! It may be possible to describe our town by a lower level of adult education and a service/corrections economy, but it is not (and we are not) defined by those characteristics. Our efforts, and the efforts of mentors, community volunteers and cyberpenguins before us, have begun to paint a different picture of Tehachapi - and a different future for the children of our community. We don't have to be the handprints on the cave, simply because that's traditionally what has been done. We can be rocket-men, robotic surgeons, bioengineers, aerospace engineers and computer programmers because we've seen the future, we've met the professionals, and we've cultivated the skills to tackle the challenges that lay before us. That is the future that we see for our younger peers, and that is the future that we endeavor to attain.