# EXECUTIVE SUMMARY

**Describe the impact of the FIRST program on team participants with special emphasis on the current season and the preceding two to five years**

"The best part of Spectrum is November 7th. The day when it all began, when the team came together, and we started this wild ride. That day is the best because it marks the beginning of something that will help so many students, something that will build character, memories, love, friendships, and a passion for not only learning and STEM but for life itself. Spectrum can't just have one best part, the entire existence of it and everything that makes up the team is it's best part." - Sarah 2013

**Describe the impact of the FIRST program on your community with special emphasis on the current season and the preceding two to five years**

- We shine a light on educational robotics demoing at college football games, major league baseball games, engineering conventions, science nights at local schools, community centers & festivals
- We spark interest in STEM by teaching courses on the foundations of engineering to younger students
- We inspired our school administrations to add courses in STEM and build a new 68,000 sqft STEM center opening in the fall
- We fight hunger by working at the food bank and competing in "Canstruction"

*Building our "Canstruction": Donated 7,000+ cans over 2 years*

**Describe the team's innovative or creative method to spread the FIRST message**

We have started PRISM with the goal of spreading FIRST's message.
- Presentations: Community events and industry conventions like Society of Women Engineers and Society of Manufacturing Engineers
- Relationships: Teaching community members about FIRST through personal connections
- Inspiration: Teaching STEM courses and giving tours of our lab and robots
- Social Media: Blog, Tumblr, Flickr, Twitter & Facebook
- Mentoring: Our Mentor for a Day and "How I Work" Blog Series lionize STEM leaders

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

- We host events, such as our annual Mock Kickoff, that enable our students to work directly with students from other teams.
- We send parts to teams that need them and help other teams solve technical problems to succeed in the competition.
- Each year, we volunteer to build the playing field at the Lone Star Regional.
- We use our blog to provide examples of how our team works on a day to day basis, giving other teams a model of an experienced FRC team to emulate.

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

We know how incredibly challenging FRC is for new teams. We also know that many schools that start FRC teams don't continue after their first few seasons because they don't have the infrastructure and people in place to sustain the program. We believe it is better for schools to start with a lower level competition such as FTC, BEST or VEX Robotics. We help them compete in these events so they can build support within their school, recruit students, and find sponsors before tackling FRC.

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

- We contact local school administrators each summer and provide them with information on FIRST programs in an effort to establish them at those schools.
- We demonstrate our robots at area middle schools to encourage teachers to start FLL teams.
- While demonstrating at community events we give out information about FIRST programs and speak with parents and teachers about how to start teams at their schools.
- Students we impact may introduce FIRST programs to their future schools.

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

Our team prioritizes helping other FRC teams become successful both on and off the field. Each year we publish "Illuminations", a guide for young FRC teams. Our summer mentor workshop provided an opportunity for 12 team mentors to learn about building FRC robots and ask questions. We publish whitepapers on topics such as building our pit and cart that can be used by rookie teams. We are an FRC Beta test team, which means we test changes to software before they're released to teams.

**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 work with teams at a pair of boot camp build days where we help assemble their drive trains and electronics. We host an annual Super Bowl Bumper Build for less experienced FRC teams. We assist teams in finishing their robots and meeting inspection requirements at our Week 0 practice event held with FRC#2587. We have mentored teams 3666, 3735, 3999, 4280, 4346, 4346, 4354, 4639, 5070 & 5287, providing technical support and ensuring they understand the logistics of running a successful team.

*We host FRC teams in our lab each year for our Super Bowl Bumper Build*

**Describe your Corporate/University Sponsors**

- ExxonMobil, our major corporate sponsor, is a world leader in the energy industry.
- Solarcraft, our main manufacturing sponsor, manufactures custom power systems for critical electronics in remote areas.
- The International Society of Automation Engineers (SAE) serves over 30,000 engineers & automation professionals.
- TX/RX Labs, Houston's largest hacker space, allows engineering hobbyists to build their projects & access tools & equipment that are normally reserved for professionals.

**Describe the strength of your partnership with your sponsors with special emphasis on the 2013/2014 year and the preceding two to five years**

- ExxonMobil has supported our engineering program for over 7 years. Since 2012, each year we work with them to thrill football fans before the Texas Bowl.
- Solarcraft has given tours of their shop to our team and given one of our students a summer internship. They also make parts for our robot each year.
- We do presentations for the SAE and show off our robots at their annual YAP fest.
- Our sponsors all provide financial or manufacturing support for the team.

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

FIRST is a nonprofit organization that strives to develop kids ages 6-18 into the STEM leaders of tomorrow. In FRC, engineering mentors work with high school students to build robots in six weeks. The students develop into extraordinary people who use their ingenuity, generosity, and enthusiasm to help others. FIRST students are immersed in gracious professionalism, which encourages integrity and respect for others during competition.

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

Spectrum evolved out of the two rival engineering teams of Strake Jesuit, an all-boys school, and Saint Agnes, an all-girls school. After competing against each other for four years in the BEST competition, the students decided to combine into one FRC team. The joining of the two teams is a major part of Spectrum's history and defines us as a team that is willing and able to overcome any obstacle by using the many talents that each member brings.

# CHAIRMAN'S ESSAY

Spectrum was formed in 2011 through the initiative of students from Saint Agnes Academy and Strake Jesuit College Preparatory, who combined their rival programs to take on the FRC challenge. Throughout our history, we have dedicated ourselves to etching Gracious Professionalism into our team, our school, & our community. We are unwavering in our commitment to empowering young FRC teams to excel, introducing more students to STEM, using our time and engineering experience to help those who are less fortunate, & providing opportunities to learn more about STEM to our team members and classmates.

Spectrum has grown to over 50 members this year while still maintaining a diverse population and a near 50/50 gender ratio. With the graduation of 24 seniors last year, we recruited heavily from both schools to sustain the team, gaining many new members, including 25 freshmen. Our team bonds during our intensive schedule, meeting every day of build season for 5+ hours a day and 6 days a week during the off-season.

Our members have used their FRC experience to catapult themselves into new opportunities. Matthew, a current junior, works for 221 Robotics Systems. He uses skills he gained on Spectrum to develop software used by FRC teams. Fluor, TX/RX Labs, Solarcraft & other organizations have allowed us to get a firsthand look at real world engineering. They have hosted our team and enlightened us to the realities of the engineering profession.

Our corporate partnerships have rewarded all those involved. Solarcraft, our main manufacturing sponsor, has produced sheet metal parts for our last two robots. Collin, a current senior, interned with them this summer and, after the season started, laser cut and bent all the sheet metal parts for our 2014 robot. Our longest partnership is with ExxonMobil. They provide the team financial support and in return we demonstrate our robots at their corporate events including the Texas Bowl, a college football game. There, we have showcased our robots along with FRC #624, #2587, & #57, to 50,000+ people.

We encourage students to pursue a career in STEM by portraying scientists and engineers as role models and heroes. In our "How I Work" blog series, we have profiled 12 inspiring figures in FIRST and relayed their advice to 8,000+ readers. To introduce students to a variety of STEM occupations, last season we started "Mentor for a Day", where 10 scientists and engineers presented their passion for their careers to our schools. We know that many people can't mentor everyday, but they can for one day. Professor Kemere of Rice University lectured on the science of memory, providing details of his experiments probing the brains of lab mice. One of our alumni, Katie Strausser, came back to speak with us about her career developing controls systems for exoskeletons at Ekso Bionics.

*"Mentor for a Day" has brought 12 scientests and engineers to our school. Including NASA Engineer, Zebulon Scoville*

Spectrum passionately shares our interest in STEM and conveys the message of FIRST to our community. In 2013, we were invited by FIRST headquarters to the Rockwell Automation Fair, where we demonstrated alongside FIRST president Don Bossi to 10,000+ engineers and industry professionals from around the world. At the inaugural Houston Astros "FIRST Pitch," we demoed alongside other FRC teams for 21,000+ people. For the past three years, Spectrum and FRC#2587 have shared our robots with 1200+ girls at the Houston Sally Ride festival, an event that encourages girls to pursue careers in STEM. We brought FIRST to the center of Houston's maker community with FRC#2587 at the Houston Mini Maker Faire, showing 2500+ people what FIRST does to inspire a passion for STEM.

Spectrum has put in 1500+ hours running free courses for children who don't have access to robotics programs, inspiring these students to be the STEM heroes of the future. Our SPECTaculaR Lego robotics camp, designed and run by our students for the past two years, has taught engineering principles to 120+ 3rd-8th graders at the Spring Branch Boys and Girls Club. We taught at the St. Agnes "Be the Change" camp, where we had 64 8th grade girls complete robotic challenges. With FRC#57 we instructed 30 middle schoolers about engineering design and let them drive our robot at the Best Buy Teen Tech Summit.

In an effort to supply our new members with the skills and knowledge needed to sustain the team for years to come, we developed a simulated FIRST game called "Pipefall" for an off-season build challenge. In this challenge, also used by other teams, our older students introduced the freshmen to the process of designing and building an FRC robot. Another way we train our team is by offering summer workshops, where we teach students from our team and other teams about the different aspects of robotics, including programming, wiring, mechanics & CAD.

We strive to ease the transition of rookie teams into FRC and be a model of a sustainable high quality program. Though they are located 2 hours away, we have taken FRC#5287 under our wing, helping them design their robot and develop their team. Providing parts and answering questions, we worked with them throughout build season. For the past 2 years, we have hosted the Houston Mock Kickoff, where Texas teams have the opportunity to learn about the FIRST build season and become familiar with the engineering design process. We work with the Houston Regional committee to support two boot camp build days each season, providing an opportunity for new teams to build their robots with the guidance of more experienced mentors and students. We have hosted our annual Super Bowl Bumper Build for two seasons, where 6 teams have come to our shop to build their bumpers. For three seasons, we have organized a Week 0 practice event with FRC#2587 to give teams experience with their robots and to ensure that all robots meet the inspection requirements before the bag deadline. In our annual publications, "Illuminations", we strive to give young FRC teams tips and tricks for building robots and managing their team that are normally only learned through years of experience.

We support FRC teams across the state and country. Our team answers phone calls from teams in need of support at all hours. We have opened our lab to 10+ teams that needed help or a place to build. If we hear of a team in need we step up to help them however we can. When FRC#3945 in Memphis, Tennessee broke their sidecar, we sent them a spare. When a team was having trouble turning at an event we donated a full set of omni wheels for them to keep. We have hosted mentor workshops and even weekly conference calls to support the development of strong FRC mentors throughout the state. We understand that the community only works when everyone pitches in.

We make an effort to volunteer as often as possible in the robotics community. In the past three seasons, we have assisted at two FLL events, thirteen VEX competitions, seven FRC events, two BEST events and an underwater robotics competition. Our members, parents, mentors and alumni all pitch in to referee, inspect, judge, score keep, field reset, etc. to make events run smoothly. We coordinate and staff the Houston ISD UIL VEX Robotics program, where we organize and run all aspects of the competitions. We are not a Houston ISD school, but through our work more students are being introduced to STEM.

We have taken on the cause of fighting hunger in our community. For the past two years, we have competed in “Canstruction” against architecture and engineering firms. For three months in the fall, we design a sculpture using CAD and in a single day build it out of canned goods to raise awareness for hunger relief efforts. In total we have donated 7000+ cans to the Houston Food Bank. In 2013, our structure won the “Juror’s Choice Best High School” and “Best Use of Most Needed Items” awards. Furthering our involvement with the Food Bank, we volunteer to help assemble food boxes for those in need in our community. At the Emile St. Urban Farm, a community garden in Houston’s 5th Ward, we helped prepare soil beds for the fall planting.

Spectrum has the full support of both our administrations, who back us financially and work with us to increase STEM education in our schools. Strake Jesuit is constructing a new science and technology building that is scheduled to be completed this fall. The largest construction project in the school’s history, this building will include a new team workshop and computer lab that we helped design. Strake Jesuit approved the addition of an engineering course in 2012; starting next year it will be available for St. Agnes students. Strake Jesuit has actively hired teachers with industry experience including two new mentors for our team. St. Agnes has added more STEM classes to its curriculum, such as AP Computer Science.

We support the schools by assisting in recruitment efforts at open houses and by promoting our program in the community. We provide a continual source of positive press for our schools. We are featured in local magazines & newspapers such as “Houston Homes and Lifestyles” which has 40,000+ subscribers. Through this publicity, we are able to spread STEM and FIRST to thousands of people.

## Promoting FIRST at STEM Night


Our blog enables us to disseminate information and news to a wide audience. Since its creation, the blog has amassed 60,000+ views, averaging 100+ views every day. We post our progress during the build season for our alumni, parents, supporters and for other teams to see. Our shooter wheel prototype video from the 2013 season received 6000+ views, and the design was used in 30+ robots that year.

Our team and FIRST are built upon the ethic of Gracious Professionalism, which goes beyond sportsmanship to incorporate empathy for all people and a sense of ownership and pride in everything that we do. We strengthen other FRC teams because we believe that we can only be driven to perform at our best when our opponents are at their best. It is upon this foundation that Spectrum will continue to shine.