



Coconino High School Robotics

FRC Team 2486 · The CocoNuts · Flagstaff, AZ

FIRST Robotics Competition Team 2486

The CocoNuts

Present our 2016 Chairman's Award Submission:

"Our Quest – To Dream Big and Act Bigger"

It began in 2008 at the FIRST World Championship. We watched FRC 842 win Chairman's and realized FIRST is more than robots. We were driven to return. With 2 paths to return, we chose the path of impact & inspiration. We began as the only team in our area, but had a vision of teams all over our vast region. FIRST Royalty Dean & Woodie always speak to the true purpose of FIRST. They challenge teams with "homework" - Quests we feel are too vital to ignore! Our call to arms is to extend STEM opportunities to the rural, underrepresented areas of Northern Arizona through FIRST. Everything we do will forever be defined by the charge laid upon us.

Our passion to make FIRST LOUD is the driving force of our Quest. We personally went to every principal in our town and started 19 new teams. We vowed that no team would ever be without the support needed to be successful, so every CocoNut chooses a team to mentor weekly. A mentor's joy is in small victories and in being a role model for the next generation. For 8 years we've hosted and run the Flagstaff FLL Tournament, which annually draws 30+ teams from the region. In '12, a 2nd FLL event was required so we travel to rural Winslow to run a tournament. By growing FIRST at all ages the Nuts are making it LOUD! Every Quest has setbacks. Many coaches quit after a couple years or are so overwhelmed that FIRST is an afterthought, but our Quest embraces coaches and teachers.

Great coaches inspire students. The growth of teams beyond Flagstaff meant we needed a way to support coaches at a distance. We created "FLL in a Nutshell," a guide for teachers to use with a team or in class. The curriculum was inspired by Camp COCONUTS, a 2-week training in robotics that teaches programming & design. It features mini-challenges designed to teach specific engineering principles and culminates in a unique FLL-style game.

In '14 we created a 2-day workshop to empower teachers so they could have the same dynamic experience as the kids and see that it "can be done" while meeting curriculum standards. This program is impacting teachers all over N. AZ, in turn inspiring kids. Teachers get certification hours from the county and FUSD plans to pay for their time. Betsy Daniels, head of FLL, flew our coaches to FIRST Place to train the 1st cohort of 4th grade teachers to use FLL in class. By '16



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every 4th grader in Manchester will do FLL as part of their curriculum. These partnerships enable us to inspire more kids in more places than we ever could alone.

In '09, FIRST asked 2486 to take over AZ's failing FTC program, which had only 8 teams. In '13 the AZ Championship outgrew capacity so we began qualifiers and added NM as an official part of our region. 2486 is the proud sponsor of the AZ & NM FTC program. With 44 teams in AZ & 12 in NM, there will be enough teams for us to run a NM Championship in '17. The amount of time we spend running events is extraordinary, but we do this because it is our Quest to make FIRST LOUD. Because of our efforts NAU is donating a venue for the '16 Championship, providing more pit space and a chance for students to see the university.

Our Quest for DIVERSITY will be our focus for many years. Flagstaff borders the Navajo Nation, the largest US reservation. A few Navajo teams compete yearly. These teams have the heart & soul to be a wonderful part of FIRST, but infrastructure challenges and low school support make it difficult to bring the rich culture of the Navajo to FIRST. Since '12, we've made numerous trips to gatherings, festivals & meetings to foster FIRST in schools that desperately need STEM. In '15, 25 teachers attended our "Nutshell" training at Dine College, which lead to 3 new NM teams. All saw the FLL project as a way to combine modern technology with the love & care of the Earth in keeping with Native tradition. There are ups & downs in this Quest. A team from Ft. Defiance stole our hearts in '14, but folded the next year due to lack of administrative support. Yet, our Ganado partners run 2 FLL teams and started a school-wide engineering program.

Team diversity is one of 2486's biggest strengths. We represent a cross section of Flagstaff with cultural, financial & educational diversity. Many of our members have overcome stereotypes and are 1st in their families to go to college. Our team is welcoming to all, no matter what the individual's Quest may be.

The Quest of MENTORING teams is paramount to our vision. When 2486 mentors a team, it is a relationship. We're in constant contact with all the FTC teams in our region communicating technology tips, rules, finding parts for teams, doing phone calls/video chats and bringing teams to our space to work side by side in all aspects of FIRST. If the teams' distances are too far for us to be there in person, we connect them with veteran teams to help in our stead.

Our adopted FRC teams are 4985, started by a student teacher of our coach and 5200 on the Apache Reservation. Though we're 3 hours apart, we meet in person numerous times. We share their victories: 4985 was a Rookie All Star and 5200 overcame low school support to compete. This season, we welcome two new teams to our rural family.



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Our personal Quest of SHARING KNOWLEDGE is highlighted by our Chairman's Exchange. It has grown to include dozens of Regionals and teams. ChEx is not about winning an award; rather it's about helping teams to set goals that focus on advancing the mission of FIRST. Teams get practice, ideas and feedback prior to interviews. We spend hours chatting with teams that we've met at ChEx from around the country to help refine their submissions. FRC2375 hosted ChEx at 2 events & finally had the thrill of hearing their name called as a Chairman's recipient. We take pride & joy in their success! ChEx combined with our popular "Complete Guide to the Chairman's Award" is helping to refocus the FIRST community on its values.

The Quest to make FIRST a SPECTATOR SPORT has been realized with our dream of an FRC Regional in Flagstaff. Many were skeptical; such a big event in our tiny town! But we had a vision. Valued at \$65,000+, NAU is donating the beautiful Skydome. With seating for 10,000 it will be a major sporting event. FRC at NAU was achieved by taking critical steps: inviting the NAU President to FIRST events, facilitating conversation with the Planning Committee & arranging for vetting. It will bring big business with 50+ teams traveling from 8 states. NAU and 2486 are working tirelessly to make sure the experience is incredible. Dozens of local businesses are offering discounts & NAU is hosting a huge team social. We arranged to have FUSD students come on spirit buses to the event and cheer us on!

Our Quest to GET POLITICAL LEADERS INVOLVED in FIRST began in '14. Our team started advocating for FIRST with our local & state policy makers. Rep. Bob Thorpe came to CHS as part of AZ Take Your Legislator to School day. He was a judge at the '15 AZ FTC Championship and is signed up again this year. On 1/27/16, 2486 traveled to the AZ Capitol to advocate for STEM education & present the flags to open the session, a huge honor. A quarter of the AZ reps visited our Robot lunch and many are volunteering for AZFIRST. We learned that politicians are real people who are fascinated by FIRST. They were surprised at the number of teams in AZ and eager to do more to support STEM. This visit will lead to a meeting with the AZ Superintendent & Governor. These are small steps in the right direction for AZ. Historically, AZ ranks near the bottom in educational funding. We have a long fight ahead of us, but with our legislative allies advocating from within and strong collaboration with policy makers we're optimistic about the future of FIRST in AZ.

We must remain true to our mission and focus on our Quest to SHARE THE IMPACT of FIRST on our community, school & ourselves. In 2012, Flagstaff became America's 1st STEM City mainly because of the impact of 2486 and the many science firms. Each year, Flagstaff celebrates by giving "STEMMY" awards to honor students, teachers & leaders. For 3 years, NAU has hosted



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the Community STEM Celebration in the Skydome, attracting a crowd of 5000+ people. The CocoNuts are the most visible symbol of STEM in Flag; the model for all other STEM clubs in town.

A past obstacle to this Quest was financial stability. Though our small town doesn't have many large corporations to sponsor us, we are highly supported by the community. Our continuous outreach and media coverage helps our Quest. Findlay Toyota gave us our largest single sponsorship in our team's history. WWT & GKC have pledged yearly sponsorships of \$1000+. Half of our \$9000 in tax credit donations this season are from people not even affiliated with the team. It's taken time, but we've achieved sustainability and start each year with the \$40,000 needed to compete in FRC and run FTC in 2 states.

Last year we were invited by JPL to prototype a caving robot to explore Mars. The research we did this summer lead to CRAWDAD, a hybrid wheel capable of climbing into caves & traversing rugged Martian terrain. This engineering opportunity is beyond FIRST, including writing a scientific abstract for professionals. We presented our concept and CAD drawings at the 2nd International Planetary Caves Conference. In attendance were NASA & JPL scientists and university mentors. All were excited about our design and want us to move forward with a physical prototype. Our idea will be published in a scientific journal by engineer Jut Wynn. With the help of our 3D printing sponsor PADT, we will create the prototype this summer.

Our impact is possible because each student & mentor embraces the power of STEM. They have the chance to lead, make a difference and inspire others to embark on their own Quest. Each individual's Quest provides transformative change that advances our vision. Every Quest of a thousand miles begins with a single step. Our Quest is no different!



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Executive Summaries 2016

Briefly describe the impact of the FIRST program on *team participants* with special emphasis on the current season and preceding 2-5 years.

No matter the distance or cost, 2486 believes everyone deserves a chance to be transformed.

"6 years ago I met 2486. I continue to be inspired by our enthusiasm." Keaton

"I've gained confidence & guidance in making a difference. Doors have been opened & goals have been set. I'm out to change the world!" David

"What we do at competition isn't nearly as important as what we do at home. Win or lose, it would not change the fact that we made a difference in thousands of lives." Kinney

Describe the impact of the FIRST program on *your community* with special emphasis on the 2015/2016 year and the preceding two to five years.

"2486 is at any STEM event in town. They are the best of STEM and Flagstaff." Mindy Bell, Flagstaff STEM Coordinator

"In Flagstaff, thanks to 2486, STEM is very cool." - Mayor Nabours

2600+ hours at 117 Outreach events, reaching 129k+ people in person
5500+ hours spent on 45 workshops & 42 presentations to professional organizations, reaching more than 3100 people
Service to school & community on & off team
11k FIRST volunteer hours
100% FUSD schools have STEM clubs

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

Our specialty is being 2 places at once because 'Nuts are expert volunteers. We've transformed FLG into a FIRST hub for NAZ. We provide a personal handshake to every school board member, potential sponsor, & future team we contact. NAZ is 5 counties & larger than GA: we traveled 29K+ miles/9 yrs to events. Our work with Rep. Thorpe at Take Your Legislator to School led to a day at the AZCapitol to advocate for STEM. 100+ media appearances gives 2486 name recognition statewide & beyond.



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

"I spoke with my team about the 'Nuts and they hoped to be able to emulate the compassion demonstrated to them by the 'Nuts." Myrna R.

"I really want to stress the GP of 2486, who were an EXTREMELY open and accommodating Alliance Captain." FRC610

"Thanks for your help. I see a different eagerness in their eyes when I spoke to them." FRC5200

"If you want to know what a true FIRST team is, look at the CocoNuts. They are one of the best teams not only in AZ but in the USA." FTC 10239

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

We inspire pre-service teachers to become FIRST coaches & volunteers. We don't let the huge distance between teams keep us from meeting in person. We started 3 teams & actively mentor each. We've passed the legacy of extending STEM opportunities to them. They've started FLL teams & STEM programs in their area, on tribal lands.

"2486 allowed us a smooth transition into the world of FRC. They transformed us into a FRC team instilling in us the values of GP and the spirit of FIRST." 4985

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

"Without their efforts there would be a huge void in everything that includes FLL, FTC, and FRC." -842

*6 years of FLL Camp; 250 kids, many start new teams
STEM Club integration, FLL/FTC create a direct line to 2486*

*FLL in a Nutshell:
2-day training for credit
Partner w/FIRST HQ
Dine' workshop on Rez = 3 teams*

*Our quality events spur FIRST growth. Since '08 2486 has done:
46 FLL/FTC tourneys
20 FLL/FTC Scrim./Kickoff
'15/16: 44 NAZ FLL teams at Flag/Winslow, 56 AZ/NM Teams at 6 Qual. & 1 Champ.*



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

Sponsor: AZ/NM FTC

Manage all events in region

Constant team communication

Provide hands-on help at workshops & events

Transition teams from FLL to FTC, sometimes in same season

"We went from dead in the water to signing up for the last FTC tourn." Everyday Heroes

Flagstaff has a direct line from FLL->FTC->FRC

65% 'Nuts were in FLL, FTC or attended COCONUTS

Chairman's Guide: 7000+ downloads

Chairman's Exchange: '15 & '16 - 25 events

Workshops – Beta Test, Chairman's, Fundraising & Outreach

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 create an atmosphere of camaraderie, longevity, & continuity with our teams.

2486 mentors local teams personally: 12 FLL & 3 FTC

'Nuts meet w/team weekly

8 years - 'Nuts are Outstanding Mentors at FLL event

Rural Teams:

Distance is no obstacle - we meet in person when we can, talk on the phone when we can't

Adopted teams under our wing at events, including food, parts, advice, tech help.

We're a community at Regionals & Championship

We are the go-to team at competition for help!



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Describe your Corporate/University Sponsors

NAU – New FRC event w/ 100+ team capacity, FTC CMP, volunteers
NASA - 2 yrs w/grant, Mars robot
WL Gore - Mentors, materials, machining, volunteers
GKC Geoscience - sponsor, volunteer
FUSD - Venue, travel support
CHS - Build space, new maker space for manufacturing, tournament venue
PADT - 3D printing service for Mars Prototype
Findlay Toyota Flagstaff - Sponsorship & team lunches
WWT/Cisco - Commitment to annual sponsorship
Flagstaff Community - 1/2 tax credit donations from people not on team

Describe the strength of your partnership with your sponsors with special emphasis on the 2015/2016 year and the preceding two to five years.

Rep Thorpe – Continued STEM Advocacy, including future meeting with Governor & Superintendent
Flagstaff Community sponsors us because of our extensive community service
Sustainability - Begin each season w/\$40,000 for FTC, Regional & CMP entry fees, travel
Saying thank you is important: Pit, robot, events, brochures, & t-shirts, recognize our sponsors. Every donor gets letter and framed picture no matter how large the donation. We have lasting partnerships, not just sponsors.

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

"My time on the CocoNuts was one of the happiest and one of the hardest times of my life" –Maddie

FIRST is our catalyst for change, where any student can and will be great. Yes we build a robot, but building people is the soul of FIRST. FIRST has given so much to us so we give FIRST to others. It's taught us to think outside the box, to work with others, to serve our community. Winning is fun, but losing teaches character. We have learned to be good people in victory, defeat, and life.

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

"They've established a thriving FIRST community in Flagstaff and continue to form new teams in the Native American communities in rural, northeastern Arizona," -Jenn

NAZ is poverty-stricken. Native American students don't have as many education opportunities due to sparse access to running water, electricity, and low support. For this reason it's difficult to start sustainable FIRST teams. WE DO the traveling because keeping promises is key to building trust, thereby building teams.



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For FRC teams older than 5 years, briefly describe your team's broader impact from its inception

Our mission has always been to bring FIRST new areas. Each year we set goals, take small steps to make FIRST bigger & LOUDER! Small steps lead to big results with time.

Yr1: Mission established

Yr2: Flag FLL

Yr3: FTC partner

Yr4: 1st 'Nuts graduate (90% of 27 grads in STEM!)

Yr5: FLL Camp & STEM City

Yr6: ChEx, 2nd NAZ FLL tourn.

Yr7: FRC - 3 teams, FTC NM

Yr8: TYLTS (Rep. Thorpe), FLL Guide in NH, & teacher training

Yr9: AZCapitol, AZ North Regional, Dine' college, Mars Robot