

EXECUTIVE SUMMARY

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

Students earned internships before high school graduation, gaining valuable hands-on experience. In the last 5 years, senior scholarship awards exceeded the team budget, with 20% of seniors earning a FIRST scholarship. 100% of students attend college with 89% of all students and 71% females declaring a STEM major.

An average of 87% of students return each year, with 80% of eligible students earning a varsity robotics letter. 90% of students participated in STEM outreach and team events in 15-16.

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

Interest in the team increases each year and 10% of the student body were interviewed for the team in 2015.

School provides CAD, programming, and robotics courses to support our passion

K-8 robotics program provides a pipeline of students from multiple schools.

Coaches/mentors coordinate to minimize schedule conflicts between robotics and other school activities.

Community partnerships provided multiple STEM experiences for 800+ K-8 students

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

RoboZone—award winning, weekly television series for FIRST Robotics grew from local networks to statewide sports network with >100,000 weekly viewers; expanding viewership and number of episodes in 2016.

FIRSTBadges.org provides students with digital credentials of demonstrated skills for college and employment. Team 33 developed, beta-tested and administers the programs.

Common Application—student-led advocacy effort to add robotics to the universal online college application for 850,000 users.

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

Programming: Beta testers for National Instruments LabView testing

Robot performance: Peer voted into the FRCtop25.com for all 3 years.

Team Outreach: All team activities are voluntary, encouraging active participation in what a student enjoys

Outreach partnerships: All outreach activities are partnerships with other FRC teams with the STEM outreach program = 28 FRC teams, Community events=15 FRC teams

Strong social media presence on Facebook, Twitter and community forums

Team's initiatives to help start or form other FIRST Robotics Competition teams

Started FRC team 5053, Laker Robotics. Mentors provided technical expertise and logistical recommendations. Students worked collaboratively on recruitment, strategy, awards submissions, and fabrication.

Helped revive FRC 3538, a neighboring team by assisting them to recruit more students, re-start their program and experience success.

Mentors worked on statewide initiative to provide grants for new and returning public teams; the Killer Bees are ineligible for these public funds.

Describe the team's initiatives on assisting other FIRST teams (including FIRST LEGO League Jr., FIRST LEGO League, & FIRST Tech Challenge) with progressing through the FIRST program

Killer Bees mentor FLL and FTC programs in multiple schools. An average of 50% of students on the team have participated in the FLL and/or FTC program.

FTC mentors are parents of Killer Bee alumni and have continuously mentored the team for the last 3 years.

Killer Bees mentored FLL 33 (Oklahoma) through webchats and email as they progressed from FLL to FRC 2723.

With one of our feeder school programs, we are mentoring the middle school FLL teams to progress to an FTC team.

Describe the team's initiatives to help start or form other FIRST teams (including FIRST LEGO League Jr., FIRST LEGO League, & FIRST Tech Challenge)

In 2013, the local Girl Scout council asked us to model STEM experiences. Creating a partnership with university engineering program and other FRC teams, we designed and produced badge workshops and introduced them to the FLL and FLL Jr programs.

The program has grown from small, troop based competitions to fully engaging the girls and their troop teams in the FIRST competitions.

In 3 years, we inspired more than 600 girls and leaders, helping start 25 new teams across the area.

Describe how your team works with other FIRST teams to serve as mentors to younger or less experienced FIRST teams (including FIRST LEGO League Jr., FIRST LEGO League, & FIRST Tech Challenge)

Several times yearly, team members present at conferences and workshops at the local, state and national level on technical topics, running a successful FRC team, and promoting student engagement and leadership.

Publish CAD, robot code and presentations.

STEM outreach programs in offseason helps students develop skills for FRC.

We co-hosted an annual FRC All Girls Tournament for the last 3 years and this has inspired participants to think about traditional gender roles and participation.

Describe the strength of your partnership with your sponsors with special emphasis on the current season and the preceding two to five years

Students and mentors collaborate to maintain consistent interactions with sponsors.

We retained all platinum level sponsors for the current season.

70% of the team's budget is funded from sponsors

Coordinated by team mentors, FCA provides towing vehicles for the competition field trailers.

The team works inside of FCA headquarters, the only FCA sponsored team to have this privilege.

Team 33 works with FCA-sponsored FRC teams to provide fabrication support, including waterjet cutting resources.

Describe your corporate/university sponsors

Sponsored by one of the "Big 3" automotive companies continuously since 1996

We pursue diverse sponsors to spread the message of FIRST to the corporate community.

Sponsors include manufacturing, technological, medical, legal, engineering and automotive supply companies.

Our newest sponsor is IFI, Innovation First International, a crown supplier for FRC. Team 33 is 1 of 9 teams sponsored by IFI.

An alumnus who owns his own company gives back to Team 33 as a continuing platinum level sponsor

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

In the beginning, teachers and counselors would recommend 11th and 12th graders join the team to assist in college applications. Now, 9th and 10th apply to the team, grow in skills and experience to provide leadership as older students.

Changed outreach program from broad, diffuse outcomes to a concentration on STEM-based skill development.

Alumni returned to the FIRST community to start new teams, mentor teams, provide service as key volunteers and provide financial support.

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

- FIRST is an environment where kids explore their STEM career opportunities and interests in thought provoking challenges and healthy competition.
- FIRST exposes kids to real world applications from math and science classes, while having fun in a learning environment.
- FIRST is a sport for the mind and is both cooperative and competitive, much like the real world.
- FIRST allows kids to see different solutions to a single problem, while teaching that is always room for improvement.

FIRST is a K-12 program where students explore their STEM interests in thought provoking challenges and healthy competition. Along with FIRST's environment of competition with real-world applications for math and science, it promotes working with other teams to help benefit the robotics community. FIRST not only creates a real world environment, but also gives students opportunities to use their knowledge from high school robotics in their future professional lives.

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

Team Goals:

1. Create and field a highly competitive robot.
2. Provide value to students through real-world engineering challenges, STEM career guidance and scholarship acquisition.
3. Provide a year-round, quality program with student leadership opportunities and STEM skills development.
4. Train and retain high quality mentors.
5. Balance the team budget for stability and sustainability

Each of the team goals have key performance indicators and we have achieved our metrics.

ESSAY

Since 1996, we have created a buzz and expanded to INVENT a strong team foundation, INNOVATE new ways to increase the impact of FIRST and INSPIRE the community.

INVENT: CREATING A SUSTAINABLE BEEHIVE NOW AND FOR THE FUTURE

With flexible subteams, dynamic mentors and year-round opportunities to apply STEM skills, students build a variety of robots to solve engineering challenges. This BEEgins with our student led recruitment program. We invite incoming freshmen through summer mailings, a club fair and class presentations. Freshman science class visits yield a large pool of newBEE applicants. Mentors interview all new and returning students to give them practice for future job interviews.

Our team is structured to teach hands-on STEM skills. Every Killer Bee builds a part of the FRC robot each year with all 45 students fabricating at least 1 part. To assimilate new worker bees, we immerse them in our flexible subteam system beginning with a Big Bee, Little Bee program. This morphs into swarms, linking several students with two student leaders for prototyping and shop training. We encourage them to expand beyond their swarm and work on various projects. This subteam system creates a natural progression from novice to leader.

One secret to our success is a school liaison supporting the balance of academics and robotics. She monitors grades, assignments and completion of school community service hours. Students with incomplete assignments or low grades are closely monitored and directed to a support system of peer tutors. In addition, the team has a culture where older students help younger students with assignments.

Our school support includes our principal announcing team's standings, leading to encouragement from the student body on social media. Robotics is a varsity sport and students earn a letter for their contributions. Our accomplishments are showcased in hallway trophy cases. Any varsity team winning a state championship earns our entire school a day off. We provided two days off since 2011.

In an economic downturn of 2011, we had a significant sustainability challenge when our main sponsor reluctantly reduced their team contribution by 90%. This forced the colony in a new direction. We met the challenge by significantly expanding our sponsor base. In the 2015-2016 season, we retained all Platinum Sponsors and added two more. Students stay in contact with sponsors, give presentations, send newsletters, tour facilities and invite them to team events to encourage continuous support.

Students on the Killer Bees requested more hands-on classes at school. In 2011, the school began a series of CAD classes that includes 3-D printing. Building on this interest, our school liaison created a class to teach robotics in our traditional college-prep school. In 2013, she pioneered a course, "Science of Technology," which started as a programming class and expanded beyond basic programming and robot building. The course is open to all students and fosters a STEM culture. Students have joined our team to learn more after this class experience.

Through these strong partnerships with the school, sponsors, alumni and mentors the Killer Bees built a sustainable colony specifically for the success of our student's futures.

INNOVATE: IMPACTING AND POLLINATING THE FIRST COMMUNITY

The Killer Bees strive to impact and grow the robotics community through innovative projects. Team members led an advocacy effort to include robotics on electronic college applications, authored a system of digital badges and helped to create and produce an award-winning television show.

In January 2014, students wanted to include their robotics experience on the Common Application. They were unable to represent their FIRST experience in the activities section. Advocating for the entire student robotics community, these seniors made a formal request to add Robotics to the extra-curricular activities list. To support their request, students gathered more than 1000 online signatures in 90 days. In April 2014, the Common Application Board added a "Robotics" option to the list of extracurricular activities. Now all students can tell their FIRST story.

In 2014, the Michigan Department of Education asked us to design a program for students. In partnership with other FRC teams, we launched FIRSTBadges.org in January 2016. This cutting-edge delivery of informal education provides online credentials for FRC students. Killer Bees design logos for the badge icons, provide peer mentoring and administer the program. Our students earned a total of 25 badges in only 3 weeks. Other teams in our state began to earn badges as well. FIRSTBadges allows students to document their measurable STEM contributions on a robotics team as they apply for scholarships and jobs.

We share the message of FIRST to a wide audience through a weekly RoboZone television series featuring analysis and results from Michigan competitions. In 2015, eight episodes aired on two local television channels to an average of 20,000 weekly viewers. This year, the show expanded to a statewide television network with an estimated 100,000 viewers weekly. The show was awarded an Emmy for "Best Youth Program." RoboZone brought new sponsors to FIRST and increased contributions from current sponsors. This television program is making an impact by sharing FIRST to a wider audience.

INSPIRE: SPREADING OUR IMPACT IN THE FIRST COMMUNITY AND CREATING A BUZZ FOR STEM

We forge impact through partnerships with Girl Scouts of Southeastern Michigan, our local intermediate school district, K-8 schools and STEM activities with other FRC teams. Historically, our events included food drives, road clean-ups and Relays for Life. Our aim has shifted to STEM outreach activities to teach real-world engineering.

In 2013, the Killer Bees and two FRC teams partnered with the Girl Scouts of SE Michigan and a local university to host workshops for girls. STEM events included how to get started in FLL and FLL Jr for leaders and adults, badge workshops, hands-on experiences, and demonstrations of FRC robots. For 3 years, the Killer Bees hosted events for 600+ girls. Troops moved from basic demonstrations to full participation. After a badge workshop for elementary girls, one inspired girl scout hosted a similar event in her local community.

The county intermediate school district hosts an annual 12-week STEM skills experience in the off-season, called Oakland County Competitive Robotics Association (OCCRA). Team 33 is one of the founding members and continues partnerships with local FRC teams. Each year for the last 16 years, over 1,000 students in the county participate in OCCRA, with 90% of the students also participating on an FRC team. High school teams are challenged to build a 100 lb robot for a competitive game. Mentors play different roles in this challenge as they only advise and provide safety oversight. Our team mentors do not sit quietly on the sidelines. They are the game design committee, the head referee and provide technical support to all teams. Mentors provide training workshops in the fall to students across the county with topics such as game strategy, programming and electronics. Killer Bee participation in OCCRA is voluntary and provides an opportunity to broaden technical skills and mentor other students. These partnerships allow students to expand leadership skills, helping all team members to prepare for the newBees and the FRC season. This year, 87% of our students participated in or attended an OCCRA event.

As a veteran team, the Killer Bees support the growth of FRC. During the Championship in 2015, we presented a seminar on promoting student leadership, packing the auditorium with over 300 spectators. At state championships in 2012-2015, students and mentors co-presented workshops on scouting and strategy. We conducted a virtual presentation for teams in Alabama on continuous improvement and starting new teams. Students lead impromptu seminars on how to be a successful FIRST team online and in the pits.

In the last 5 years, we led demonstrations for more than 750,000 people at large venues such as the North American International Auto Show, the Michigan Legislature, National Guard Air Show, Maker Faire Detroit, as well as many smaller groups. With safety precautions in place, we even invite the public to drive or operate our robot. Team demonstrations are important to encourage coopertition, creating partnerships to provide spectators with a sense of the competition. This builds communication and teamwork skills for all FRC participants and showcases the talent of the students to the local community.

For 15 years, the Killer Bees built a strong robotics program with multiple K-8 elementary schools. Team members volunteer to mentor FLL teams, provide mock tournament support, assist with the research project, programming, demonstrate the FRC program and work to help them expand to FTC teams. In addition, we hosted middle school students at district events to experience FRC. These programs provide a stream of newBees from 30+ FLL and FTC teams and want to fly with the Killer Bee hive.

To support all students, we encourage students to “pick up the tools” and we have thrice co-hosted an offseason FRC All-Girls Tournament. This competition requires female drive teams and pit crews; participating senior girls can earn scholarships. These competitive events drew teams from other states and Canada, with scores equivalent to district competitions. The team registration filled quickly and this year two television stations provided live coverage while interviewing girls and mentors. After attending our event, an out-of-state team (234) was inspired to host their own all-girls tournaments.

Our hive strengthens and grows each year, through the INVENT, INNOVATE and INSPIRE efforts of our students, mentors, sponsors, and parents. We KNOW teamwork keeps the hive alive - we are team 33 and this is what we do.

