FIRST® FAQ

What is *FIRST*®?
FIRST® (For Inspiration and Recognition of Science and Technology) was founded in 1989 by inventor Dean Kamen to inspire young people's interest and participation in science and technology. Based in Manchester, N.H., the 501(c)(3) not-for-profit public charity inspires young people to be science and technology leaders, by engaging them in exciting Mentor-based programs that build science, technology, math, and engineering (STEM) skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

FIRST provides a progression of four international, after-school programs for K-12: the *FIRST*® Robotics Competition (FRC®) for Grades 9-12; the *FIRST*® Tech Challenge (FTC®) for Grades 7-12; the *FIRST*® LEGO® League (FLL®) for Grades 4-8; and the Junior *FIRST*® LEGO® League (Jr.FLL®) for Grades K-3. *FIRST* also operates a research, development, and training facility called *FIRST*® Place™ at its headquarters in New Hampshire.

Who are some of the organizations that sponsor *FIRST*?
FIRST is supported by a strong network of corporations, educational and professional institutions, and individuals. Some of the world's most respected companies – including more than 200 of the Fortune 500 companies – provide funding, mentorship time and talent, volunteerism, equipment, and more to make *FIRST* a reality.

Founding Sponsors:
Baxter International Inc., Boston Scientific Corporation, The Chrysler Foundation, DEKA Research & Development, Delphi, General Motors, Johnson & Johnson, Kleiner Perkins Caufield & Byers, Motorola Solutions Foundation, Xerox Corporation

Strategic Partners:
3M, BAE Systems, The Boeing Company, DEKA Research & Development, FedEx Corporation, General Motors, Google, jcpenney, Johnson & Johnson, NASA, National Instruments, PTC, Rockwell Automation, Rockwell Collins, Time Warner Cable, United Technologies Corporation

Rockwell Collins is the Official Program Sponsor and PTC is the CAD & Collaboration Sponsor for the *FIRST* Tech Challenge.

The LEGO Group is a Founding Partner of *FIRST* LEGO League. 3M and LEGO Systems A/S are Official Suppliers, and National Instruments, Rockwell Automation, and Statoil are Global Sponsors of *FIRST* LEGO League.

How does the education community support *FIRST*?
FIRST provides an education, skill, and career path for young people who might not otherwise have discovered an interest in and pursued education and careers in science and technology. *FIRST* works closely with schools at every level to transform both the perception and reality of education in science and technology. Some of the finest colleges and universities support *FIRST* by providing scholarship opportunities, sponsoring teams, and providing mentorship, equipment, and facilities. As a result of the support of these colleges and universities, 2013/2014 season *FIRST* high-school students are eligible to apply for more than $18 million in scholarship funds to continue education in science, technology, engineering, and math (STEM).

Who manages the teams and events?
FIRST is truly a Volunteer-driven organization. For the 2013/2014 *FIRST* season, more than 130,000 Volunteers are expected to contribute in areas including mentorship, event management, recruitment, and team management. The growth and success of *FIRST* is a direct result of the efforts of the Mentors, parents, teachers, community leaders, and citizens who volunteer their time and talent.

How can Volunteers get involved?
The best ways to start discovering the rewards of *FIRST* are:

- Attend a *FIRST* event (visit www.usfirst.org and click on the "Locate a *FIRST* Team or Event" link in the upper right corner to find an event close to you – attendance is free!);
- Contact a Mentor from a local team to assist;
- Visit the *FIRST* website at http://www.usfirst.org/community/volunteers/get-involved for local Volunteer/event opportunities; or
- Contact *FIRST* at 1-800-871-8326.

Interested Volunteers can visit our website at www.usfirst.org for more information about how to become a Mentor, Coach, or event Volunteer.

What is Gracious Professionalism®?
Gracious Professionalism® is part of the ethos of *FIRST*. The idea and phrase are found throughout *FIRST*, but no one has been a stronger champion than *FIRST* National Advisor, Woodie Flowers.

> *"Gracious Professionalism is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community. With Gracious Professionalism, fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process."*

What is Coopertition®?
Coopertition® produces innovation. At *FIRST*, Coopertition is displaying unqualified kindness and respect in the face of fierce competition. Coopertition is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete. Coopertition involves learning from teammates. It is teaching teammates. It is learning from Mentors. And it is managing and being managed. Coopertition means competing always, but assisting and enabling others when you can.

FIRST® Robotics Competition FAQ

What is the *FIRST*® Robotics Competition (FRC®)?
The *FIRST*® Robotics Competition (FRC®) for Grades 9-12 (ages 14 to 18) is an annual competition that helps young people discover the rewards and excitement of education and careers in science, engineering, and technology. FRC challenges high-school-aged students – working with professional Mentors – to design and build a robot, and compete in high-intensity events that reward the effectiveness of each robot, the power of team strategy and collaboration, and the determination of students. In 1992, the initial *FIRST* Robotics Competition took place with 28 teams in a high school gym in New Hampshire. In 2014, the largest-ever FRC season is expected to include more than 2,700 teams from 17 countries competing in 54 Regional events, 4 State/Region Championships, 40 District Competitions, and the *FIRST* Championship at the Edward Jones Dome in St. Louis, April 23-26, 2014.

Why involve a professional Mentor? Why don't students build the robot themselves?
FIRST creates powerful mentoring relationships between the students and professional Mentors. FRC teams include engineers and other professionals from some of the world's most respected companies. Students work closely with and learn from these "stars" of the engineering world. Meaningful involvement of adults in children's lives is proven as an essential component for developing young people's potential.

How is the game played?
Each year's Kickoff event unveils a new, exciting, and challenging game. From the Kickoff, teams have just six weeks to build a robot to compete in the game using a kit of parts provided by *FIRST* and a standard set of rules. The 2014 game, AERIAL ASSIST℠, is played by two Alliances of three teams each. Alliances compete by trying to score as many balls in goals as possible during a two-minute and 30-second match. Additional points are earned by robots working together to score goals, and by throwing and catching balls over a truss suspended just over five feet above the floor as they move the ball down the field.

Who participates in the competition?
During the 2014 season, approximately 68,000 high-school students on more than 2,700 FRC teams are expected to compete in 54 Regionals (in the U.S., Canada, Israel, and Mexico), 4 State/Region Championships, 40 District Competitions, and the *FIRST* Championship. FRC teams are comprised of professional Mentors and 10 or more students in grades 9-12. In addition, each *FIRST* team has one or more Sponsors. Those Sponsors include companies, universities, or professional organizations that donate their time, talent, funds, equipment, and much more to the team effort.

Is scientific, technology, or mathematic expertise required for students to participate in the *FIRST* Robotics Competition?
FIRST invites students who may not be predisposed to science, math, or technology to participate. In fact, FRC is designed to inspire, motivate, and encourage students to learn basic principles while challenging more experienced students. Since there are critical roles for students in everything from design and building, to fundraising and research, to marketing, every student can actively participate and benefit.

What do the students gain from participating?
Throughout their *FIRST* experience, students gain maturity, build self-confidence, learn teamwork, and gain an understanding of professionalism. Students have fun while building a network of friends and professional Mentors who enrich their lives.

Any FRC participant is eligible to apply for more than $19 million in scholarships from leading engineering colleges and universities.

A series of awards honor accomplishments in areas including engineering, design excellence, competitive play, sportsmanship, and high-impact partnerships between schools, businesses, and communities. A judging committee of distinguished professionals makes award decisions. The most prestigious award is the Chairman's Award, which recognizes the team that best represents a model for other teams to emulate and best embodies the purpose and goals of *FIRST*.

Are there other benefits to participating?
Young people gain the skills and knowledge to fill one of the more than two million STEM-related positions available in the U.S. today. Sponsors benefit by finding future employees and interns. Mentors benefit from renewed inspiration and a reminder as to why they chose science, technology, engineering, and math (STEM) as a career. Volunteers are recognized as an integral and vital part of the way in which young people connect to the real world, in their own communities and in the world at large.

A 2005 Brandeis University evaluation of *FIRST* participants primarily from urban and low-income schools found that, compared to a group of students with similar backgrounds in high school math and science, FRC participants were:

- Nearly twice as likely to major in science or engineering (55 percent vs. 28 percent).
- More than three times as likely to major specifically in engineering (41 percent vs. 13 percent), and they majored in engineering at roughly seven times the average among US college students overall.
- More than twice as likely to expect to have a science or technology-related career after college (45 percent vs. 20 percent).

FIRST® Tech Challenge FAQ

What is the *FIRST*® Tech Challenge (FTC®)?
The *FIRST*® Tech Challenge (FTC®) for Grades 7-12 is a challenging mid-level robotics competition designed for young people who want a hands-on learning experience to develop and hone their skills and abilities in science, technology, engineering, and math (STEM). FTC was designed for teams who want hands-on experience building with a reusable kit and competing head to head against other teams in a sports-like atmosphere. FTC is also an ideal next step for students moving from *FIRST*® LEGO® League (FLL®) or prior to participating in the *FIRST*® Robotics Competition (FRC®).

What is the Game?
The annual game is revealed to teams each September. Teams must determine their strategy, develop their plan, and program, build, and test their robot. Working through the engineering process brings the reality of science and technology to students on an intimate, hands-on level. Teams compete in an Alliance format in a head-to-head competition that challenges them to adjust their tactics based upon changing Alliance partners and changing opponents during a competition.

How is the game played?
Using a combination of motors, controllers, wireless communications, metal gears, and sensors, including infrared tracking (IR) and magnet seeking, students program their robots to operate in both autonomous and driver-controlled modes on a field with a center rack. The object of the 2013-2014 game – FTC BLOCK PARTY!SM – is to score more points than an opponent by placing plastic blocks into pendulum goals. Teams are challenged to raise their team Alliance flag up a flagpole, raise their robots off the ground using a platform pull-up bar, and end the match with a balanced pendulum to earn extra points.

What do teams use to build their robots?
The FTC competition kit is a complete robotics platform designed to provide students with the same resources used by engineers and scientists. It consists of TETRIX™ or MATRIX metal parts, LEGO® MINDSTORMS® NXT Education Base Set, DC drive motors, servomotors, controllers, and advanced sensors. It also includes two software platforms which FTC teams can use to program their robots, including *LabVIEW for LEGO MINDSTORMS*, *ROBOTC* for FTC, and includes PTC's Creo, ProE and Windchill software. Teams are also allowed to use a wide array of raw materials.

Who participates in the competition?
In the 2013/2014 season, approximately 30,000 students on 3,000 teams are competing in FTC. Teams will advance through local and regional tournaments, with the chance to compete in the *FIRST* Championship, April 23-26, 2014. Each team is comprised of a professional Mentor or Coach and between 3 and 10 students on average. The program is flexible in structure, allowing teams to form within the school or home-school environment, as an after-school program, with a neighborhood group, or as part of any youth-based organization.

Where do events take place?
For the 2013/2014 season, more than 200 FTC events will be held in the U.S., Australia, China, Germany, India, Mexico, the Netherlands, New Zealand, Romania, Russia, Saudi Arabia, Singapore, South Korea, Spain, and Taiwan.

What do the students win?
Teams receive awards at FTC Qualifying and Championship Tournaments in recognition of their achievements in robot design, creativity, innovation, team performance, outreach, and enthusiasm.

Giving awards for outstanding achievement builds self-esteem in students and is a great way to encourage them to continue pursuing science, technology, engineering and mathematics. The highest level of achievement at an FTC competition is the Inspire Award. It incorporates elements of all other award categories.

A judging committee of distinguished professionals makes award decisions. With more than $13 million in scholarships available to participants, FTC is an opportunity for students to enhance their education and personal development through a challenging and meaningful extra-curricular activity. FTC programs are recognized by top universities and corporations as essential preparation for higher-education and workforce development.

Are there other benefits to participating?
Research conducted by Brandeis University has shown that the FTC program delivers powerful and tangible results in motivating students to do better in school, learning more about science and technology, and increasing consideration of careers in science, technology, engineering and math (STEM). More than 80 percent of participants in the program believe their desire to do better in school is a result of their participation in FTC. Nearly 84 percent of students indicate an interest in taking advanced math and science courses, and 89 percent indicate an interest in pursuing STEM as a career as a result of participating in FTC. FTC is also unlocking an awareness of how math and science can be used in the real world, with more than 90 percent citing their participation in FTC for sparking an interest in math and science.[1]

[1] Brandeis University FTC-FRC Cross Program Evaluation, July 2011

Is scientific, technology, or mathematic expertise required for students to participate in the *FIRST* Tech Challenge?
FTC motivates students just becoming familiar with basic concepts in science, math, and technology. The program effectively engages students from various backgrounds, instilling new ideas and concepts in more experienced students, while helping to inspire, motivate, and encourage learning basic principles and skills among students with less experience. Through their *FIRST* involvement, students also learn about important, life-long team skills such as planning, research, collaboration, mentorship, and teamwork.

What Sponsors are involved?
FTC is supported by Official Sponsor, Rockwell Collins, and CAD & Collaboration Sponsor, PTC.

FIRST® LEGO® League FAQ

What is *FIRST*® LEGO® League (FLL®)?
FIRST® LEGO® League (FLL®) for Grades 4-8 (ages 9 to 16; 9 to 14 in the U.S., Canada, and Mexico) introduces children to the fun and experience of solving real-world problems by applying math, science, and technology. *FIRST* LEGO League is an international program for children created in a partnership between *FIRST* and the LEGO Group in 1998. Each year, FLL announces an annual Challenge to teams, which engages them in authentic scientific research and hands-on robotics design using LEGO MINDSTORMS® technologies. After eight intense weeks, the FLL season culminates at high-energy, sports-like tournaments. In the 2013/2014 season, approximately 230,000 children are participating in close to 80 countries.

What is the LEGO Group's role?
The LEGO Group is the Founding Partner of *FIRST* LEGO League. Since its inception, the LEGO Group has supported the growth and success of FLL by contributing each year to the development, management, and funding of customized Challenge Kits, Robot Sets, marketing communications resources, Volunteers, and more.

What is the role of *FIRST*?
FIRST is responsible to provide:
- The overall vision and mission to inspire young people's interest and participation in science and technology. This vision guides all *FIRST* decisions and led to the development of the *FIRST* LEGO League program.
- The *FIRST* LEGO League program includes developing the annual FLL Challenge, the standards for the FLL program and Championship Tournaments, and supporting program documents.

Do you have any information on how *FIRST* LEGO League actually impacts the future science and engineering workforce?
Approximately 230,000 children will participate in FLL in 2013/2014. A study of FLL participants in the U.S. and Canada conducted by Brandeis University showed that:
- Ninety-four percent of Coaches reported an increase in students' understanding of how science and technology can be used to solve problems

Among past participants:
- Ninety-three percent wanted to learn more about computers and robotics;
- Eighty-eight percent wanted to learn more about science and technology; and
- Seventy-seven percent reported increased interest in having a job that uses science or technology when they are older.

Is the *FIRST* LEGO League experience rooted in real-world issues?
Absolutely. Every year, as FLL designs the Challenge, we look to the real-world practitioners and experts in the chosen subject area for guidance, input, and opinion, so that children are engaged in practical and realistic activities.

For the 2013/2014 **NATURE'S FURY℠** Challenge, FLL collaborated with organizations such as the Federal Emergency Management Agency (FEMA), the Red Cross, the National Weather Service, and other specialists to create a theme and challenge missions that reflect real-world issues.

Why did you select NATURE'S FURY as the 2013/2014 Challenge theme and why is it important?
Every FLL Challenge reflects an important real-world issue as a way to not only bring visibility to it among young children, but also as a way to show students how science and technology can contribute to solving problems. In **NATURE'S FURY**, teams will come up with innovative solutions to solve what can be done when natural events, like earthquakes, tornadoes, and hurricanes, meet the places where people work, play, and live. Throughout their experience, teams will operate under the FLL signature set of Core Values.

What do the students win?
The competition is judged in four areas: project presentation; robot performance; technical design and programming of the robot; and teamwork. A judging committee of distinguished professionals makes award decisions. The highest honor, the Champion's Award, goes to the team that is strongest across all four performance categories. Every participant who attends a Championship Tournament receives a medallion to commemorate his/her experience and dedication to the eight-week process.

What is the role of the *FIRST* LEGO League Partners?
FLL relies on Volunteers to run the program at many levels, from managing a region to coaching an individual team. FLL Operational Partners, or FLL Partners, roll out the FLL program in their respective regions. These FLL Partners fundraise, run Championship Tournaments, hold workshops and demonstrations, market FLL locally, handle public relations, and recruit Volunteers and teams.

What other Sponsors are involved?
In addition to the LEGO Group's role as Founding Partner, FLL is supported by Official Suppliers 3M and LEGO System A/S, and by Global Sponsors National Instruments, Rockwell Automation, and Statoil. Also, FLL Championship Tournaments are made possible by close to 200 local Sponsors with over 45 universities/colleges participating in FLL.

Junior *FIRST*® LEGO® League FAQ

What is Junior *FIRST* ® LEGO® League (Jr.FLL®)?
Junior *FIRST* ® LEGO® League (Jr.FLL®) for Grades K-3 (ages 6 to 9) is designed to introduce younger children to the fun and excitement of solving problems with science and technology. Jr.FLL teams are given a challenge based on the same theme as the *FIRST*® LEGO® League (FLL®) research Project, requiring them to build models and create a *Show Me* poster depicting their research journey. Teams are encouraged to gather together to share their projects and experiences with family and friends or at a locally organized Expo or on the Jr.FLL Online Showcase. In 2013/14, approximately 23,000 children are expected to participate.

Why did you select DISASTER BLASTER℠ as the 2013/14 Challenge theme and why is it important?
Jr.FLL is the starting point to exploring the world of science and technology. Every Jr.FLL Challenge reflects an important real-world issue as a way to not only bring visibility to it among young children, but also as a way to show students how science and technology can impact the world around them. In DISASTER BLASTER℠, participants experience a "hands-on" approach to the topic of natural disasters by exploring the awe-inspiring storms, quakes, waves, and more that we call natural disasters and how people prepare, stay safe, and rebuild.

What do the students win?
Jr.FLL offers a non-competitive introduction into the world of science, technology, and innovation. Teams are not judged but are encouraged to present their research findings to family and friends or at a Jr.FLL Expo or the Jr.FLL Online Showcase. Volunteers often organize expos where each child may receive a participation medal or other optional team recognition awards.

What is the Jr.FLL Online Showcase?
The Jr.FLL Online Showcase is a way for Jr.FLL teams to share what they have learned during the season. They do so by posting a team profile to jrfllshowcase.usfirst.org. They then have the opportunity to connect with other teams from around the world by checking out their profile pages, giving stickers, and sending them messages.

How is the Jr.FLL experience administered?
Jr.FLL relies on Volunteers to run the program at many levels. Parents, educators, community program administrators, can start and coach or mentor a team in their area. Jr.FLL also has Partners who facilitate the Jr.FLL program in their region. These Partners help fundraise, run expos, market Jr.FLL locally, handle public relations, and recruit Volunteers and teams.