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, engineering and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

FIRST provides four programs: the *FIRST*® Robotics Competition (FRC®) and the *FIRST*® Tech Challenge (FTC®) for Grades 9-12 (ages 14 to 18); the *FIRST*® LEGO® League (FLL®) for Grades 4-8 (ages 9 to 16; 9 to 14 in the U.S. and Canada); and the Junior *FIRST*® LEGO® League (Jr.FLL™) for Grades K-3 (ages 6 to 9). *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 three out of every five Fortune 500 companies – provide funding, mentorship time and talent, volunteerism, equipment, and more to make *FIRST* a reality. Founding Sponsors are Boston Scientific Corporation, Baxter International Inc., The Chrysler Foundation, DEKA Research & Development, Delphi, General Motors, JCPenney, Johnson & Johnson, Kleiner Perkins Caufield & Byers, Motorola, Inc., and Xerox Corporation. Strategic Partners are BAE Systems, The Boeing Company, DEKA Research & Development, FedEx Corporation, General Motors Corporation, Johnson & Johnson, Motorola Foundation, NASA, National Instruments, Rockwell Automation, Rockwell Collins, and Time Warner Cable. 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 Vestas are sponsors of *FIRST* LEGO League. Rockwell Collins is the Official Program Sponsor; PTC is the CAD & Collaboration Sponsor; and General Dynamics is a Program Sponsor for the *FIRST* Tech Challenge.

How does the education community support *FIRST*?
FIRST provides an education 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, 2010 *FIRST* high-school students are eligible to apply for close to $14 million in scholarship funds to continue education in science, technology, engineering, and math.

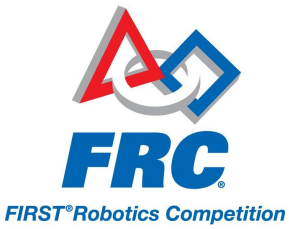
Who manages the teams and events?
FIRST is truly a volunteer-driven organization. For the 2010/11 *FIRST* season, more than 90,000 volunteers are expected to contribute in areas including mentorship, event management, recruitment, and team management. The growth and success of *FIRST* is a direct result 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 "What Teams and Events Are In My Area" red block map to find an event close to you – attendance is free!);
- Contact a mentor from a local team;
- Visit the *FIRST* website at www.usfirst.org; 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.

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."



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 2010, the largest-ever FRC included 1,808 teams from12 countries competing in 43 Regional events, seven District competitions and a State Championship (in Michigan only), and the *FIRST* Championship at the Georgia Dome in Atlanta.

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 solve the season's common problem using the same kit of parts and a standard set of rules. In the 2010 game, *BREAKAWAY*™, two alliances of three teams each compete on a 27-by-54-foot field with bumps, attempting to earn points by collecting soccer balls in goals. Additional bonus points are earned for each robot not touching the field at the end of the two minute and 15 second match. The 2011 game will be unveiled on January 8, 2011.

Who participates in the competition?
During the 2010 season, more than 45,000 high-school students on 1,808 FRC teams competed in 43 Regionals (in the U.S., Canada, and Israel), seven District competitions and a State Championship (in Michigan), and the Championship. Each team is comprised of professional mentors and an average of 25 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, the 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 computer animation, to fundraising and research, every student can actively participate and benefit.

What do the students win?
Teams compete for a series of awards honoring 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*. All participating students receive a medallion in honor of their achievements.

Any FRC participant is also eligible to apply for close to $14 million in scholarships from leading engineering colleges and universities.

Are there other benefits to 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.

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).

Goodman Research Group, Boston, Mass., found positive results from its 2000 *FIRST* Robotics Competition evaluation. Their findings showed:

- Improvement in student attitudes about science, math, teamwork and the working world.
- Improvement in students' self-image, particularly among under-represented groups.
- *FIRST* students' attitudes about teamwork are significantly more positive after *FIRST* than they were before participating in the competition season.
- Two-thirds of student participants indicated interest in working for one of their team sponsors after completing their education, and one fifth planned to work for one of their team sponsors in a summer internship or part-time job.

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 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.

What is the *FIRST*® Tech Challenge (FTC®)?
The *FIRST*® Tech Challenge (FTC®) for Grades 9-12 (ages 14 to 18) 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. FTC was designed for teams who want the same real-world challenges as the *FIRST*® Robotics Competition (FRC®); but who require a more affordable build kit and more geographically accessible events. FTC is an ideal next step for students moving from *FIRST*® LEGO® League (FLL®) or prior to participating in the *FIRST*® Robotics Competition (FRC®).

Does FTC replace existing *FIRST* robotics competitions?
No, FTC completes the family of *FIRST* programs that starts with Junior *FIRST*® LEGO® League (Jr.FLL™) where students graduate to *FIRST* LEGO League, then FTC, and finally to the *FIRST* Robotics Competition. *FIRST* Tech Challenge is an ideal next step for students moving from *FIRST* LEGO League (FLL) or prior to participating in the *FIRST* Robotics Competition (FRC). Young people can now become involved in robotics starting in the third grade and continue with *FIRST* through high school.

What is the yearly Challenge?
The Challenge is the annual game 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 a more intimate, hands-on level. The proving ground for this work is competition against other teams who are faced with the same challenge and resources.

How is the game played?
The 2010/11 game *GET OVER IT!*™ was developed with input of professional robotics designers, engineers, and sensor experts from across the country. Using combination of sensors, including infrared tracking (IR), line following, magnet seeking, ultrasonic, touch, and more, students program their robots to operate in both autonomous and tele-operated modes over a raised center goal. *GET OVER IT!*™ matches will last two minutes and 40 seconds, and begin with a 40-second autonomous period followed by a two-minute tele-operated period. The final 30 seconds of the tele-operated period is the “end game,” where teams can only make contact with their own bridge and will try to get their robots and goal on top of the bridges to get balance points.

What do teams use to build their robots?
The 2010 FTC competition kit is a complete robotics platform designed to provide students with the same resources used by engineers and scientists. It consists of an expanded *TETRIX*™ *Education Base Set,* LEGO® MINDSTORMS® NXT Education Base Set, DC drive motors, servomotors, controllers, and advanced sensors. It also includes three software platforms which FTC teams can use to program their robots, including *LabVIEW Education Edition*, *ROBOTC* for FTC, and PTC’s Pro/ENGINEER 3D CAD/CAM design software. Thanks to Cisco Systems for development and the

Kaufman Foundation for financial support, each FTC team will receive a Samantha module, an innovative, new WiFi robotic interface which allows teams to communicate more reliably with their robots and provides a Field Control System (FCS) that operates in both autonomous and tele-operated modes.

Who participates in the competition?
In the 2010/11 season, approximately 15,000 young people on 1,500 teams will compete in qualifying events and Championship Tournaments, and the *FIRST* Championship, April 27-30, 2011. Each team is comprised of a professional mentor or coach and a maximum of 10 students. 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 2010/11season, 100 official FTC events are being held in in the U.S., Canada, the Netherlands, Mexico, India and China.

What do the students win?
Teams compete for a series of awards honoring 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 *FIRST* Tech Challenge Inspire Award, a peer- and formal-judged award that honors the team that performs well in all categories, is viewed by other teams as the most desirable alliance partner, and is viewed by judges as best exemplifying all components of the *FIRST* Tech Challenge philosophy.

With more than $7 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?
A team of researchers at the Center for Youth Development at Brandeis University conducted an evaluation of the 2006 pilot season that included observation of the six events and interviews with teams and their coaches/mentors. Both team leaders and team members assessed FTC positively:

- Ninety percent or more reported that the program had increased participants understanding of basic science principles, how technology could be used to solve real-world problems, and team members' understanding of the engineering design process
- Ninety-three percent of participants reported wanting to learn more about science and technology
- Eighty percent or more of participants reported increased interest in science and technology careers and doing well in school
- Seventy-four percent of team leaders participated as a way to get youth involved in science and technology.

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; CAD & Collaboration Sponsor, PTC; and Sponsor, General Dynamics.

FIRST® LEGO® League & Junior *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. and Canada; outside the U.S. and Canada) 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 September FLL announces an annual Challenge to teams, which engages them in authentic scientific research and hands-on robotics design using LEGO MINDSTORMS® technologies. After 8 intense weeks, the FLL season culminates at high-energy, sports-like tournaments. In the 2010/11 season, more than 170,000 children are expected to participate in more than 50 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 *FIRST*'s role?
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?
More than 170,000 children will participated in FLL in 2010. A study of FLL participants in the US 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.

The 2010/11 **Body Forward**® Challenge is very much linked to and rooted in the work undertaken by such organizations as Next Step Prosthetics and Orthotics; Draper Laboratory – Biomedical Engineering Group; University of Minnesota – Center for Medical Devices; and University of Virginia – Department of Biomedical Engineering.

Why did you select Body Forward as the 2010/11 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 **Body Forward**, participants will explore the cutting-edge world of Biomedical Engineering to discover innovative ways to repair injuries, overcome genetic predispositions, and maximize the body's potential, with the intended purpose of leading happier and healthier lives.

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 Junior *FIRST*® LEGO® League (Jr.FLL™)?
Junior *FIRST*® LEGO® League (Jr.FLL™) for Grades K-3 (ages 6 to 9) is an extension of *FIRST* LEGO League and is designed to introduce younger children to the fun and excitement of solving problems with science and technology. Jr.FLL teams are given a modified version of each year's 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. In 2010/11, approximately 10,000 kids are expected to participate.

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 sponsors National Instruments, Rockwell Automation, and Vestas. Also, FLL Championship Tournaments are made possible by close to 200 local sponsors with over 45 universities/colleges participating in FLL.