



## **FIRST<sup>®</sup> FAQ**

### **What is FIRST<sup>®</sup>?**

*FIRST<sup>®</sup>* (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<sup>®</sup>* Robotics Competition (FRC<sup>®</sup>) and the *FIRST<sup>®</sup>* Tech Challenge (FTC<sup>®</sup>) for Grades 9-12 (ages 14-18); the *FIRST<sup>®</sup>* LEGO<sup>®</sup> League (FLL<sup>®</sup>) for Grades 4-8 (ages 9-16; ages 9-14 in the U.S. and Canada); and the Junior *FIRST<sup>®</sup>* LEGO<sup>®</sup> League (Jr.FLL) for Grades K-3 (ages 6-9). *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 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, 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, and Rockwell Collins. 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,

2009/10 *FIRST* high-school students are eligible to apply for close to \$12 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 2009/10 *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](http://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](http://www.usfirst.org); or
- Contact *FIRST* at 1-800-871-8326.

Interested volunteers can visit our website at [www.usfirst.org](http://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<sup>®</sup> Robotics Competition FAQ**

### **What is the FIRST<sup>®</sup> Robotics Competition (FRC<sup>®</sup>)?**

The FIRST<sup>®</sup> Robotics Competition (FRC<sup>®</sup>) for Grades 9-12 (ages 14-18) 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 includes 1,809 teams from 12 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 2009 game, LUNACY™, robots were designed to pick up 9" game balls and score them in trailers hitched to their opponents' robots for points during a 2 minute and 15 second match. Additional points were awarded for scoring a special game ball, the Super Cell, in the opponents' trailers during the last 20 seconds of the match. "LUNACY" was played on a low-friction floor, requiring teams to contend with the laws of physics. The 2010 game will be announced on January 9, 2010.

### **Who participates in the competition?**

During the 2010 season, over 45,000 high-school students on 1,809 FRC teams will compete 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 \$12 million in scholarships from the 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% vs. 28%).
- More than three times as likely to major specifically in engineering (41% vs. 13%), 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% vs. 20%).

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.



## **FIRST<sup>®</sup> Tech Challenge FAQ**

### **What is the FIRST<sup>®</sup> Tech Challenge (FTC<sup>®</sup>)?**

The FIRST<sup>®</sup> Tech Challenge (FTC<sup>®</sup>) for Grades 9-12 (ages 14-18) 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<sup>®</sup> Robotics Competition (FRC<sup>®</sup>); but who require a more affordable build kit and more geographically accessible events. FTC is an ideal next step for students moving from FIRST<sup>®</sup> LEGO<sup>®</sup> League (FLL<sup>®</sup>) or prior to participating in the FIRST Robotics Competition.

### **Does FTC replace existing FIRST robotics competitions?**

No, FTC completes the circuit of FIRST programs that starts with Junior FIRST<sup>®</sup> LEGO<sup>®</sup> 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 2009/10 game *Hotshot!* was developed with the input of professional robotics designers, engineers, and sensor experts from across the country to provide a relevant engineering challenge. Robots will develop and execute both offensive and defensive strategies to score balls into a rotatable center goal and off-field goals in the last 30 seconds of a match. Using a combination of sensors including infrared tracking (IR), line following, ultrasonic, touch, and more, students will program their robots to operate in both autonomous and tele-operated modes. The *HotShot!* matches will last two minutes and thirty seconds, and will begin with a 30 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 additional outside goals become available and bonus balls come into play ensuring an exciting finish.

### **What do teams use to build their robots?**

The 2009 FTC competition kit is a complete robotics platform designed to provide students with technology scientists and engineers use. It consists of an expanded TETRIX® metal robot structure kit, LEGO® MINDSTORMS® NXT robotics kit, DC drive motors, servomotors, controllers, and advanced sensors. It also includes three software platforms which FTC teams can use to program their robots, including LEGO® NXTG, National Instruments LabView™ for FTC, and RobotC.

### **Who participates in the competition?**

In the 2009/10 season, approximately 13,000 young people on 1,300 teams are expected to compete in 40+ tournaments and the *FIRST* Championship, April 15-17, 2009. 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?**

In 2009/10, we anticipate 60 qualifying events and Championship Tournaments to be held in the U.S., Canada, Holland, and Mexico.

### **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:

- 90% 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
- 93% of participants reported wanting to learn more about science and technology
- 80% or more of participants reported increased interest in science and technology careers and doing well in school

To learn more about *FIRST*, go to [www.usfirst.org](http://www.usfirst.org)

- 74% of team leaders participated as a way to get young people 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<sup>®</sup> LEGO<sup>®</sup> League & Junior FIRST<sup>®</sup> LEGO<sup>®</sup> League FAQ**

### **What is FIRST<sup>®</sup> LEGO<sup>®</sup> League (FLL<sup>®</sup>)?**

FIRST<sup>®</sup> LEGO<sup>®</sup> League (FLL<sup>®</sup>) for Grades 4-8 (ages 9-14 in the U.S. and Canada; ages 9 to 16 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<sup>®</sup> 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<sup>®</sup> technologies. After 8 intense weeks, the FLL season culminates at high-energy, sports-like tournaments. In 2009, more than 147,000 children are expected to participate in more than 50 countries.

### **What is The LEGO<sup>®</sup> 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 147,000 children are expected to participate in FLL in 2009. A study of FLL participants in the US and Canada conducted by Brandeis University showed that:

- 94% of coaches reported an increase in students' understanding of how science and technology can be used to solve problems

Among past participants:

- 93% wanted to learn more about computers and robotics;
- 88% wanted to learn more about science and technology; and
- 77% 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 2009 **Smart Move** Challenge is very much linked to and rooted in the work undertaken by such organizations as the Center for Advancing Research and Solutions for Society at the University of Michigan; General Motors Corporation, and Garmin.

### **Why did you select Smart Move as the 2009 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 **Smart Move**, participants will explore the many modes of transportation that currently exist and streamline them by making smart moves to help access people, places, goods, and services in the safest, most efficient possible way.

### **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*<sup>®</sup> LEGO<sup>®</sup> League (Jr.FLL)?**

Junior *FIRST* LEGO League (Jr.FLL) for Grades K-3 (ages 6-9) 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 2009, approximately 9,000 children 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.