

Overview of FIRST and Its Programs

FIRST (For Inspiration and Recognition in Science and Technology) is an international non-profit organization whose goal is to promote science and technology in education. Its core value is "gracious professionalism" – excellence in quality of work and character. It encourages students to take an active role, not only by competing on teams, but also in mentoring younger teams and volunteering at tournaments. There are 2 main programs, and a third is being launched:

1. FIRST Lego League (FLL) - for students ages 9-14 (elementary/middle school). Teams are challenged in 2 task areas: 1) to build and program a robot to perform certain tasks and 2) to perform research on a theme which relates technology to practical problems. The students are evaluated in 4 areas: robot performance, robot design, research project, and teamwork (interviews are conducted for the last 3 categories). Themes have included Ocean Odyssey, No Limits (overcoming the challenges of disabilities), Mission to Mars and City Sights. The cost per team is approximately \$700 for new teams, and \$300 for returning teams. Modesto teams have participated since 2003.
2. FIRST Robotics Competition (FRC) – for high school students. Teams of students (average team size is 30) build life-sized robots that perform specific tasks on a gym floor-sized field. The cost per team typically ranges from \$10,000 - \$40,000 (many teams are sponsored by technology corporations and universities). Last year, over \$6 million in college scholarships was awarded to FRC participants.
3. FIRST Vex – program being pilot tested for high school students. In response to complaints that FRC is too expensive for many high schools, FIRST created Vex and is launching it regionally at 6 locations on the East Coast in Spring 2006. Modesto's team participated in the first National Vex Pilot in Atlanta in April 2005. An unofficial Vex tournament was held in San Pablo in December 2005, and it is likely that a Vex competition will be available in Stockton in Fall 2006. (For more--see page 3)

Benefits to students. Participation in FIRST programs provides students with the opportunity to learn and use a wealth of skills: engineering design, machining and/or building, computer programming, research, technical writing, public speaking, interviewing, teamwork, web design, graphic artistry, and fundraising, to name a few. Students who mentor teams and organize tournaments also acquire leadership and administrative skills. In addition, many students who are heavily addicted to video games often have certain aptitudes which robotics uses in a creative, active way. Repetitive trial and error, puzzle-solving, and fast-fingers action are crucial to good robot design and performance.

Benefits to the community. FIRST has the potential to bring technological development into a community in a positive way. For example, Clovis began its FLL program in 2002 and grew from to 80+ teams in 2005. Over 500 children and 70 adult coaches from the Clovis/Fresno area (most of whom are parents and teachers with no formal technical or engineering background) are involved in building and programming robots through FLL. In addition, these adult coaches have formed an organization called Central Valley Robotics, whose mission is to promote technology in education in their community.

Benefits to business. Students in FIRST programs gain technical skills and exposure which are essential in keeping up with advances in technology. They often are motivated to seek higher education, obtaining skills that businesses need. Businesses also have the opportunity to receive recognition from the community by sponsoring tournaments and forming partnerships with schools.

More information is available at:

www.usfirst.org

www.firstlegoleague.org

www.cvrobotics.com

<http://www.wildstang.org/fll/video/>

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FIRST Lego League Robotics – For Elementary/Middle School Students

What?

FIRST (For Inspiration and Recognition in Science and Technology) Lego League is a nationwide series of tournaments where teams of students ages 9 - 14 perform research on an assigned theme and build robots from Lego parts which perform assigned tasks. The 2005 theme is Ocean Odyssey; previous themes include No Limits, Mission to Mars, City Sights, and Arctic Impact. More information on the First Lego League can be found at www.usfirst.org and www.firstlegoleague.org.

When?

The teams generally meet from early September through November in preparation for the tournament(s). Details of the official Challenge are announced in mid-September. Regional and local tournaments are typically held late October through January. The Central Valley State tournament is typically held in early December.

Team?

Teams are comprised of up to 10 students and at least one adult coach. There is no minimum number, but at least 3 are recommended. Having an adult or youth mentor is desirable if possible.

Task and evaluation?

The 2 main task areas are: 1) building and programming robots using RIS or Robolab (computer languages) and 2) researching the assigned topic and preparing a 5-minute presentation. While every student should be familiar with each area, these tasks can be divided and assigned according to the abilities and interests of the individuals. Teams are judged 4 main areas: robot design, robot performance, research project, and team work (e.g. enthusiasm, sportsmanship, cooperation). At the tournament, team members take part in a technical interview (for robot design), a research presentation/interview, and 3 or more robot runs for performance. Teamwork judges may give an interview, but are also continually evaluating students in the practice areas, at the competition table, and throughout the tournament. Additional awards may be given at the judges' discretion.

Tournaments?

There are State tournaments held in Clovis and San Jose; a team may not attend more than one State tournament. Regional/local tournaments can be found on the FLL website. Tournaments generally cost \$20 – 50. There are 2 types of regionals: qualifiers and non-qualifiers. The top 20-40% of teams from qualifiers typically advance to the state level.

Time commitment?

Team members typically spend about 5 hours/week in during FLL season (2 – 3 months). This could involve 2 weekly meetings of 2 – 3 hours each, or one weekly meeting of 2 – 3 hours, plus individual homework assignments of 2 – 3 hours.

Cost?

The approximate cost to run new team is:

Robot kit and parts	\$250 - 300
Registration (+ tx)	160
Challenge kit (+ tx, S&H)	65
FLL table materials	50 - 150
Tournament fees	50 - 100
<u>Misc. (batteries, photocopies)</u>	<u>25</u>
Total	\$600 - 800

Note: Returning teams do not need to purchase an additional Robot kit or FLL table. The Challenge kit and FLL table can be shared by multiple teams at the same site.

Local (Stanislaus County) FLL contact?

Yolande Petersen (kyjipetersen@hotmail.com) has coached an FLL team for 2 years and coordinated a local tournament in Modesto in 2004 & 2005. A list of people interested in receiving updates on FLL and FIRST programs is being compiled.

FIRST Vex (For Inspiration and Recognition in Science and Technology) Low-Cost High School Robotics

The FIRST Robotics Competition (FRC) is a well-developed high school robotics program which typically costs schools \$10,000 - \$40,000/year. In response to complaints that this program is too expensive for many high schools, FIRST created its Vex high school program, which was pilot tested nationally in April 2005 and launched at 6 regional centers in Spring 2006 (the nearest to Modesto was Arlington, TX). Modesto's robotics team participated in the national pilot in April 2005.

1. Task

- Teams are expected to build a robot from the Vex kit and accessories which performs tasks outlined in the FIRST Vex Challenge, which is issued in October.
- Teams are expected to document their work in an engineering journal, which enables an independent builder to reconstruct the robot, as well as recording ideas which may or may not have been used to actually build the robot.
- It is beneficial if the team constructs a practice field which enables the robot to be tested in an environment similar to the one it will face on competition day.

2. Tournaments

- In 2006, 6 official FIRST Vex regional tournaments were held in DE, MO, GA, TX, CT, and SC. It is expected that more regional tournaments will be held in 2007, and Stockton, CA is being discussed as a possible site.
- An unofficial Vex competition was held at Contra Costa College in San Pablo, CA in Dec. 2005.

3. Kit and Parts

- Use of the Vex kit (\$300) from Radio Shack is required.
- Additional accessories are permitted and advised. These include programming platform (\$100), battery pack (\$50), metal and hardware kit (\$80), chain and sprocket kit (\$30), and tank treads (\$30).
- Replacement parts for pieces that are cut or broken are permitted.

4. Other Requirements

- A meeting room with access to a computer is required for most meetings.
- Hacksaw, vise, workbench, and tin snips are occasionally needed for modification of robot parts.
- Access to construction tools for building the field elements is needed early in the season.

5. Cost

Basic kit and parts:	\$590
Replacement parts, misc:	\$100
Challenge field materials:	\$100
<u>Tournament registrations:</u>	<u>\$500</u>
Total:	\$1290

- Basic kit and parts cost is for parts outlined in #3, not including tax or replacement parts. It is recommended that each school have 1 – 2 kits with accessories, although the programming platform may be shared (a second set would cost an additional \$500). Radio Shack periodically offers significant discounts on Vex kits and parts (10 – 30%).
- Challenge field materials include PVC pipes, soft tiles, wood, and screws.
- FIRST Vex charges \$500 in registration fees for its official tournaments (\$200 to the national organization, \$300 to the site to cover the costs of venue rental and expenses like awards).
- The registration fee for the unofficial Vex competition at Contra Costa College was \$50/team (most schools had 2 kits and sent 2 teams).

6. Team Size and Composition

- At this time, no official limit on team size has been set, though 5 – 10 students is recommended.
- Possible team roles include robot builders and programmers, technical writers, photographers, videographers, website designers, field construction crew.

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