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# Robotics Coaches' Manual

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*Funding provided by Department of Labor, Employment & Training Administration: WIRED Initiative*

# Robotics Coaches' Manual

## Special points of interest:

- Learn what to look for when selecting students for a robotics team
- How to divide the work among students on a team
- Suggestions for the research project
- What to expect at a tournament

## Topics of Interest

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## Introduction

So you have decided to join the FIRST LEGO League! FLL will be an exciting and motivational experience for both you and your students. This manual has been designed to help coaches and schools navigate through the process of building a strong program. This manual has been written by two teachers at a middle school in the Santa Clarita Valley who have years of experience in robotics coaching.

The program at Placerita Jr. High school began in 2003, when students at the local high school asked Paul Kass to serve as advisor to a new robotics program. With no previous experience, he agreed and formed

two teams with the high school students providing the technical knowledge. In that first year, one team won a third place award in robot performance at a state tournament. Two years later, the program grew to four teams and Wendy Mathis joined the team as a co-coach. We have continued to win numerous awards

at local tournaments and state tournaments. Two of our high school mentors have also won the "Young Mentor Award" at state tournaments.



You may feel that there is a great deal to learn about coaching robotics and FLL. We have written this manual to help make this process easier. You don't have to have experience in engineering or robotics to be successful.

# Choosing a Team

Choosing a team can be an overwhelming task. Some teams may struggle with finding enough team members while others may have to turn away students who want to be a part of the program. Regardless of your situation, you should look for students from different backgrounds and experience. For example, you may want some who have an expertise in Lego robotics already, some who are good with researching and those students who are just good team players.

## How to Advertise to Students

To begin finding these students, start by advertising around the school. You can post signs and banners, have a demonstration at brunch or lunch which could include videos from prior competitions (available on the internet), include an announcement in the daily bulletin, school newsletter and website. You might consider advertising specifically to GATE students or to students enrolled in enriched or honors classes.

## Informational Meeting

Once you have an interest list, the next step should be to hold an informational meeting. Parents and interested students should be invited to this meeting so that everyone understands your philosophy of coaching and the commitment that you require from robotics students.

During this meeting, show a video of a tournament from online or show a mat from a previous tournament. Hand out applications and a timeline of events which should include: application deadlines, try outs, practice sessions, team dinner, and tournaments dates.

This is the time when you really need to sell the commitment aspect or you will have some students and parents who will not take it seriously. When team members are habitually absent from practice sessions or they come late and leave early, valuable time is lost and the team will suffer. We recommend that you have an attendance requirement that students may not miss more than 2 meetings and that they must attend all tournaments. If parents will have to drive their children to tournaments, make sure that you explain that to them. Ask

parents and students to look at the other commitments they have and determine if they will be able to participate in the robotics club

Unless you have sufficient funding for the year, we recommend that you charge a reasonable fee for student participation in robotics. Every year there are financial obligations that need to be fulfilled: FLL registration, tournaments fees, t-shirts, and research project supplies. Depending on the size of your team and the number of tournaments that you plan to attend, we recommend charging between \$30 and \$50 to cover these costs.

At this meeting, you should also ask for parent volunteers to help you during the year. Parents can be very helpful and save you valuable time. Give them examples of the types of jobs with which you need help. Refer to the section on parent volunteers for more suggestions.

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you really need to  
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# Tryouts

Conducting tryouts will help you to build a more successful team. It is also very difficult to cut students from the team when they are interested in robotics. We suggest that you form a committee of other coaches, teachers, and mentors to help you observe students during the tryouts and choose the members of the team.

We usually conduct five activities and score each student on their performance. These activities are designed to measure a student's building skills, programming experience, research skills, lead-

**Note to Coaches**  
*Group students by their general experience level and explain to students that they will not be eliminated because they lack experience.*

## **Building Skills**

Create a simple mission where a robot is required to drag small objects from one end of the board to the other. Instruct students to build an attachment that will be able to complete the mission. The students will not actually use the attachment, but you will be able to assess their building skills and the practicality of their creation. Assess their work for creativity and its expected performance.

## **Programming Experience**

Make paper cut outs of RoboLab icons for students to use for this activity. For students with little or no experience, spend a few minutes giving a short lesson, and then ask them to use the icons to write a simple program. For students with more experience, assess their level of expertise by giving them a series of robot commands that increase with difficulty.

## **Research Skills**

Find an article that relates to the FLL theme for the year and ask students to answer questions and write a summary of the article. Include open ended questions about how they

would find out more information about the topic. Consider using an article that is a little above their average reading level since much of what they will encounter during the research project will be difficult. This will also give you insight into which students have the highest abilities.

## **Interview**

An interview will give you information about students speaking skills and their interest in robotics. Students often will say unexpected things, such as, "My mother told me I have to do this," or "I live and breathe LEGOS and this is the biggest dream of my life."

Since you will not have enough time to interview students individually, put them in groups and ask each student to answer the same question. We usually ask:

- Why do you want to do robotics?
- What does commitment mean to you?
- What past experience (not necessarily in robotics) will help you to contribute to your team?

## Leadership Ability

These activities present a group of students with a problem that must be solved. Students who are natural leaders will step forward to help, other students will show themselves to be team players, and some students will be disruptive. Watch each group and take notes on student behavior.

### Human Knots

Begin by having everyone stand in a circle. Then have each student hold left hands with the person across from them. Make sure they are not holding hands with the person next to them. Then they should do the same with their right hand. Make sure they are not holding both hands with the same person. Then working together, they need to undo the knot and form back into a circle without letting go of any one's hand.



### Tarp Turn

Lay a tarp flat on the ground. Have all the students stand on the tarp. Then working together, they need to turn the tarp over without any student stepping off the tarp.

### Shark Island

Draw a square on the ground that is 1.5 ft. by 1.5 ft. Then tell students that they must all stand on the square and no part of their body can be touching the ground around it. When done, discuss why this task is nearly impossible.

## Selecting Students for the Team

FLL has a maximum team size of ten students. They will not allow more than ten to attend a tournament. We have found that six students on a team is optimal and allows all students to participate. Make a list of all of the students who came to try outs and summarize the information on your rubric to one page. Write out each student's strengths and weaknesses. You should choose students to build a balanced team with strengths in building, programming, and research skills.

Work with your committee to make the best selections that you can. Once you have selected your team, send congratulations notices to students that have been selected and thank you notices to those who were not selected (see appendix).



# Team Building

During the first practice session, give teams time to choose a name which represents your school and the FLL theme of the year. For example, during Nano Quest, many team names included words such as nano, cyber, tech, mini, etc. You should always refer to the team by their team name to help them begin to think of themselves as a team.

## Division of Work

To make sure that every student is engaged during practice sessions, assign each member of the group a role. The role is not necessarily a particular job such as programmer, builder, and researcher. Give them a role that helps with the organization and management of the team. These roles can be rotated throughout the season.

*We have identified six possible roles that you can use. If your team is larger than six members, assign two students to a job.*

<p><b>Team Manager</b></p> <p>Takes attendance, keeps team on task, liaison to coach</p>	<p><b>Equipment Manager</b></p> <p>Checks out equipment, responsible for kit</p>
<p><b>Board Manager</b></p> <p>Resets board, inventories board pieces</p>	<p><b>Research Manager</b></p> <p>Records the team's progress on research</p>
<p><b>Scorekeeper</b></p> <p>Scores the board during practice runs, charts the high score</p>	<p><b>Historian &amp; Record Keeper</b></p> <p>Takes pictures for team, records accomplishments, fills out and posts goal sheet</p>

## T-Shirts

Most teams have shirts at competitions to make it easy to identify team members. A simple shirt with team name and logo is sufficient. You may want to have a design contest to come up with the logo.

# Goal Setting

To keep your team on task during the season, it is help to create goals to be accomplished. Work with your team to develop the goals and have them posted in the work area. This ensures that everyone is continually making progress. Goal setting entails writing goals, objectives, and action plans. Teams will know they have been successful when all the items on

their action plans have been accomplished. It also ensures that every student participates and contributes to the team.

In the chart below we have defined the three parts of goal setting and given an example of each one.

*See the appendix for a goal implementation worksheet.*

Component	Description	Example
<b>Goal</b>	A broad, long range, desired achievement	Earn a high score in robot performance.
<b>Objective</b>	A specific, short-term accomplishment that is measurable	Create a program to accomplish mission X.
<b>Action Plan</b>	A very specific list of tasks designed to complete the objective, each item on the list is assigned to a person	Students A and B will create the program. Students C and D will build the attachment.

# Brainstorming

Brainstorming is a technique to help students find creative solutions to problems. As their coach, you must develop a safe environment where every student feels that their ideas will be accepted and considered. Effective brainstorming keeps one student from controlling everything and other students feeling left out of the discussion. Everyone feels that they have contributed to the plan or at least had the opportunity to contribute. When brainstorming is completed, everyone can move in one direction.

Start by writing the problem on a whiteboard.

1. Allow each student to offer suggestions and write down their ideas. Instruct students that they should not offer criticism or judgment about another student's idea. Every idea should be treated as a good idea. Set a time limit for how long students will be allowed to give ideas.
2. Go back through each idea and discuss its potential success.
3. Ideas that may not work can be crossed out at this time.
4. Ideas that will work should be incorporated into your goal setting plans.



# Navigating through Conflict

During the season, you are sure to encounter times when students are distracted and unmotivated. Finding out the reason for the problem will help you to solve it. Below is a chart with common reasons and solutions.

Problem	Possible Solution
Students lack the skills to continue building, programming or doing research	Create a small lesson to teach the skills they are lacking. Provide time where you will be available to give them more help as they learn new skills.
Disagreements over the division of work. Some students complain that they are doing all the work and others feel they aren't allowed to participate.	Work on goal setting, objectives, and action plans. Make sure that everyone has something to do and that they all have a chance to build and program.
Disagreements over how to proceed on a project	Lead a discussion with the group allowing both sides to present their argument. Have the team vote to determine the next direction.
Interpersonal conflicts	Discuss respect for others and sort out their problems the best that you can. Consider asking your school counselor to help sort through these problems if they become disruptive.

# Team Management

## Volunteers

Coaching robotics teams can be demanding and time consuming. Finding parents, high school students, and community members that are interested in helping can lighten the load. At the information meeting, recruit parents that can help you. High schools that are involved in the FIRST program, and local engineering companies may provide you with additional volunteers.

Potential roles for these volunteers could be:

- Programming Mentor
- Robot Design Mentor
- Research Project Mentor
- Historian & Photographer



## Timeline of Events

Month	Events and Deadlines
May	FLL registration opens
August & September	Informational meeting Applications for joining FLL robotics Interview process to select team Announce team members FLL Challenge arrives, build models
October & November	Team practices Register for local & state competitions
December	State competitions Team dinner
February	Look for regional, informal competitions in your area

## Budget

We did not include the cost of a computer in the budget since most schools will have one available. for your use.

2007 Budget for Each New Team	
Item	Cost (\$)
FLL Registration	200
Field Set-up Kit	65
Robotics Kit	280
Extra Lego Equipment	80
RoboLab	130
Local Tournament	50
State Tournament	50
T-Shirts	120
Supplies for Research Project	50
<b>TOTAL</b>	<b>1025</b>

2007 Budget for Each Established Team	
Item	Cost (\$)
FLL Registration	200
Field Set-up Kit	65
Local Tournament	50
State Tournament	50
T-Shirts	120
Supplies for Research Project	50
<b>TOTAL</b>	<b>535</b>

## Fundraising and Publicity

We developed this schedule based on a practice session of an hour and forty-five minutes. Practice sessions that exceed two hours often fall apart as other things distract team members.

There are different ways to raise funds for your team. The participation fee will help to cover operating costs, but it may not be enough. You may need new equipment, other supplies or additional tournament fees.

Consider writing for a grant or requesting money from ASB, school site council, local engineering firms and other interested companies.

It is a good idea to publicize the formation of your team, scores and awards at recent competitions and upcoming events. It is important to keep everyone informed to encourage potential sponsors and to recruit volunteers.

Community members like to get involved in programs they have heard about. You can publicize through your local newspapers, radio stations, magazines, school and district newsletters and websites. Also keep your PAC or PTA well informed.



*Fundraising and publicity are related because the more publicity you can get, the more fundraising opportunities will come your way.*

## Practice Area Set-up and Organization

A dedicated practice room is ideal, but a classroom with a board will work. Purchase multi-drawer organizers for small pieces and always inventory major parts of the robot and require team members to take inventory weekly. If possible, build a table with a light (refer to FLL instructions). If you only have one table, use a 2x4 for the unity mission. Have a specific place for teams to store their robot and research papers. Have bulletin board where teams can post their team name, a chart of their progress, and their goals, objectives, and action plans.

## Team Meetings

Consider holding separate robot practice meetings and research meetings. Most students want to work with the robot, and they are surprised to learn that there is a research component to the competition. It can be difficult to convince a student to willingly put down the robot and work on their research topic. If you must combine the meetings, always work on the research before taking out the robots.

# Robot Practice Meetings

## **Action Plan Meeting (10 minutes)**

Begin this meeting by discussing the goals that you have set for the day. Teams work best when you tell them what you expect them to complete before the team begins their practice runs. Have teams review their objectives and action plans. This is also a good time to show students a new building technique or programming sequence.

## **Teams Work on Missions (60 minutes)**

Allow team members freedom during this time to experiment with building and programming. They should be working on the specific action plan that they set for themselves during the general meeting. Be available to help them, but never do the work for them. We often give hints and tell them, "Figure it out for yourself."

## **Practice Runs (15 minutes)**

This fifteen-minute window is set aside for teams to complete as many missions as possible during timed rounds. Don't begin using practice runs until students have completed at least two missions. It may take a few weeks for students to reach this point. Provide each team with a timer and remind students to complete their assigned roles.

Practice runs help teams to integrate the completion of new and old programs. Teams may have difficulty completing several missions during the 2 ½ minutes allotted. If they are using more than one attachment, they will need to practice attaching and removing these pieces between programs. With some types of programming, the beginning position of the robot is essential to its success. There is a dif-

ference between perfecting a specific mission and being able to perform several missions in a row. The more practice times that are provided, the more likely those teams will have a favorable outcome. In addition, teams may accidentally alter or lose a program that they believed was complete and ready for a competition. Teams don't always realize this is a problem until an upcoming tournament is eminent. When students are required to perform their old missions at each practice session, they will be working toward a higher final score for the season.

## **Competition Runs (10 minutes)**

Competition runs are designed to help students prepare for a tournament. Begin competition rounds at least two weeks before a tournament. The coach should time and run these sessions in the same way as they are run at actual competitions. Mimicking the competition environment will prepare operators and supporting team members to perform well under stress.

Consider turning the lights down, playing loud music, and loudly announcing mission successes and fumbles. Don't allow teams to restart if they make a mistake in the first few seconds. Write down their scores for each round and then have teams graph their highest score on a giant chart.

## **Clean Up (5 minutes)**

Requiring teams to clean up well each day will save time during the next practice session. Consider purchasing some of the plastic organizational bins that are available to keep track of important parts. Assign one student to account for the small pieces that are a part of the mat.



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## Research Meetings

### Coaches' Participation

Talk to your team and give them advise on the best direction of their project, examine their project for illogical or unreasonable ideas, edit their written work for grammar, and assist teams develop their visual aids. As a coach, you should always ensure that the students are doing the work and that you are not doing more than advising them. Judges see many projects during a tournament and they can usually recognize projects that were completed by adults instead of team members.

Devote time to reading FLL's description of the project carefully. The project usually has multiple components and team members are sometimes confused about the main point of the project. The coach's responsibility is to keep the team project on track.

## Team Participation

To ensure that all team members take part in the research, we recommend that the main topic be divided into several subtopics, which can be dispersed to members individually or in pairs. The assigned subtopics should be investigated on the team member's own time. The team member should report his/her findings to the team and prepare to present their portion of research to judges at the tournament. Team members should discuss the direction of the project and vote whenever there are disagreements.

*Develop a  
democratic system  
where teams vote  
on all important  
decisions..*

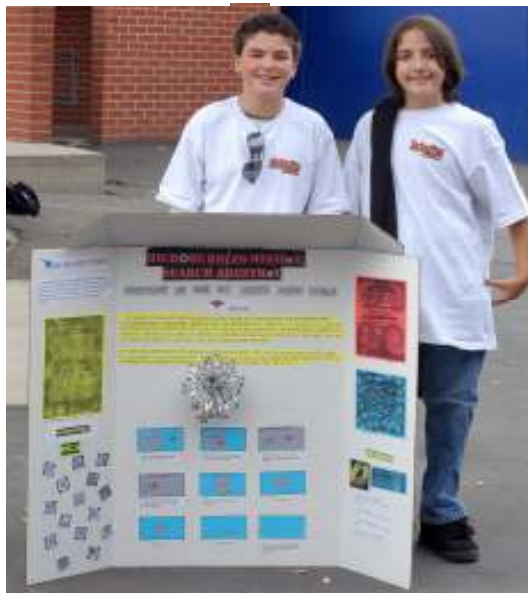
# Components of the Research Project

## Visual Aids

Teams should create visual aids to help them as they make their presentation. They should include pictures, graphs and three-dimensional models that are relevant to their research topic. Find examples from past FLL projects on-line or past student projects at your school to give them an idea of the quality that you expect.

### *Suggestions for visual aids:*

- three-section poster
- several single posters
- flip-top chart
- PowerPoint presentation (Check with your local tournament directors to find out if they will have a computer and LCD projector available for team use if you do not have these.)



## Suggestions for Posters

Teams may need assistance with the layout of their poster. Encourage students to sketch out and create a possible layout. After discussing it with the team and making changes, students should begin assembly. Below are some general suggestions to help students make an attractive poster:

- large titles and sub-titles
- bright colors
- color borders for the outline of the poster, pictures, graphs, and written portions
- written sections should be formatted with an easy-to-read font that is 18 point or larger
- pictures that relate to the research topic
- pictures of team members
- pictures of the team on a field trip that relate to the research topic
- graphs that will be explained during the presentation
- three-dimensional components

## Written Information

Require your team to write a one to two page research paper. Portions of their paper can be used as the written portion of their poster or other visual aid. Some teams have chosen to write a brochure that introduces research judges to the team's project and also introduces the members of the team. The brochure can include a picture of the team

## Presentation Style

Part of a team's final re-search score will be based on their style of presentation. Judges sometimes see 10-20 presentations in a day. For a team to stand out, their presentation style must be unique and entertaining. Many teams make their presentation fun and entertaining by including a skit or demonstration.

Team members can dress up as characters or even as inanimate objects that relate to their research topic.

Teams should practice their presentation for coaches at least one week before the tournament. Take notes while they are practicing



using the rubrics provided in the FLL Coaches Handbook and make suggestions to help them improve. Once teams have made changes, they should practice the presentation at least three more times.

# Steps in Project Development

## *Topic Selection*

This may be one of the most difficult parts of the research project. Team members often desire different topics and conflict may ensue. Some teams struggle to find a topic that they find interesting and go in circles for weeks. On other teams, one or two students complete the entire project while the others barely know what the topic is. The plan presented in this chapter is designed to help teams work together to compete a quality project.

During the first research meeting, have students explore the FLL-recommended websites. Students can explore these sites in pairs and until they find a topic of interest. Require each pair to find at least five reputable web pages about the topic.

Student pairs should present their ideas for the research topics at this team meeting. After all of the ideas have been presented, ask students to vote on their favorite topic. Before voting, you may need to encourage students that as a team, they must all be fully committed and work hard on the project even if it is not the topic they would like.

## *Topic Development and Subtopic Identification*

After a topic has been selected, all students should read about the topic on the Internet and in print resources. Require students to take notes on the information they find.

Help students discuss the direction of their project. Ask them to identify the subtopics of the project, especially in view of FLL's project description. Team members or pairs should take subtopics as their portion of the project. The pairs will be responsible to thoroughly research their subtopic and report back to the team each week.

## *Team Pairs Develop the Subtopics*

Pairs should print or copy articles about their subtopic. Pairs should outline the most important information for their subtopic and submit the works consulted list. Pairs should present and discuss their findings with the team. Teams should adjust the project direction as needed.



## *Developing the Written Portion of the Project*

Pairs should write a few paragraphs summarizing their findings. Have groups peer-edit each others work. A coach or other adult should edit their written portions and work with the team to make it sound cohesive.

## *Developing the Presentation Style and Visual Aids*

Lead the team in a discussion of their presentation style and visual aids. When the team has come to a consensus, divide up the remaining work among members. Teams should practice their presentations and receive feedback from the coach.



# Competitions

Before you go to the competition and at the beginning of the day, tell students that they are to have fun and do their best. Remind them that the tournament is not about winning.

## Checklist

Items to bring:

- Consent and release form
- laptop computer
- surge protector
- extension cord
- robot
- extra pieces
- USB cord
- copy of all programs
- jump drive with back up of all programs
- team banners
- research project
- back up robot
- mat and models (if allowed)
- battery charger
- snacks & drinks

## When you arrive

Find the check-in table and they will give directions that are specific to the tournament. Be prepared that you will only be given a certain amount of wristbands. You can check with the tournament director prior to the competition to learn the number they will give you.

A pit area will be provided for you that will be your base of operations. Organize equipment and student's personal belongings. Most tournaments allow you to post a banner to personalize your area. Make an effort to find your pit judge and review the schedule with them. Tell students that they should be prepared to speak to the pit judge at any time. Sign up for a practice time on a practice table.



## Note to Coaches

*If the tournament requires you to travel out of the county, you will need to file the appropriate paperwork with your district office in order to attend.*

Be prepared that all tables are constructed differently and this may affect your team's robot.

### Competition Arena

Arrive at competition arena 5-10 minutes before the start time. Identify which two students will be operators. You may choose different students for different rounds. Depending on tournament, team members may be allowed to stand next to the board or they may have to wait in the stands. Whatever you do, your team should always move together. Most competitions ask coaches to stand away from the table during the competition.

During each round be prepared for loud music and noises. The action on the tables will be announced by the MCs.

### Research Presentation

For the research presentation, the team needs to bring the following: visual aids, props, and supporting materials. In some instances, they will also be judged on robot construction and programming so they may need to bring their robot to this presentation.

Most tournaments allow only team members and judges in the research room. Even if you are allowed in the presentation, we recommend that you don't go in with your team to reduce the pressure they feel presenting in front of you.

At the conclusion of your last round, clean up your area and put away all belongings to avoid the crowds. Get to the awards ceremony early. Ask parents to reserve seats. Have the team sit together.

## State Tournament Awards

At state and local tournaments, teams are judged in four ways: Robot Design, Robot Performance, Project Presentation, and Teamwork. One award is given for each category to the team that earned the highest score. The Director's Award, which is considered the highest honor, is awarded to the team that earns the highest overall score when each category is given a 25% weight. A team that wins a Director's Award at a state tournament qualifies to compete in the FLL World Festival in Atlanta, Georgia.

Judging at FLL State Competitions		
Technical Category	Robot Design	Robot Performance
	Robot Innovative Design Award	Robot Performance Award
Team Presentation	Project Presentation	Teamwork
	Project Award	Teamwork Award

FLL publishes rubrics for robot design, project presentation and teamwork in the FIRST LEGO League Coaches' Handbook. These rubrics are detailed and they are designed for use by judges at tournaments. We have summarized these rubrics into a shorter form to use with students (See Appendix).

We recommend that you spend time reviewing these summaries with your team. When each team member understands how they will be judged, they will be able to improve their scores in each category. Consider posting the summaries and asking teams to score themselves to identify their strengths and weaknesses.

## Last Thoughts

We hope that this manual has helped you in the start up of your FLL robotics team. The energy and work that you put into your team will be rewarded in the end. Good luck and we look forward to meeting you at many FLL robotics competitions.

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## Helpful Websites

<b>ON-LINE RESOURCES</b>	
First Lego League	<a href="http://www.firstlegoleague.org">www.firstlegoleague.org</a>
Carnegie Mellon University—Robotics Academy	<a href="http://www.education.rec.ri.cmu.edu">www.education.rec.ri.cmu.edu</a>
Tufts University for Engineering Educational Outreach	<a href="http://www.ceeo.tufts.edu">www.ceeo.tufts.edu</a>
Oregon Robotics Tournament and Outreach Program	<a href="http://www.ortop.org">www.ortop.org</a>
High Tech Kids Online	<a href="http://www.hightechkids.org">www.hightechkids.org</a>
Lego Education West	<a href="http://www.legoedwest.com">www.legoedwest.com</a>
FLL Freak’s Website	<a href="http://www.fll-freak.com">www.fll-freak.com</a>
<b>LEGO SUPPLIES</b>	
LEGO	<a href="http://www.lego.com">www.lego.com</a>
Pitsco	<a href="http://www.pitsco.com">www.pitsco.com</a>
Bricklink	<a href="http://www.bricklink.com">www.bricklink.com</a>
<b>FUNDRAISING RESOURCES</b>	
Fundraising Ideas & Products Center	<a href="http://www.fundraising-ideas.org">www.fundraising-ideas.org</a>
Fundraiser Help	<a href="http://www.fundraiserhelp.com">www.fundraiserhelp.com</a>
Step by Step Fundraising	<a href="http://www.stepbystepfundraising.com">www.stepbystepfundraising.com</a>

# Sample Application for Robotics

## <Letterhead>

Welcome and thank you for your interest in the <school name> Robotics Program.

The <school name> Robotics program is broken up into two parts. During the first semester, a select group of students will be chosen to compete in the First Lego League competitions. During the second semester, any student who would like to learn about Robotics will be allowed to join the program.

### What is the First Lego League?

First Lego League provides an inspirational learning experience that celebrates science and technology for 9 to 14 year-old students. FLL believes that the natural curiosity and creativity inherent in students are qualities to understanding complex problems, envisioning possibilities, and developing innovative solutions to solve the *Challenge* – a current scientific or technological need facing the world.

Working in an environment that encourages inquiry and hands-on experimentation, team members fulfill project responsibilities modeled after actual professions. The roles they assume grant them the thrill of discovery as they witness firsthand how abstract concepts become concrete solutions. Team members will also learn life skills such as respect for others, appreciation of different perspectives, cooperation, perseverance, and time management. As a result of the FLL experience, participants gain confidence, discover new skills and interests, and shape their futures.

Each year, the FLL season (September to December) begins with a new challenge. First develops the challenge, which engages teams in the same problem-solving process practiced by industry: research, brainstorm, design, build and test. Teams use the RoboLab program and LEGO bricks, sensors, motors and gears to construct and program a fully autonomous robot capable of completing the various missions of the challenge.

This year's challenge:



### Who can join <school name> Robotics?

Any 7<sup>th</sup> or 8<sup>th</sup> grade students may try out for the <school name> Robotics team during the first semester. To be eligible, you must not be older than 14 years old as of January 1, 2007. Students, who wish to be considered for the team, must also have at least a 2.0 GPA and no D's or F's on any progress report or report card. Students trying out for the team must commit to all meetings and competitions (see Calendar section). Students absent from 3 meetings will be disqualified from the team. Students trying out for the Robotics team will be interviewed by <names/titles>. The <school name> Robotics program will be registering one team with ten students.

During second semester, any student may join the Robotics program. Students must maintain at least a 2.0 GPA and have no F's on any progress report or report card.

## Calendar of Activities

September/October (Meetings begin on <day of the week> <date>)

Meetings - <days and hours>

Research Meetings - <days and hours>

November

Design and Research Meetings – <days and hours>

Challenge Practice Meetings – Selected Saturdays. Time TBA

Santa Clarita Valley Competition – Saturday November 10, 2007

9:00 am to 12:00 pm, awards ceremony at 4:00

December

Practice Meetings – as needed

LEGO Land Competition – December 1, 2007

February – May

Robotics Meetings – <day of the week and hours>

## Responsibility

Students involved with this program will be using the computer software, RoboLab, laptop computers, and robots. Teams and students are responsible for the equipment they are assigned to and will be financially responsible for any lost, broken or damaged equipment.

Students are also a part of a team. As in all team situations, each member is a key part of the program. When a student is absent, the team may not be able to complete the challenge. It is therefore the responsibility of each student who joins the robotics program to have a strong commitment and attend all meetings and competitions.

# <Letterhead>

To qualify to be a team member of the <school name> Robotics Program, please fill out the following application. All applications must be returned by <day of the week> <date>. Please answer in complete sentences and be as specific as possible.

Name \_\_\_\_\_ Grade \_\_\_\_\_ Birthdate \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_ Parent's Name \_\_\_\_\_

Student Email address \_\_\_\_\_

Parent Email address \_\_\_\_\_

English Teacher \_\_\_\_\_ Math Teacher \_\_\_\_\_

Science Teacher \_\_\_\_\_ History Teacher \_\_\_\_\_

Have you ever participated in the First Lego League Robotics Program? \_\_\_\_\_

If "Yes" explain where and what your responsibilities were.

Why do you want to be a part of the <school name> Robotics program?

What qualities would you bring to the robotics team?

What does the word "commitment" mean to you?

What does the word "teamwork" mean to you?

Why should you be chosen to be a part of the <school name> Robotics Competition team?

We have read the information page and understand what is involved in being a part of the <school name> Robotics program.

Student's Name (printed) \_\_\_\_\_

Student's Signature \_\_\_\_\_

Parent/Guardian Name (printed) \_\_\_\_\_

Parent/Guardian Signature \_\_\_\_\_

## Mini Research for Challenge 2007



**2007 Theme:**

<copy theme description from FLL website>

### Mini Research Qualifying Project

For your mini-research project, <create an assignment for students>.



# Dear Robotics Team Member,



## Congratulations!!!!!!

You have been selected to be a part of the <school name> Lego Robotics Program. Our first official meeting will be <day and date> from <times>. Please be prompt as we have to get ready for our missions and set-up our kits. On <day>, you will also be assigned to one of our four teams.

Remember that being in this program requires a commitment. If you feel that you are unable to make this commitment, please let me know so we can invite an alternate to take your place.

<Coach's Name>

# Dear Robotics Team Applicant,

Thank you for applying for a position in the <school name> Robotics Program. As you know, we had a lot of people apply for only a few spots and we could not take everybody. Even though you have not been chosen, we will keep you on our alternate list. We also would encourage you to come back in February when Robotics is open to everyone and there are no limits on the size of our team.

<Coach's Name>



# Goal Implementation Sheet

**Goal**

**Objective**

<b>Action Plans</b>	<b>Person(s) Responsible</b>	<b>How Results Will Be Measured</b>	<b>Date Started</b>	<b>Date to be Completed</b>
#1				
#2				
#3				

# Robot Design Evaluation

	Needs Improvement	Fair	Good	Excellent
<p><b>Strategy, Process, Problem Solving</b></p> <ul style="list-style-type: none"> <li>Communicates complete design process including initial ideas, building, testing and refinement.</li> <li>Innovative strategy (combining missions, plotting routes, maximizing points)</li> </ul>	1	2	3	4
<p><b>Locomotion and Navigation</b></p> <ul style="list-style-type: none"> <li>Goes defined distances efficiently and accurately</li> <li>Adjusts speed based upon position and accuracy</li> <li>Turns are accurate and consistent</li> <li>Uses various sensors</li> </ul>	1	2	3	4
<p><b>Kids Did the Work</b></p> <ul style="list-style-type: none"> <li>Knowledge of robot structure by understanding the design and technology with age specific explanations</li> <li>Building was done by the team members</li> </ul>	1	2	3	4
<p><b>Structural</b></p> <ul style="list-style-type: none"> <li>Robot assembles easily with a stable base.</li> <li>Attachments function as expected and are easily added or removed from the robot. They also perform tasks well and are repeatable</li> <li>Displays a wide range of capabilities</li> <li>Design is unique and creative</li> </ul>	1	2	3	4
<p><b>Overall Design</b></p> <ul style="list-style-type: none"> <li>Robot is an elegant and complete system</li> <li>All components work well together</li> <li>All components look like they belong together.</li> </ul>	1	2	3	4
<b>TOTAL SCORE</b>				

# Research Project Evaluation

	Needs Improvement	Fair	Good	Excellent
<b>Question, Language Use</b> <ul style="list-style-type: none"> <li>• Clear</li> <li>• Persuasive with examples</li> <li>• Question stated directly</li> <li>• Logical</li> <li>• Relevant</li> </ul>	1	2	3	4
<b>Completeness, Teamwork</b> <ul style="list-style-type: none"> <li>• All team members participate</li> <li>• Date is documented</li> <li>• Students answer judge's questions</li> <li>• Clearly, the kids did the work</li> </ul>	1	2	3	4
<b>Background, Data &amp; Graphics</b> <ul style="list-style-type: none"> <li>• Books, periodicals, websites cited</li> <li>• Supporting printed material given to judges</li> <li>• Visual aids clearly support research</li> </ul>	1	2	3	4
<b>Analysis &amp; Conclusions</b> <ul style="list-style-type: none"> <li>• Conclusions supported by data</li> <li>• Analysis relates to question</li> <li>• Clear, supported position on issues</li> <li>• Alternative views considered</li> <li>• Original insights</li> </ul>	1	2	3	4
<b>Style</b> <ul style="list-style-type: none"> <li>• Creative, imaginative</li> <li>• Joy for audience, humor</li> <li>• Clarity and good speaking</li> <li>• Well-rehearsed</li> <li>• No technical difficulties</li> <li>• Clever choice of presentation style</li> </ul>	1	2	3	4
<b>TOTAL SCORE</b>				

# Programming Evaluation

	Needs Improvement	Fair	Good	Excellent
<p><b>Programming</b></p> <ul style="list-style-type: none"> <li>• Program is logically organized</li> <li>• Programs are efficient and work for every task</li> <li>• Programs work in competition as well as in practice</li> <li>• Variables, loops, subroutines and conditions are used</li> </ul>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<p><b>Kids Did the Work</b></p> <ul style="list-style-type: none"> <li>• Kids can describe the programs</li> <li>• Knowledge of programming is shown through understanding</li> <li>• Programming was done by team members</li> </ul>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>TOTAL SCORE</b>				

# Request for Out of County Travel

<Letterhead>

<Date>

Re: Request for out of county travel

For: <school name> Team trip to <competition name>

Submitted by: <coach's name>

“The FIRST LEGO League (FLL), considered the "little league" of the FIRST Robotics Competition, is the result of a partnership between FIRST and the LEGO Company. FLL extends the FIRST concept of inspiring and celebrating science and technology to children aged 9 through 14, using real-world context and hands-on experimentation.

With the help of LEGO® MINDSTORMS™ Robotics Invention System™ technology, young participants can build a robot and compete in a friendly, FIRST-style robotics event specially designed for their age group. Using LEGO bricks and other elements such as sensors, motors, and gears, teams gain hands-on experience in engineering and computer programming principles as they construct and program their unique robot inventions. “

The robotics students at <school name> would like to attend the <competition name> in <city, state> on <date>.

We are requesting permission for up to <number> to attend this competition. The students will be accompanied by their parents and supervised by <coach's name>.

*Funding provided by Department of Labor, Employment & Training Administration: WIRED Initiative*



[www.InnovateCalifornia.net](http://www.InnovateCalifornia.net)

