

Introduction to LEGO® Robotics and MindStorms Software

**Fall 2010
8:30-3:00 or
9:00-3:30***

**Presented by Maine Robotics
167 Bennoch Road
Orono, ME 04473**

Tom Bickford, Instructor

***Check website for finalized dates,
locations, and times**

Agenda:

1. Welcome and Logistics:
2. Background on Robotics
3. Building your first robot
4. Working with the MindStorms software
5. Common problems
6. Overview of different programming languages
7. The FIRST LEGO League (fall)
8. Imbedding robotics into the classroom
9. Encouraging individual creativity and fostering teamwork
10. On-line resources and books that are available

The NXT MindStorms Kit

This basic workshop is designed to cover getting a team or a class going using the LEGO MindStorms kit.

The kit comes with motors and sensors that have a more “Technic” or “Bionicle” look. Connections are made with a phone type plug. The NTX (the brain) can communicate with the computer using either a USB cable or by using BlueTooth technology. The motors have built in sensors for control and the NTX can handle 4 sensor inputs (not counting the motors). There are light, touch, sound and distance sensors.

The possibilities with the NXT kit are extensive. Most of the parts that come with the kit are not your standard ‘knob and hole’ LEGO pieces, and our experience has shown that there are definite plusses and minuses when working with the kit.



Learn how to Program the robots!

For many adults programming is a 4 letter word, but the LEGO® Group did a good job at making the NXT easy to program. During the workshop

you will have the opportunity to learn basic programming with the software and the NXT brick.

The software environment is 100% graphic and allows you to build a flow chart styled program that logically progresses along in its function.



For those still using the RCX or the RoboLab 2.9 software, we will answer questions but you should bring a laptop with the software installed so we can help you program.

Building a Robot

Since robotics is a two part process, you also need to build a robot. We have basic instructions for beginner robots using the NXT robot kits.

The FIRST LEGO League (fall)

The FIRST LEGO League (FLL) is an international program for ages 9 to 14 and runs from September to December in Maine. Each year teams of 2 to 10 children work on building robots that solve the missions while researching and presenting a problem related to the year’s theme.

This year’s theme is **BODY FORWARD** and focuses on *biomedical engineering* issues.

All missions are the same around the world! All played on the 4’ x 8’ playing field and teams

have 2-1/2 minutes to complete as much as possible. Its all about teamwork, brainstorming, and reliability.

Each team also identifies a problem or condition that they want to research (having to do with biomedical engineering) and then researches information about that topic, including brainstorming ways to improve the problem or condition for the future. Answers have to be original, thought out, but not necessarily up to engineering standards.

Other areas that the teams are evaluated on include; programming, robot design, team spirit, team work, and innovative thinking.

Imbedding robotics into the classroom

With more than two million MindStorms kits having been sold by the LEGO Group, it isn't surprising to see more and more teachers having access to them in the classroom. The kit can be used to build robots, demonstrate/experiment with mechanical principles, and to collect data from the classroom environment.

Because robotics is a multi-disciplinary field it can be incorporated into a number of different programs within a school.

Mathematics:

By experimenting with robots and the resulting actions you can do work with $F=ma$, coefficients of friction, conservation of momentum, gear ratios, data collection and evaluation, and plain old general math.

Science:

Simply by building and working with robots you can teach general science, mechanics, physics, electrical engineering, system design, and computer programming. But on a larger scale

you can look at how robotics impacts all of the other avenues of science.

Language Arts:

Having to work as a team to do the research, develop a report and presentation, and then give that is a perfect example of how Language Arts can be tied in to the FLL program.

Encouraging individual creativity and fostering teamwork

Perhaps one of the greatest impacts that can be accomplished with a robotics program is the involvement of the individual and the creation of positive teamwork. There are few times in a modern classroom where a child can be asked to create a technological marvel, be given minimal guidance, told to do it their way, and still have a great success.

Links for more information:

Good source for purchasing the kits

www.legoeducation.com

Home page for the new NXT kit

www.mindstorms.com

Maine Robotics home page

www.mainerobotics.org

FIRST's home page

www.usfirst.org

International Home Page for the FLL

<http://usfirst.org/roboticsprograms/fll/>

Robotic Curriculum Pages:

Tufts Center for Education Engineering

Outreach and LEGO curriculum:

<http://www.legoengineering.com/>

Botball Curriculum from KIPR (KISS Institute of Practical Robotics)

www.kipr.org/curriculum/curriculum_intro.html

NASA Robot Educational Matrix

<http://robotics.nasa.gov>

Carnegie Mellon University. Robotics Academy

http://www.rec.ri.cmu.edu/education/robotic_scurriculum/index.html

Registration:

Mail this form or email the equivalent information and payment to:

You may also register and pay ONLINE at www.mainerobotics.org/workshops.html

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Orono, ME 04473
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207-866-4340

Name: _____

Phone: _____

Alt. Phone: _____

Email: _____

School/group: _____

Address: _____

City: _____

State: _____ Zip: _____

COST:

\$30/attendee

\$15 for high school mentors (must be accompanied by an adult)

[] October 4th -- Portland

[] September 27th - Auburn

[] September 29th - Machias

[] September 30th - Bangor

Check website for others as they develop.