**Advanced Robotics Day Camp: Building a Bot**

**with LEGO Mindstorms NXT**

Did you ever want to build a robot? This four-week LEGO Mindstorms NXT course offers a great opportunity to learn the basics of assembling and programming a robot in a fun and exciting way. During this course, the students will build and program a flexible robot vehicle that can be used with several different modular attachments. The robot will be programmed to follow a line, to recognize when it needs to stop, and execute several simple actions, like lifting and carrying an object, and using several modular attachments.

*Week 1 -- Building the Bot: Getting to Know Sensors*

The first lesson in robot building is learning how to build with LEGO Technic parts and to assemble a wheeled robot (Express Bot). LEGO Mindstorms relies on somewhat different pieces than the usual LEGO building sets. Students will familiarize themselves with sensors and how they work by assembling simple mechanical constructions and writing very basic programs. Once the students understand the role sensors play in the robot's ability to execute a program, students will assemble the Express Bot that will be used in the rest of the class.

*Week 2 -- Building the Bot: Getting Around*

The second phase will focus on controlling the robot’s movements by writing programs. The robot will receive instructions on how to follow a line and recognize a point at which it needs to stop, as well as use the input from other sensors to turn away from walls or to stop. By the end of this phase, the students will complete a program that will allow Express Bot to navigate a simple maze.

*Week 3 -- Building the Bot: Picking Stuff Up*

The LEGO Mindstorms set comes with interchangeable accessory modules that can be used to accomplish simple tasks, like picking up and carrying objects. During the third phase, the students will construct a simple arm to pick up a box. Using elements of programming from the previous phase, the students will program the robot to follow a path, pick up a box, and carry it back.

*Week 4 -- Building the Bot: Working Together* The last part of class will showcase how robots can work together by creating a synchronized “dance” routine with all of the robots, not unlike a robotic rifle guard.