

Beginning Robotics 1

Dates: September 11 - October 23, 2013 (7 weeks)

Instructor: Digital Kidz

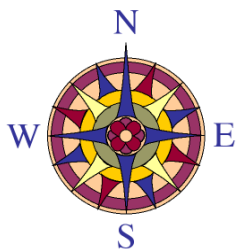
Objective: This course is an introduction to robotics using Lego Mindstorms. Students start by learning basic robot construction, programming using the NXT-G graphical language, and robot movement. Each week students will construct a base robot from online instructions and incorporate different sensors such as sound, light, touch, ultrasonic, and infrared sensors. Student will learn programming concepts such as conditional statements, loops, variables, and multitasking. Each week's project will apply increasingly complex robot behaviors such as repeat instructions, consecutive actions, path planning, and navigation.

Skills Learned:

- Programming using the NXT-G graphical programming language.
- Motors, rotation, and sensors (sound, light, touch, ultrasonic, infrared).
- Robot navigation and path planning.
- Apply conditional statements, loops, variables, and multitasking.
- Learn how to use feedback from sensors to make robots complete a simple task.

Preliminary Course Outline

<u>Week</u>	<u>Theme/Topic</u>
1.	Movement and Turns <ul style="list-style-type: none">• Build base robot.• Overview of the NXT programming environment.• Learn the basic Motor block movement pattern to program the robot to drive forward and backward.• Program the robot to make left, right and measured turns.• Download and run a program.



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2. Sound Sensor
 - Use a sensor to control the robot's behavior.
 - Write a program that makes the robot stop and go using sound.
 - Use a Loop in a program to repeat behaviors.
 - Program two behaviors in a row.

3. Light Sensor
 - Calculate a threshold value for the Light Sensor.
 - Set programmatic decisions to control robot behavior.
 - Use a Switch and Loop blocks to program the robot to track a line.
 - Examine the effects of changing motor speed on line tracking.

4. Touch Sensor
 - Build a Touch sensor bumper.
 - Program the robot to stop when it runs into something.

5. Ultrasonic Sensor
 - Determine Ultrasonic sensor values.
 - Take sensor reading of a small object.
 - Determine the limits of the Ultrasonic Sensor's detection range for the object.
 - Program the robot to stop before it runs into something.

6. Display and Sounds
 - Program the robot to use sounds and images to convey a personality.
 - Design a way for the robot to show an emotion.
 - Learn about human-robot interaction.

7. Infrared Sensor
 - Review math blocks and switch.
 - Design a program for the robot to scan for infrared, speed up when it approaches the infrared ball, and use third motor to swing a hockey stick.
 - Play a robotic hockey game and score as many goals against your opponent as possible!

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