Duke/DPS Robotics Program
10/20/2011
Lesson Plan 2

Goal: *Familiarity with the NXT brick and with basic movement in NXT-G.*

Materials Needed: *Assembled robot with one downward-facing light sensor*

**Part 1: The NXT Brick**

You should have discussed the NXT with your group last week, but review the basics again at the start of this week. The Lego NXT has 4 sensor ports, 3 motor ports, 4 buttons, and a screen. Ask your students which of these are input and which are output. If they don’t know, provide examples of I/O with a computer: mouse and keyboard are input while monitor and speakers are output. Make sure to show them the battery, the charger, the battery life indicator, and how to power the robot on and off.

**Part 2: Working in NXT-G**

A. *Basic Program Structure*

All NXT-G programs are written in a program screen like the one below. Programming icons are all available in the “palettes” to the left. Icons are strung together in the grey space.
B. Moving Forward

To move forward, you need to use the “Move” block. Discuss all of the ways you can control the move block, including Port, Direction, Steering, Power, Duration, and Next Action. Specifically discuss how “unlimited” duration works, and when you might want to use it.

![Move block in NXT-G](image)

**Programming Challenge**

Write a program that will make the robot move forward at 50% power for 5 seconds. Do this twice, once using unlimited duration with a wait block (described below).

C. “Wait” and Time

One useful block in NXT-G is the “Wait” block. There are a lot of different things you can program your robot to wait for. The picture below shows all of the options for the wait block (left to right: time, touch sensor, light sensor, sound sensor, ultra-sonic sensor).

![Wait block in NXT-G](image)

**Programming Challenge**

Write a program that moves forward until the robot senses black.
D. Turning

How the robot to turn? Talk through all of the ways to that your robot can make a turn, including sending power to only one wheel and spinning the wheels in opposite directions.

In NXT-G we can control the motors with two different blocks: move blocks and motor blocks.

Move block with steering:

Motor blocks

**Programming Challenge**

Write a program that will move forward at 50% power for 2 seconds, turn left for 1 second, move forward at 50% power for 2 seconds, then turn right for 1 second.