

Basic Programming - NXT and EV3

Presented by teams Robrostorms and LEGO Robot Alliance

Concepts:

- Create programs on a computer. Download programs to robot - need to keep track of programs using distinctive names and a version control (either a date or version number e.g. "V01" as part of the file name. Programs cannot be uploaded from the robot to the computer.
- Programming blocks have default information filled in already. Programming is easiest when the robot is set up using the default ports.
- The robot has output ports (A, B,...) for motors, used to move the robot or an attachment. The direction the robot moves depends on the orientation of the motors. Ports B and C are the default ports for driving the robot. Port A (for NXT) and ports A and D (for EV3) are the default ports for attachments.
- The robot has input ports (1, 2,...) for sensors. Some common sensors and their default ports (#) are:
 - (1) Touch sensor - can detect objects by bumping into them
 - (2) Sound sensor - not used in competition
 - (3) Light sensor - can detect lines on the mat and help robot follow them
 - (4) Ultrasonic sensor - measures distance to an objectColor sensor - can detect colors on the mat
Gyro sensor - can measure turns and keep the robot going straight
- The programming screen has 4 sections:
The palette that contains the programming blocks
Programming workspace where the program is created
Configuration panel where the blocks settings are selected
Download control to transfer the program to the robot
- Program by dragging and dropping program blocks, then configuring them. Programs are linear. They execute one block at a time. Programs are read left to right.
- Set the move block's parameters for direction, steering, power, duration (rotations, degrees, seconds, unlimited), and next action (break or coast).
- Each program block has an ACTION - what the block executes
and/or a FLOW - when the program moves to the next block.
- The distance the robot will travel in one rotation depends on the size of the wheels.
- Turning - it takes twice as much space for the robot to turn using one motor instead of two motors. When two motors are used the robot spins in place.
- There is a difference between the degrees a motor turns and the degrees a robot turns.
- A loop block is used to repeat a section of programming blocks.

- Robots can use squaring, wall following and sensors for navigating around the competition field.

Basic Programming - NXT and EV3

Presented by teams Robrostorms and LEGO Robot Alliance

Resources:

<http://www.firstlegoleague.org/challenge/teamresources> - this webpage has all kinds of resources. Scroll down to the Robot Game - Programming section to find links to NXT and EV3 tutorials.



We thank Cyber Robotics Learning for sponsoring the summer robotics events. They are offering fun classes where team members and parent coaches can get hands on experiences with the NXT. Parent coaches can attend programs for free when you sign up your child (space permitting). Contact them directly at www.cyberroboticslearning.com.

Contacts:

Ridgewood STEM Club at ridgewoodstem@gmail.com

Sandra Mueninghoff from Glen Rock Engineering And Technology (GREAT) Association at GRrobotics@gmail.com