

# Activity: Let's build a ball shooter using LEGO NXT

- This activity assumes that the lesson ‘What is a robot?’ has already been covered. This activity takes 50 mins.



# INSTRUCTIONS TO ASSEMBLE THE BALL SHOOTER

- Follow the link below for building instructions.

[http://www.nxtprograms.com/NXT2/ball\\_shooter/steps.html](http://www.nxtprograms.com/NXT2/ball_shooter/steps.html)

The instructions have also been provided at the end of this PowerPoint, starting at slide 4.

- You can also watch the following ½ minute video to see what you'll be building:

[http://www.youtube.com/watch?v=\\_k8bqWySzk4](http://www.youtube.com/watch?v=_k8bqWySzk4)

**STUDENT ACTIVITY SHEET** – to be handed out to the students prior to the activity. Students fill this as they complete the activity. The answers are to be discussed after the entire activity.

- What happens when you turn the system on by pressing the enter button on the NXT brick?
- Why does this happen?
- Is there any similarity between this and how you throw a ball using your hand? Explain it clearly.

**Attachment: Instructions for building and programming the NXT Ball Shooter – follows starting slide 5**

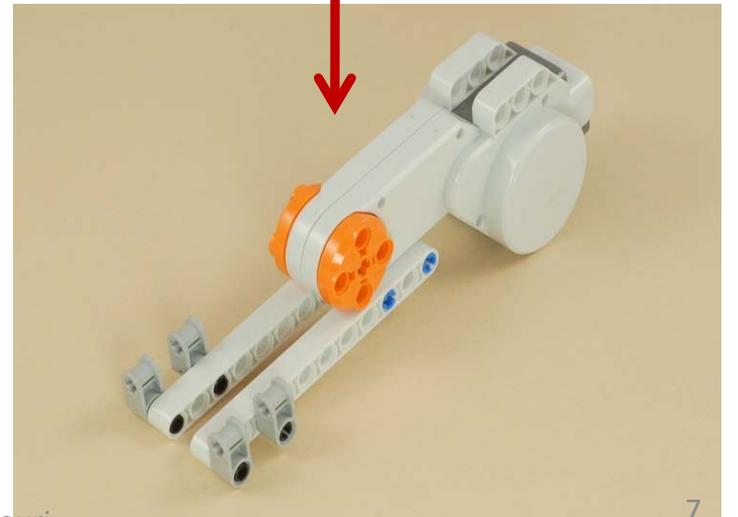


# BUILDING: STEP 1

- **What you need:**

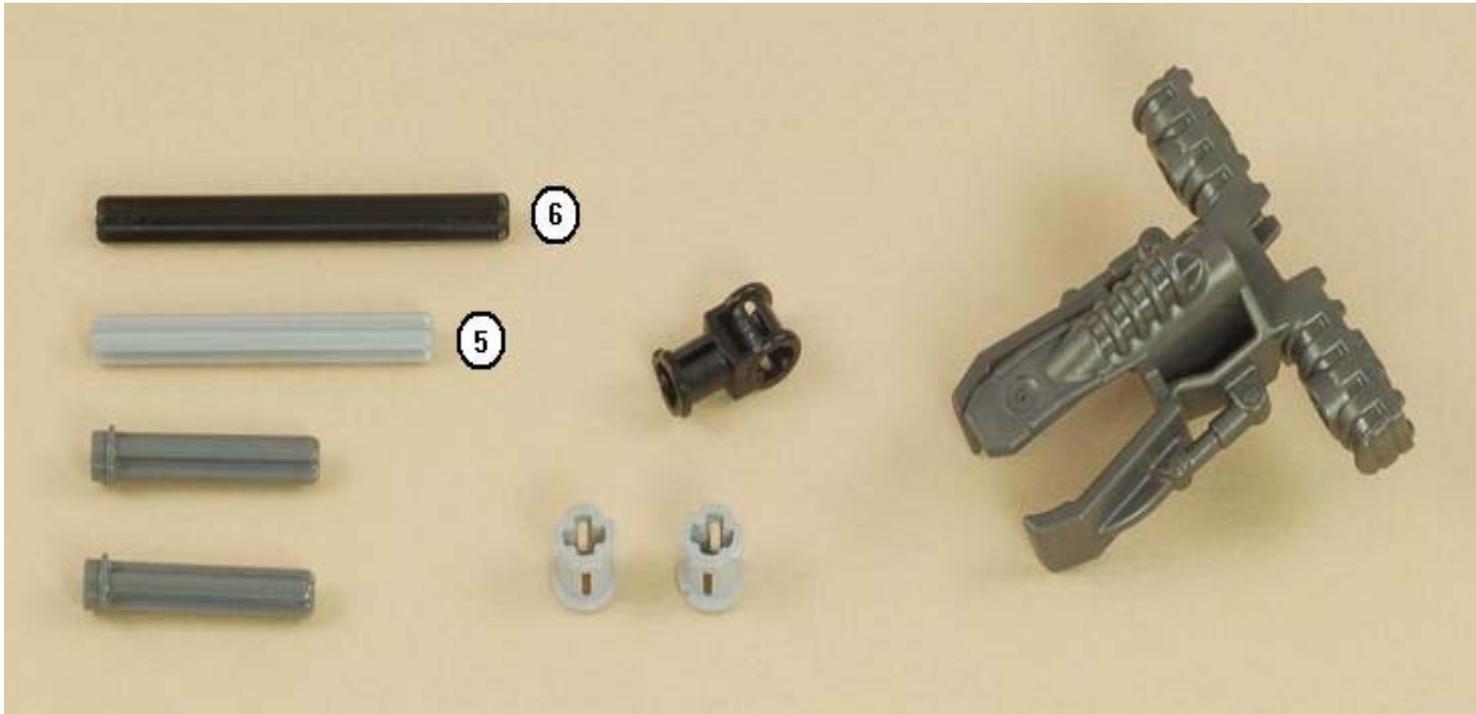


# STEP 1 contd.....



# BUILDING: STEP 2

- **What you need:**

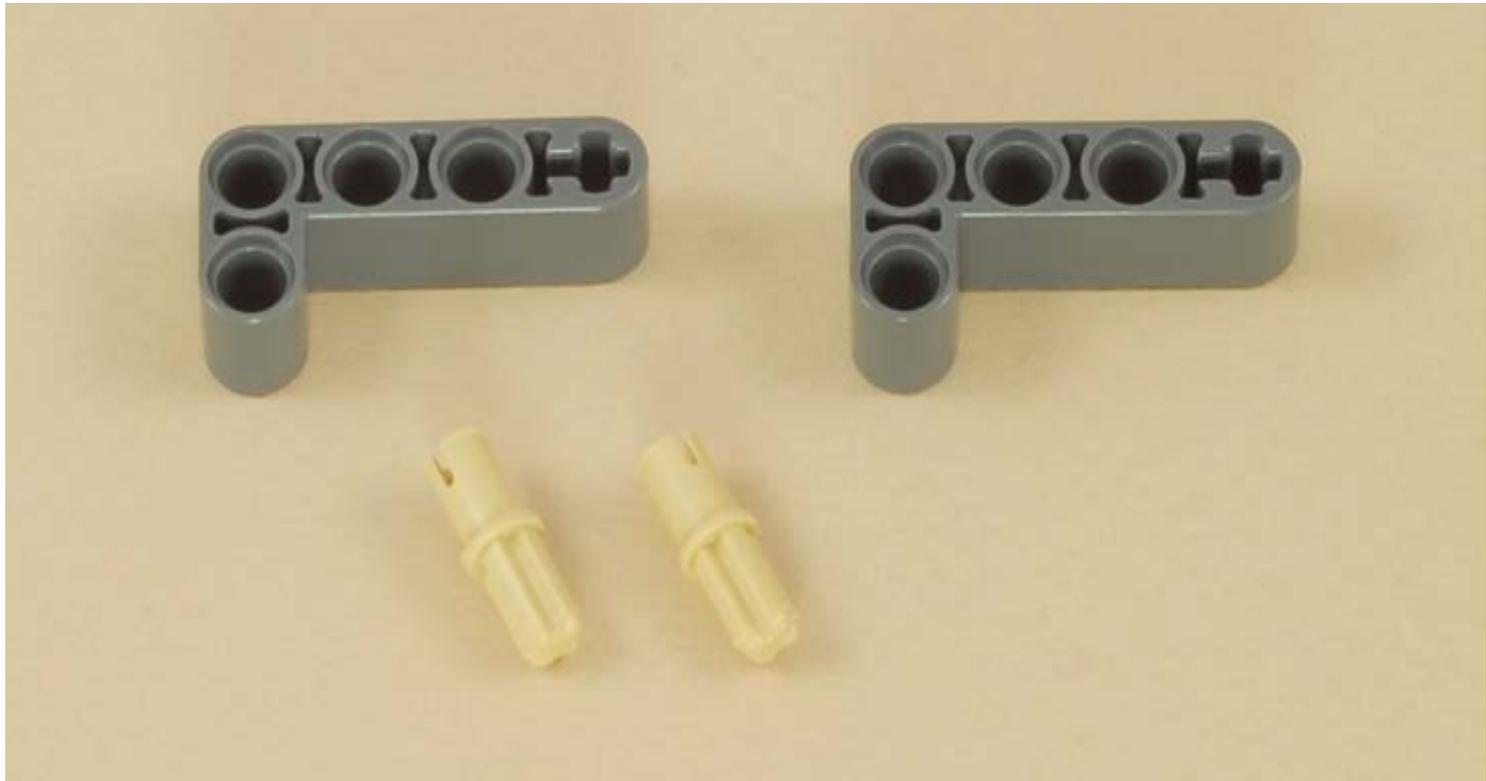


# STEP 2 contd.....

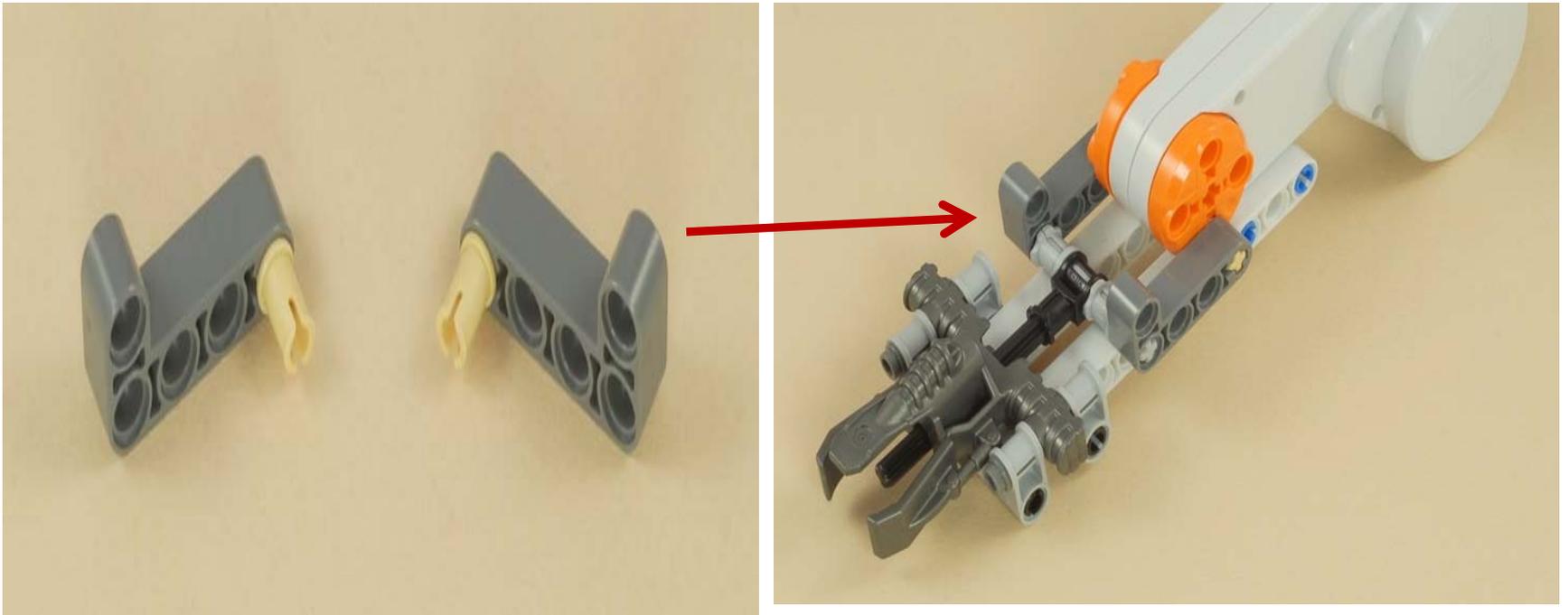


# BUILDING: STEP 3

- **What you need:**

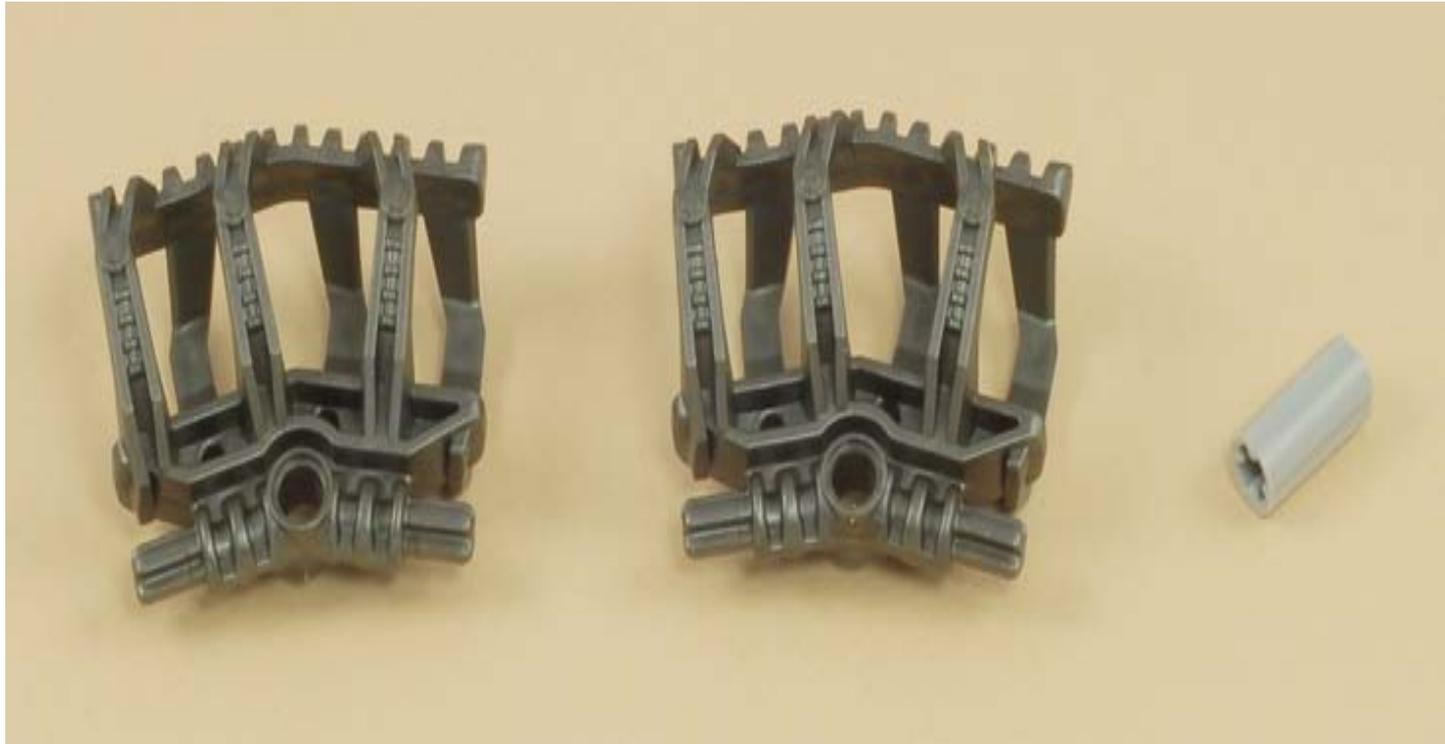


# STEP 3 contd.....

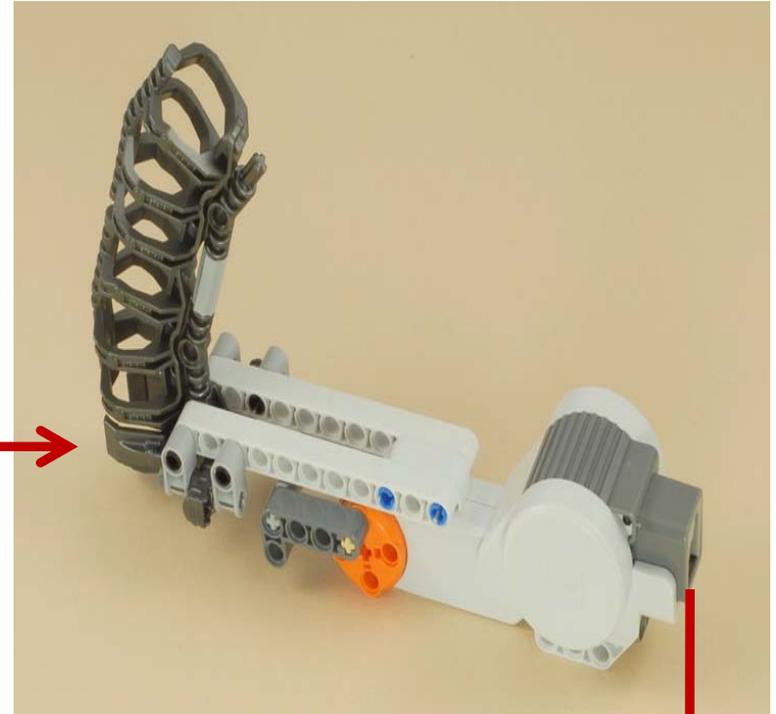


# BUILDING: STEP 4

- **What you need:**



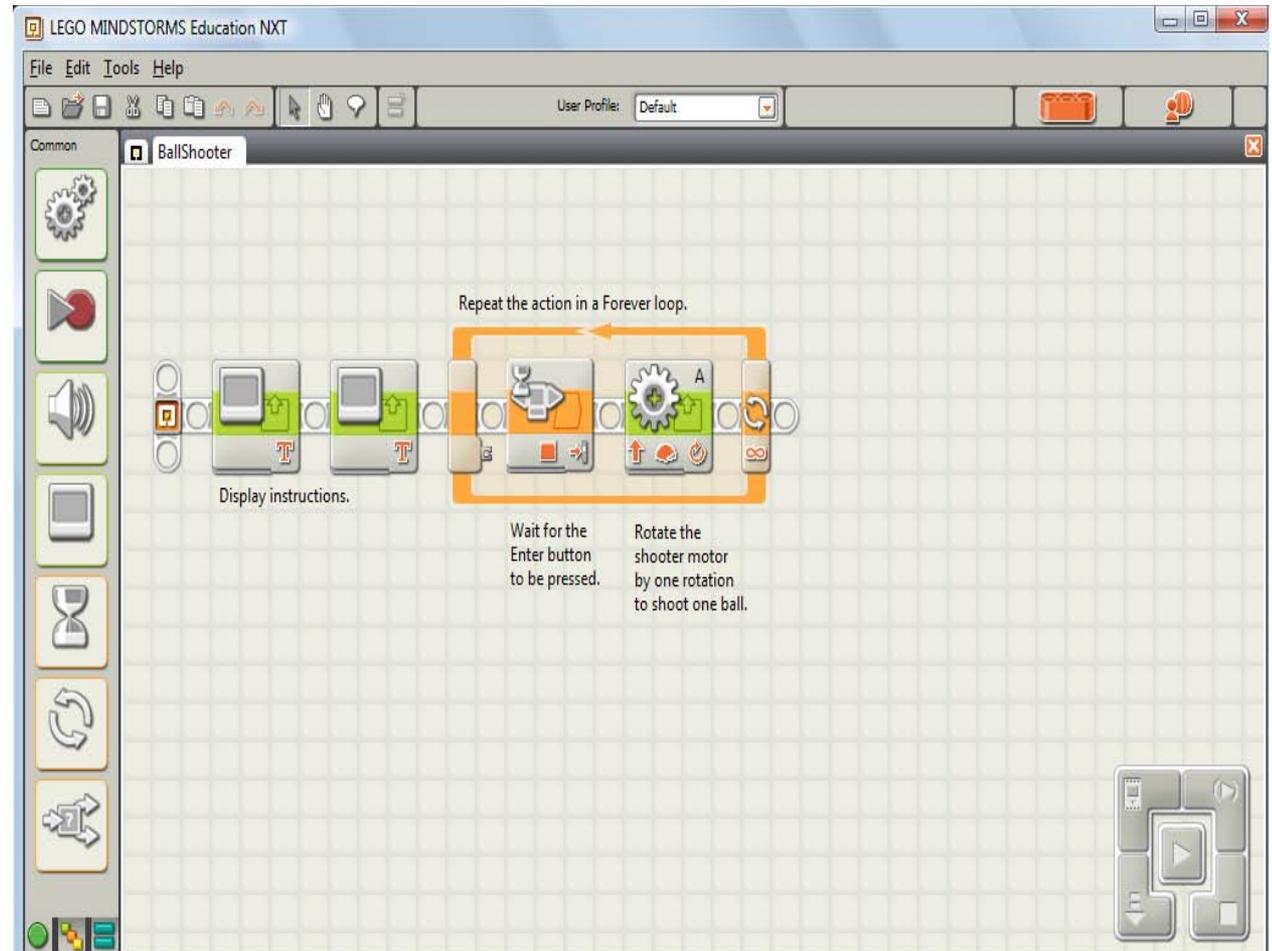
# STEP 4 contd.....



Connect this to one of the ports of the NXT brick

# PROGRAMMING -NXT PROGRAM

- Build NXT program as illustrated in the figure. Download and run the program after building the ball shooter.



# PROGRAMMING - Step 1

The screenshot shows the LEGO MINDSTORMS Education NXT software interface. The window title is "LEGO MINDSTORMS Education NXT". The menu bar includes "File", "Edit", "Tools", and "Help". The toolbar contains various icons for file operations and execution. The "User Profile" is set to "Default". The main workspace is titled "BallShooter" and "Untitled-1". A central block is highlighted with a blue border, and a "Settings" dialog is open over it. The dialog is titled "Settings" and has a "Display" tab. It contains the following fields and controls:

- Action:** A dropdown menu set to "Text".
- Position:** A preview window showing a white box with the text "Push Enter".
- Display:** A checkbox labeled "Clear" which is checked.
- Text:** A text input field containing "Push Enter".
- X:** A numeric input field set to "12".
- Y:** A numeric input field set to "32".
- Line:** A dropdown menu set to "4".

At the bottom of the interface, there is a "Display Block" section with a "Display" tab. It contains the same fields and controls as the "Settings" dialog. To the right of this section is a "Display Block" help panel with the following text:

**Display Block**  
Use this block to display an image, write some text, or draw a shape on the NXT's display screen. Choose "Clear" to start with a fresh screen.  
[More help »](#)

# PROGRAMMING - Step 2

The screenshot displays the LEGO MINDSTORMS Education NXT software interface. The main workspace shows a sequence of blocks on a grid, with a 'Text' block selected and highlighted in green. A 'Settings' dialog box is open, showing the configuration for the selected block. The dialog includes fields for 'Action' (set to 'Text'), 'Display' (checked), 'Text' (set to 'to shoot'), and 'Position' (X: 12, Y: 24, Line: 5). A 'Need help?' section is visible in the bottom right corner of the dialog.

**Settings**

Display

Action: Text

Position: X 12 Y 24

Display:  Clear

Text: Simple Text to shoot

Line: 5

**Need help?**  
Move the cursor over an object to read about its function. For additional help, click the "More help" link. [More help >](#)

# PROGRAMMING - Step 3

The screenshot displays the LEGO MINDSTORMS Education NXT software interface. The window title is "LEGO MINDSTORMS Education NXT". The menu bar includes "File", "Edit", "Tools", and "Help". The toolbar contains various icons for file operations and execution. The main workspace shows a sequence of blocks: a "Start" block, two "Wait" blocks, and a "Loop" block. The "Loop" block is highlighted with an orange border. Below the workspace, the "Settings" panel for the "Loop" block is visible. It features a "Control:" dropdown menu set to "Forever", a "Show:" checkbox, and a "Counter" checkbox. A "Loop Block" help panel is also present in the bottom right corner, providing instructions on how to use the loop block.

**Settings**

**Loop**

Control: Forever

Show:  Counter

**Loop Block**

Use this block to repeat sequences of code. Set the condition that will end the loop: elapsed time, the number of repetitions, a logic signal or a sensor. You can also set a loop to go on forever.

[More help >](#)

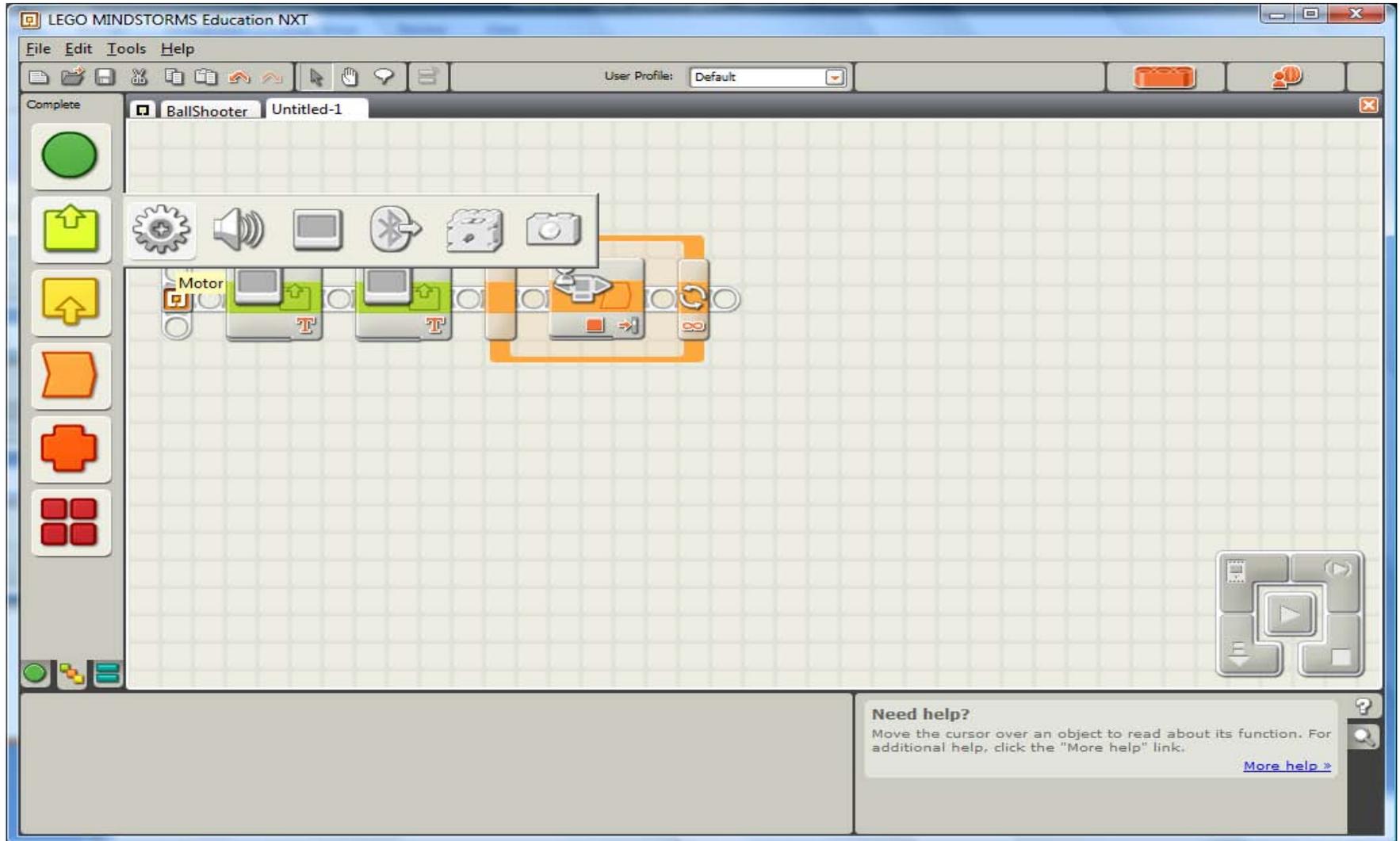
# PROGRAMMING - Step 4

The screenshot displays the LEGO MINDSTORMS Education NXT software interface. The main workspace shows a sequence of three blocks: a 'Wait' block, a 'Motor' block, and another 'Wait' block. The third 'Wait' block is highlighted with an orange border. A 'Settings' panel is open over this block, showing the following configuration:

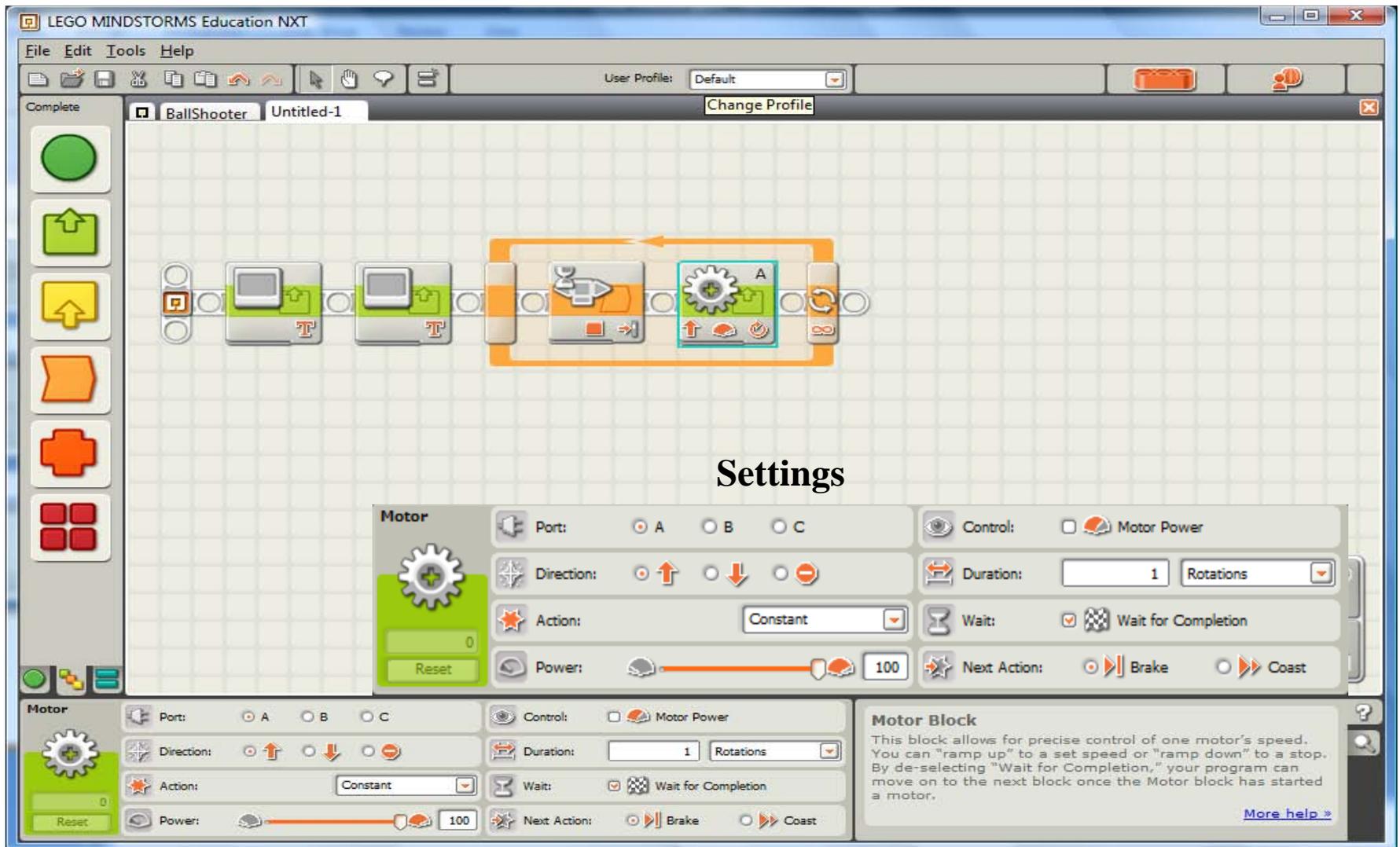
- Control:** Sensor
- Button:** Enter button
- Sensor:** NXT Buttons
- Action:** Pressed (selected), Released, Bumped

The 'Wait' block itself has a slider set to 0. The software interface includes a menu bar (File, Edit, Tools, Help), a toolbar, and a sidebar with various programming blocks. The title bar indicates the project is named 'BallShooter' and 'Untitled-1'.

# PROGRAMMING - Step 5



# Step 5 contd....



The screenshot shows the LEGO MINDSTORMS Education NXT software interface. The workspace contains a sequence of blocks: two 'Touch Sensor' blocks, a 'Motor' block, and a 'Motor' block. The second 'Motor' block is highlighted with an orange box. Below the workspace, the 'Settings' panel for the selected Motor block is visible. The settings are as follows:

Motor	Port:	Control:
	<input type="radio"/> A <input type="radio"/> B <input type="radio"/> C	<input type="checkbox"/> Motor Power
Direction:	<input type="radio"/> ↑ <input type="radio"/> ↓ <input type="radio"/> ↻	Duration: 1 Rotations
Action:	Constant	Wait: <input checked="" type="checkbox"/> Wait for Completion
Power: 0	Power: 100	Next Action: <input type="radio"/> Brake <input type="radio"/> Coast

**Motor Block**  
This block allows for precise control of one motor's speed. You can "ramp up" to a set speed or "ramp down" to a stop. By de-selecting "Wait for Completion," your program can move on to the next block once the Motor block has started a motor. [More help >>](#)

# STUDENT ACTIVITY SHEET

## ANSWERS

- What happens when you press the enter button on the NXT brick?

The balls in the ring are shot out one after the other.

- Why does this happen?

The NXT motor moves forward and every time it moves it also pushes the balls out with a force.

- Is there any similarity between this and how you throw a ball using your hand?

The muscle in your arm is like the 'motor'. Muscles use glucose energy to help your arm to move and throw the ball.