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the zookeeper's guide: what you need to know to create the animals in the NXT zoo

Sometimes experienced NXT users take for granted the meanings of various terms, methods, and procedures. I offer this information for the new user, to make building successful robots as easy as possible.

coast vs. brake

There are times when you will be offered the option of *Brake* or *Coast* (shown at the lower right of Figure 2-1, beside the words *Next Action*). If you choose *Brake*, the robot will stop moving—like when you step on the brakes hard. If you choose *Coast*, the motors will stop turning, but the robot will stay in motion until it eventually stops—like when you coast on a bike. If you always choose *Brake*, your battery will drain faster. When it is not actually necessary for a motor to stop on a dime, choose *Coast*.



Figure 2-1: A sample configuration panel

direction

One of the most confusing things about programming a robot is making sure the program you've written moves the motors in the direction you want them to move. The motors can be built into your

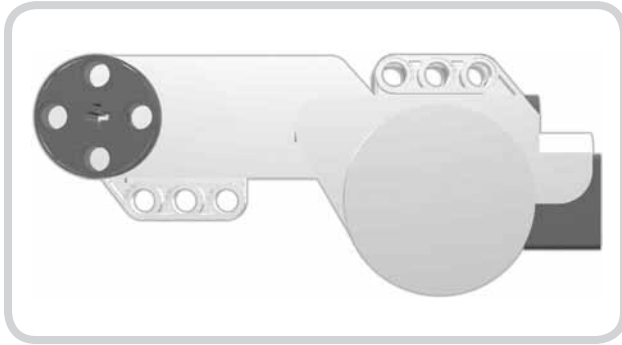


Figure 2-2: In the actual motor, the rotating part is orange.

robots in so many different ways! In NXT-G programming, the up arrow (↑) is referred to as *forward* and the down arrow (↓) is referred to as *backward*, but in many robots you'll need to choose forward to make your robot go backward. For example, hold a motor as shown in Figure 2-2. The orange part is the part that turns. In this position, clockwise motion results when you choose forward (↑), and counterclockwise motion is the result when you choose backward (↓).

downloading a program from your computer to the NXT brick

This is the procedure for getting an NXT-G program from your computer to your NXT brick:

- 1 Connect the computer to the NXT brick with the USB cord.
- 2 Turn on the brick.
- 3 Click the **Download** button (shown in Figure 2-3) and wait for the beep.



Figure 2-3: The lower left button downloads your program.

changing inches to centimeters

When you want to change from the default distance setting of inches to centimeters, the computer will make the calculation for you, but it is easy to get wrong if you don't enter the changes carefully. Here is the procedure for changing the distance to a specific number of centimeters:

- 1 Click the pull-down menu next to *Inches* (seen at the lower right of Figure 2-4) and select **Centimeters**. It is important that you do this first.
- 2 Type the number of centimeters you want.

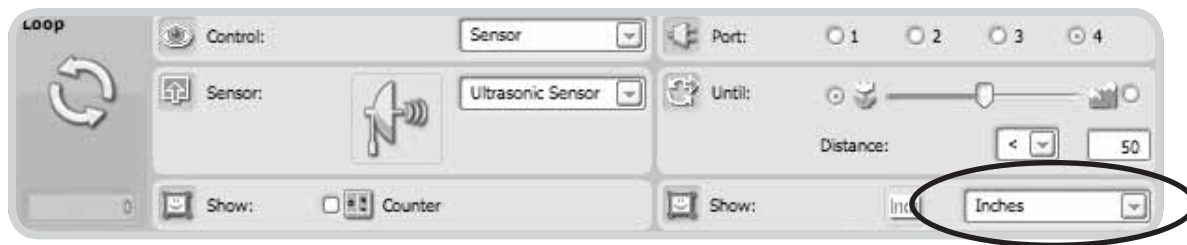


Figure 2-4: A configuration panel showing Inches at the lower right

my blocks

A long, complicated program is easier to understand and write when you break it into smaller parts. In the NXT-G program, we do this by creating miniprograms called *My Blocks*. Once they are created, My Blocks can be used to build other programs as well.

To create a My Block, first create the small program you want to convert to a My Block. In Figure 2-5, I have created a program with four different Move blocks.

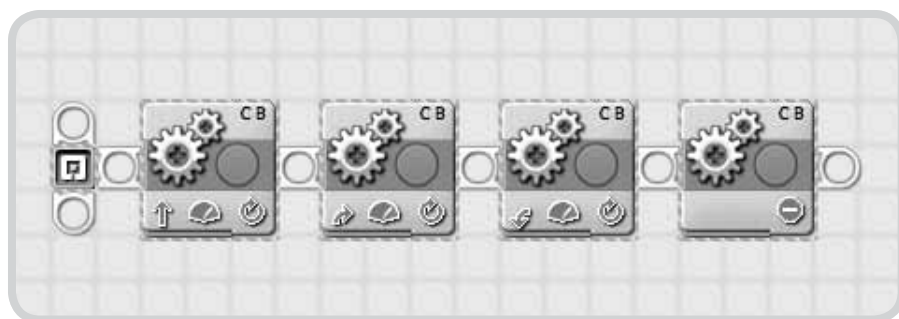


Figure 2-5: These four blocks will become a small program that moves the C and B motors forward, turns them side to side, and then stops them.

Next, use your mouse to select all the blocks in the program as seen in both Figures 2-5 and 2-6. (The borders of selected blocks are turquoise when selected.)

Figure 2-6 shows where the *Create My Block* button is at the top of the screen. Click this button.

You will then see a screen like Figure 2-7. Use this screen to name your My Block. (I've named this My Block *wiggle*.) Once you've typed a name, click the **Next** button at the bottom.

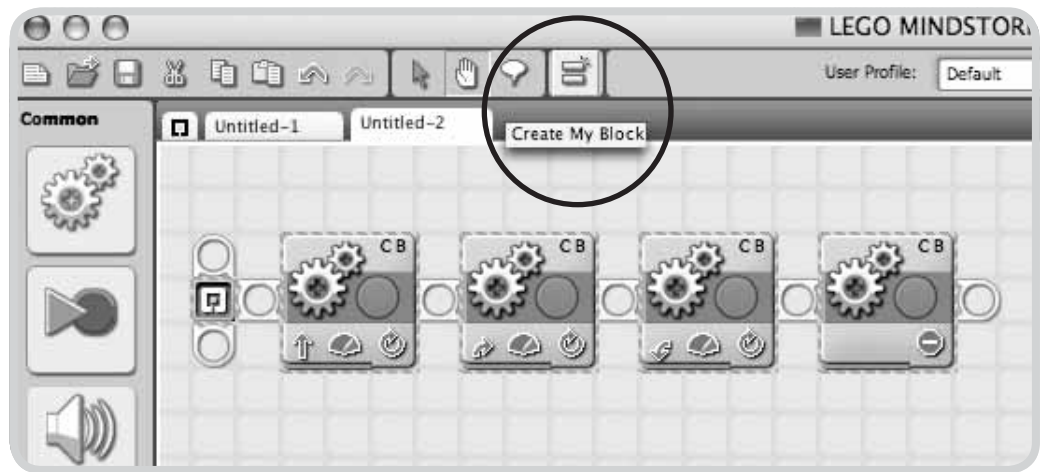


Figure 2-6: The Create My Block button is found on the top toolbar.

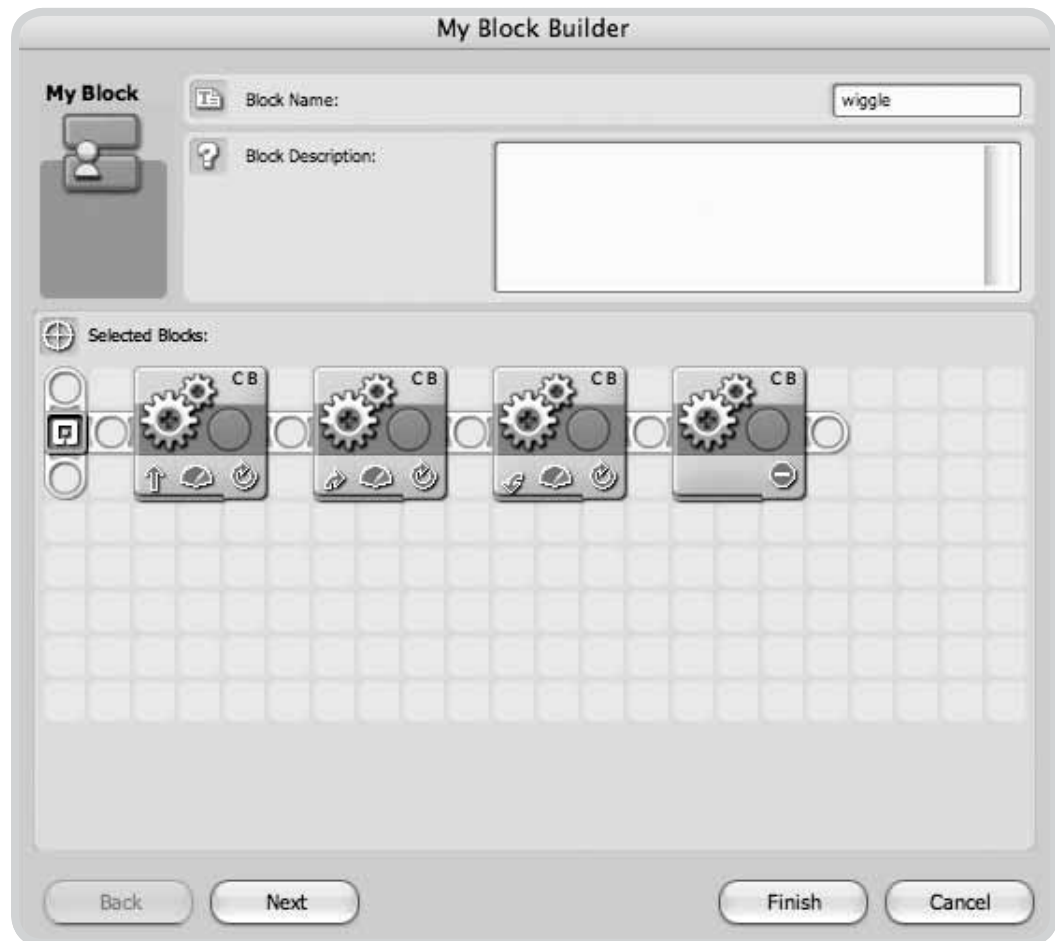


Figure 2-7: Name the block using this screen.

After you click Next, a screen will appear like the one shown in Figure 2-8. On this page, you can drag icons onto the open square at the top. This is not required, but it will help you to recognize your different My Blocks at a glance.

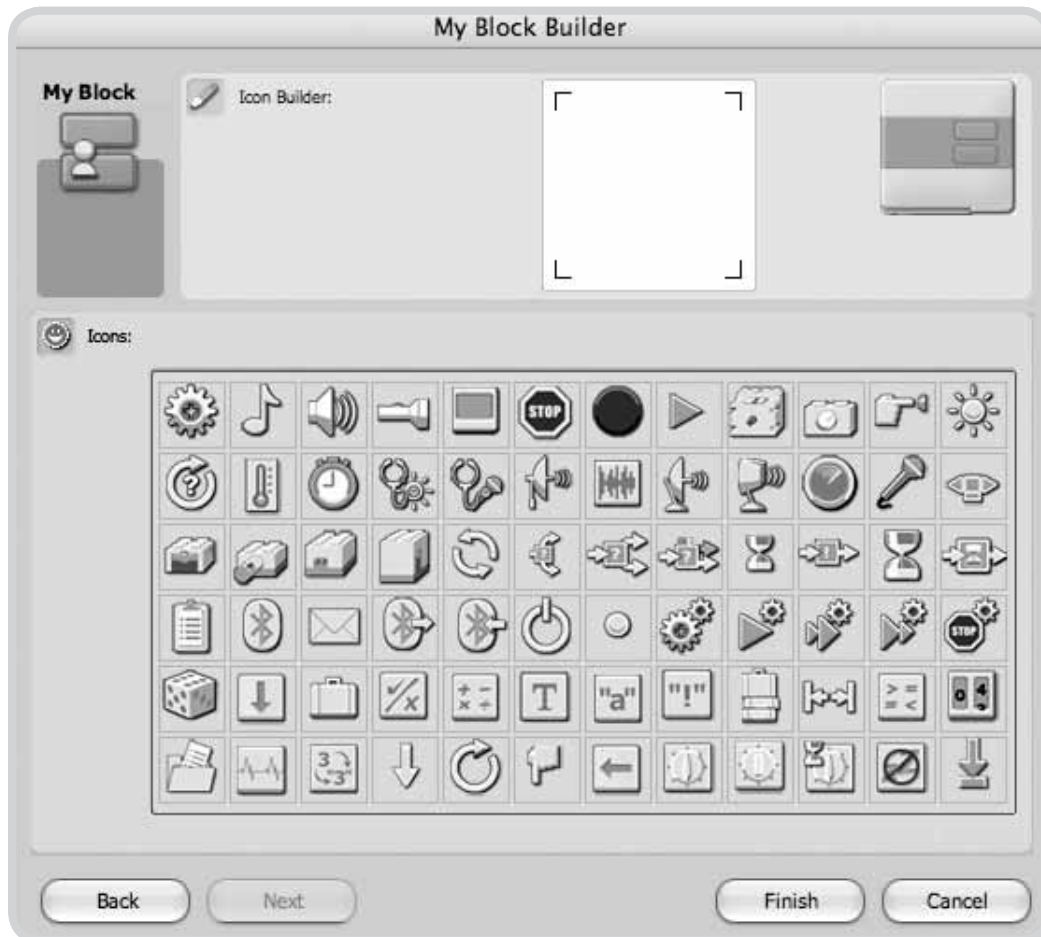


Figure 2-8: This screen allows you to give your icon a unique look.

Click **Finish** to complete the My Block.

7

LEGOsaurus: an NXT dinosaur

My original inspiration for building this LEGOsaurus was the cool orange TECHNIC spikes (the 1 × 3 BIONICLE tooth). You may not have as many spikes in your parts stash as this robot needs, but don't let that stop you. You can make your own spikes from foam board or cardboard—just punch holes in them so you can attach them to the axle pins.

The gear arrangement on the base of this robot is one you can use for many different four-legged animals. But be careful as you build it, because the NXT brick is attached underneath the robot, facing down. That means that there is a good chance you will accidentally turn the robot on during construction. To save battery strength, be sure to check periodically that the brick has not turned on.

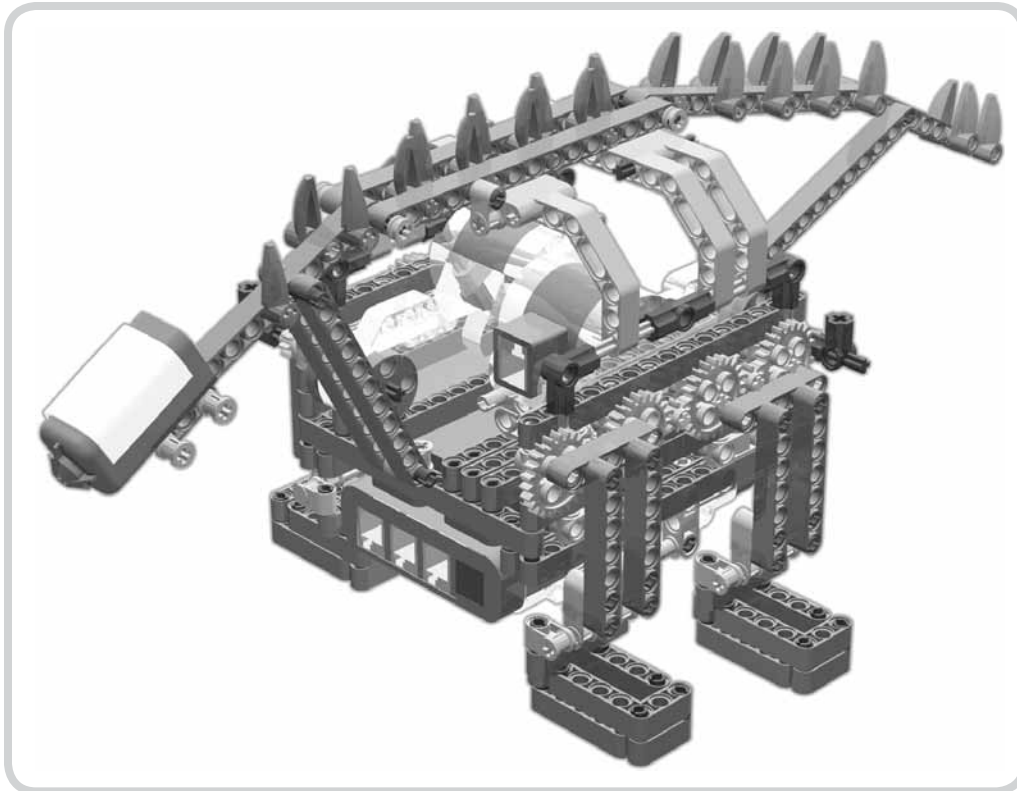
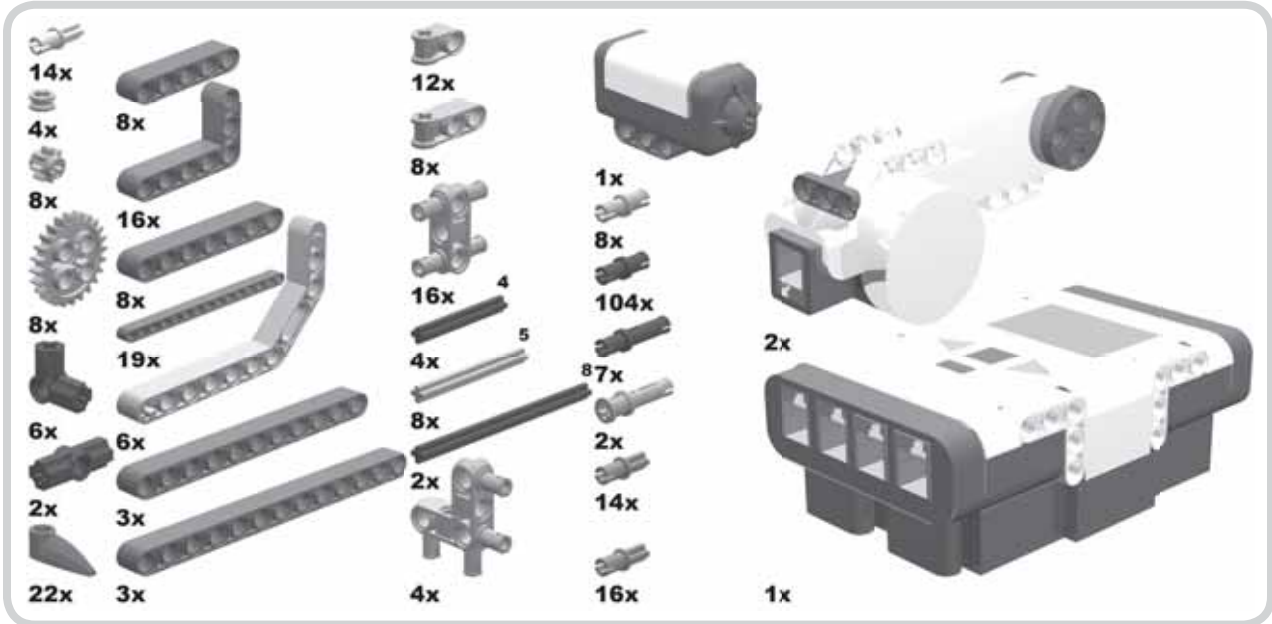


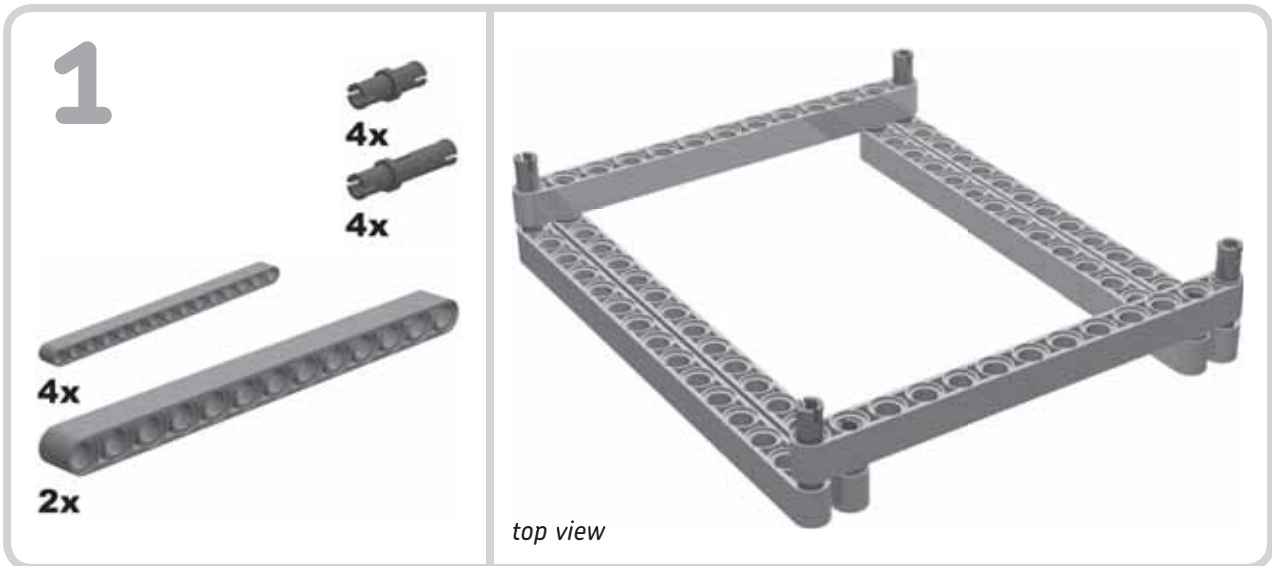
Figure 7-1: A plodding NXT stegosaurus

building LEGOsaurus

LEGOsaurus conveniently turns on and off with a Touch Sensor.



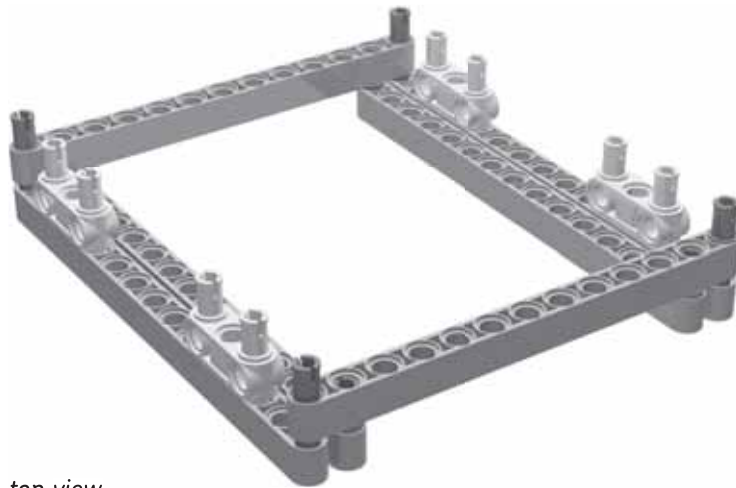
base



2



4x



top view

PART SUBSTITUTION SUGGESTION

In this step, two long pins plus one 3-hole beam (Figure 7-2) can substitute one of these pieces (Figure 7-3).



Figure 7-2: You can use this combination of pieces . . .

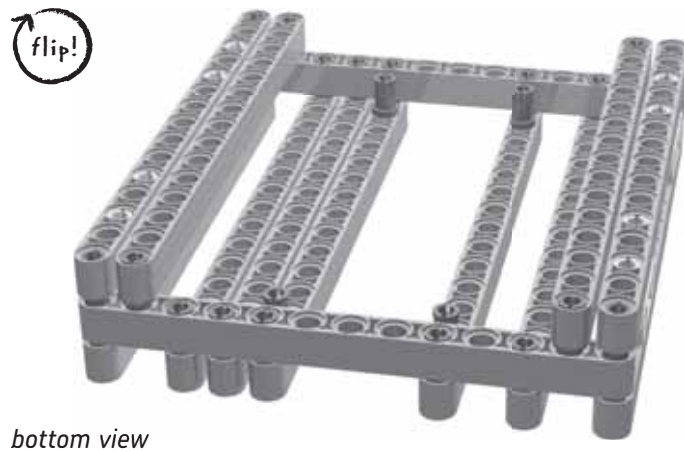


Figure 7-3: . . . in place of this piece.

3



4

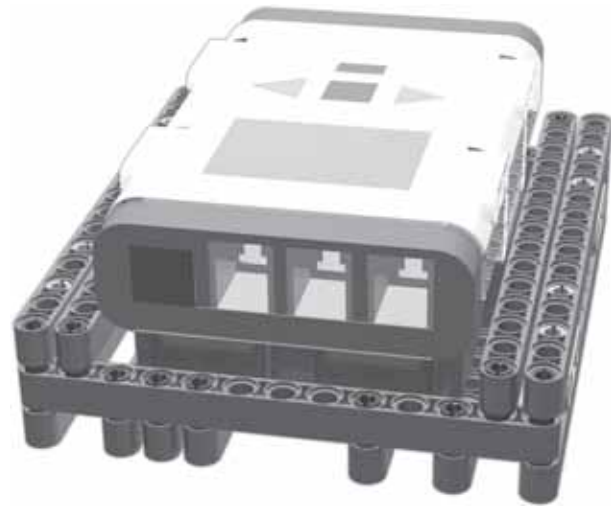


These four pins will help attach the brick to the bottom of the robot.

5



1x



bottom view

Snap the brick onto the four pins from step 4. Be sure to hold the brick carefully as you attach it in the next two steps.

6



8x

4x

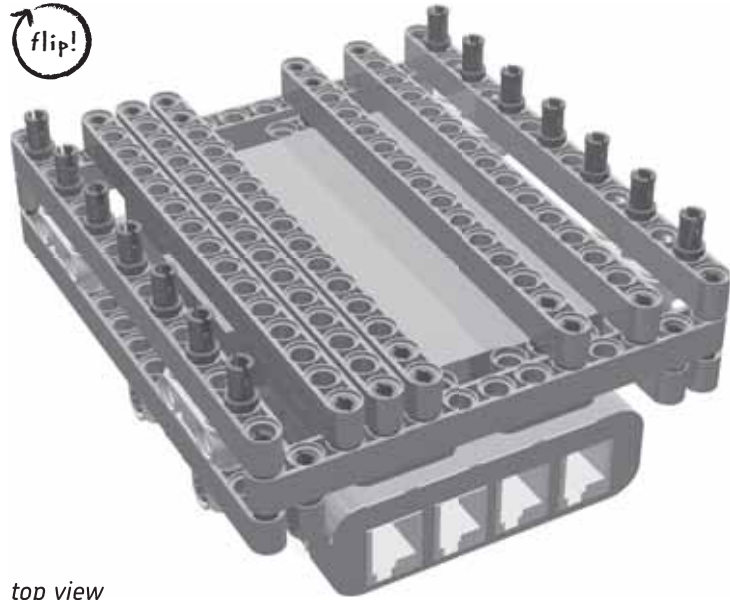


You need to lift the brick out to attach these connectors.

7



14x

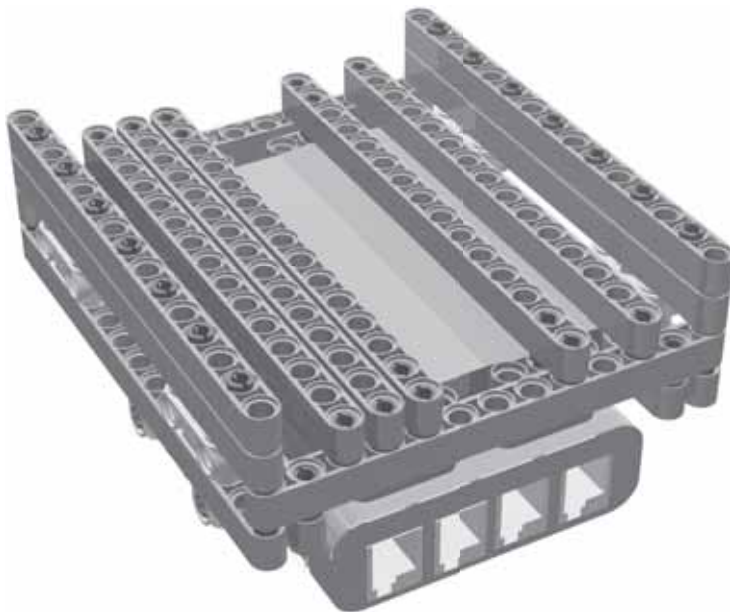


top view

8



2x



10

strutter: an NXT peacock

This robot is a peacock who does his mating dance for everyone—and everything—he meets. Just like his namesake, he turns and flutters his tail feathers at any potential mate. Using some artificial feathers adds greatly to the effect and doesn't overtax the motor.

The pulley setup for the tail pieces is a bit tricky, but the programming is surprisingly simple, and the results are worth the effort.

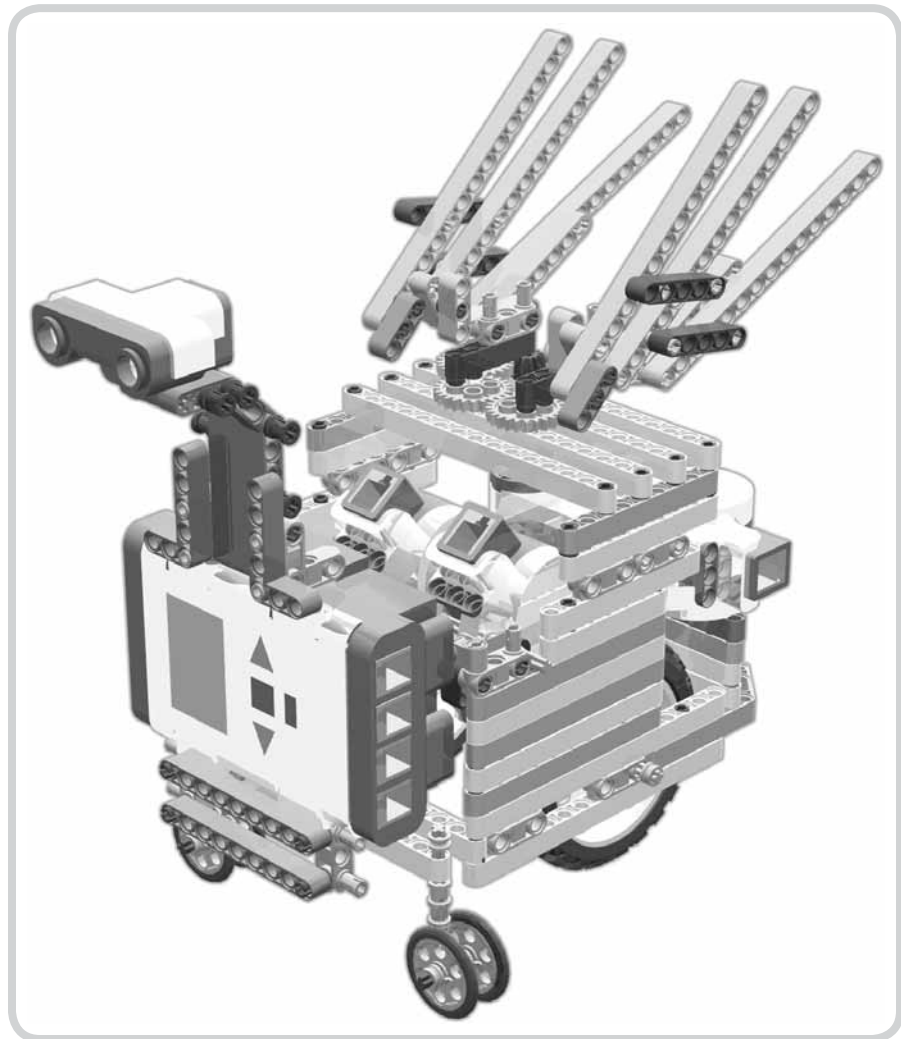
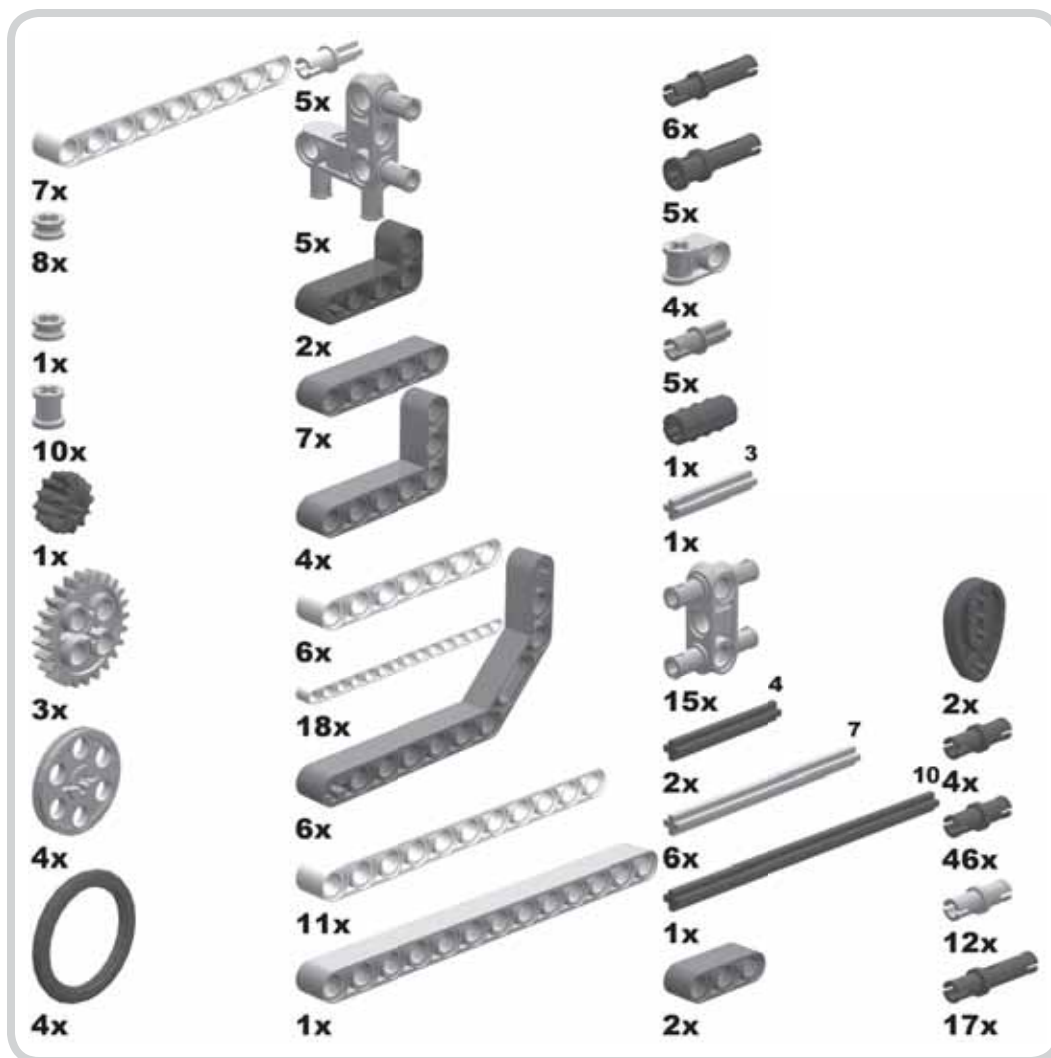


Figure 10-1: Strutter, the NXT Peacock!

building strutter





- * Non-LEGO part required: Fishing line
- * Optional: Artificial peacock feathers, available at all major craft stores

front wheel (build two)

1



2



3



left wing

1



2



3



4



Use a yellow axle pin here.

5



Use gray pins on the moving wing connections.