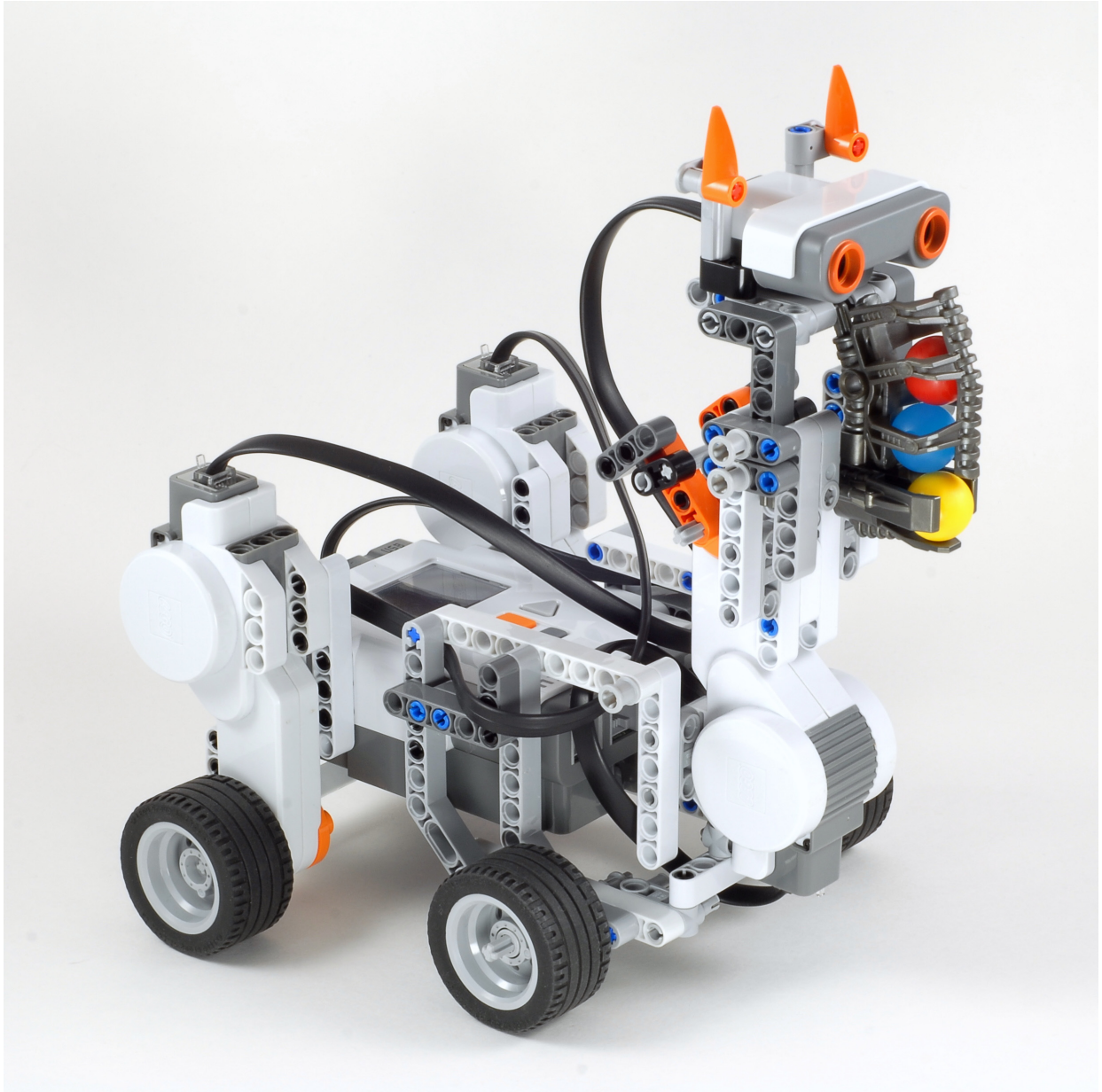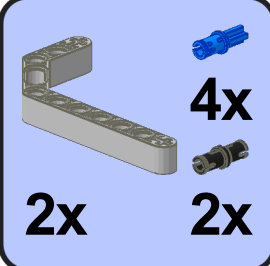# Llama

Llamas actually do spit—which you will learn first-hand of you scare or anger one of these animals in person. This robots spits balls with a Zamor shooter.

At the end of these instructions, you'll find some variations of this model—two of them reduce torque on the front wheels, one is a model built with the competition cannon found in the Education Resource Set Supplemental (sold by LEGO Education).
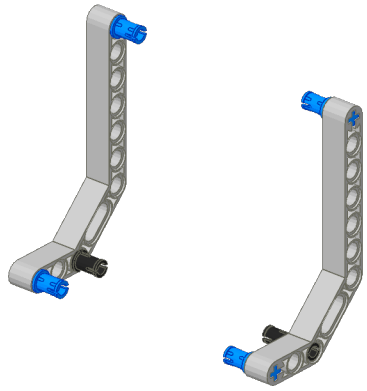
There is also a simple idea for making your llama look even more like a real llama.

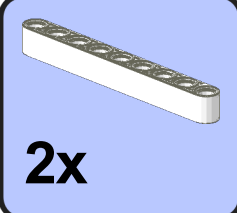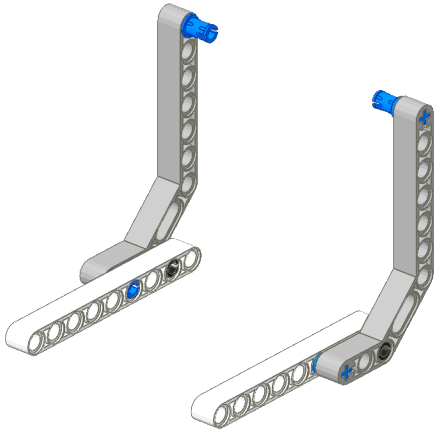My thanks to Dave, Steven and Andrew Parker for their helpful input. (Photo credit: Dave Parker)
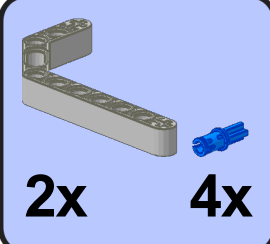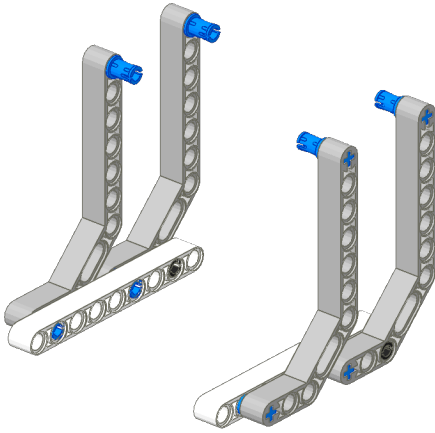
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2x 2x
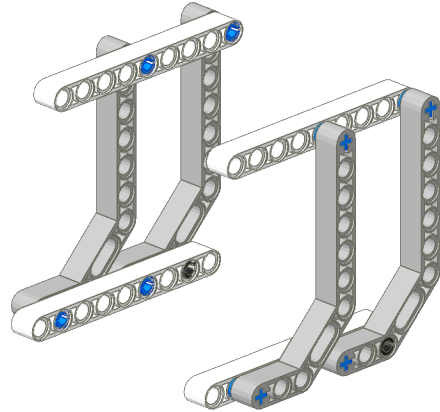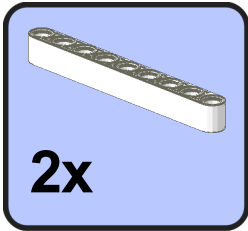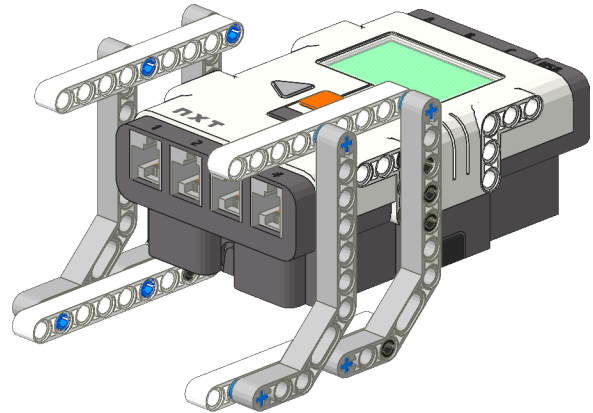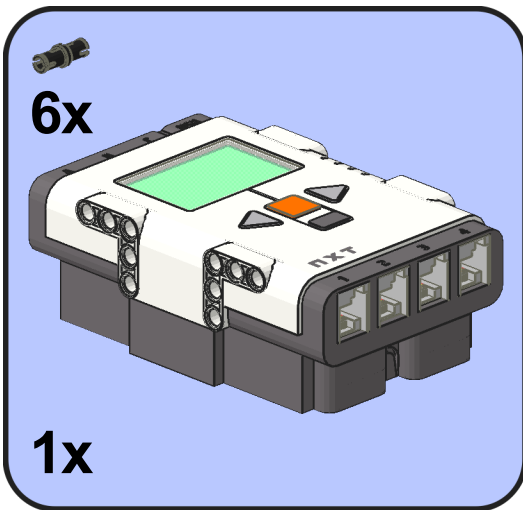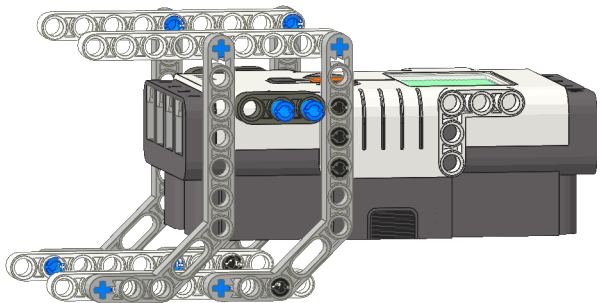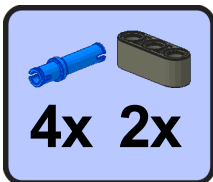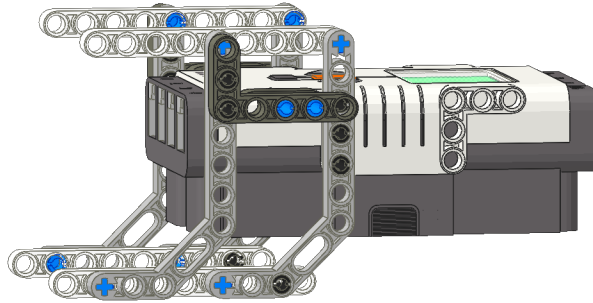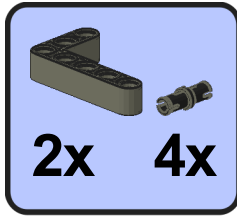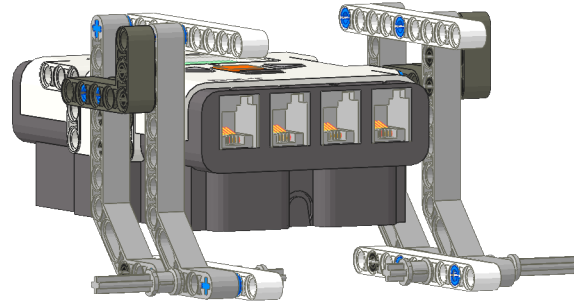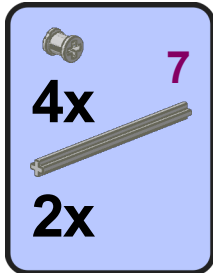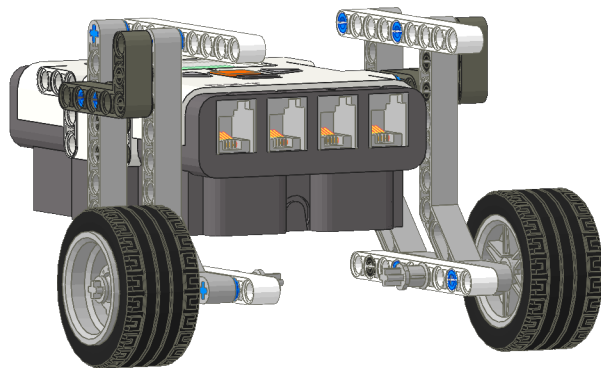
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3

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4

2x

5

6x

1x

6

4x 2x

7

2x 4x

8

4x **7**

2x

9

2x

2x 2x

10

2x 12x

11

2x

12

5

2x

2x

2x

2x

13

2x 4x

14

2x

2x

1x

15

2x

16

2x

1

3x

1x

2

3x

3

2x

7

1x

4

2x

5

4x

2x

6

2x

2x

7

1x

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7

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11 2x

12 2x

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4x

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14

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16

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1

1x   1x

2

1x   2x

3

1x

4

1x

5

1x

6

1x

18

4x

19

4x

20

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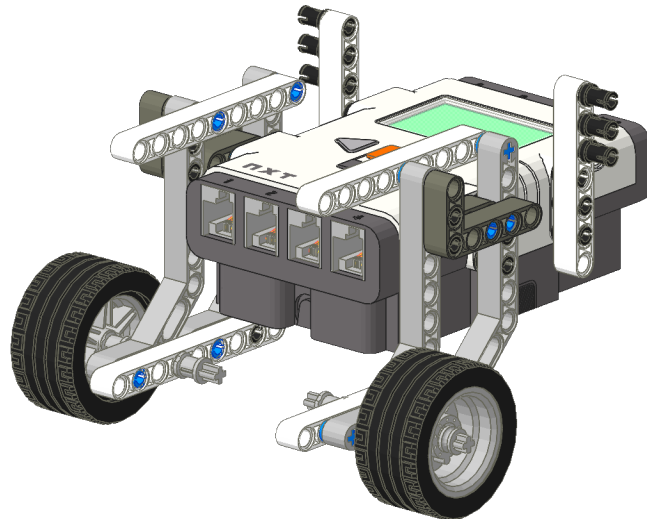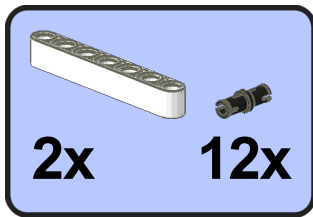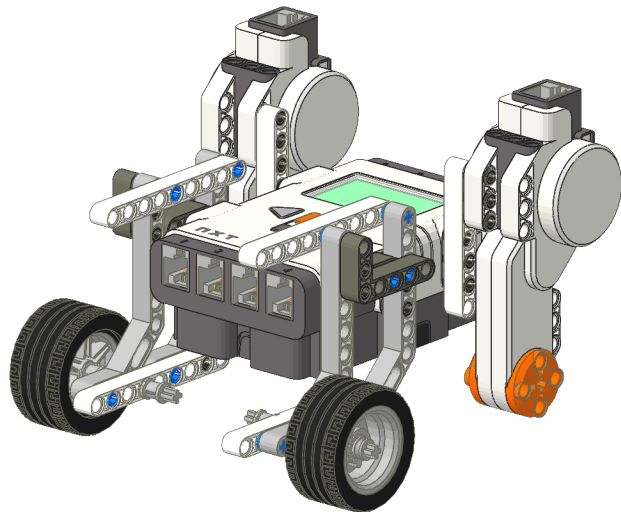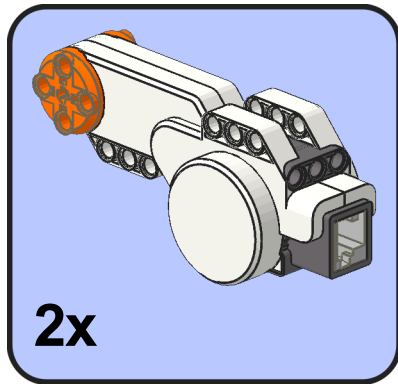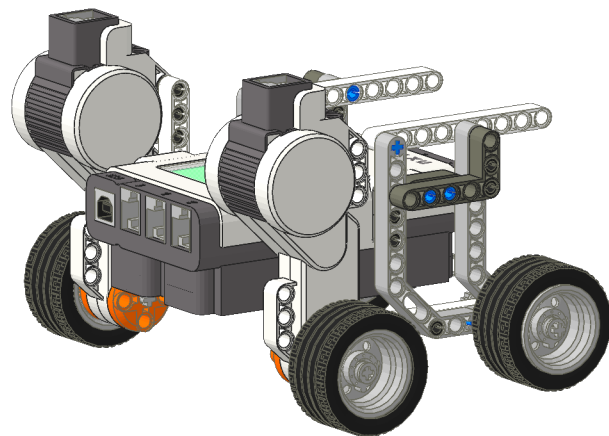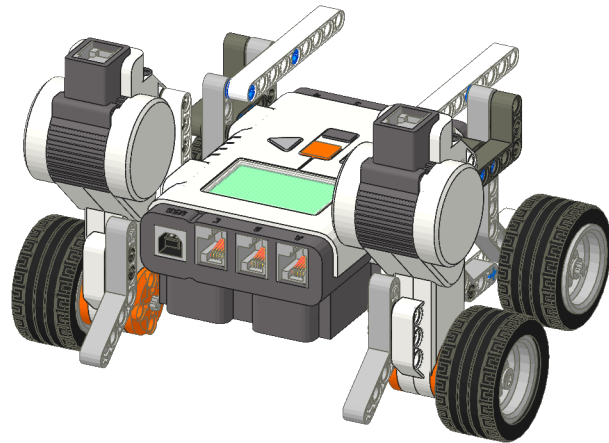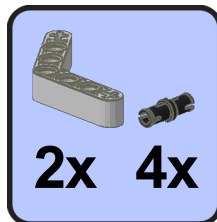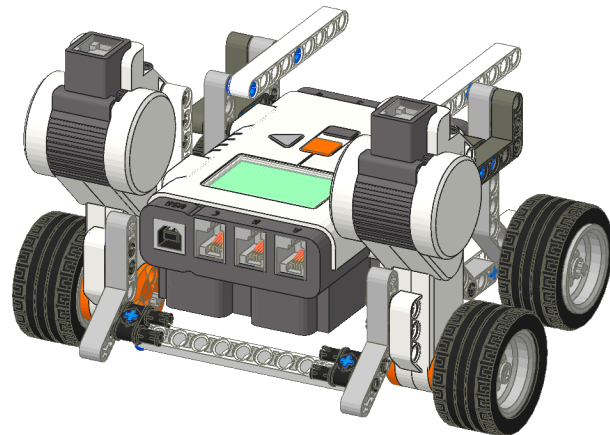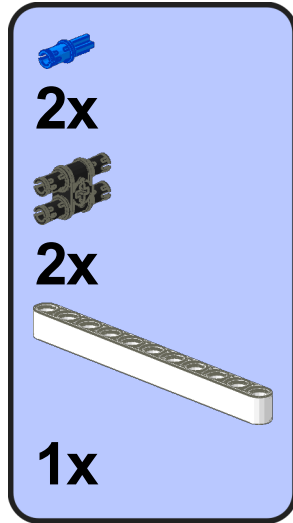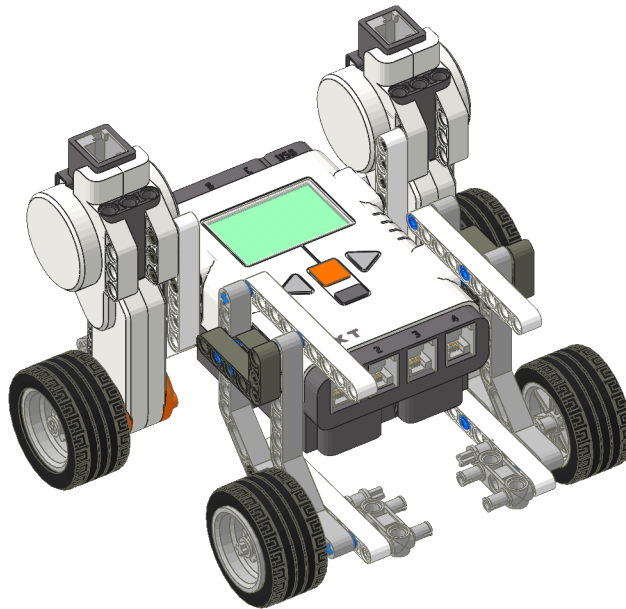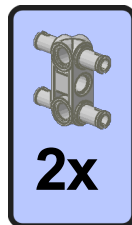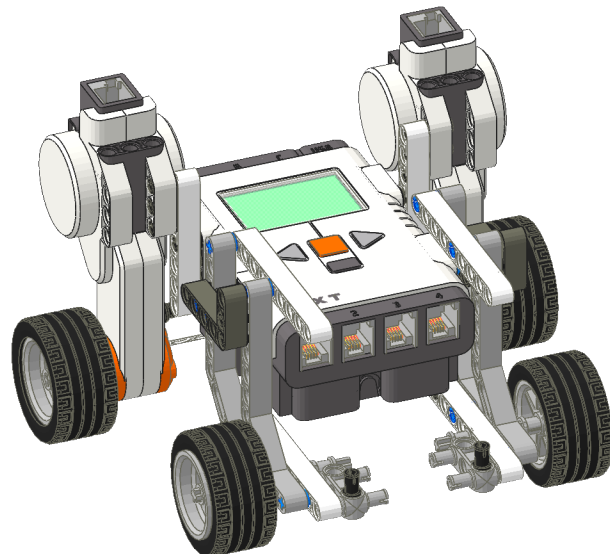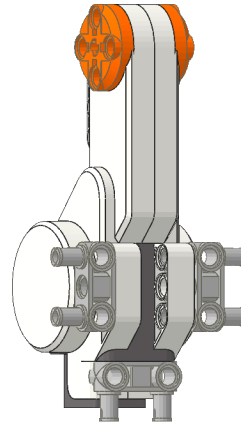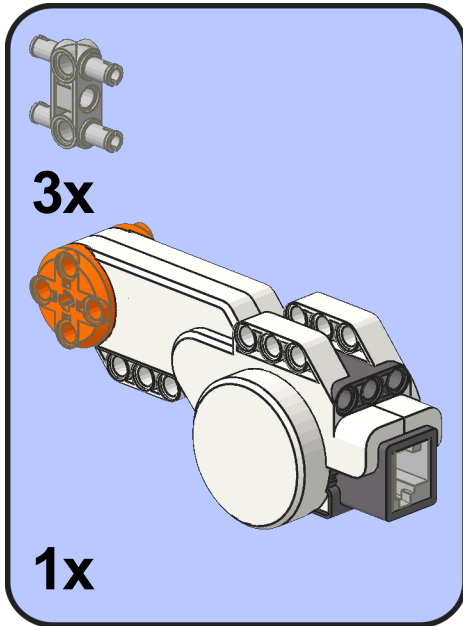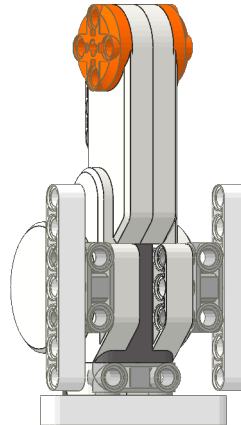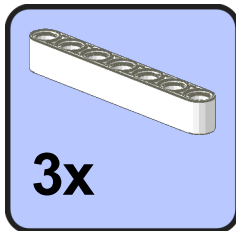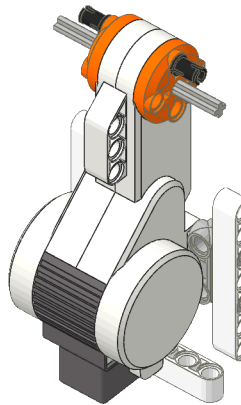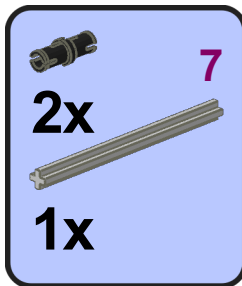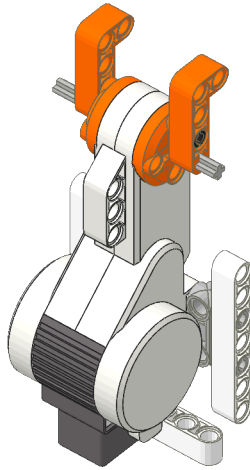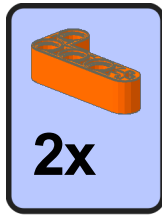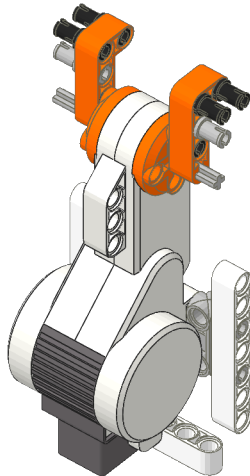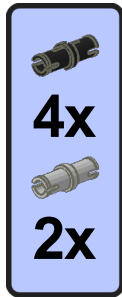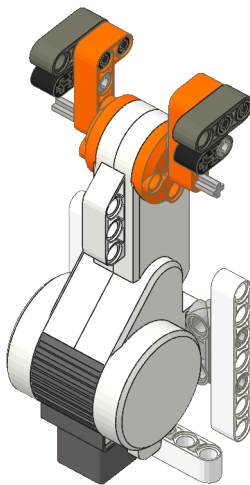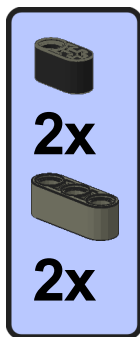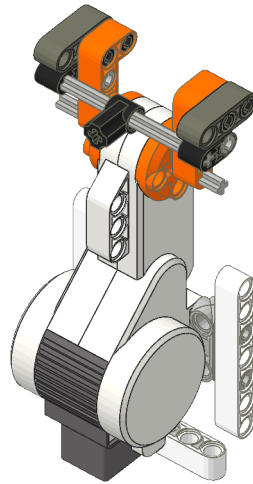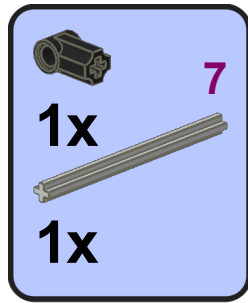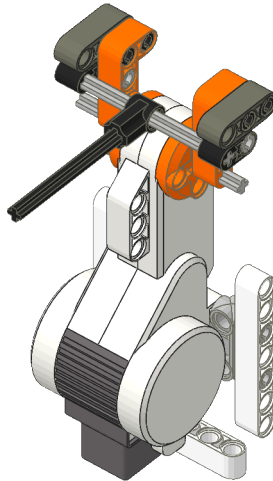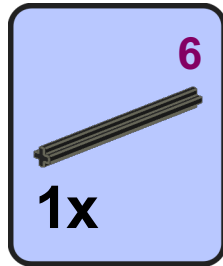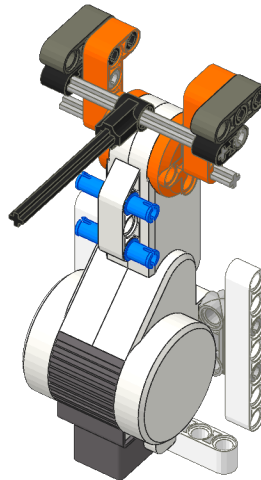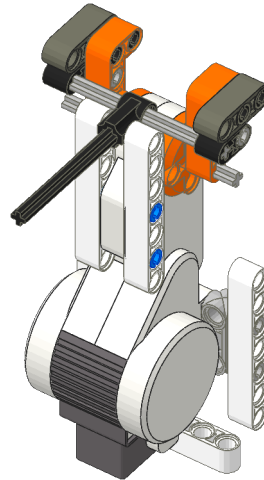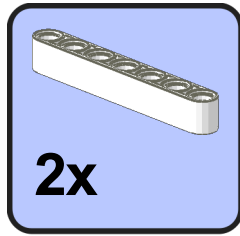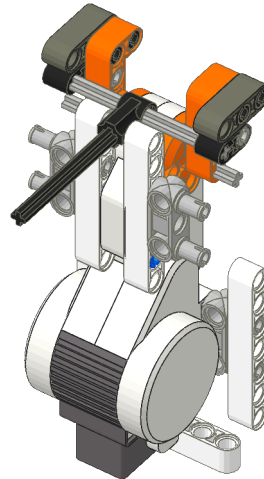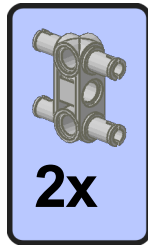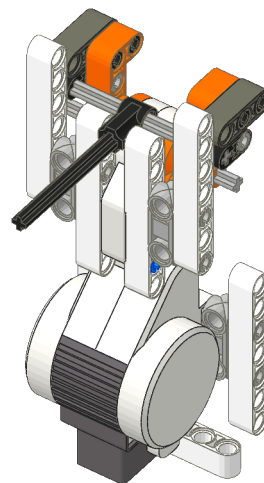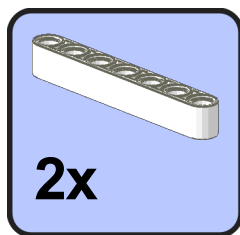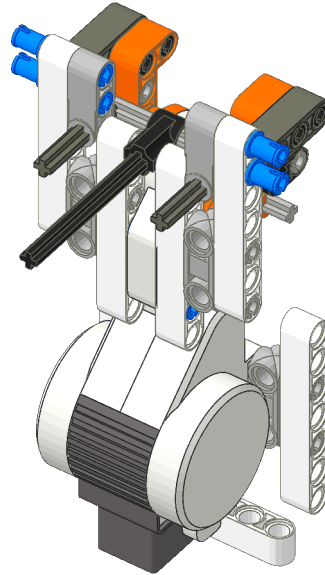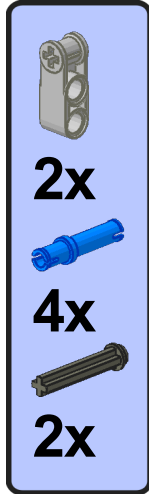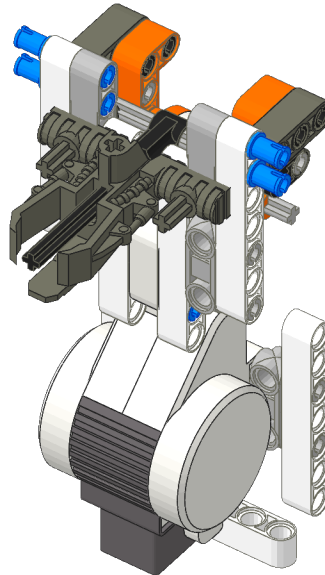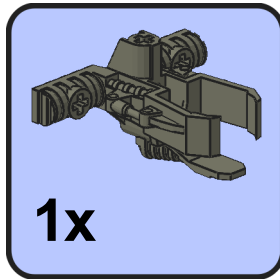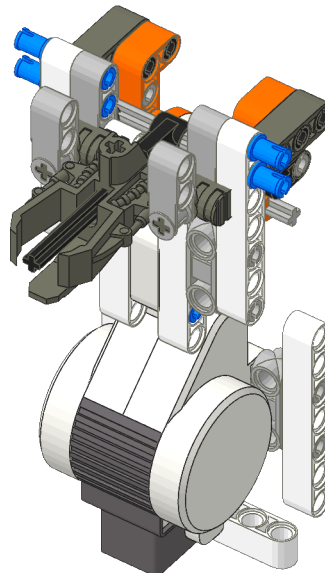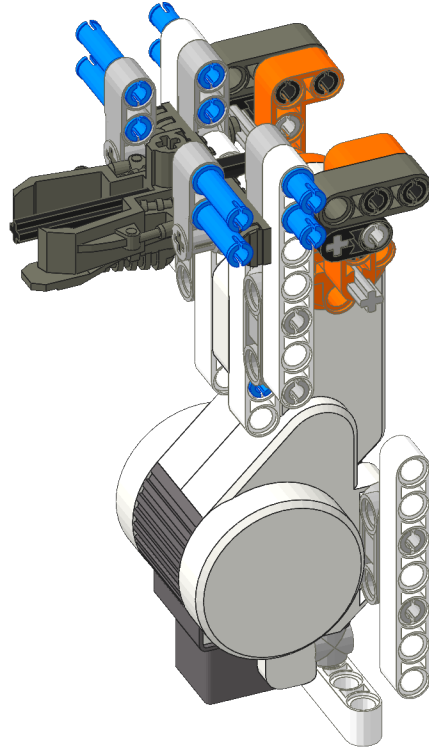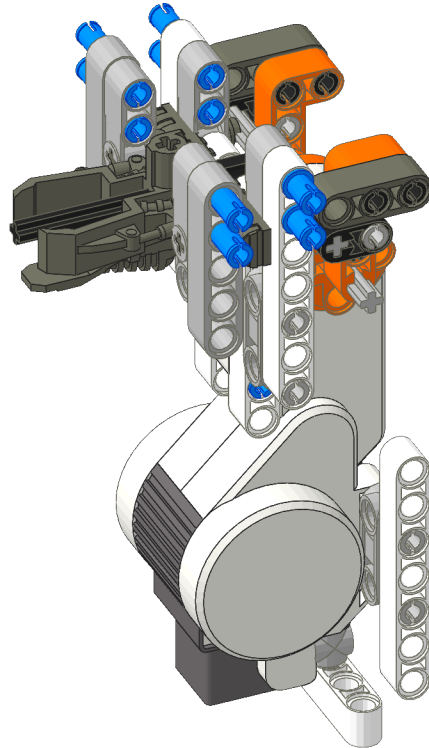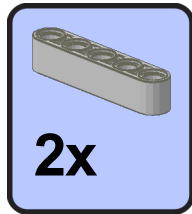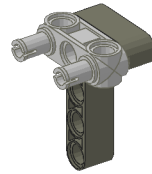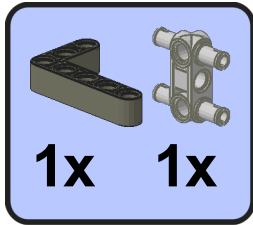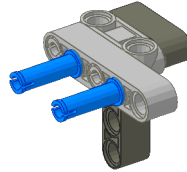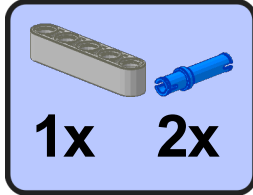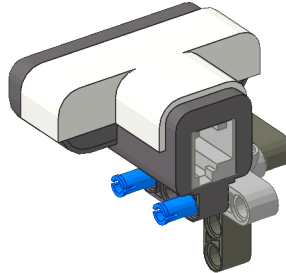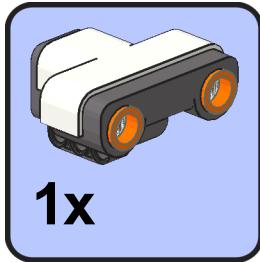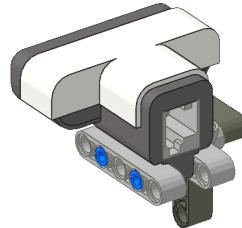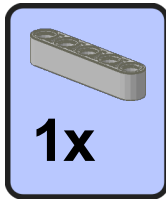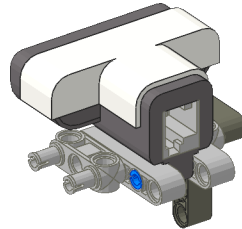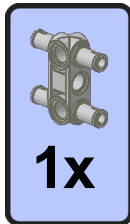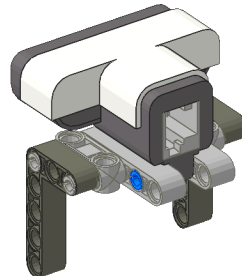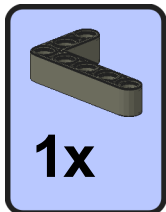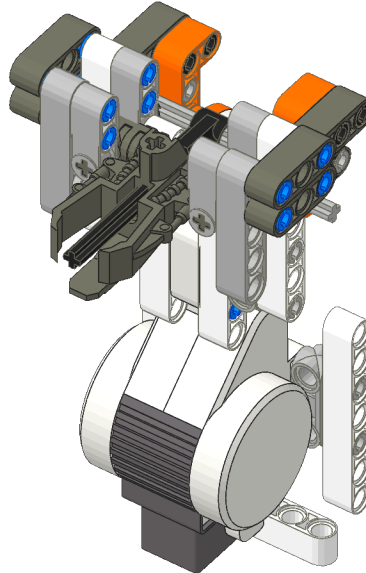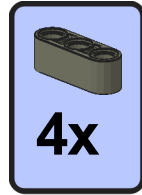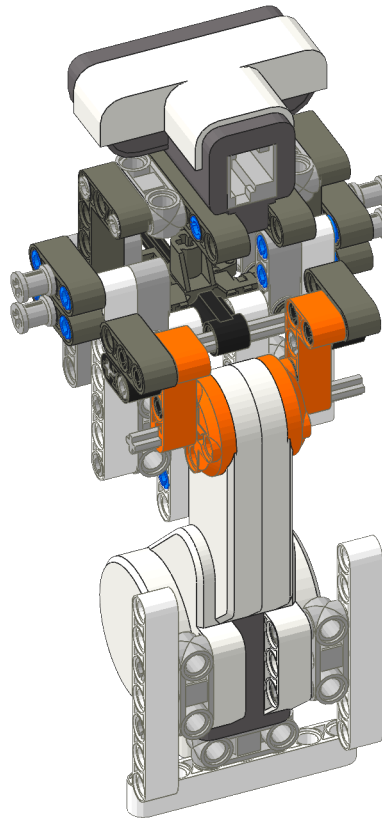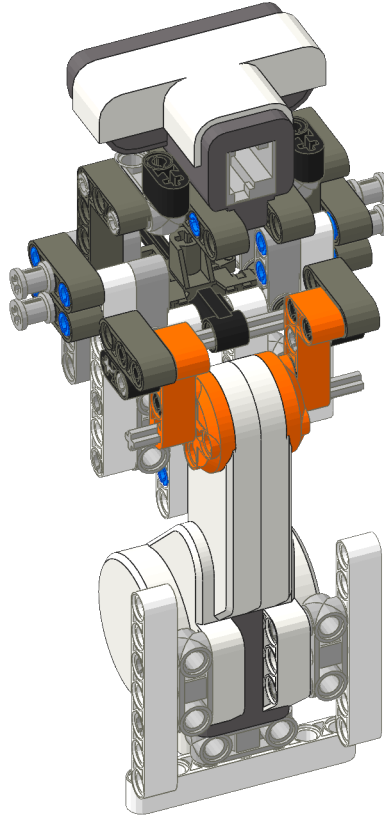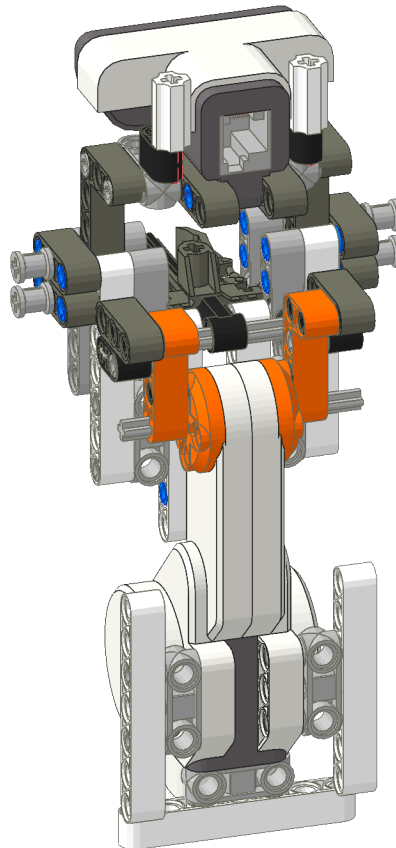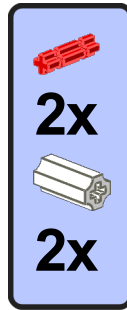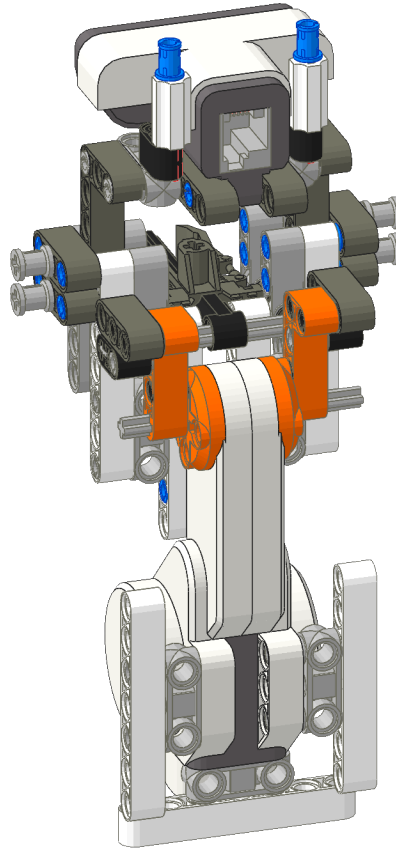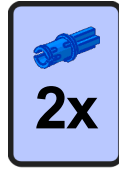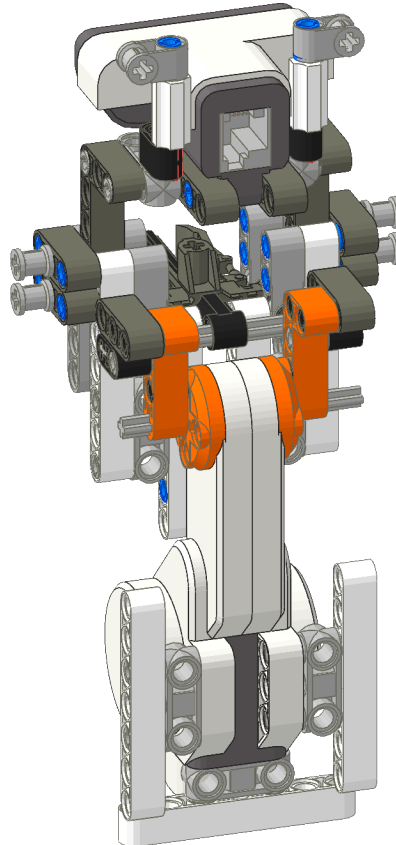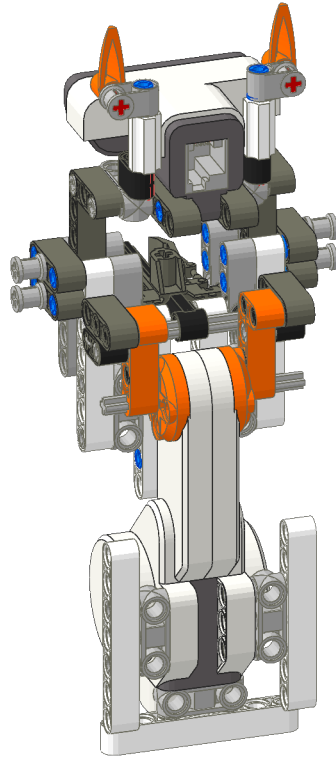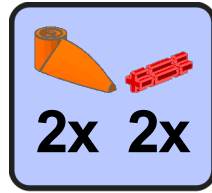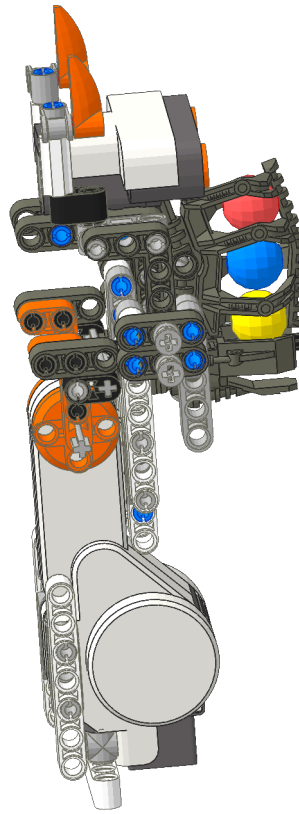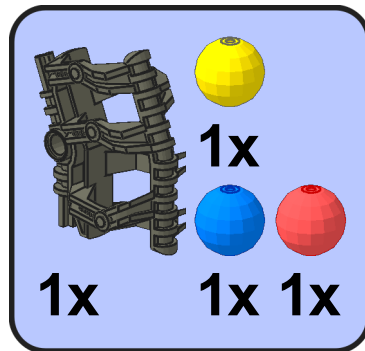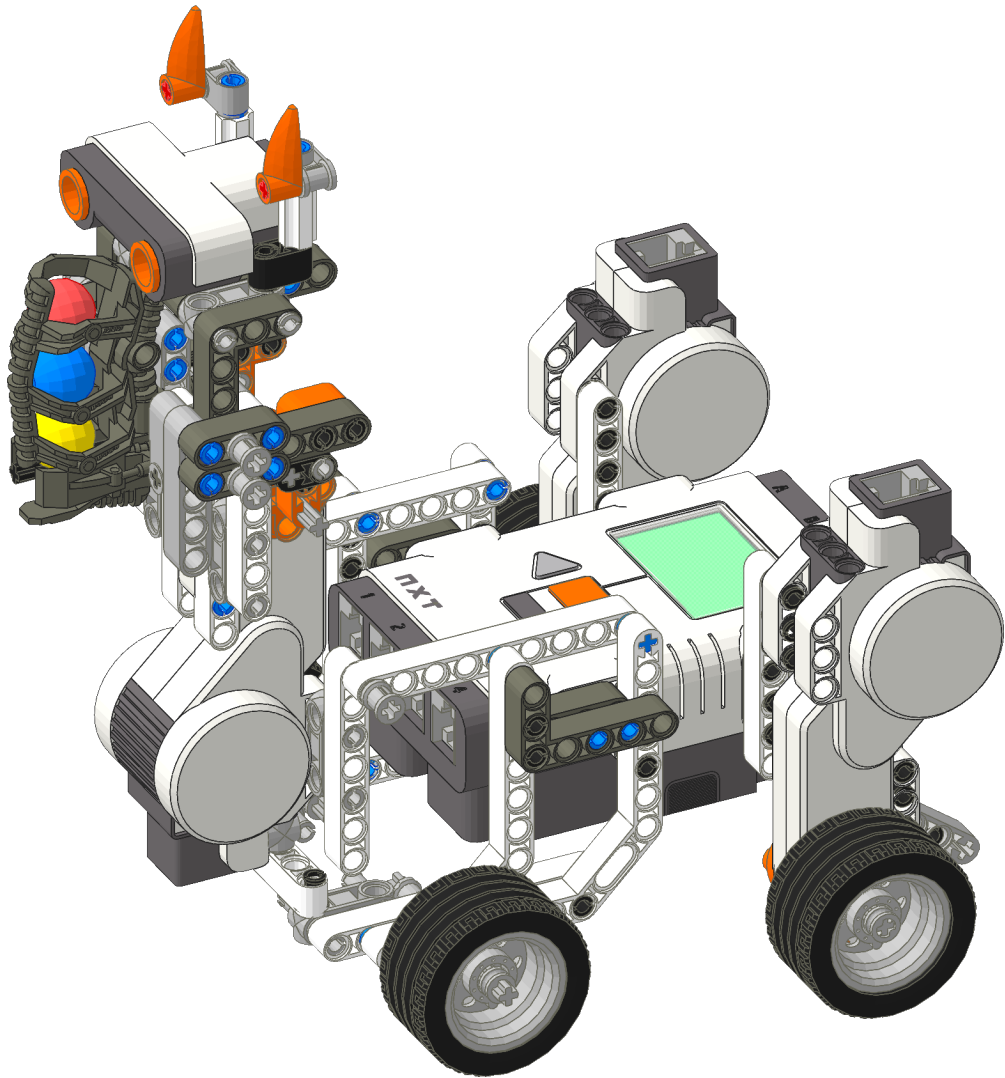
llama.rbt

This is a simple program to get you started. It assumes you will run the wheels in Port B and C with the remote control. Unfortunately, the remote control seems to inhibit the shooter, and may not always shoot at close objects, if you are using the remote control.

LOOP
Forever

Wait Block
Port 4
Ultrasonic Sensor
< 12 inches

Motor Block
Port A
Up Arrow
.5 seconds
Power—75
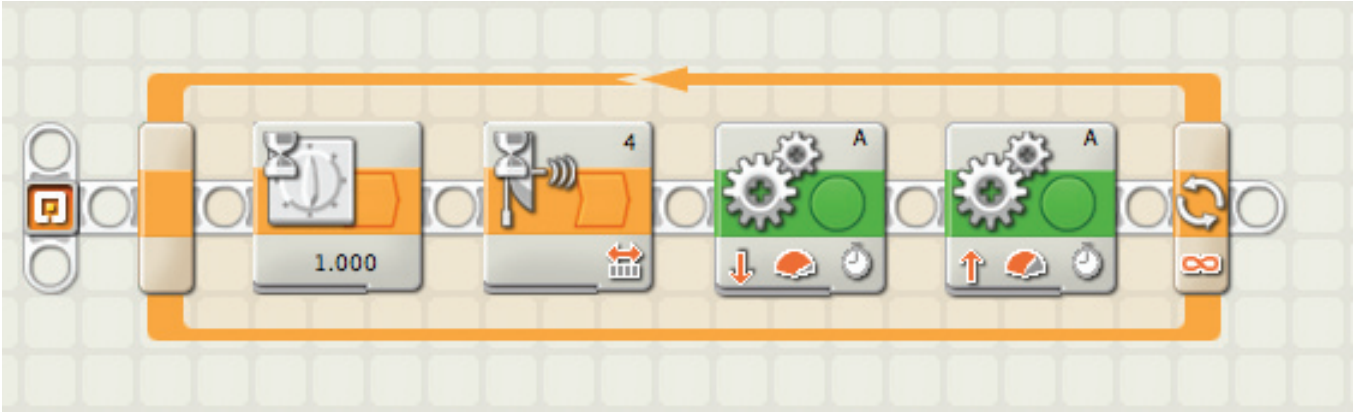
Wait Block
Sensor
Ultrasonic

Motor Block
Port A
Down Arrow
.5 seconds
Power—100

Attach the spitting motor to Port A. Plug the wheel motors into Ports B & C. (If you are going to use the remote control, cross the B and C wires, so the orientation of turns will be the same for the robot and you.)

You may find that the front wheels of the llama are prone to come off with a lot of turning and twisting. You can reduce this torque by removing the front tires and allowing the to run on the gray wheels. (Without the rubber tires there is less drag.)

Simply removing the tires will work, but the llama form is somewhat lost. Here are a few simple modifications that will retain the lines of the robot.

There are no changes in the front section, and the sections connect together as they did before.

Shift the front wheels and the front wheel supports down one hole.
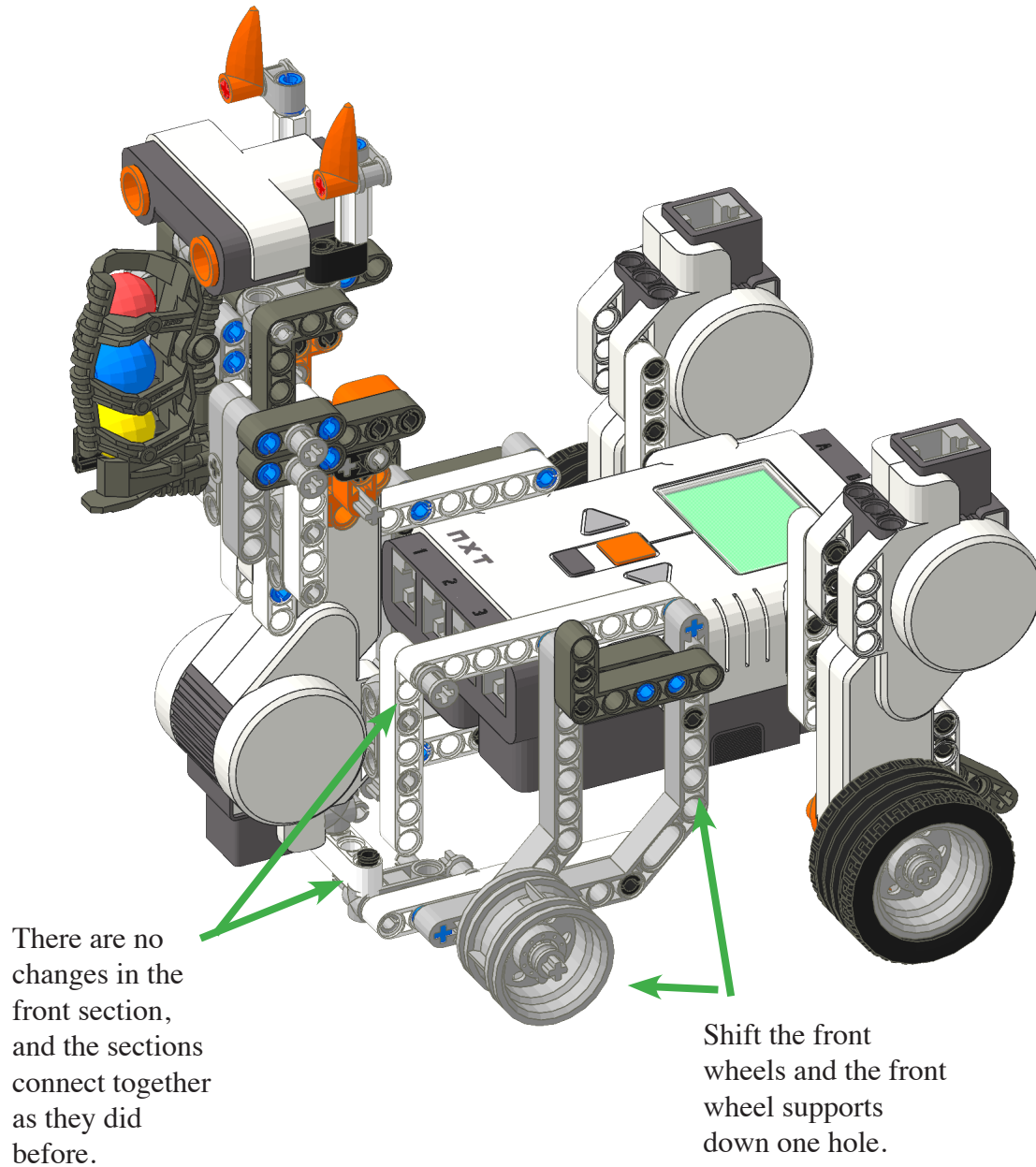
Beyond the Box-A

A ball caster allows the robots to move more freely. This is jut one example of how you might create one.
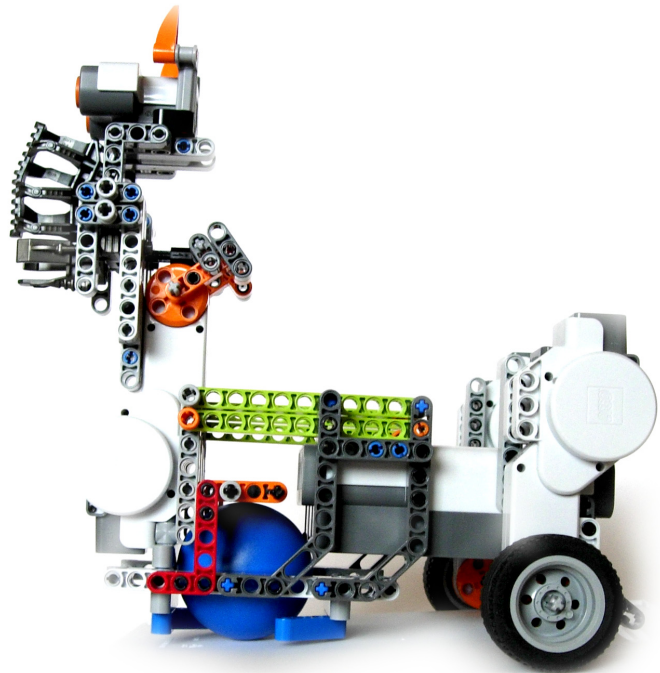
The top of the ball caster (left) is formed by two axles with an axle joiner in the middle. The addition of the joiner gives just enough push so that the robot rolls on the ball, rather than sliding on the supports.

These 1 x 7 bent beams (blue) hold the ball in place, but allow it to rotate.

Beyond the Box–B

This colorful character demonstrates how I might replace the Zamor Shooter with the competition cannon, which is found in LEGO Education's Resource Set Supplemental. The red beam holds the trigger for the dart.

As you can see, I've also experimented with bigger tires (from a TECHNIC dump truck) and colored beams (inspired by my green dart).
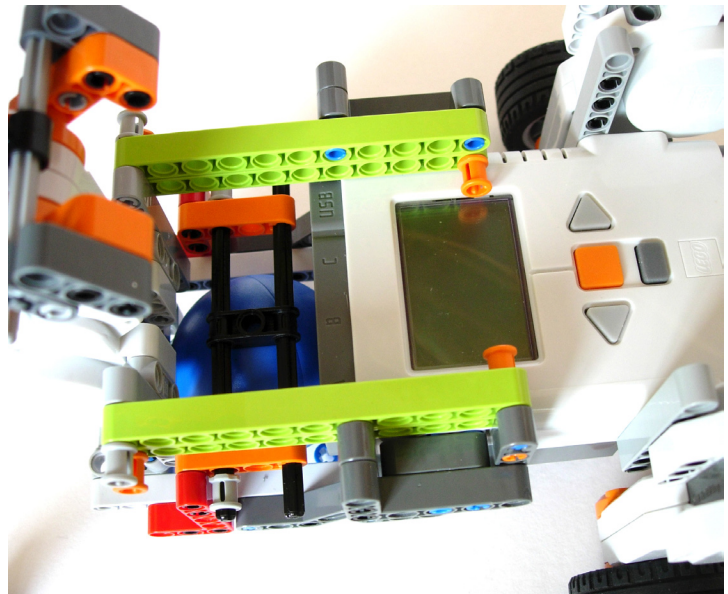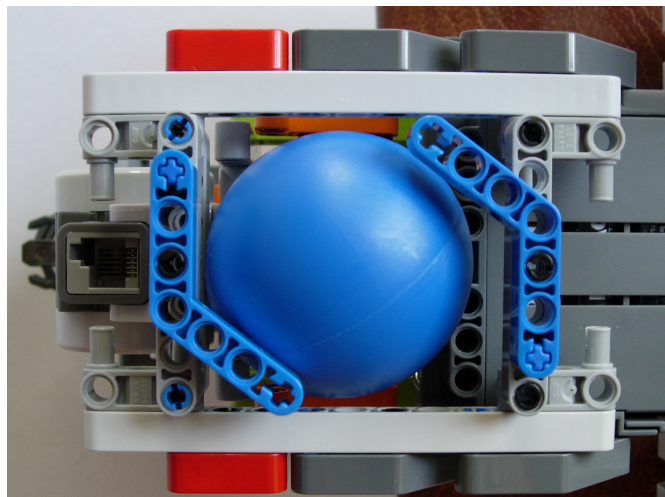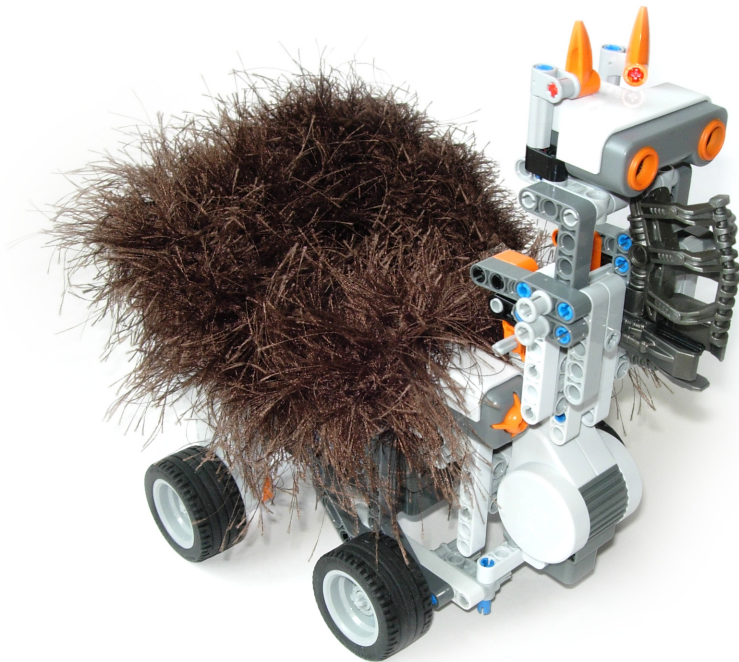
Outside my local ice cream parlor, there is a field of llamas. Observing them, I realized that a simple fur toupee would make my robot look even more like a real llama.

It's a simple project to knit or crochet a rectangle using brown or black eyelash yarn. In this case, I've added a touch sensor, so I can start and stop the robot without having to fuss with the fur.

(Photo credit: Rick Rhodes)