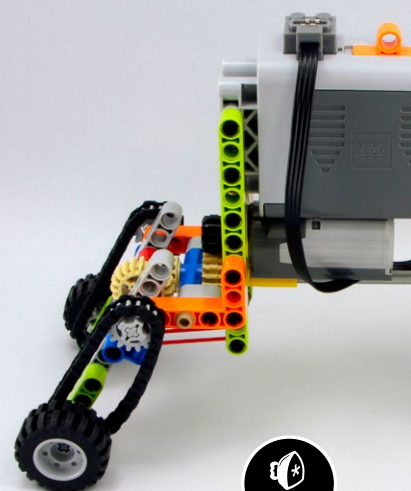
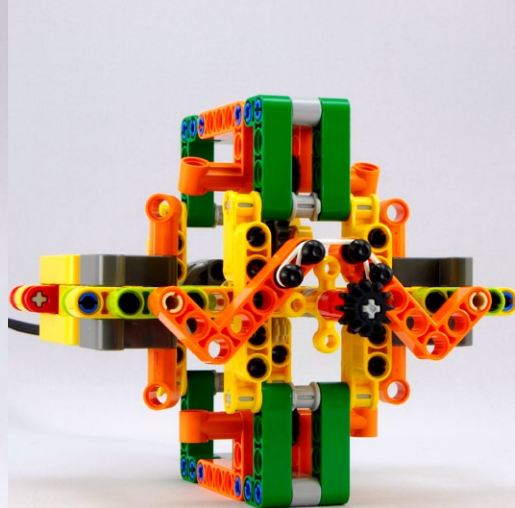
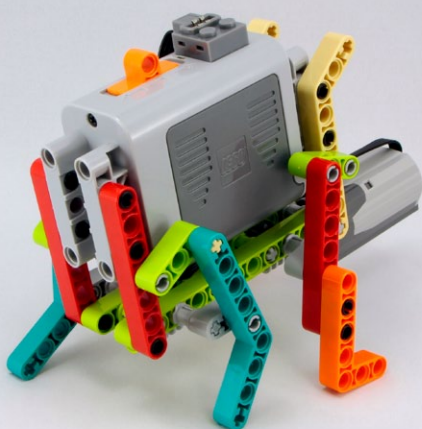


THE LEGO® POWER FUNCTIONS IDEA BOOK

CARS AND CONTRAPTIONS

YOSHIHITO ISOGAWA



THE LEGO® POWER FUNCTIONS IDEA BOOK
CARS AND CONTRAPTIONS

VOLUME 2

THE LEGO®
POWER
FUNCTIONS
IDEA BOOK

CARS AND
CONTRAPTIONS

Y O S H I H I T O I S O G A W A



The LEGO® Power Functions Idea Book, Volume 2: Cars and Contraptions.

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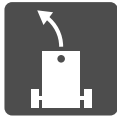
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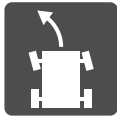
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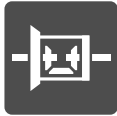
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Introduction

This is an idea book, offering hundreds of projects and mechanisms you can build with LEGO Technic parts. The book especially focuses on LEGO Power Functions, which is the latest version of the Technic system of motors, lights, and other electric building elements.

Where Are the Words?

Other than this brief introduction and the table of contents, this book has almost no words. Instead, you'll find a series of photographs of increasingly complex models, each designed to demonstrate a mechanical principle or building technique.

While the book lists the pieces needed to build each model, it does not include step-by-step building instructions. Look at the photographs taken from various angles and try to reproduce the model. Building in this way is something like putting together a puzzle. You'll get the hang of it after a little practice.

The Use of Color

The examples in this book are made with parts of various colors to make it easier for you to see the individual bricks' shapes. But you don't need to use the colors I've chosen in your models; use whichever colors you want to make the projects your own.

Substituting Parts

The parts used in this book were selected from among the easily obtainable ones as much as possible, but you'll probably still be missing a few.

Try to build as many models as possible using the parts that you already own. If you find that you're missing parts, try to think of ways to substitute other parts for the ones that you're missing.

For example, there are many types of LEGO tires. If you don't have the tires shown in a particular project, try using any tires you have that are a similar size. Also, there are several types of Power Functions motors. In this book, the commonly available Medium (M) motors are used most frequently. It's relatively easy to replace the M motor with the Large (L) motor or older motors from earlier systems, so use whatever you have available.

The Parts List in the back of the book will help you find the pieces you need.

You Are the Creator

Look at the models you build closely. By thinking about how they move and why they are designed that way, you will greatly improve your building skills.

This is an idea book; it's about imagination. It is my sincere hope that you make these projects your own, combine them, and evolve them into something even better—your own original models.

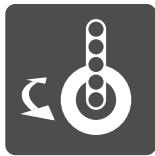


PART 1

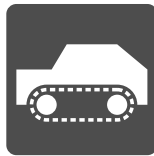
Vehicles



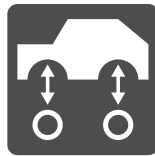
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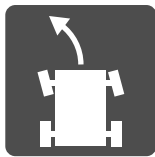
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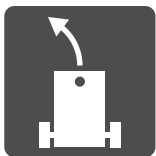
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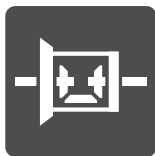
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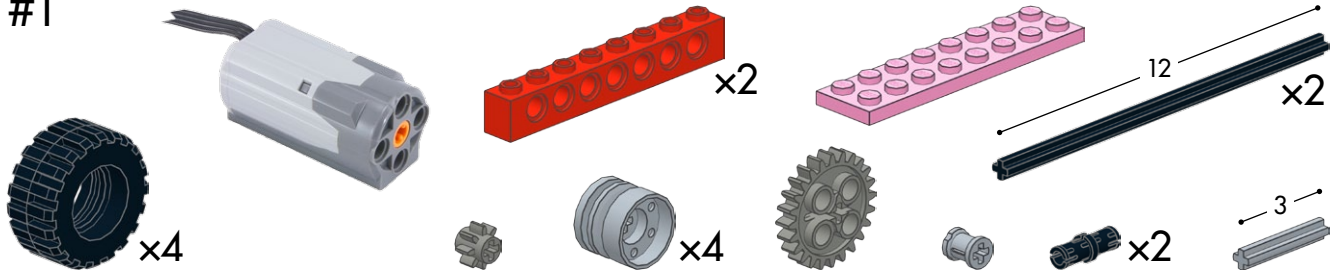


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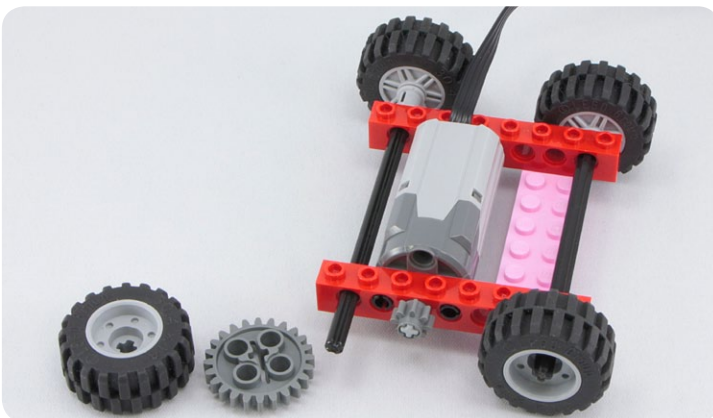


Driving wheels with a motor

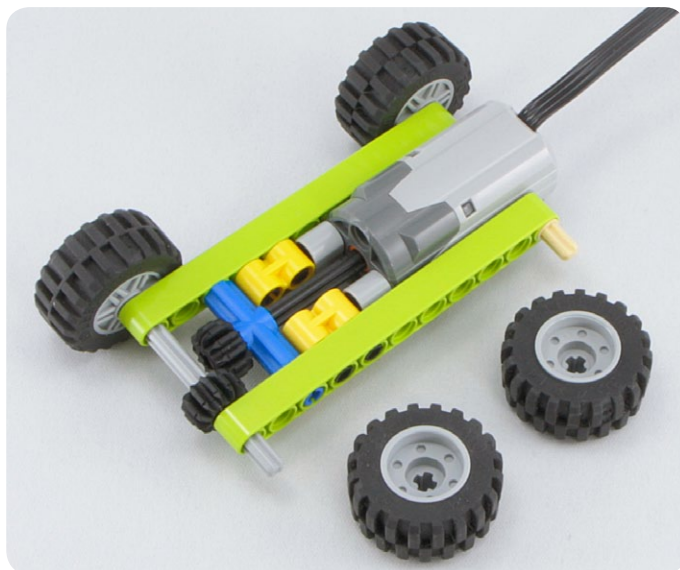
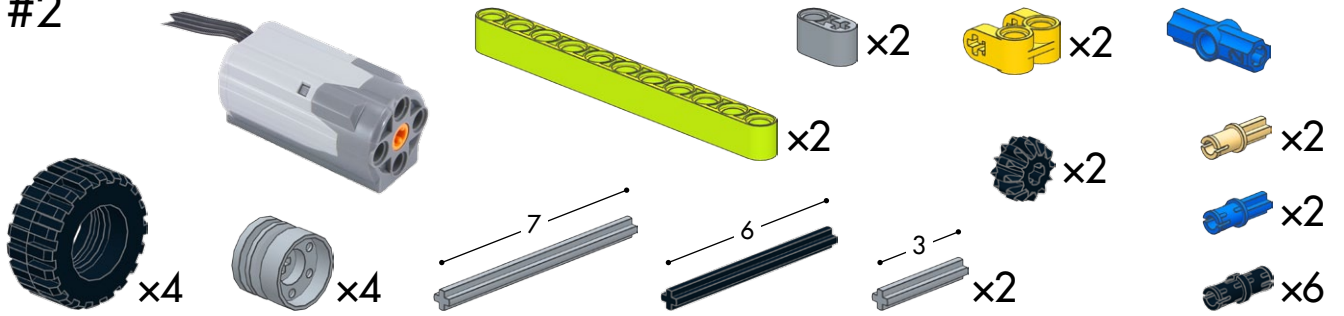
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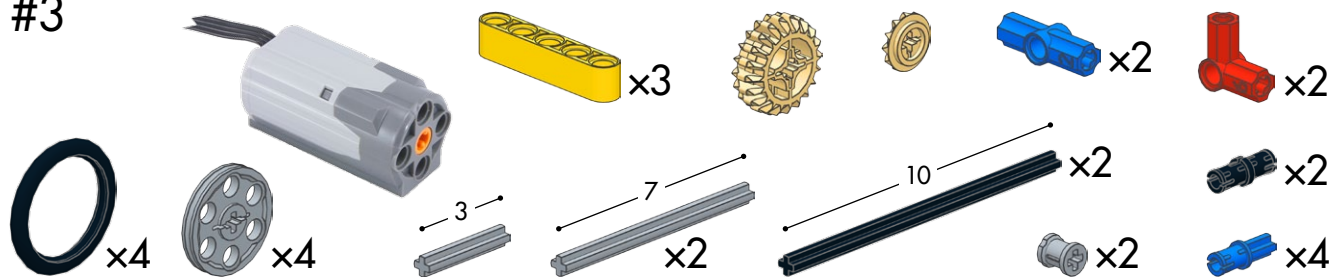
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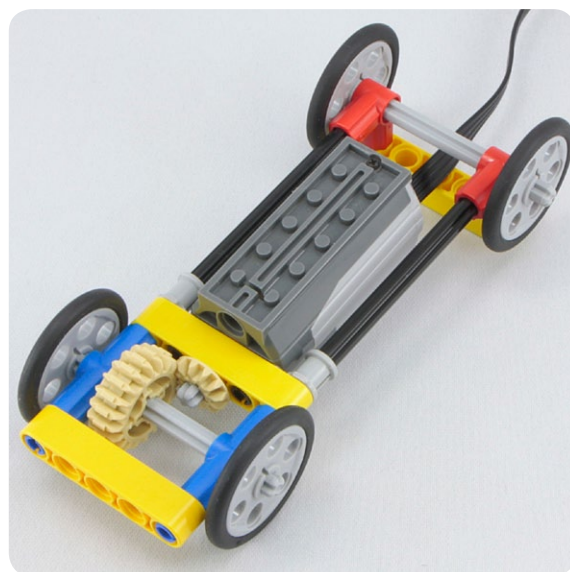
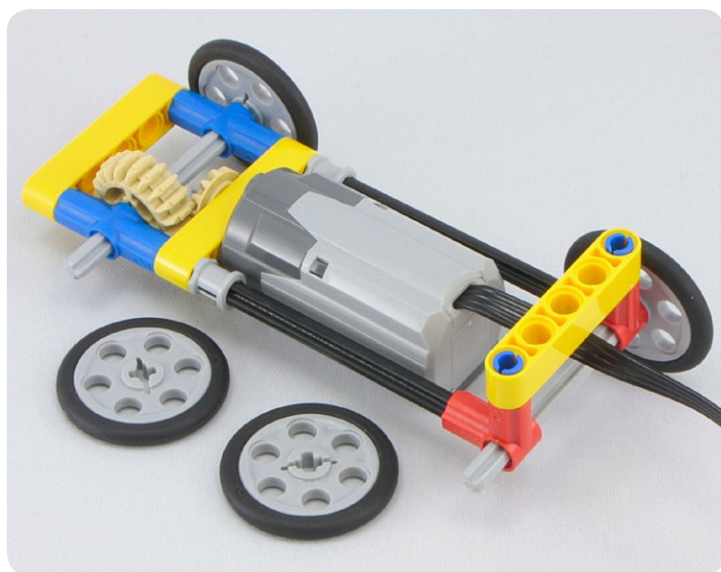
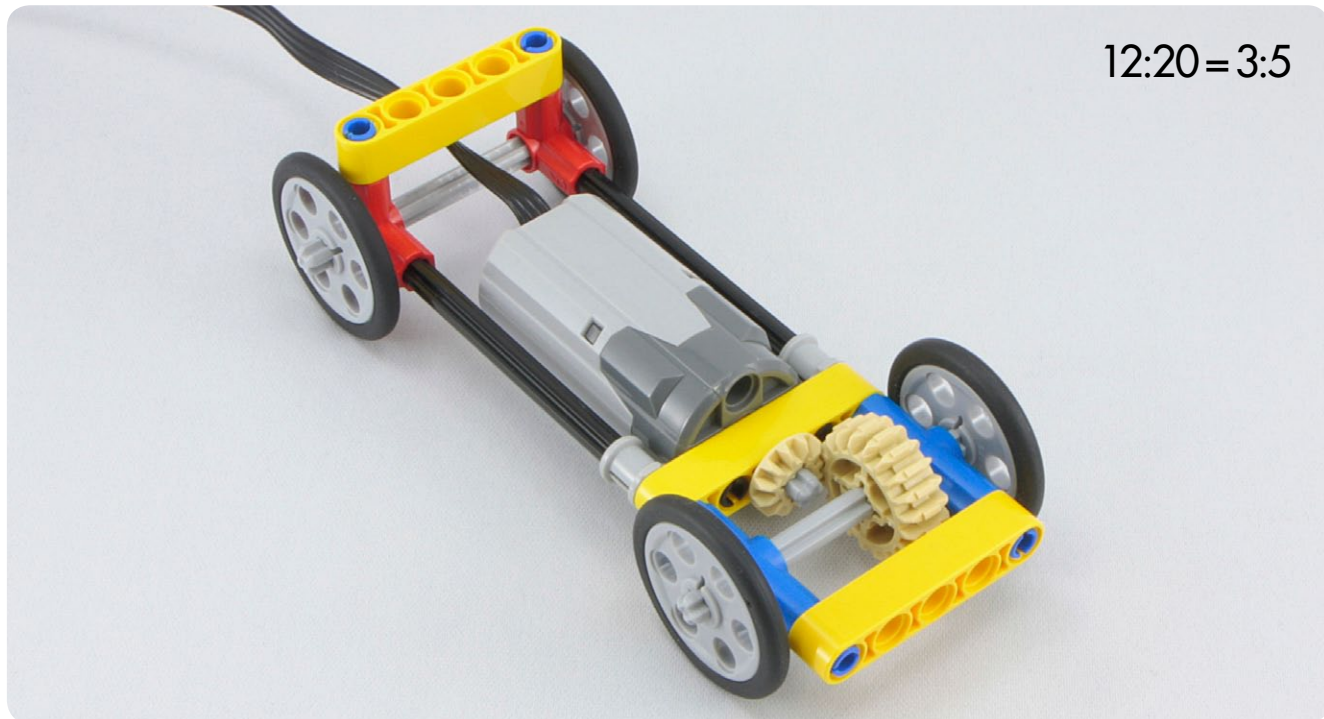
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#3



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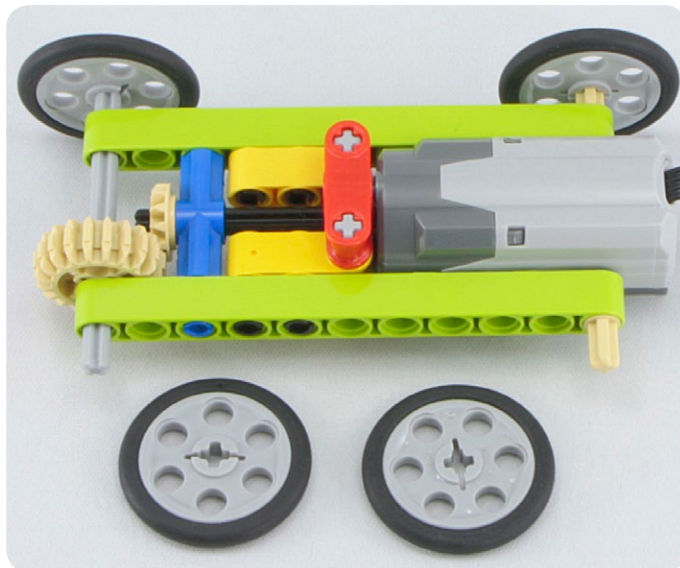
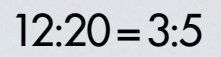


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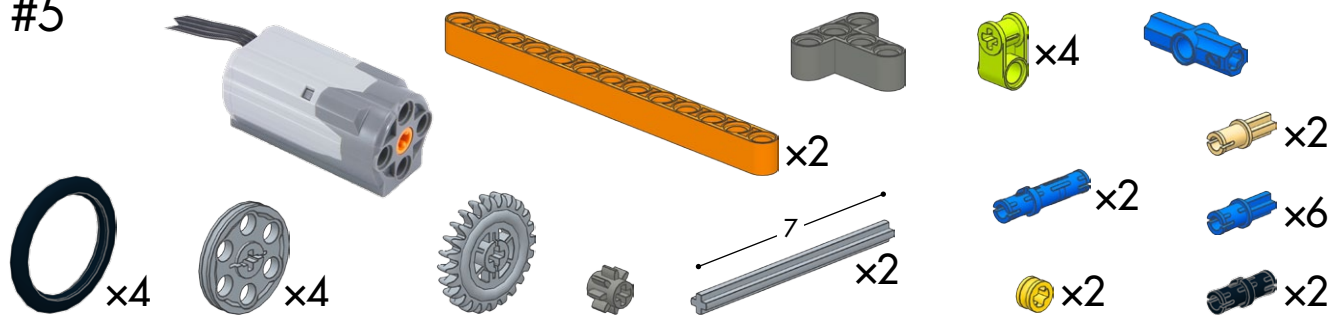


Parts list for step 4:

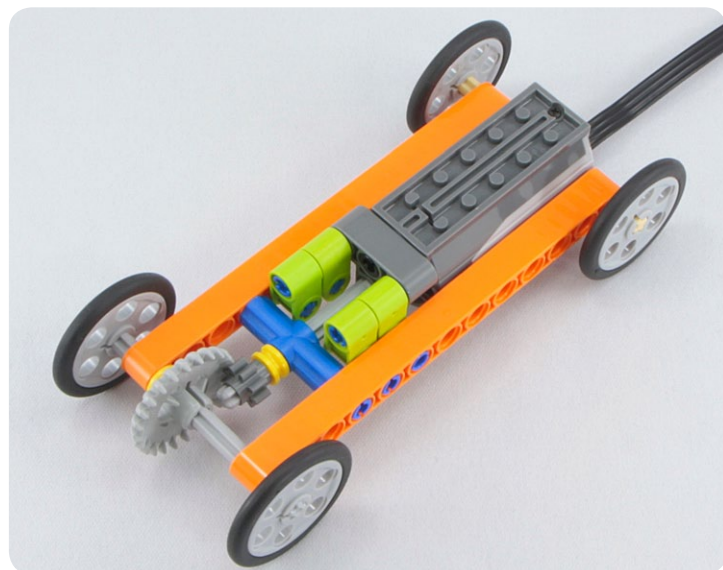
- 1 grey motor
- 2 yellow Technic beams (1x10)
- 2 red Technic pins (1/2)
- 2 yellow Technic pins (1/2)
- 1 blue Technic pin (1/2)
- 4 black O-rings
- 4 grey wheels (1.5)
- 1 yellow gear (24 teeth)
- 1 yellow gear (12 teeth)
- 2 grey Technic axles (3)
- 2 black Technic axles (6)
- 1 grey Technic axle (7)
- 2 tan Technic pins (1/2)
- 2 blue Technic pins (1/2)
- 6 black Technic pins (1/2)



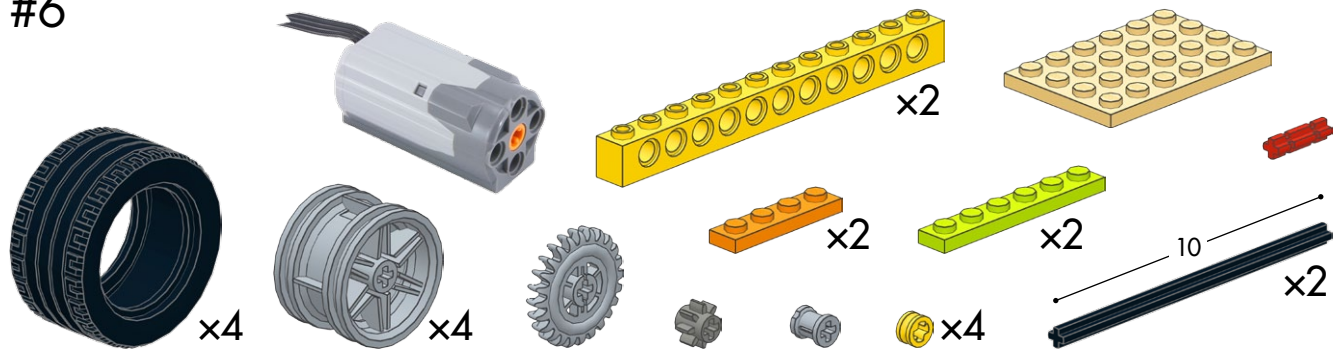
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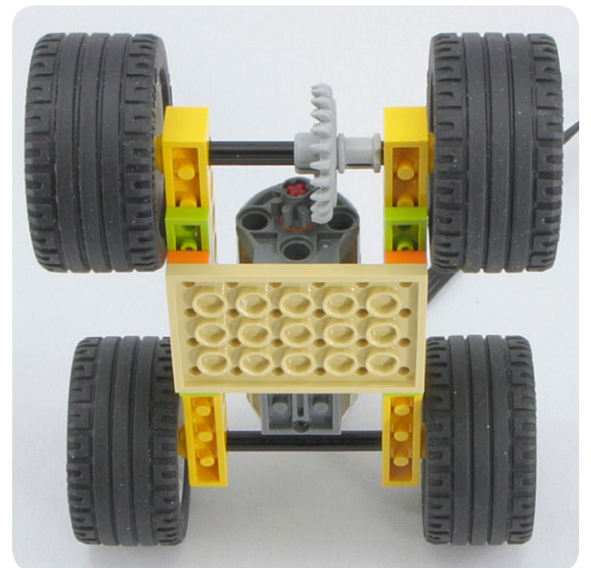
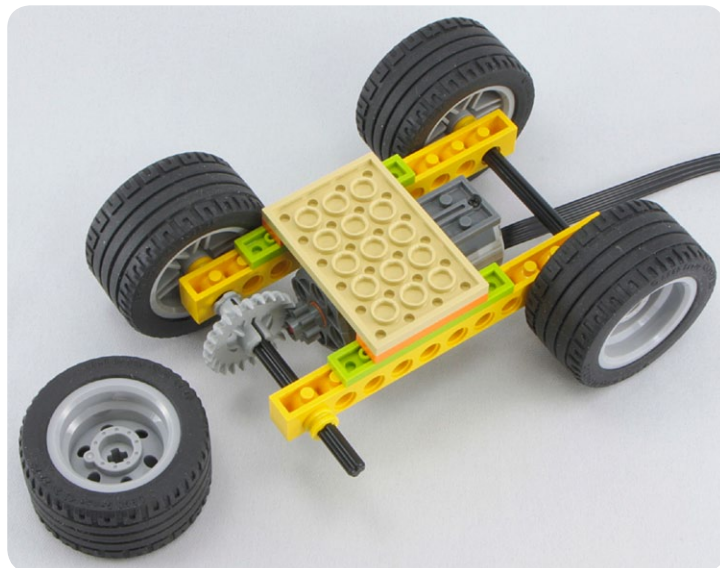
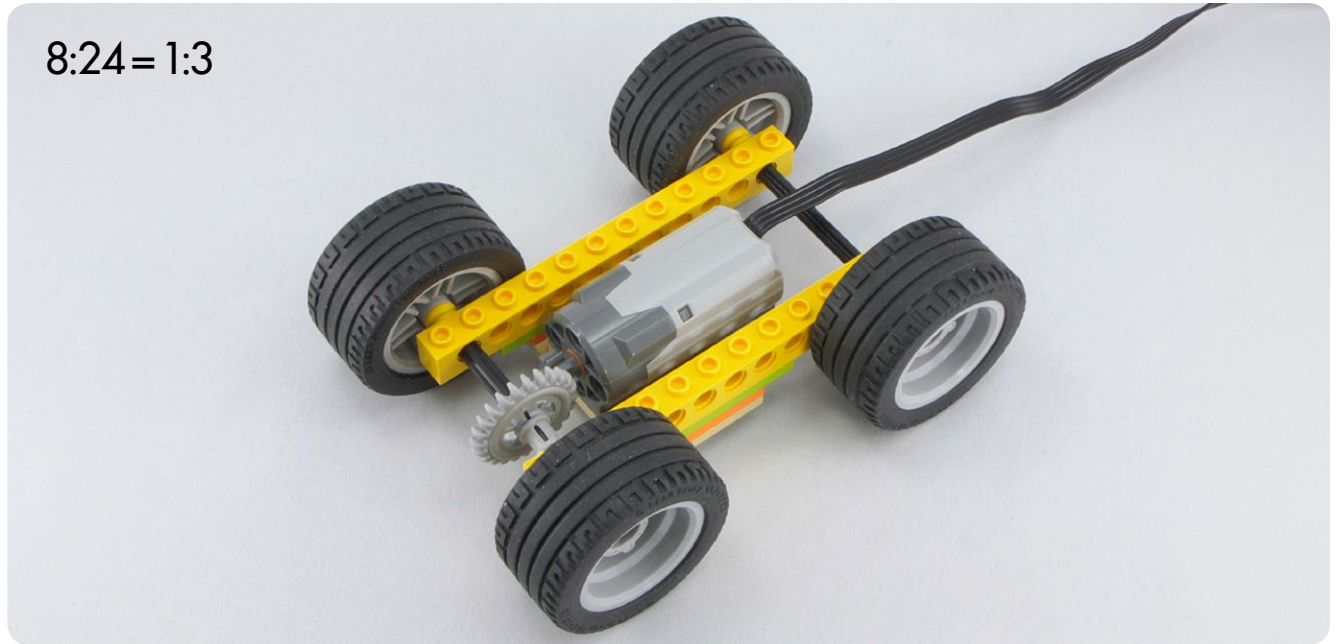
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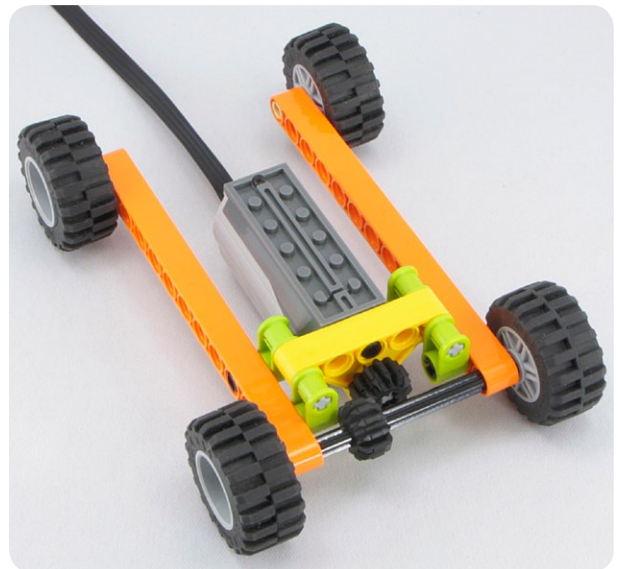
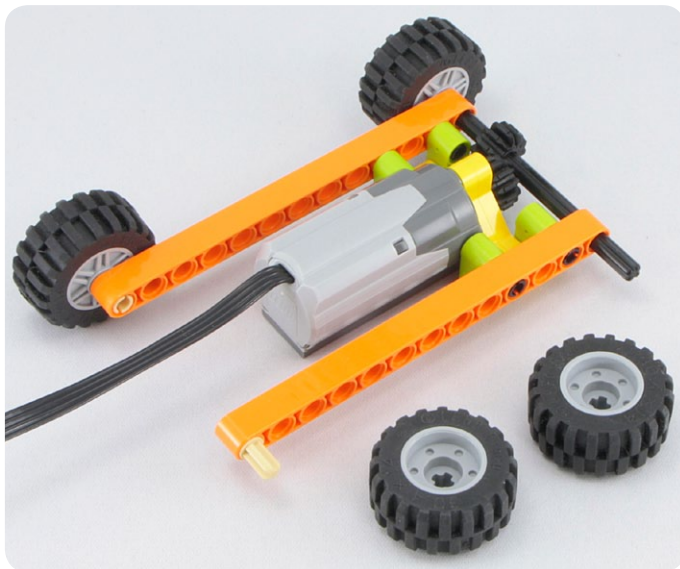
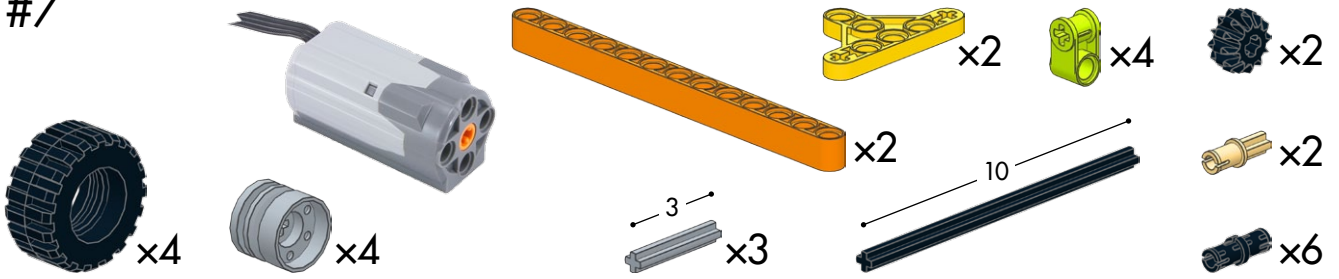
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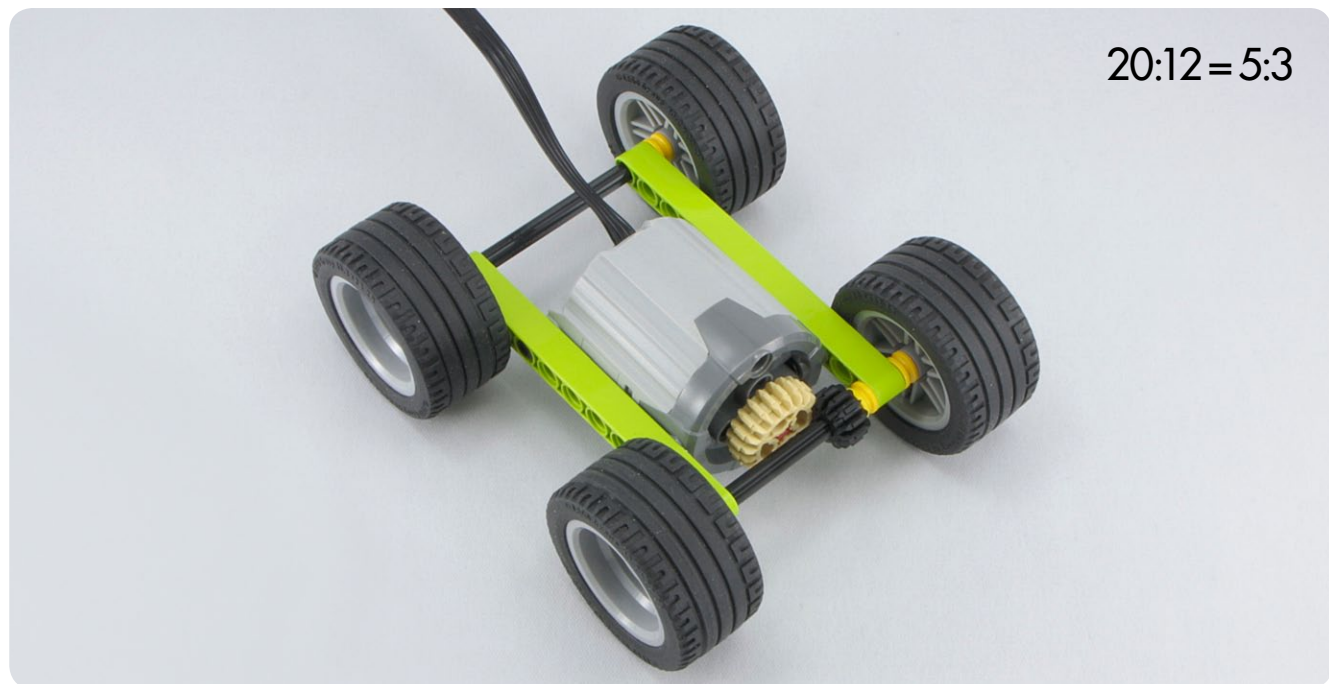
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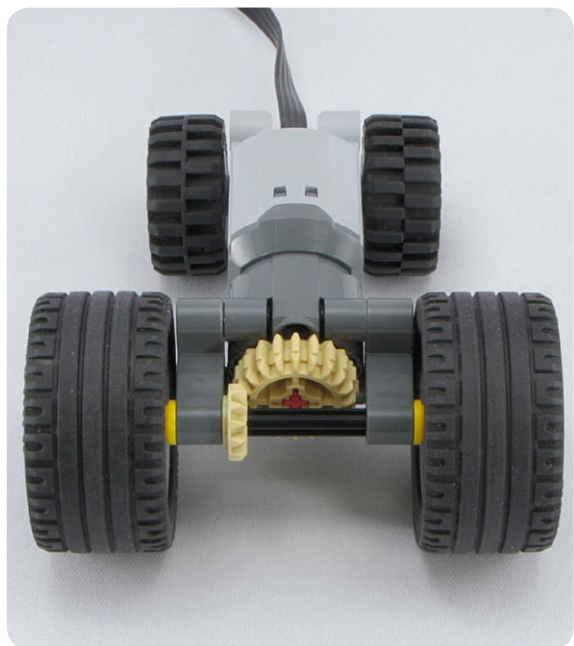
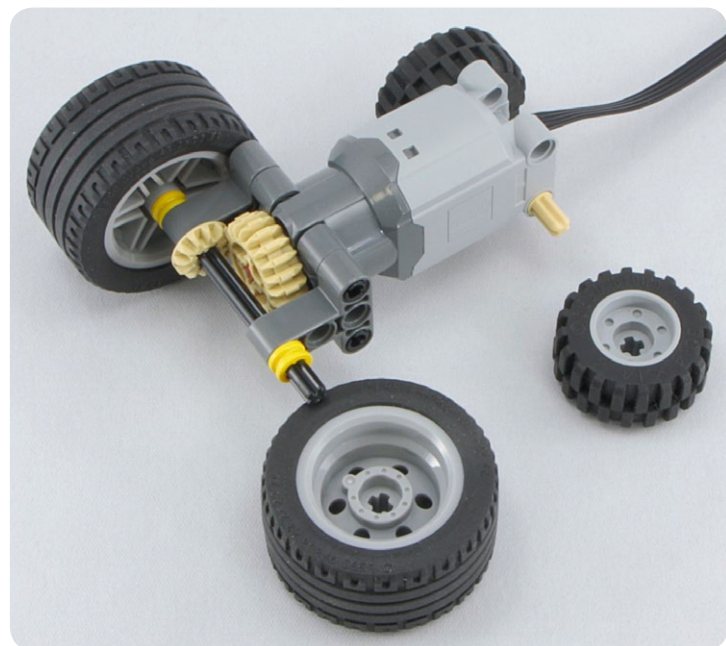
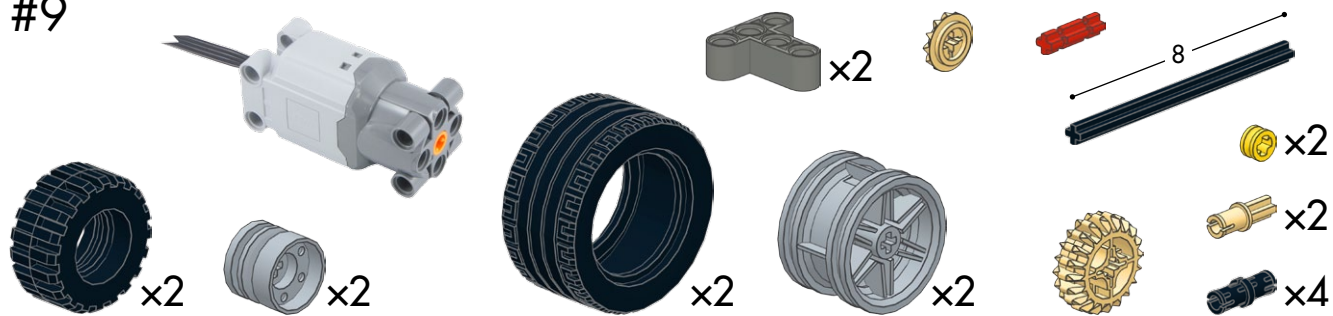
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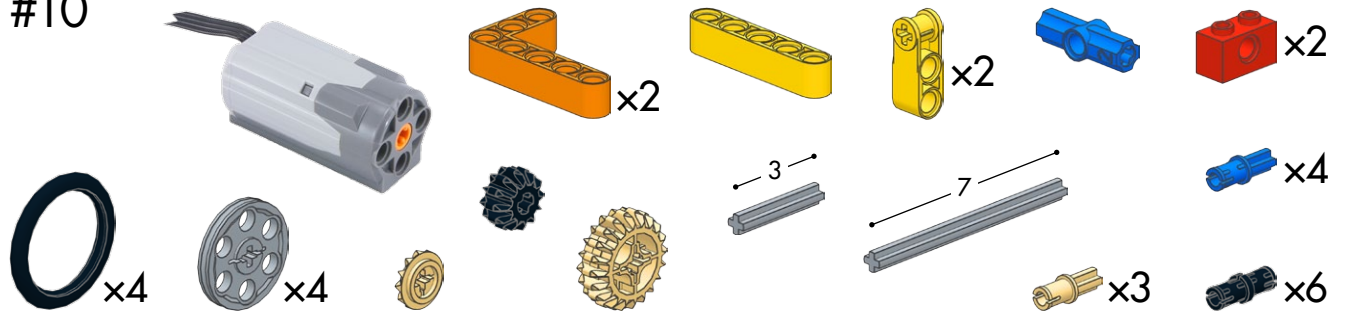
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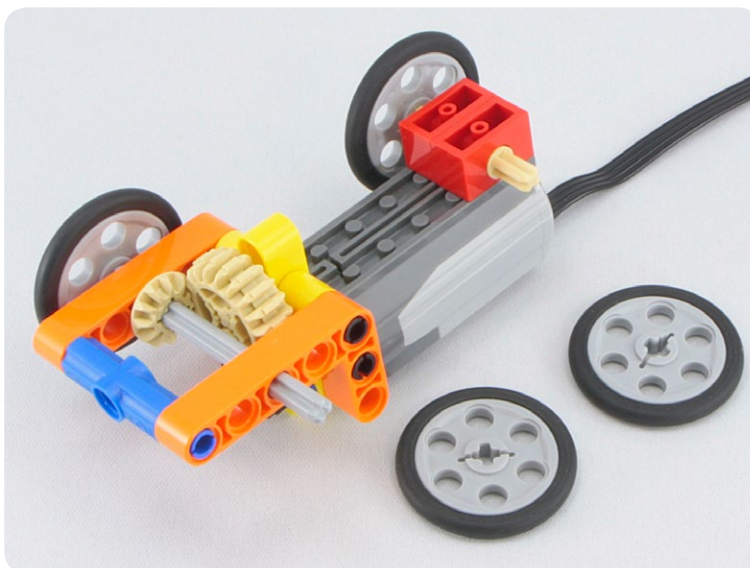
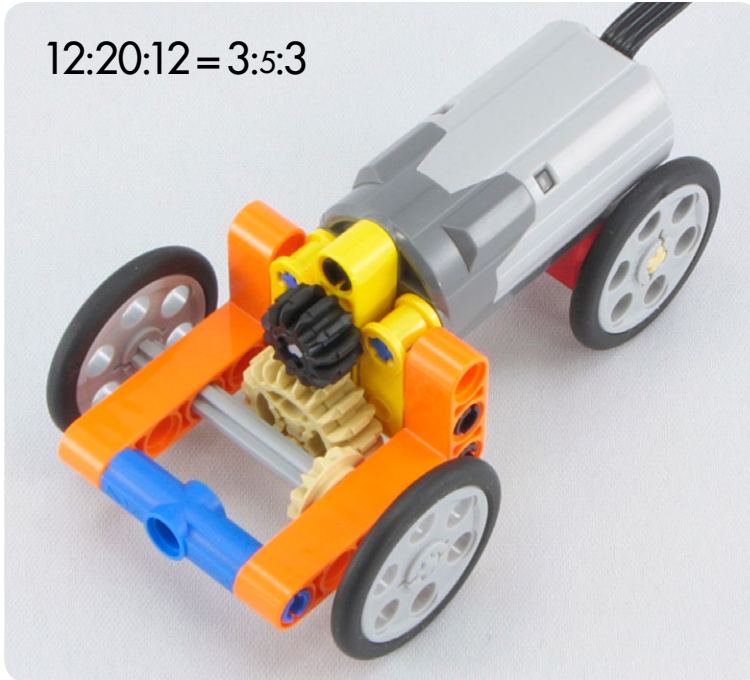
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#10



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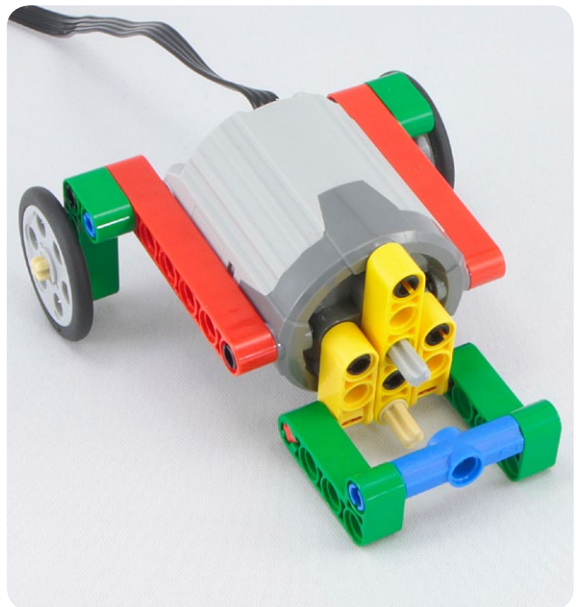
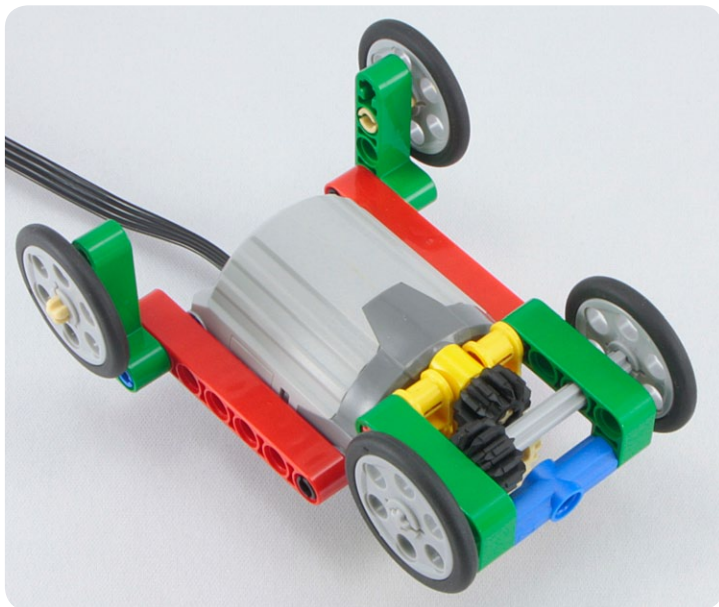
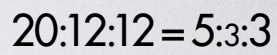


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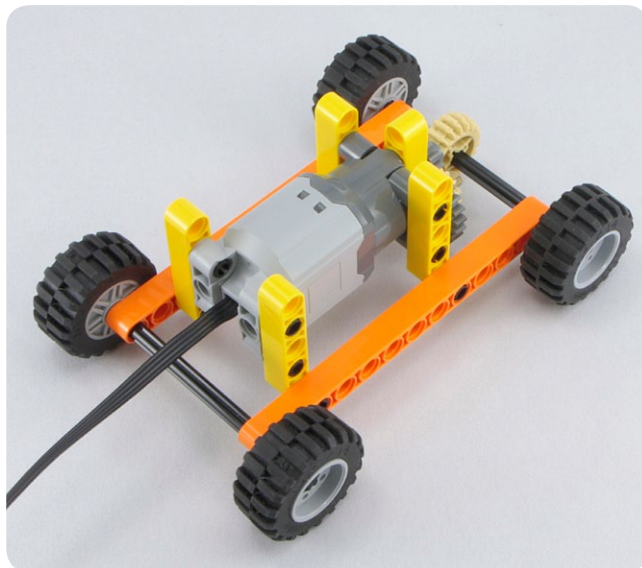
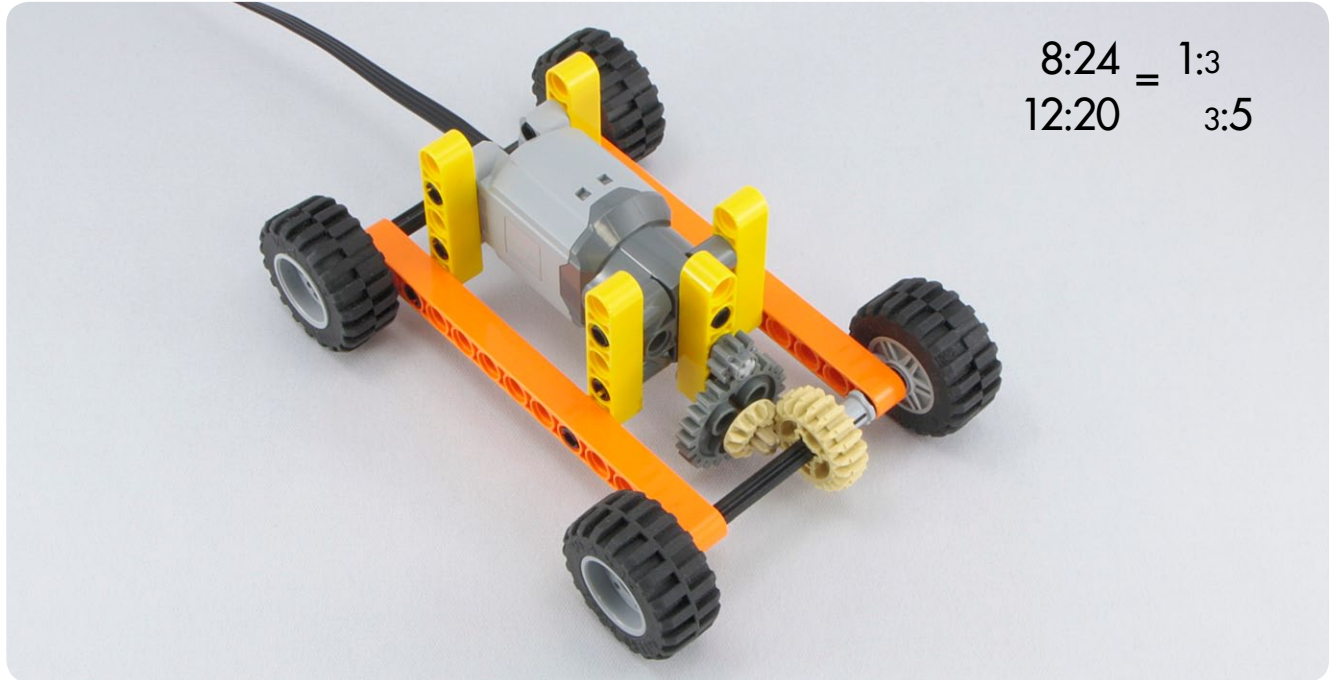
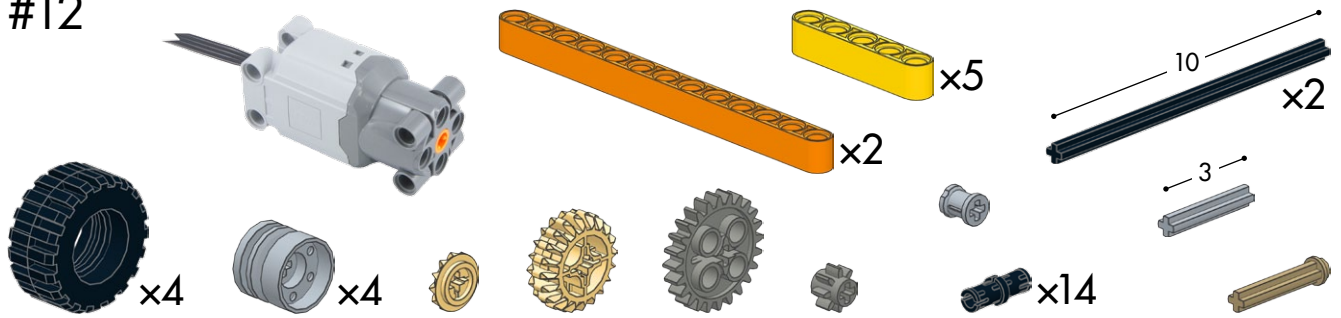


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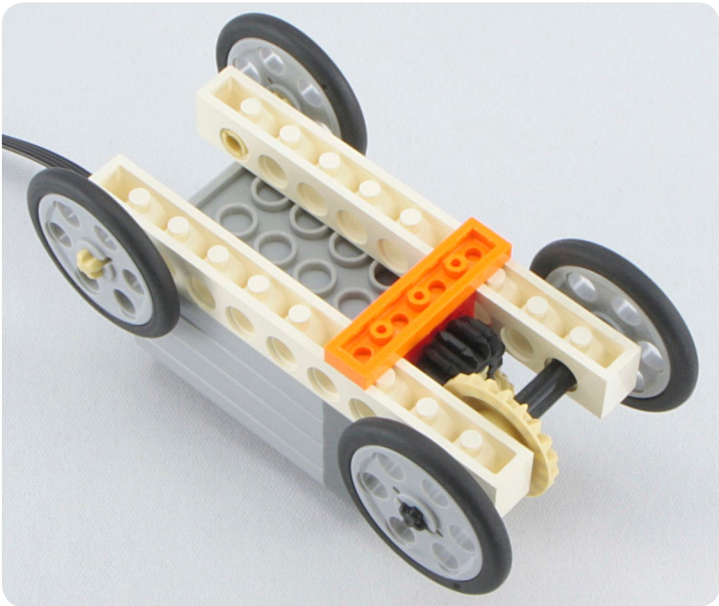
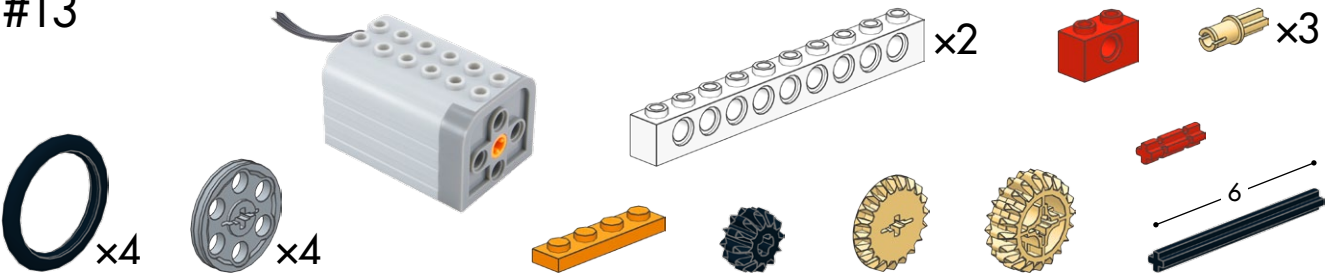
- 1x Motor
- 2x Red 1x5 Technic Beam
- 1x Yellow 1x5 Technic Beam
- 4x Green 1x3 Technic Beam
- 2x Blue 1x3 Technic Pin
- 3x Tan 1x3 Technic Pin
- 2x Blue 1x3 Technic Pin
- 2x Yellow 1x3 Technic Pin
- 4x Black 1x1 Technic Ring
- 4x Grey 1x1 Technic Ring
- 2x Black 1x1 Technic Ring
- 1x Gold 1x1 Technic Ring
- 2x Grey 1x1 Technic Ring
- 2x Red 1x1 Technic Pin
- 3x Grey 1x1 Technic Pin
- 7x Grey 1x1 Technic Pin
- 2x Yellow 1x1 Technic Pin
- 2x Black 1x1 Technic Pin



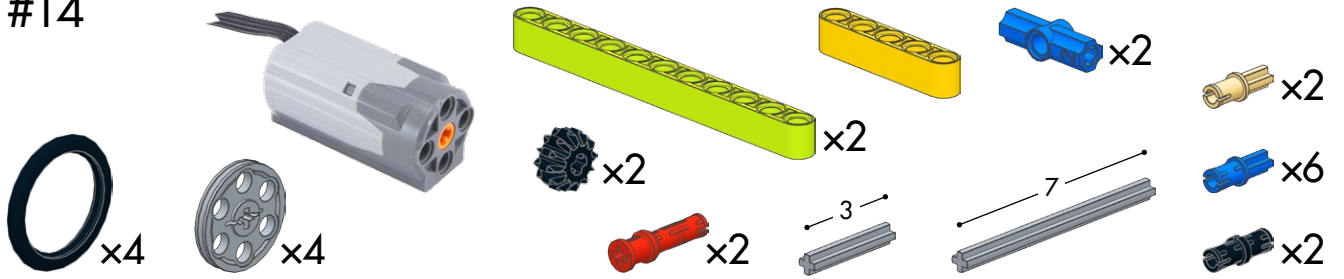
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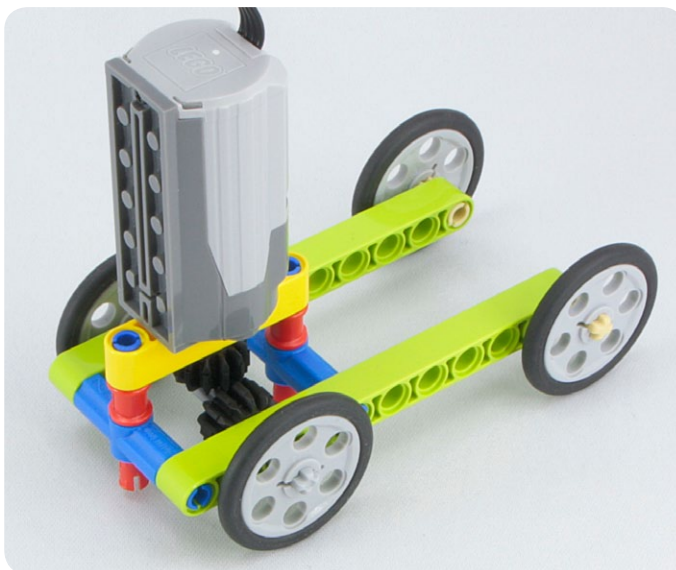
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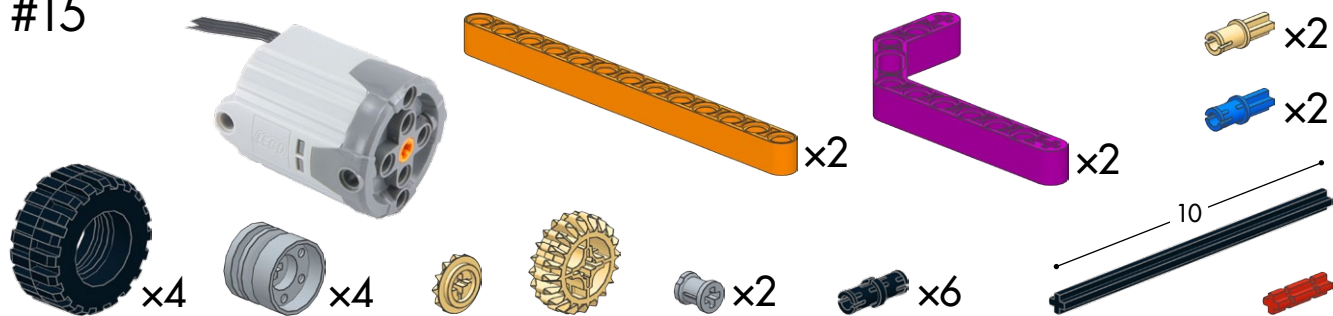
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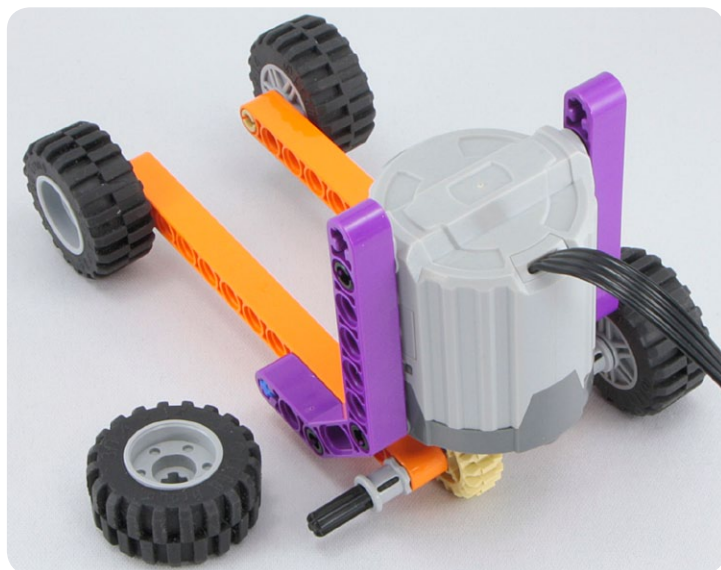
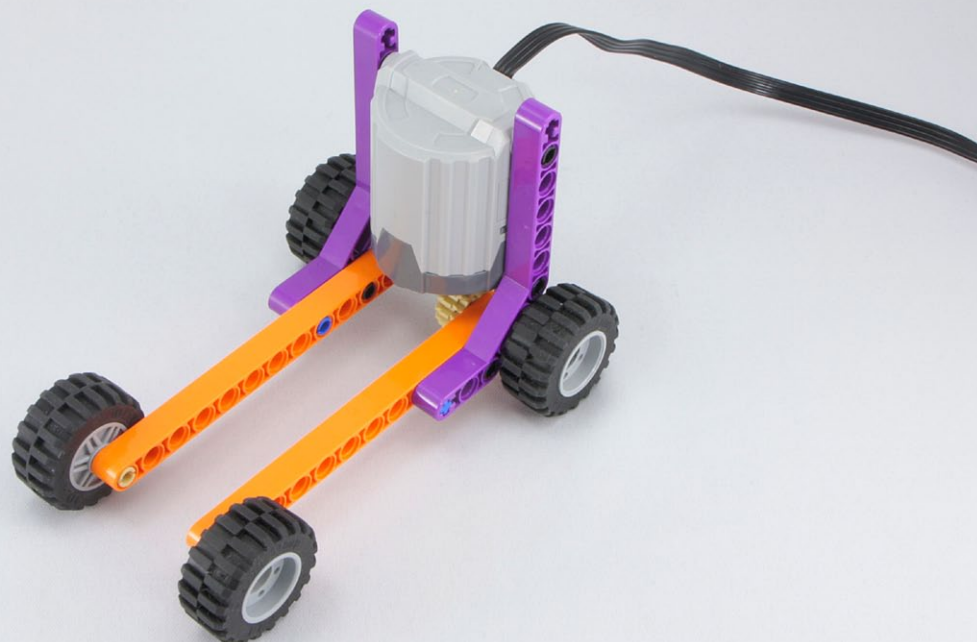
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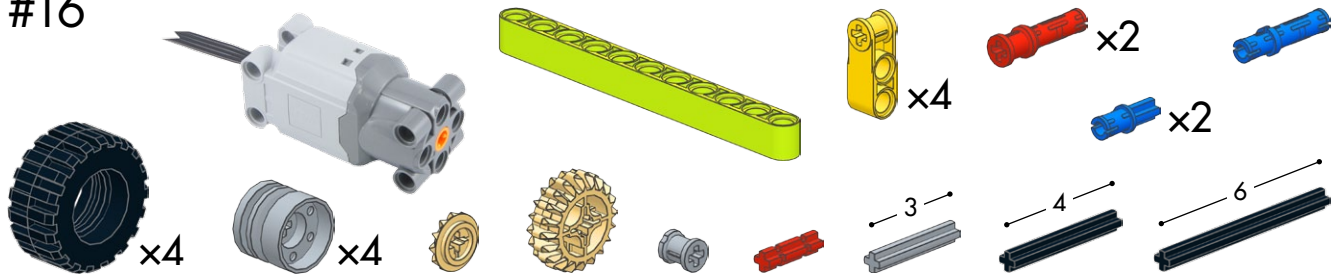
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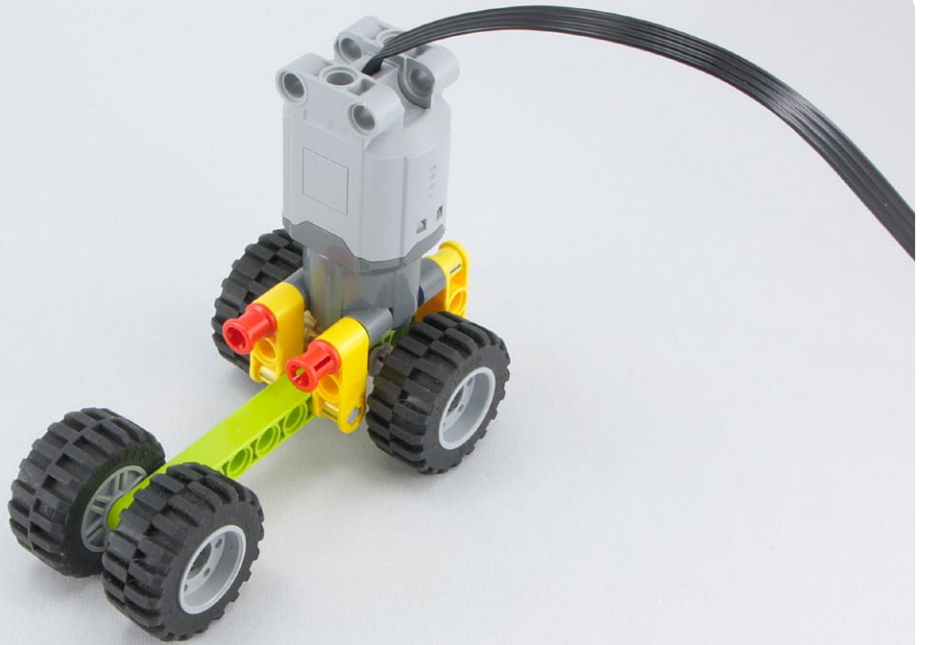
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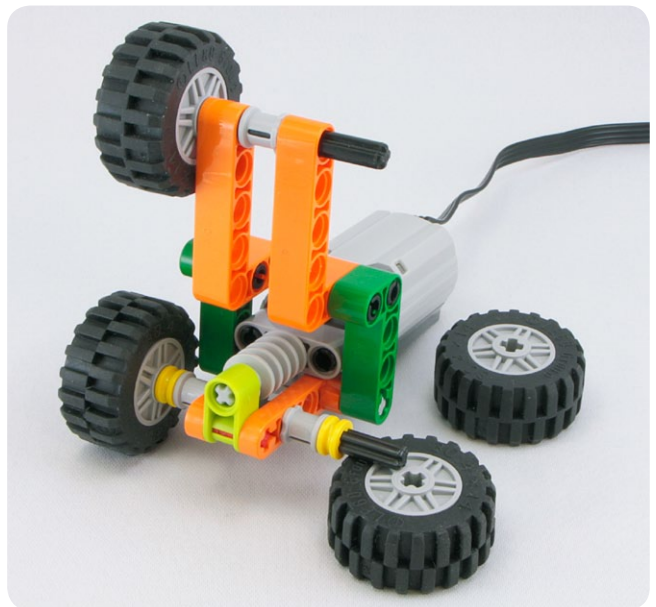
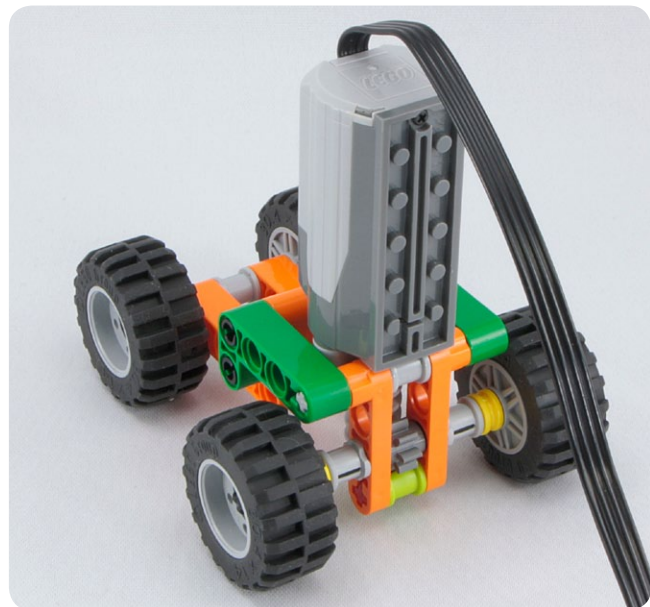


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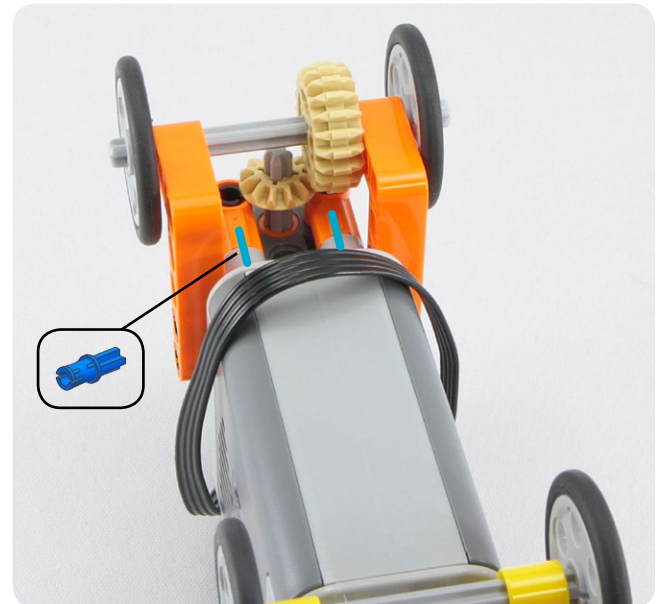
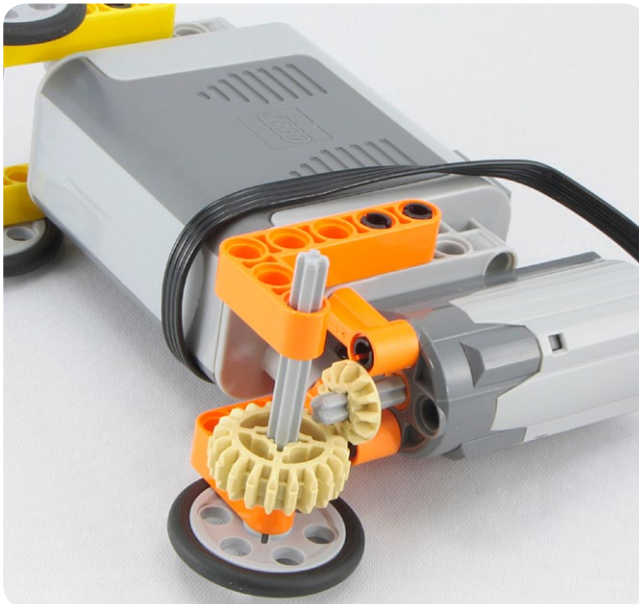
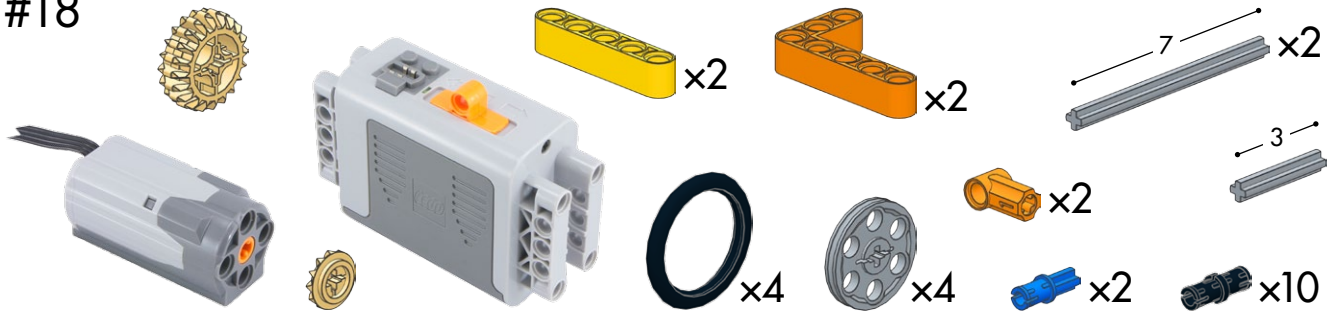


[illegible]

1:8

A LEGO Technic robot is shown from a three-quarter perspective. It features a grey motor at the back, connected to a black cable with a grey connector. The robot's frame is constructed from orange and green Technic beams. It has four black wheels with white hubs. The robot is positioned on a light grey surface.

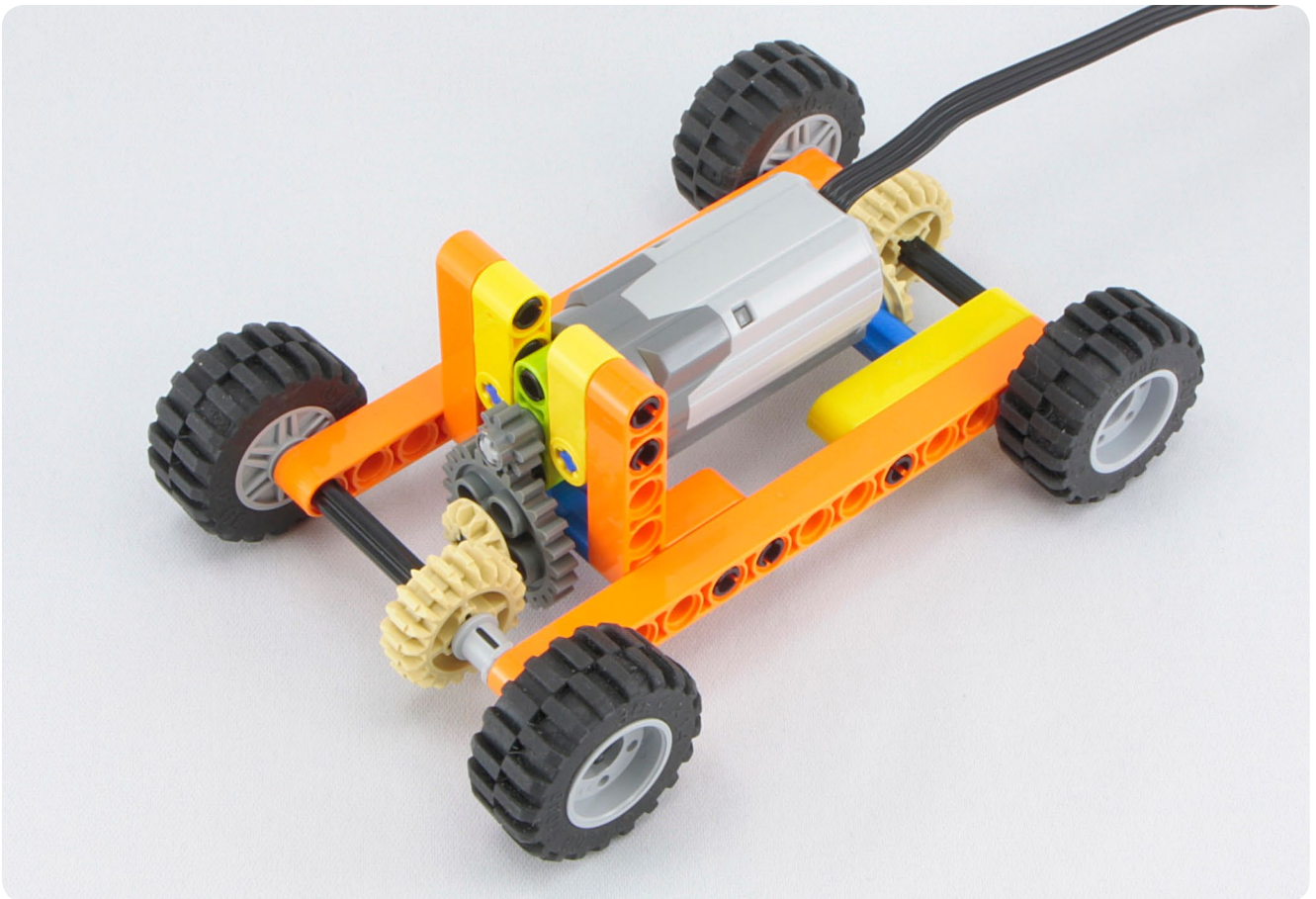
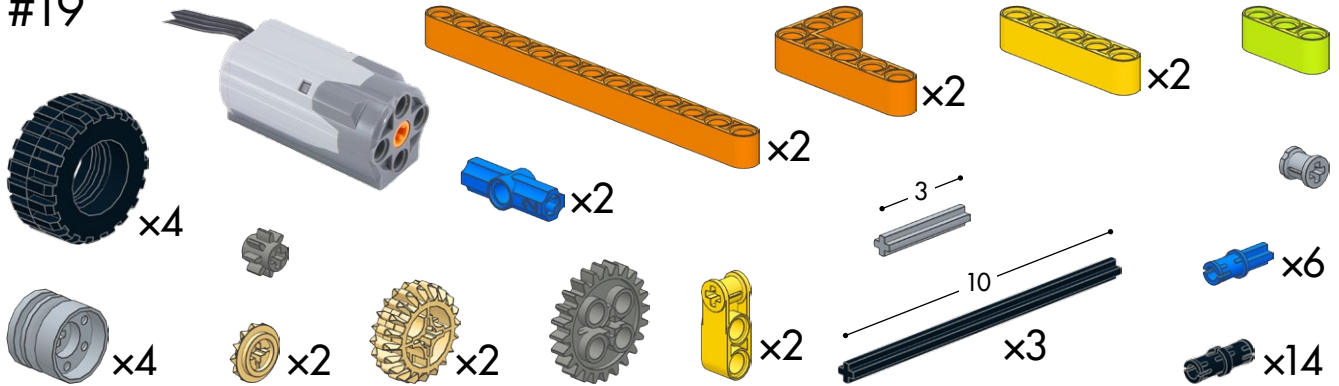
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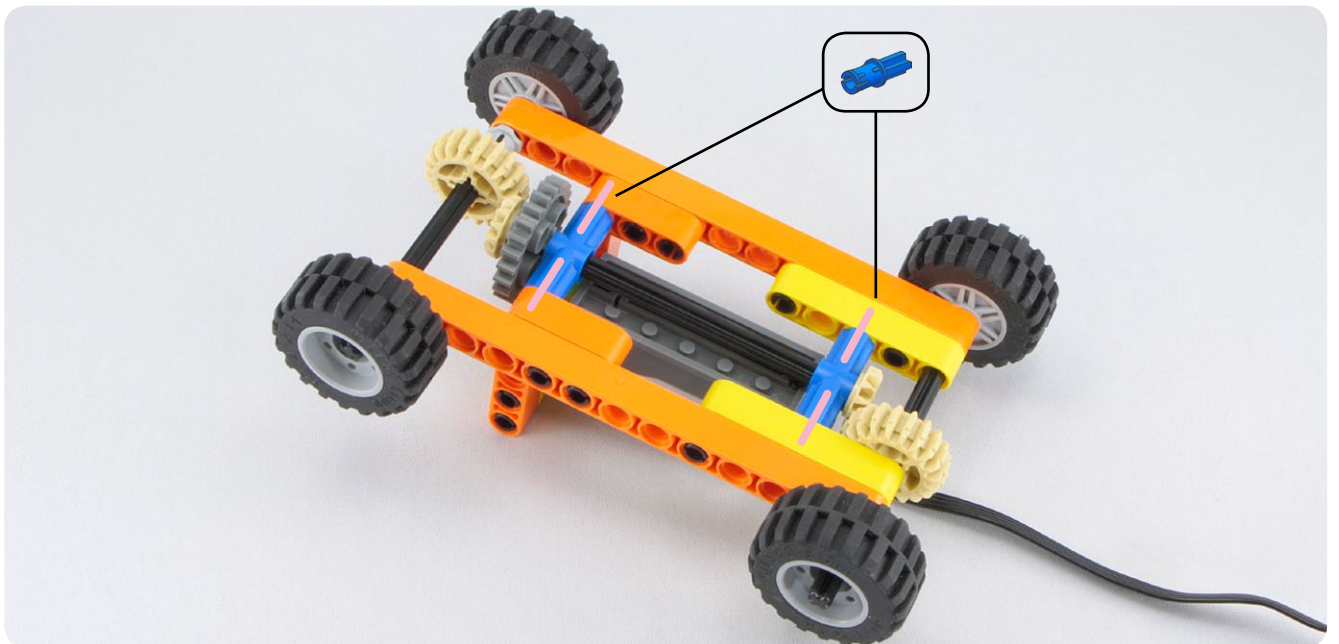
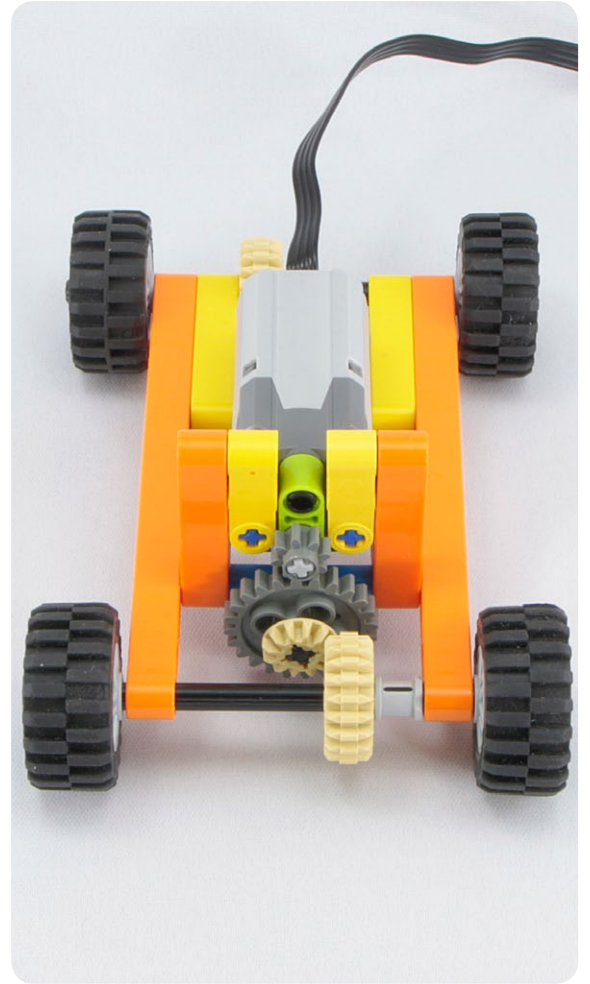




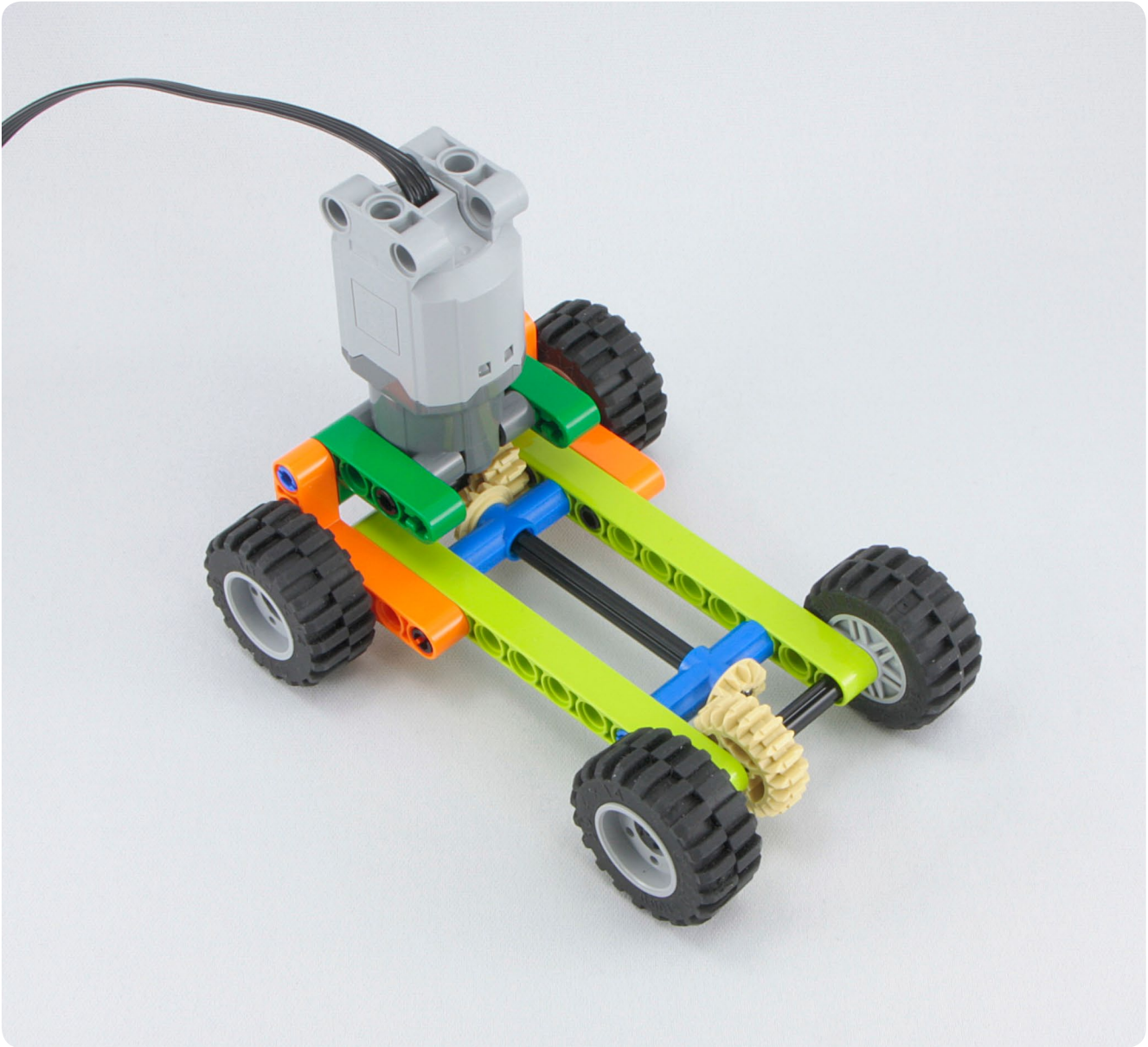
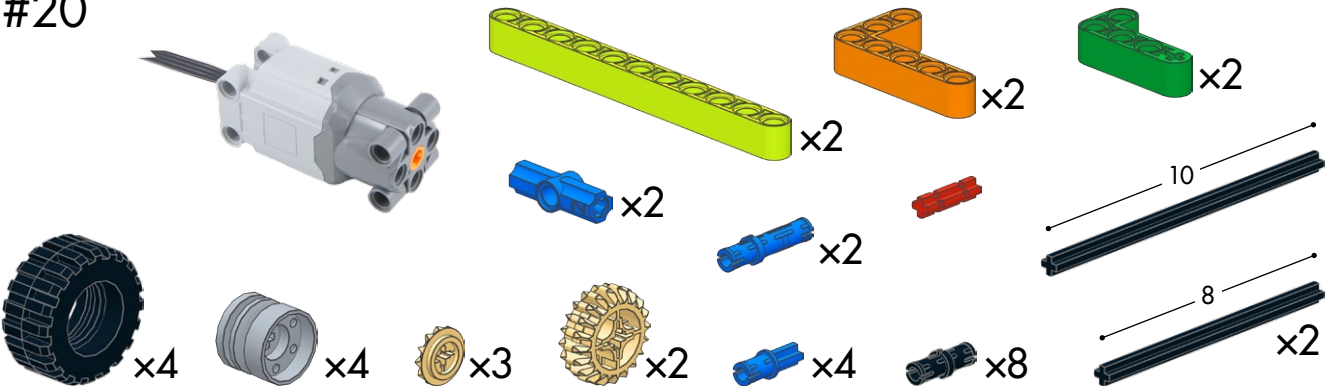
4WD cars

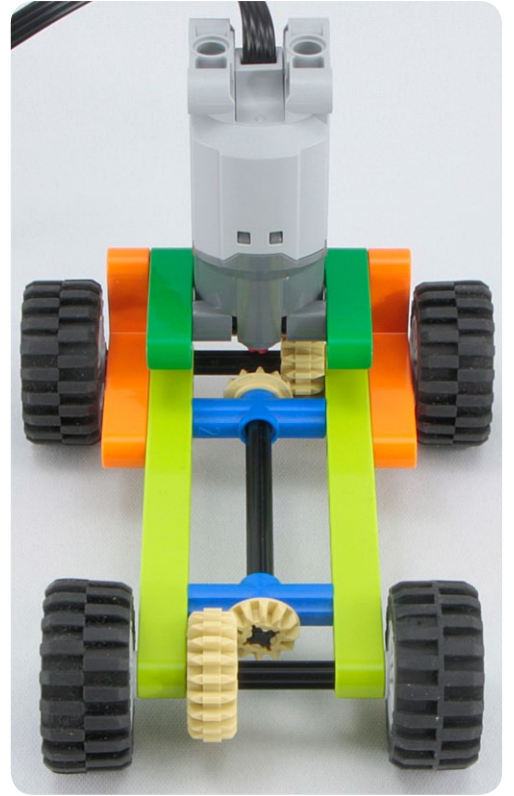
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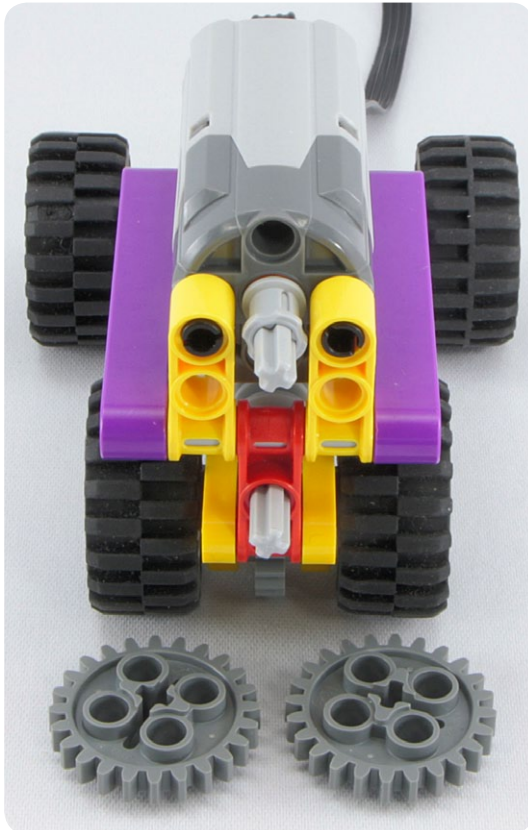


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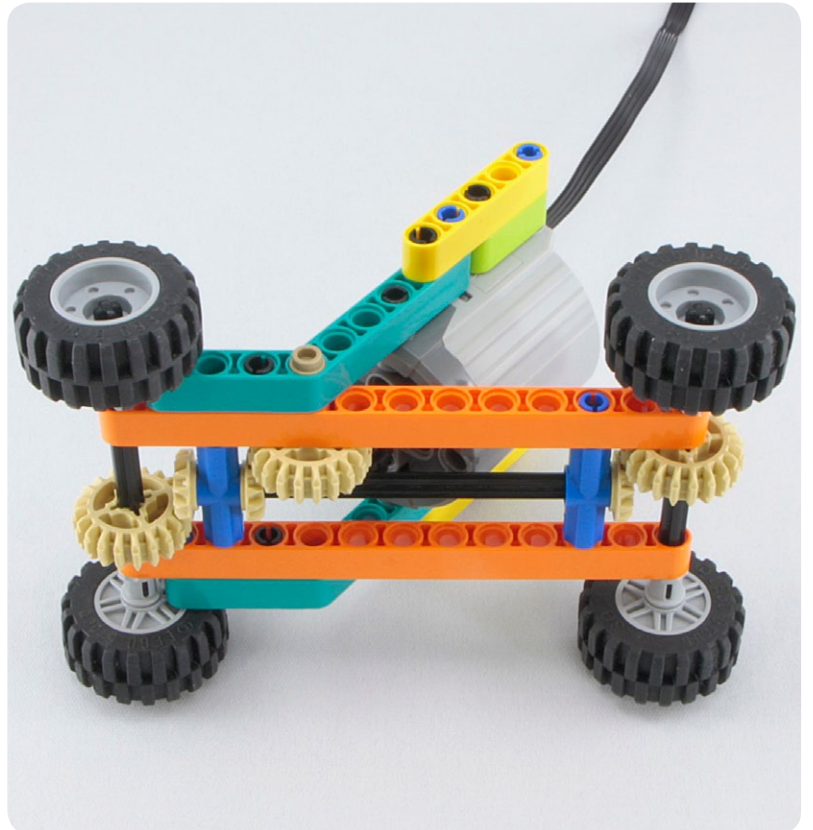
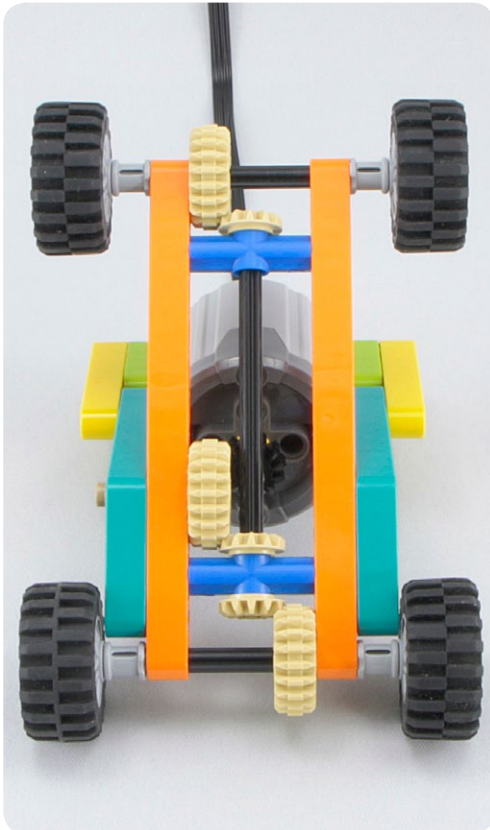




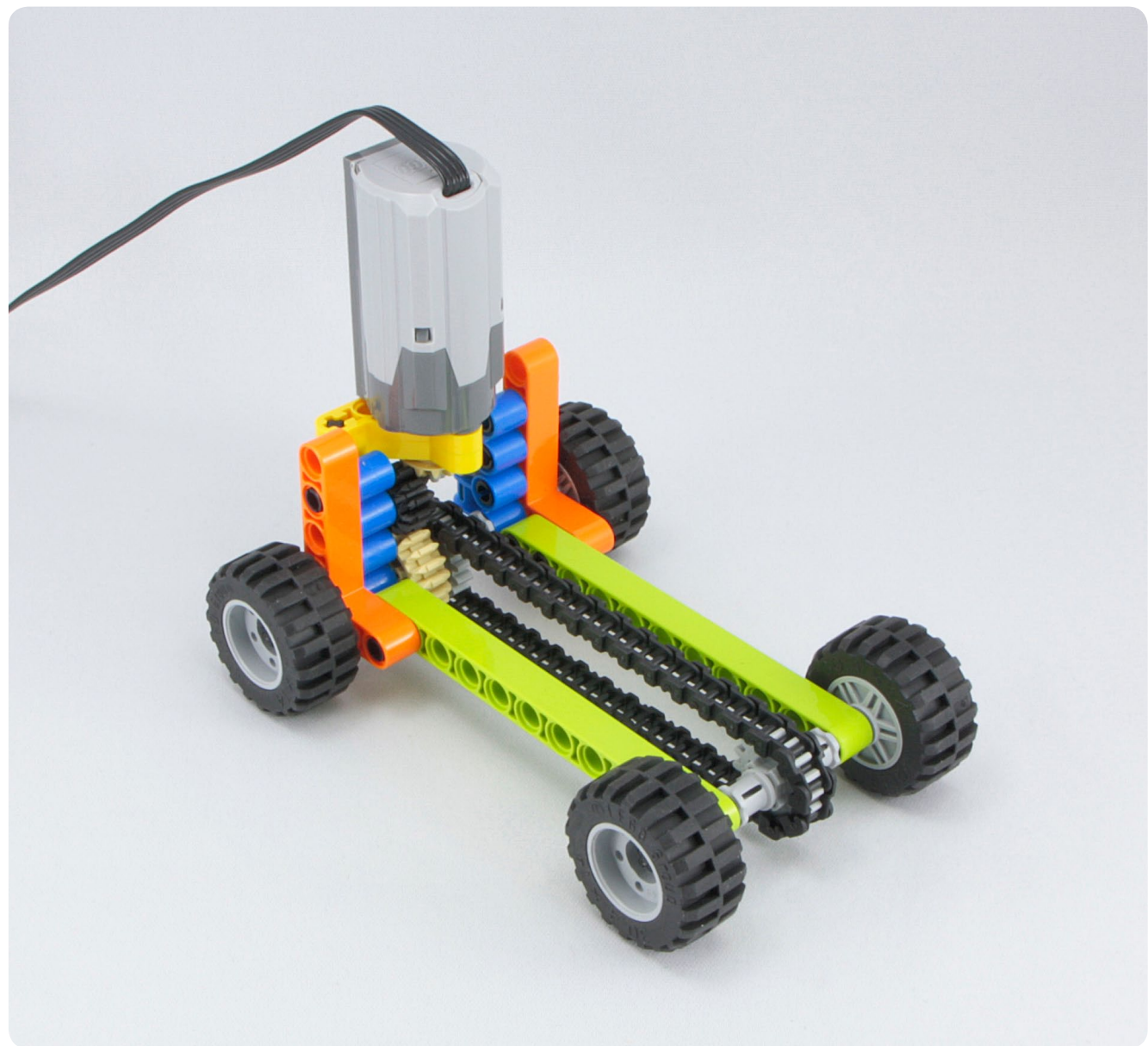
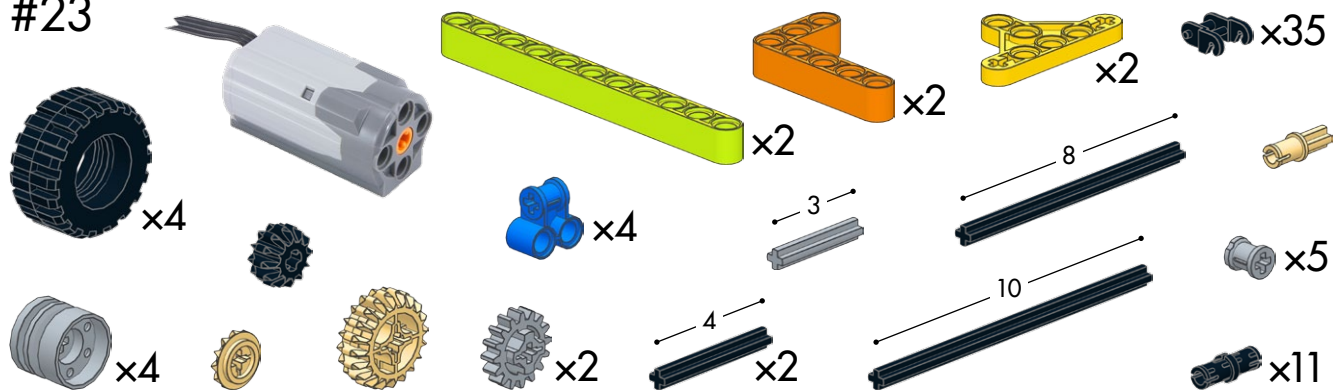
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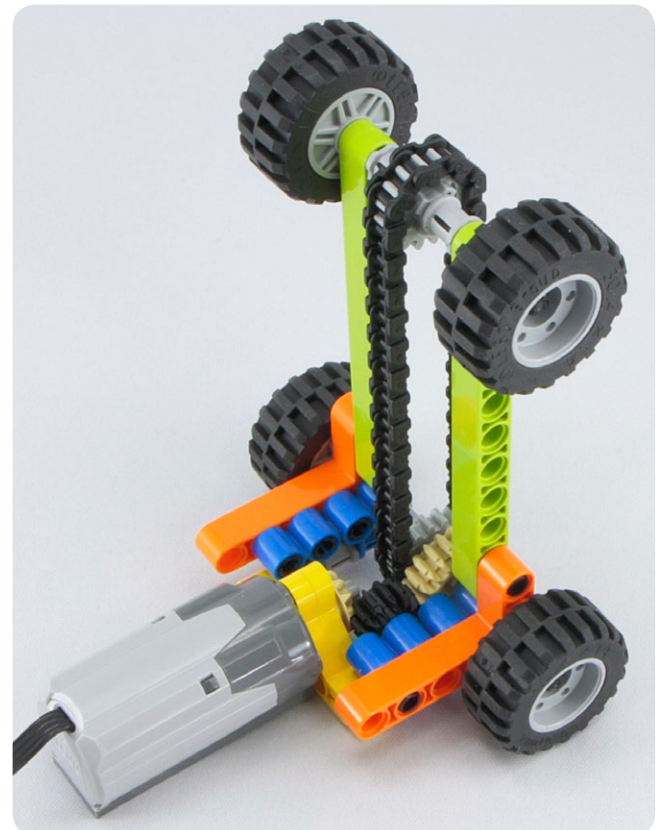
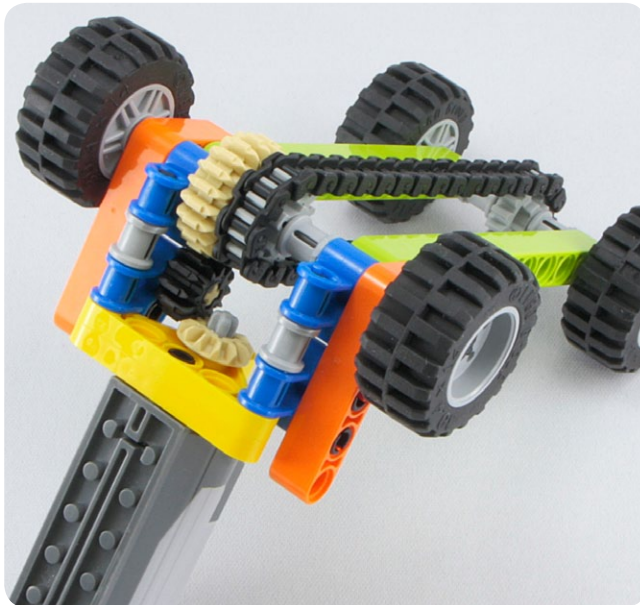
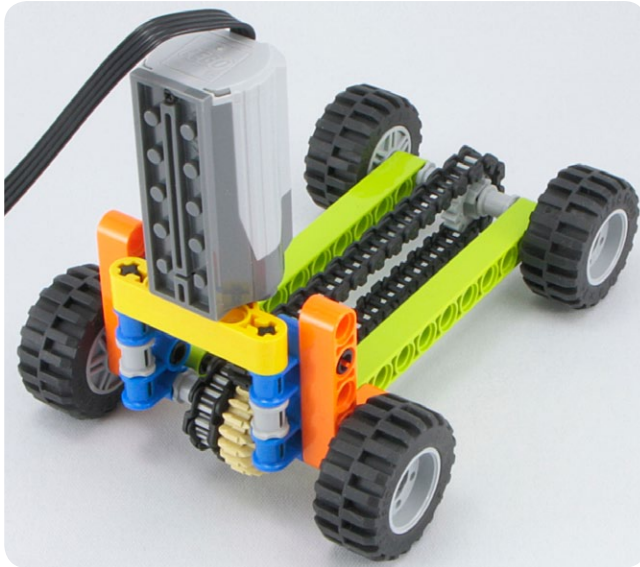


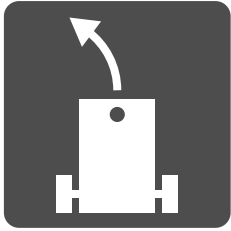
[illegible]



#23





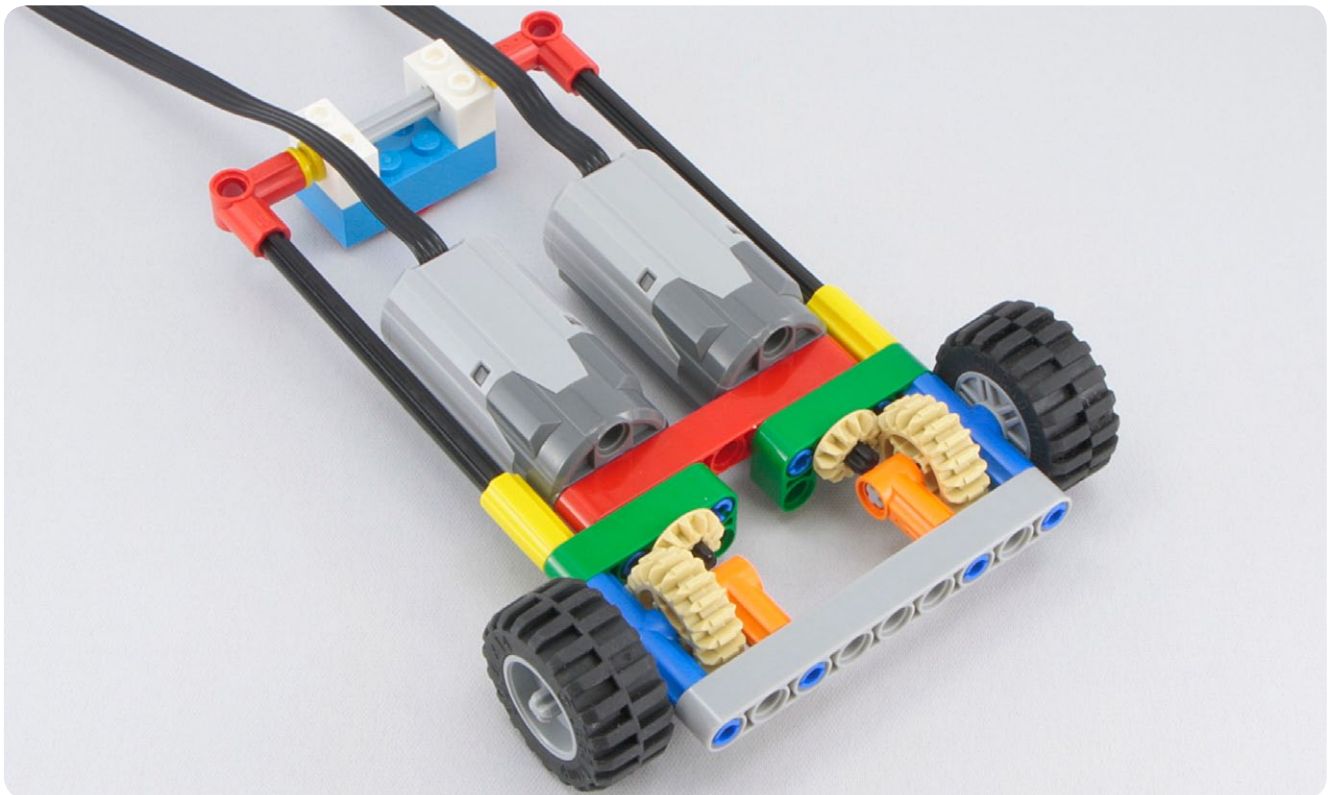
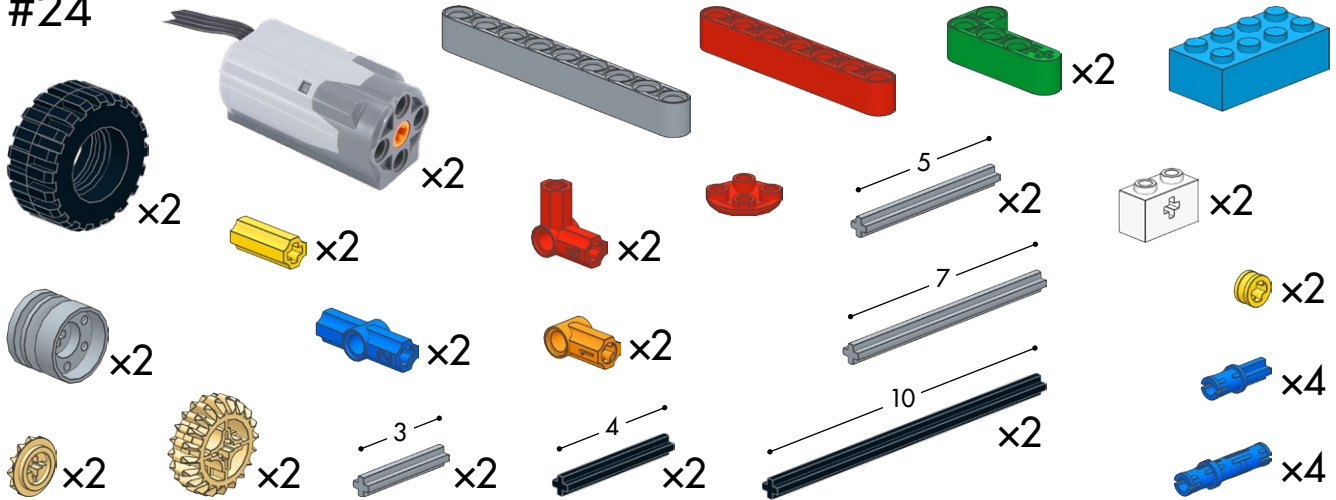


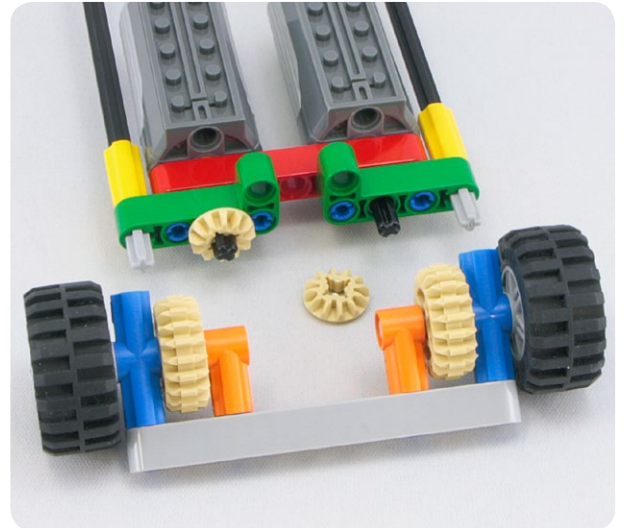
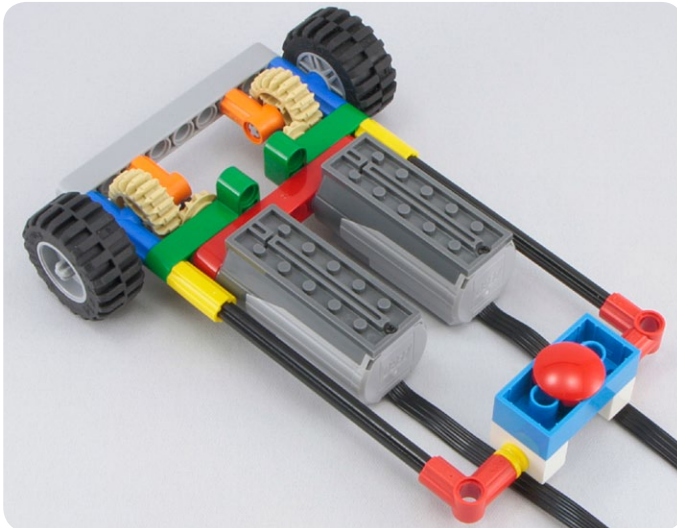
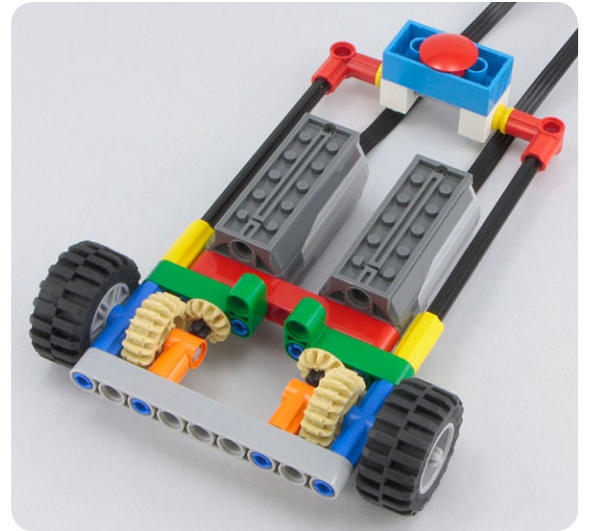
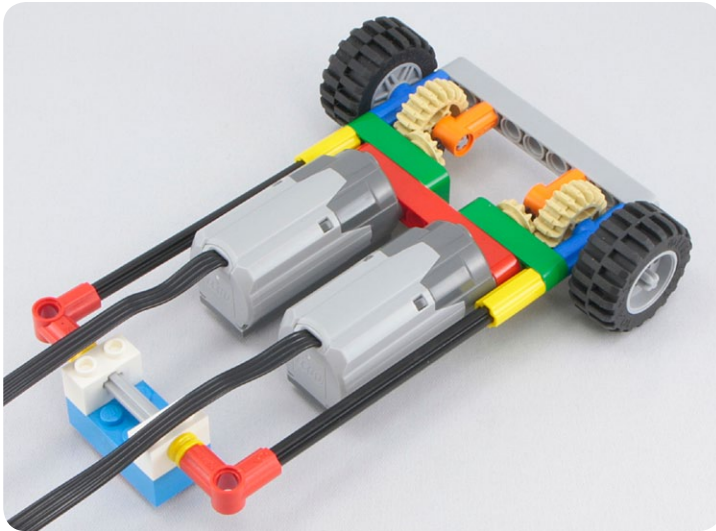
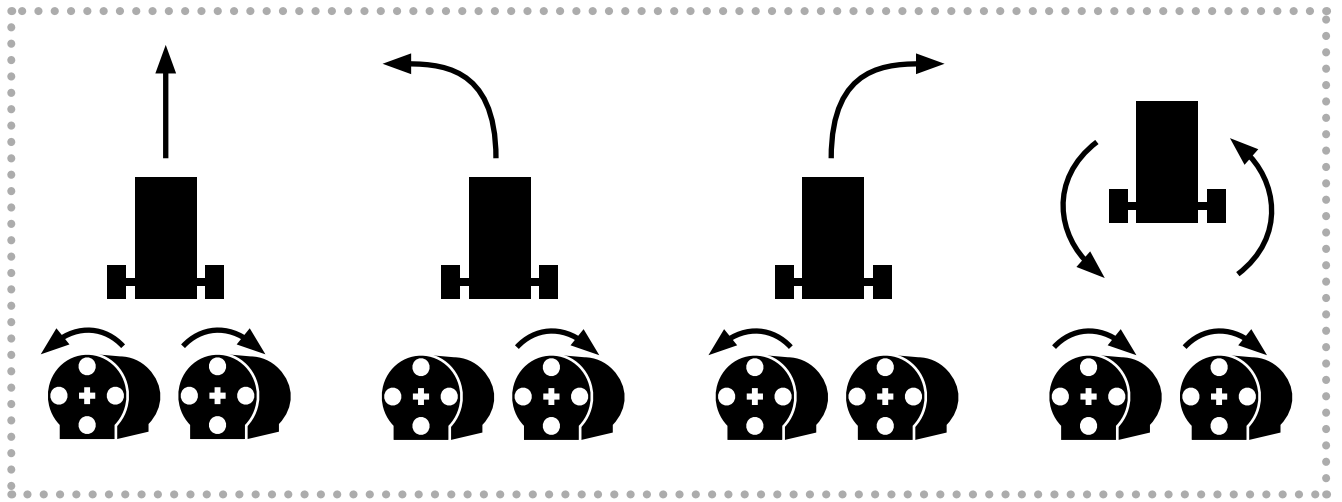
You can build cars that steer by combining these with the models in **Caster wheels** (page 44).

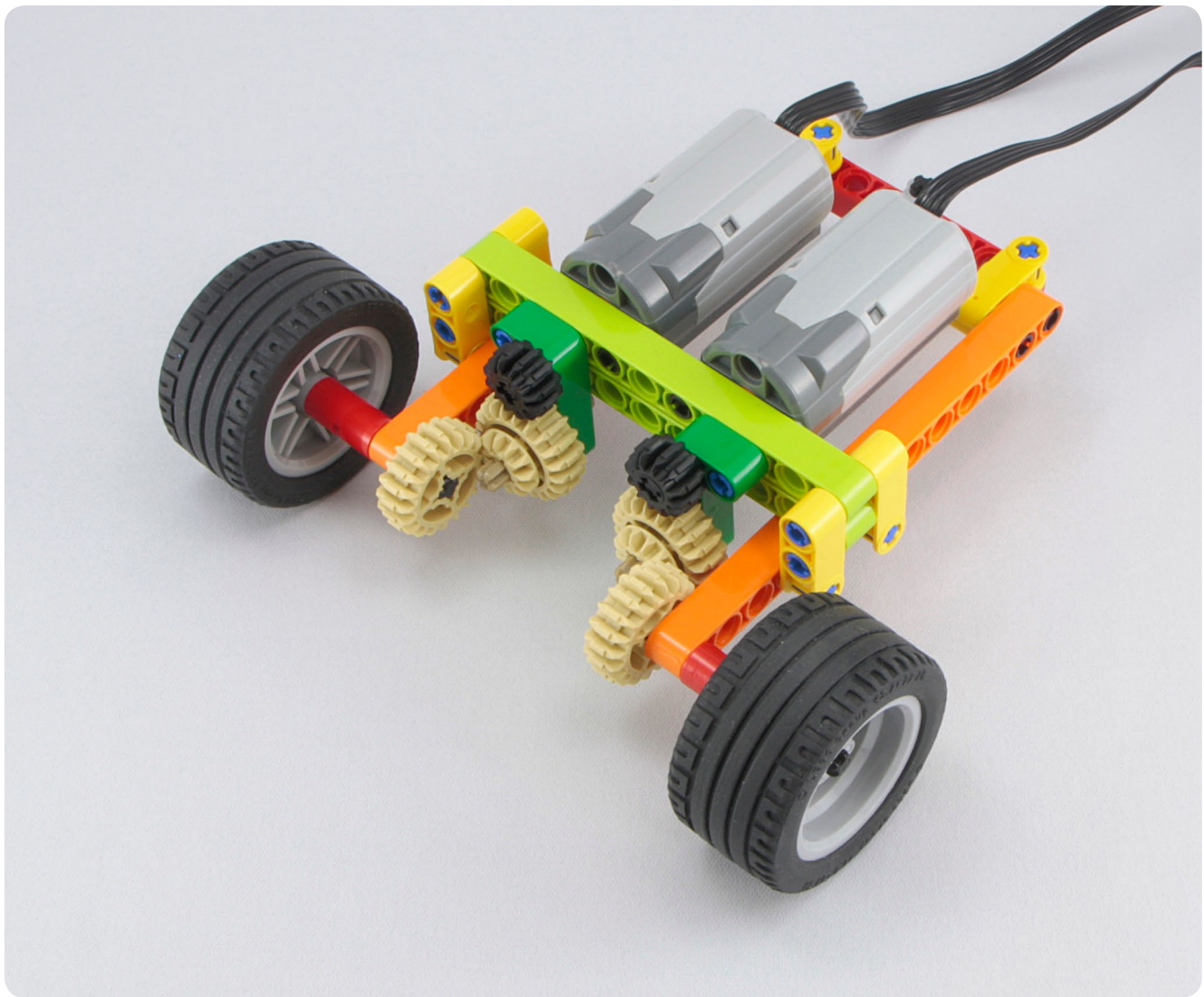


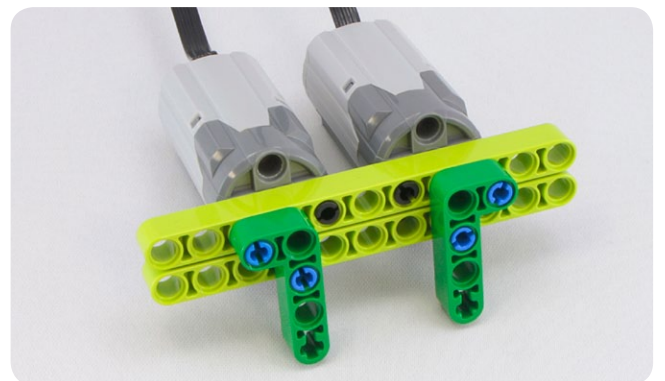
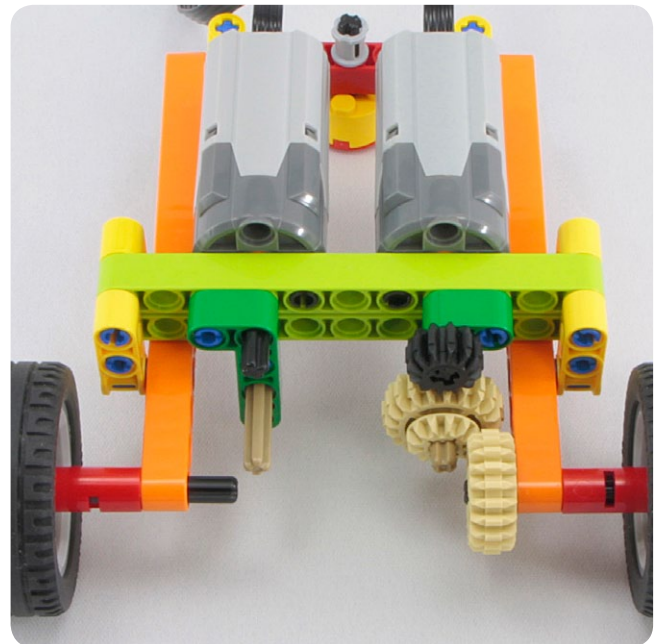
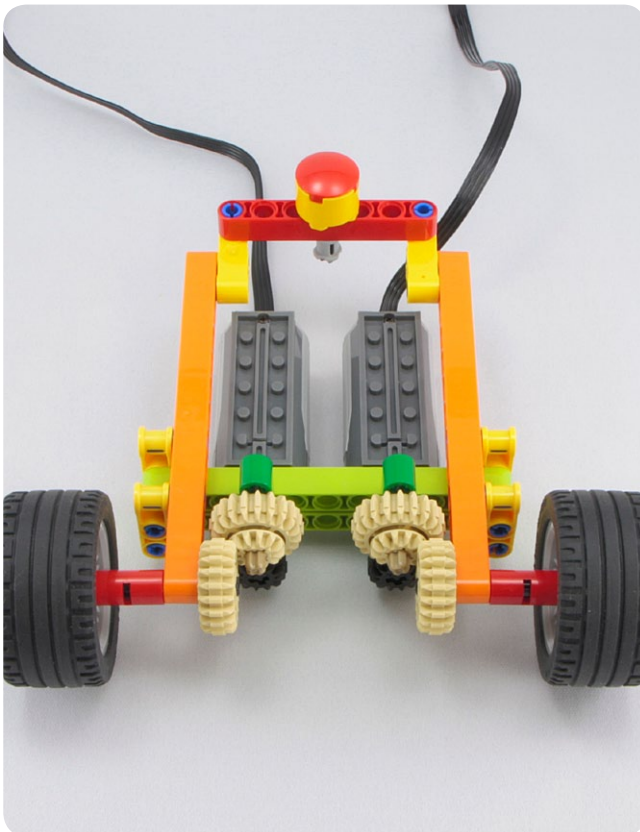
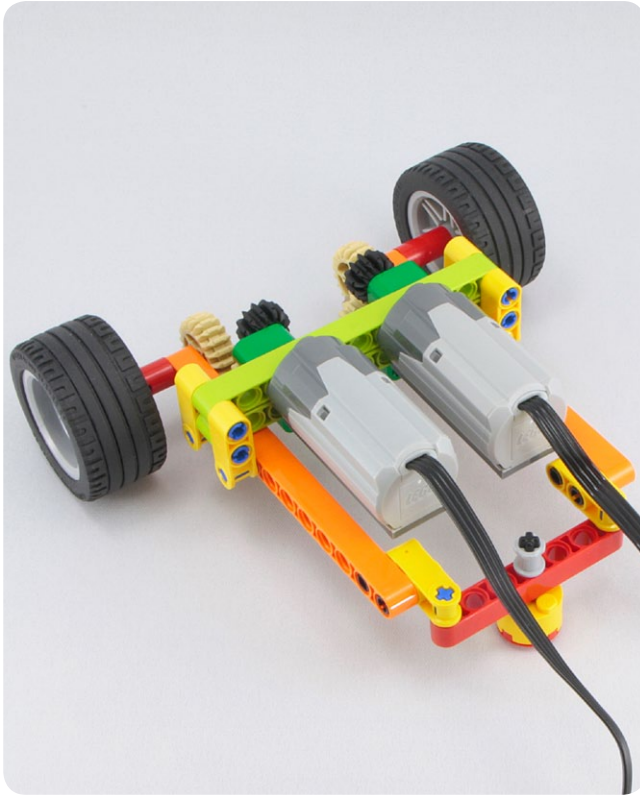
Each motor turns a wheel

#24

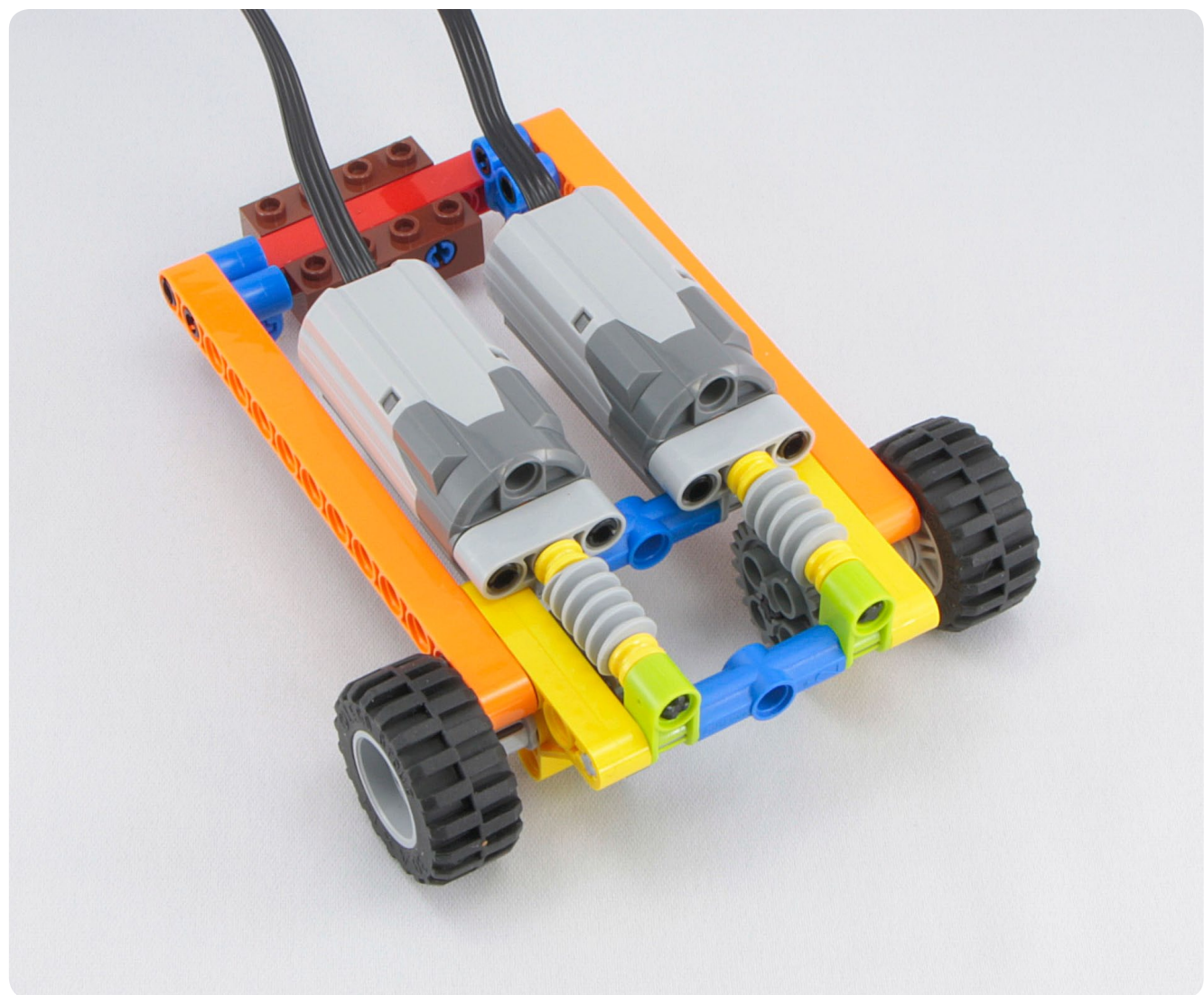
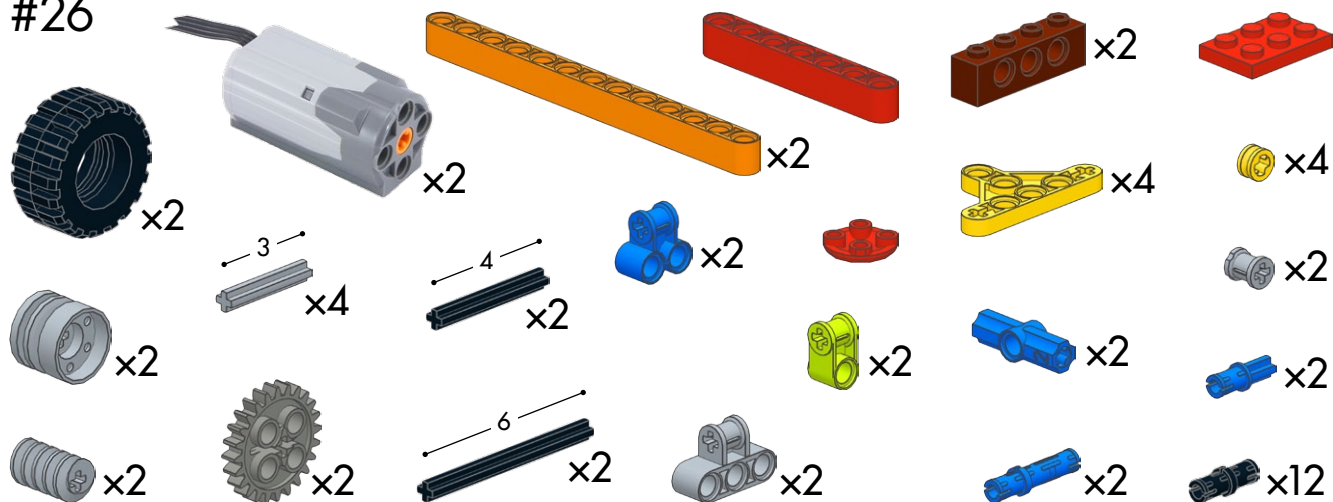


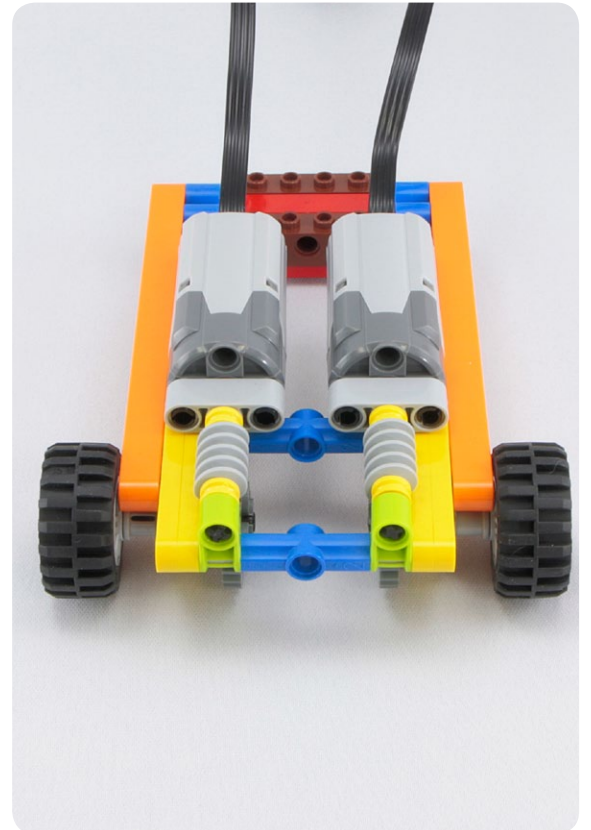
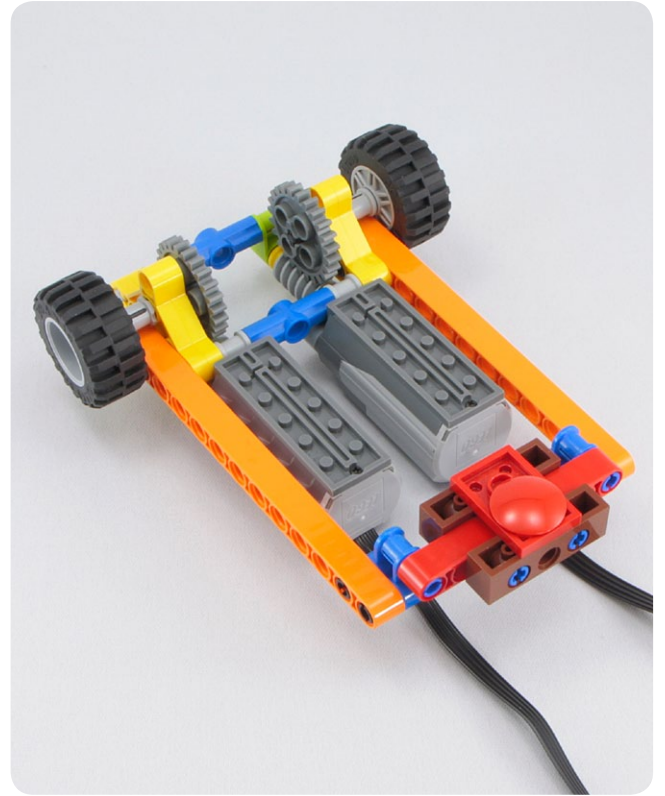
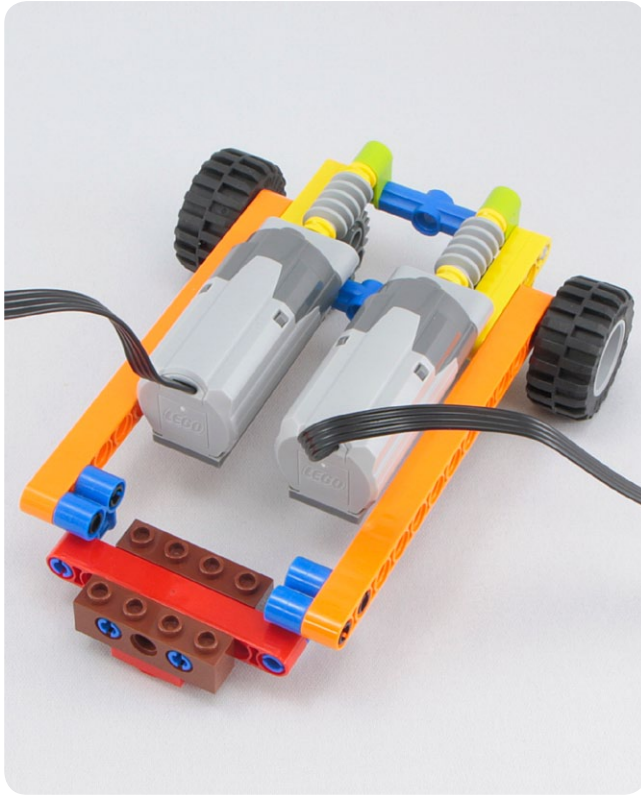


[illegible]

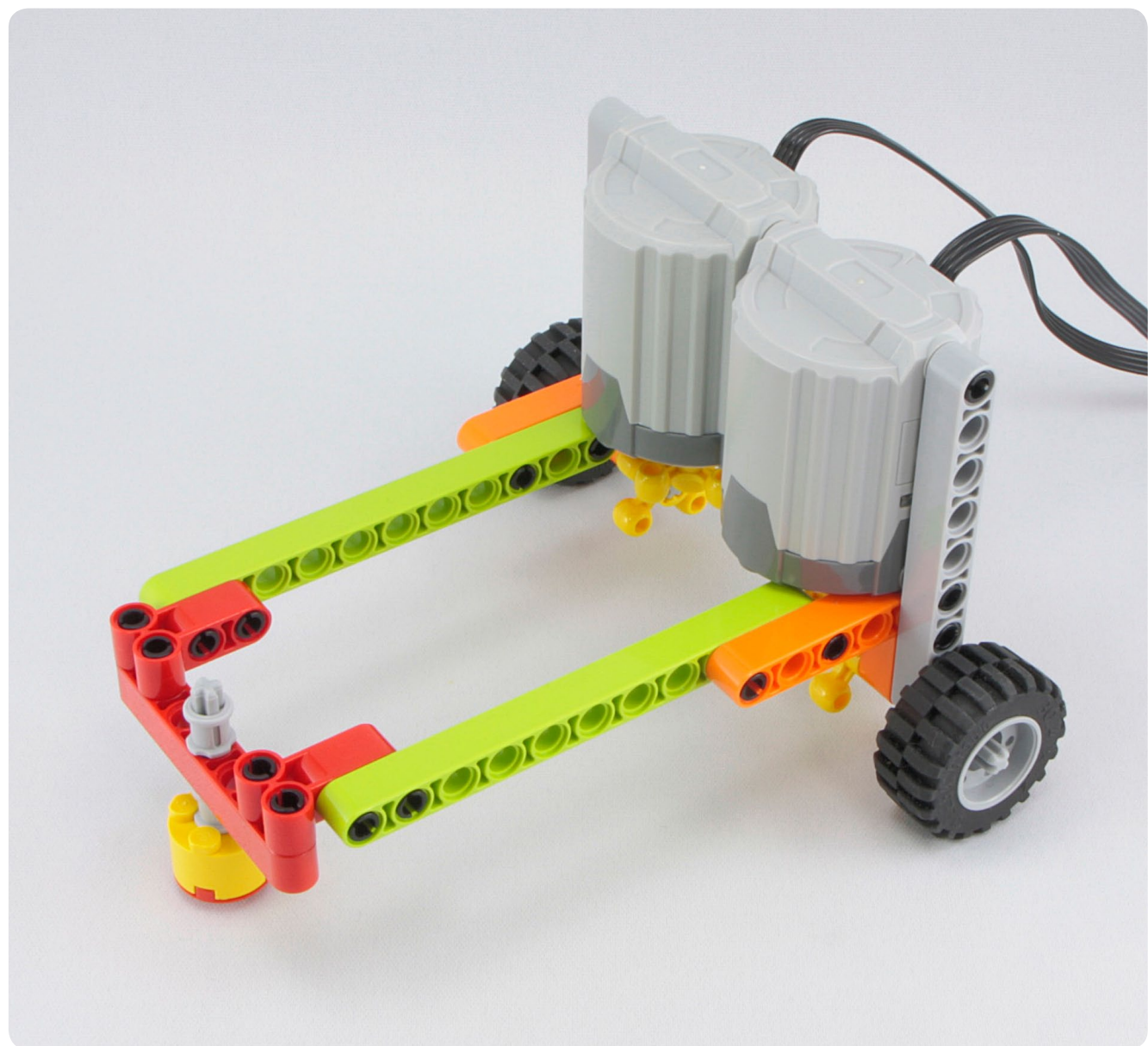
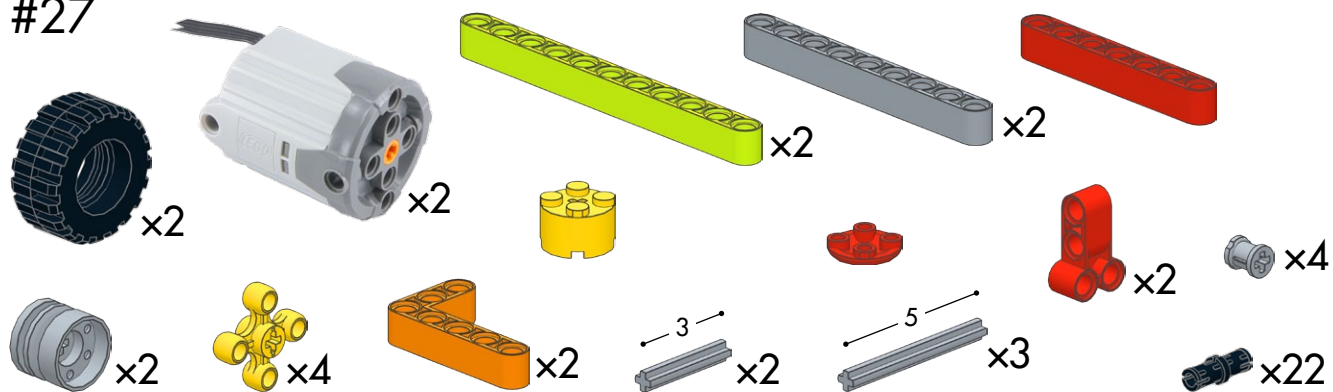


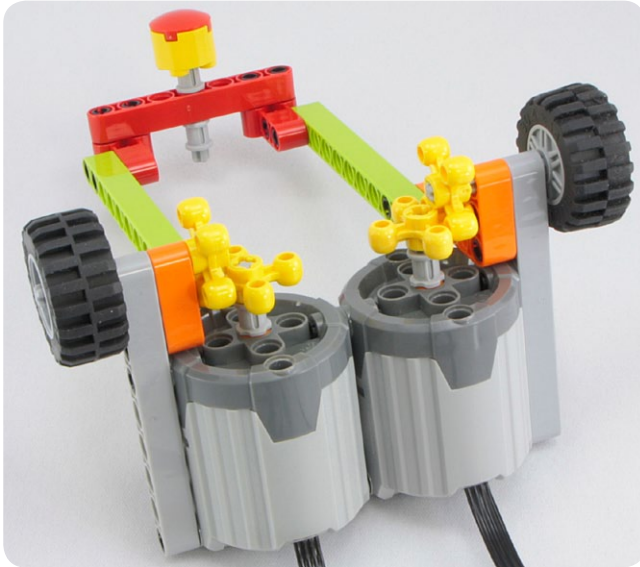
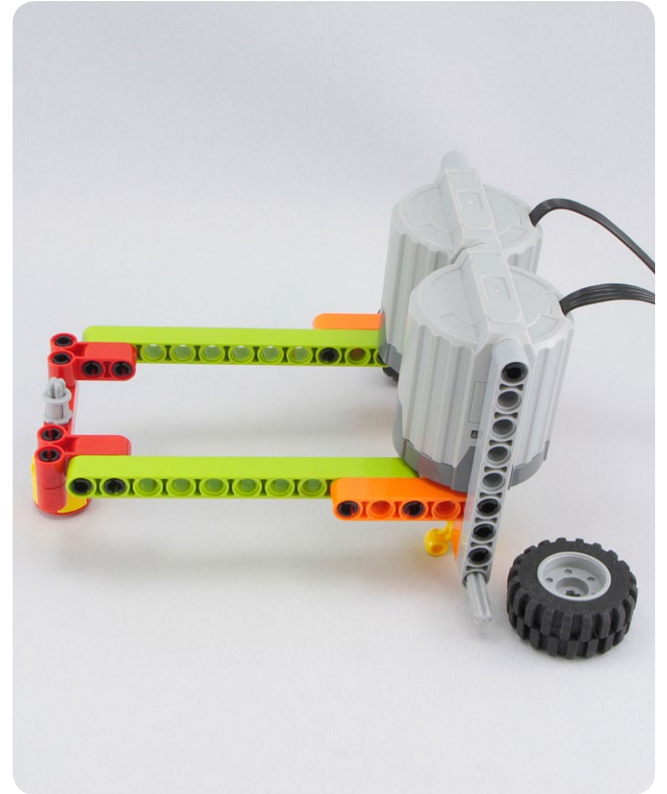
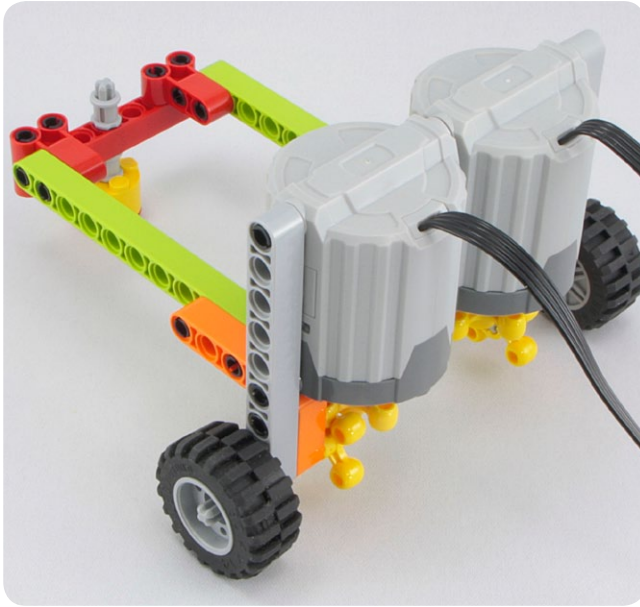
#26

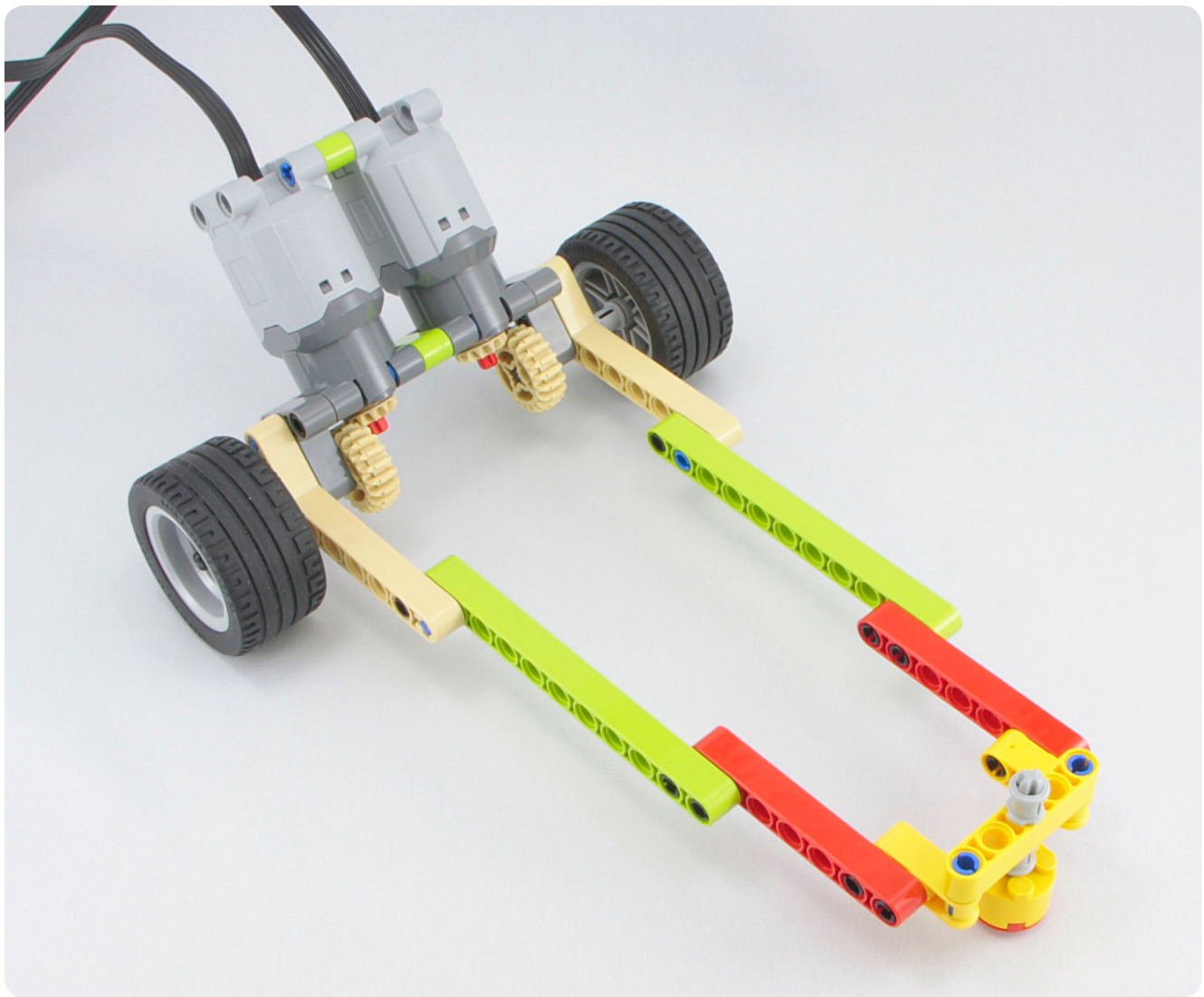


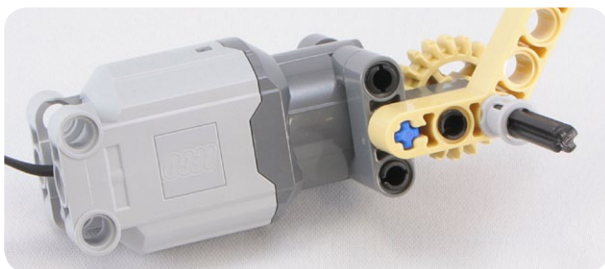
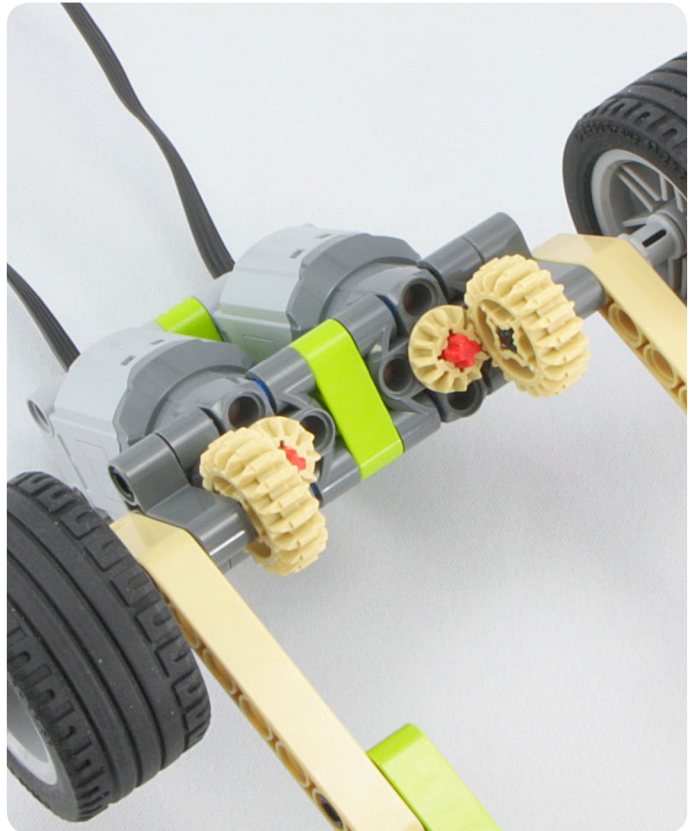
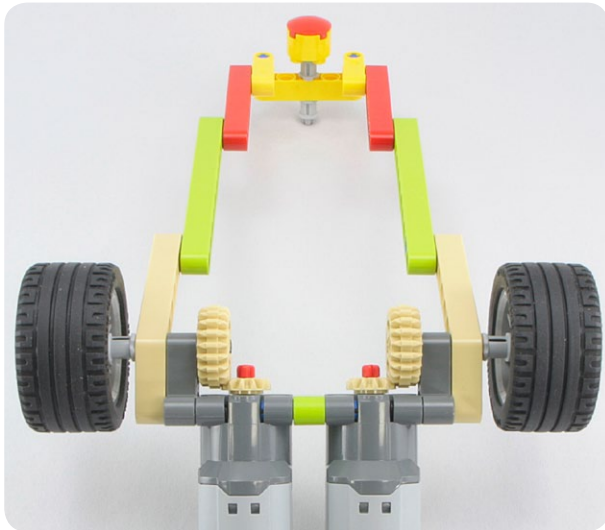
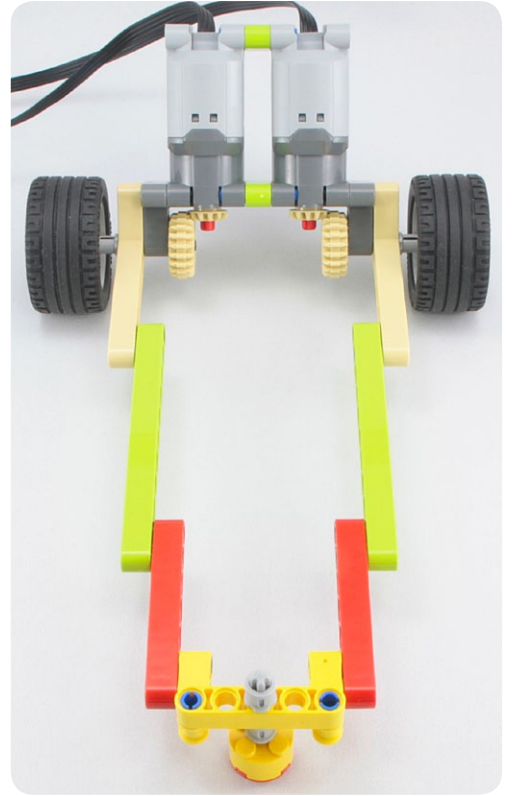


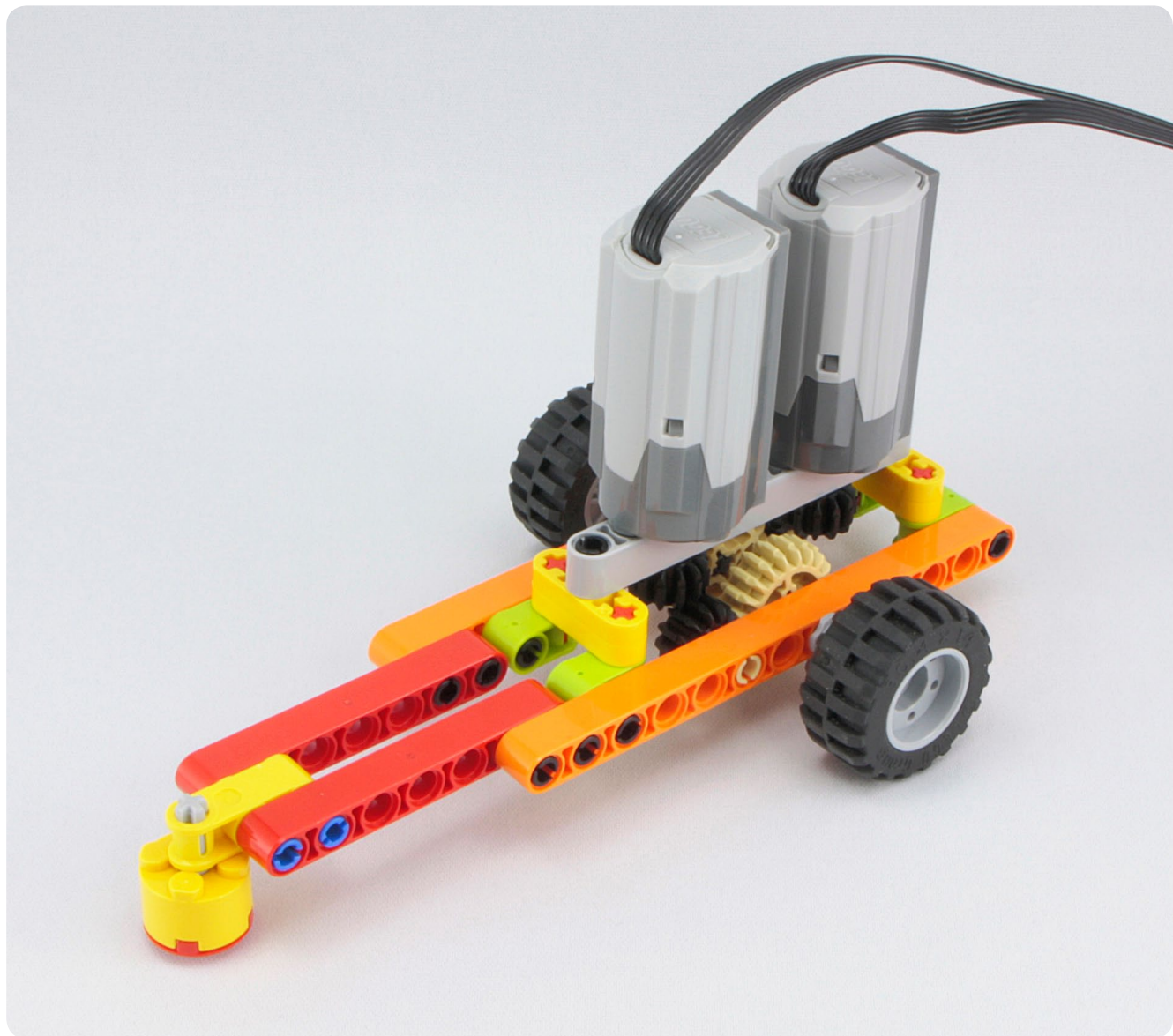
#27

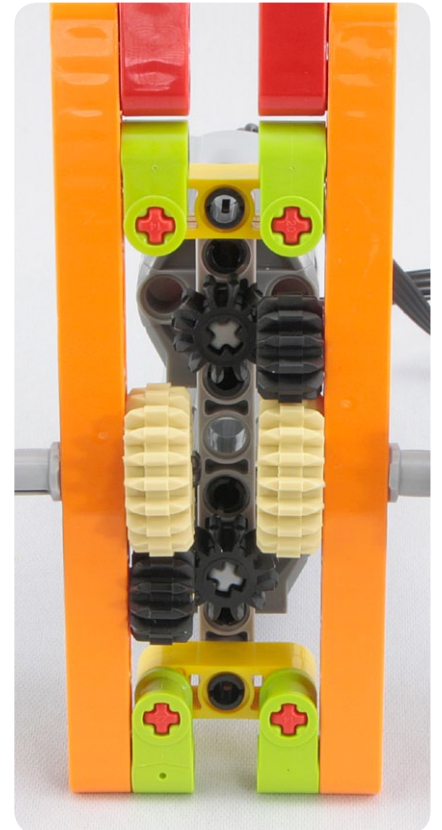
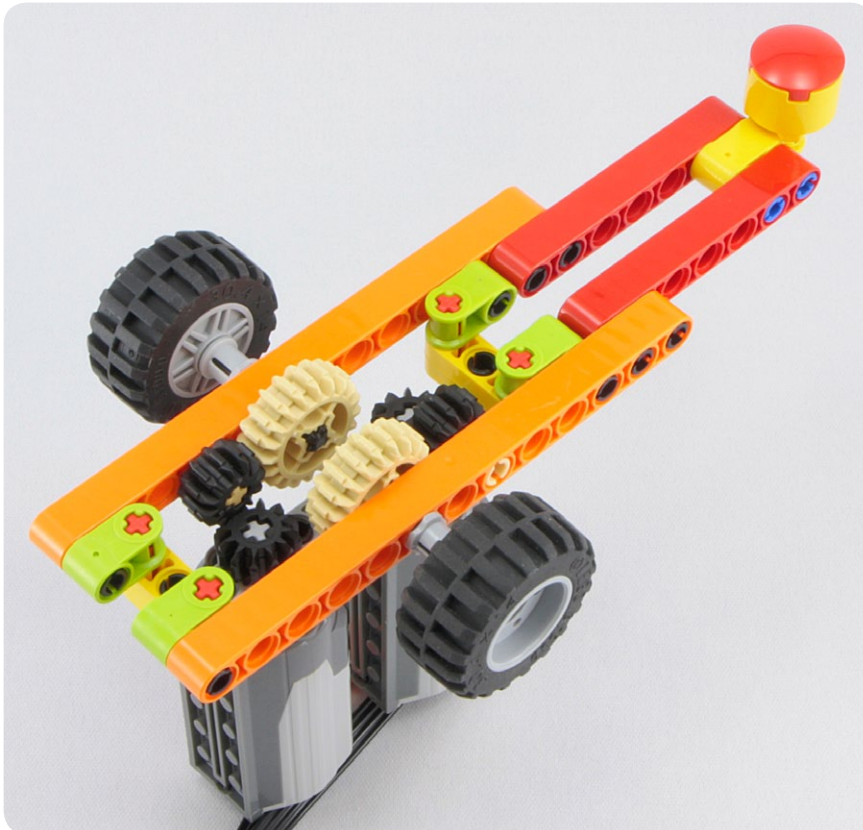


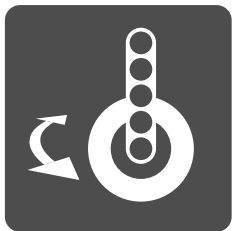


[illegible]



[illegible]



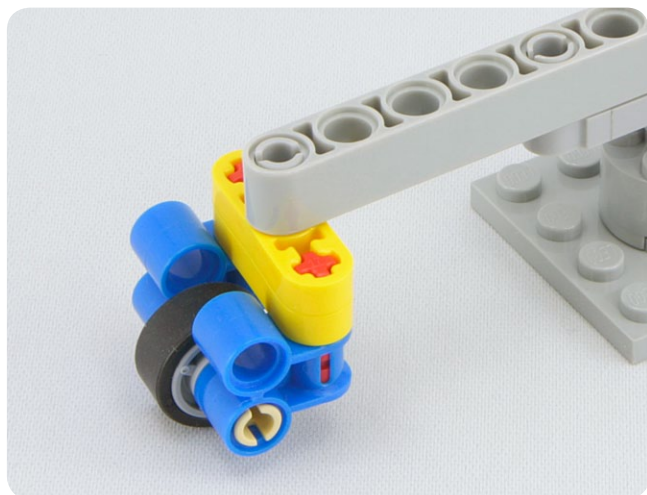


You can build cars that steer by combining these with the models in **Each motor turns a wheel** (page 32).

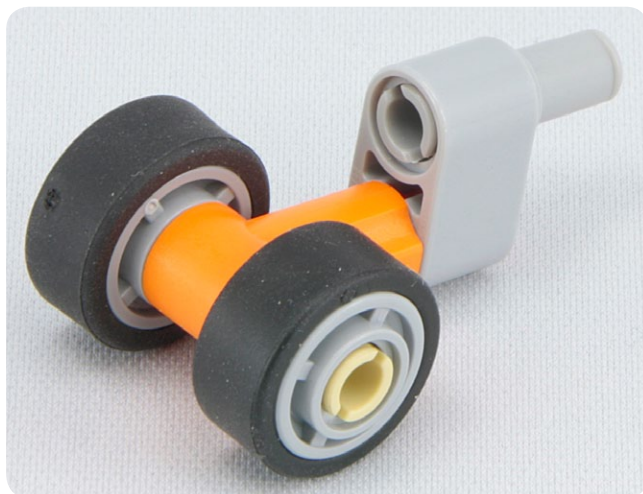
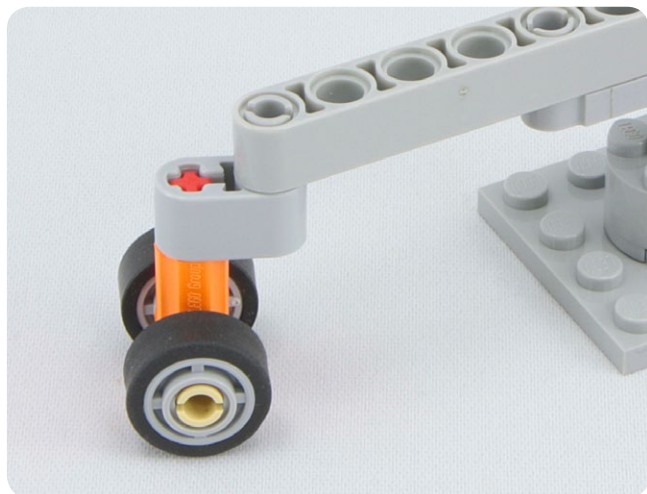


Caster wheels

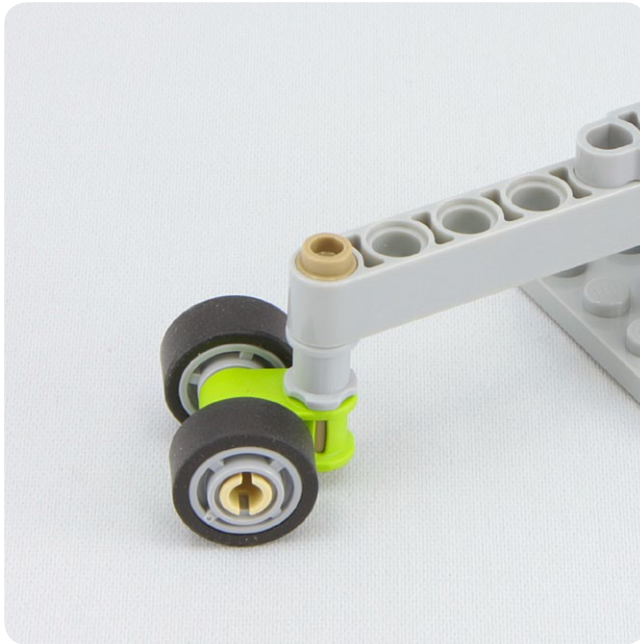
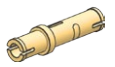
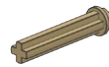
#30



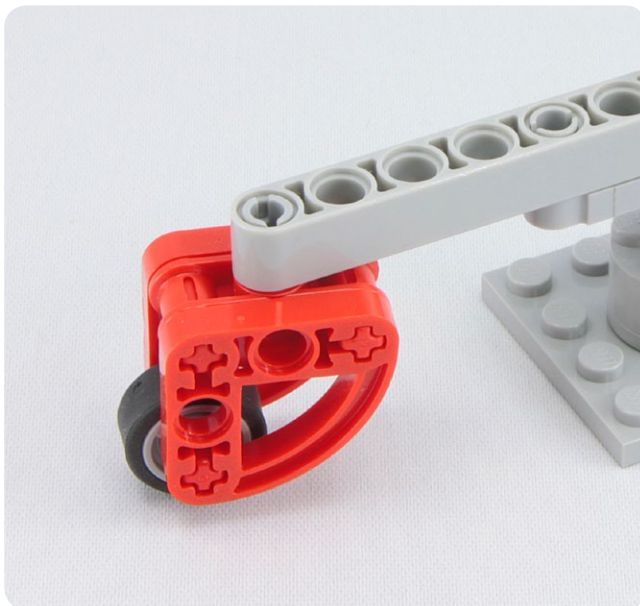
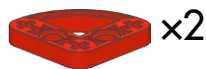
#31



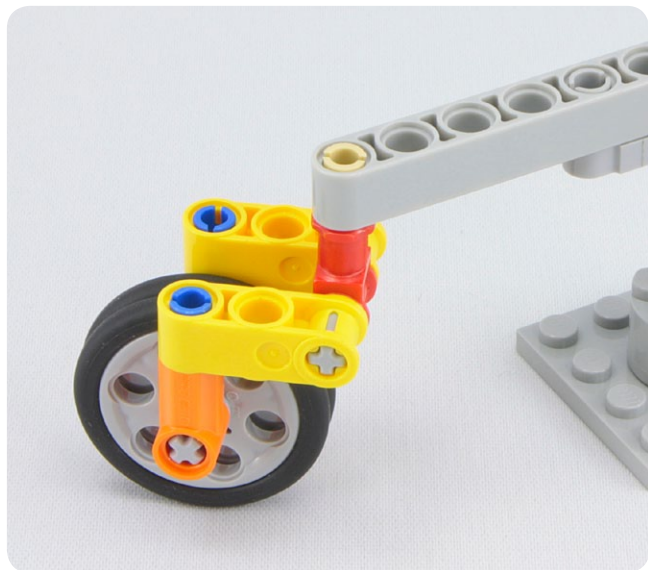
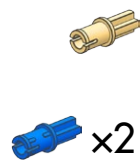
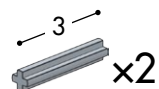
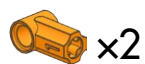
#32



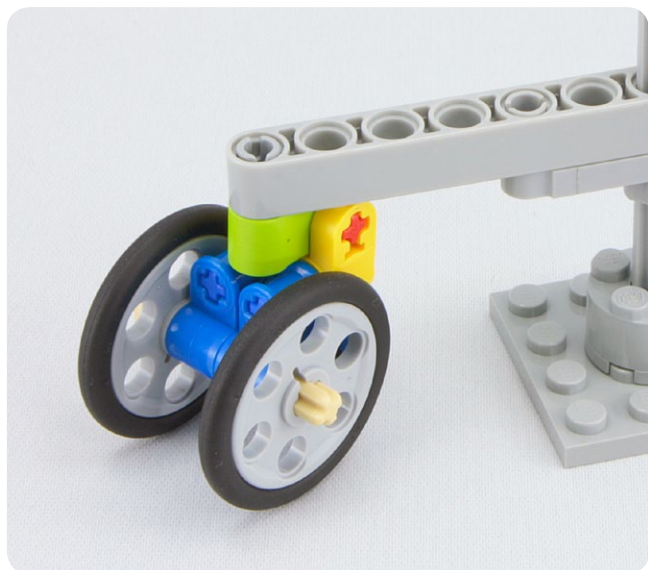
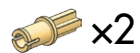
#33



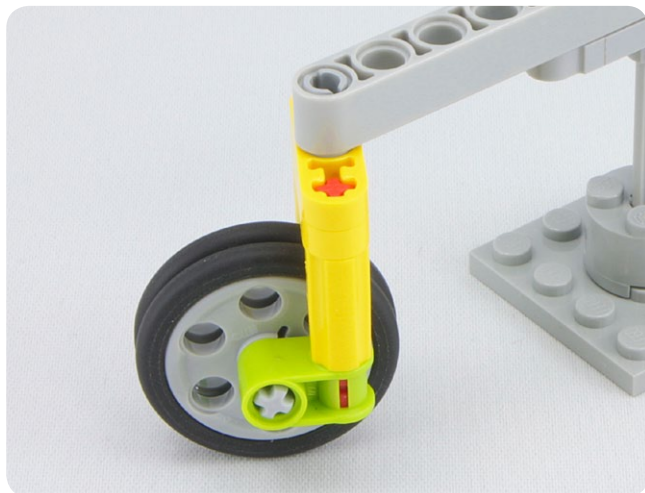
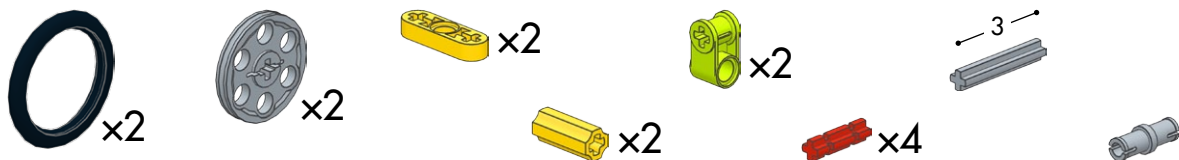
#34



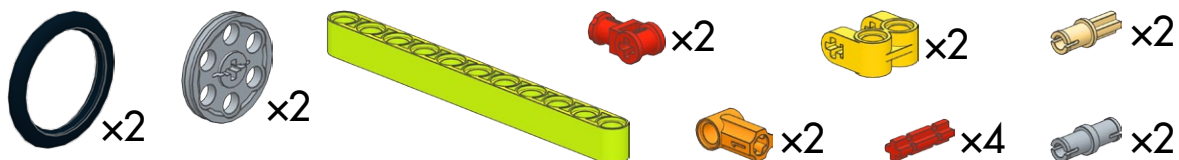
#35



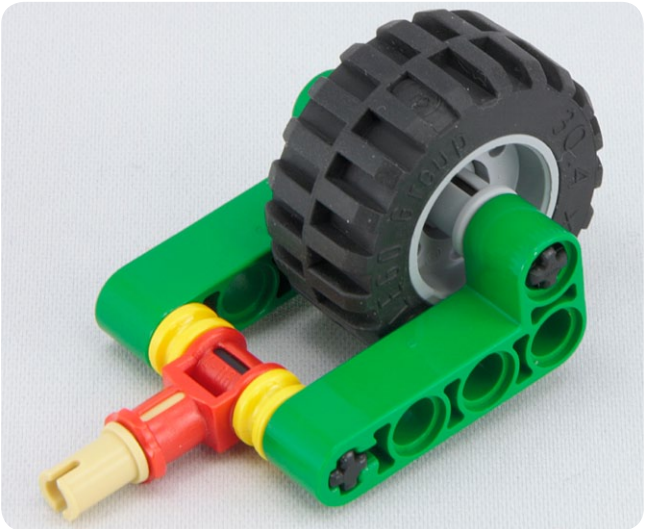
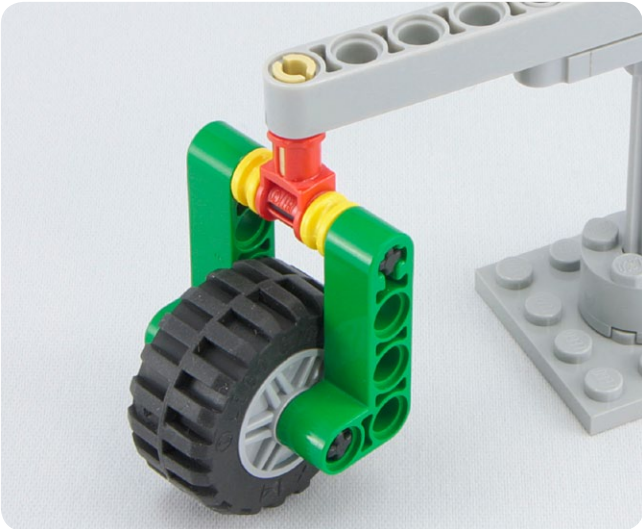
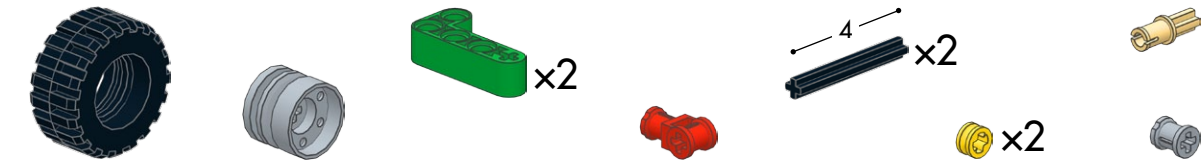
#36



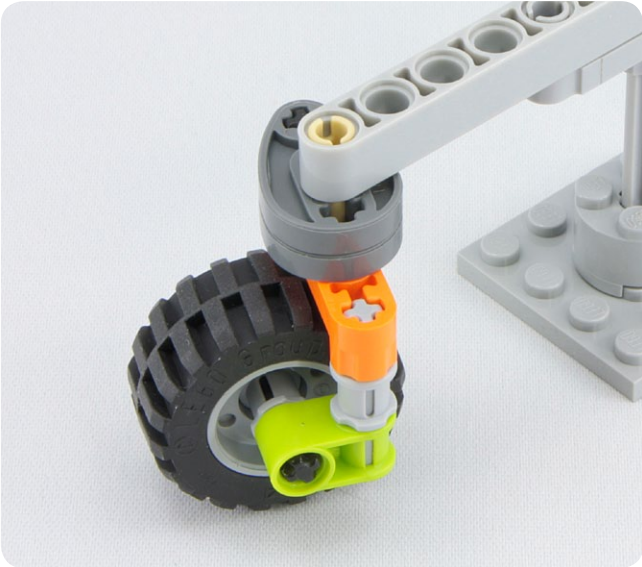
#37



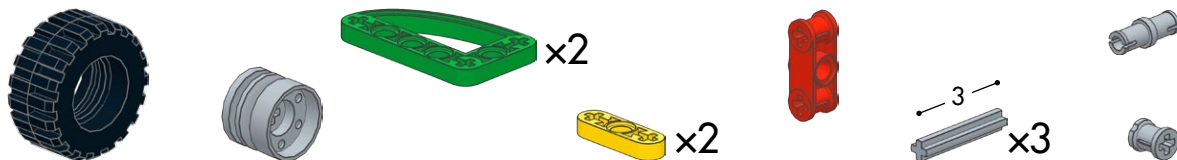
#38



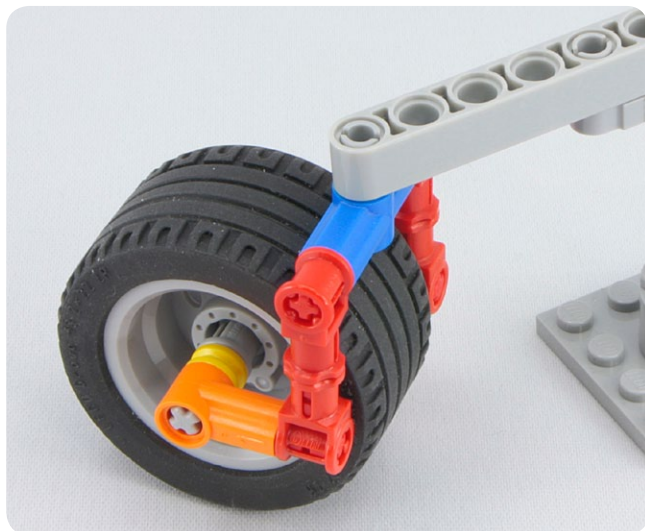
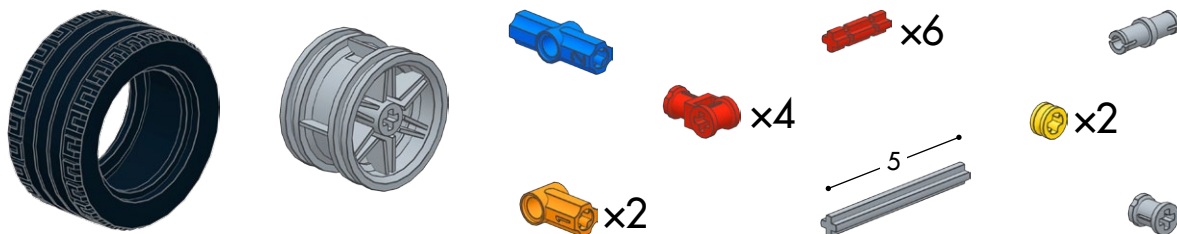
#39

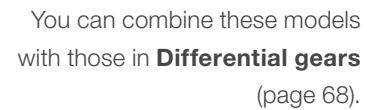


#40

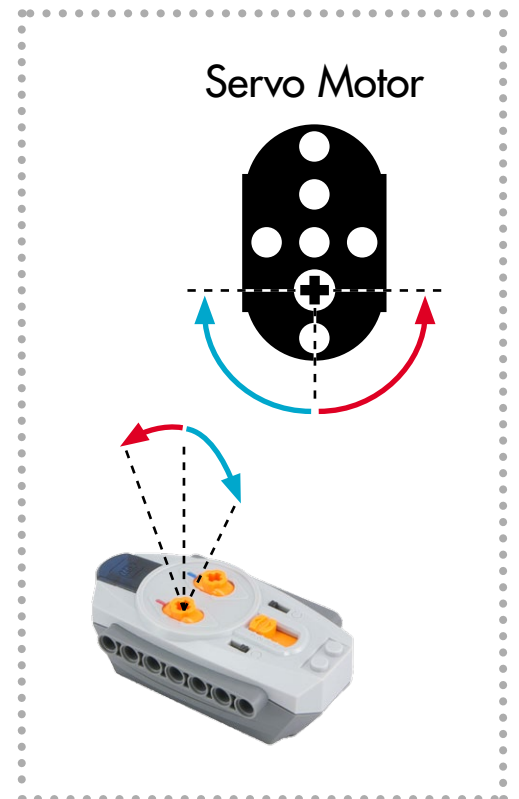
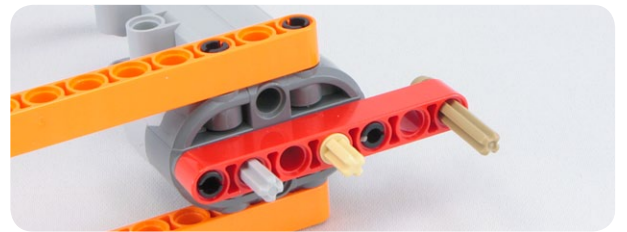
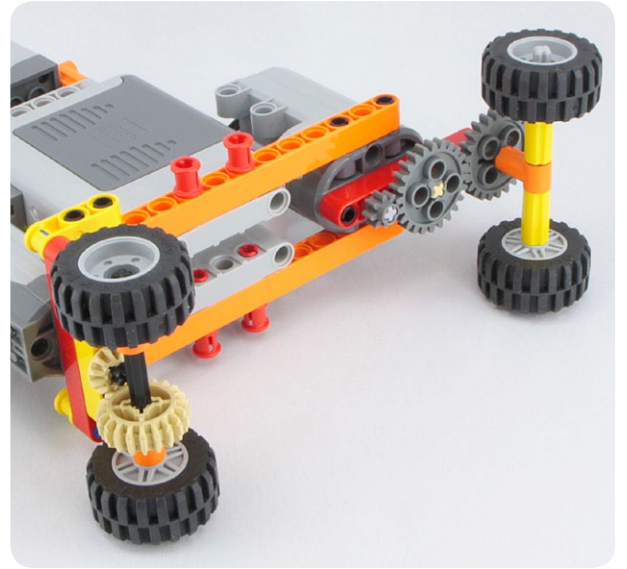


#41

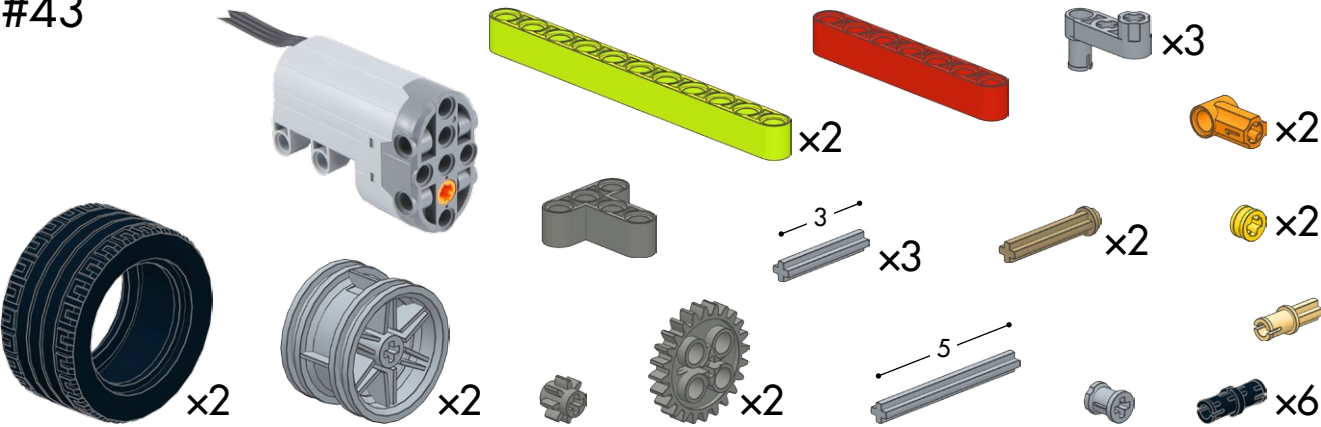


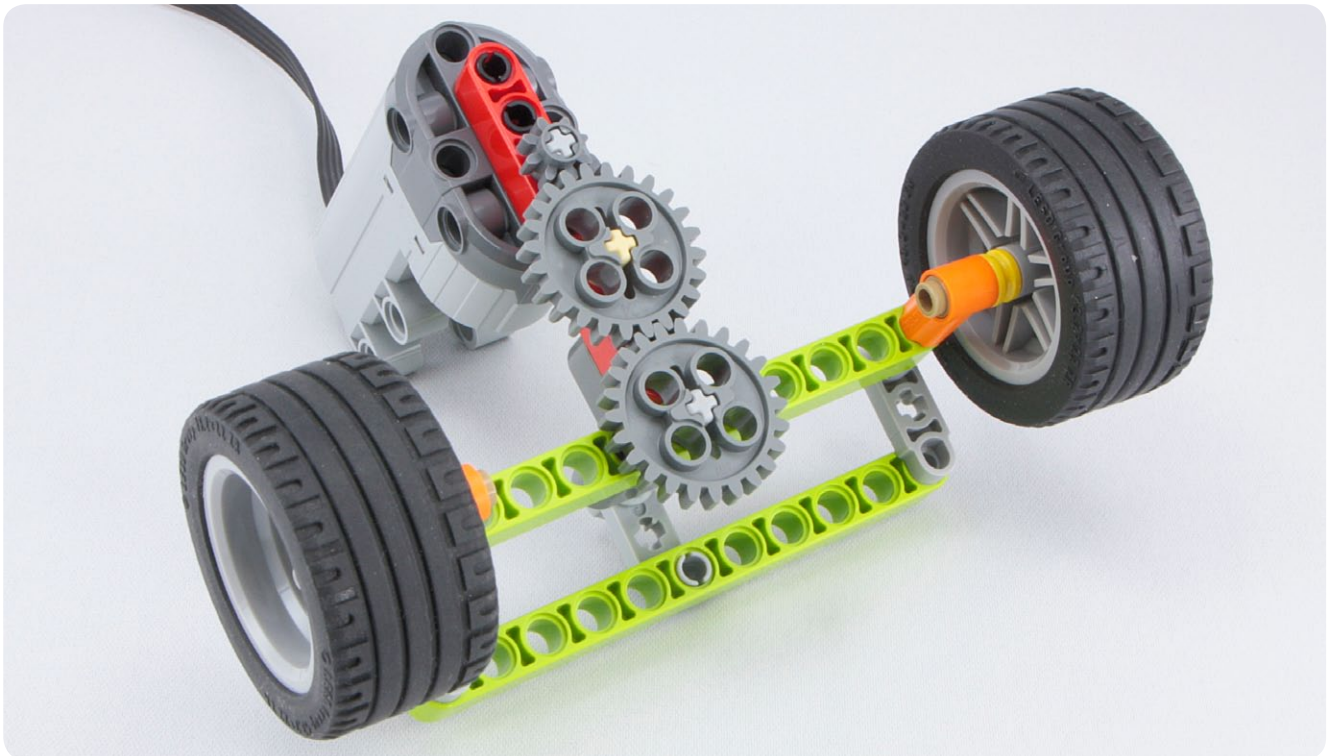
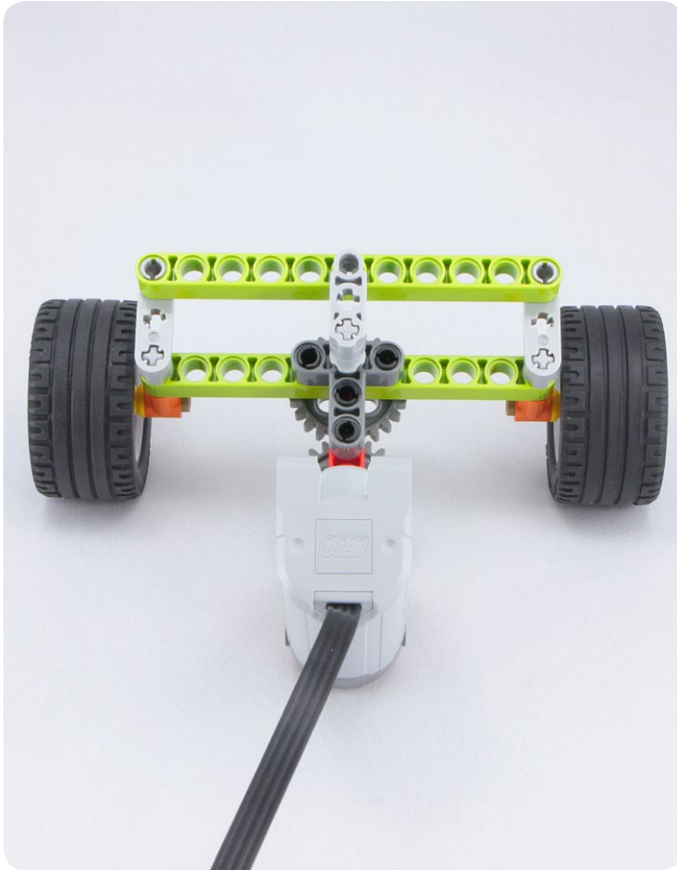


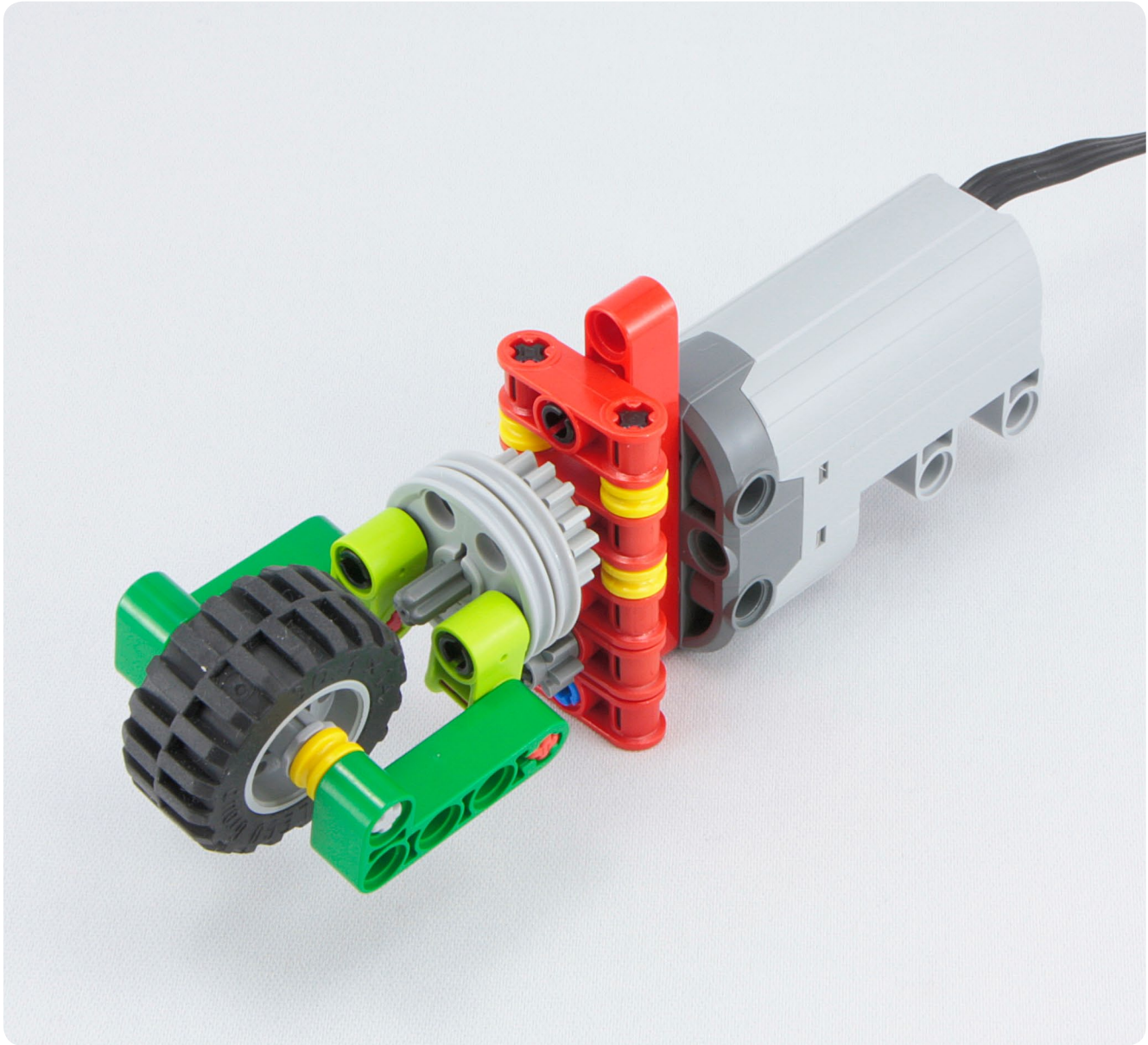
A photograph of a LEGO Mindstorms NXT robot assembly. The robot has a grey NXT brick at the top with various sensors and connectors. It is built on a yellow Technic beam chassis with black wheels. A blue connector is highlighted with a callout box.

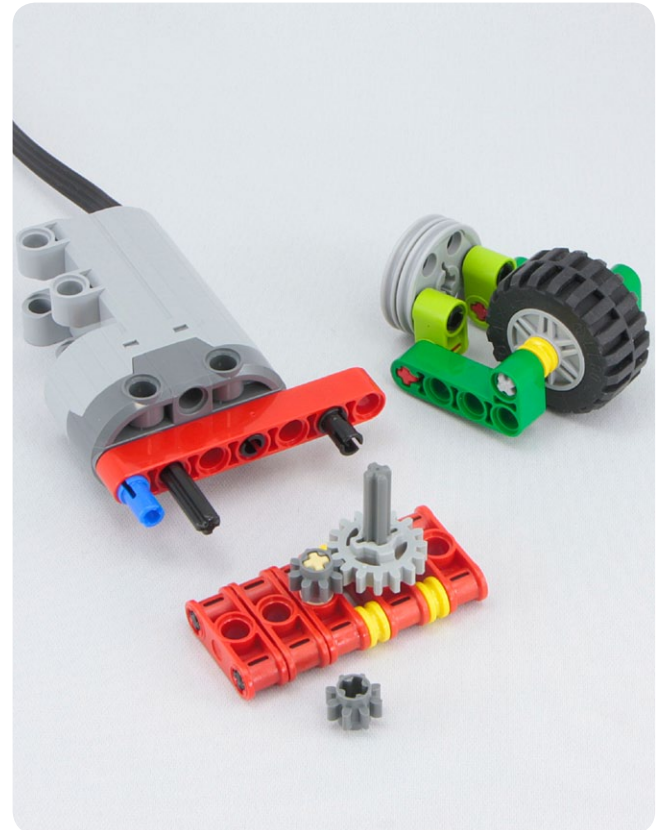
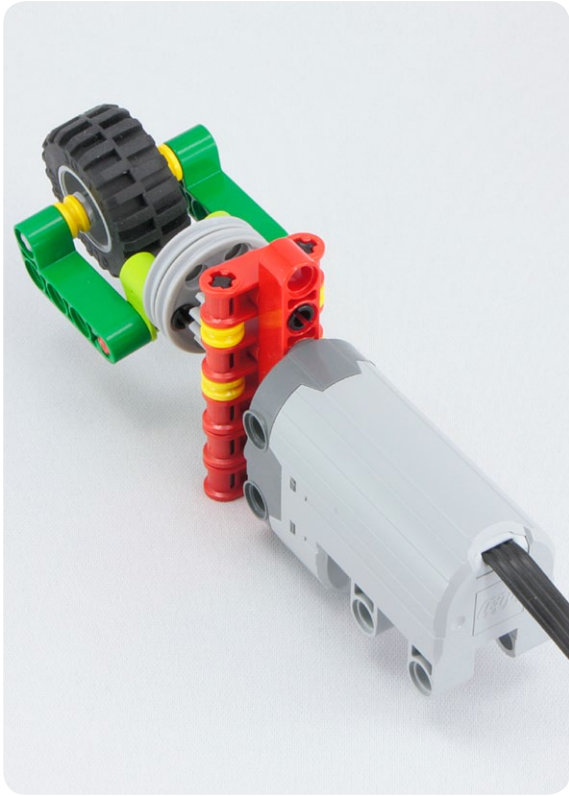


#43

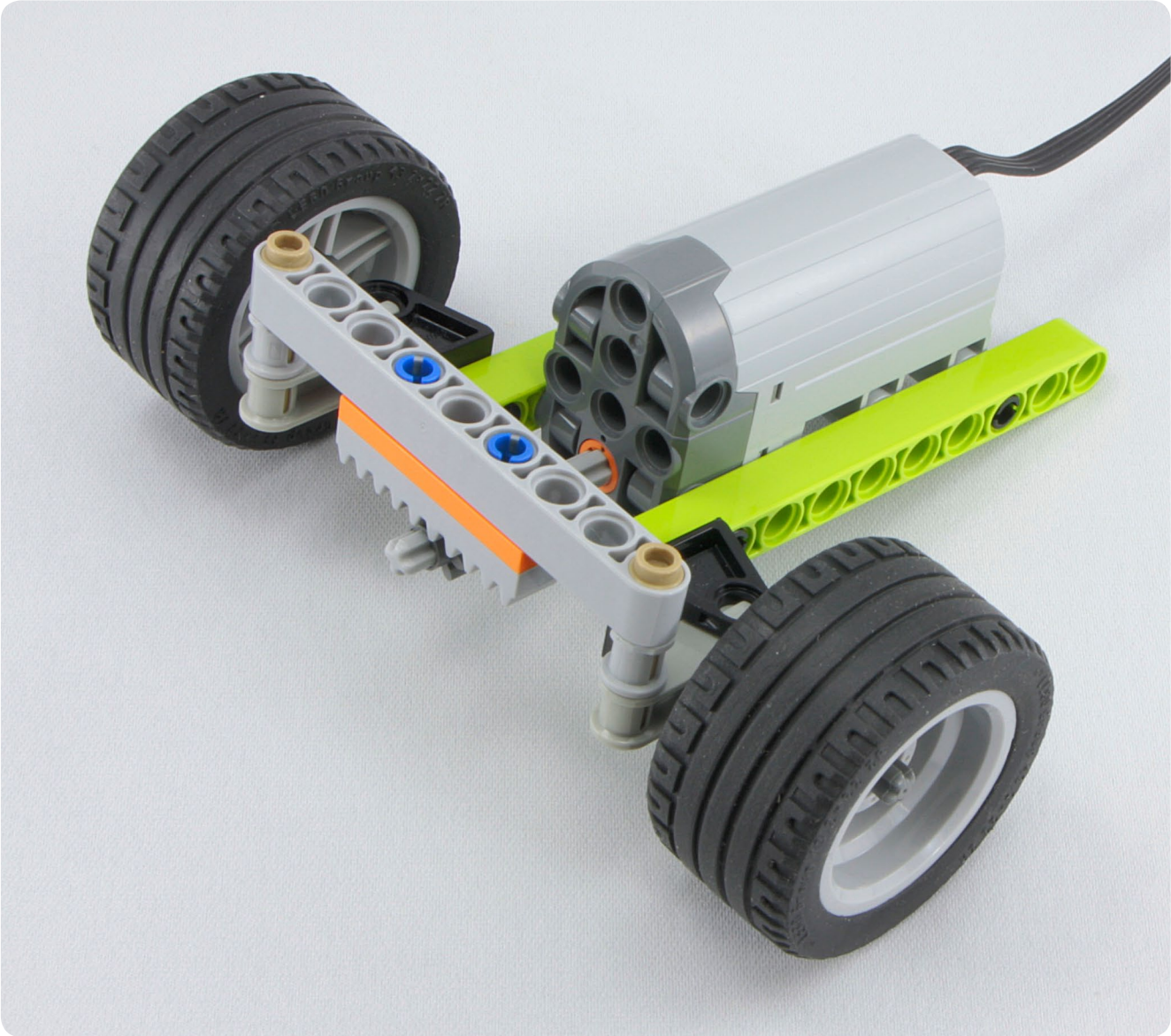
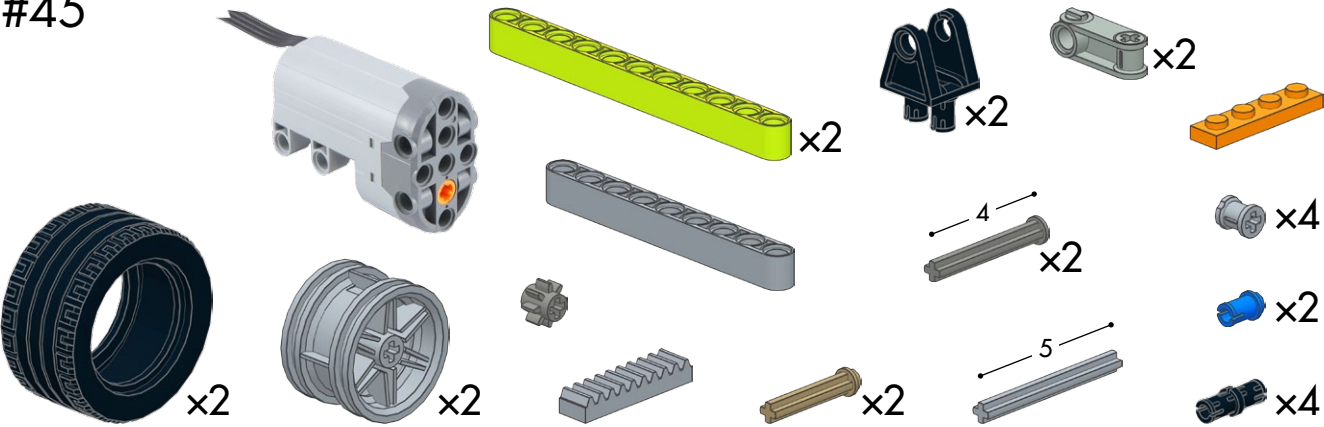




[illegible]

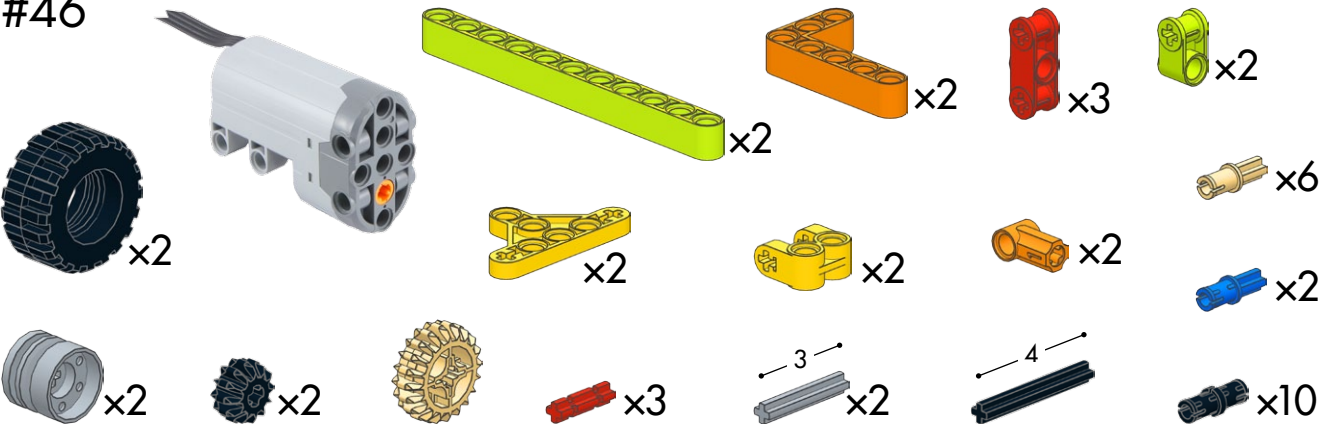


#45

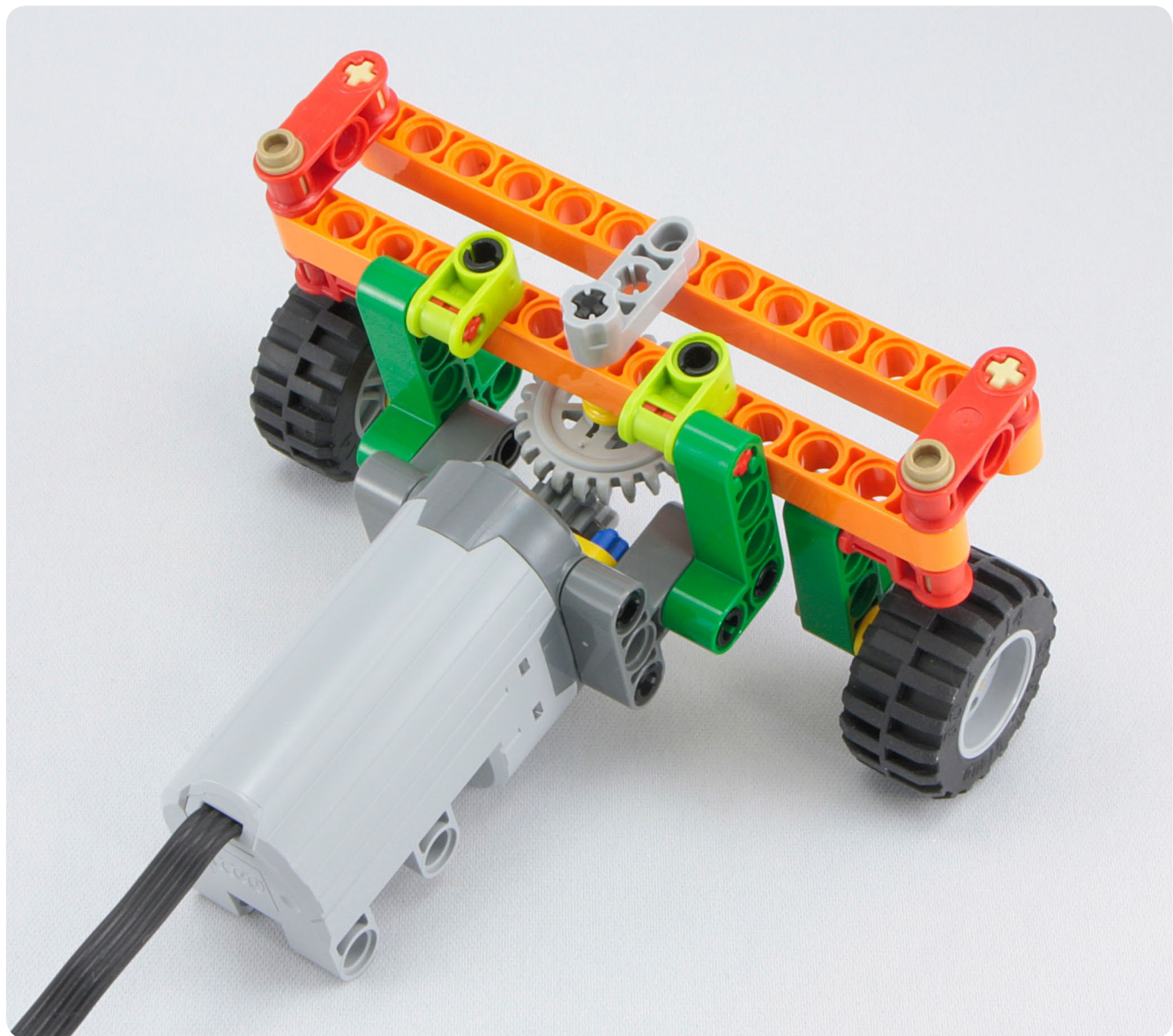


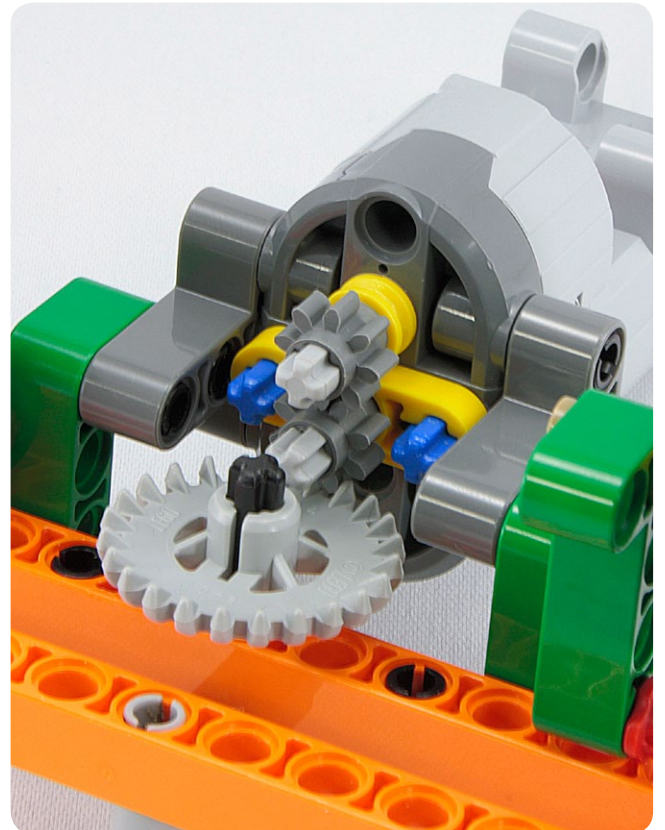
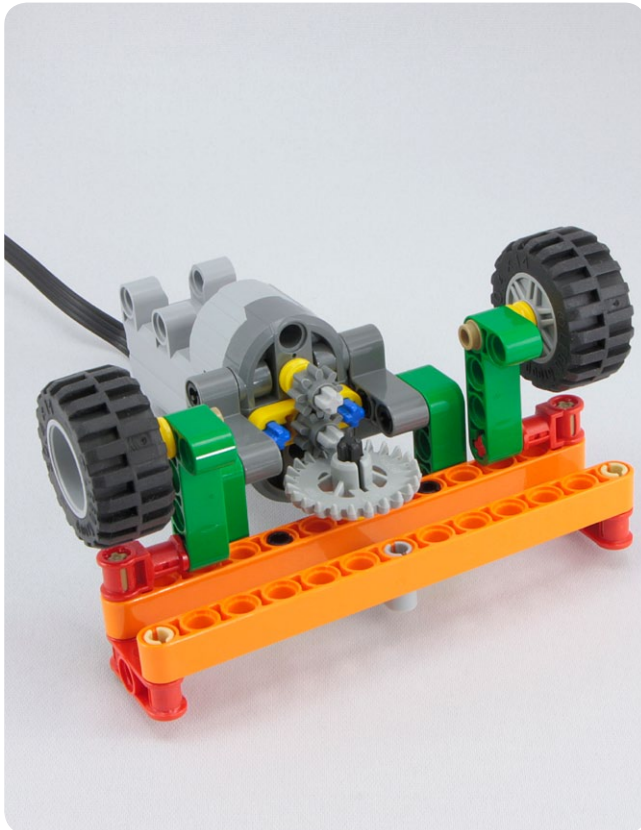
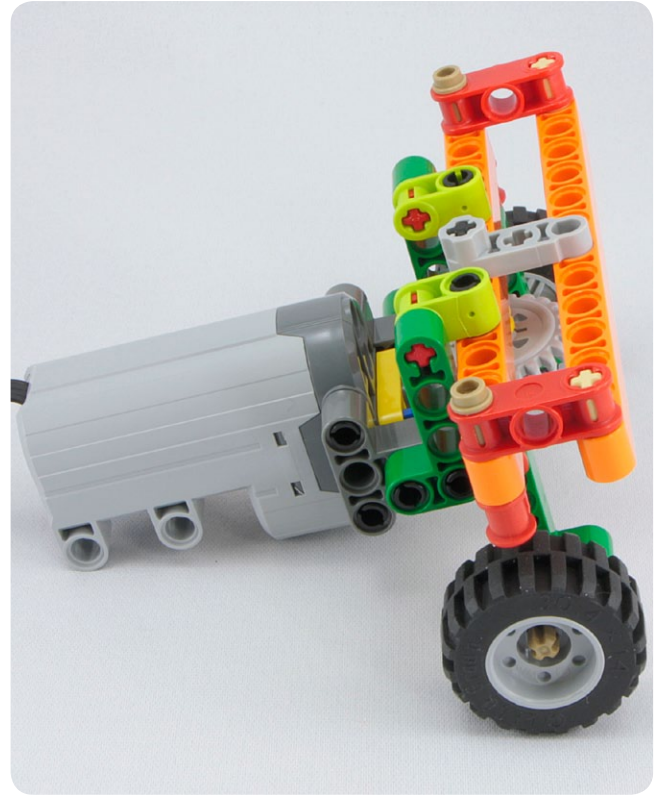
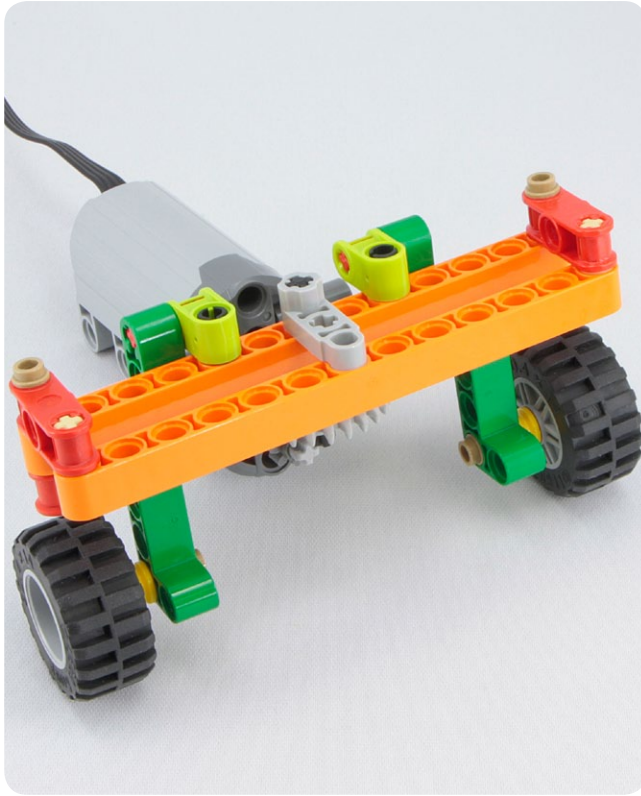


#46

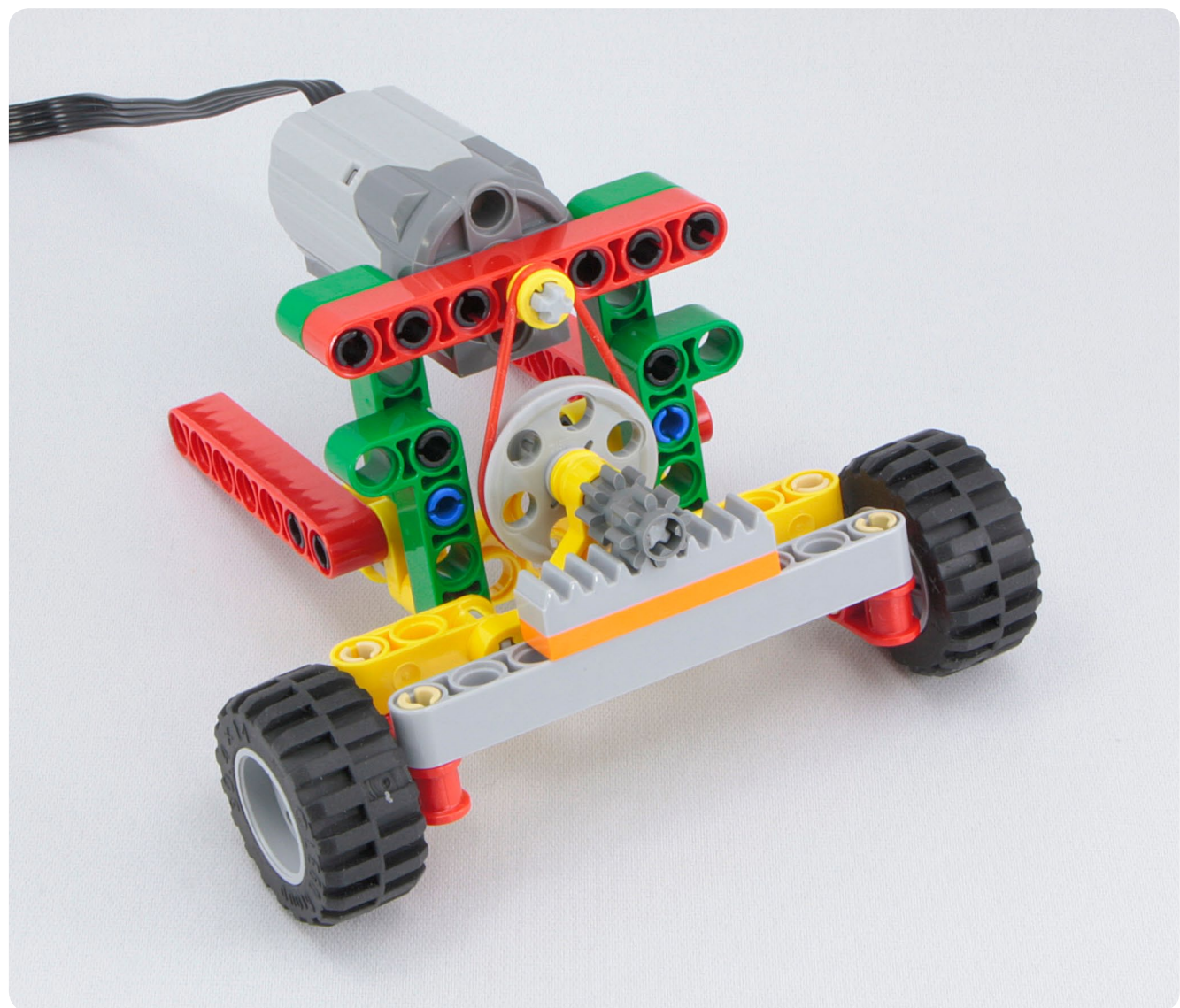
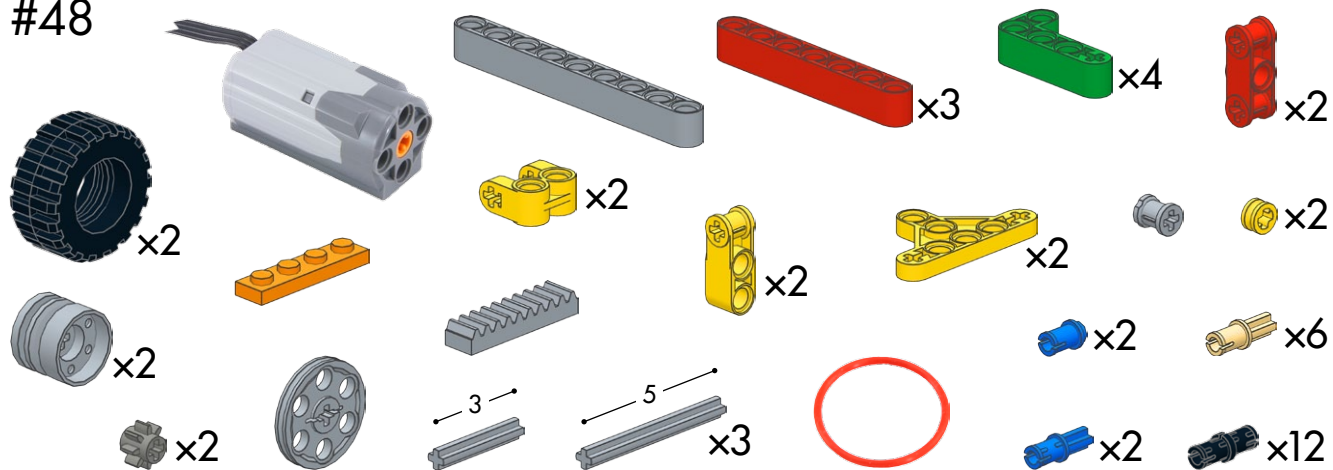


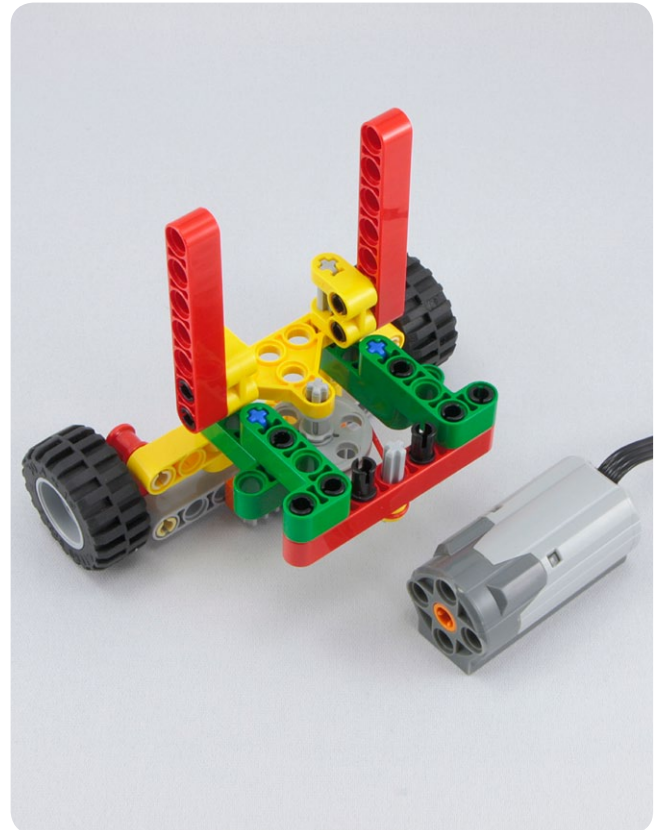
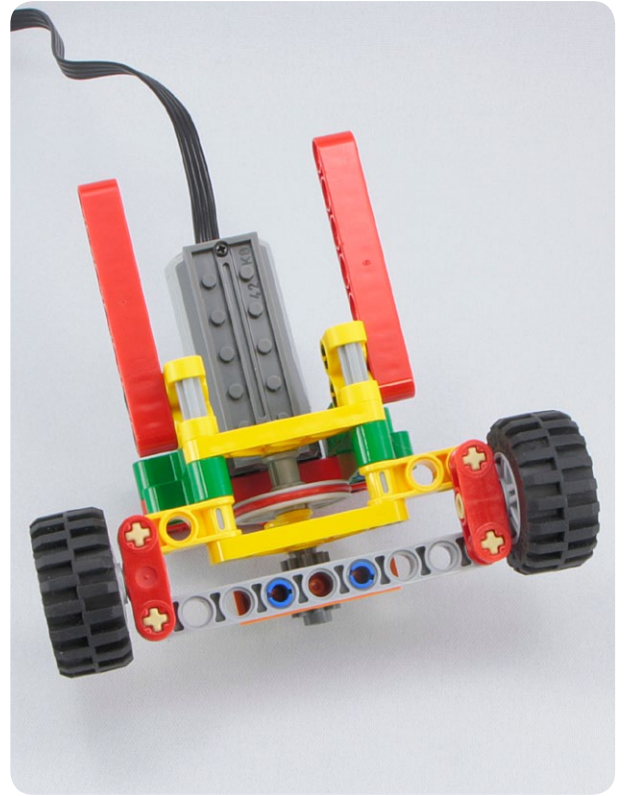
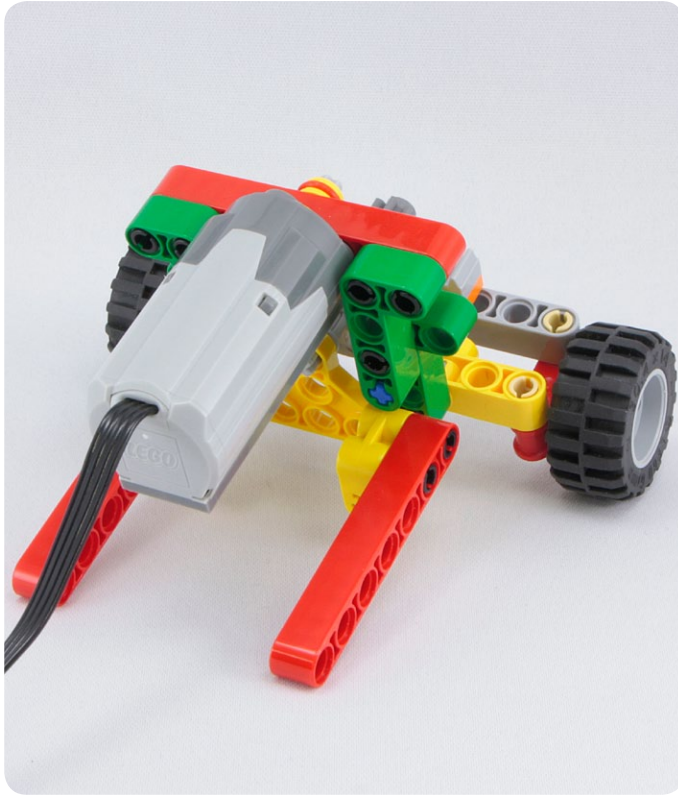


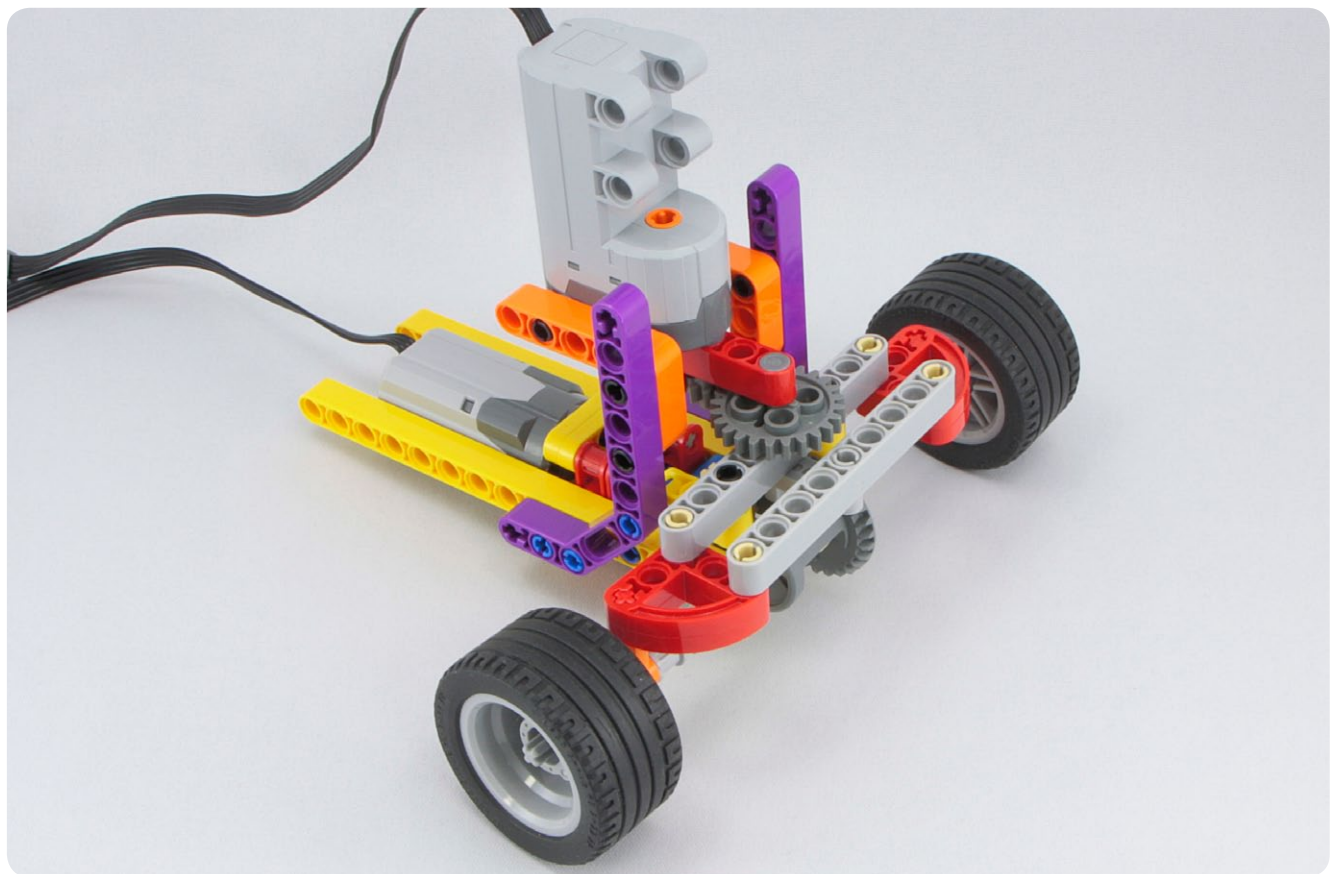
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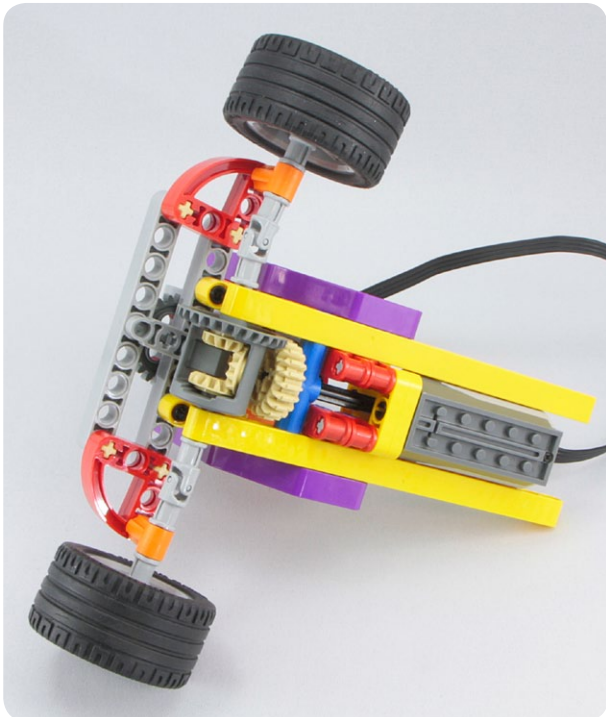
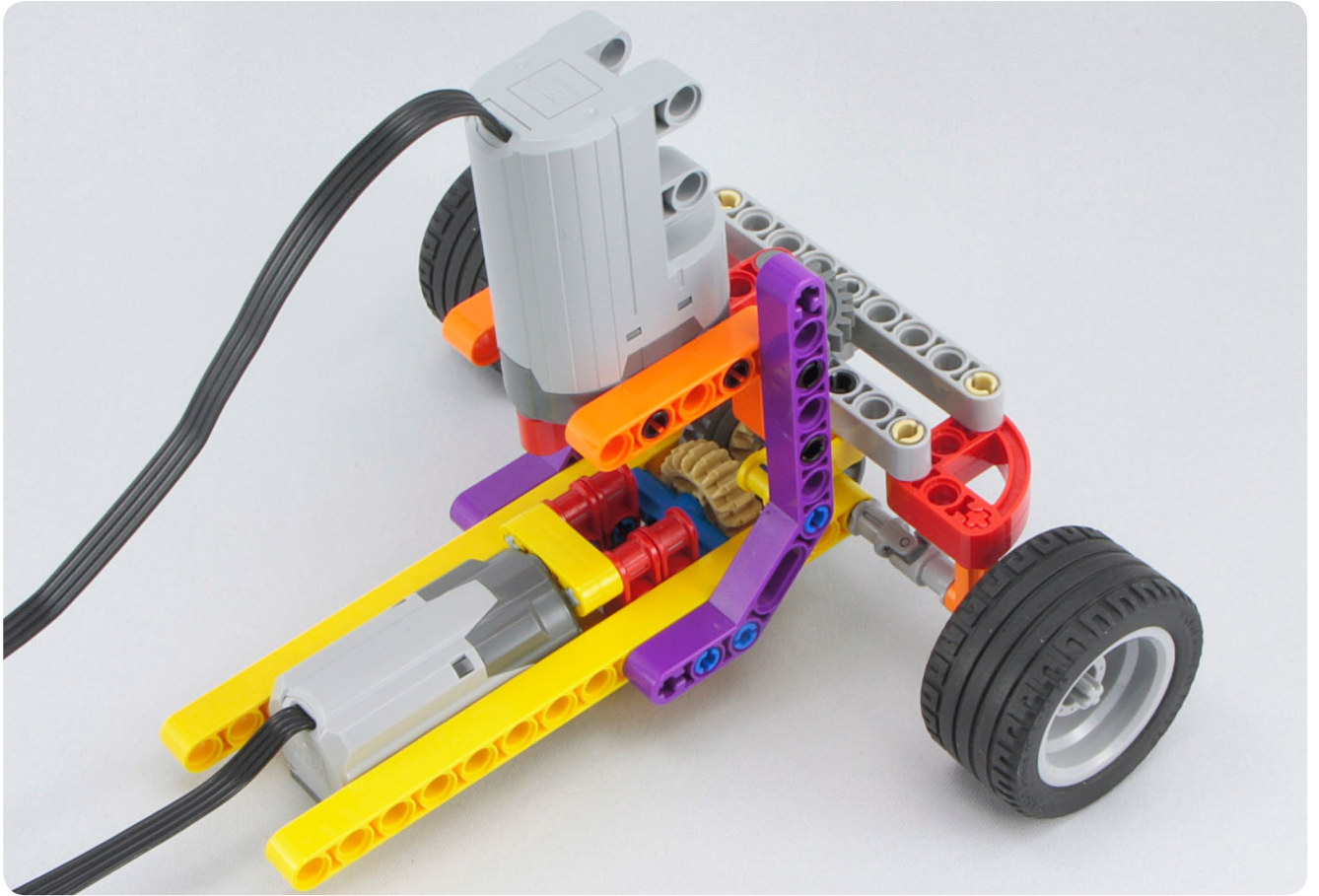


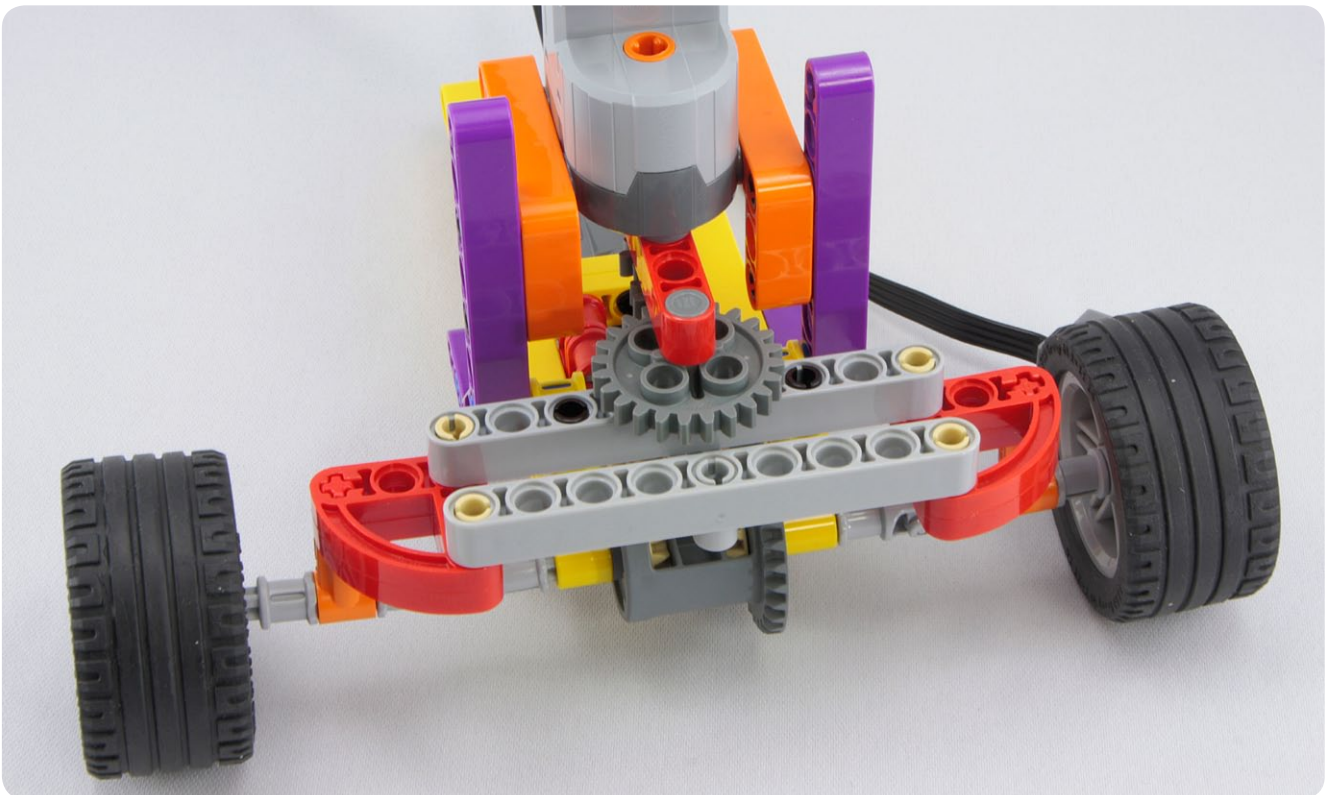
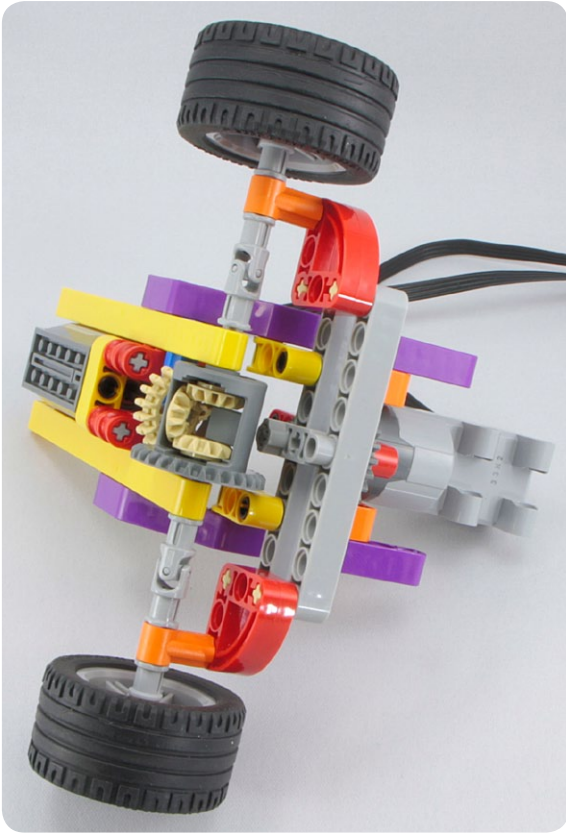
#48

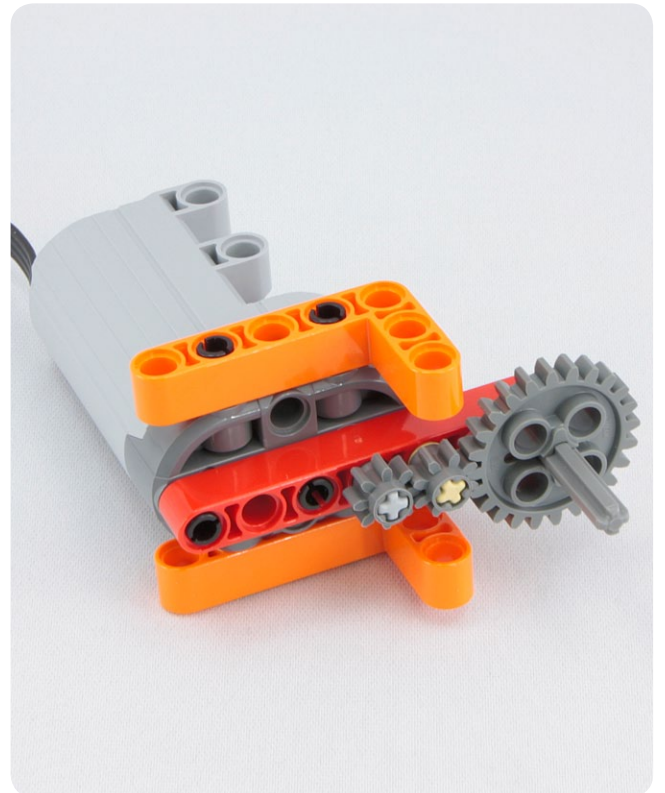
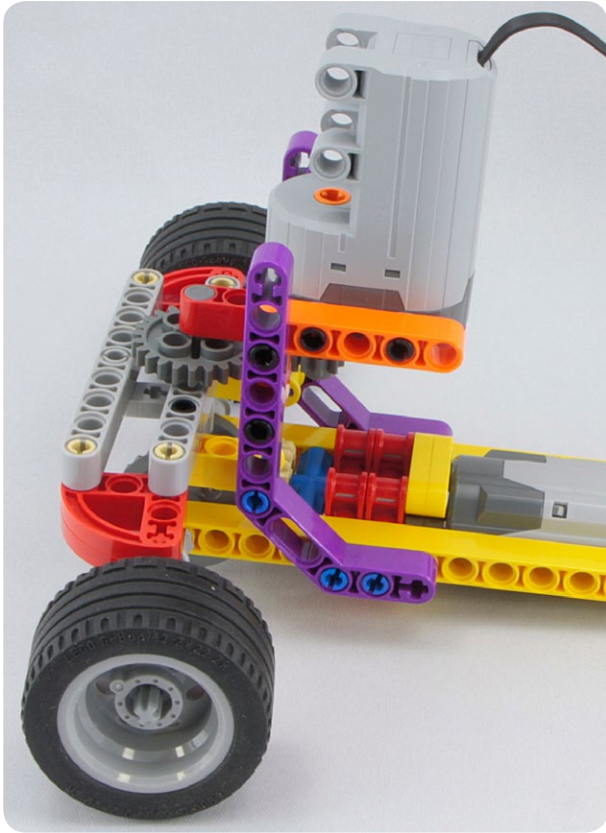


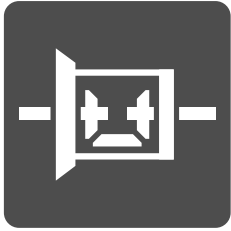


[illegible]







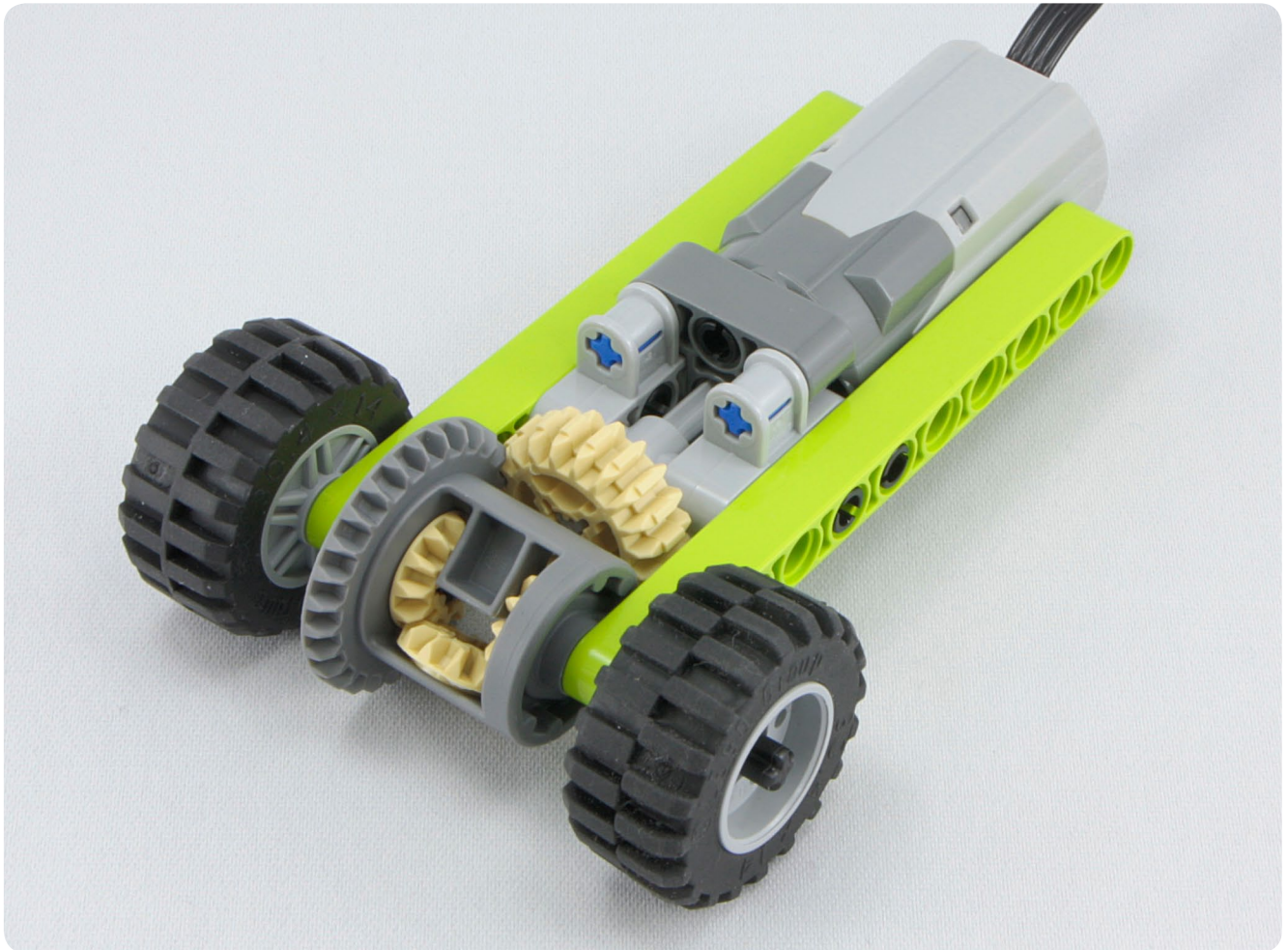
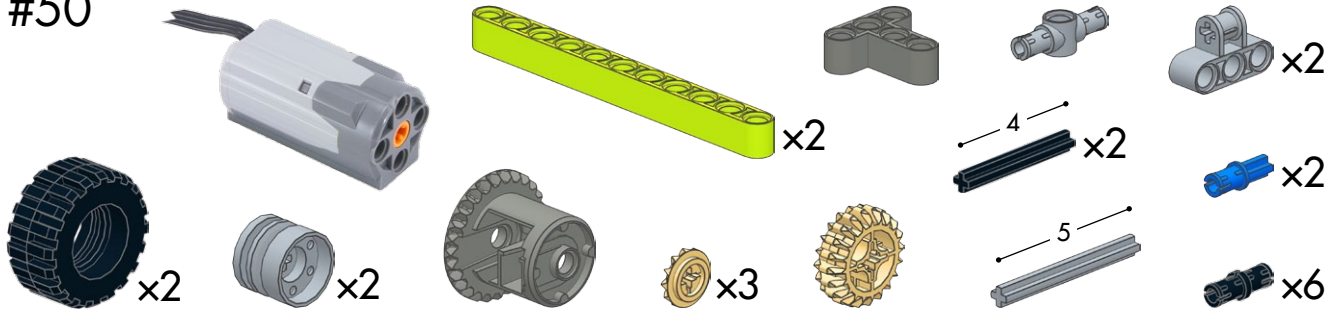


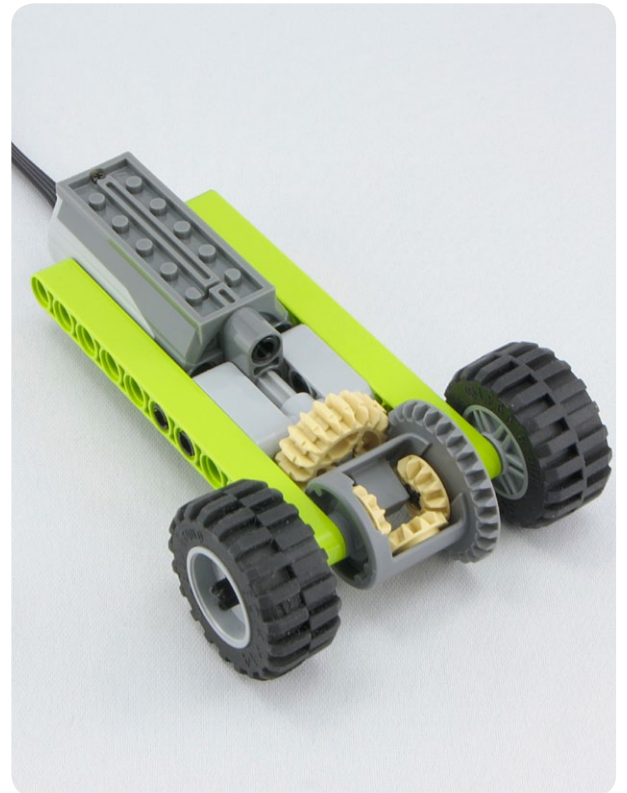
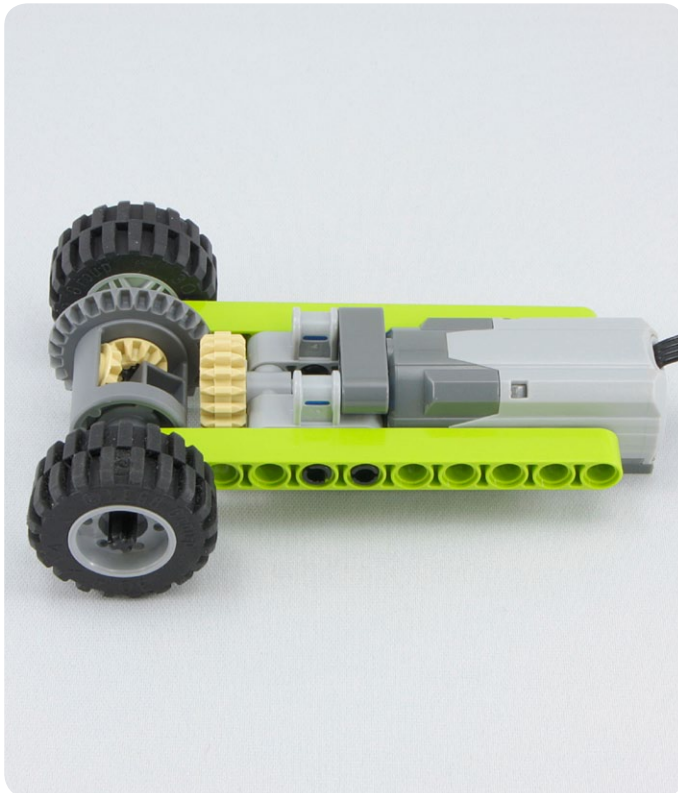
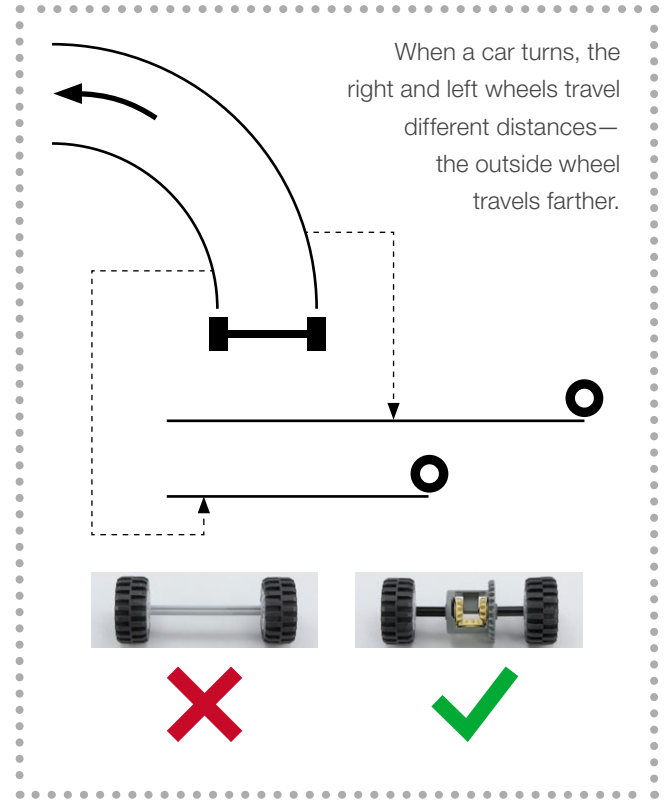
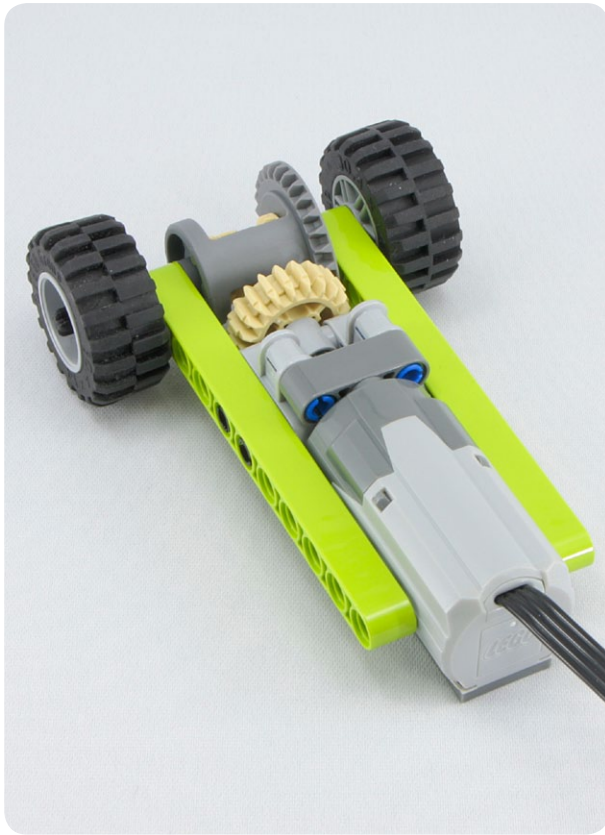
You can combine these models
with those in **Steering with the
servo motor** (page 50).



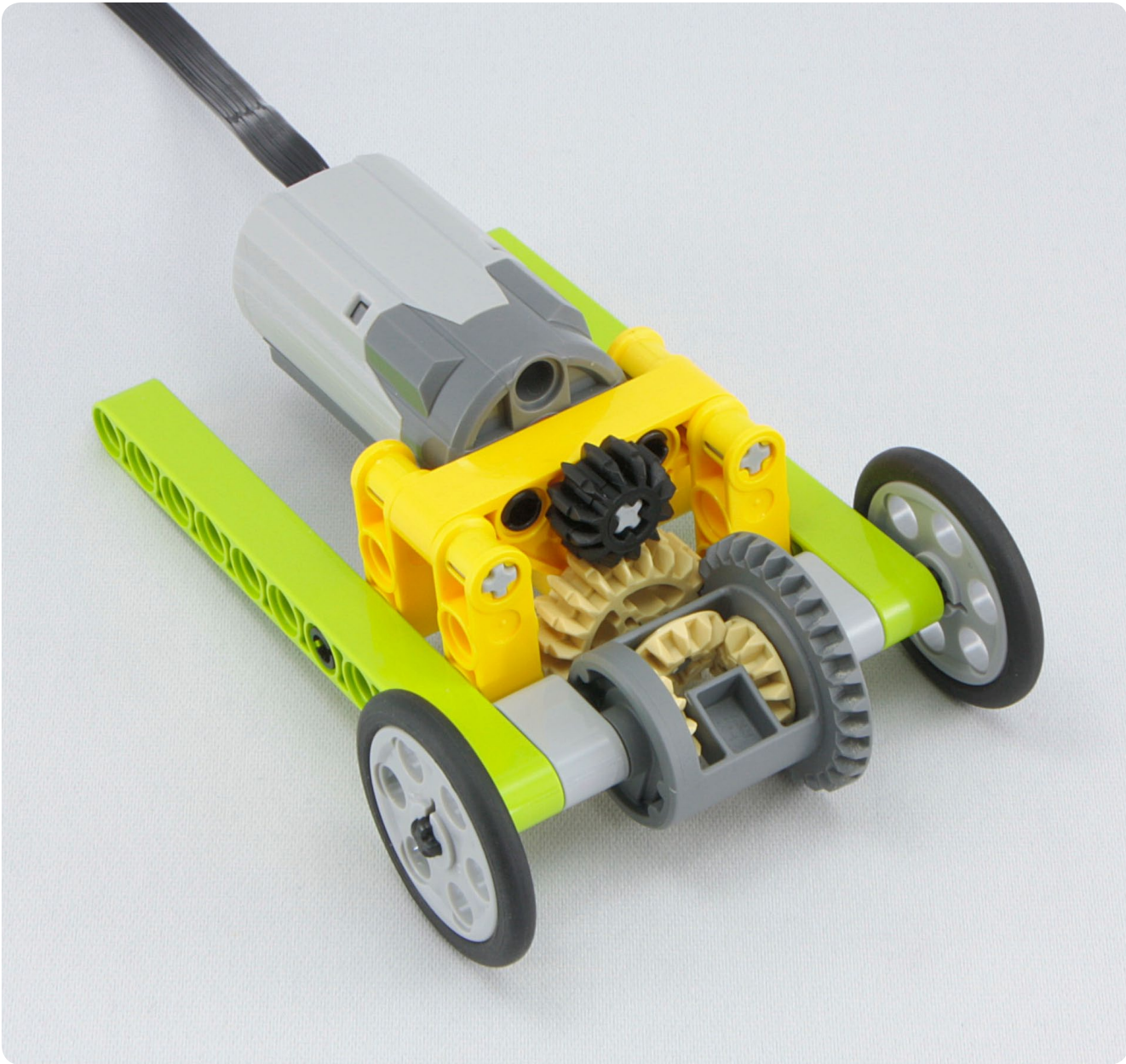
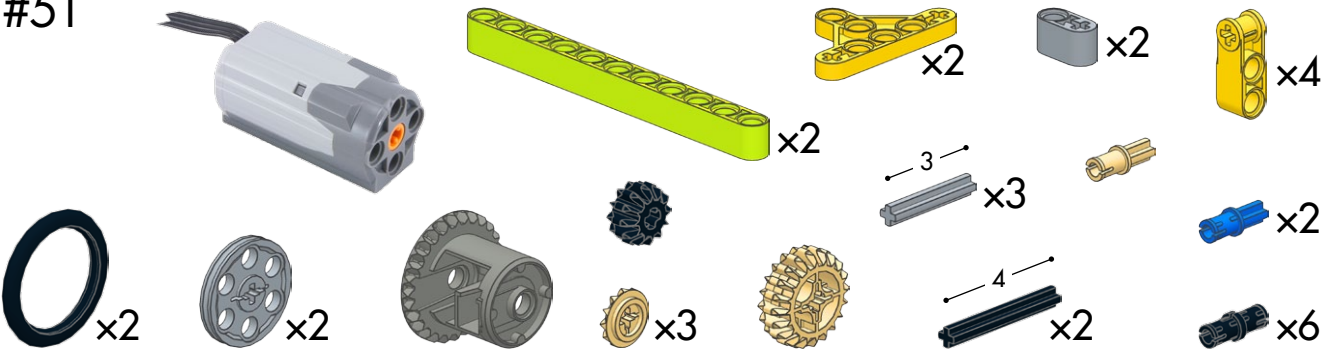
Differential gears

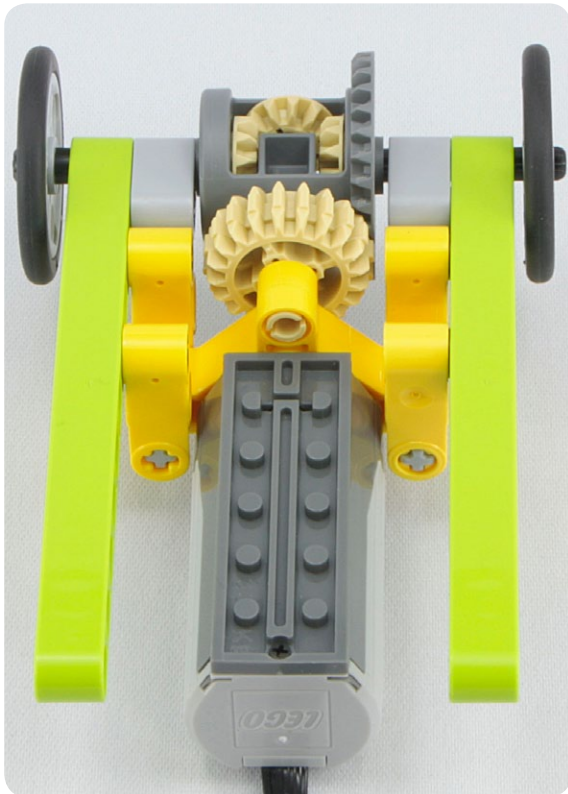
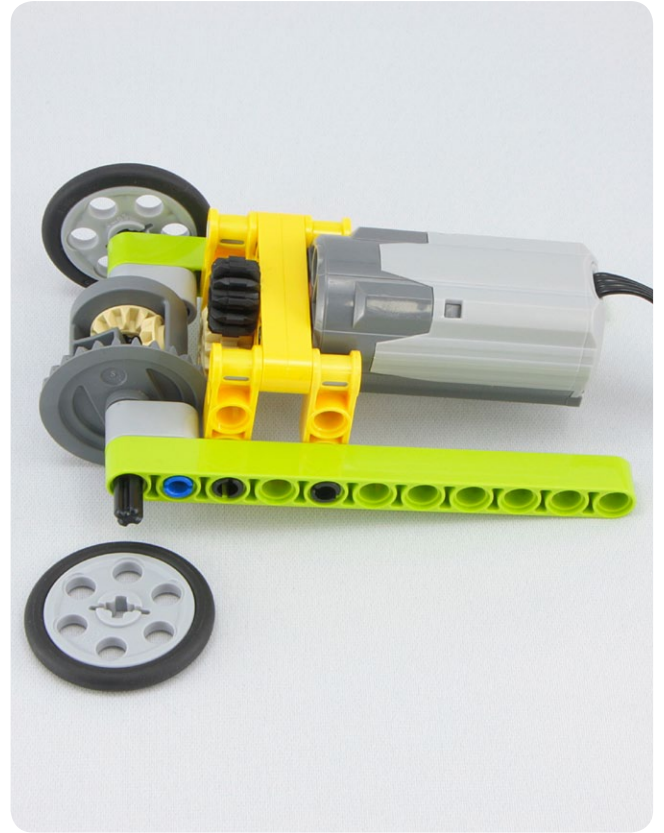
#50



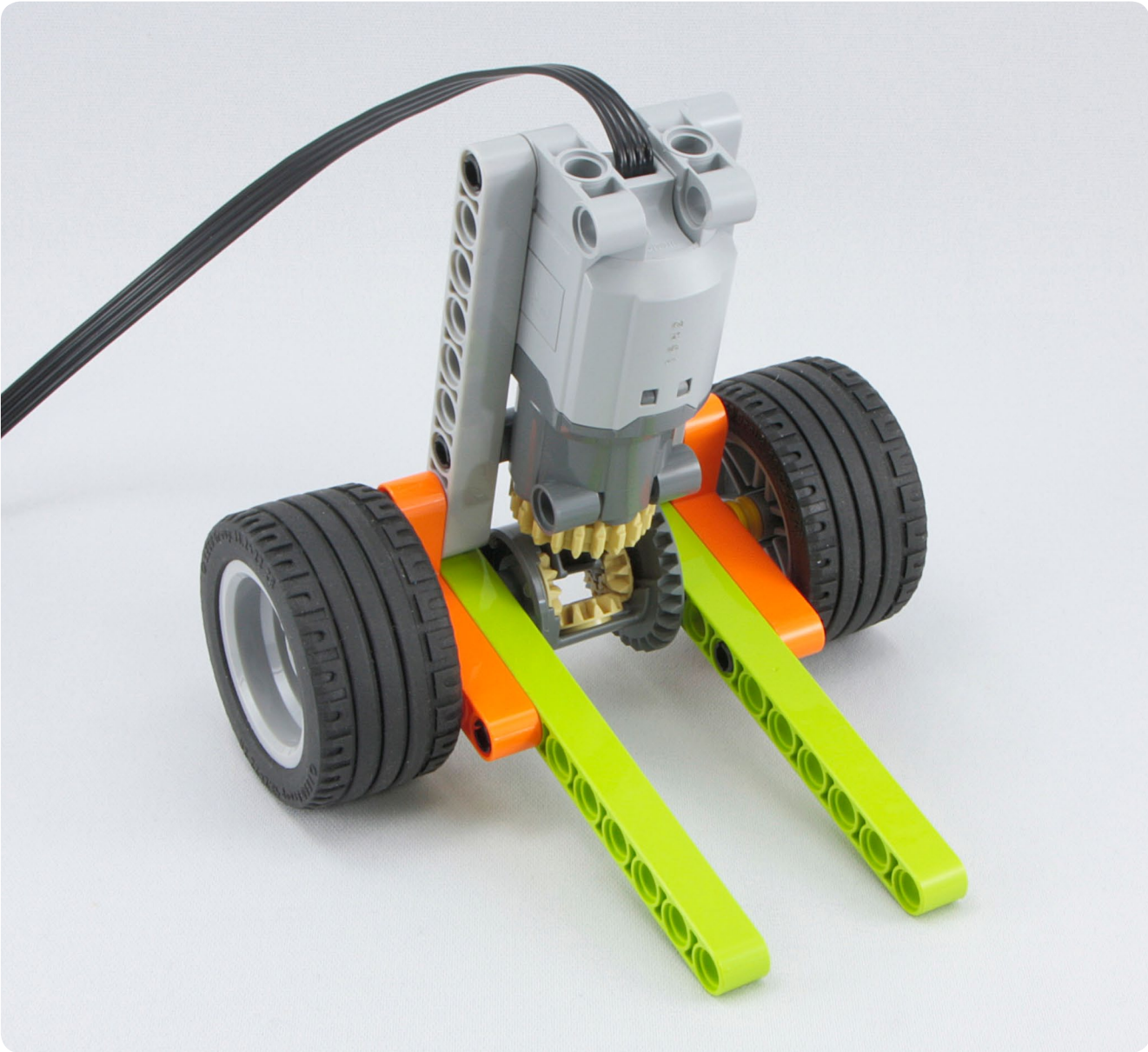
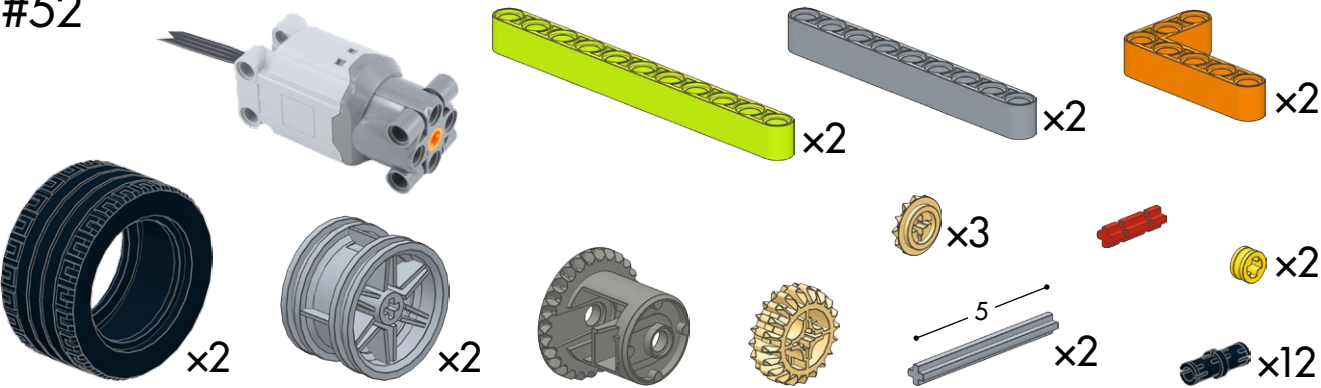


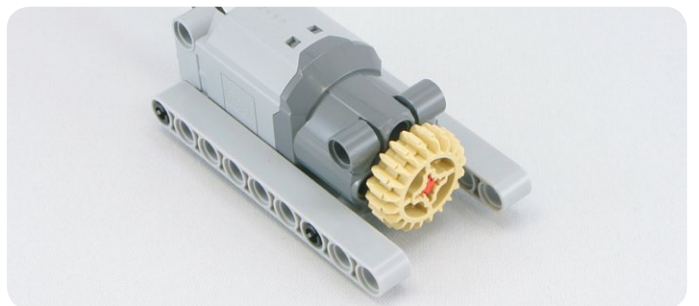
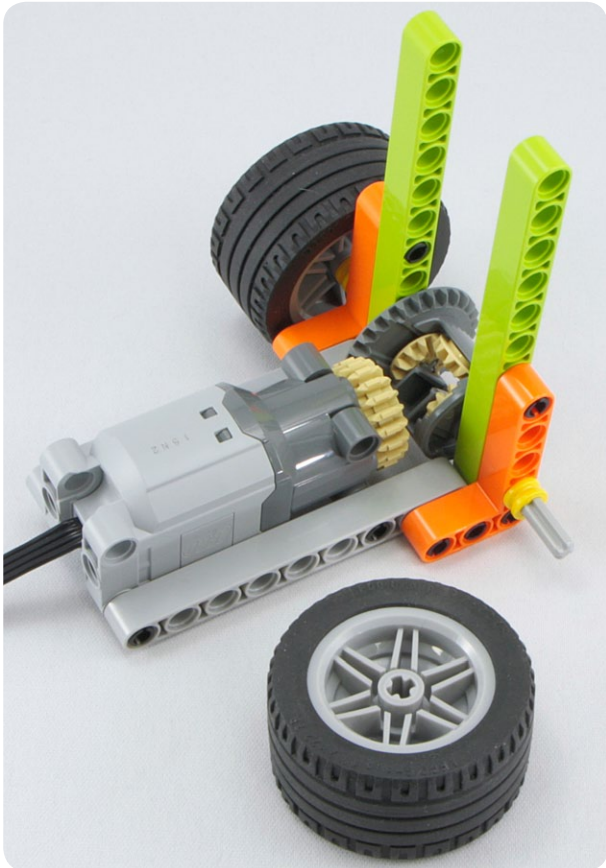
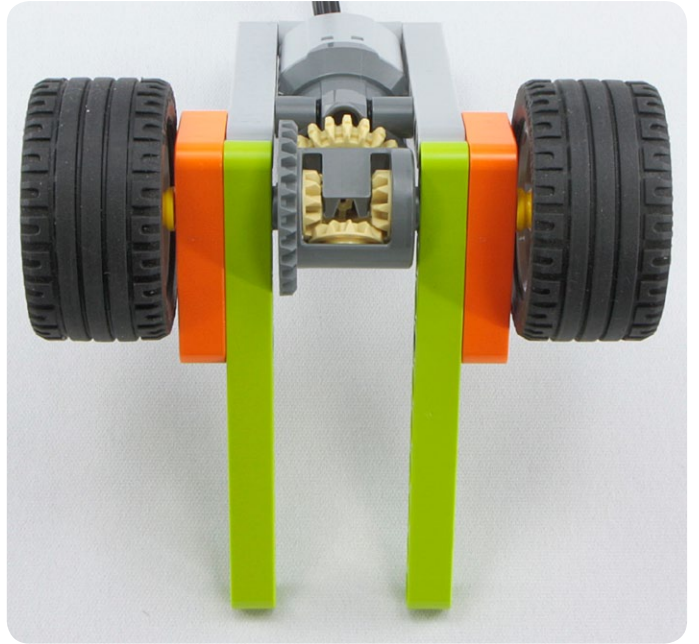
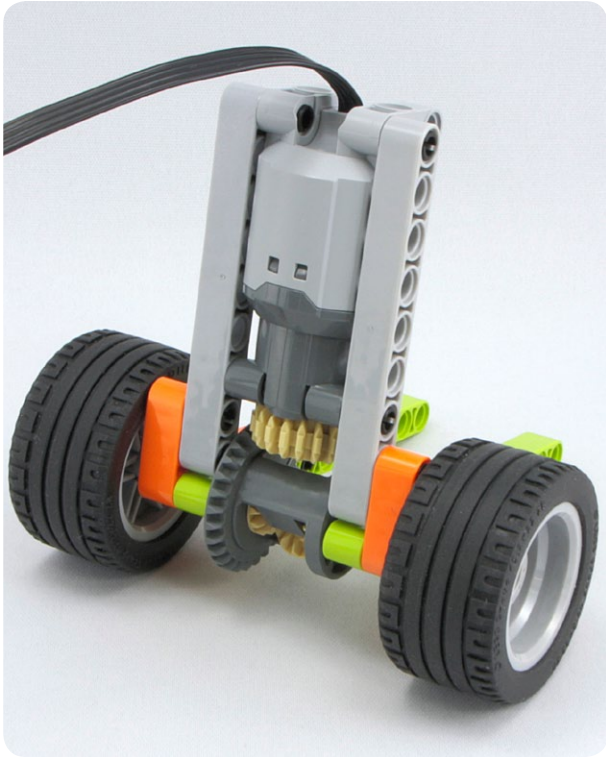
#51



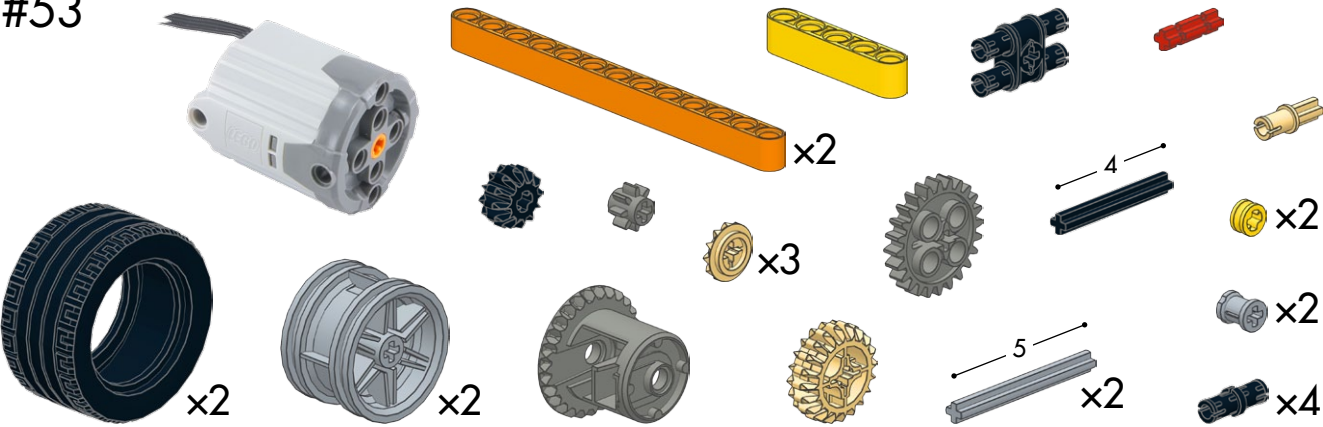


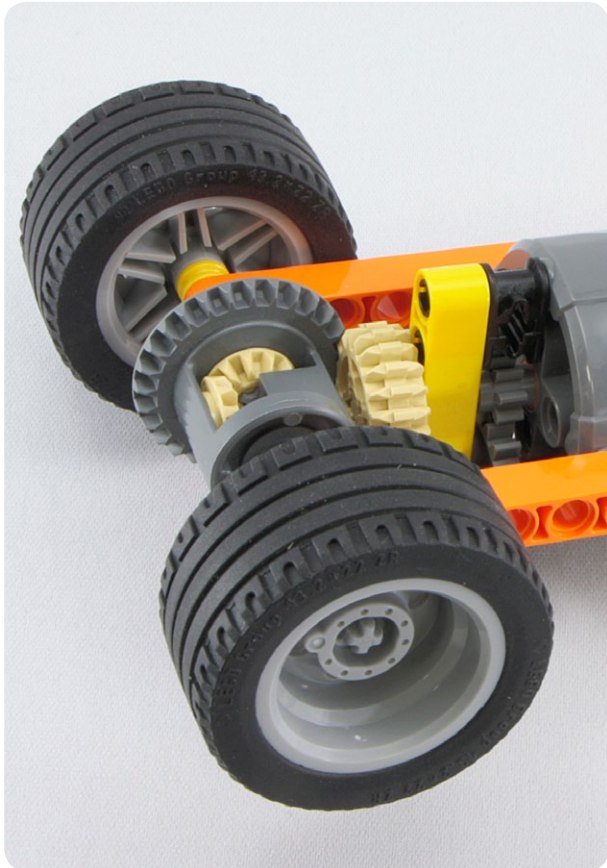
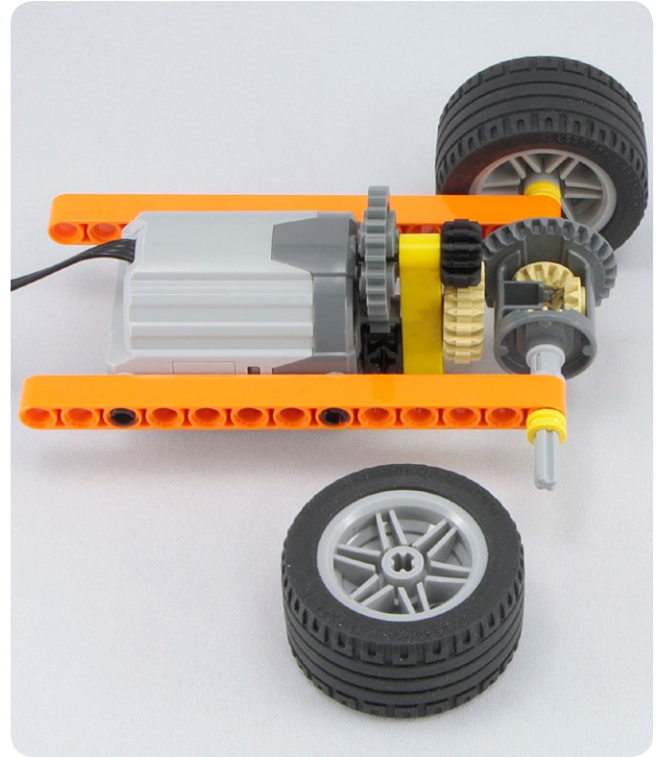
#52



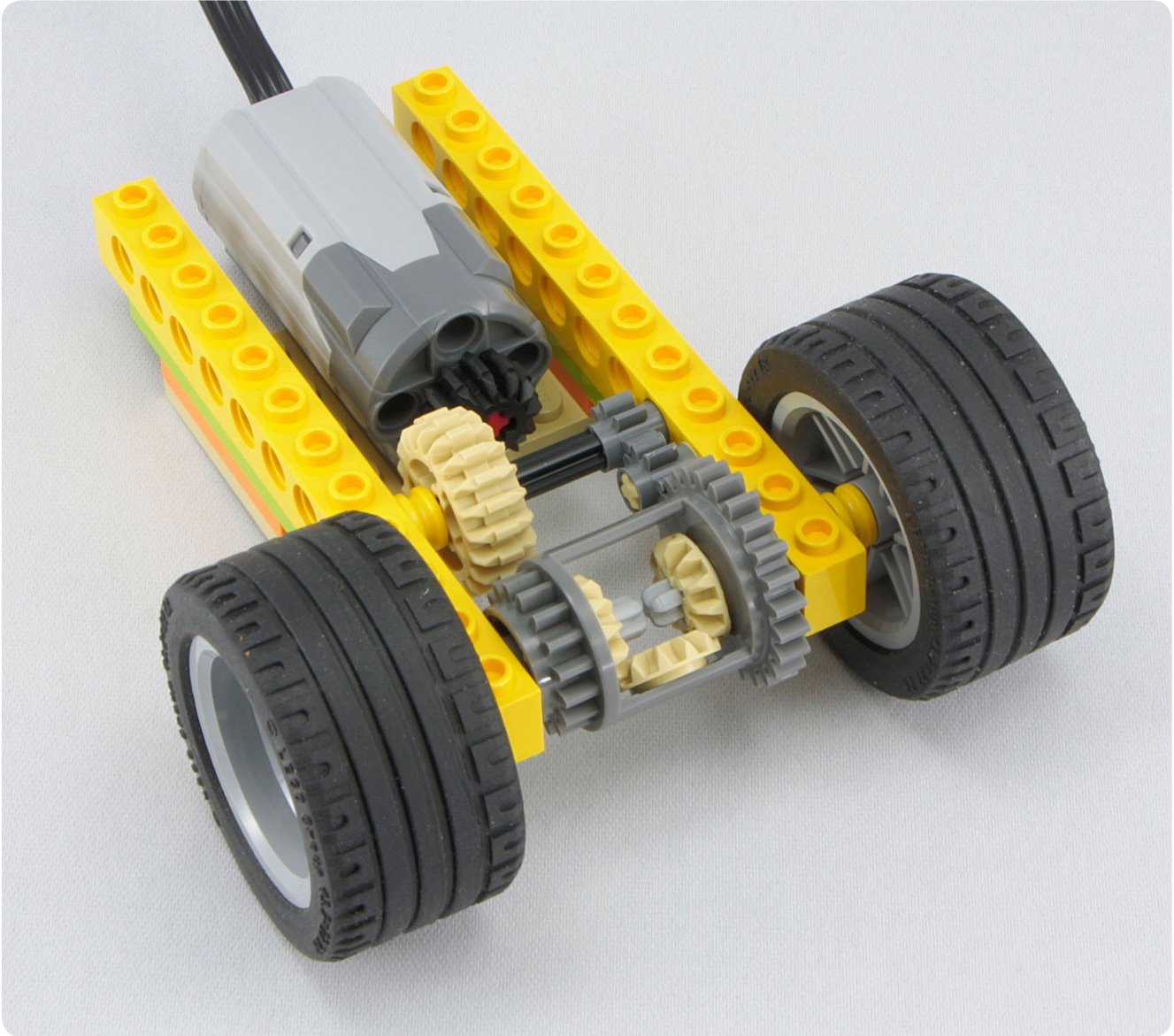
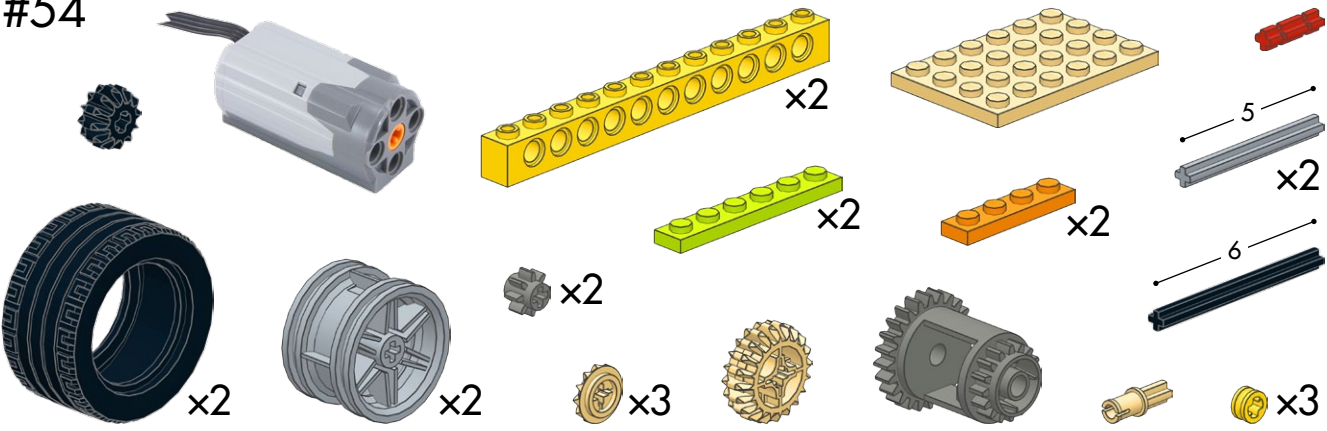


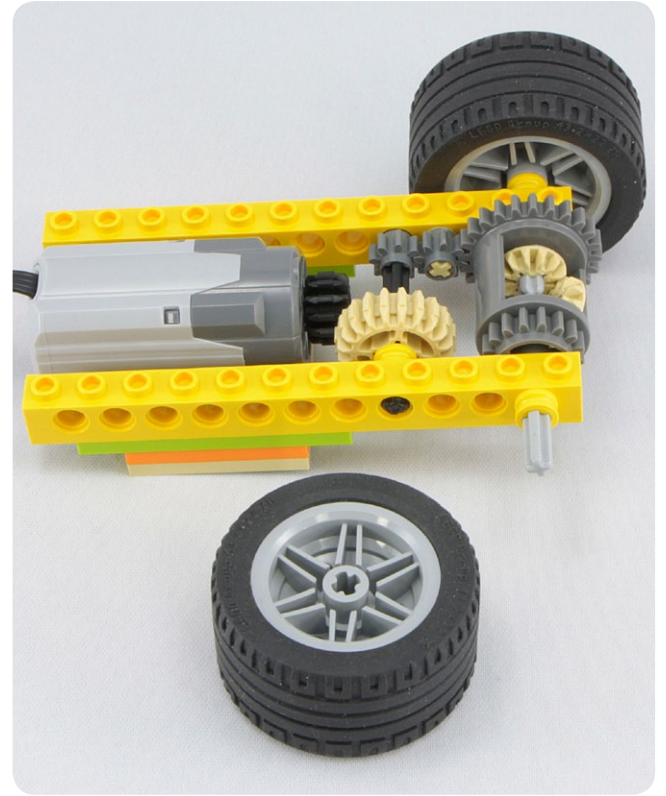
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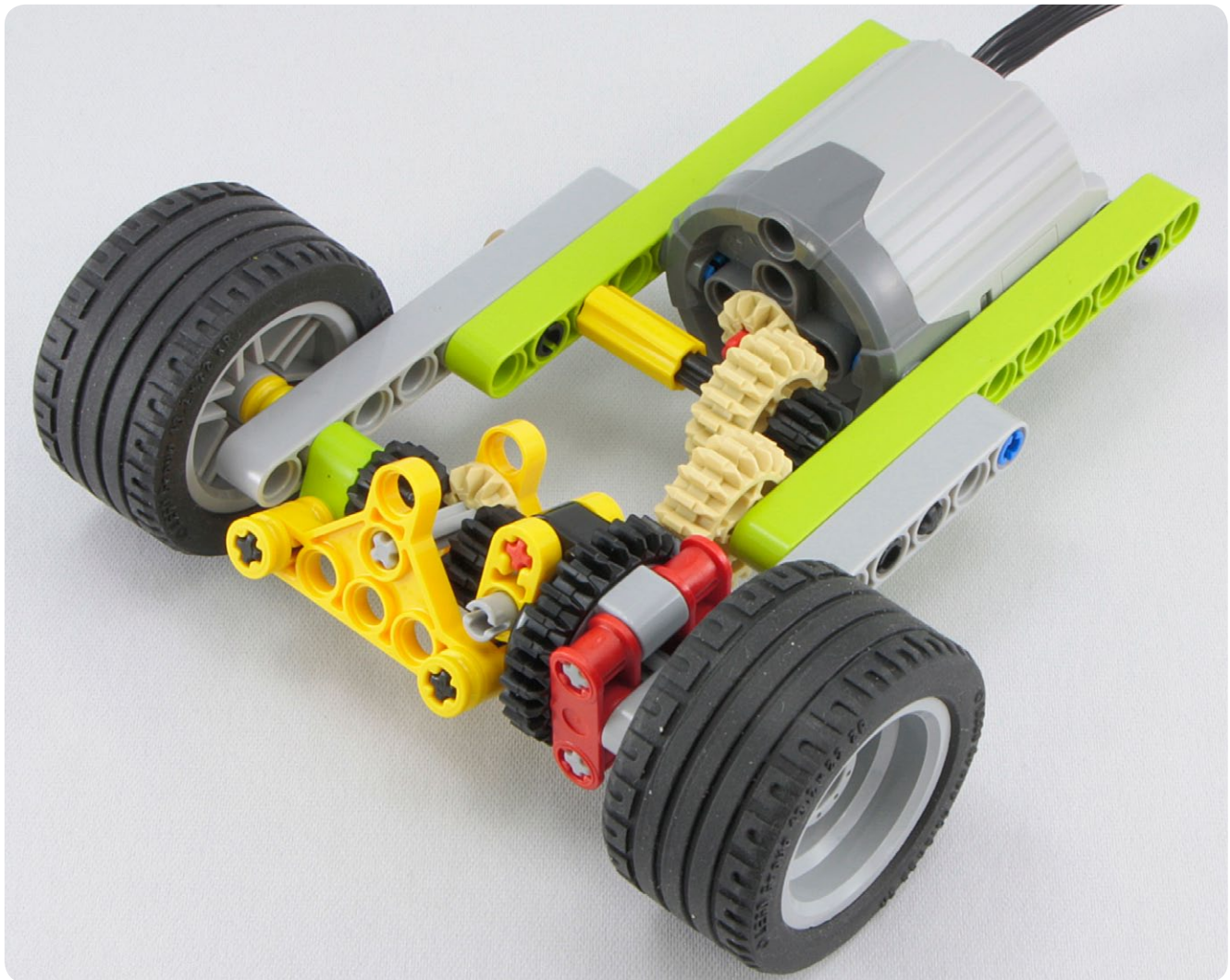




#54

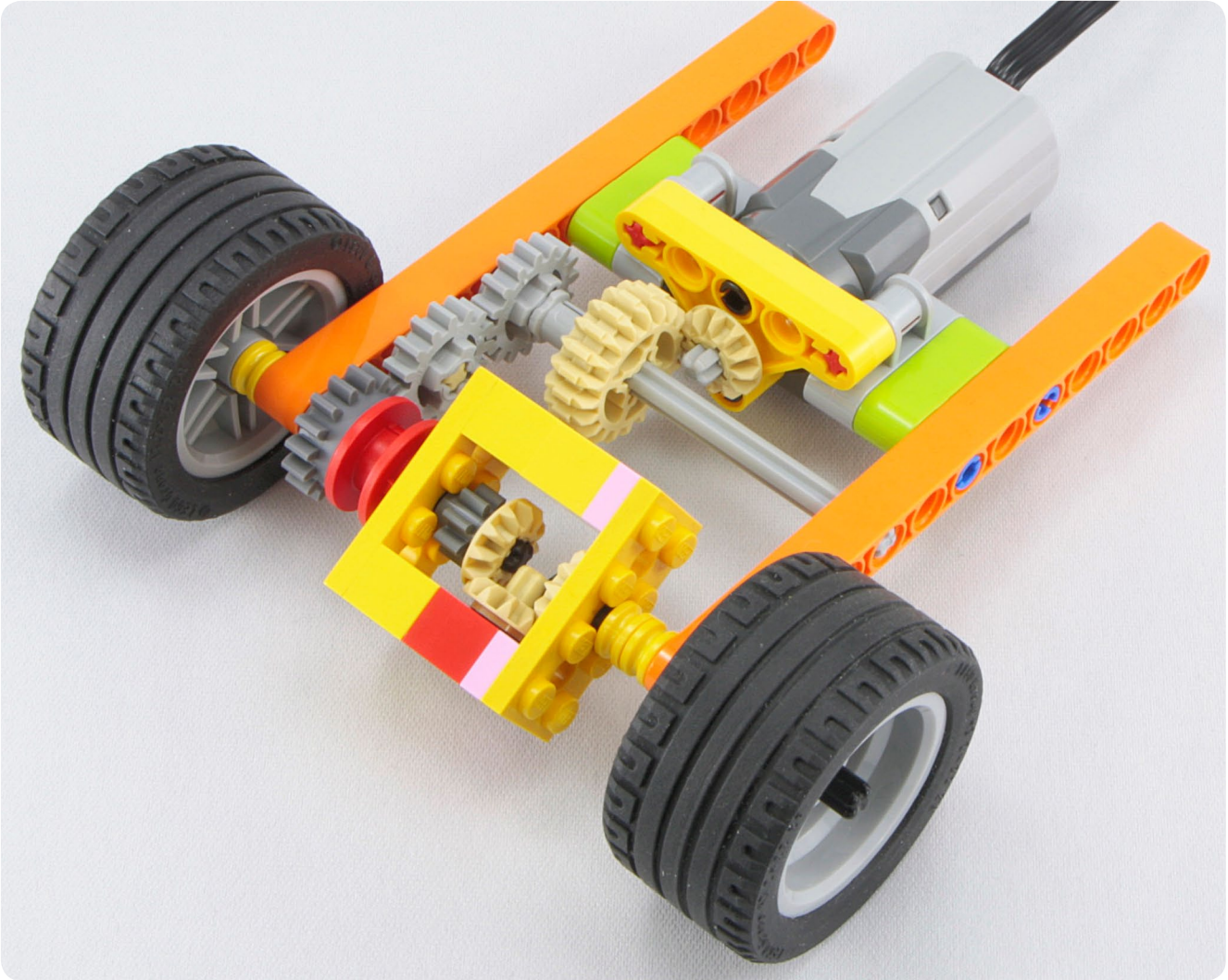
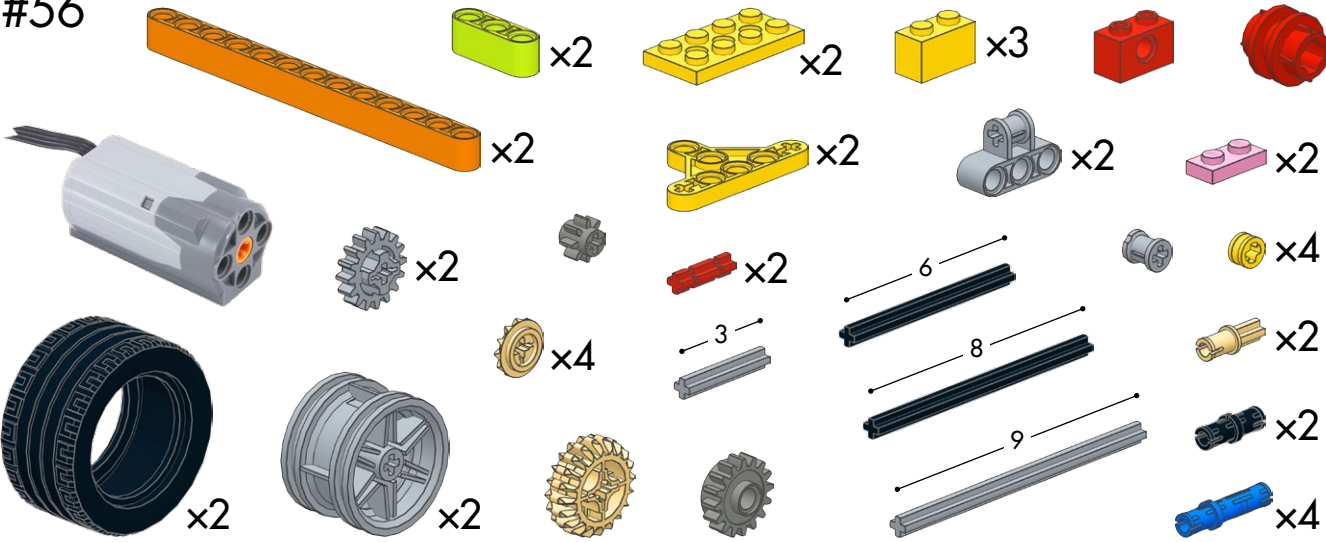


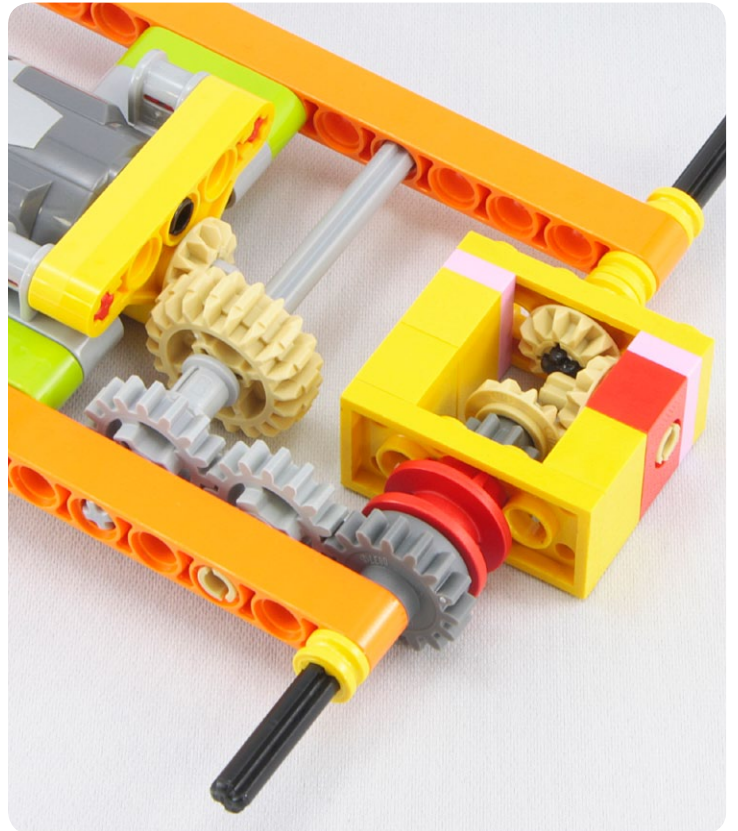
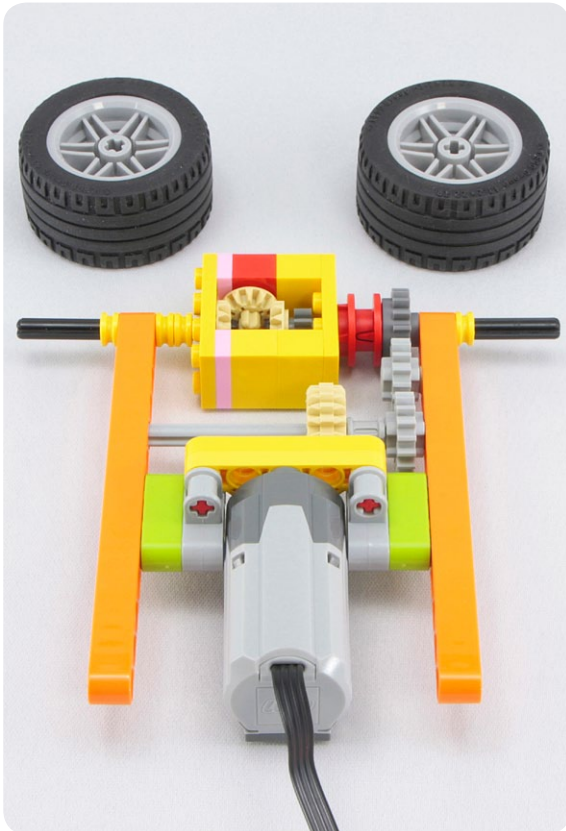
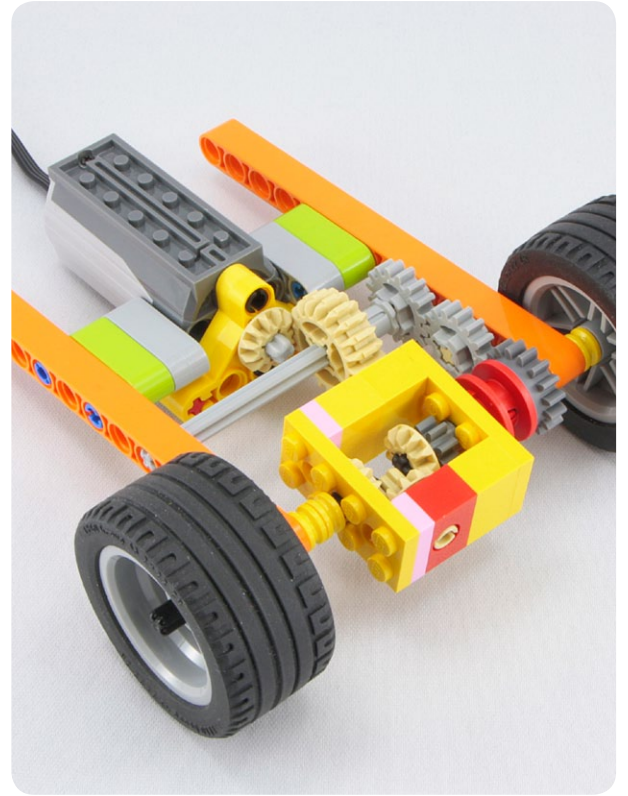


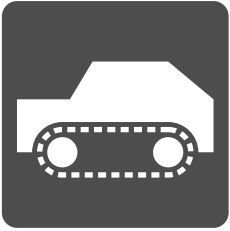
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#56

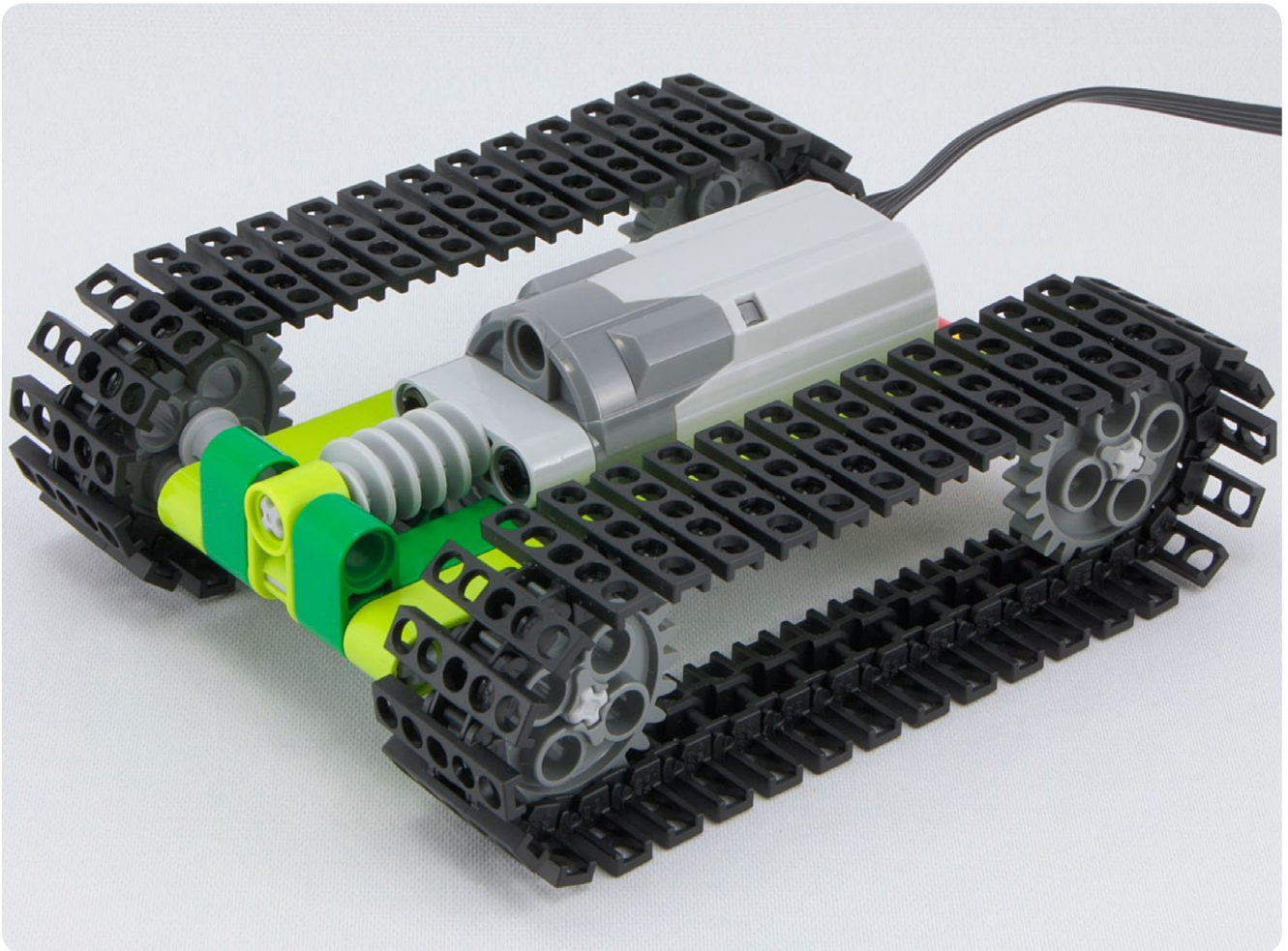
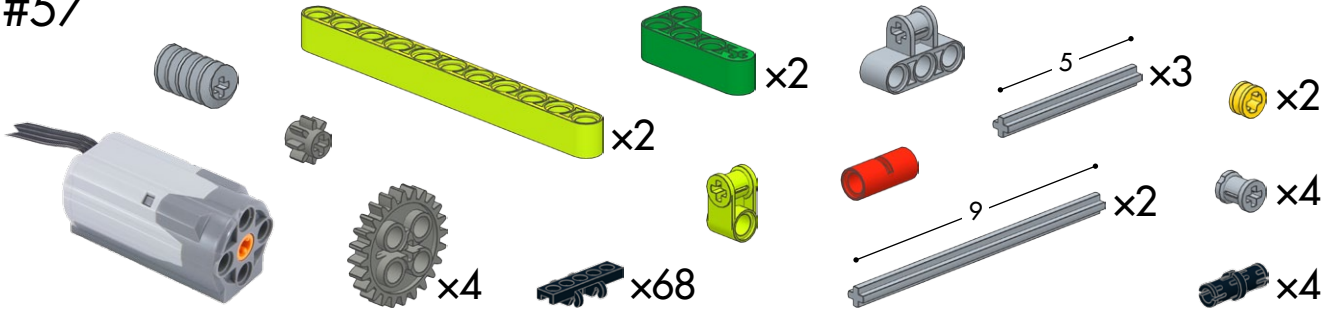


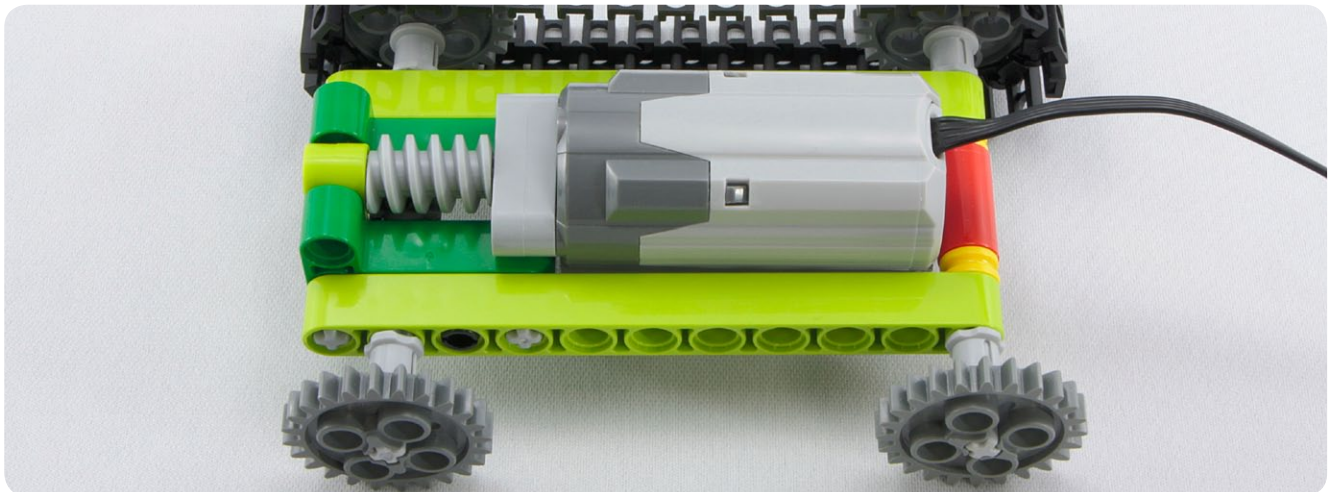
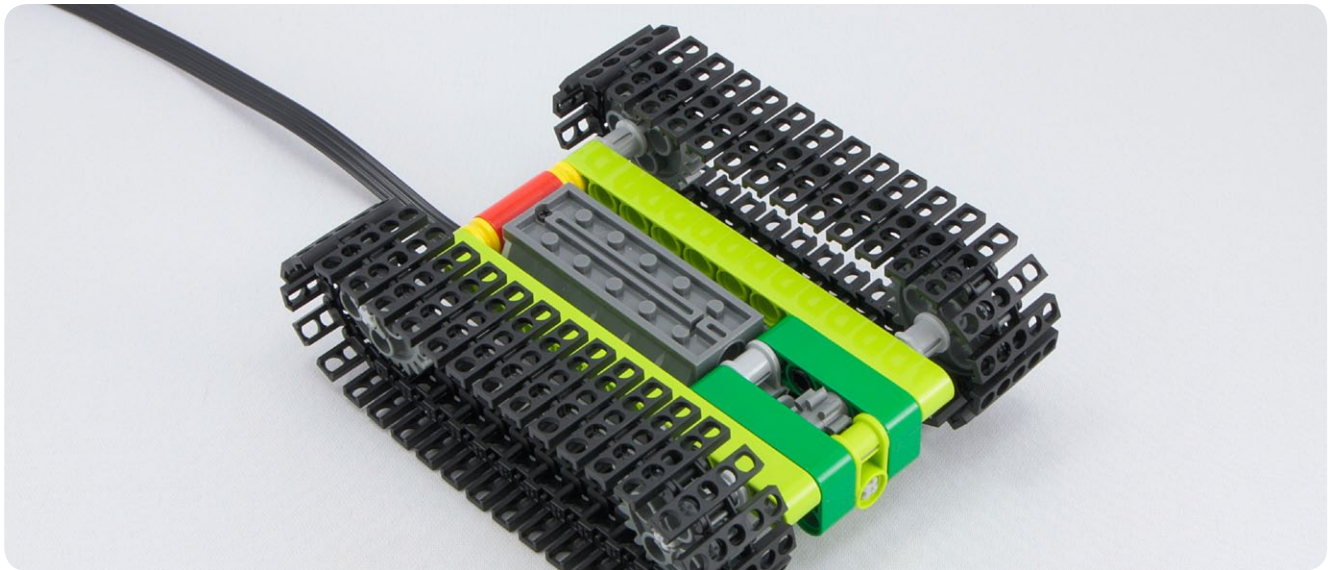
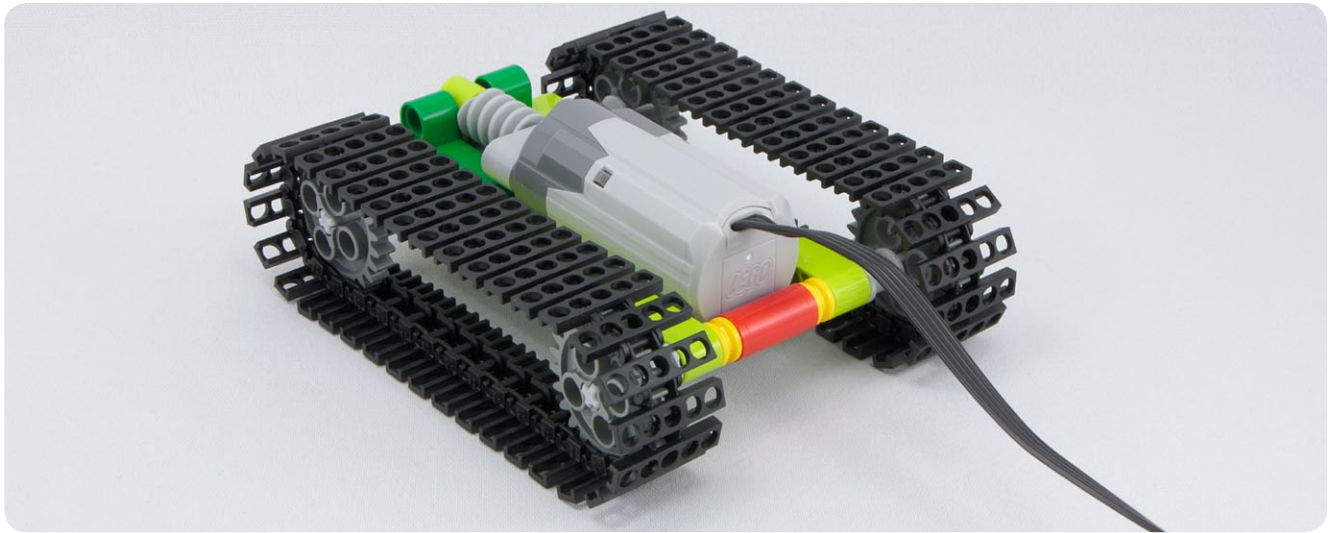




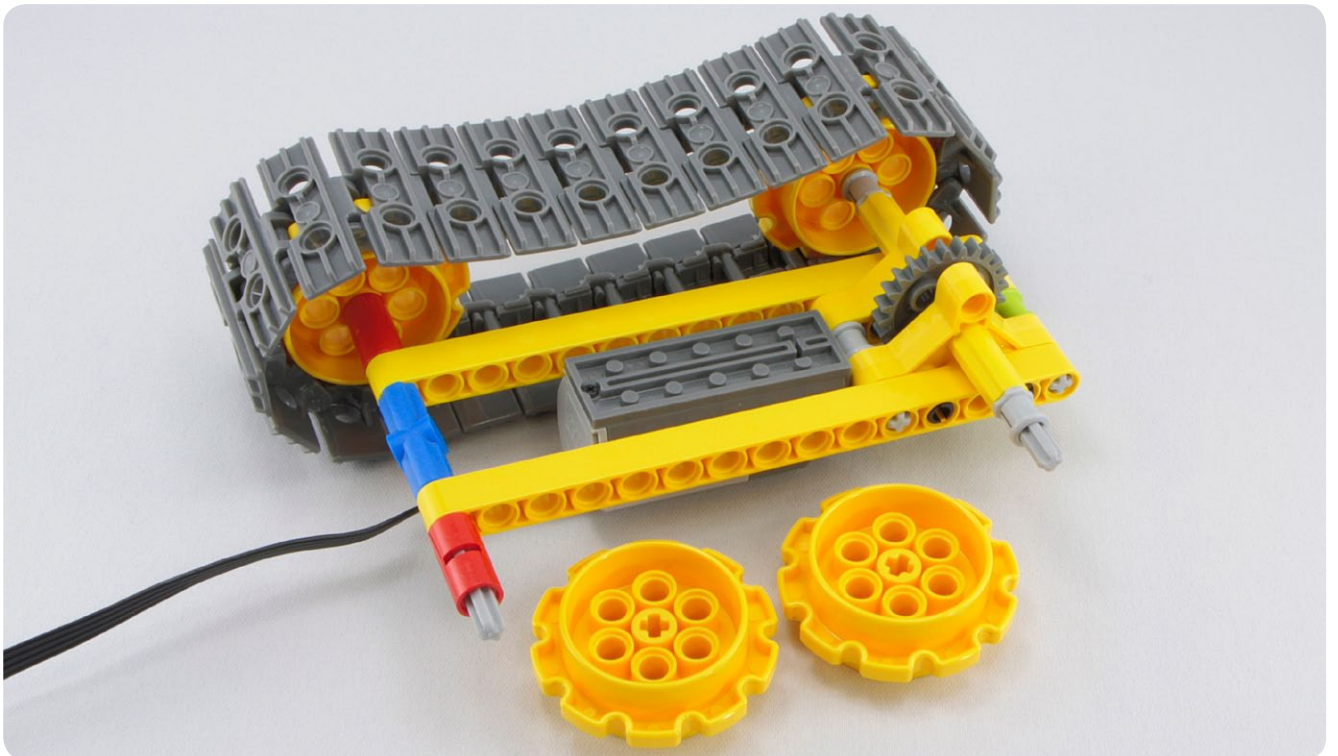
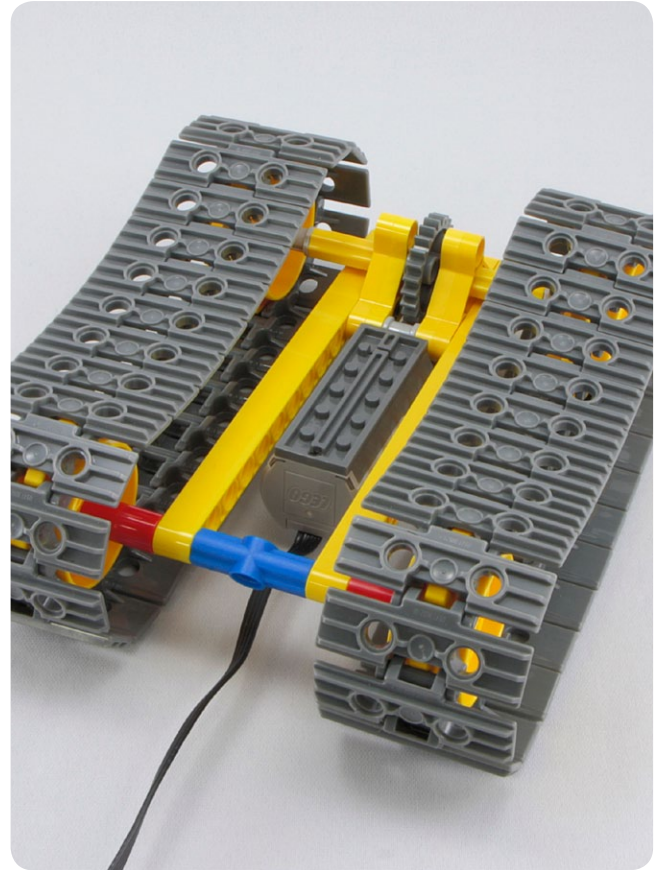
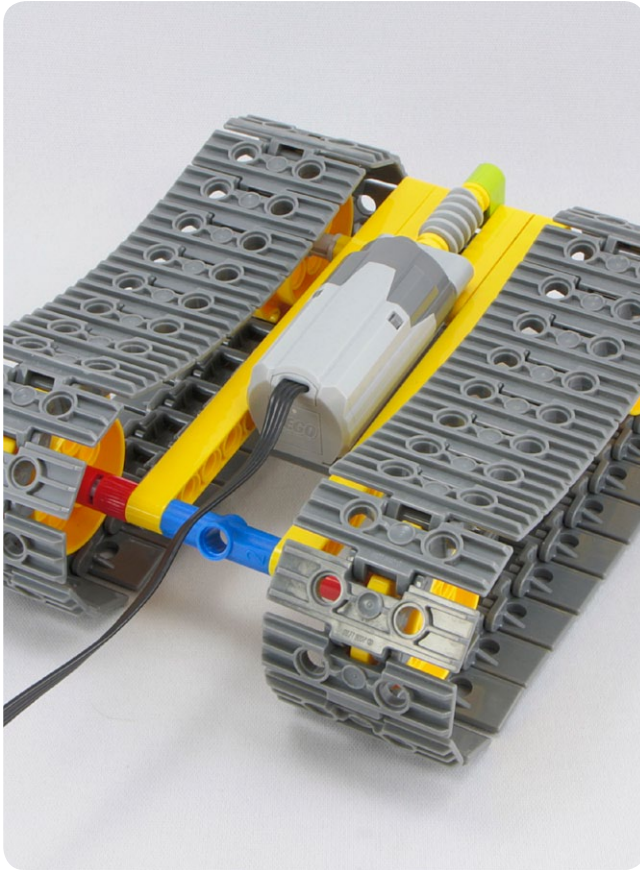
Crawlers

#57

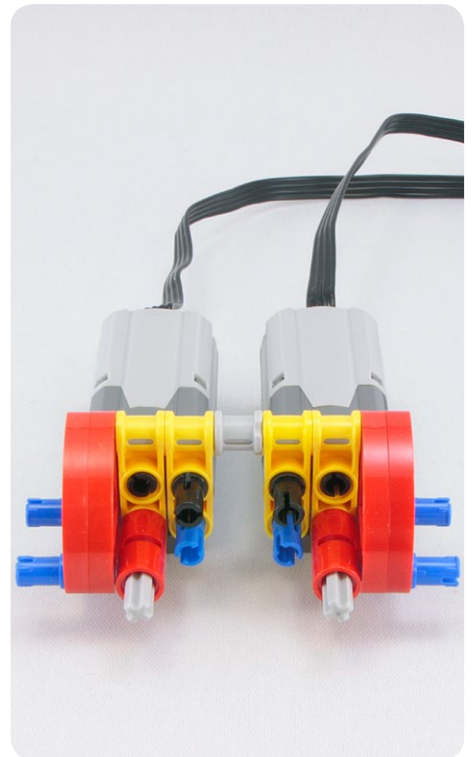
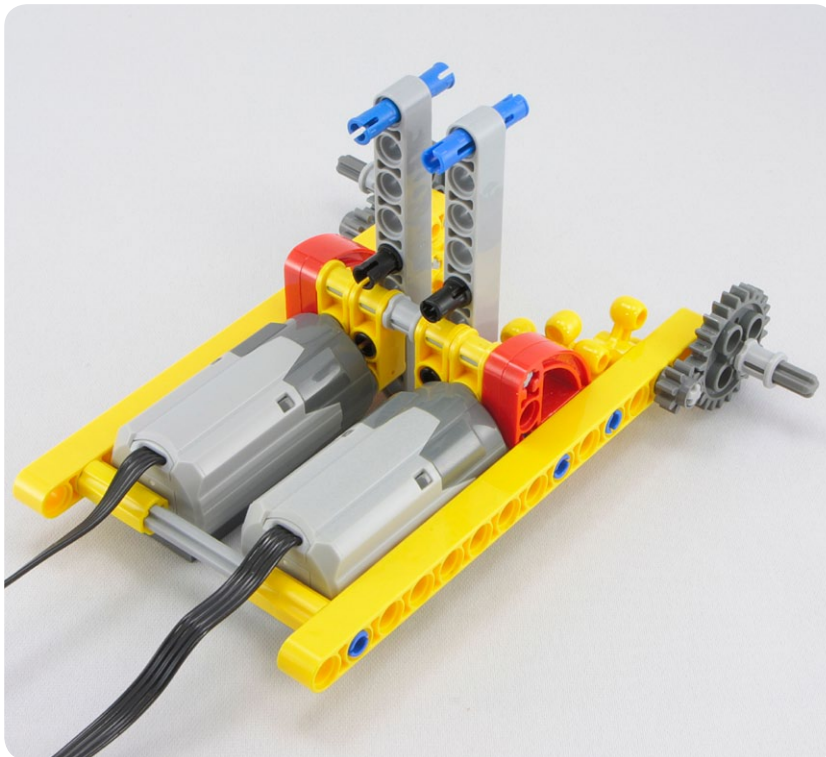
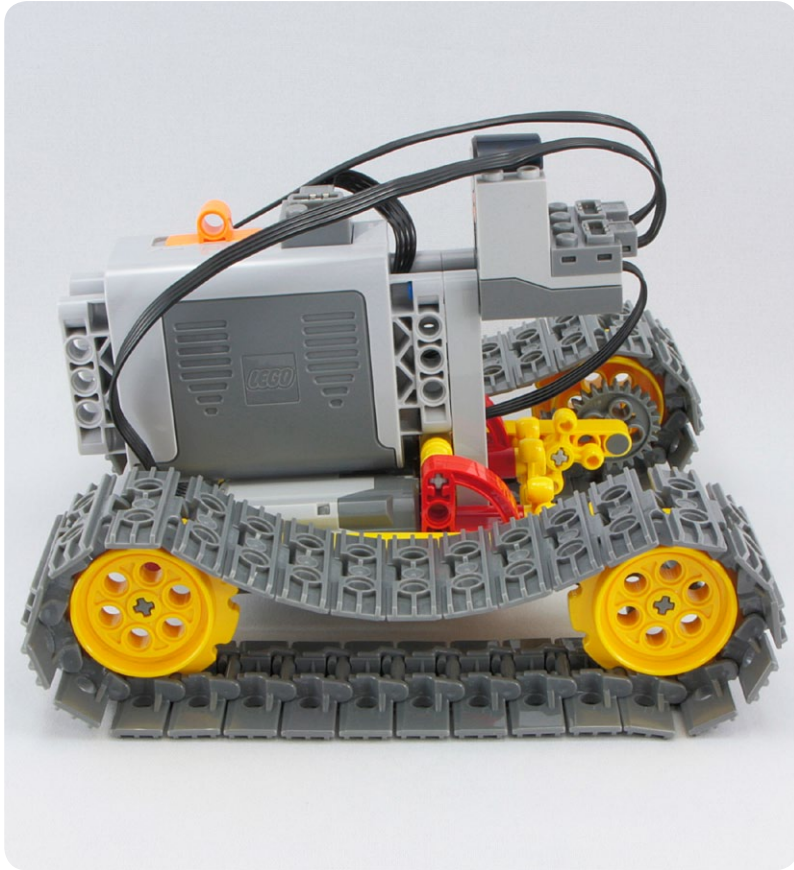




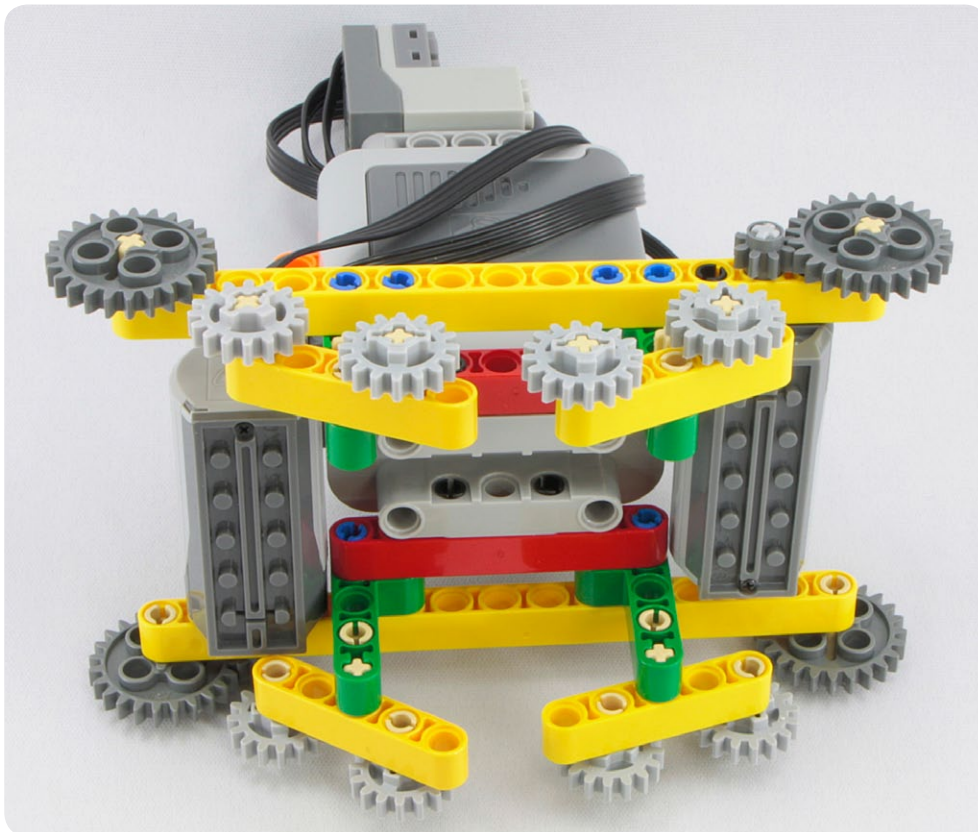
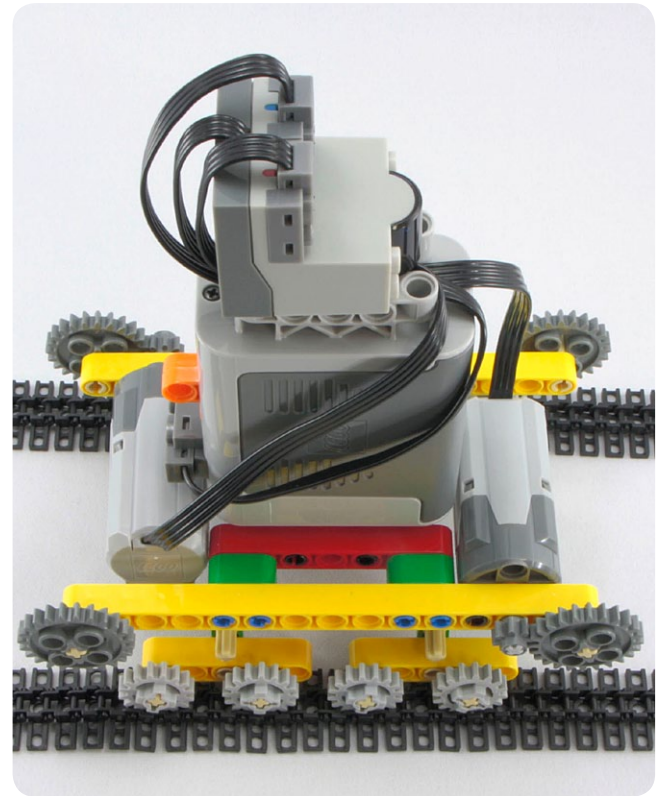
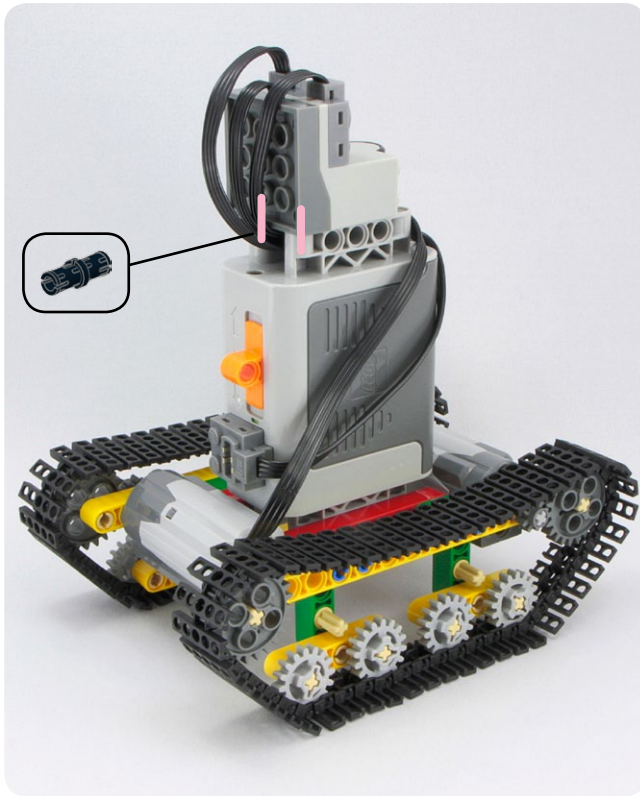
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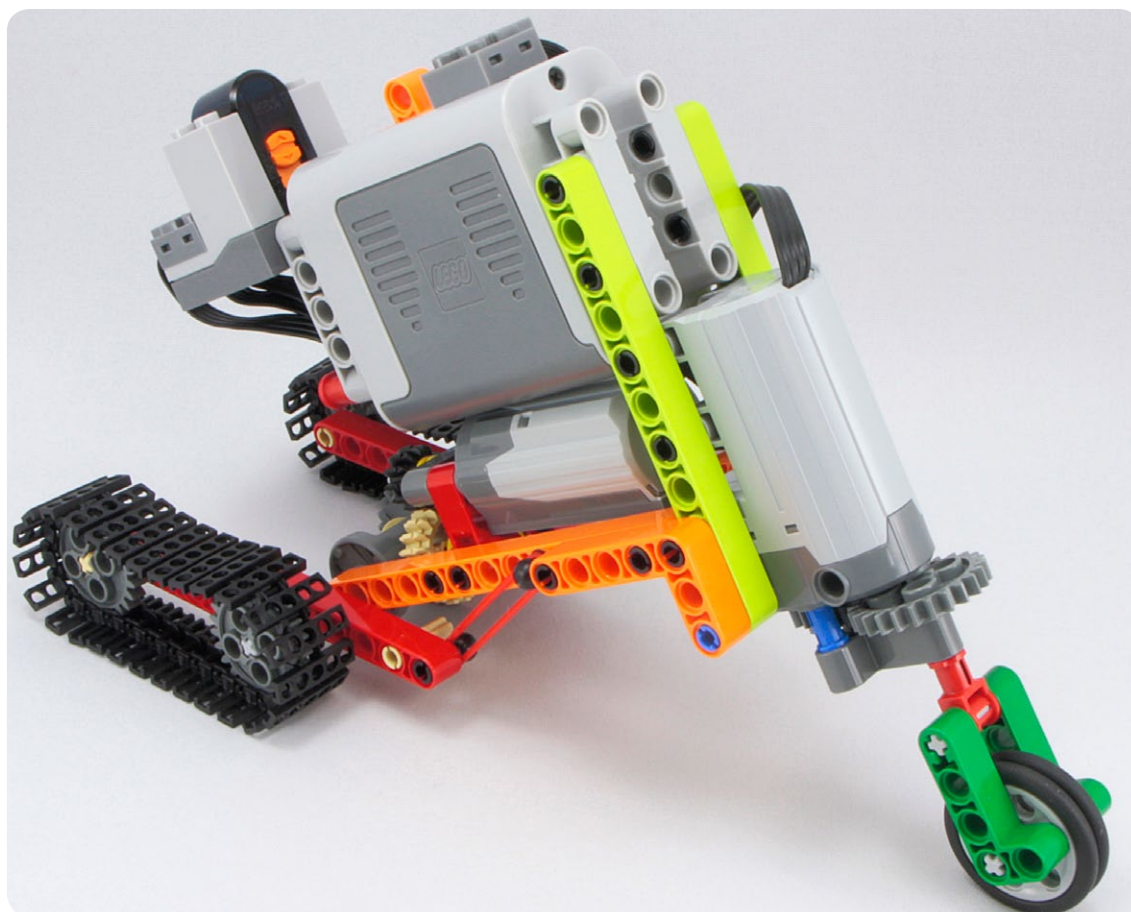


[illegible]



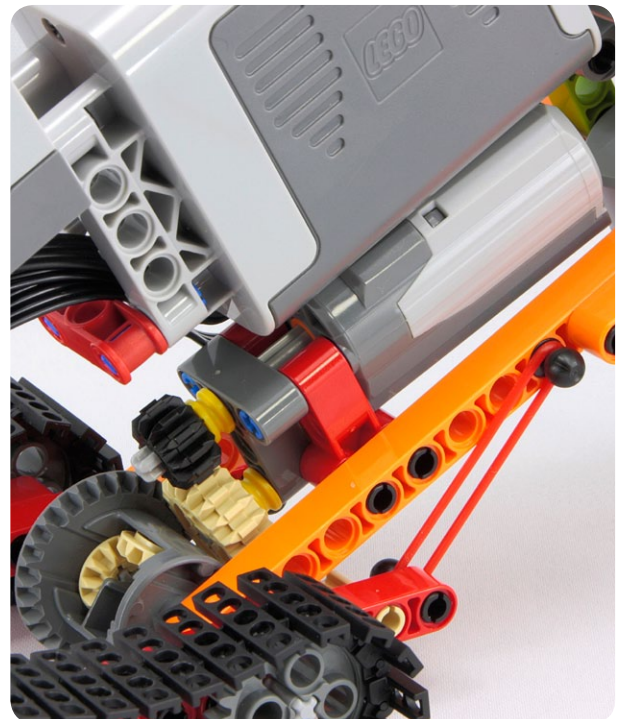
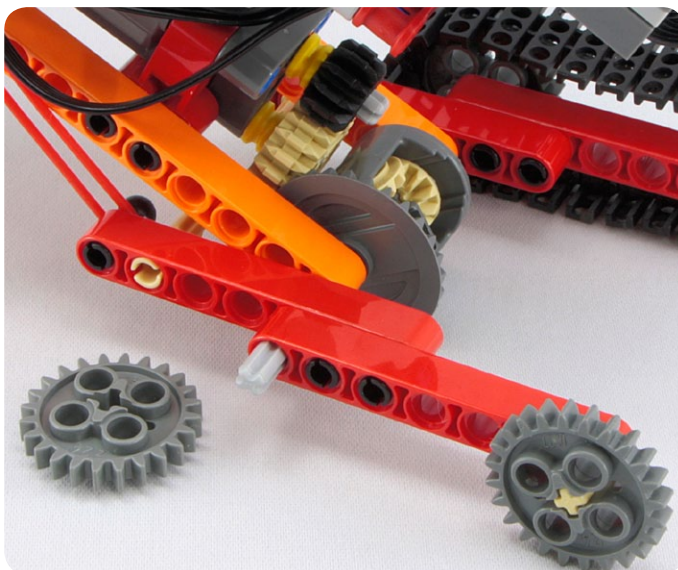
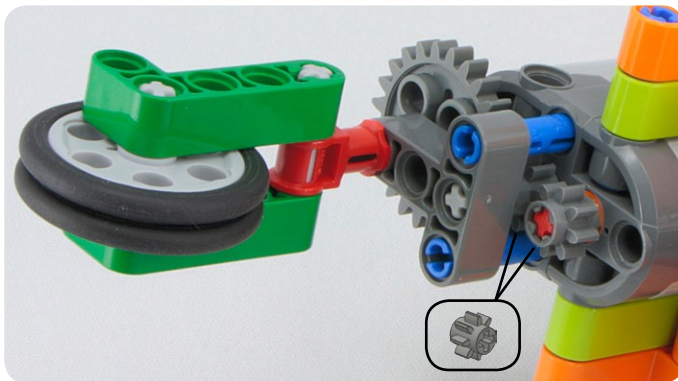
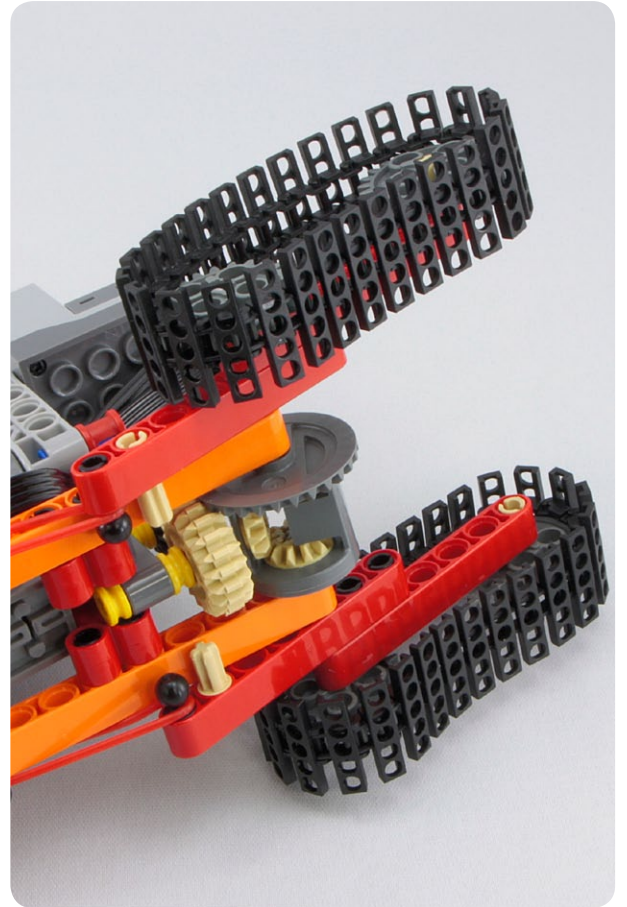


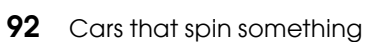


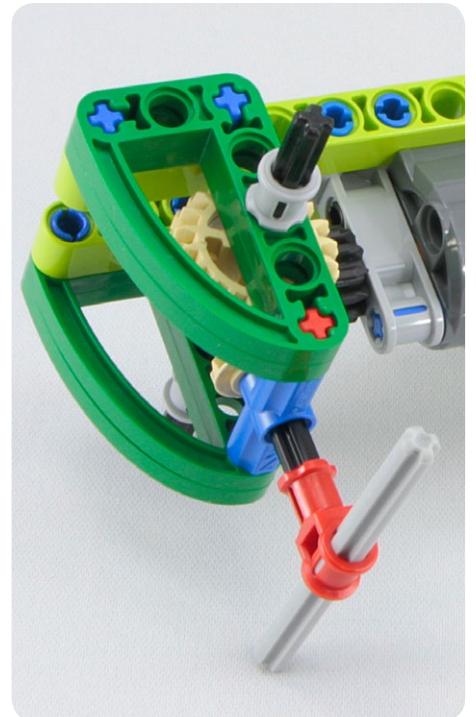
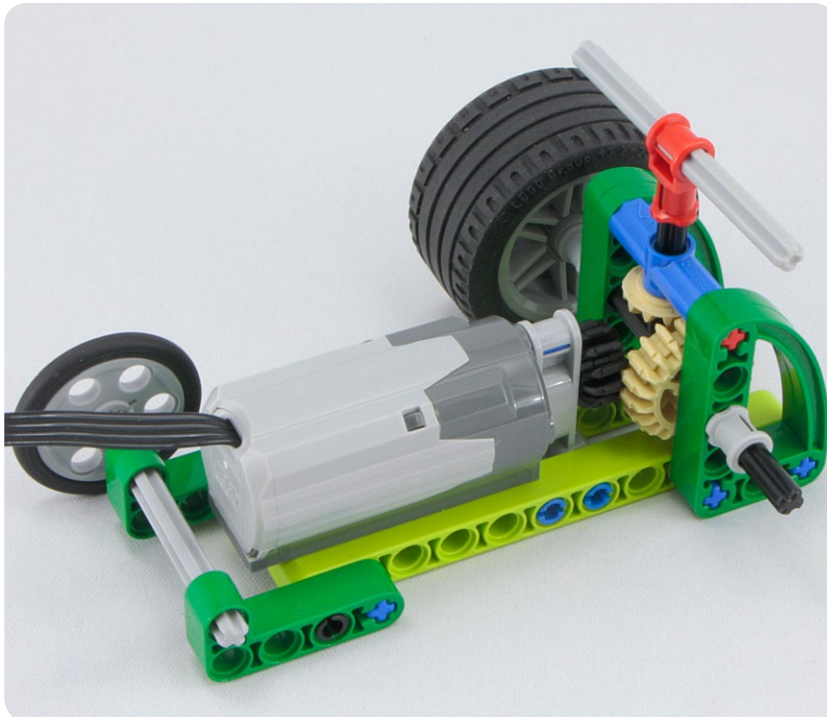
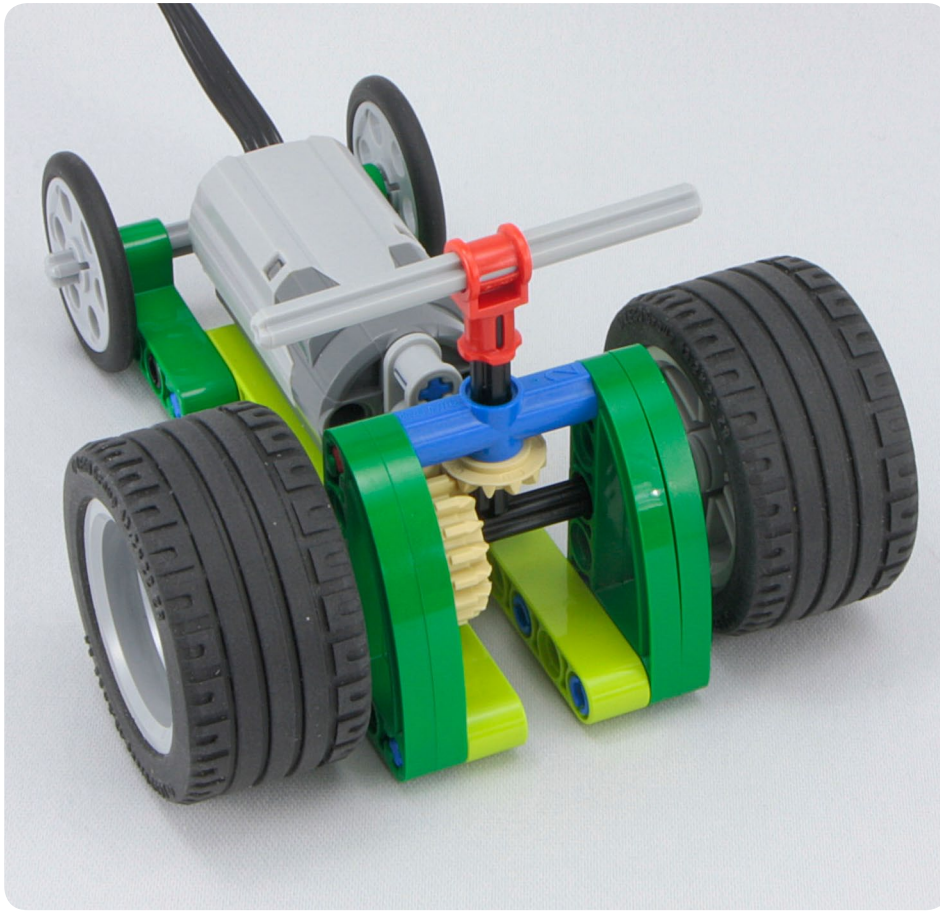
[illegible] x4 x3 x6 x2

x4

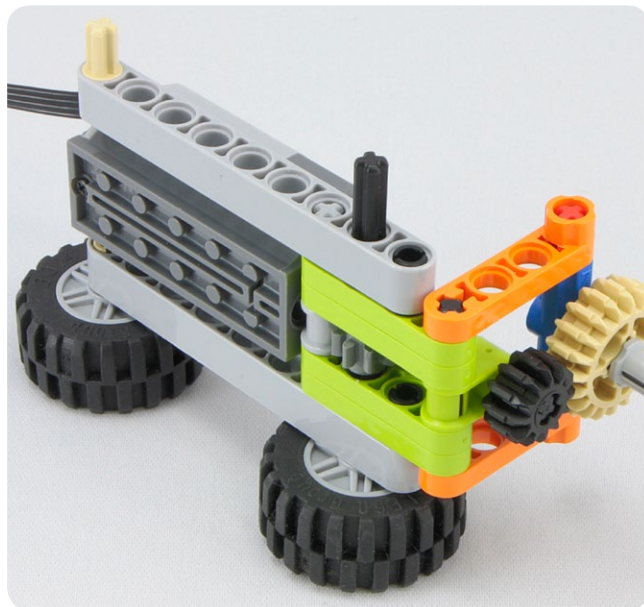
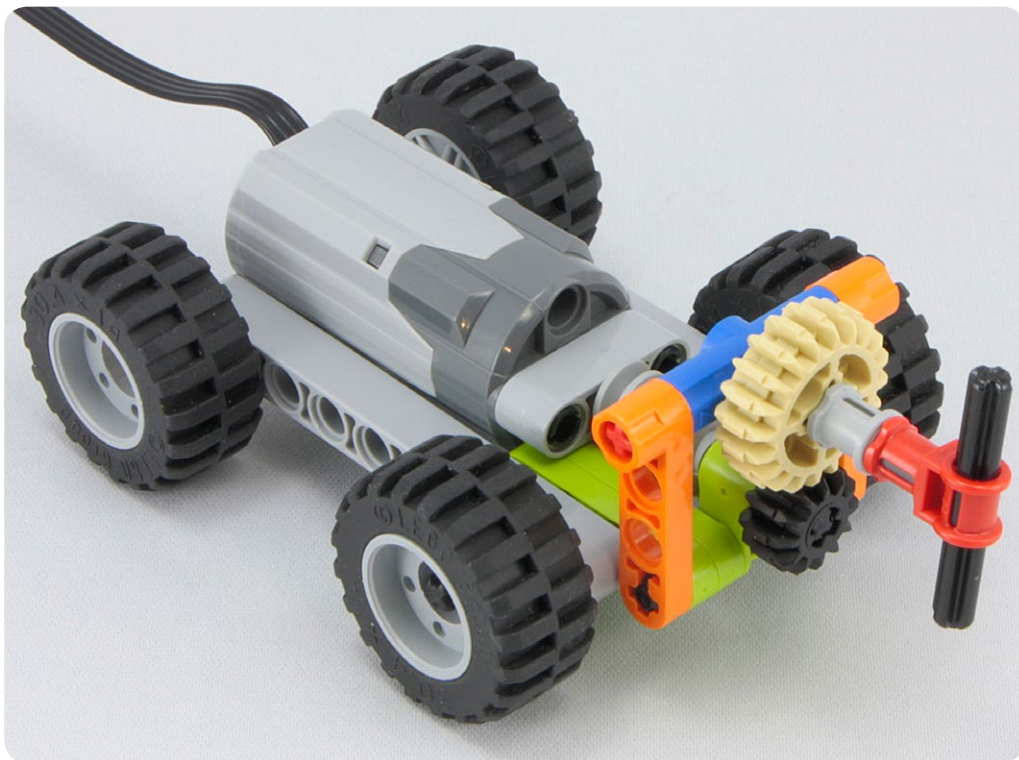
 x24



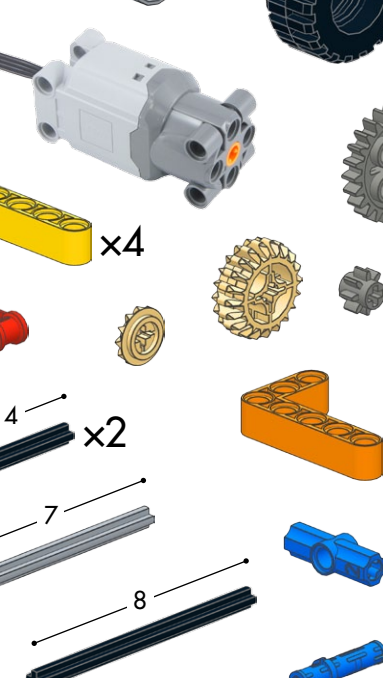
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#63

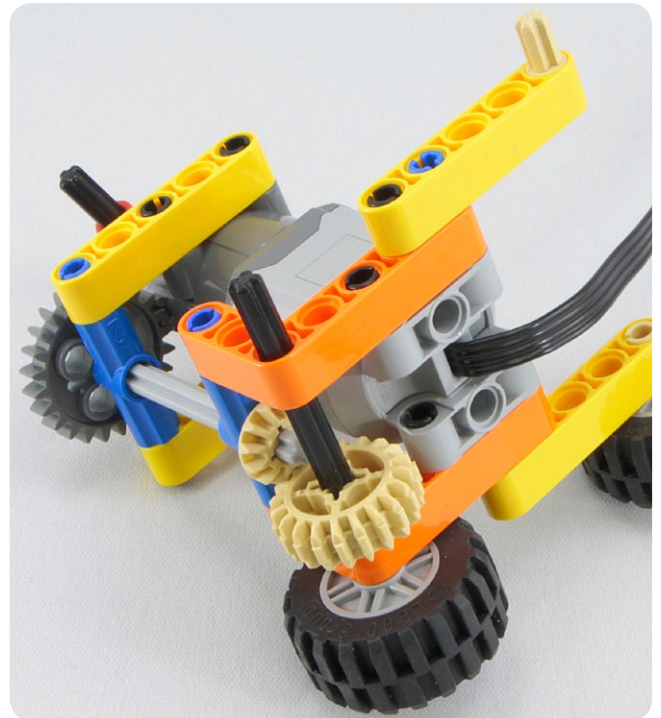
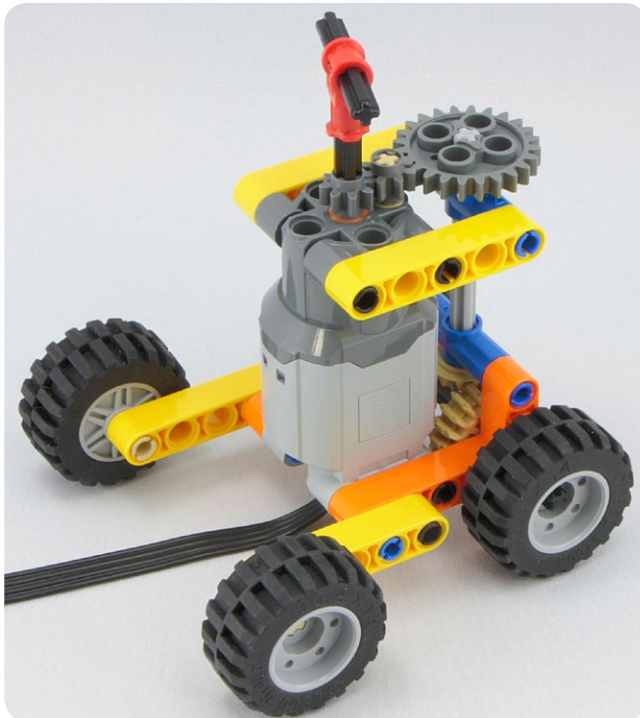


#64

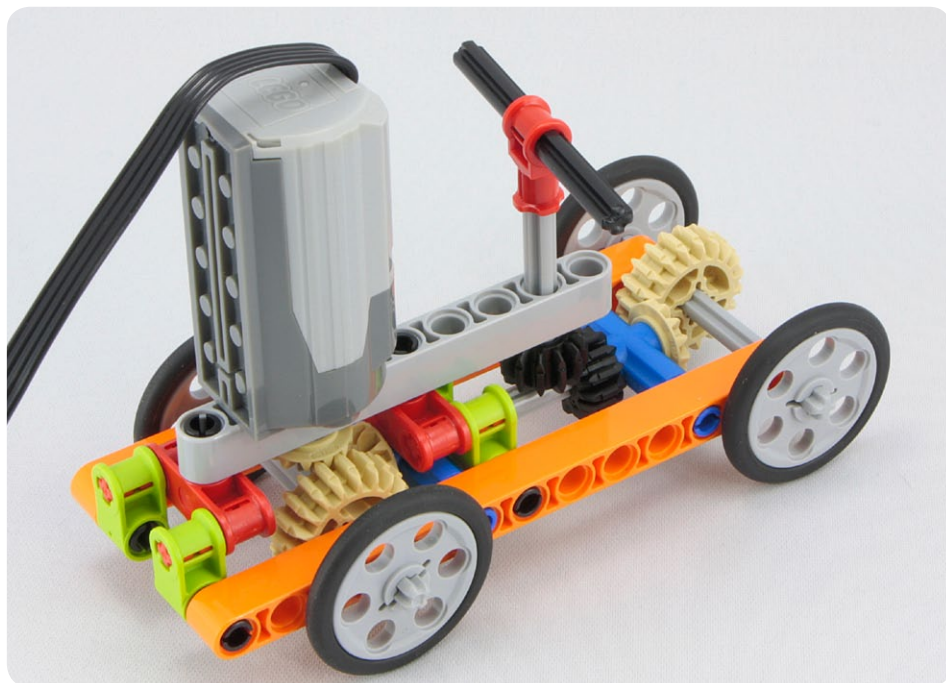
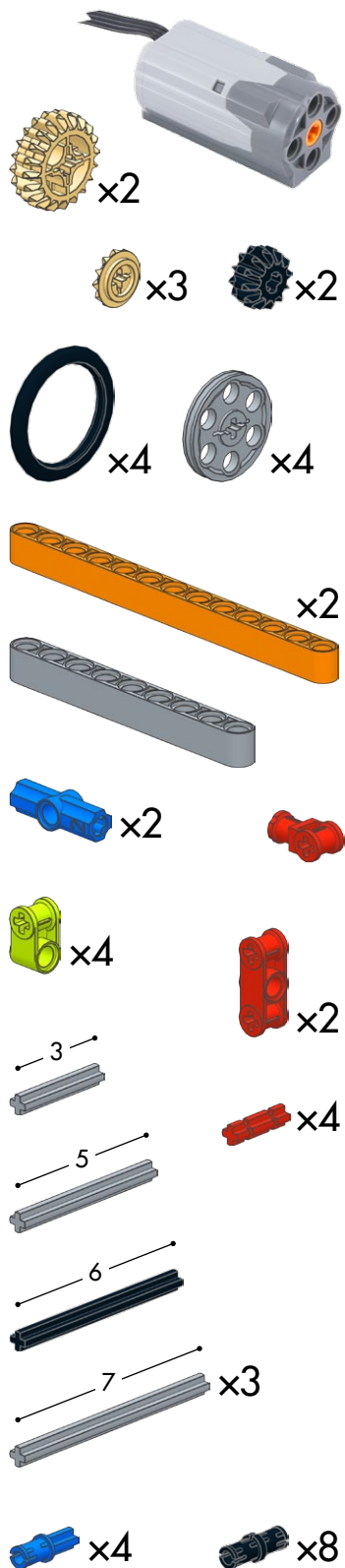


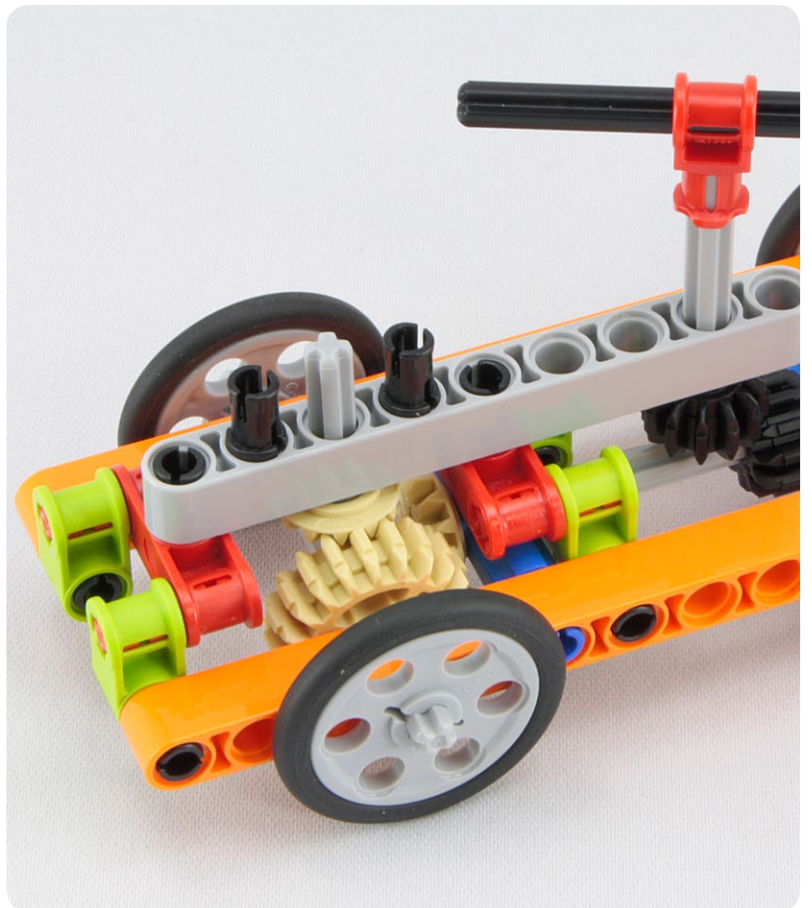
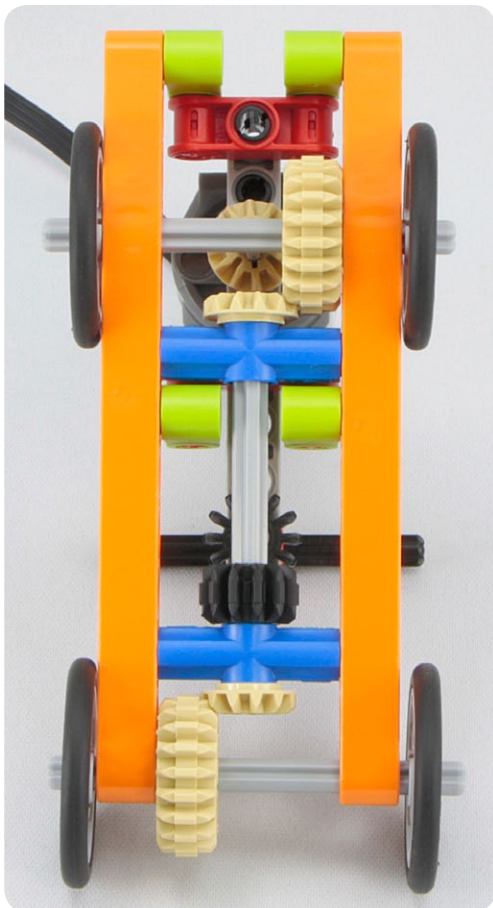
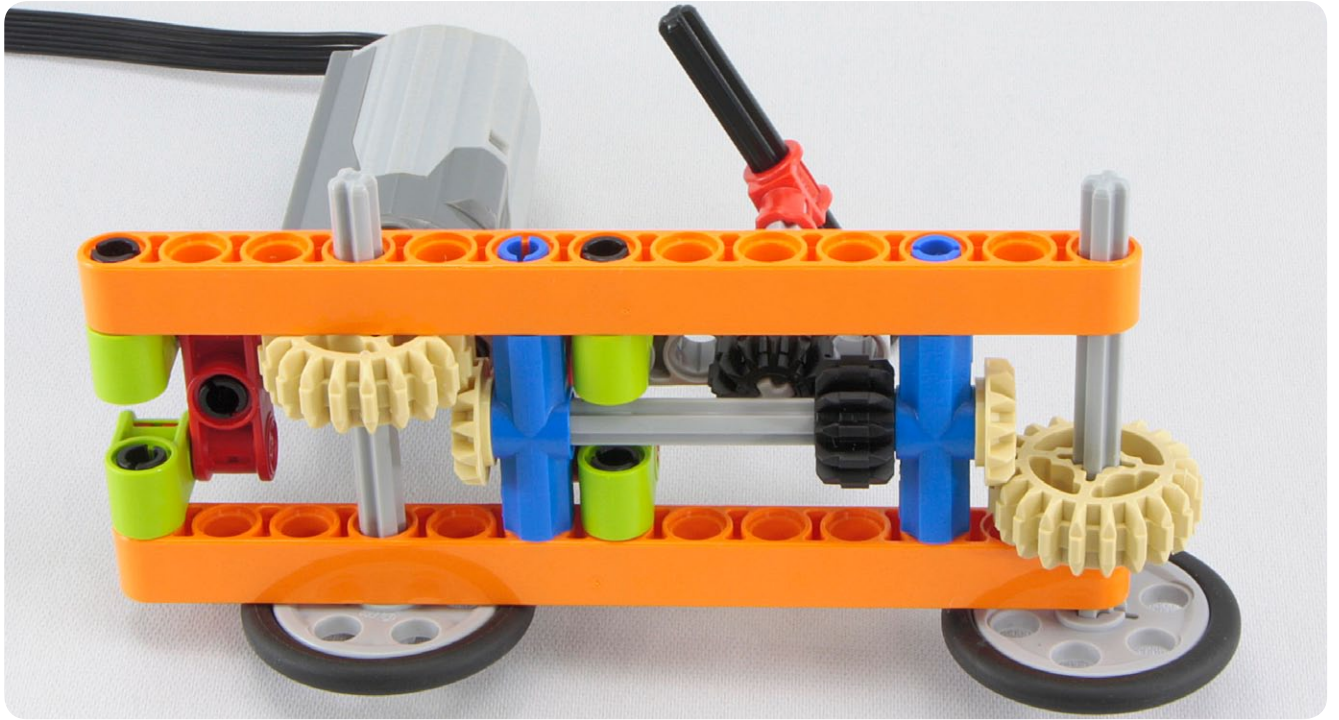
Parts list for step 64:

- 1 grey axle connector (x4)
- 1 black rubber tire (x4)
- 1 grey motor (x1)
- 1 grey 24-tooth gear (x1)
- 1 yellow 1x4 Technic beam (x4)
- 1 grey 24-tooth gear (x1)
- 1 red 2-way connector (x1)
- 1 tan 12-tooth gear (x1)
- 1 tan 24-tooth gear (x1)
- 1 grey 2-way connector (x2)
- 1 black 4-hole Technic beam (x2)
- 1 orange 1x4 Technic beam (x2)
- 1 grey 7-hole Technic beam (x1)
- 1 black 8-hole Technic beam (x1)
- 1 blue 2-way connector (x2)
- 1 blue 2-way connector (x2)
- 1 tan 1/2 pin (x3)
- 1 blue 1/2 pin (x4)
- 1 black 1/2 pin (x8)

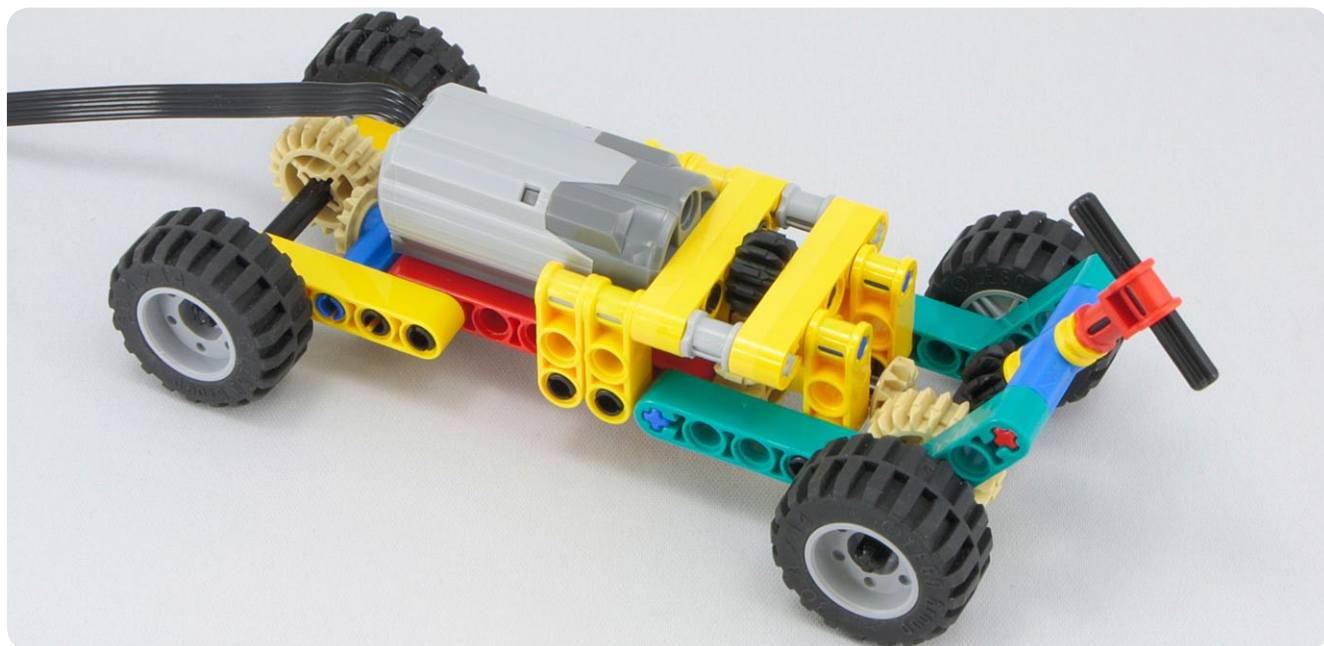
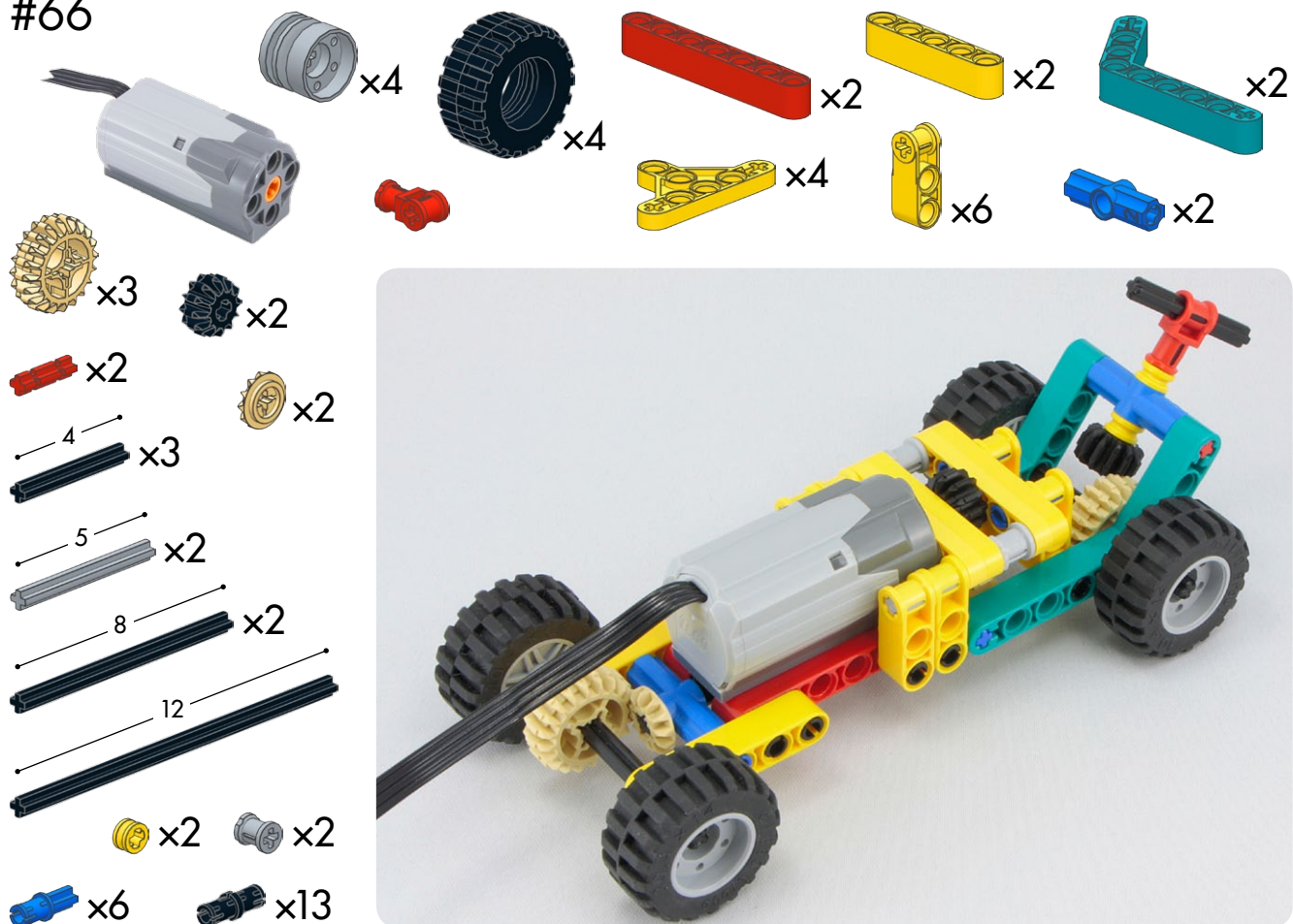


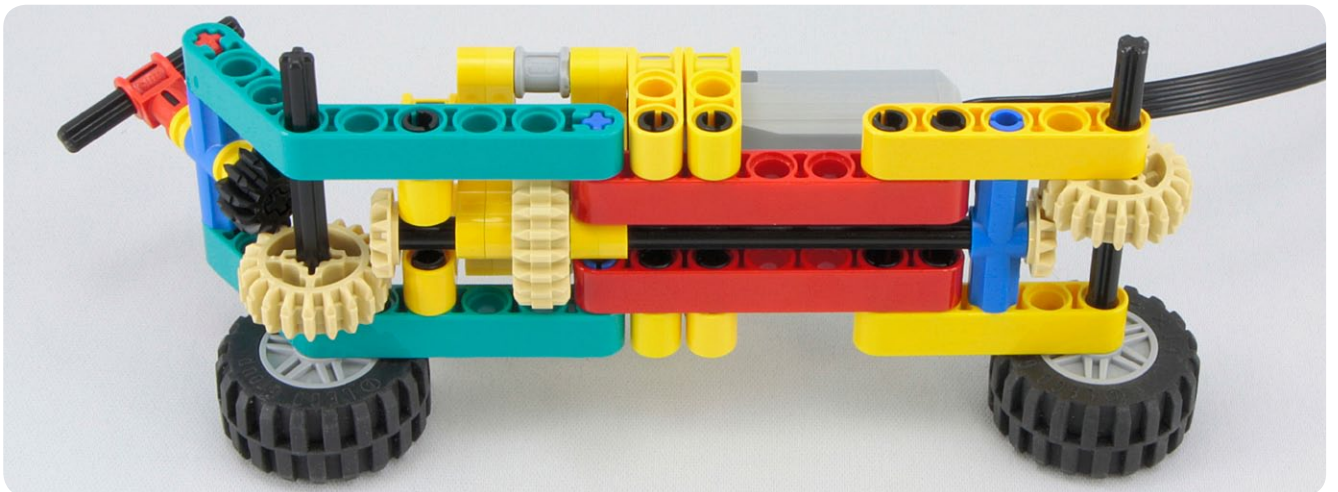
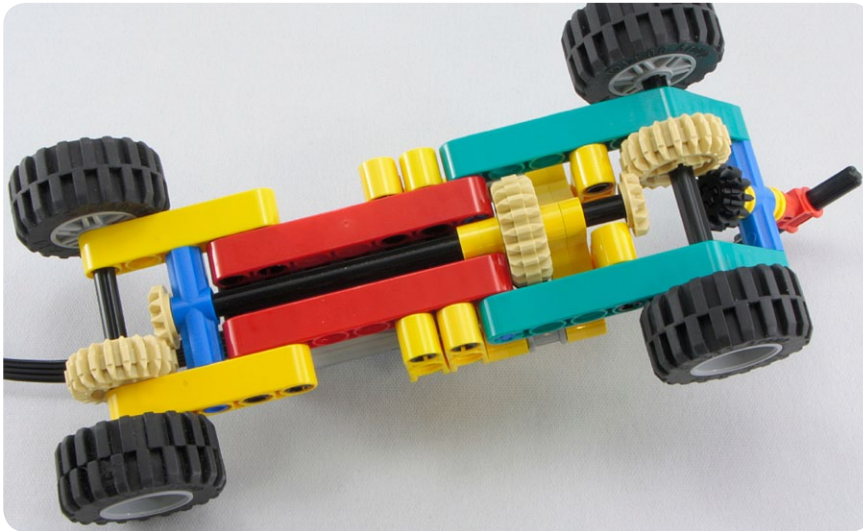
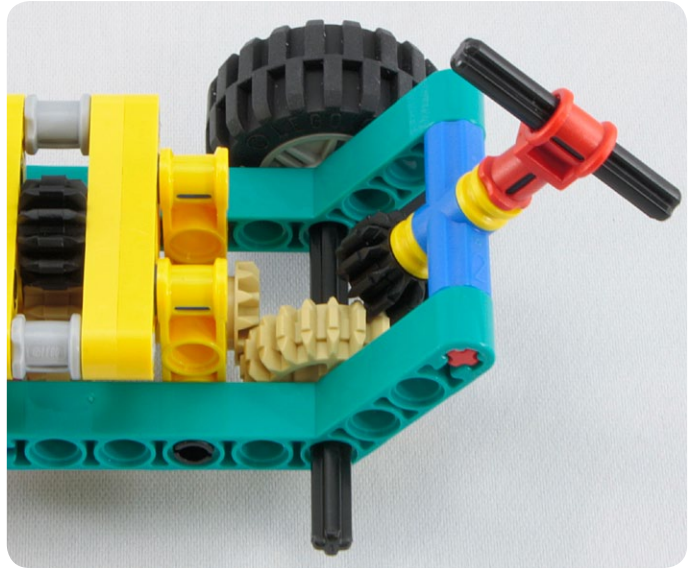
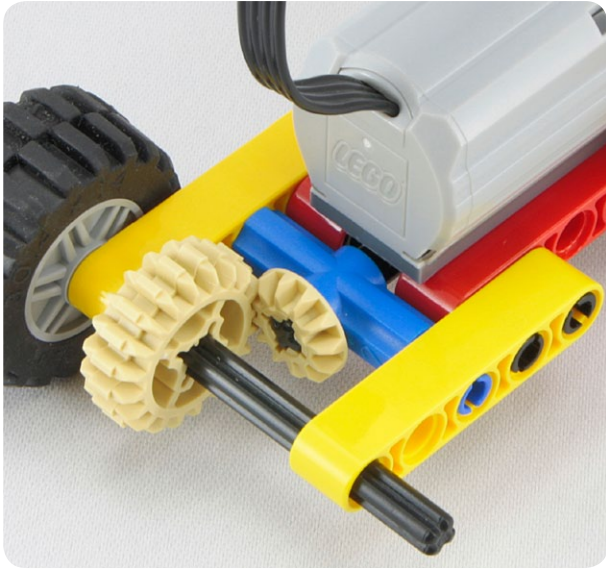
#65



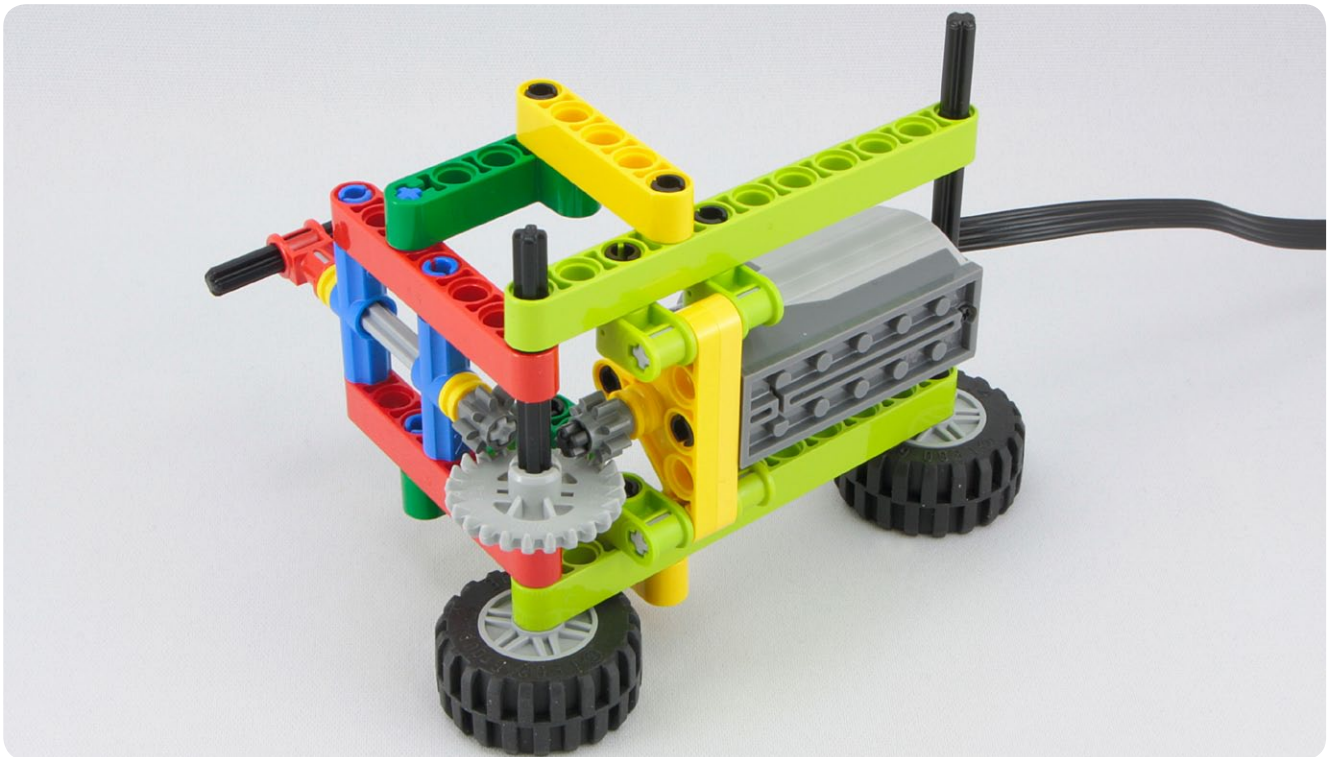
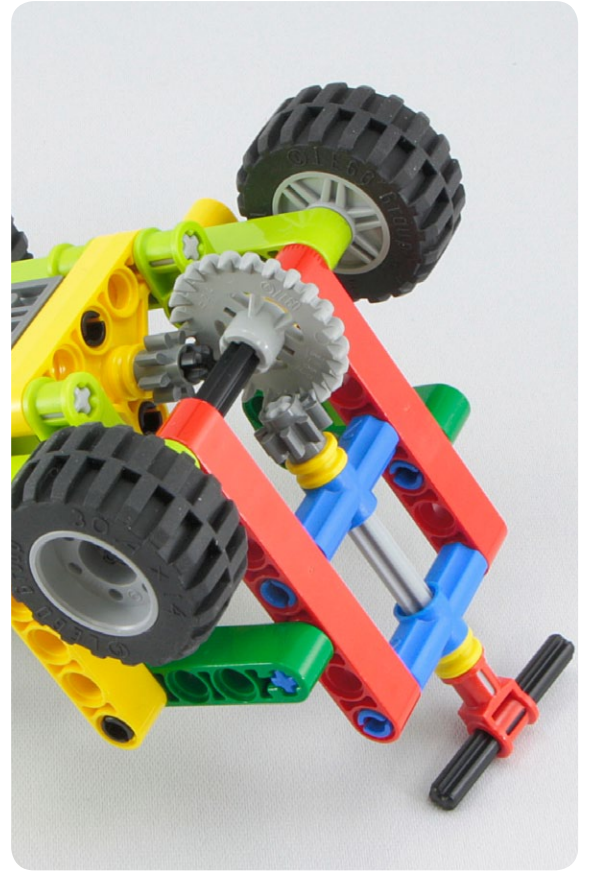
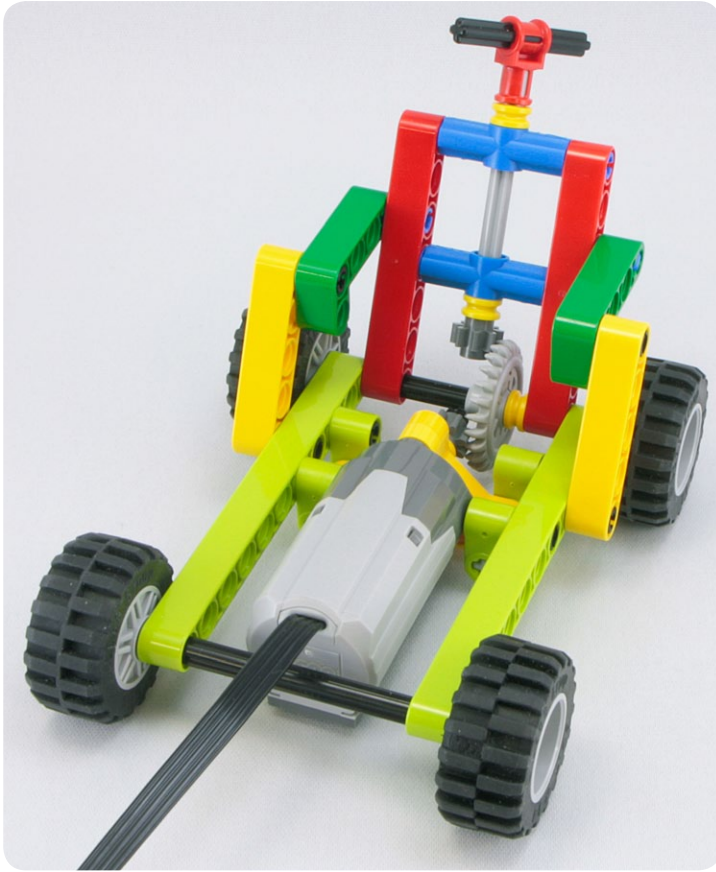


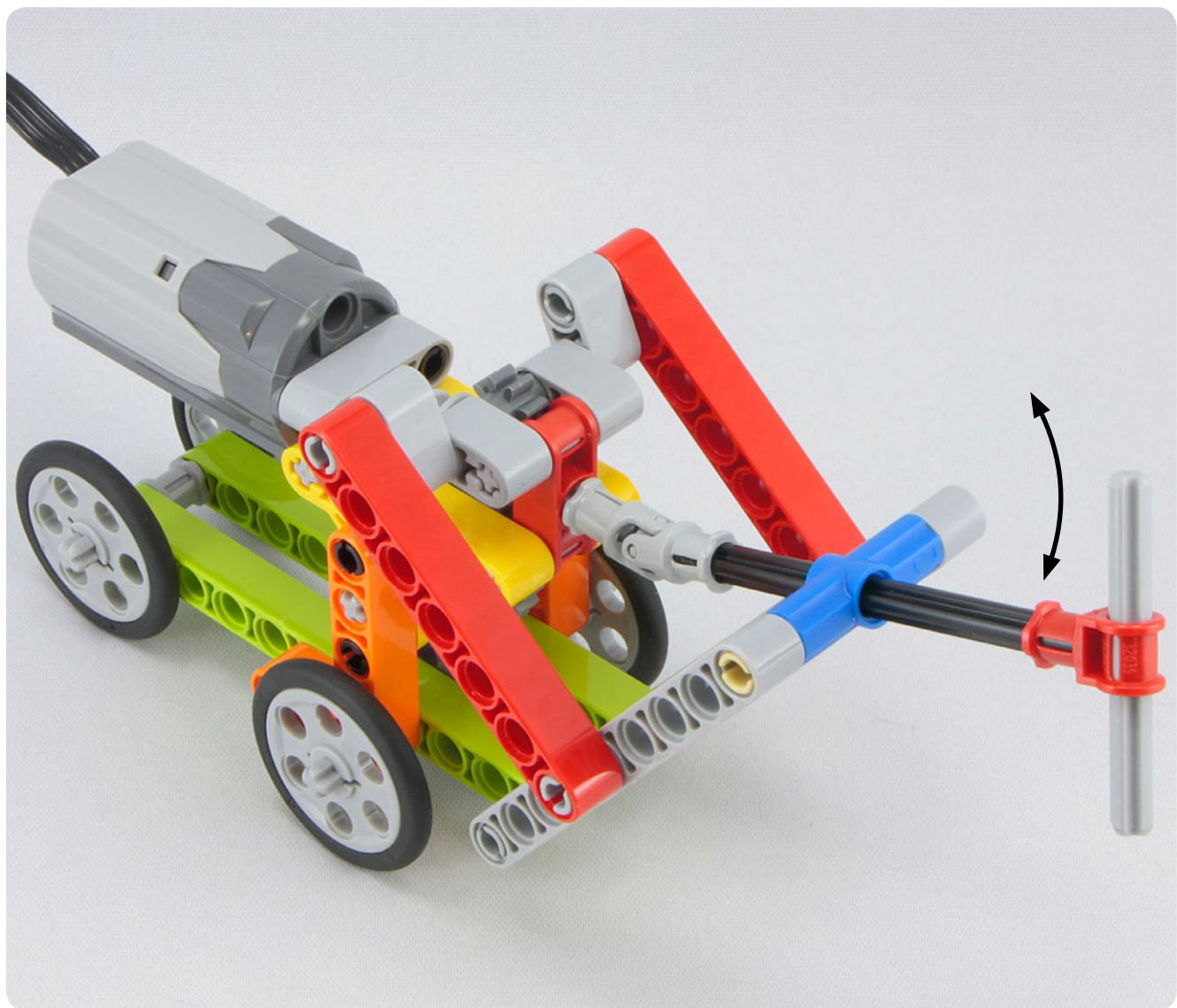
#66

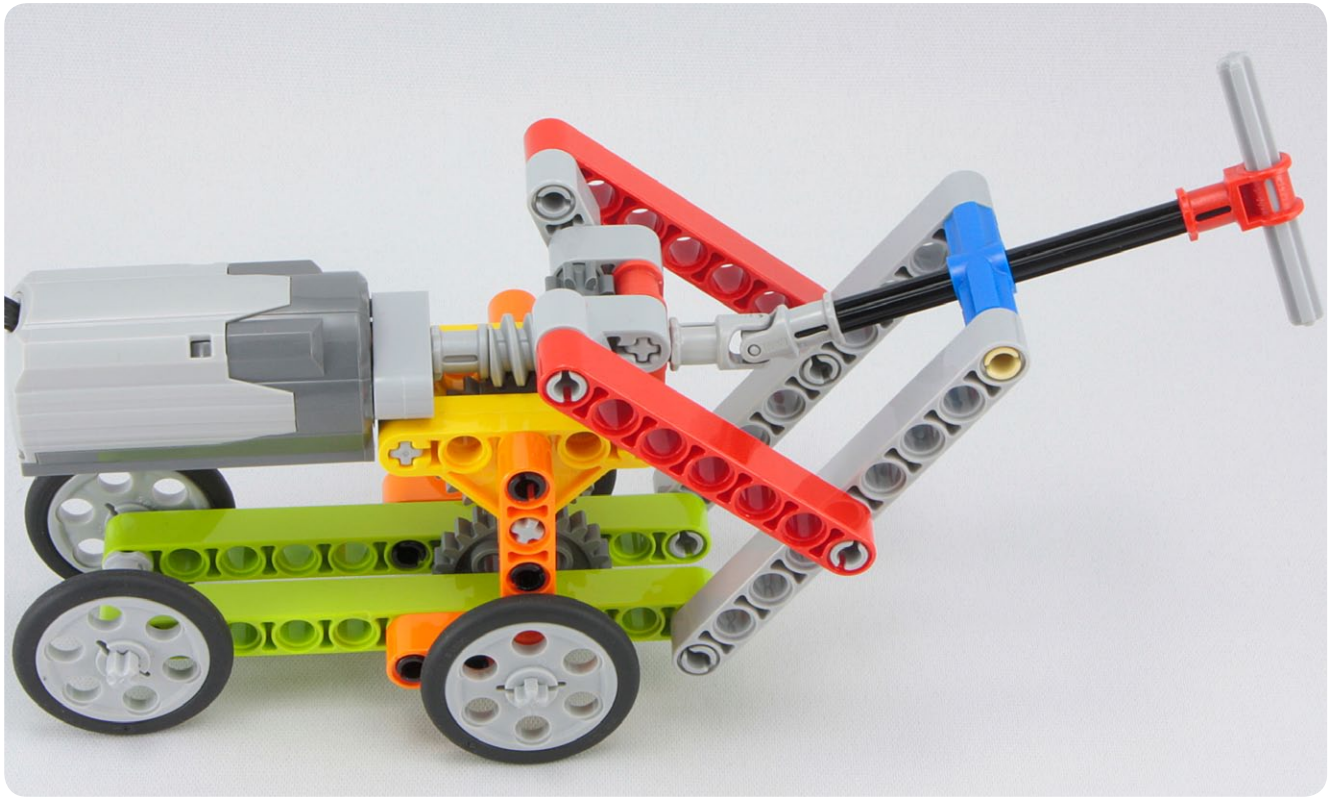


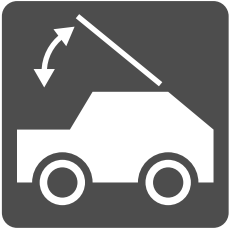


[illegible]



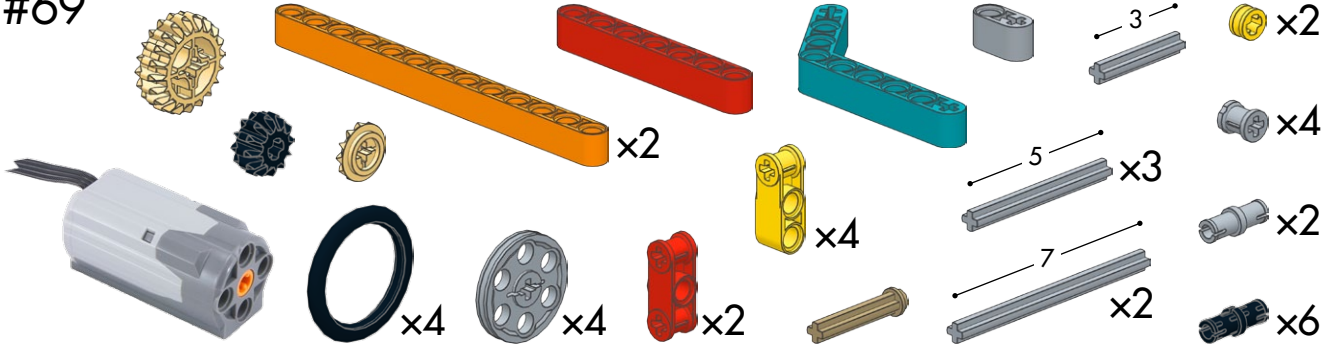
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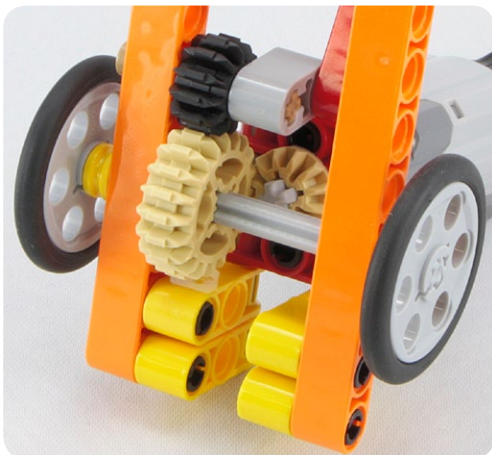
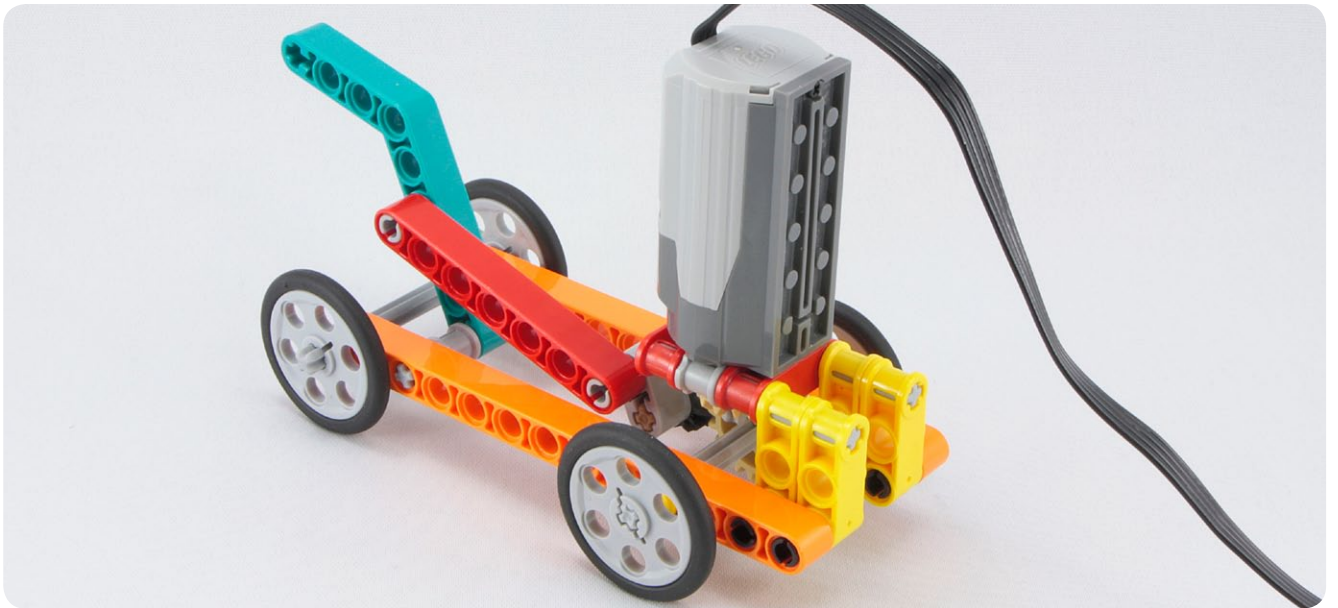


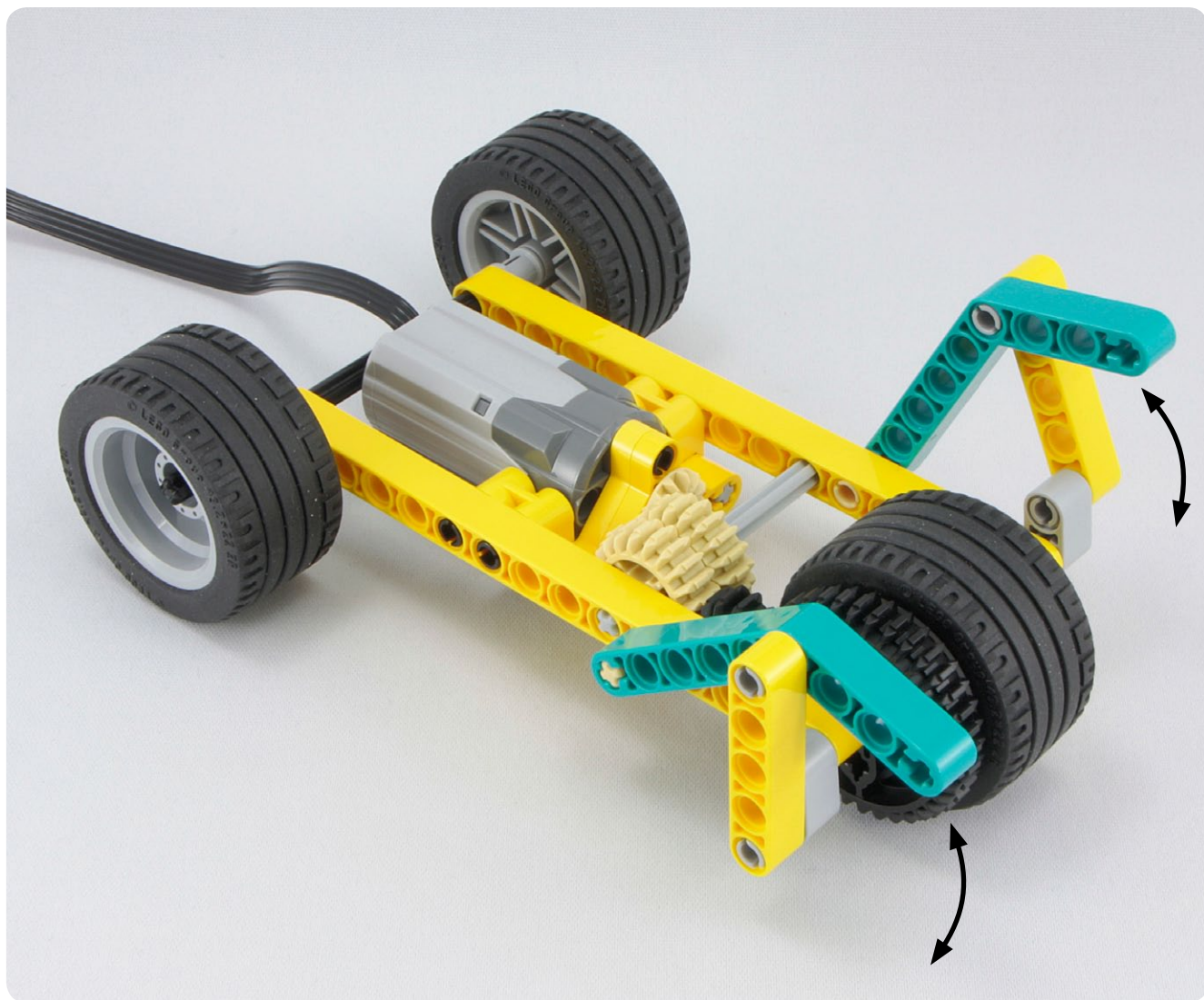


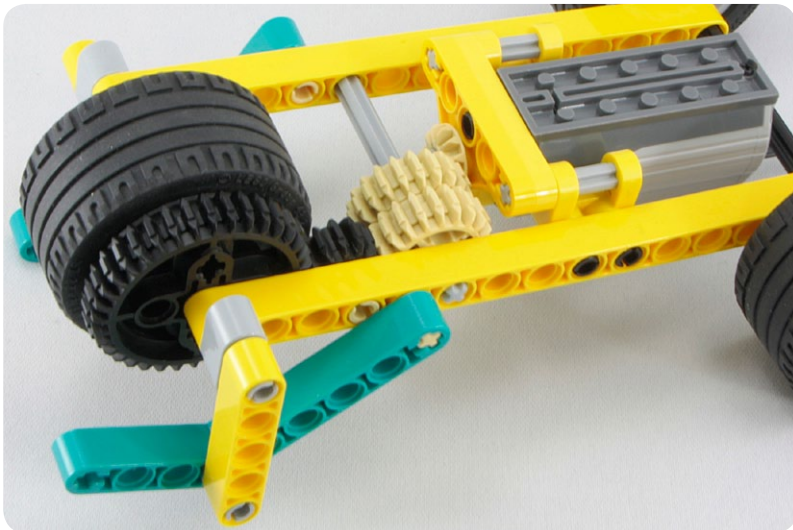
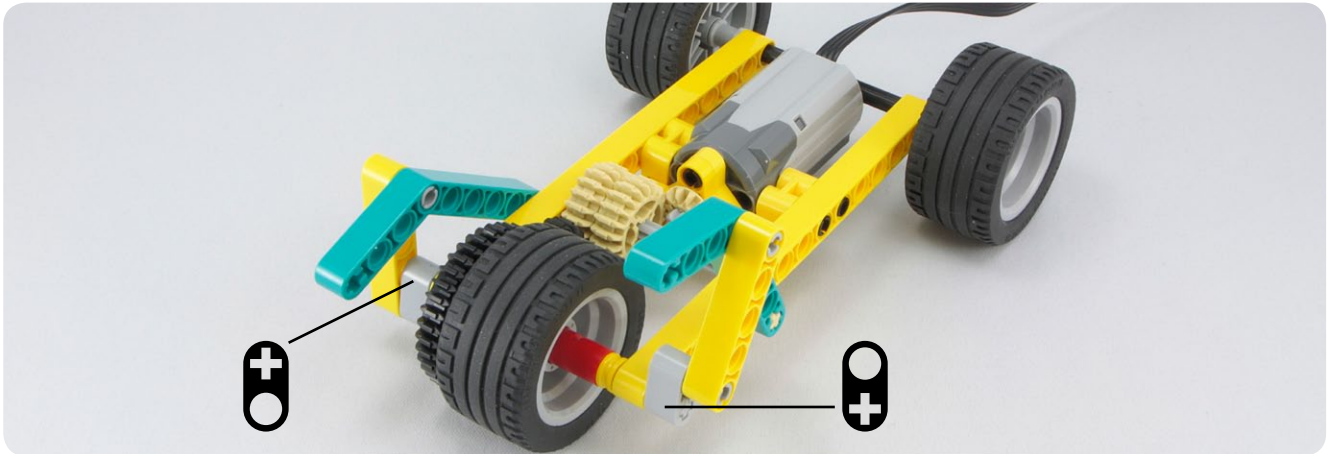
Cars that move something

#69

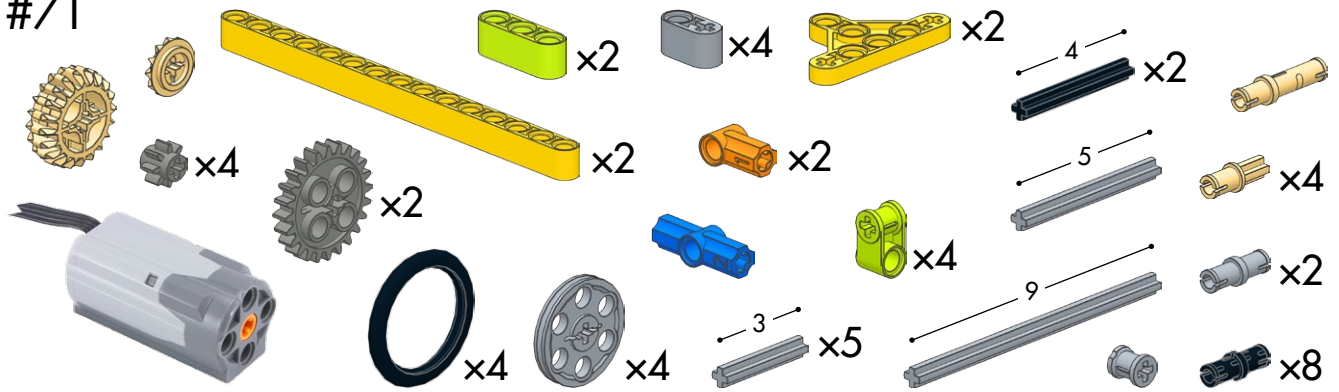


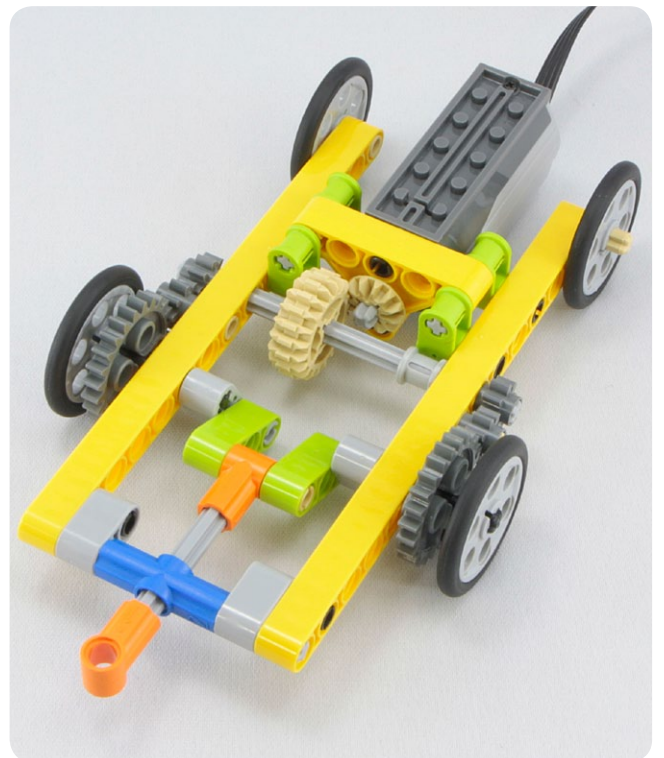
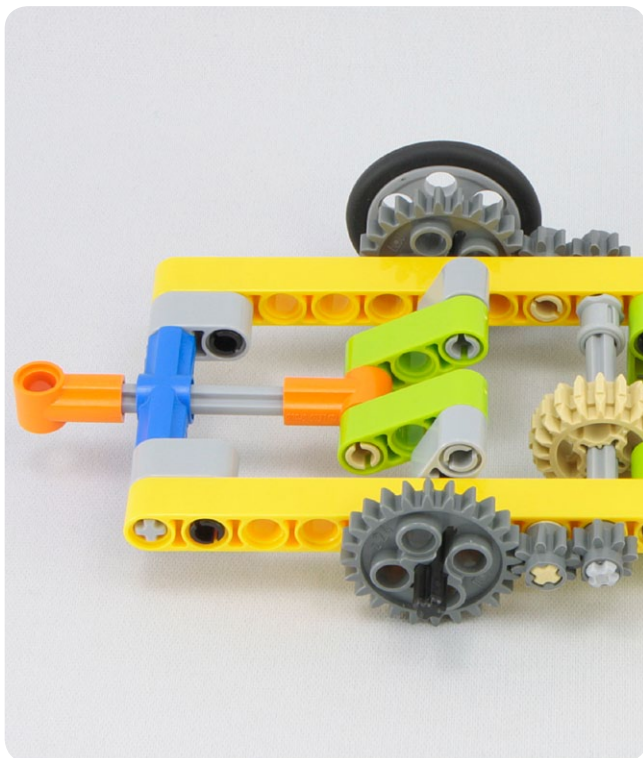


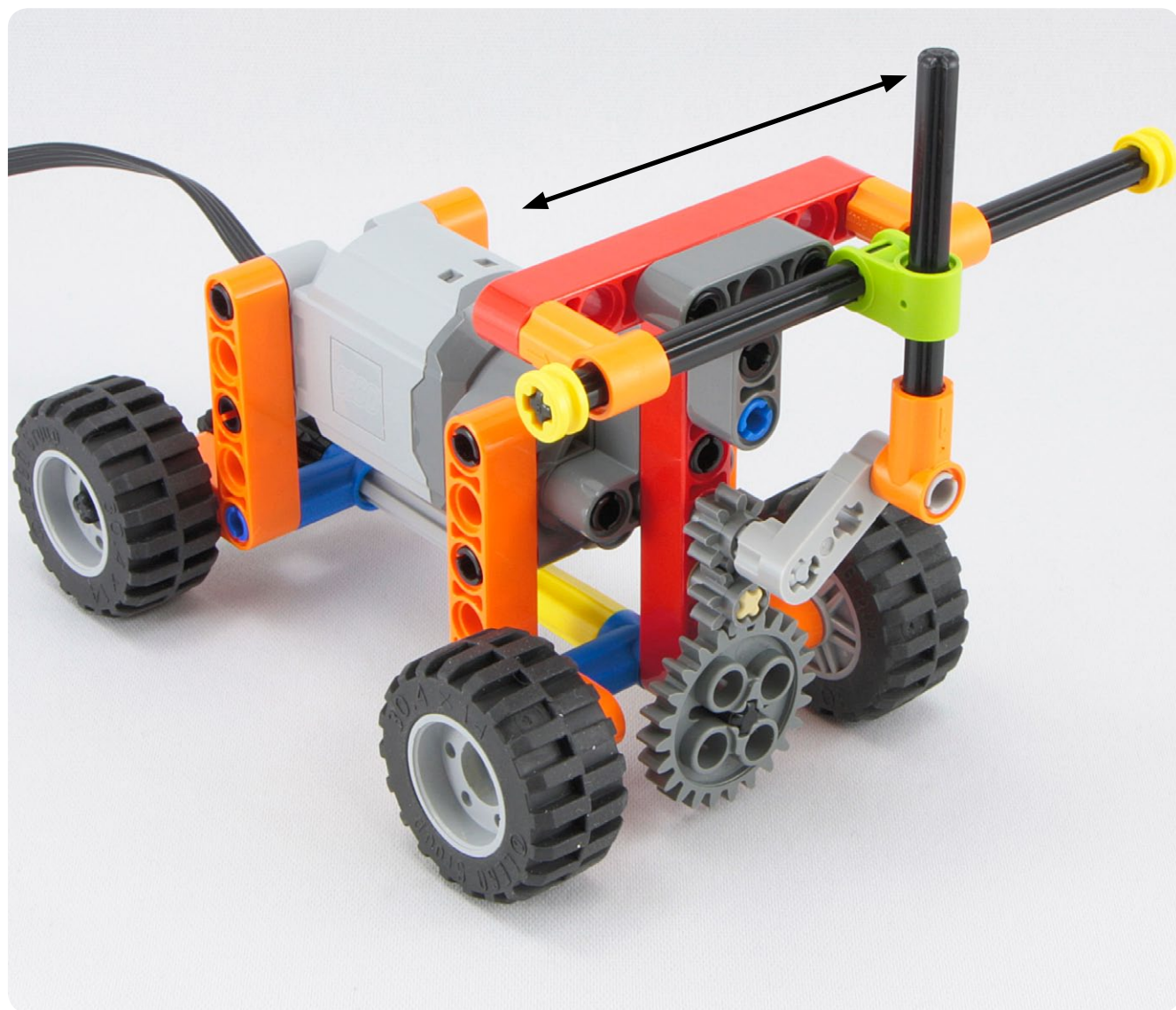
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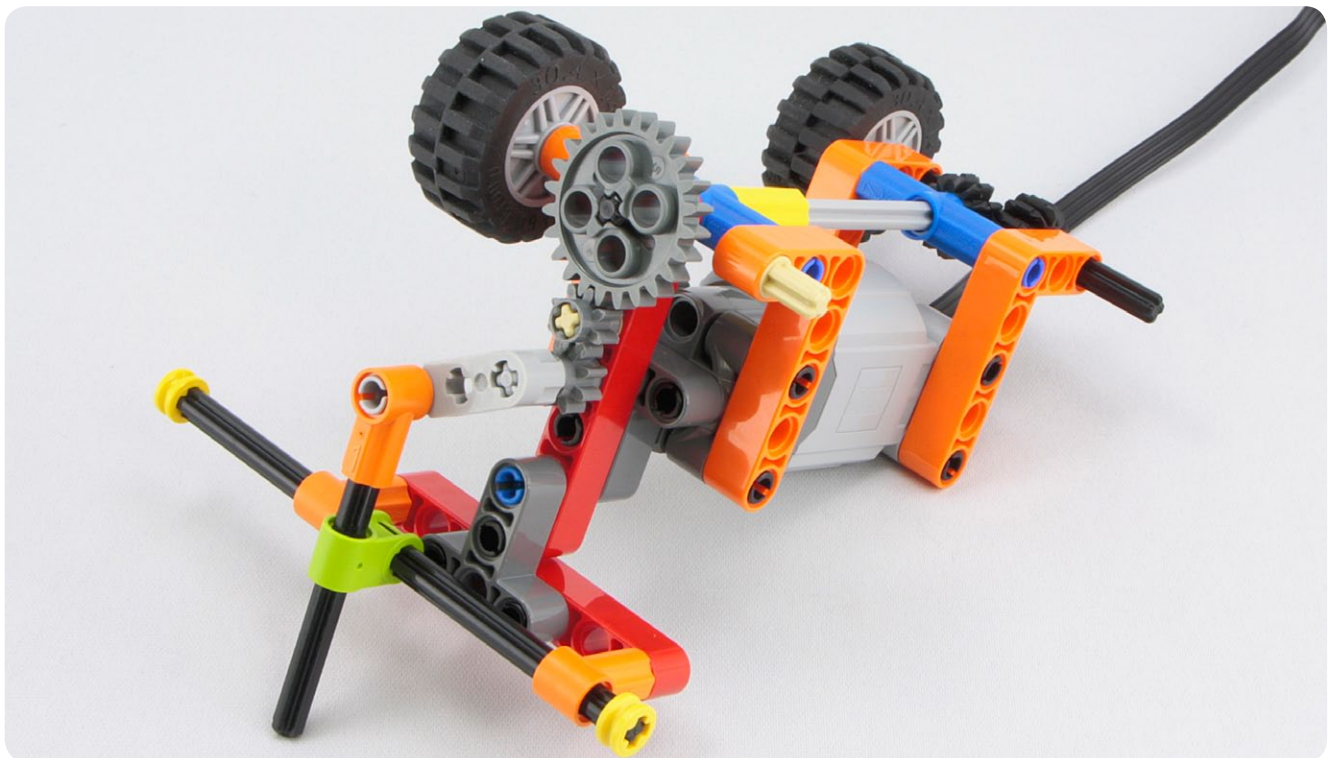
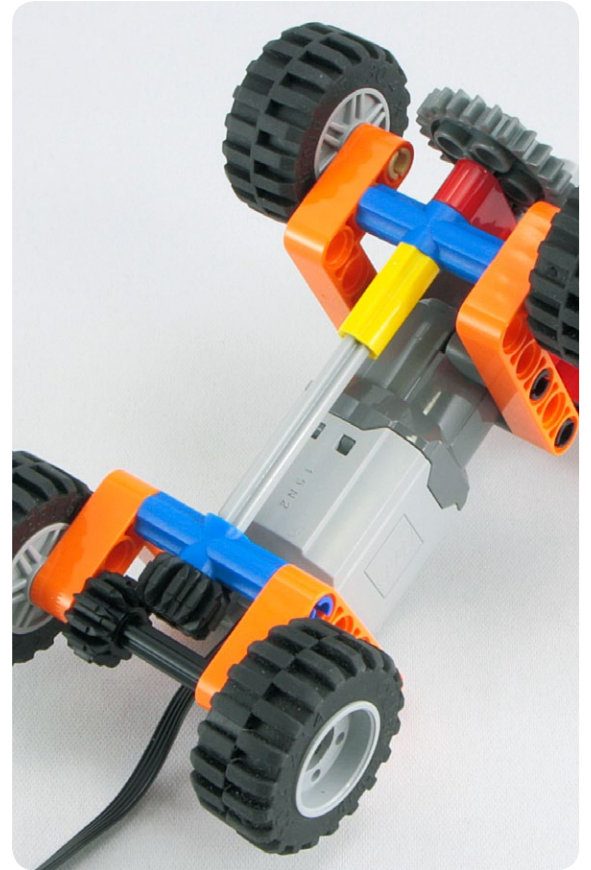


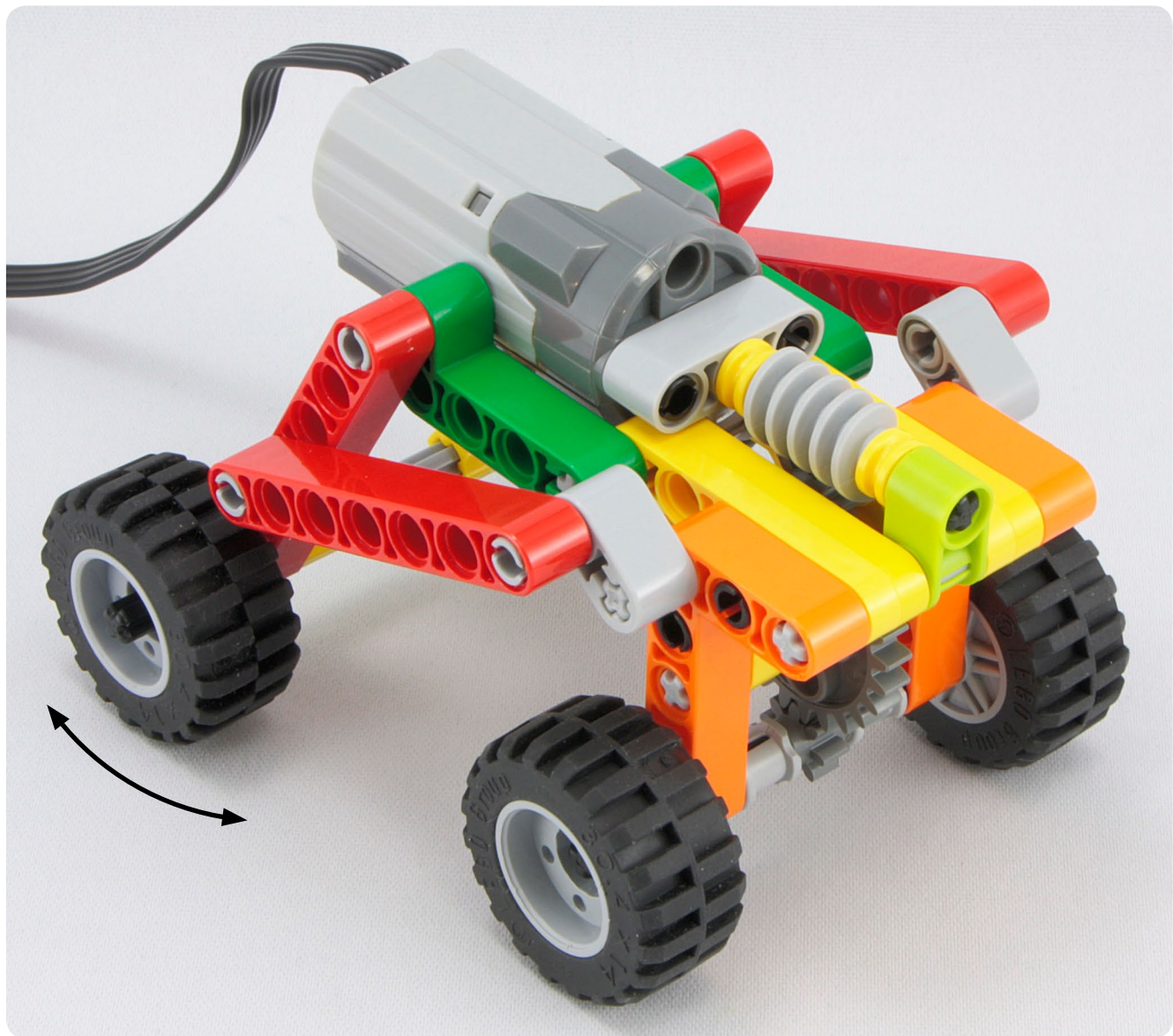
#71

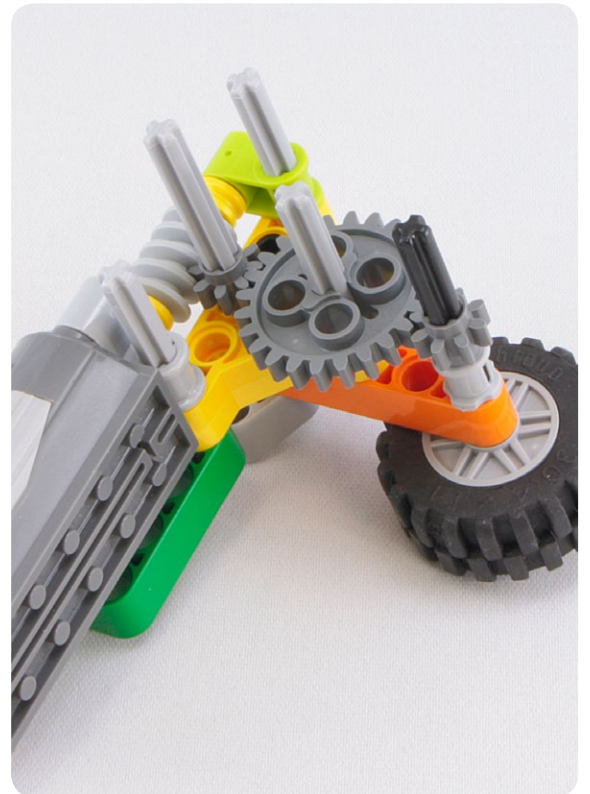




[illegible]

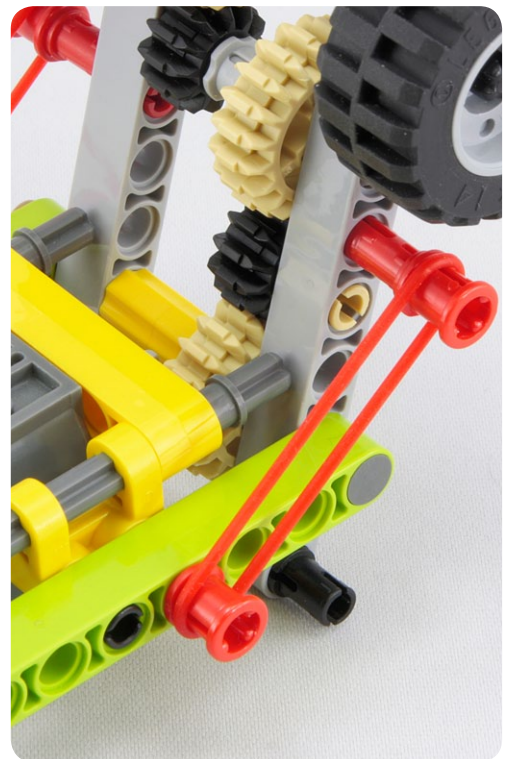
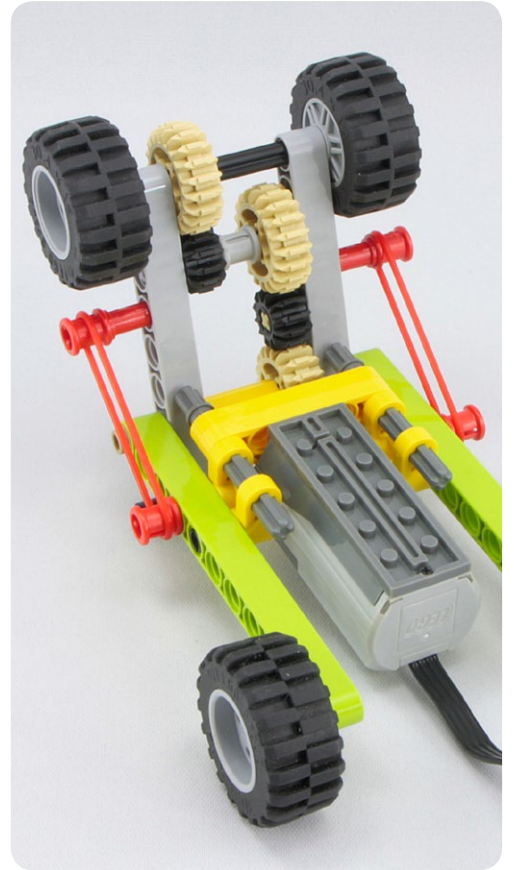


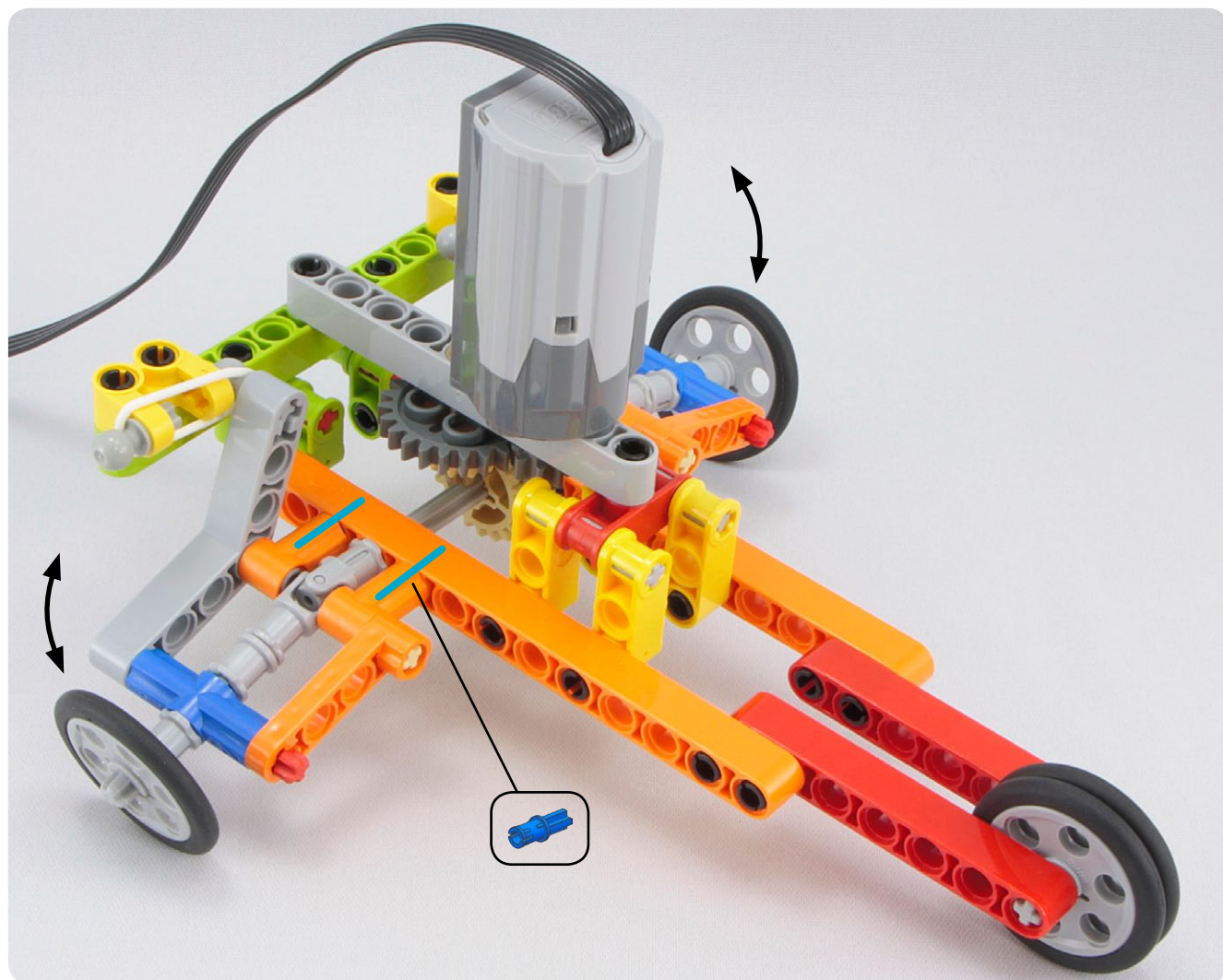
[illegible]

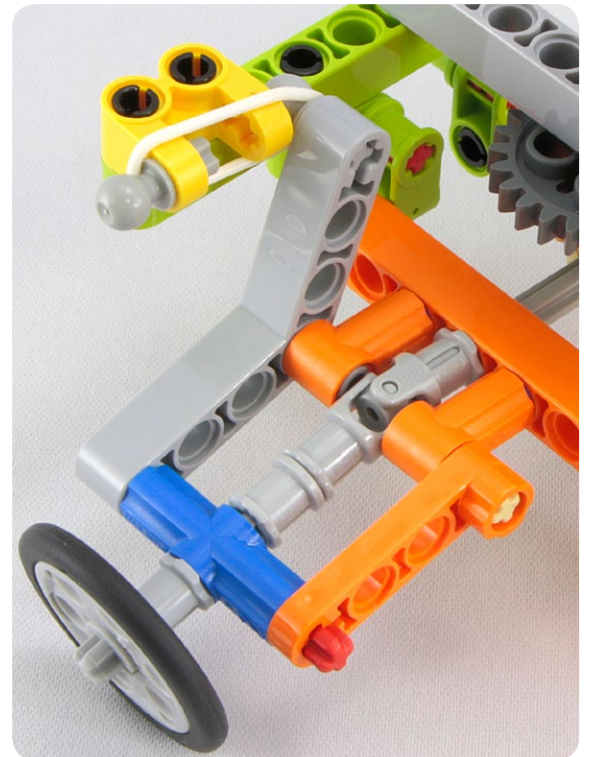
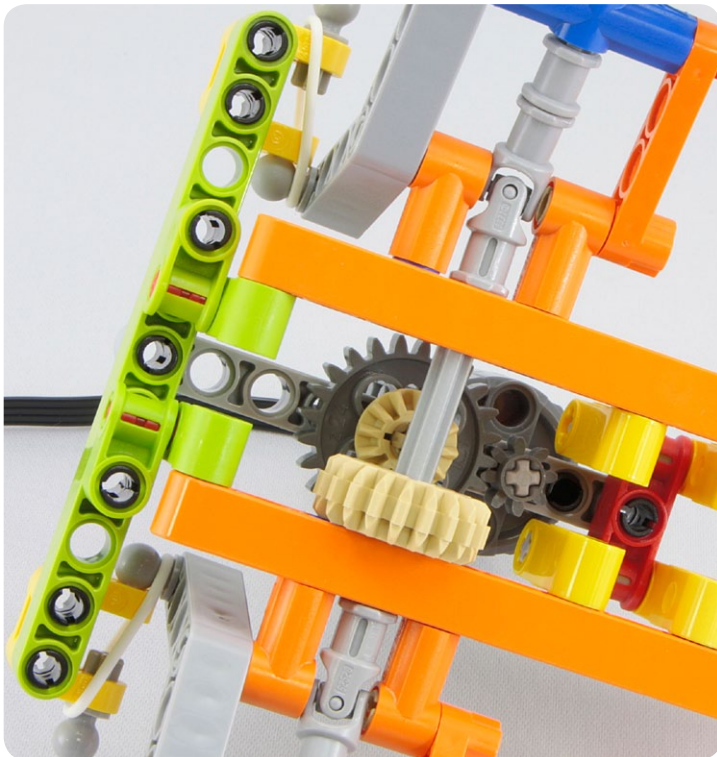




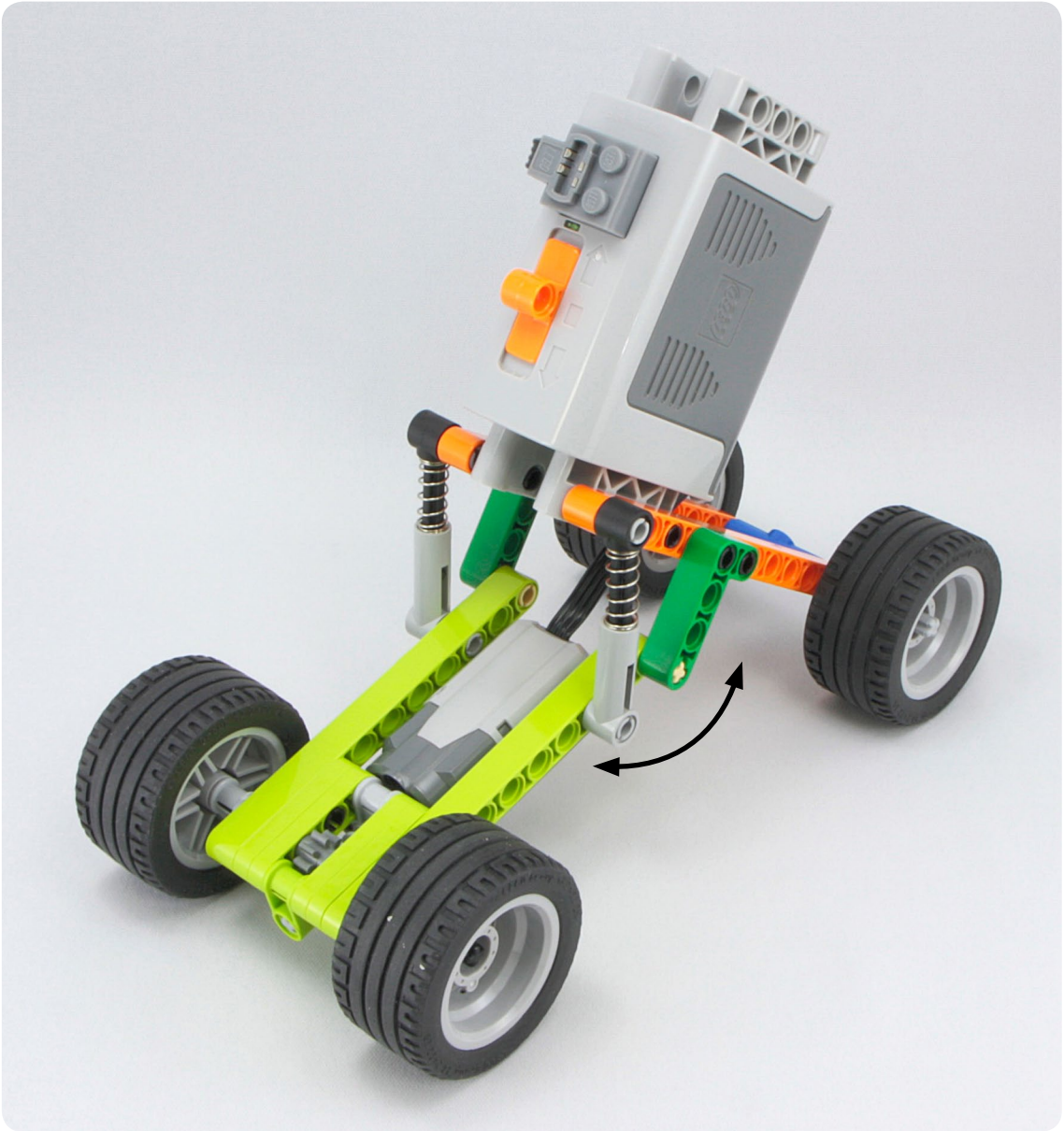
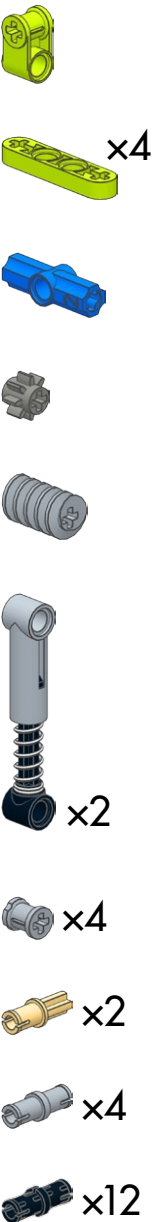
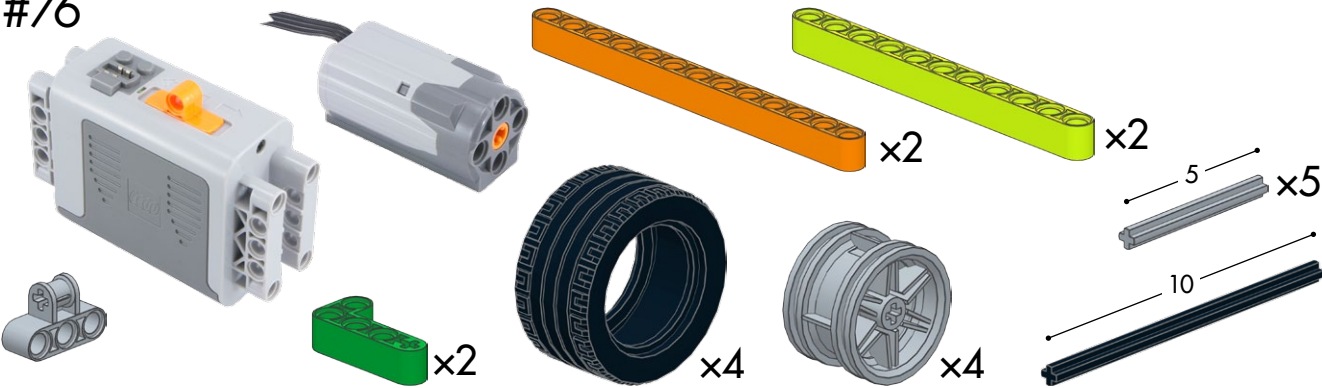
A close-up view of the LEGO Technic chassis, showing the motor, gears, and wheels. A curved arrow indicates the direction of rotation for the motor.

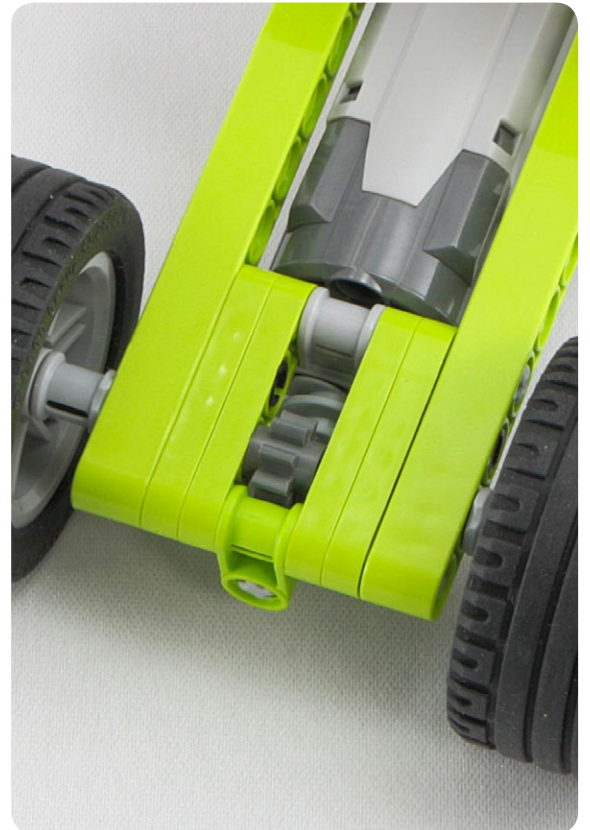
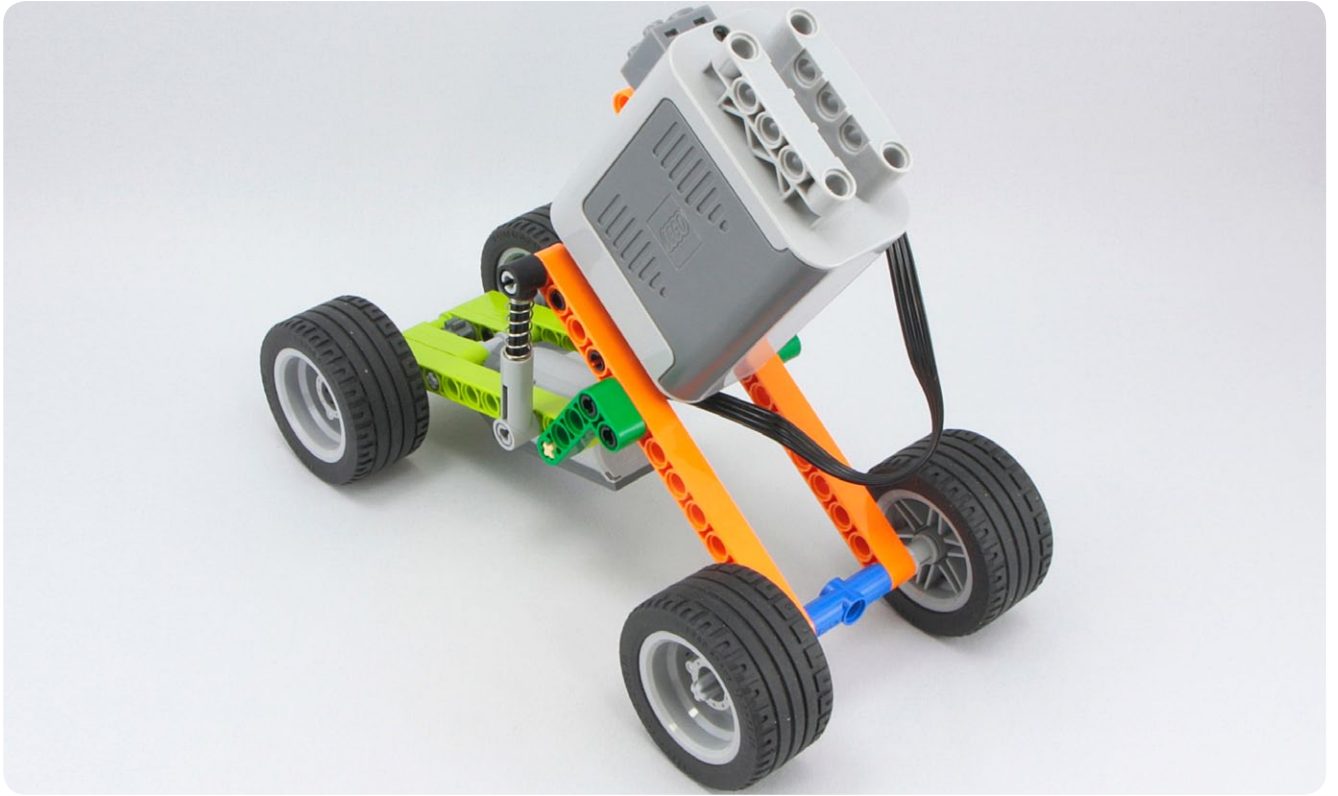


[illegible]

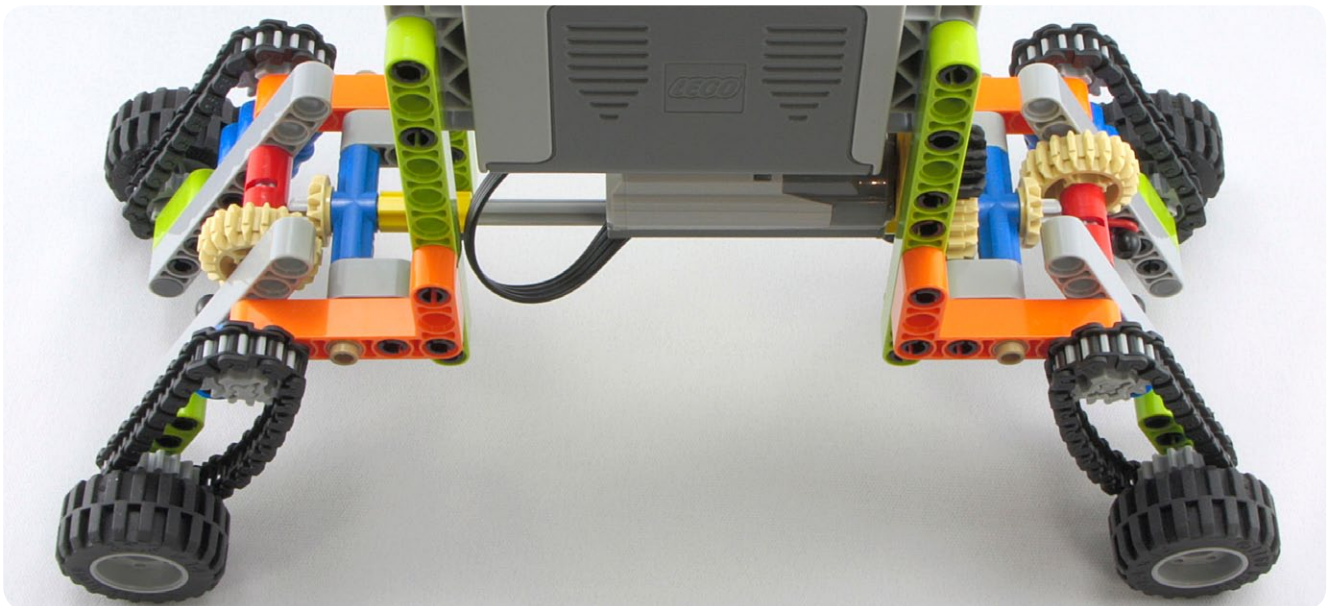
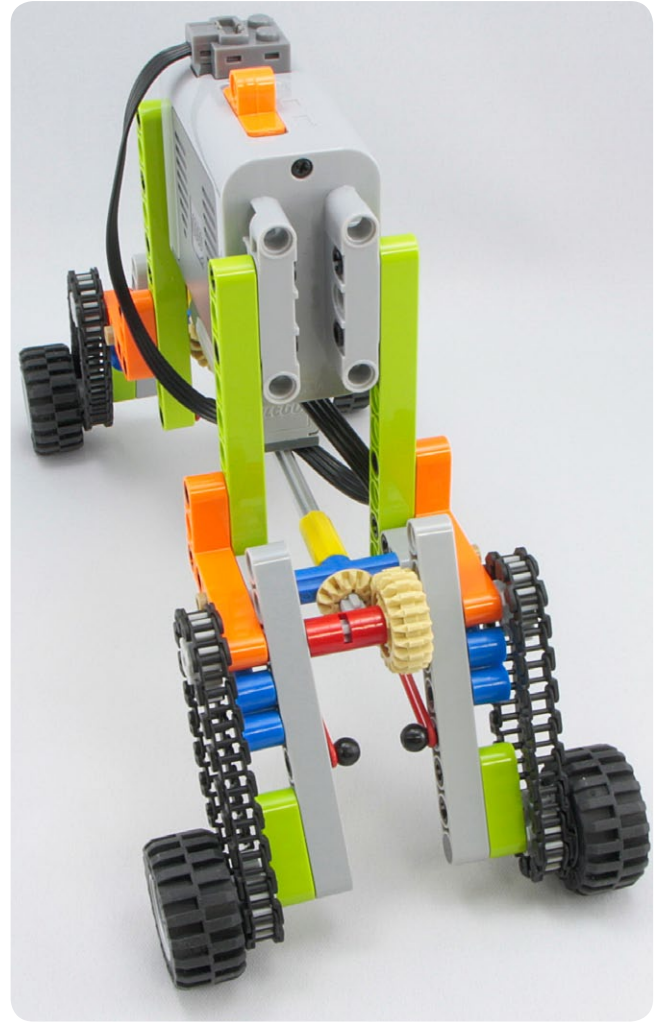
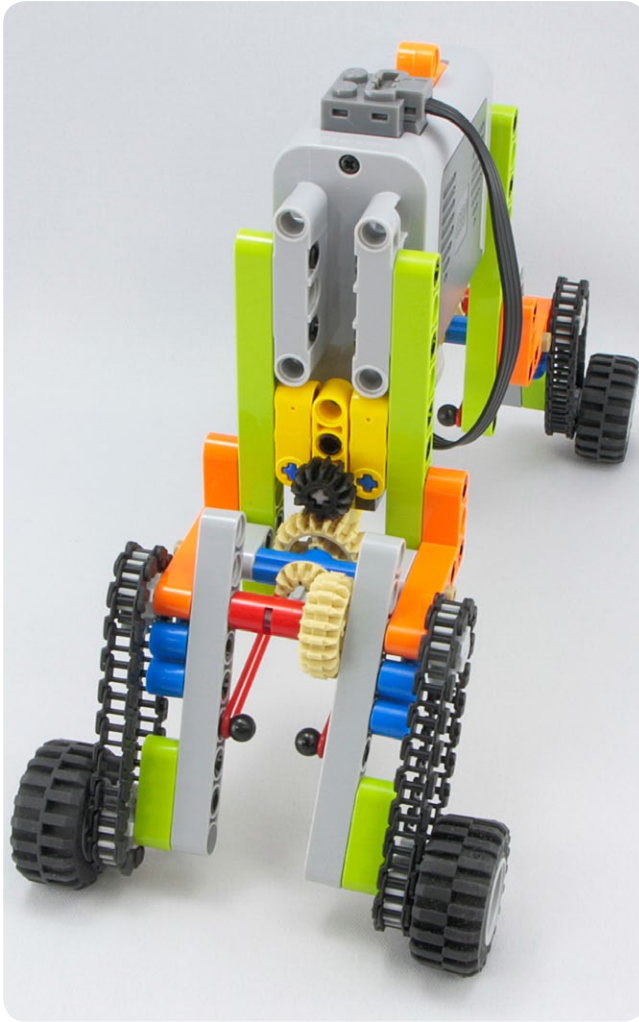


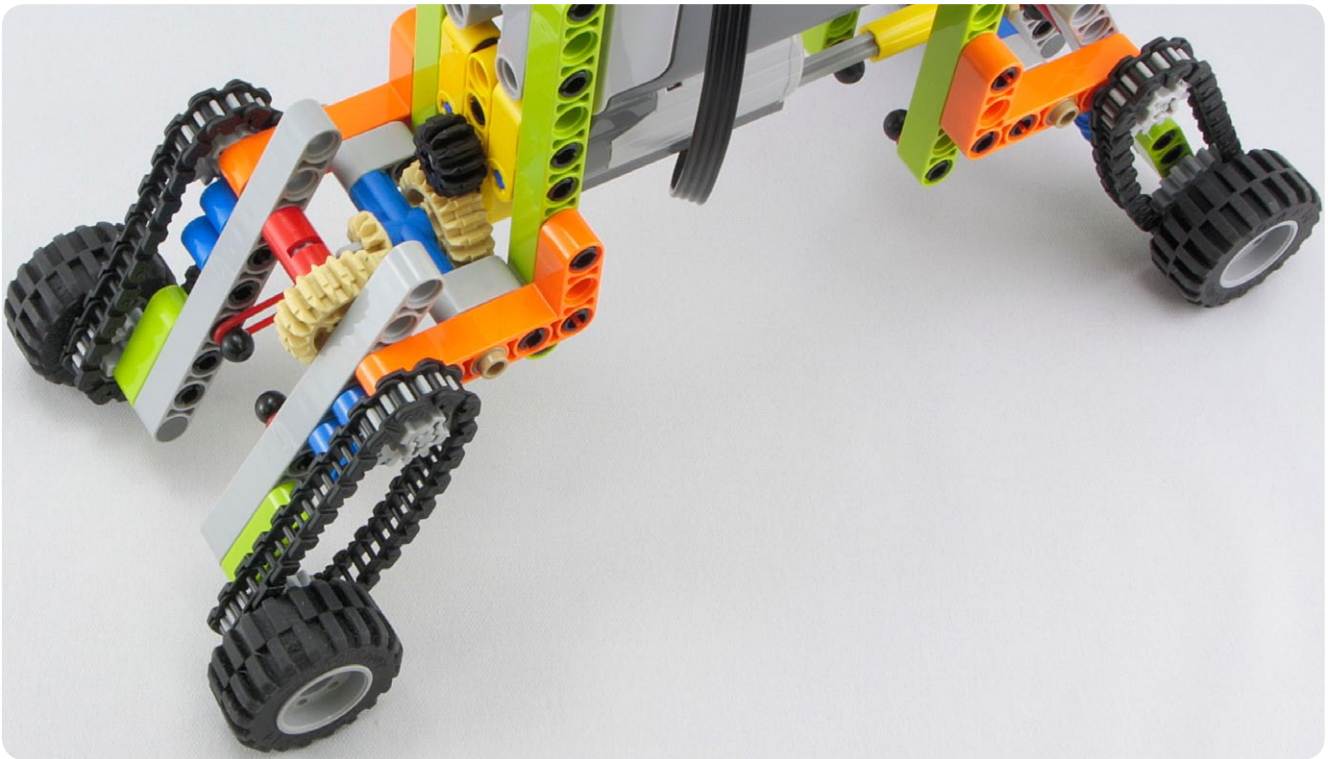
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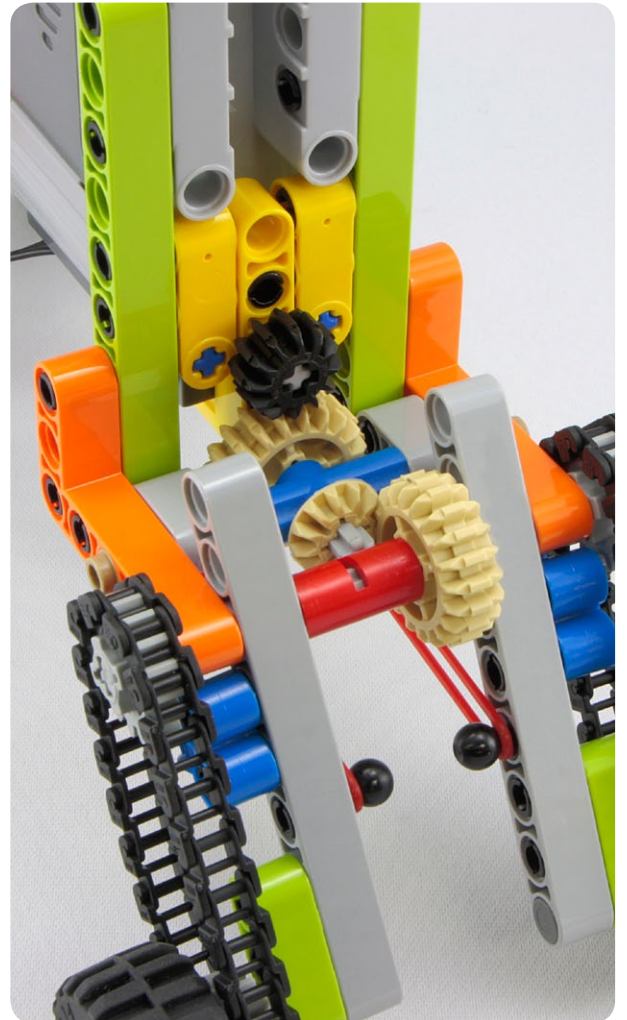
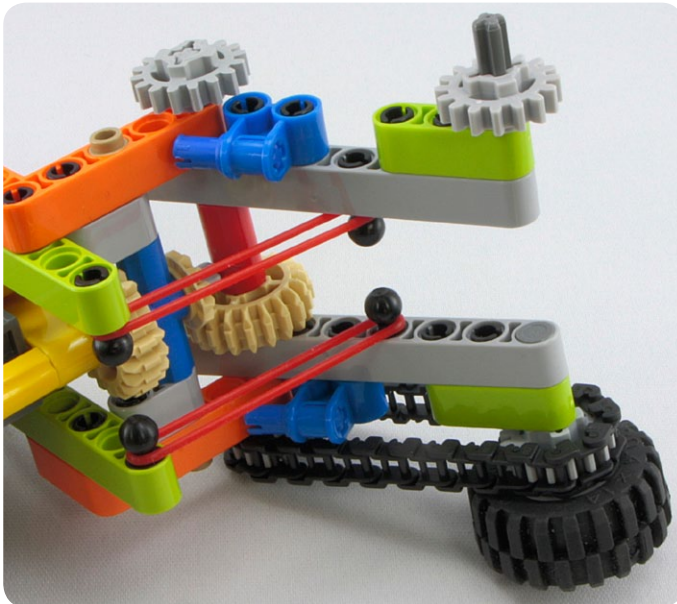
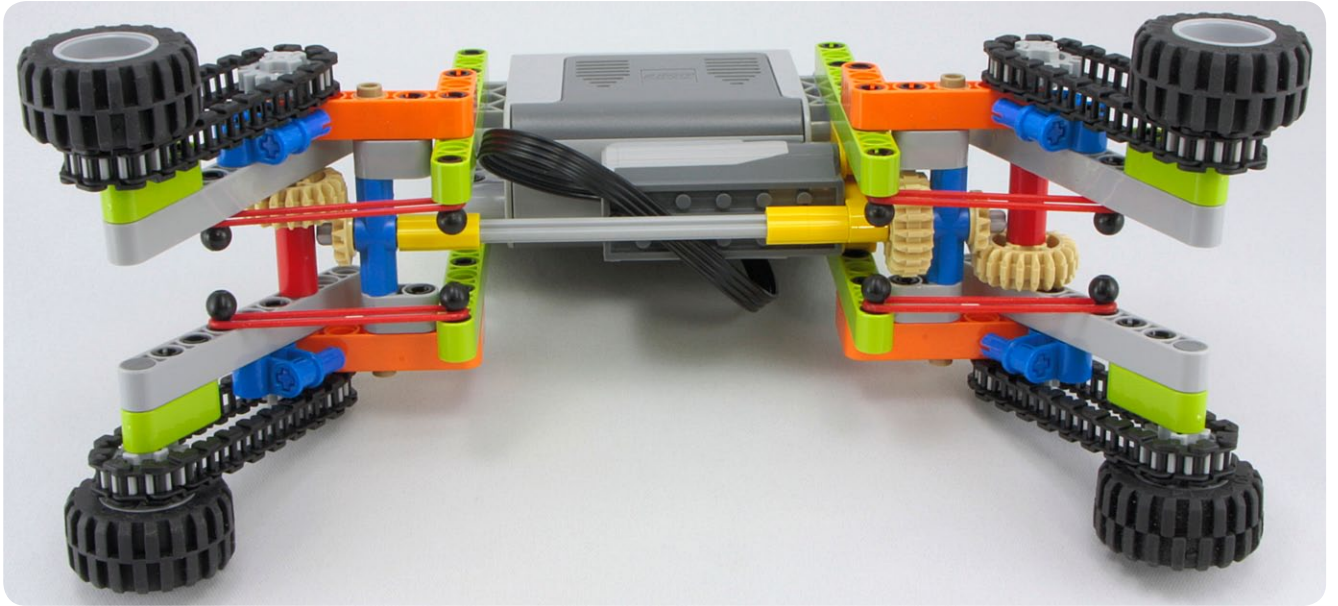




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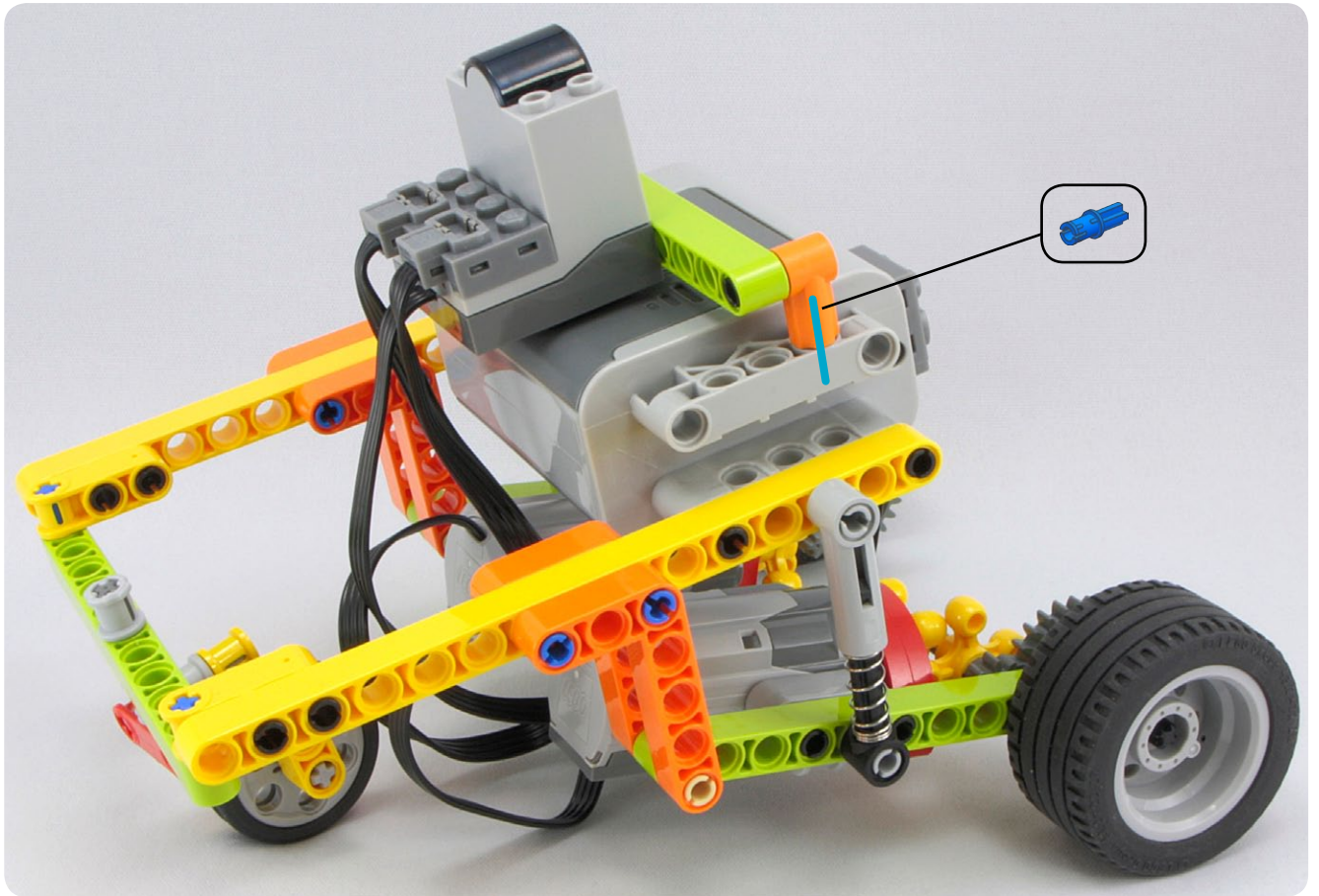


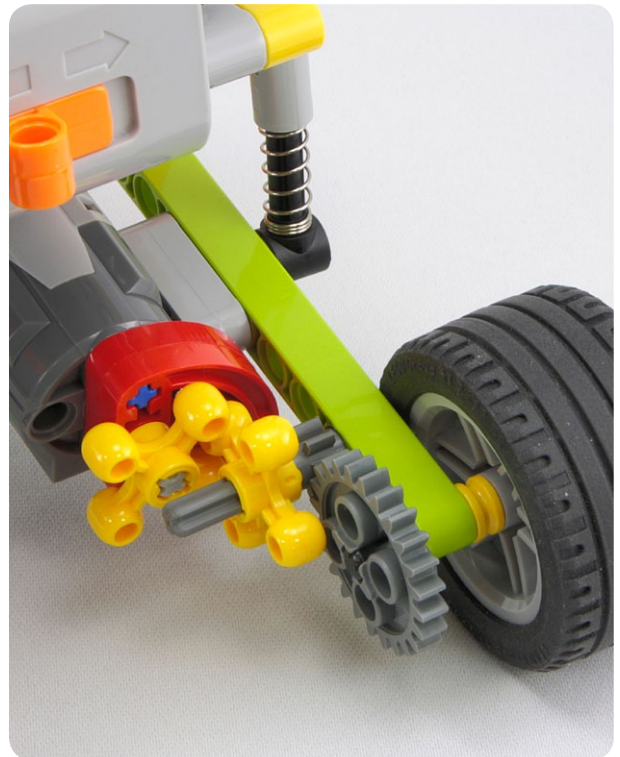
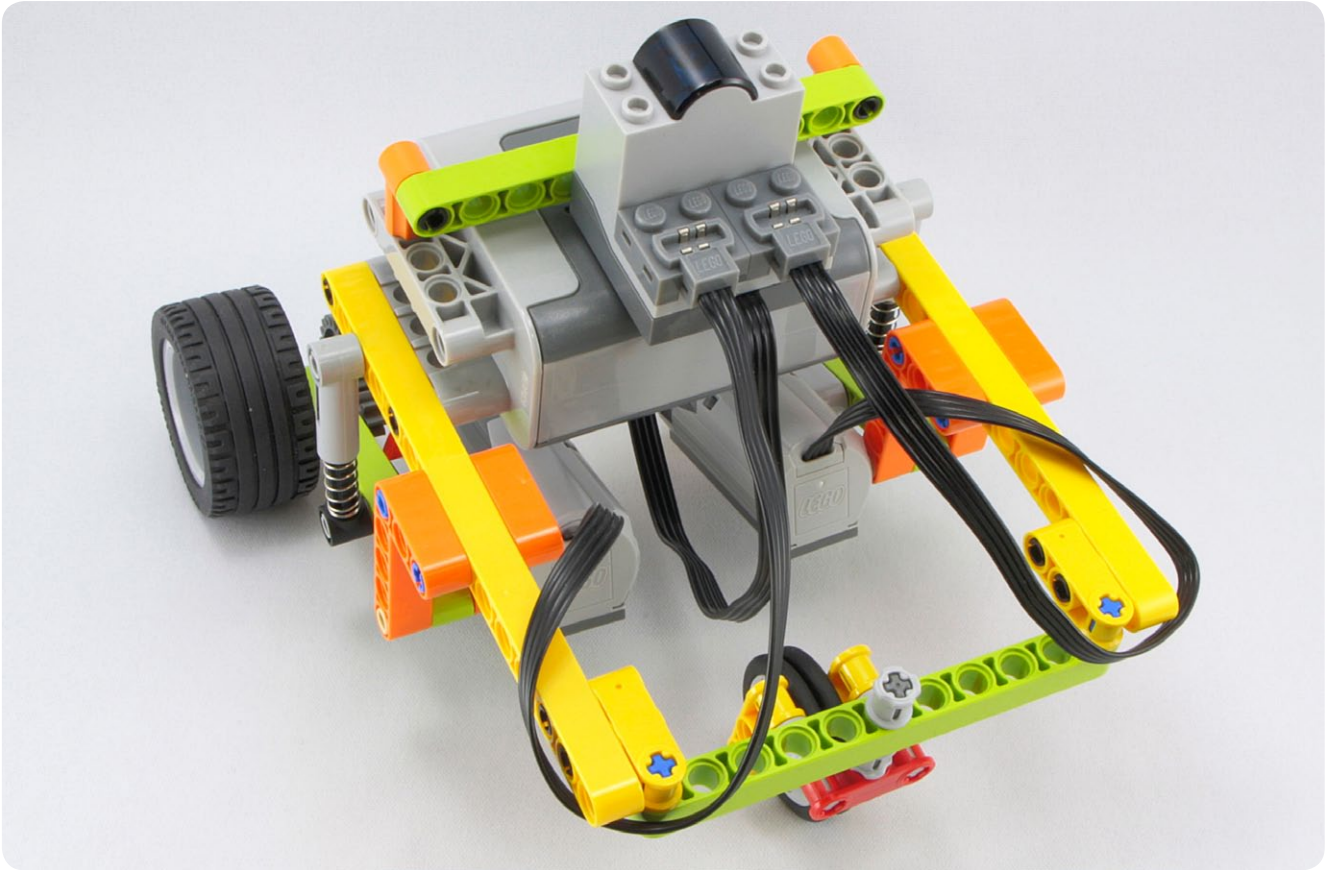




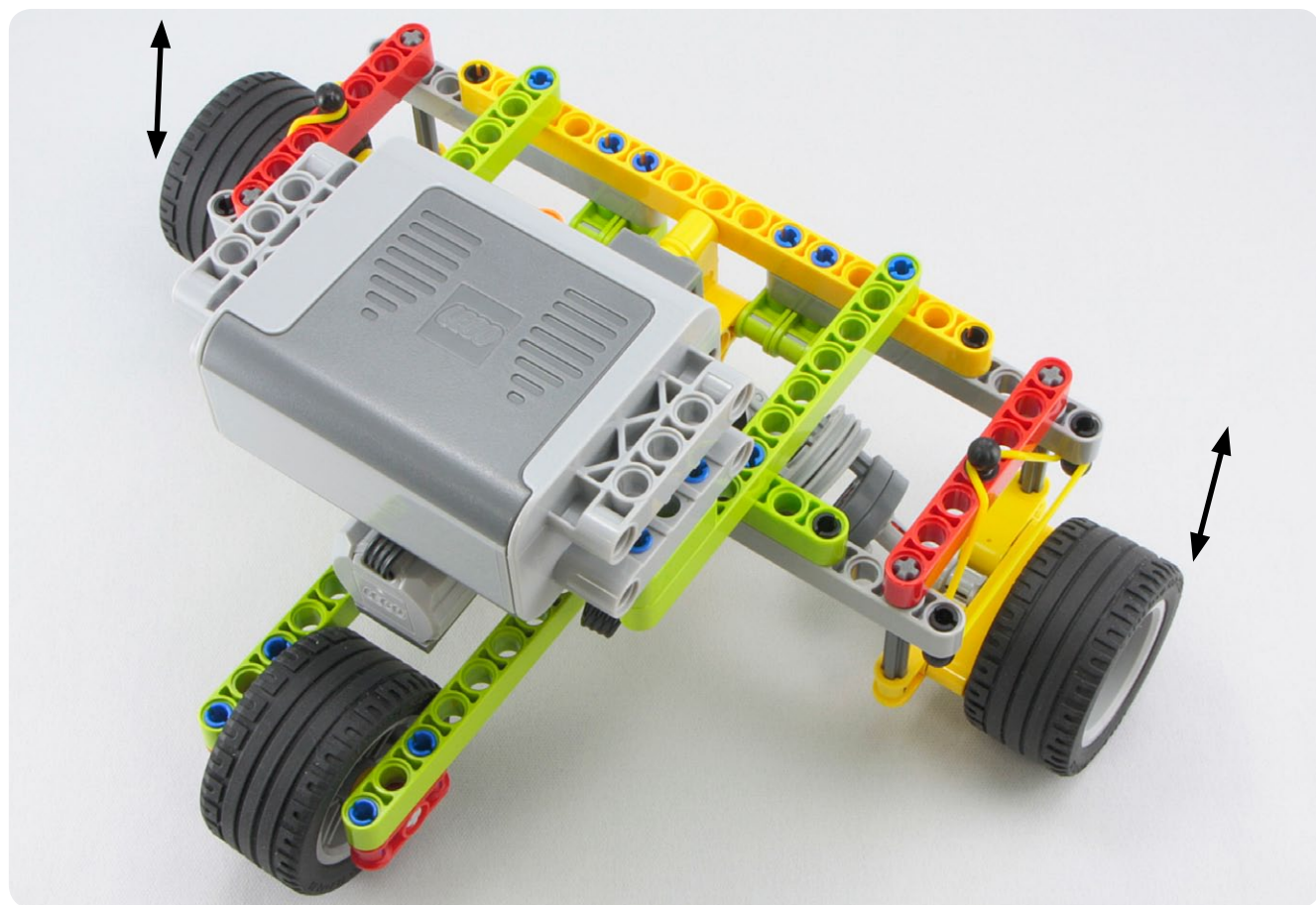
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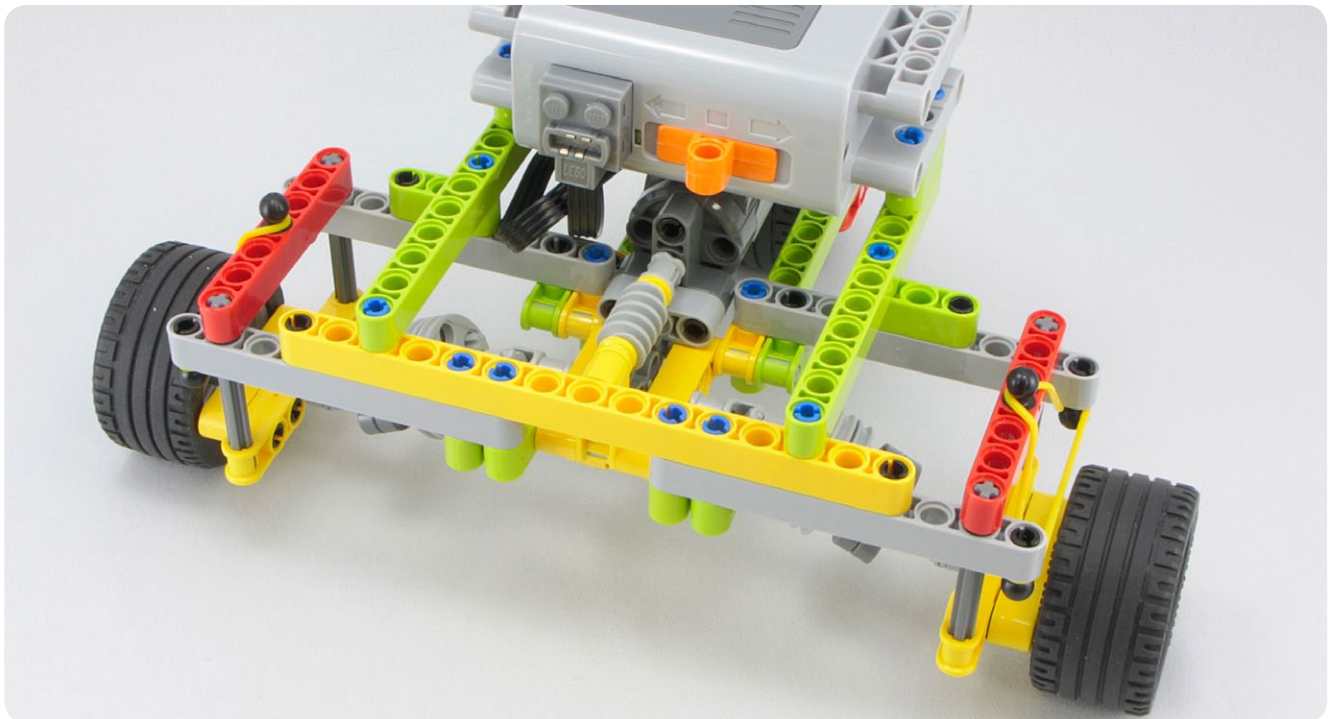
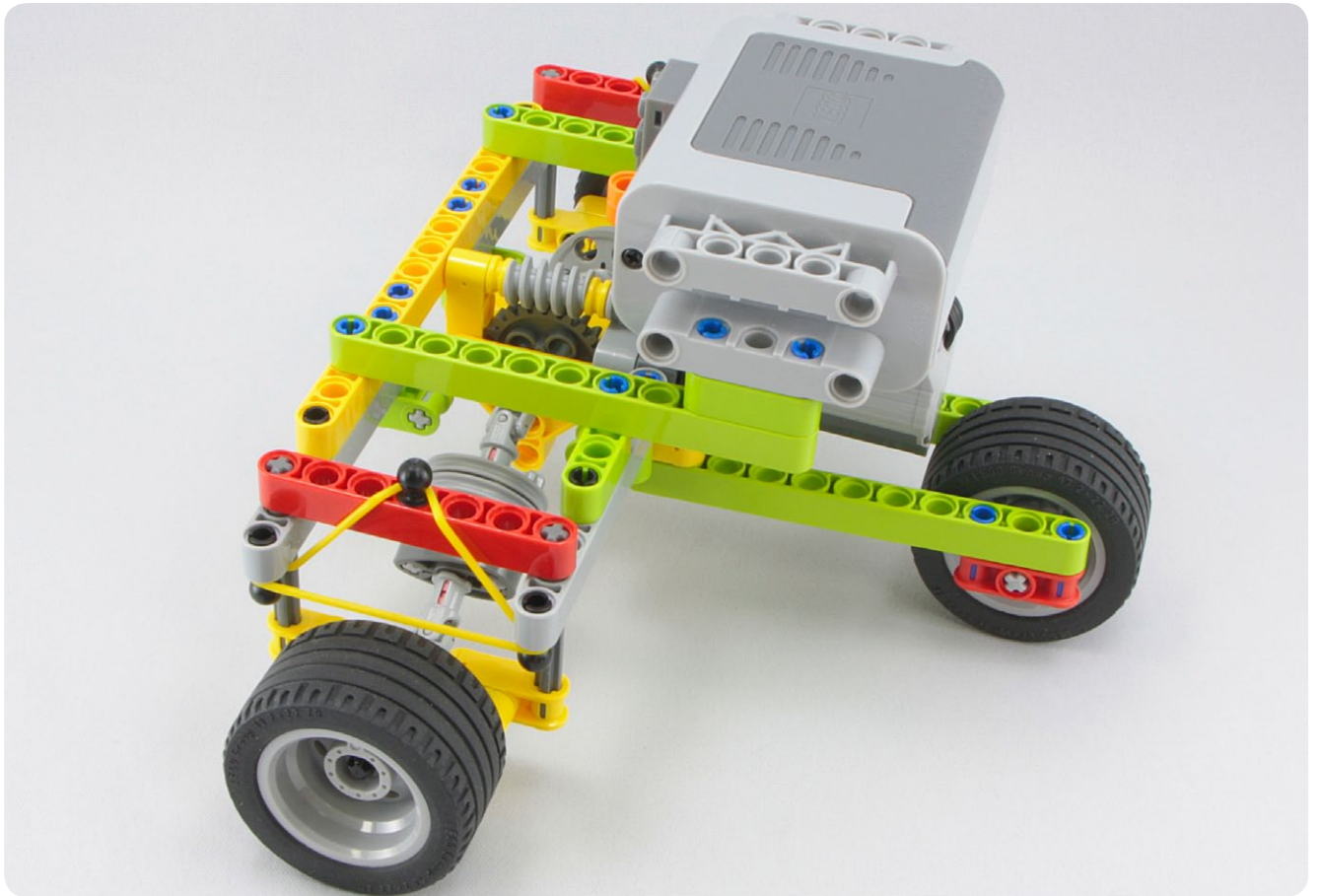


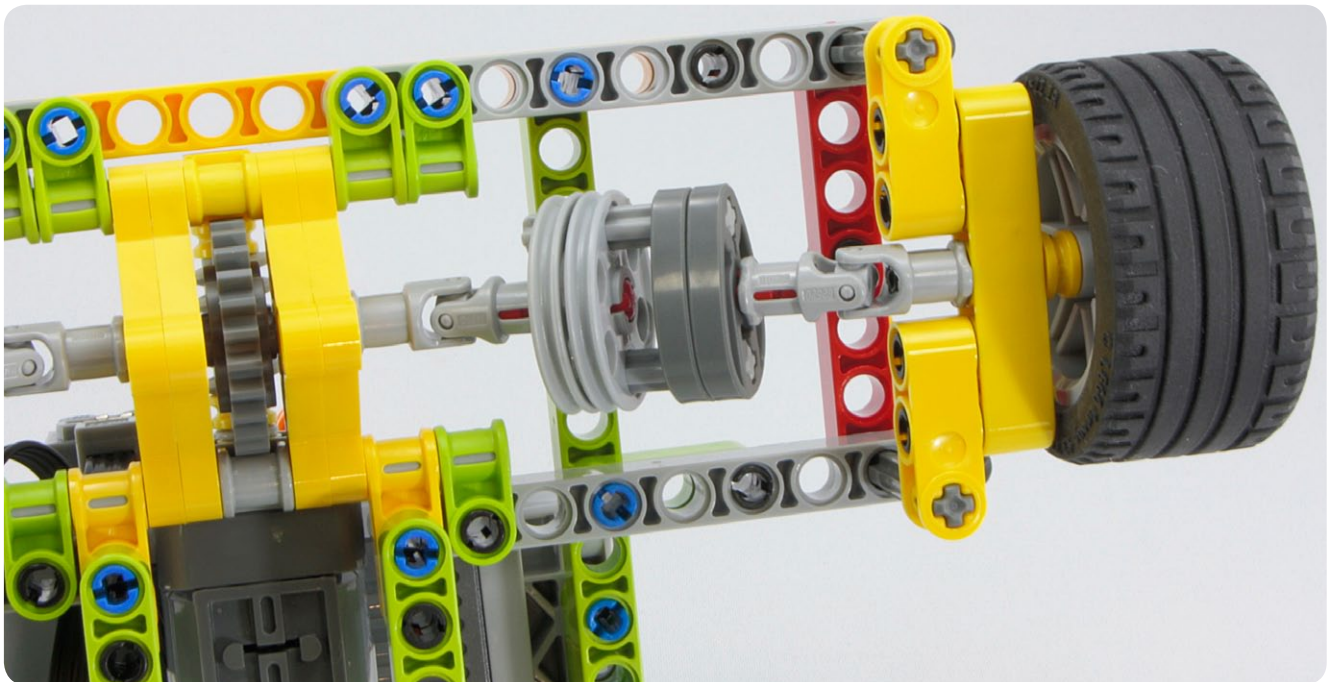
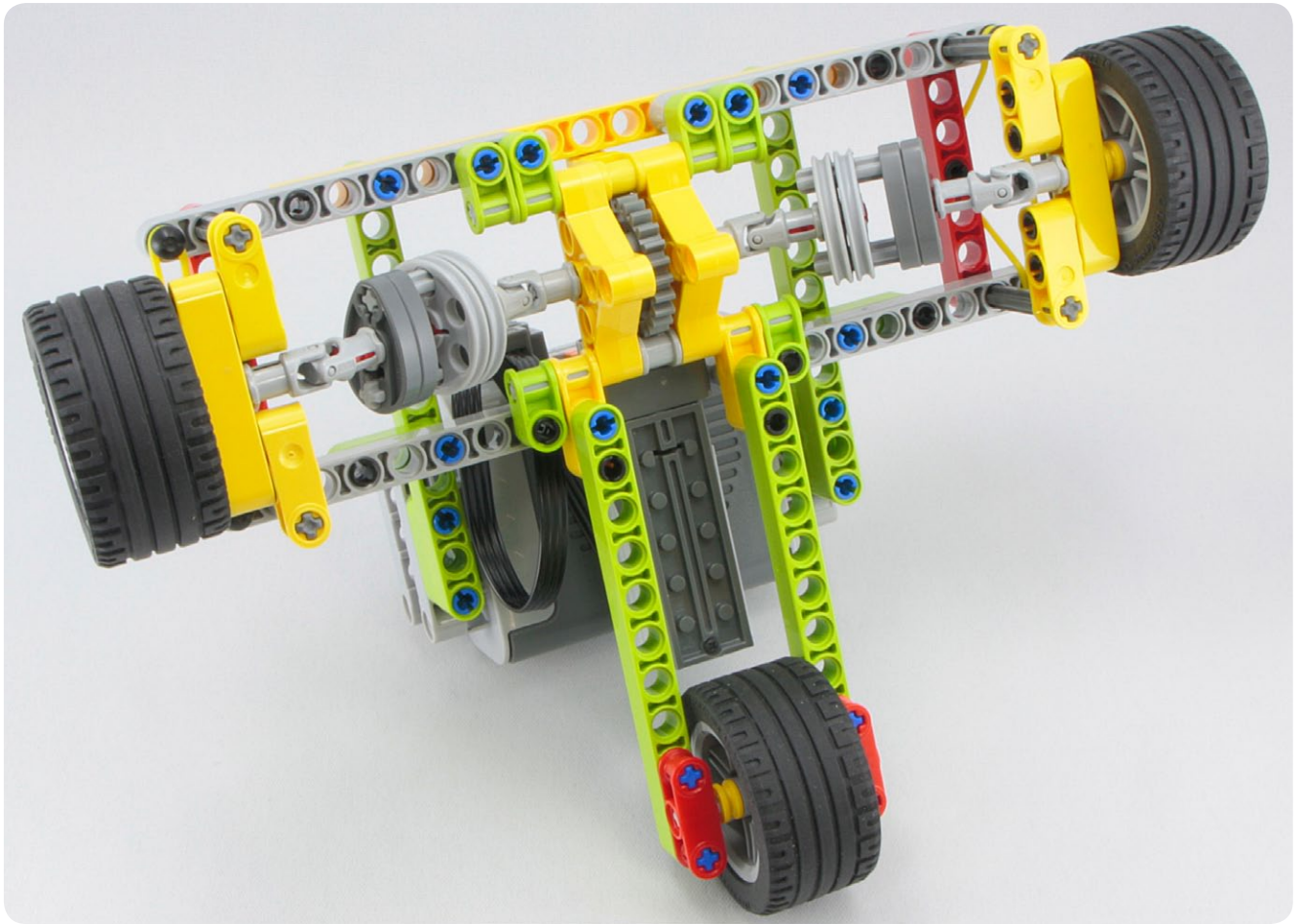


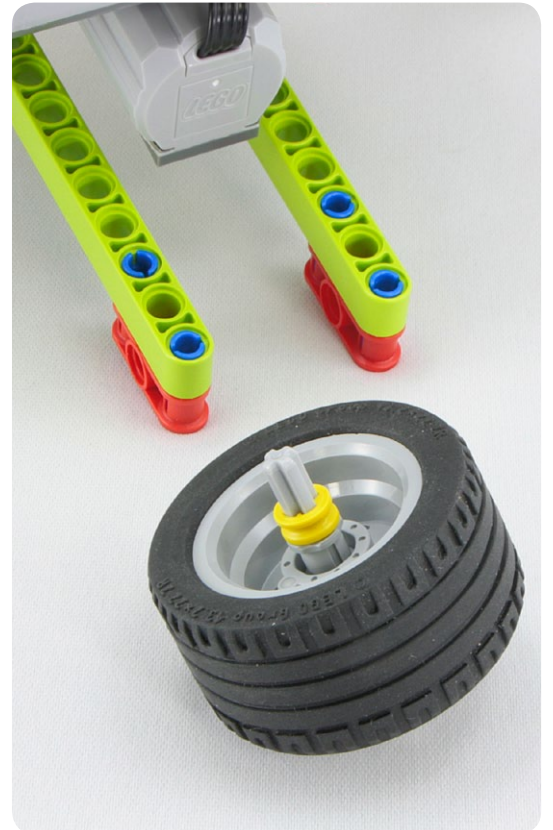
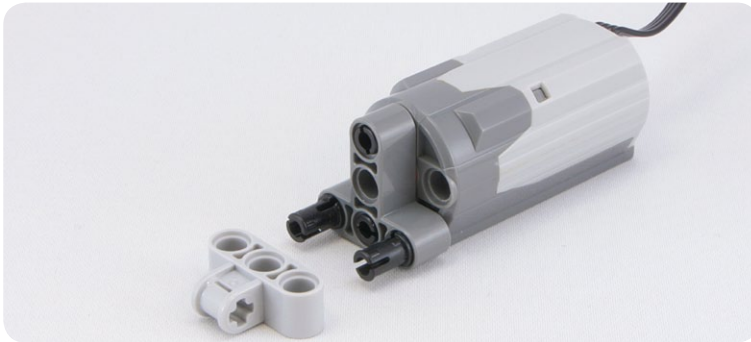
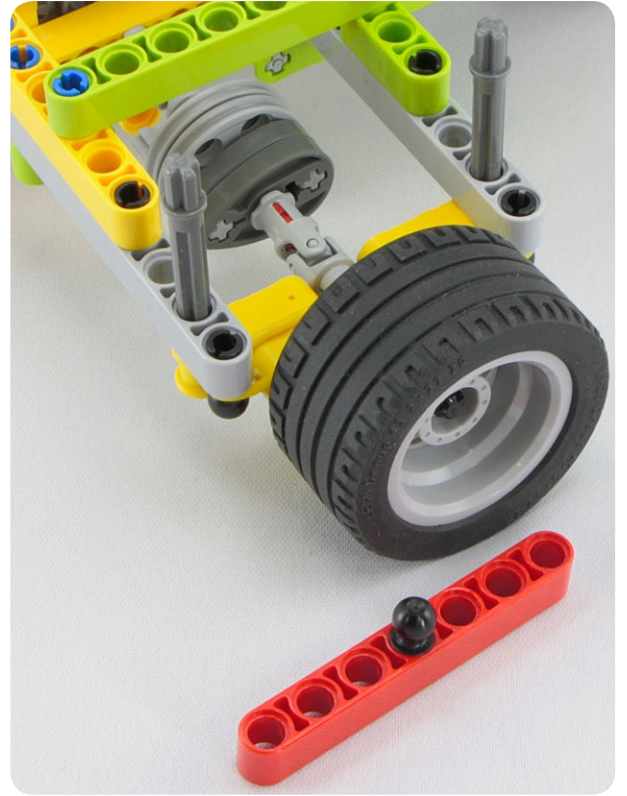
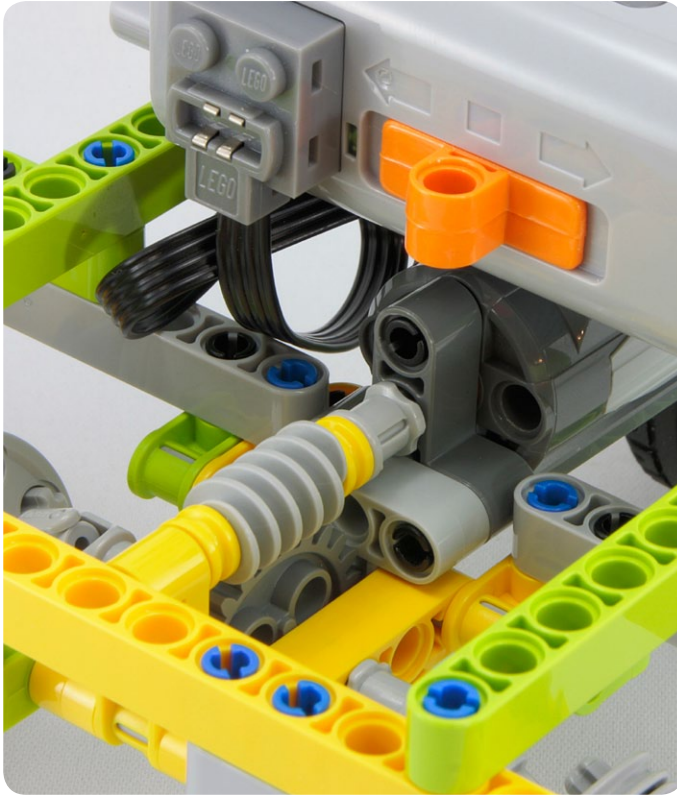




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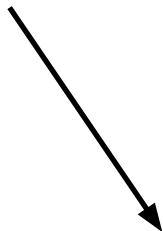
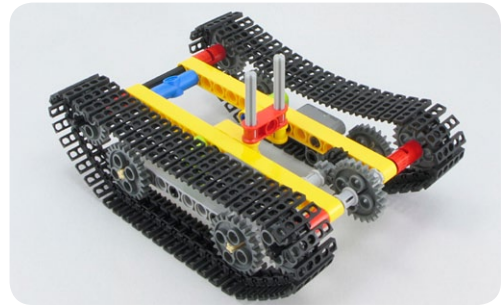


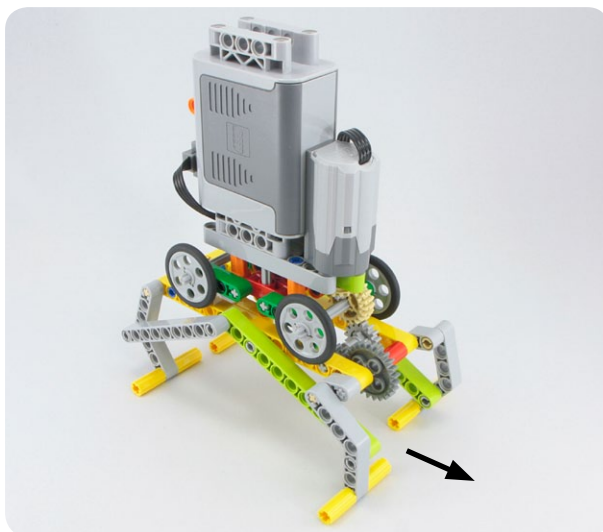
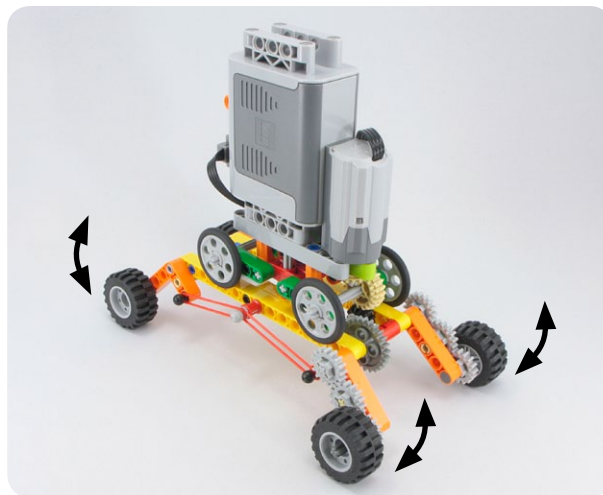
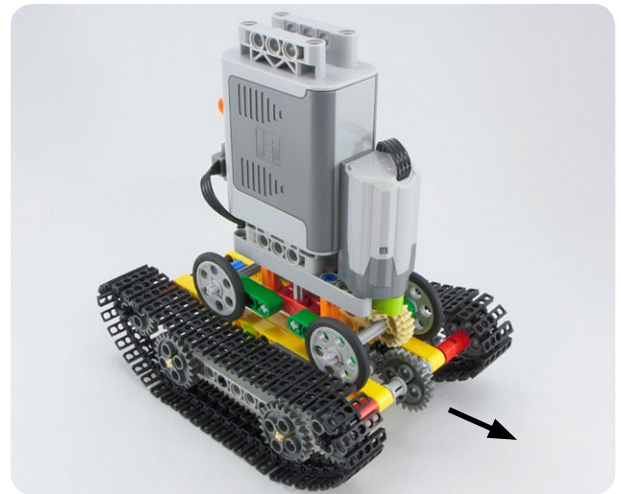




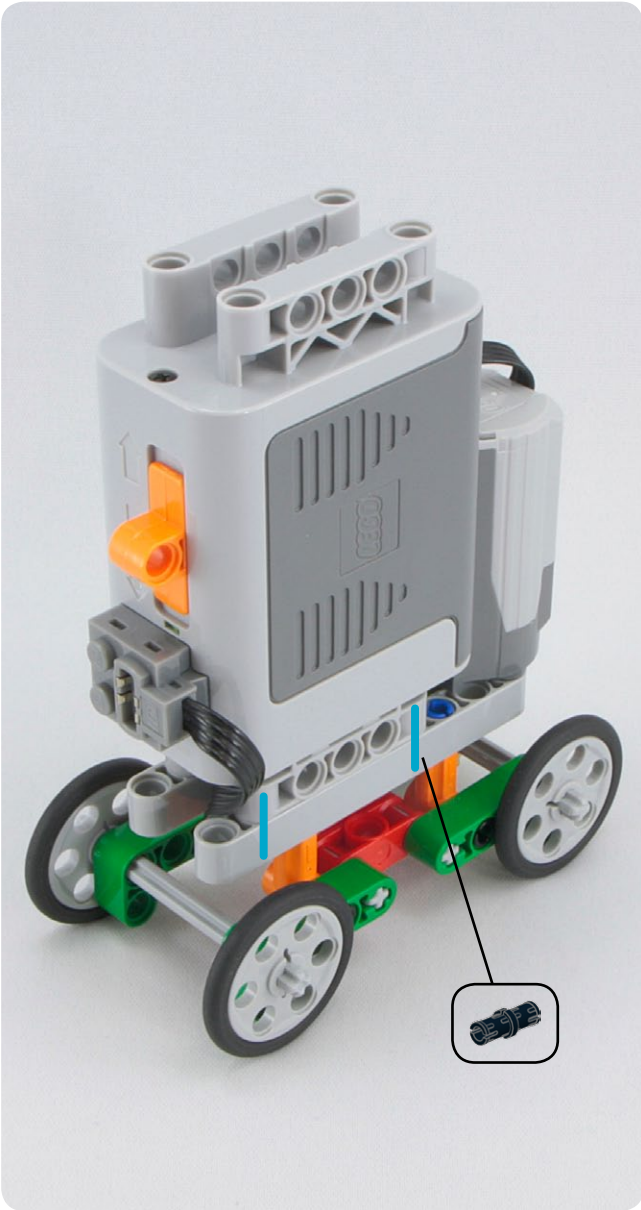
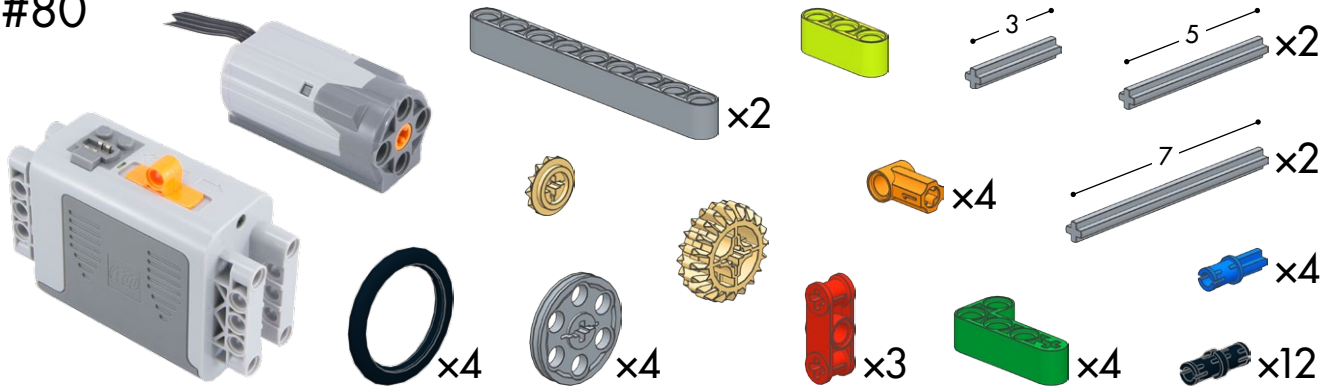


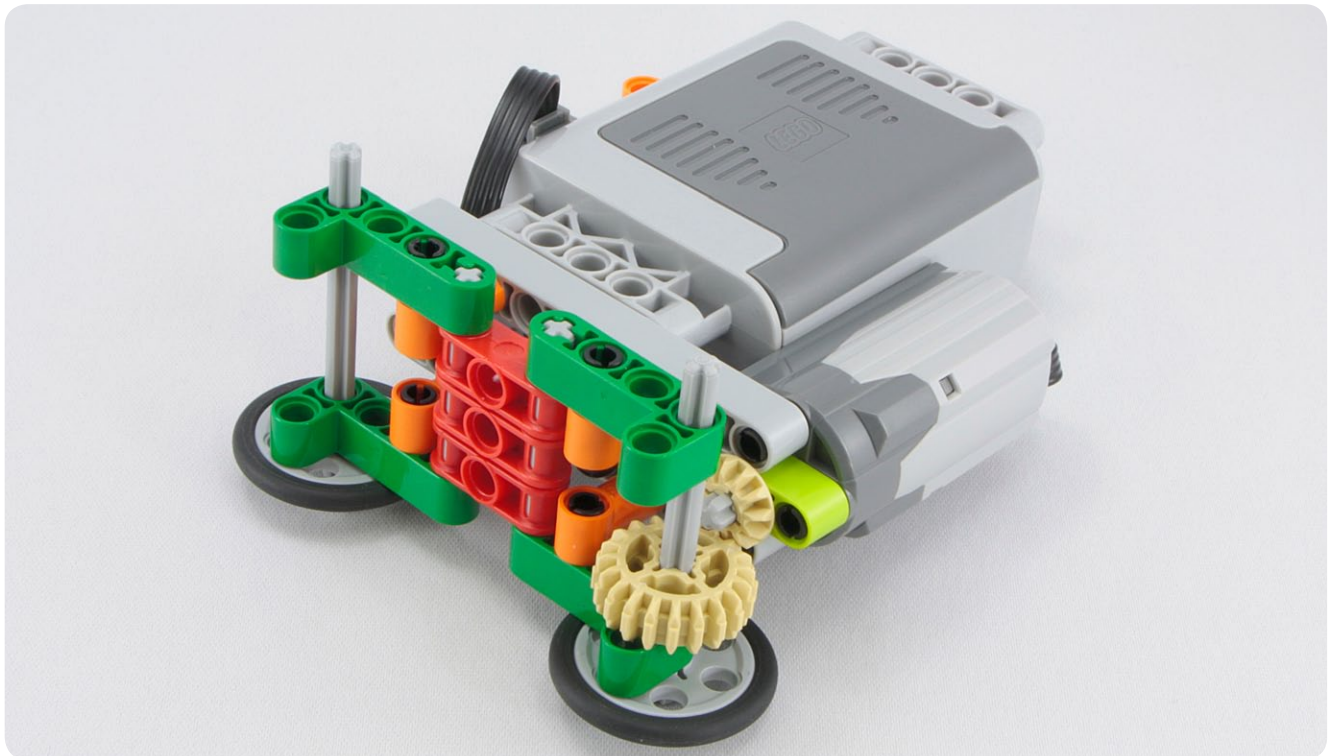
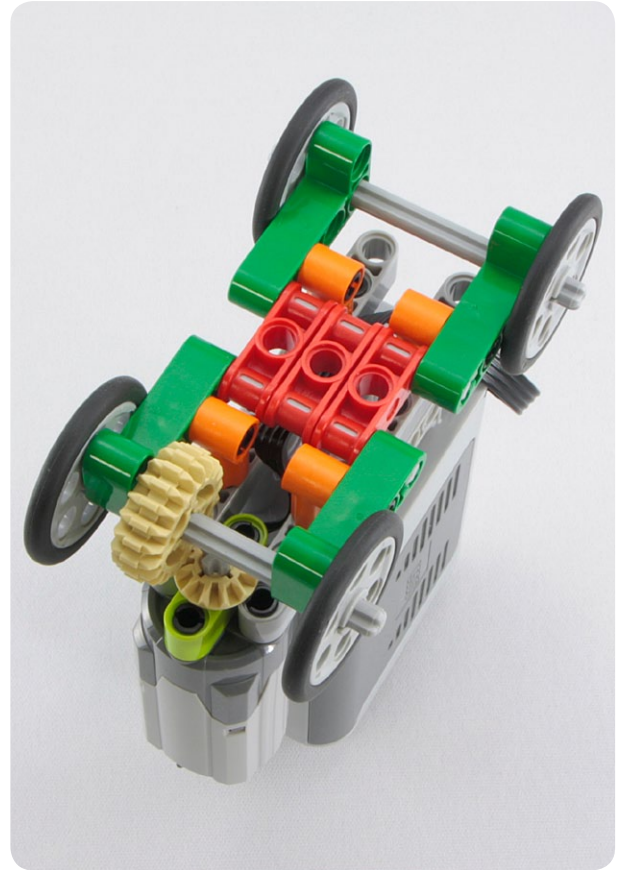
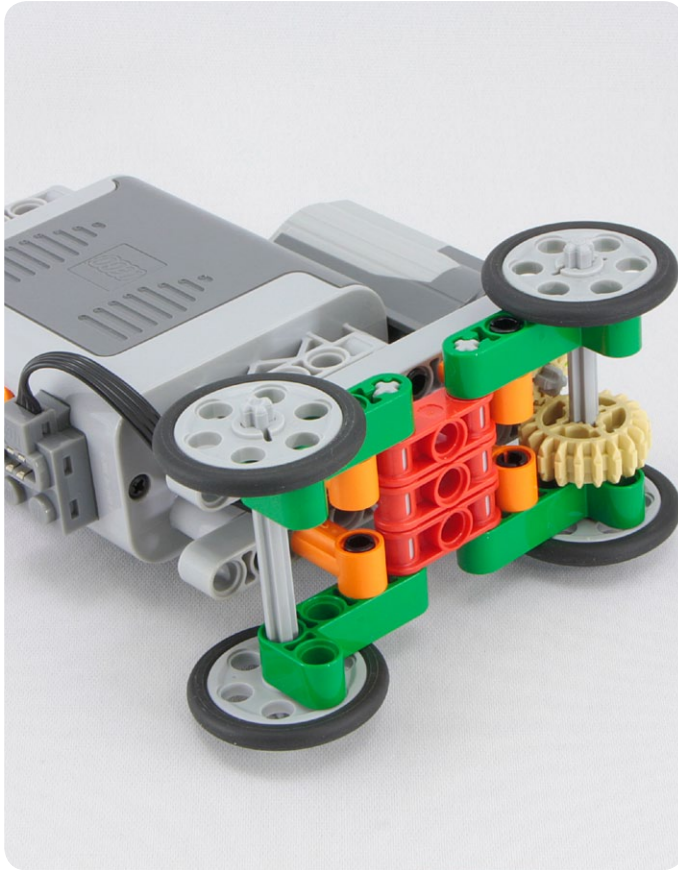
Five different bases for a small car



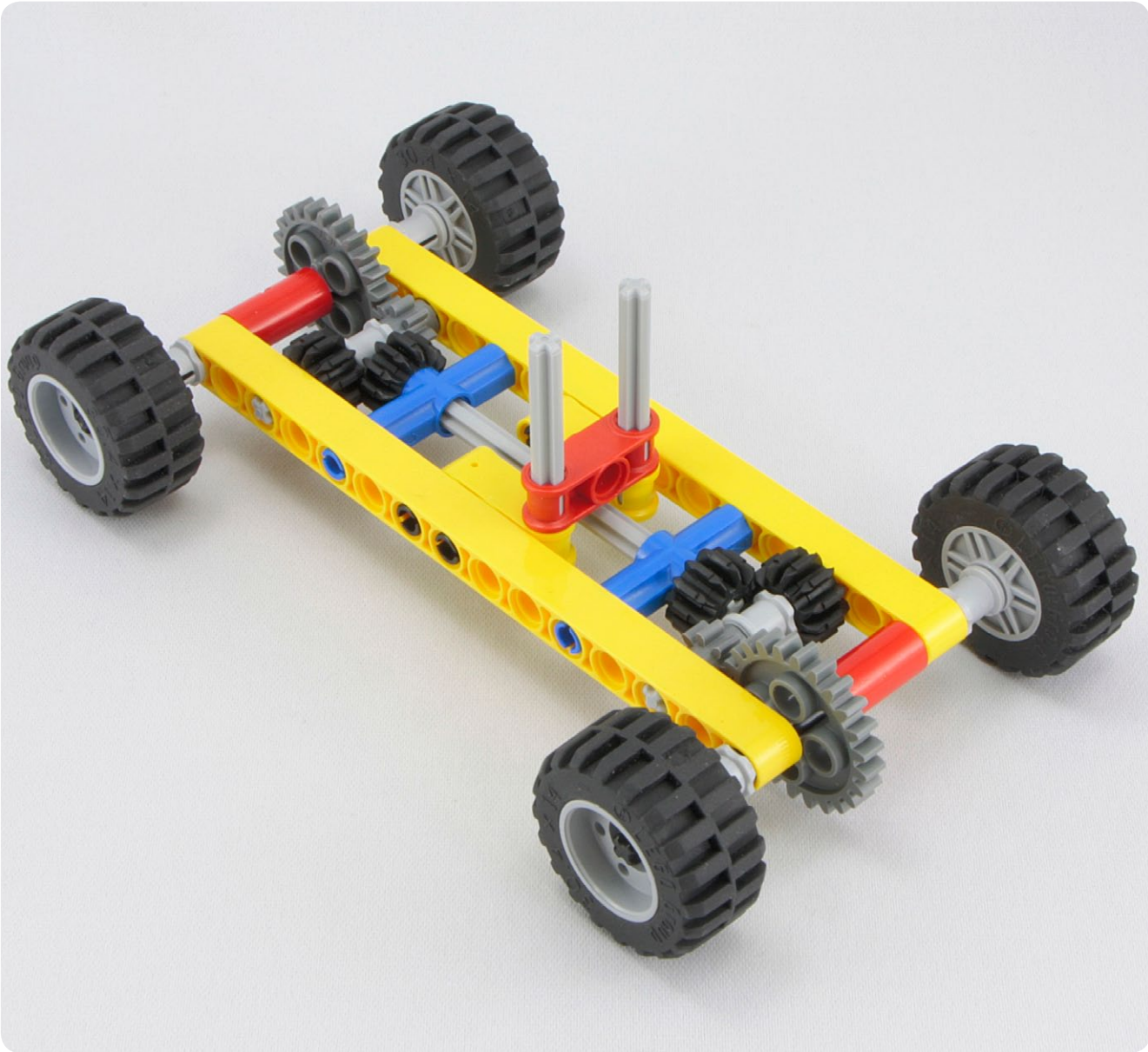
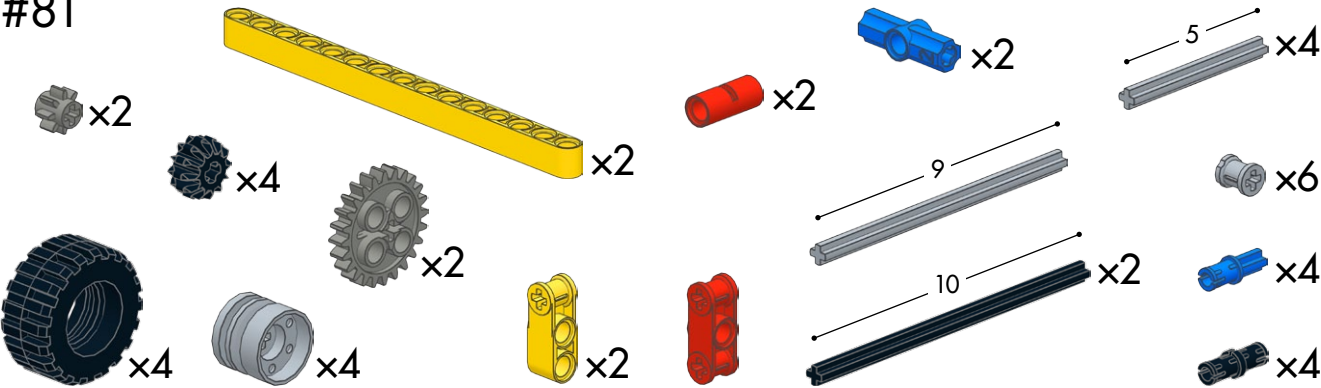


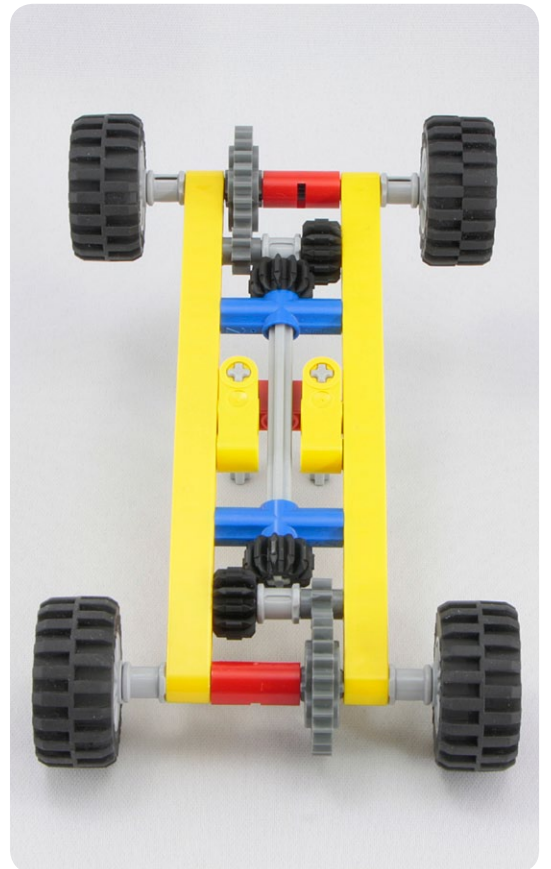
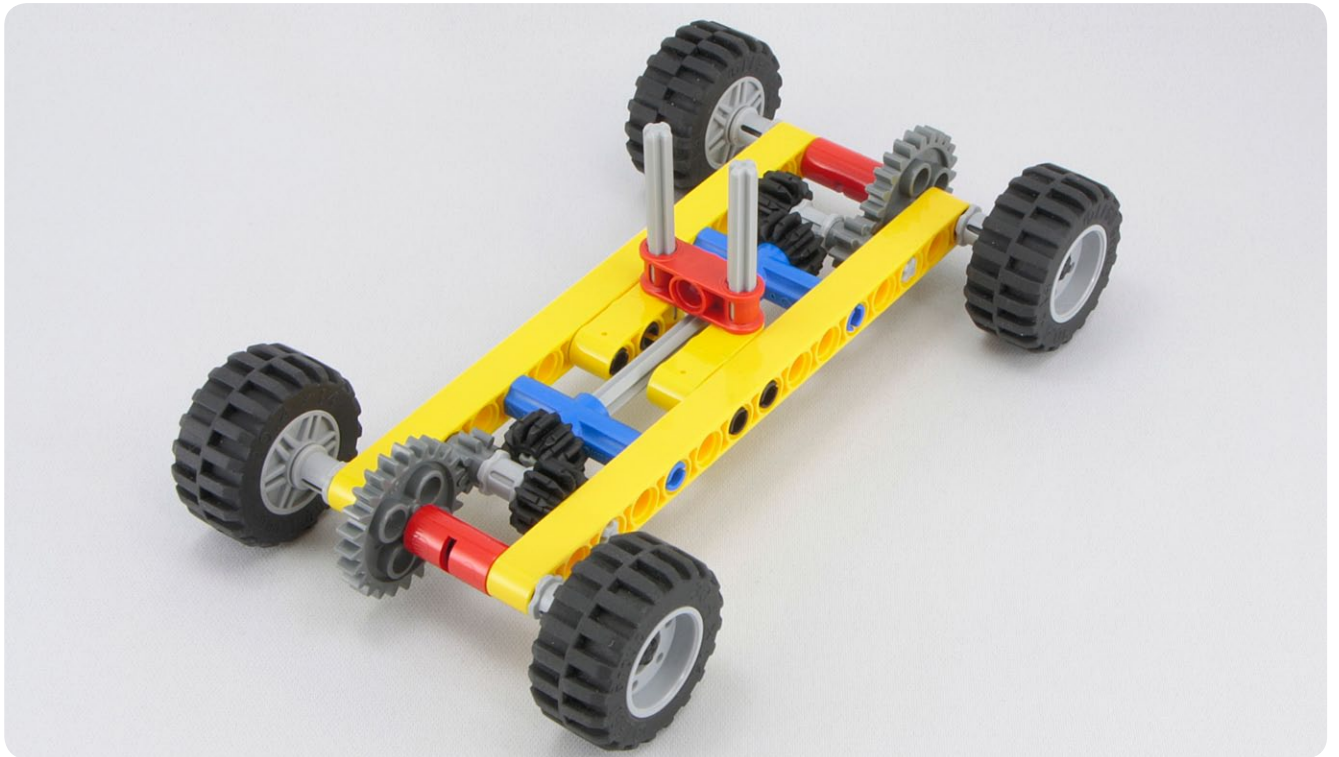
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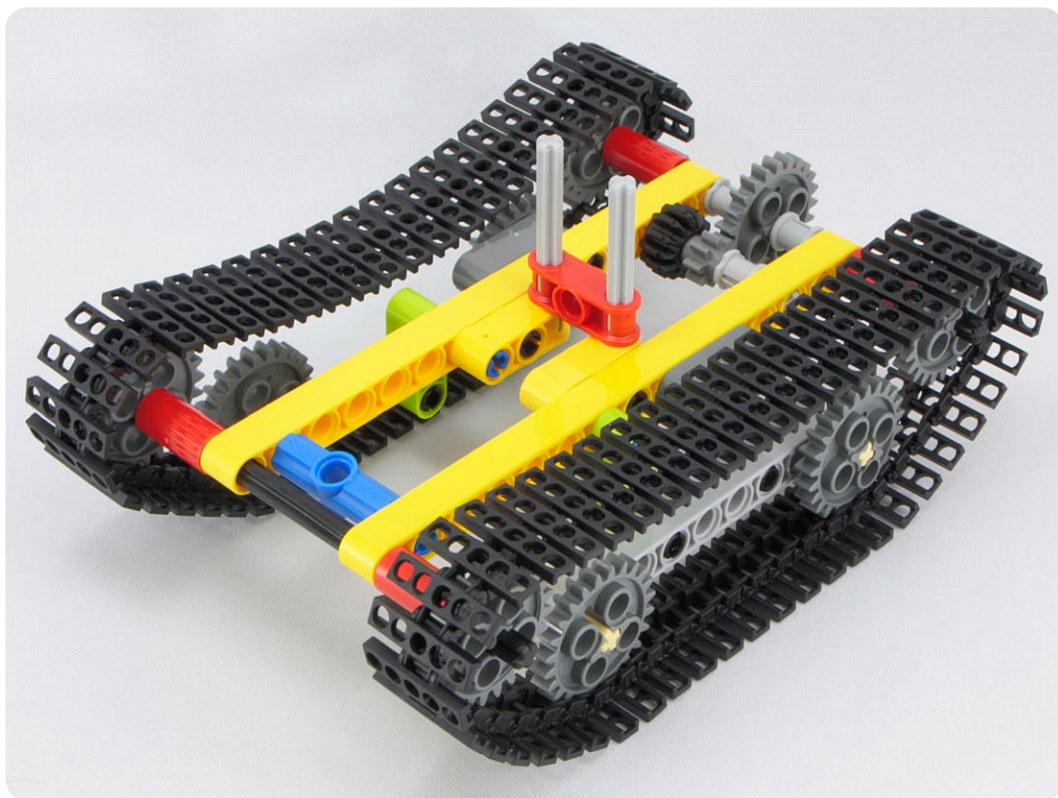
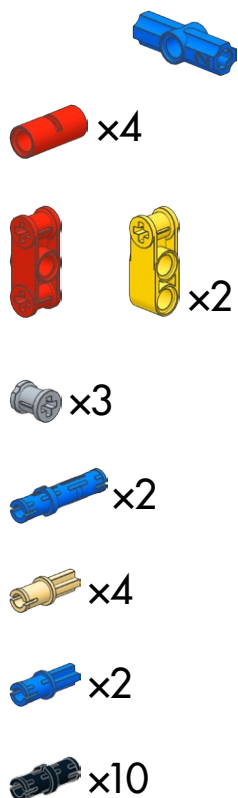
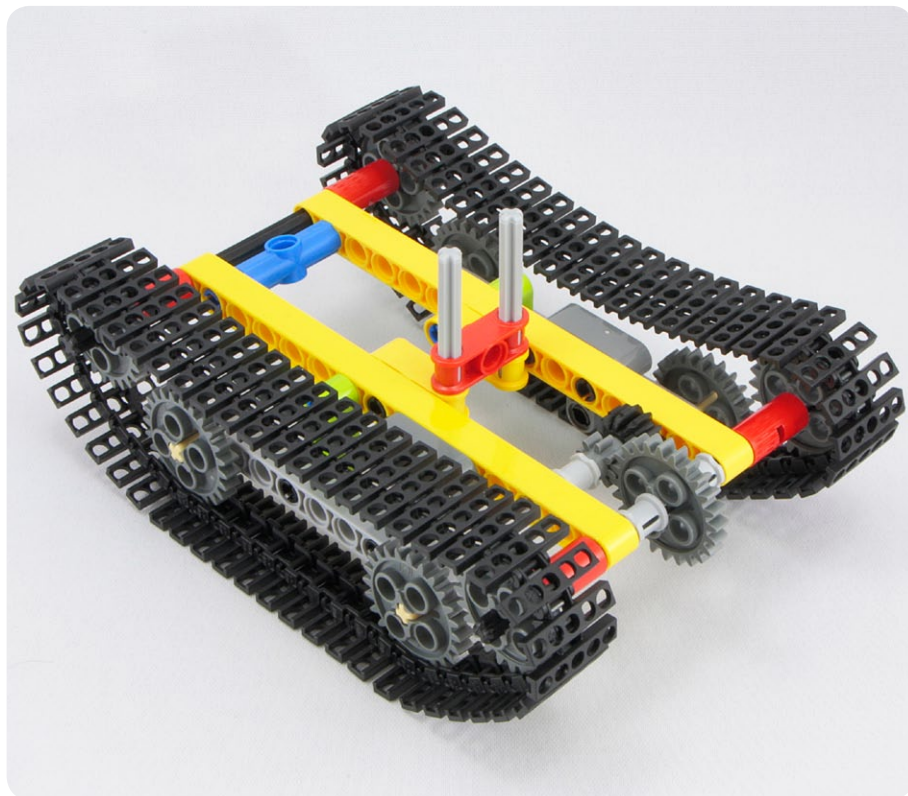
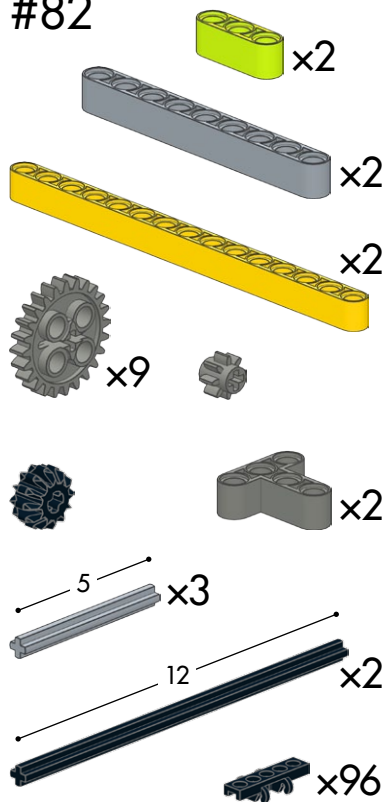


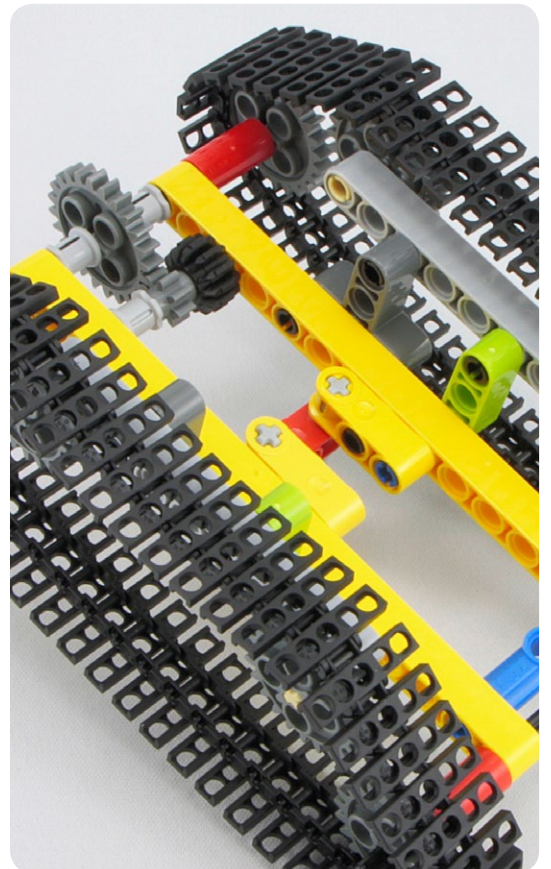
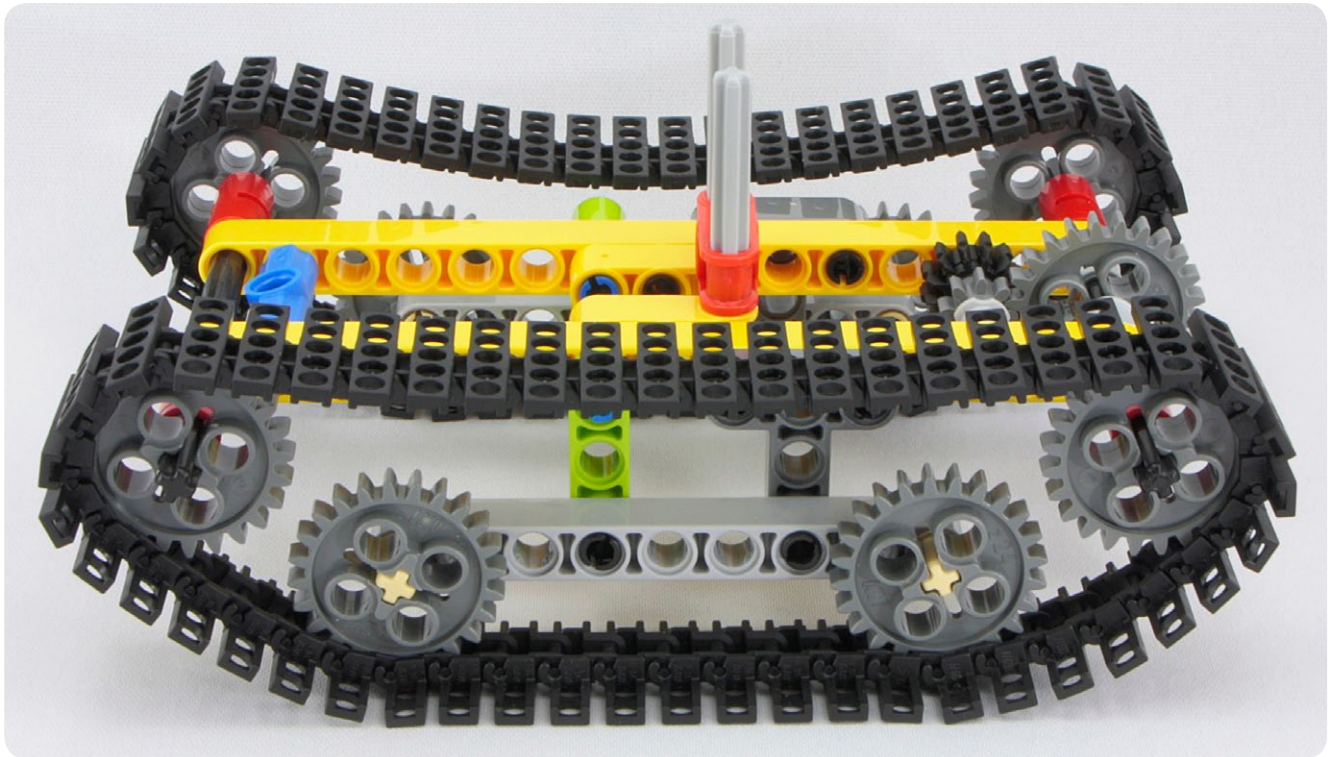
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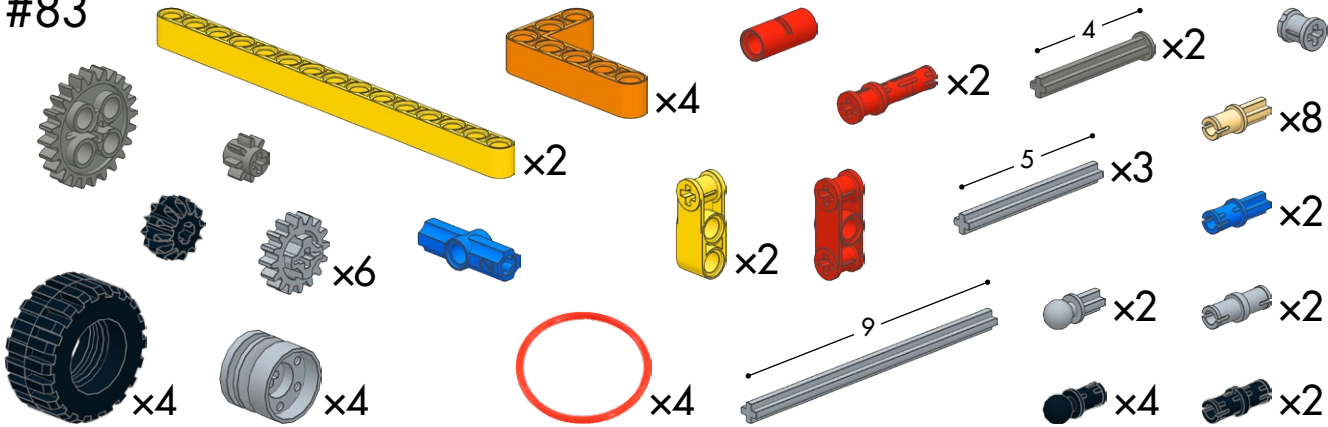


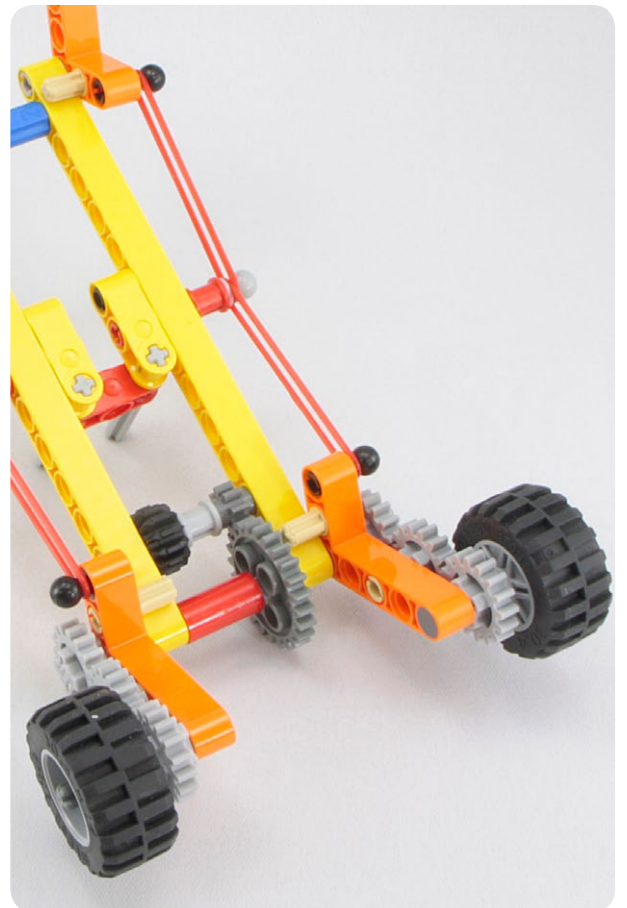
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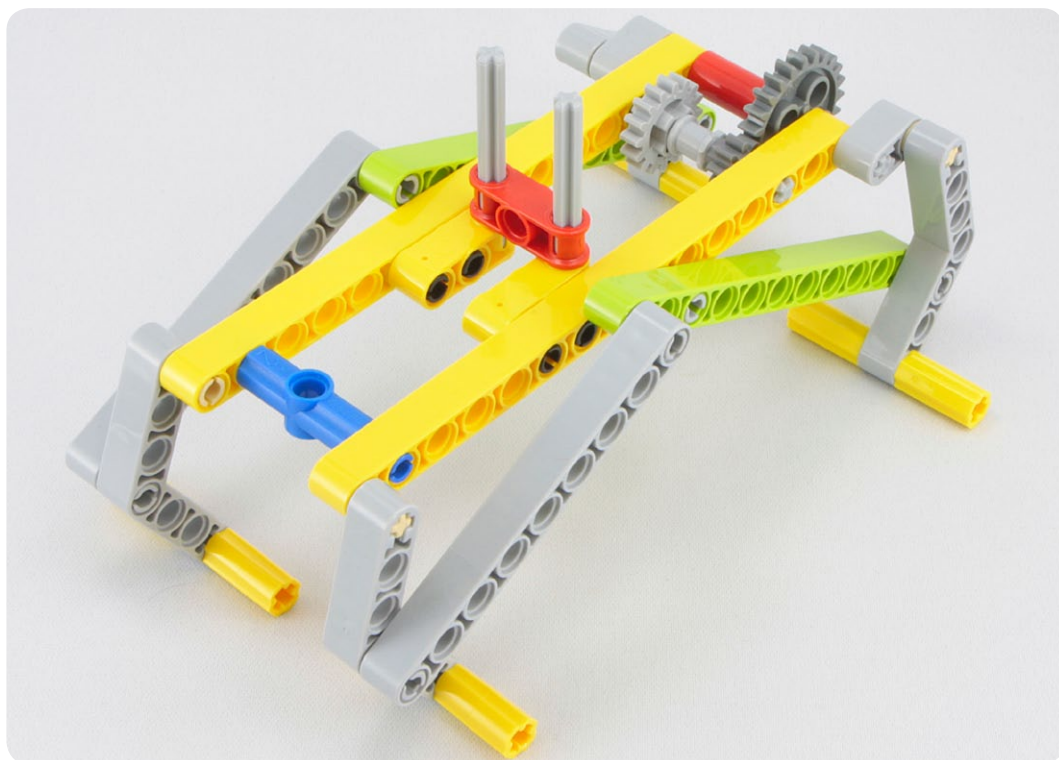
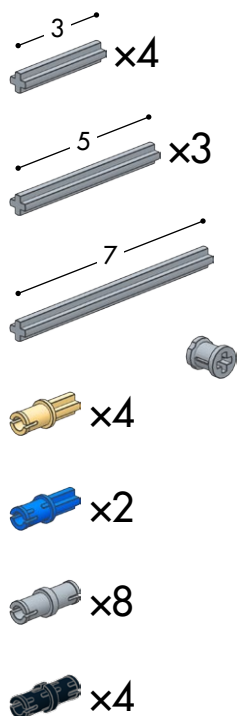
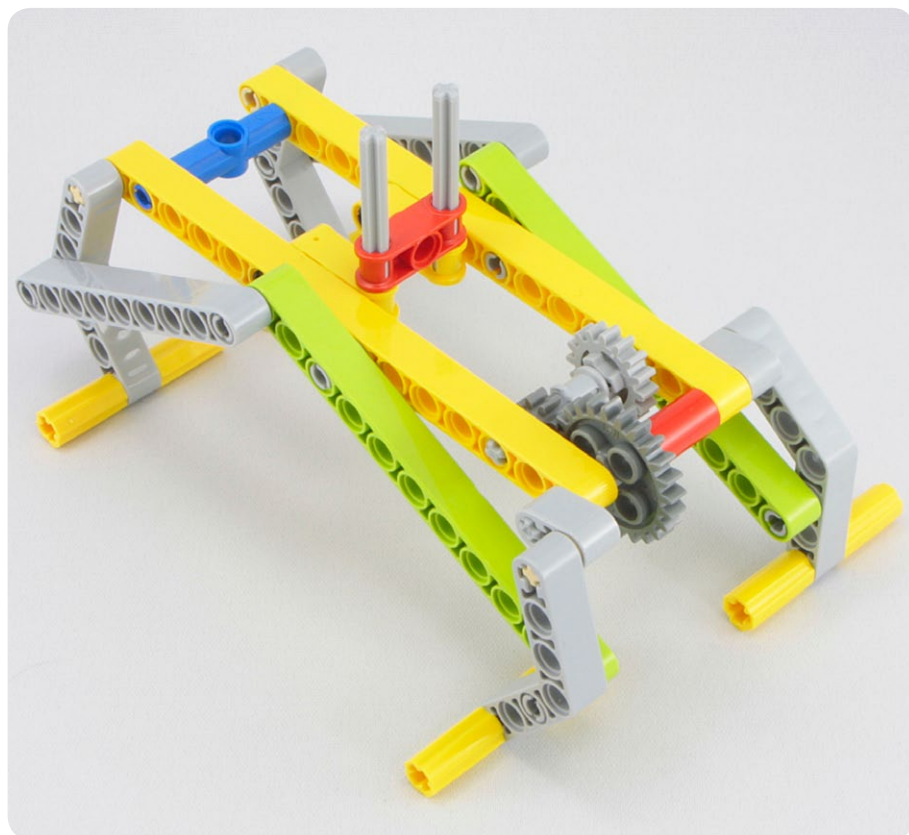
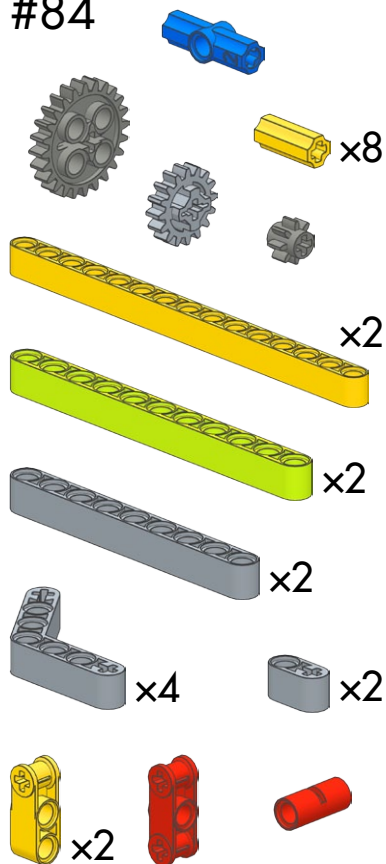


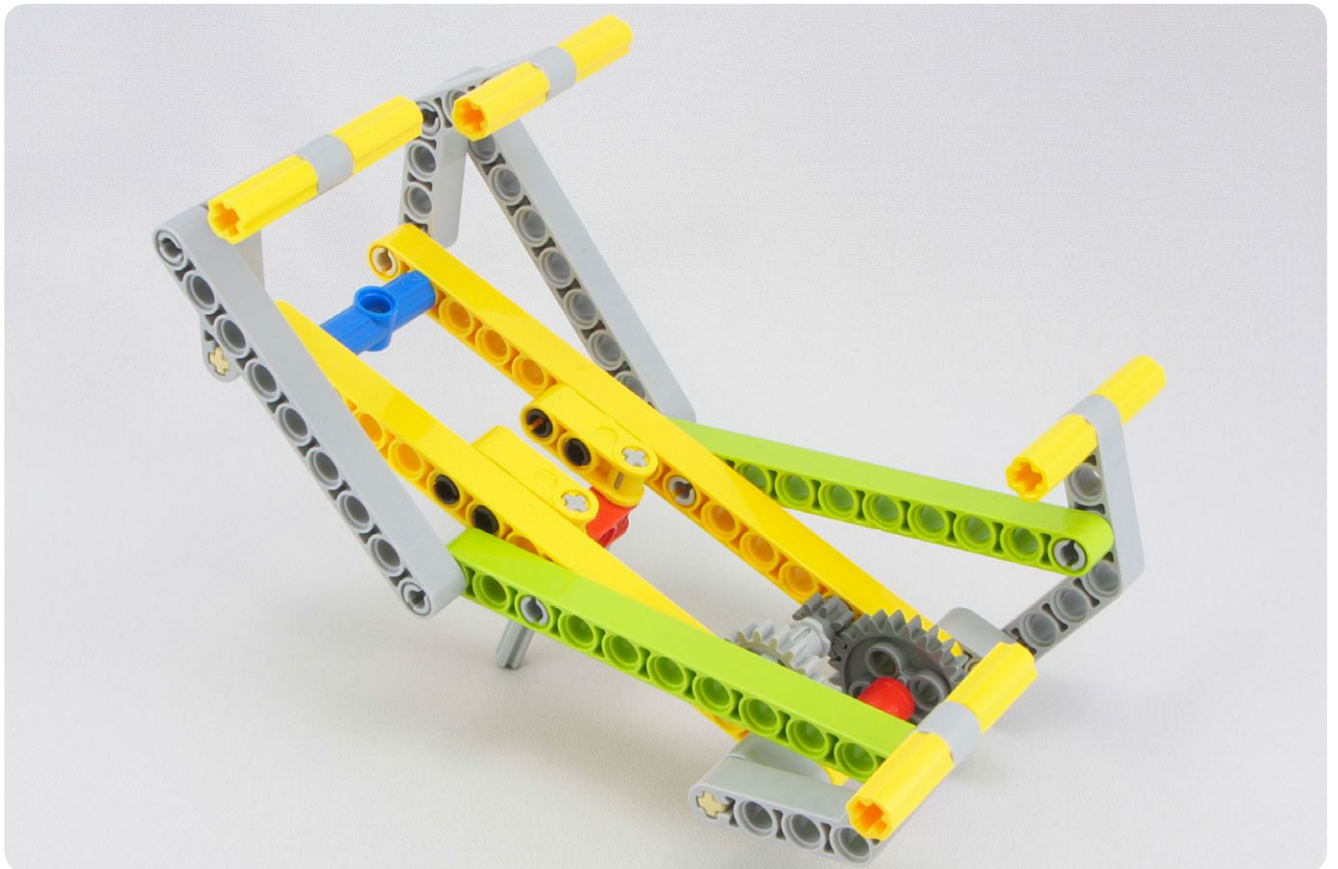
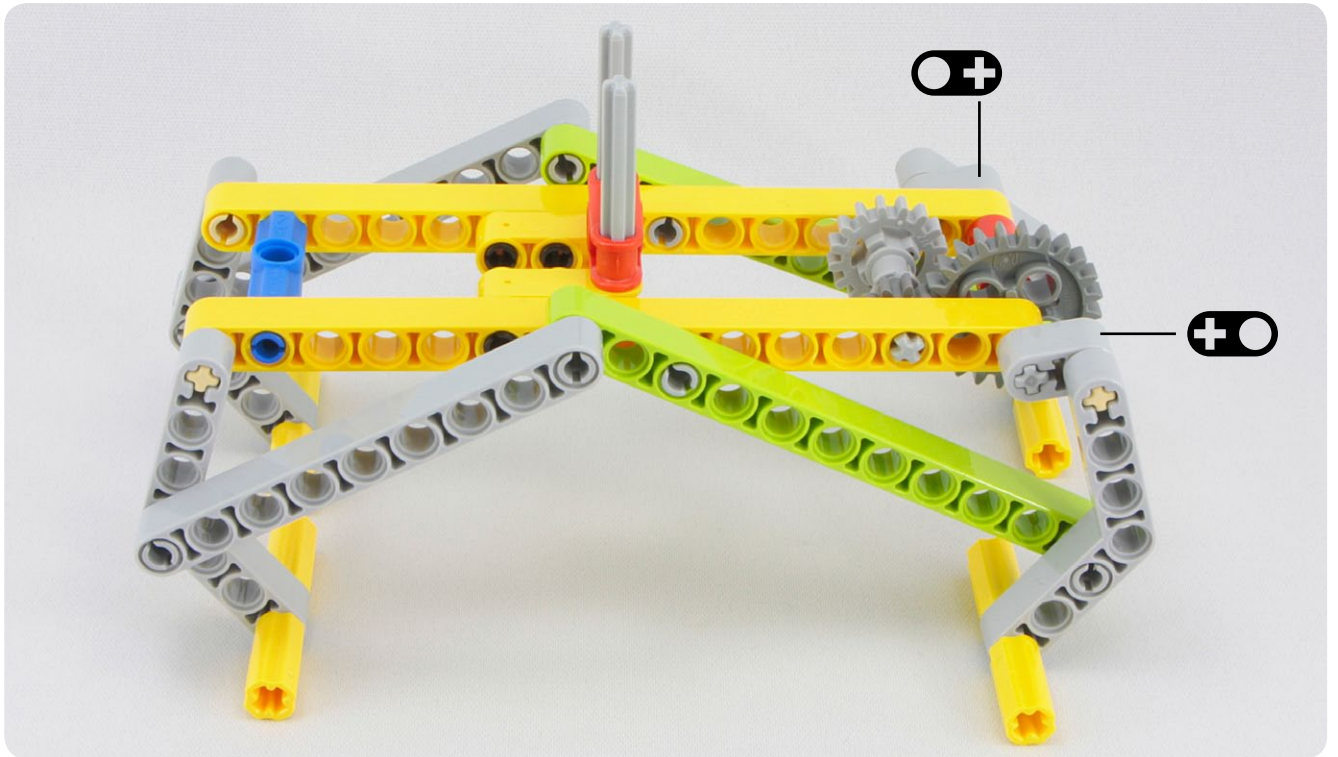
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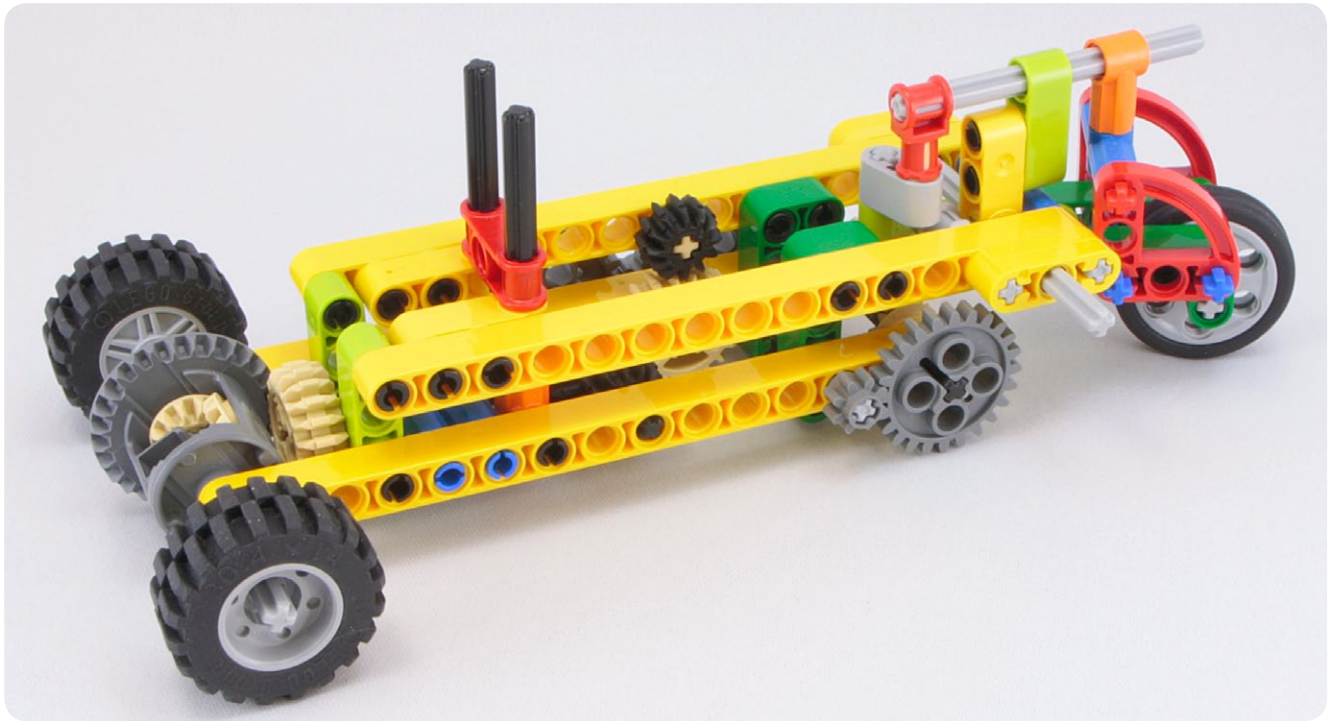


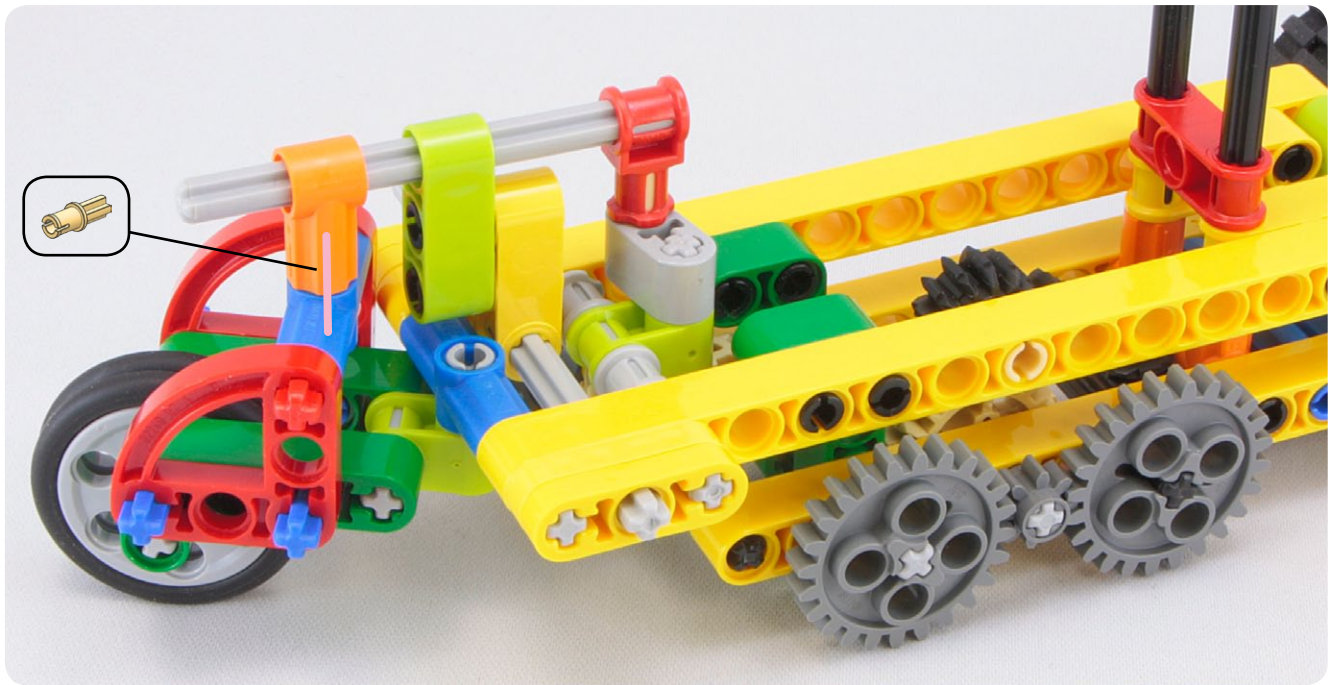
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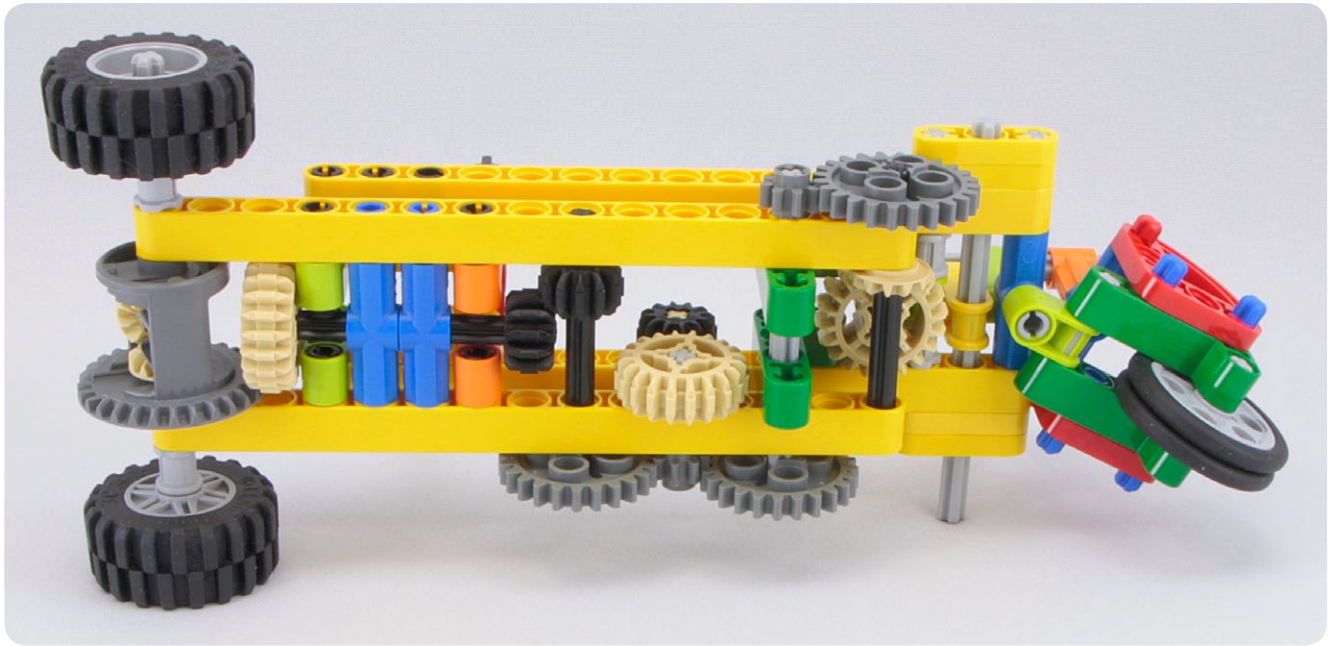


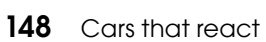


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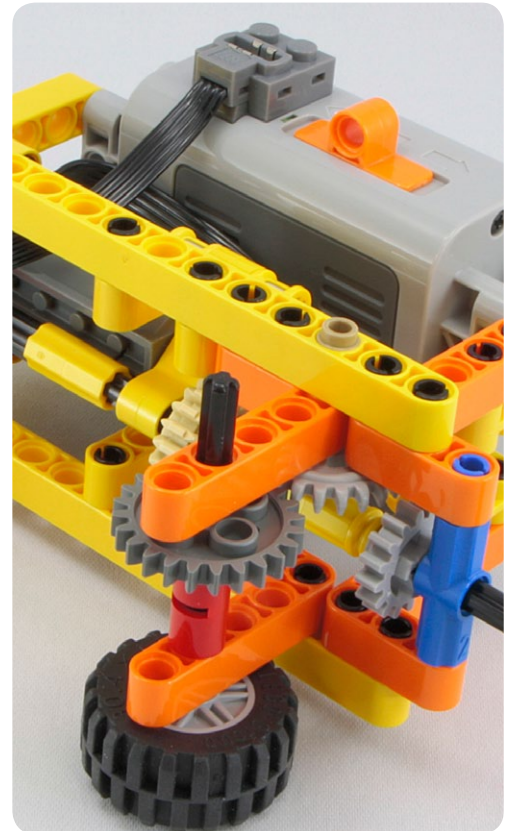
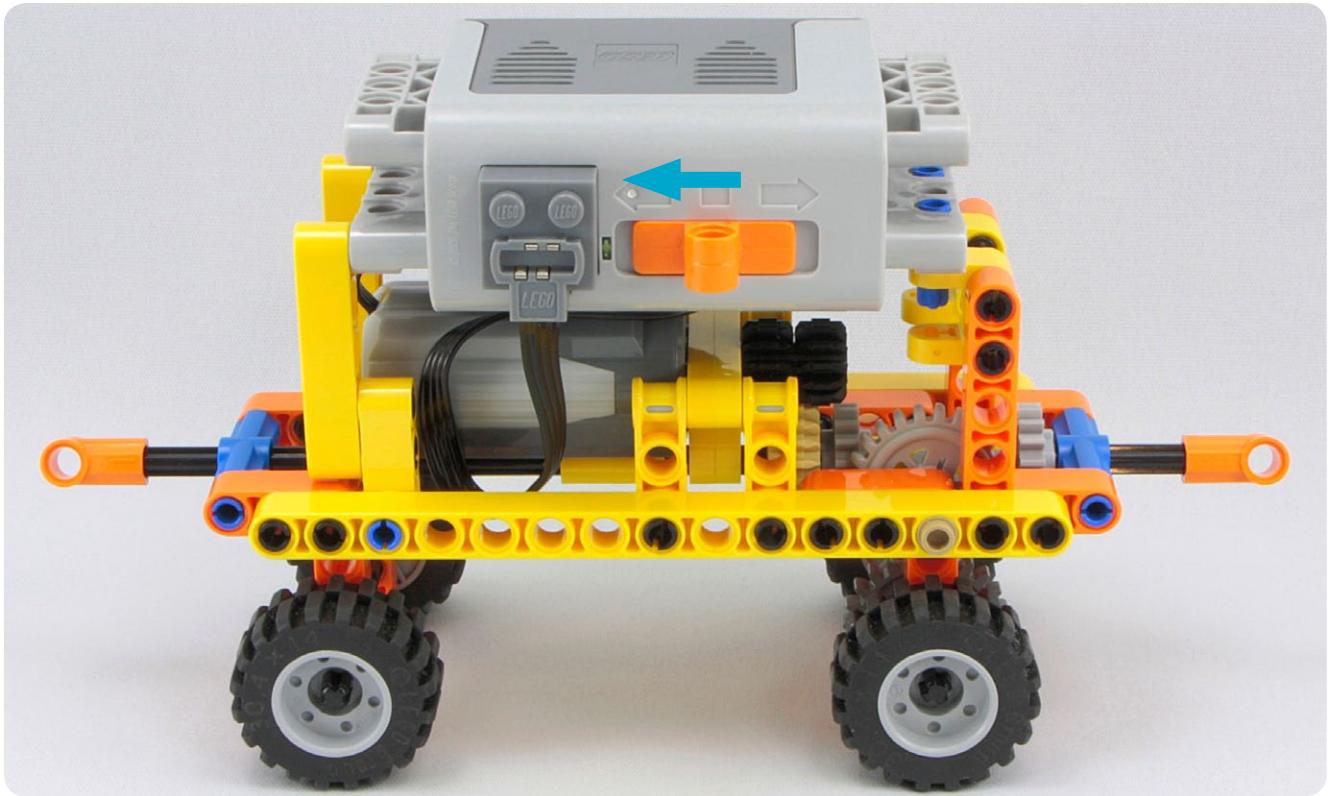


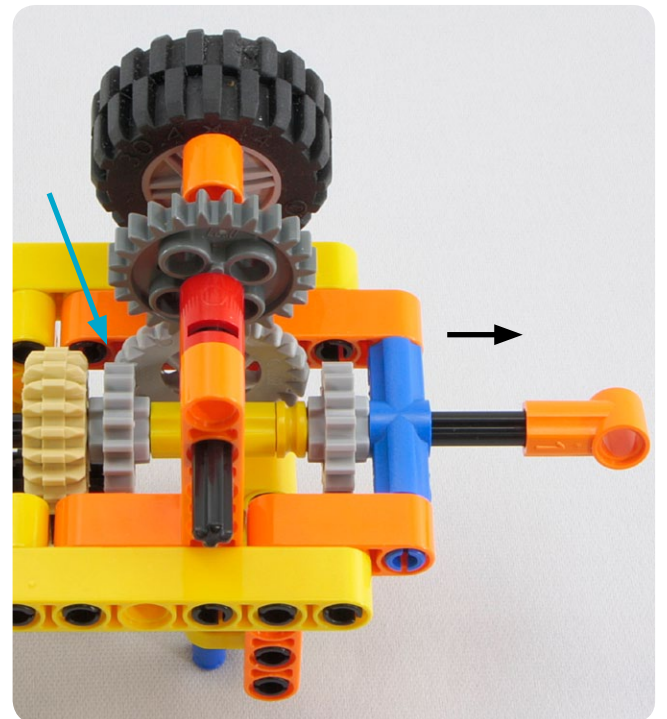
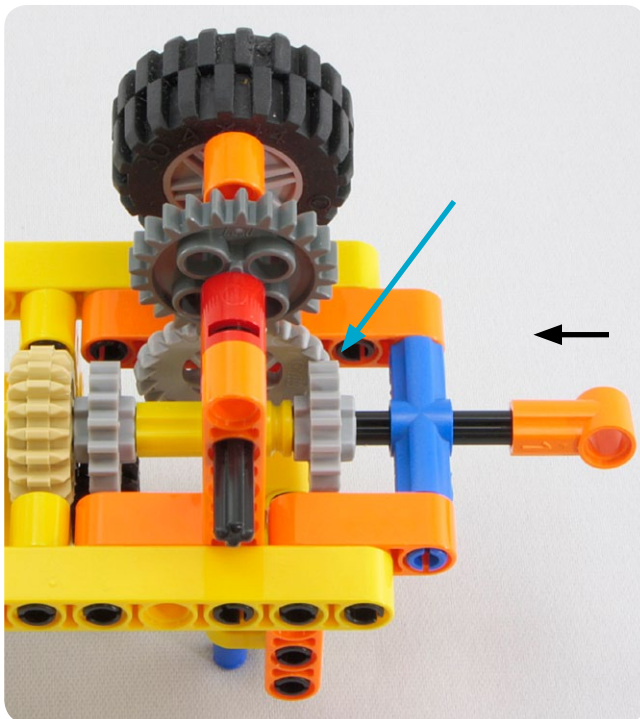
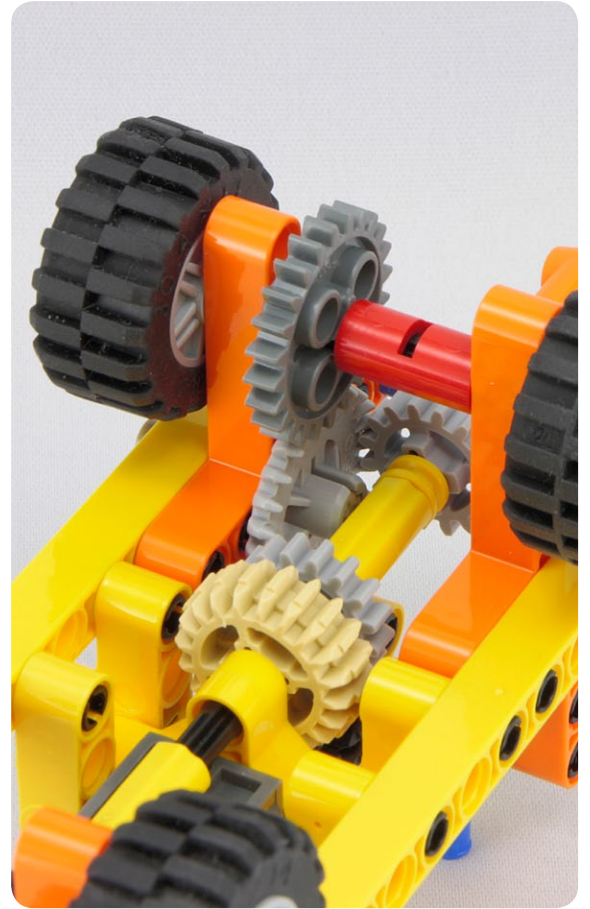




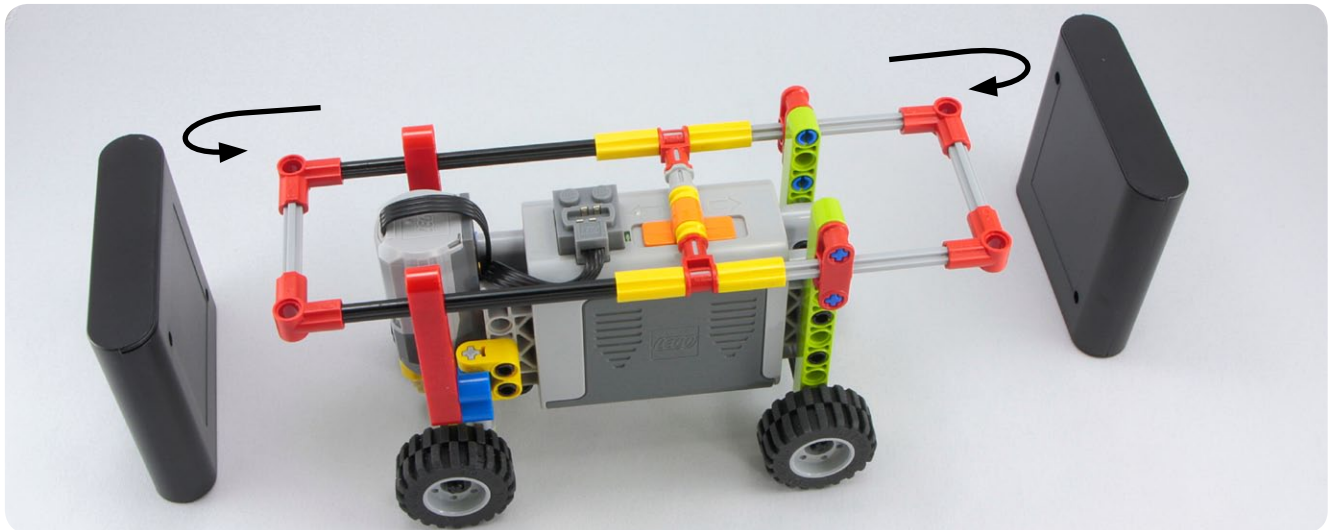
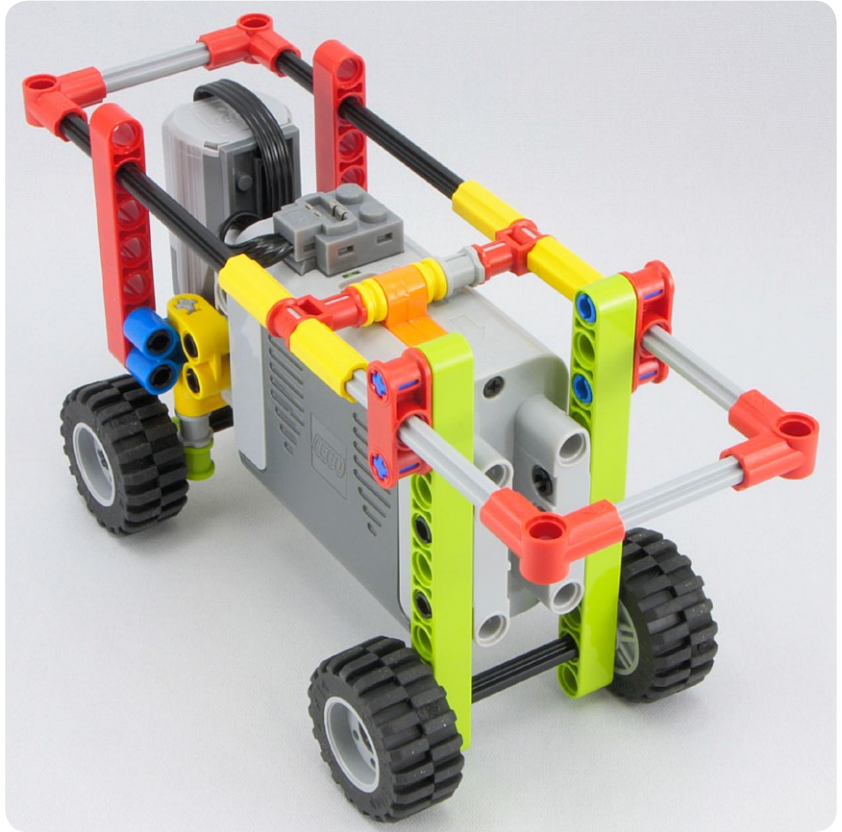
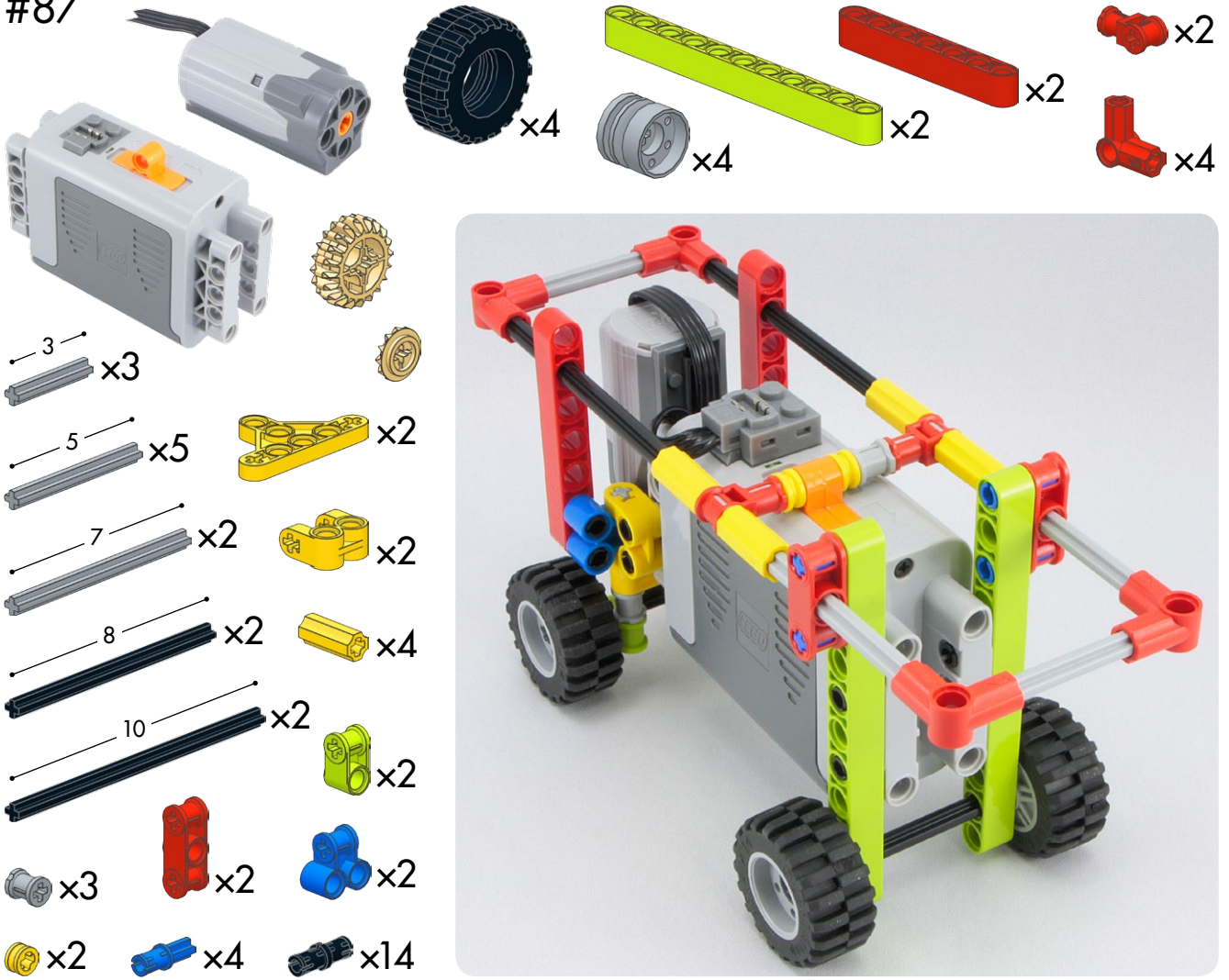
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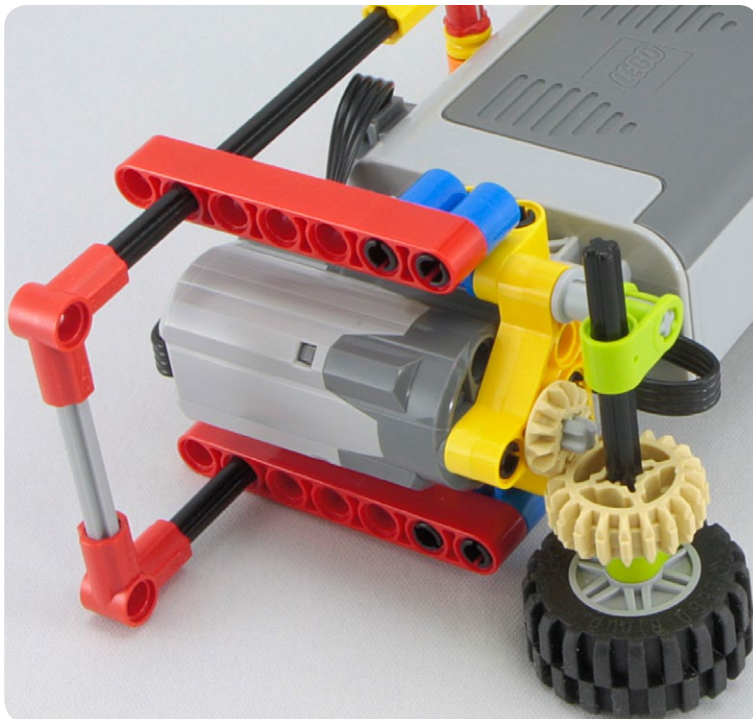
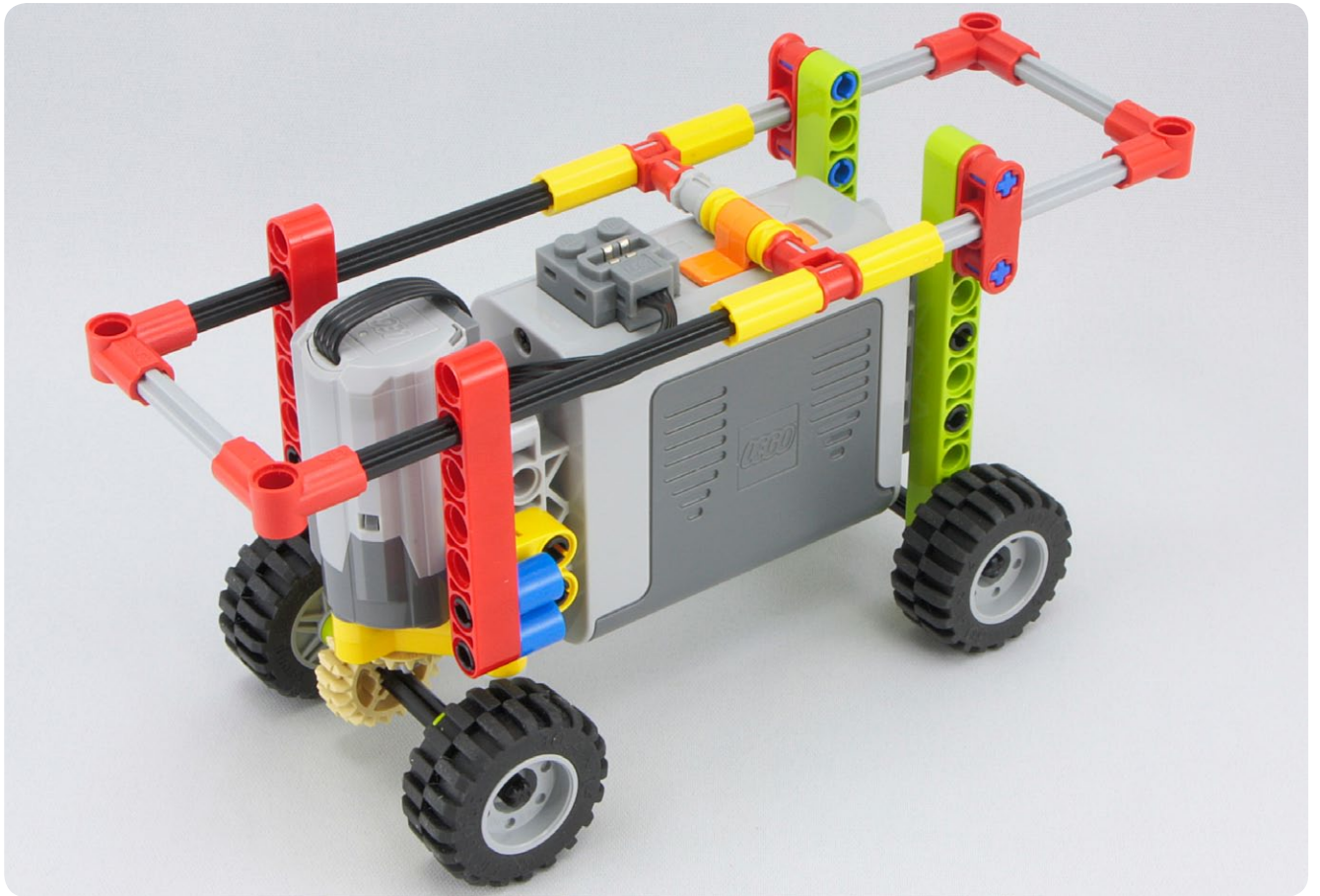




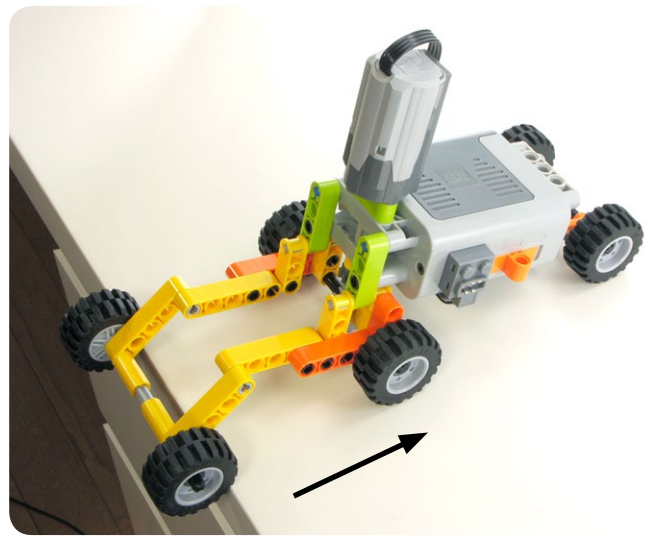
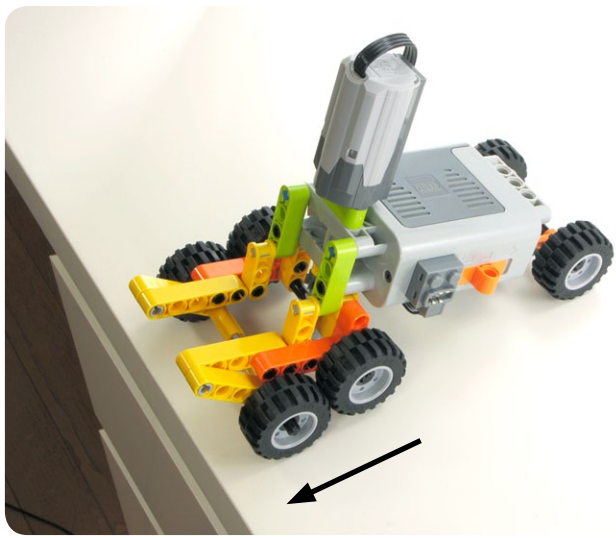
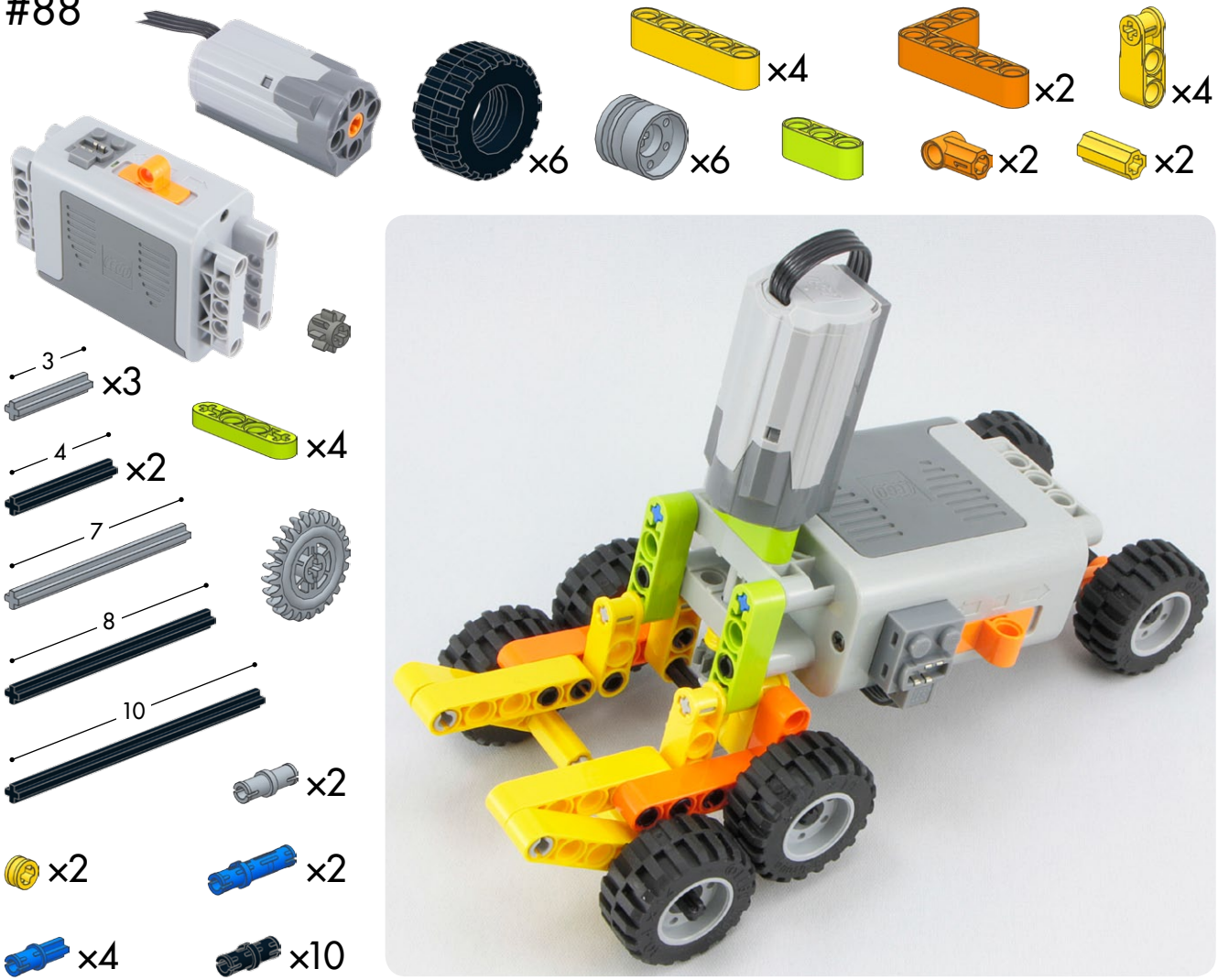


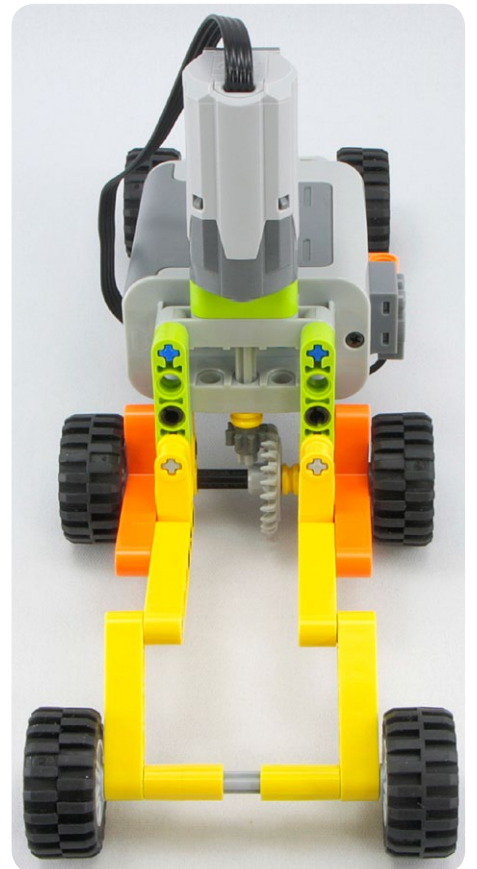
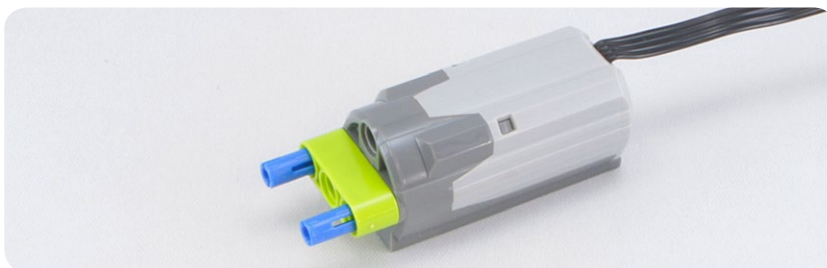
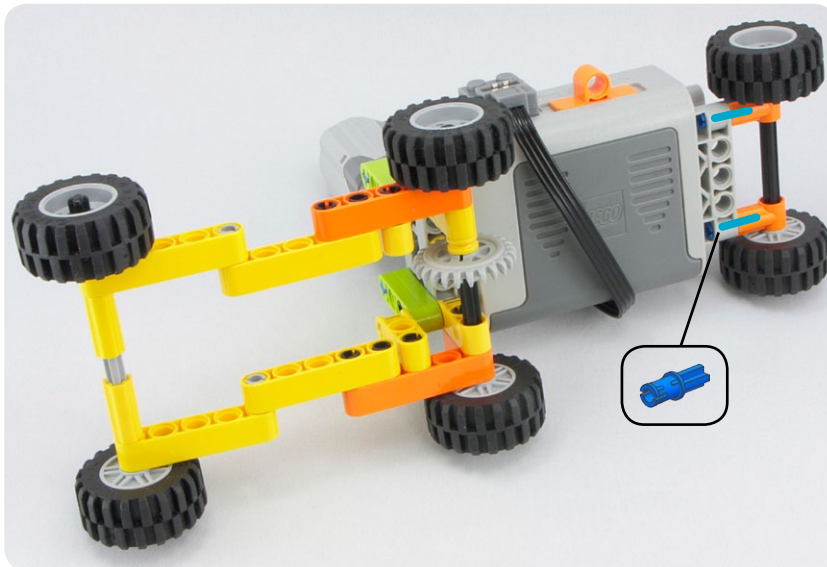
#87





#88

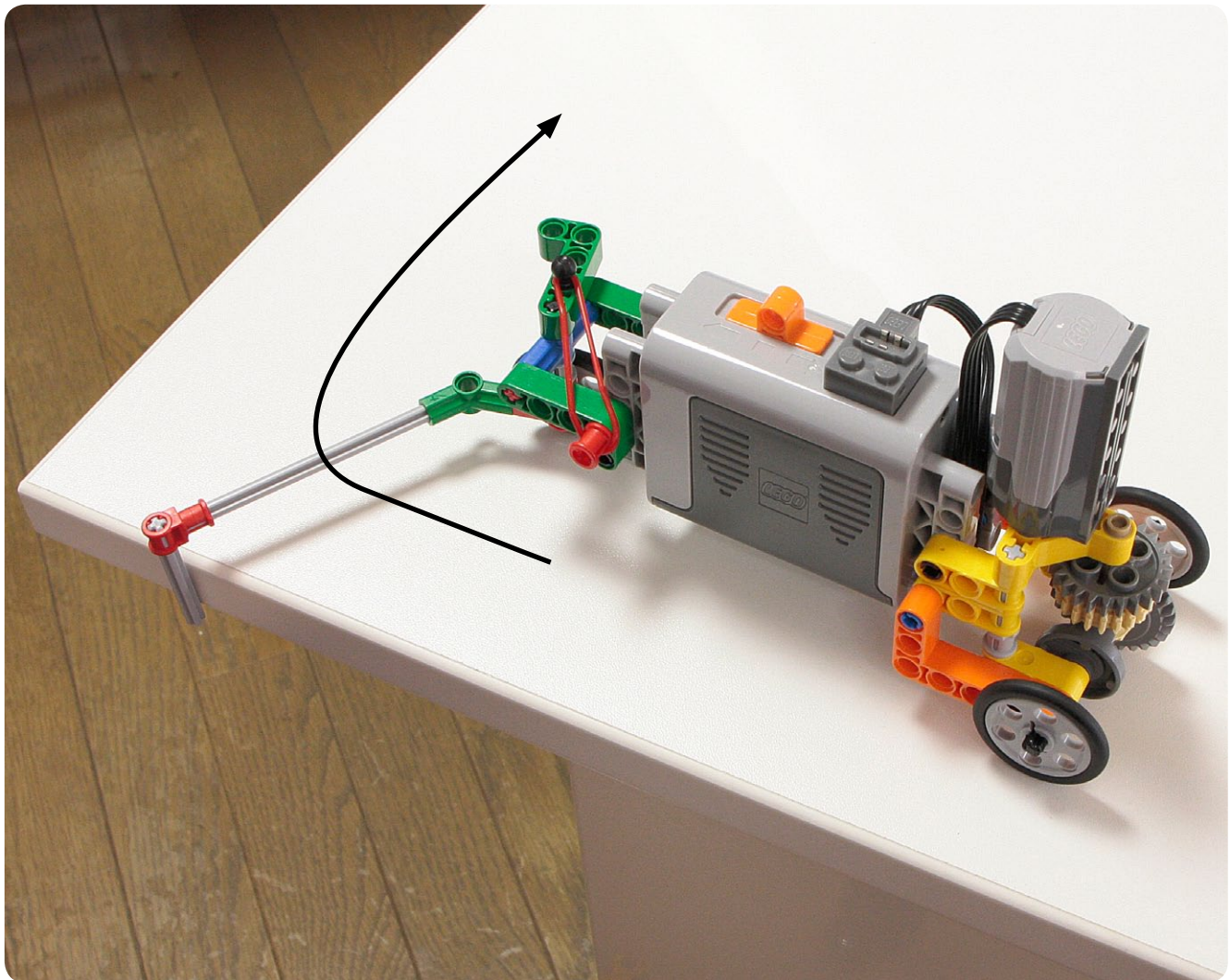


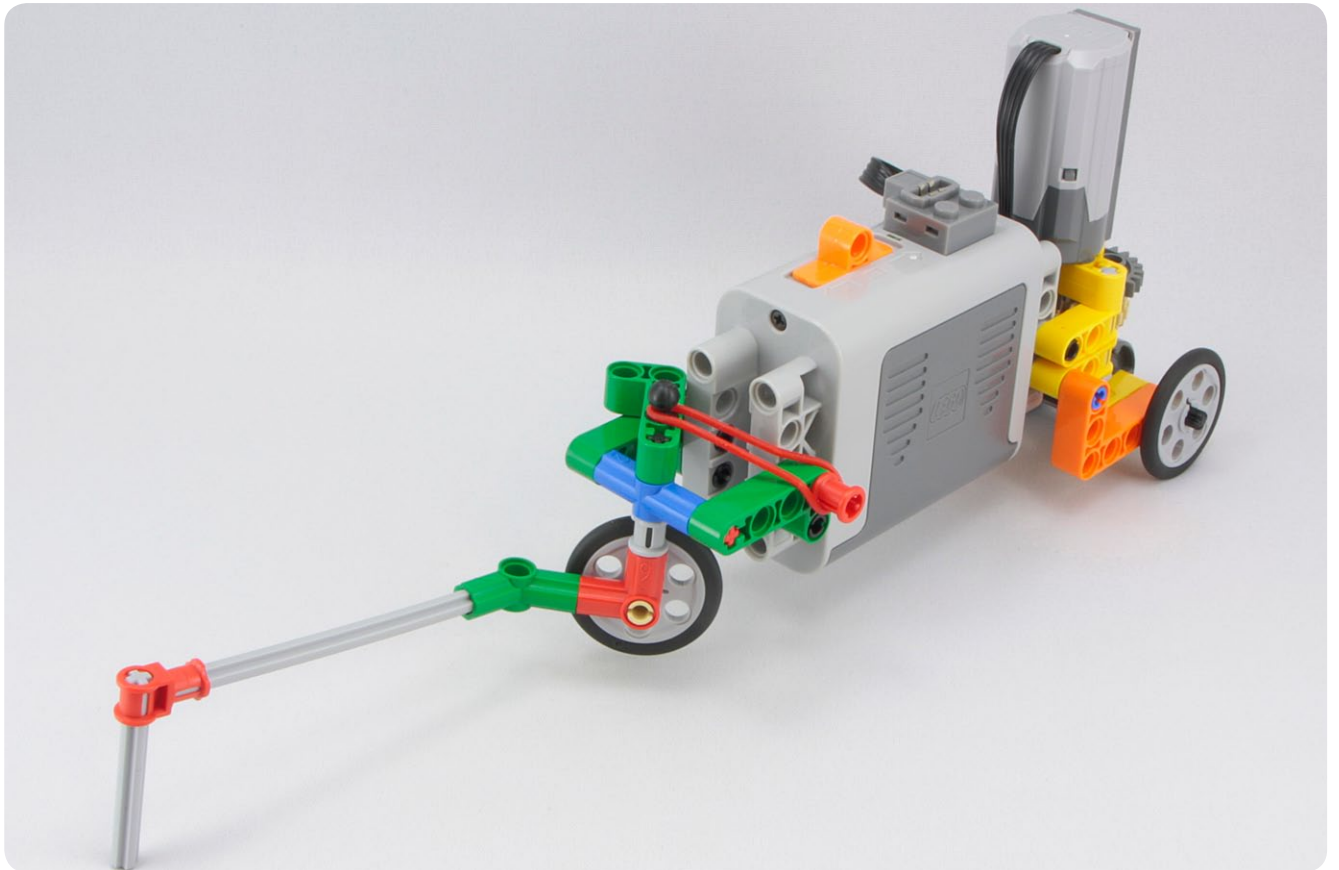


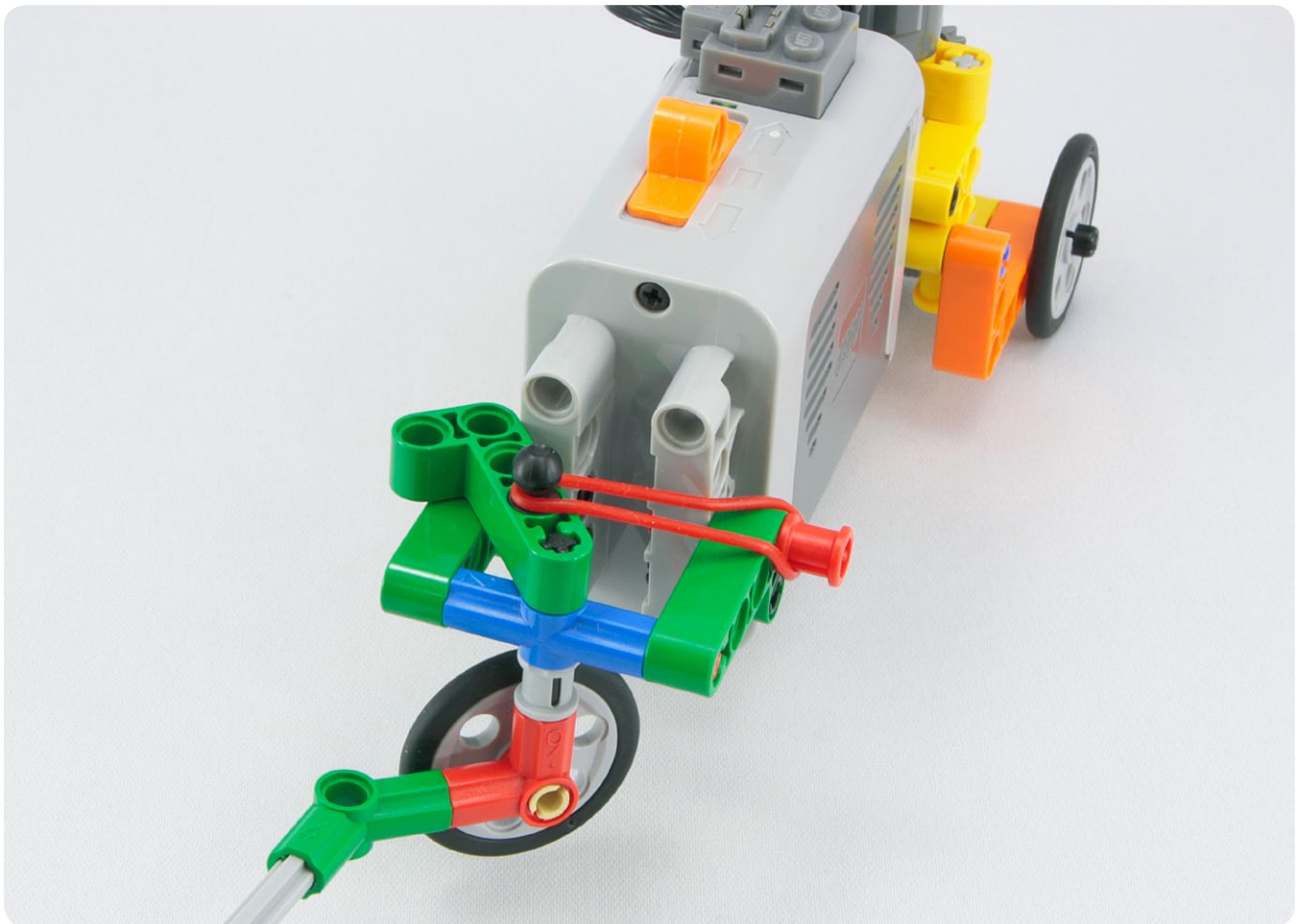
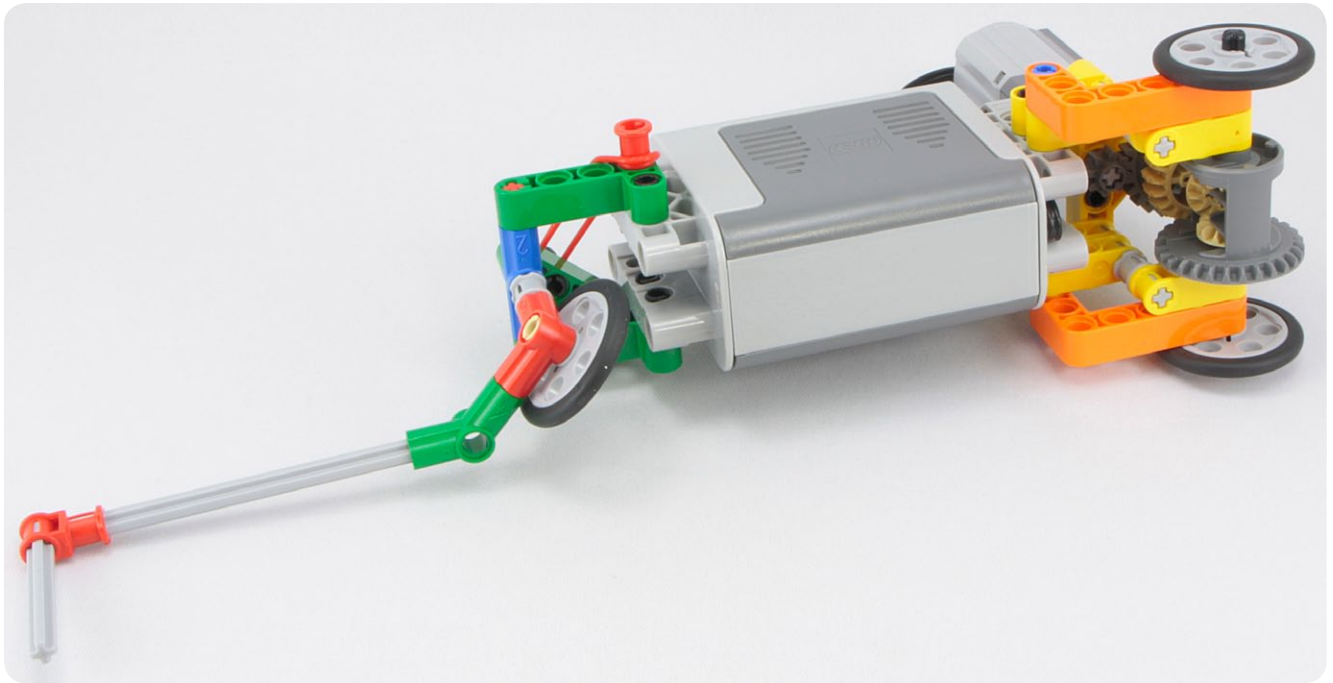
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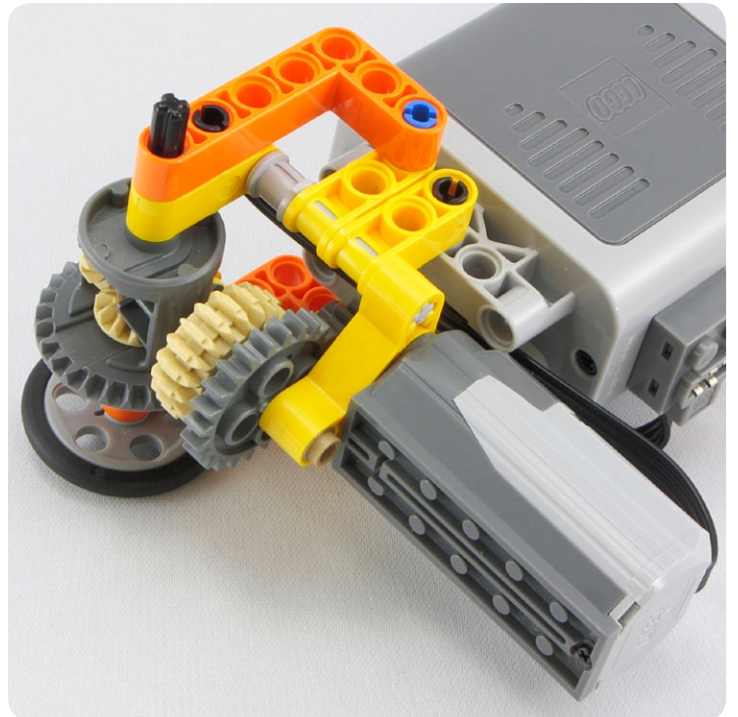
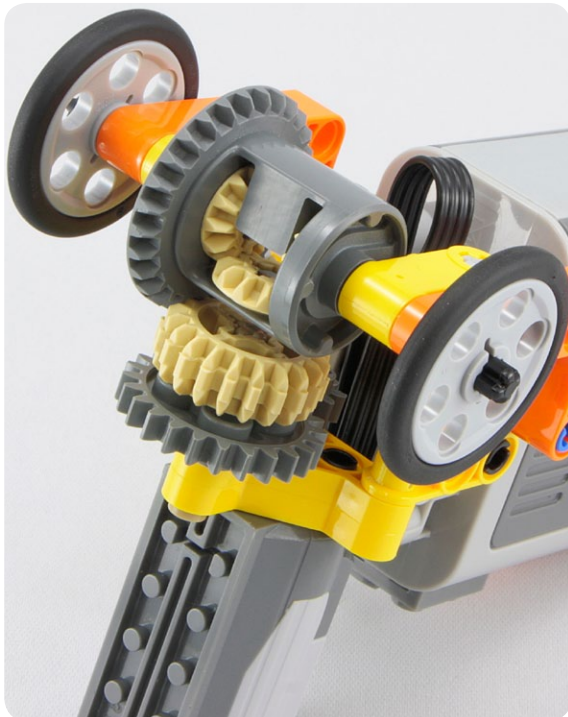
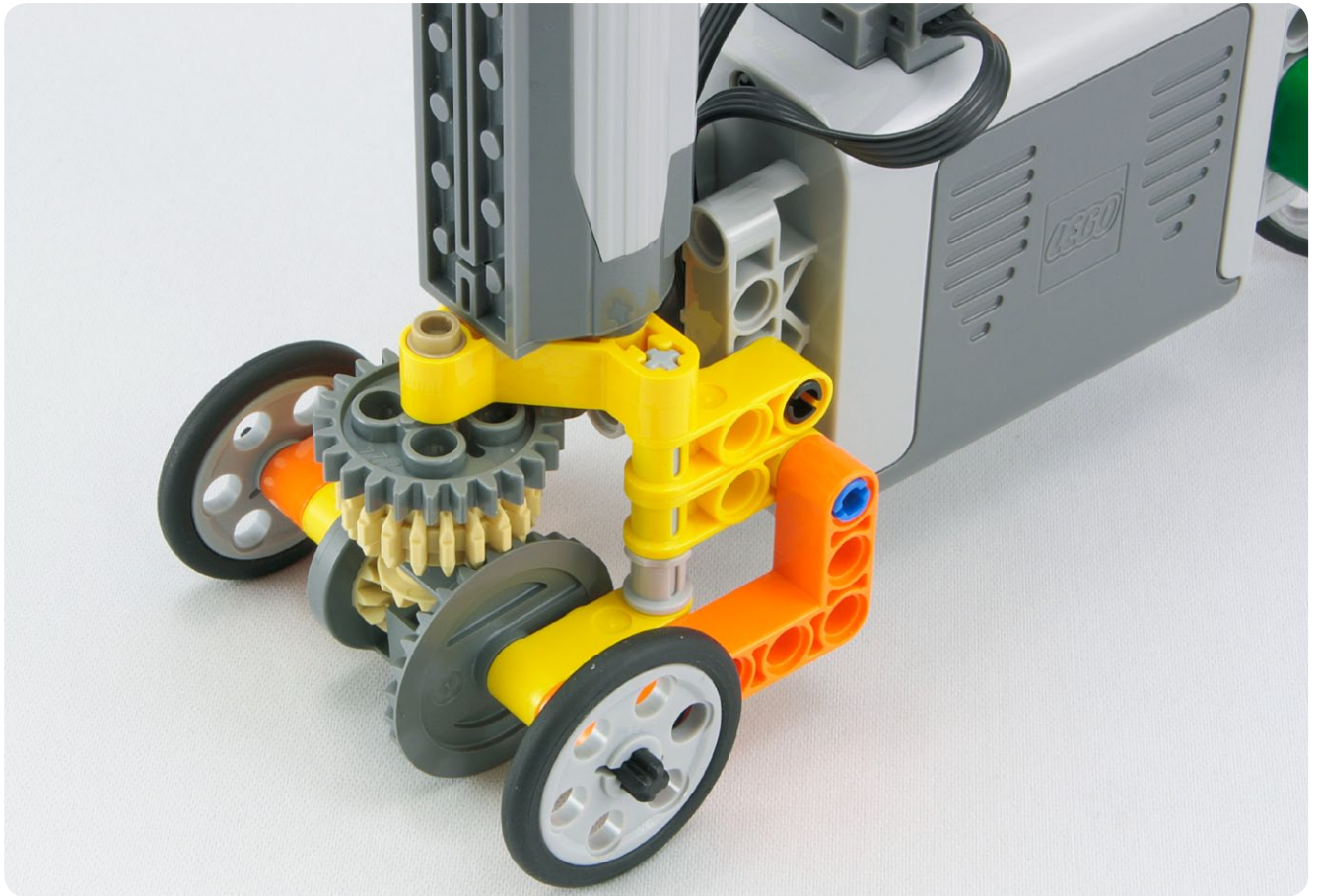
This image displays the components required for step 89 of a LEGO construction project. The parts are arranged in a grid-like fashion, each labeled with its quantity. The items include:

- 1x Large grey motor assembly with a black cable.
- 2x Orange 1x3 Technic beam.
- 3x Green 1x3 L-shaped Technic beam.
- 2x Yellow 1x3 T-shaped Technic beam.
- 2x Red 1x2 Pin.
- 3x Blue 1x2 Pin.
- 3x Green 1x2 Pin.
- 3x Red 1x2 Pin.
- 3x Black 1x3 Pin.
- 3x Grey 1x3 Pin.
- 3x Tan 1x3 Pin.
- 3x Grey 1x2 Pin.
- 3x Yellow 1x2 Pin.
- 3x Red 1x2 Pin.
- 3x Blue 1x2 Pin.
- 3x Black 1x3 Pin.
- 3x Grey 1x3 Pin.
- 3x Tan 1x3 Pin.
- 3x Red 1x2 Pin.
- 3x Blue 1x2 Pin.
- 3x Black 1x3 Pin.
- 3x Grey 1x3 Pin.
- 3x Tan 1x3 Pin.





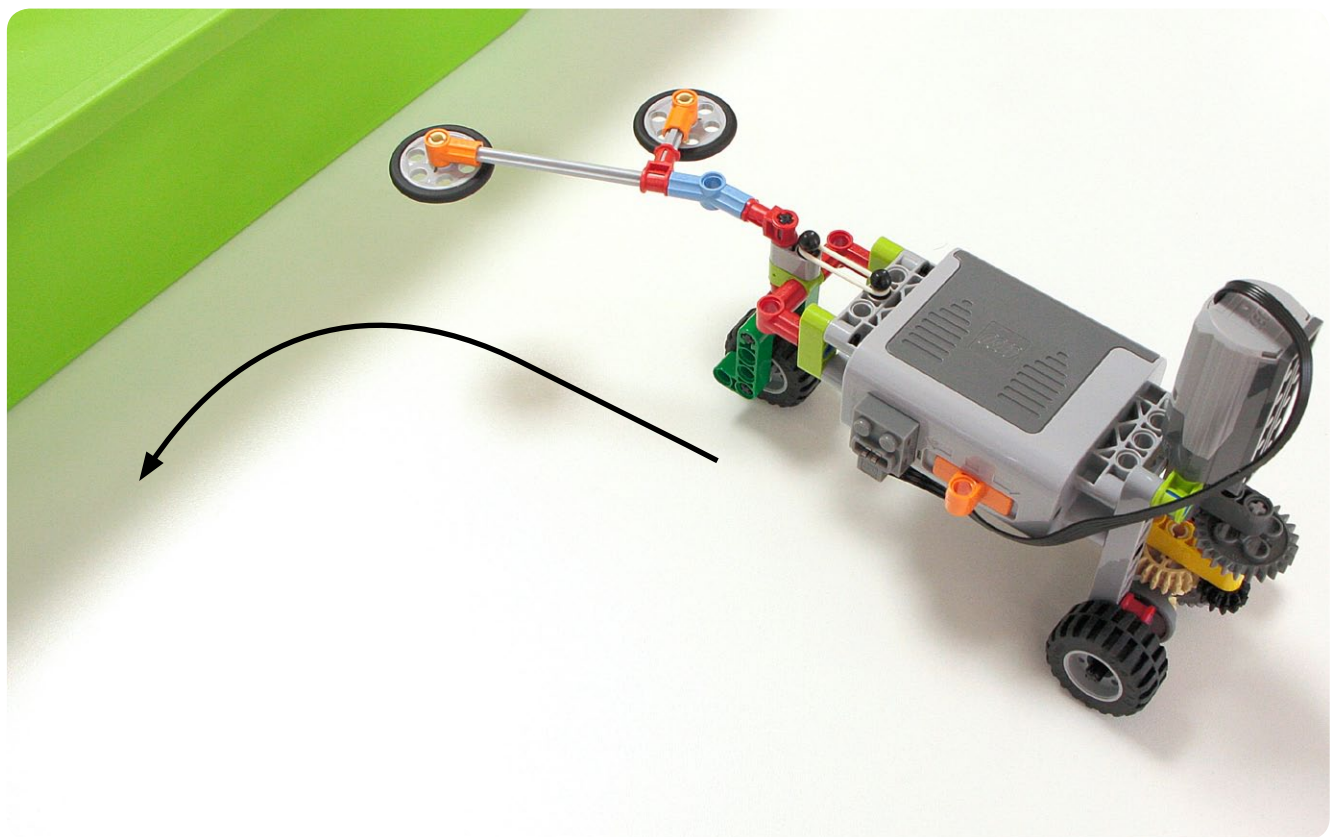


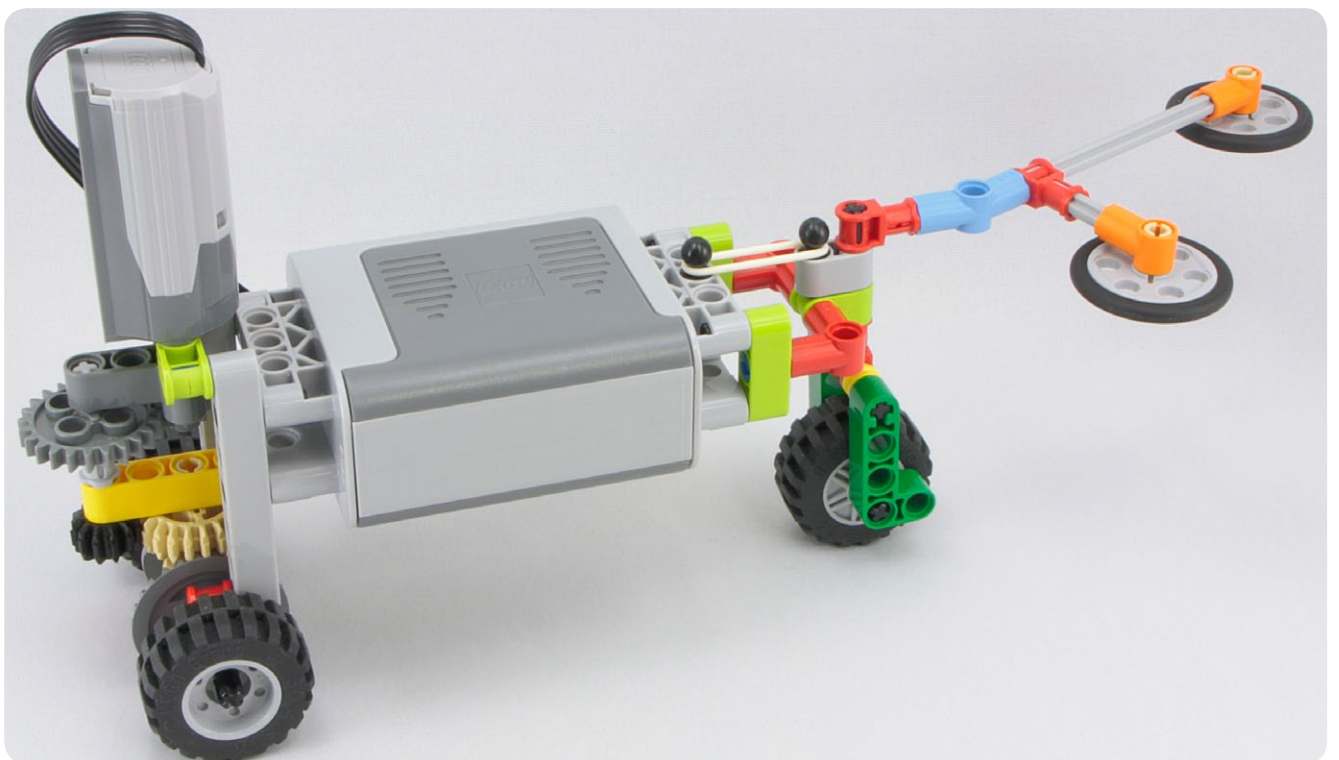
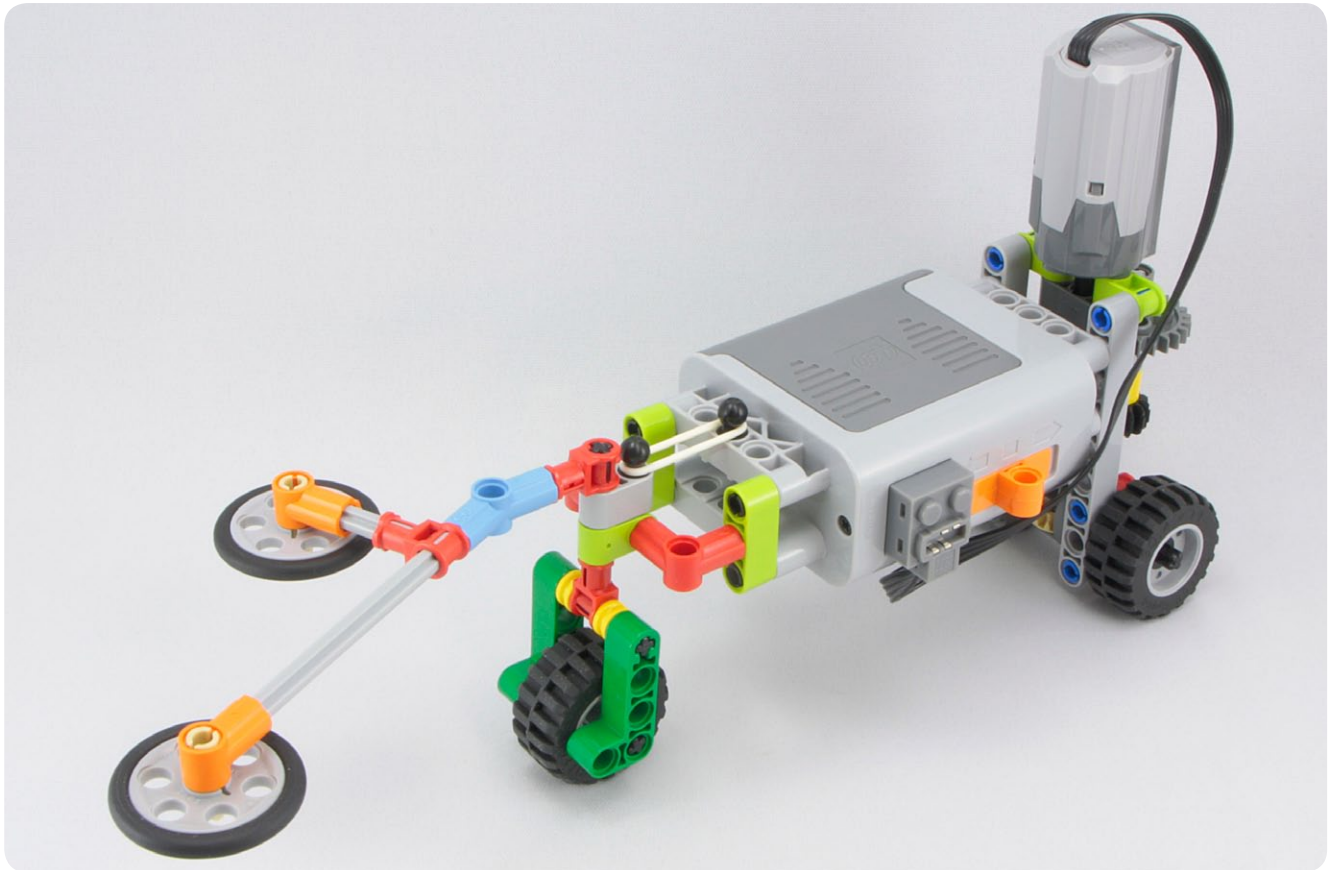


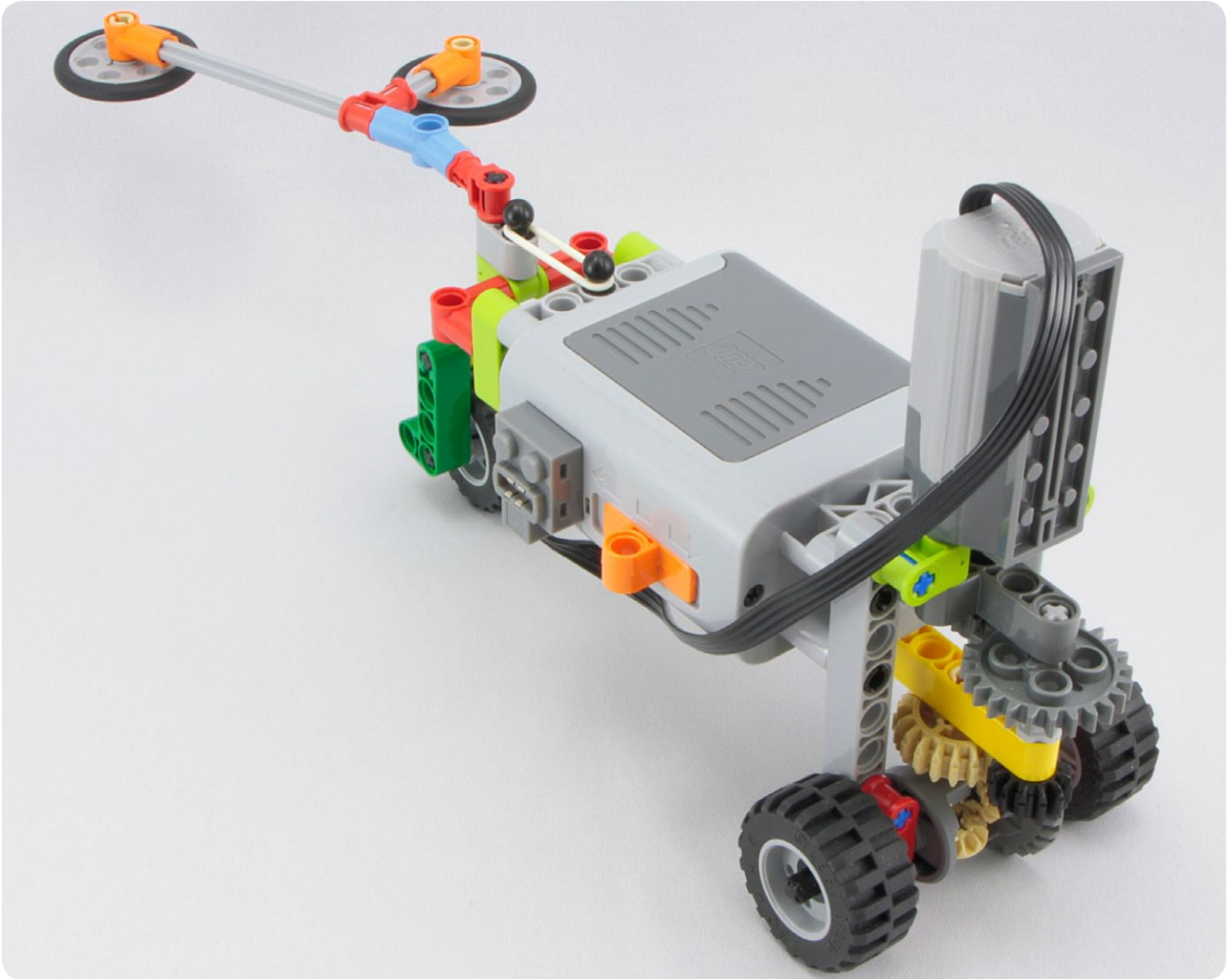
#90

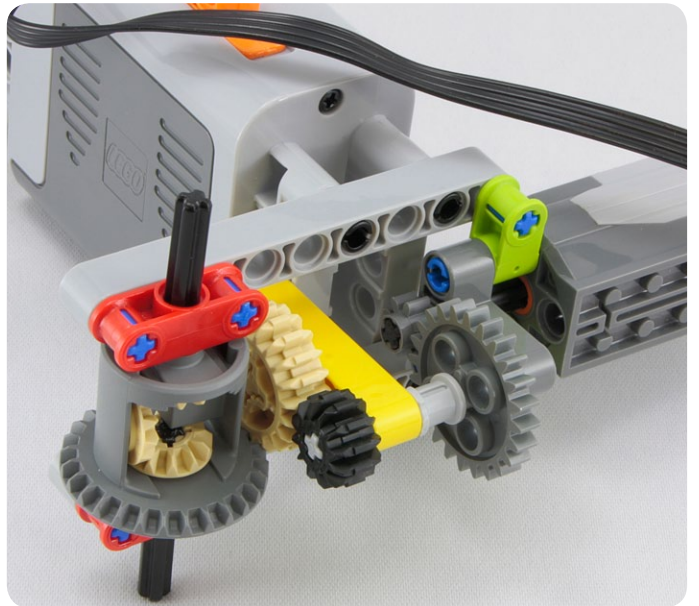
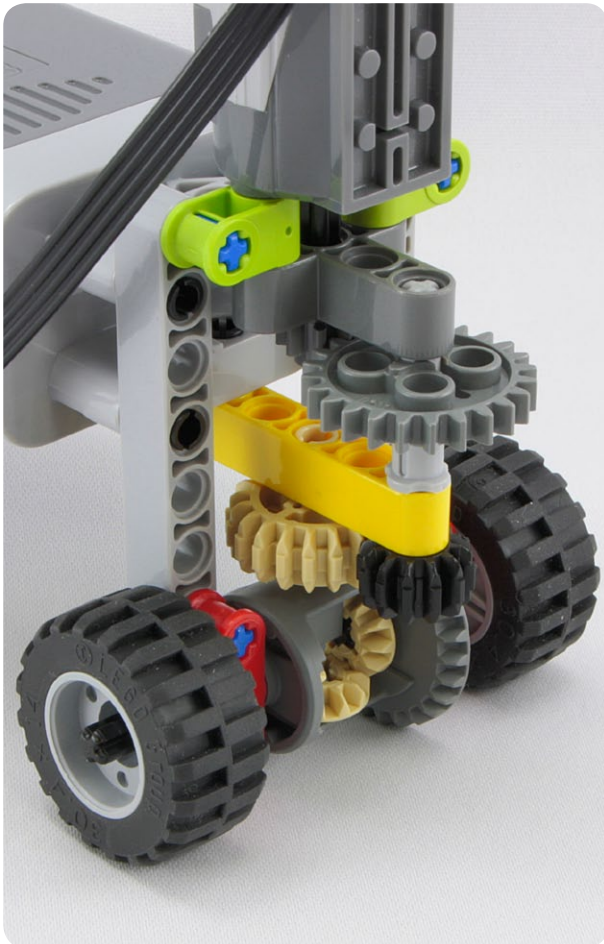
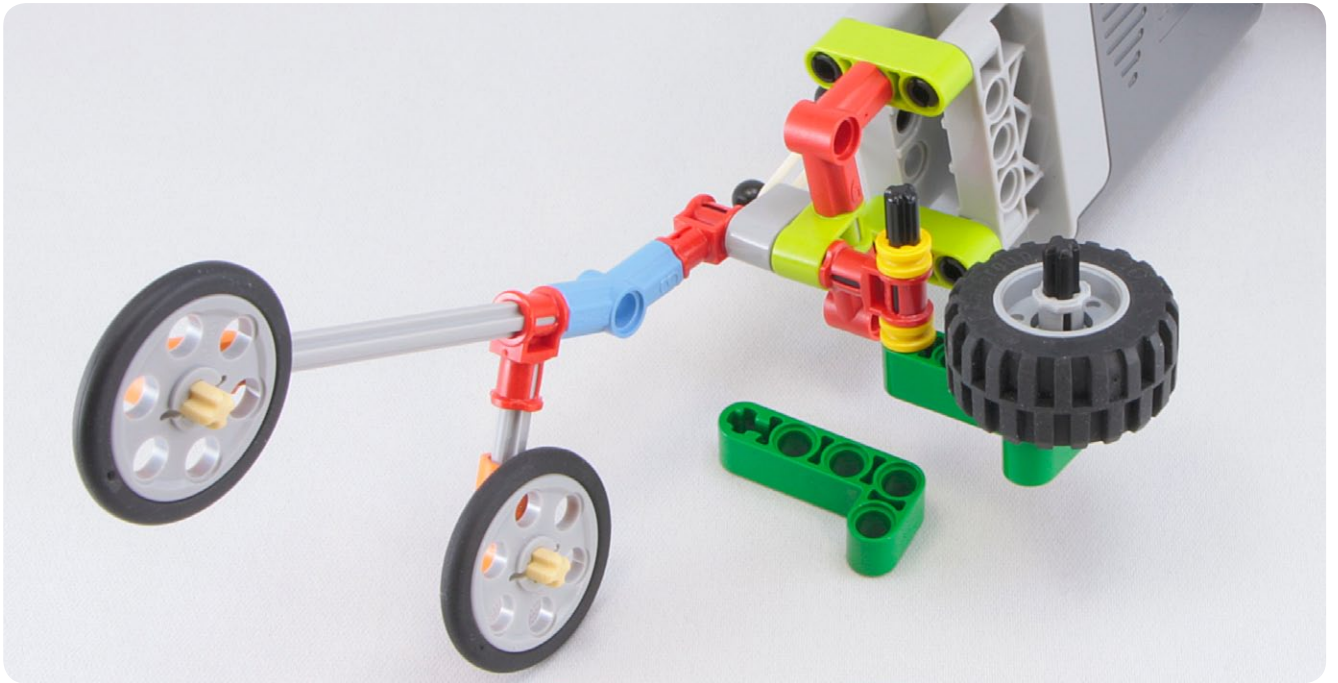
LEGO parts list for step 90:

- 1x Motor
- 1x Gear (24 teeth)
- 1x Gear (12 teeth)
- 1x Gear (8 teeth)
- 1x Gear (4 teeth)
- 1x Gear (2 teeth)
- 1x Tire
- 1x Wheel
- 1x Axle (3)
- 1x Axle (4)
- 1x Axle (5)
- 1x Axle (9)
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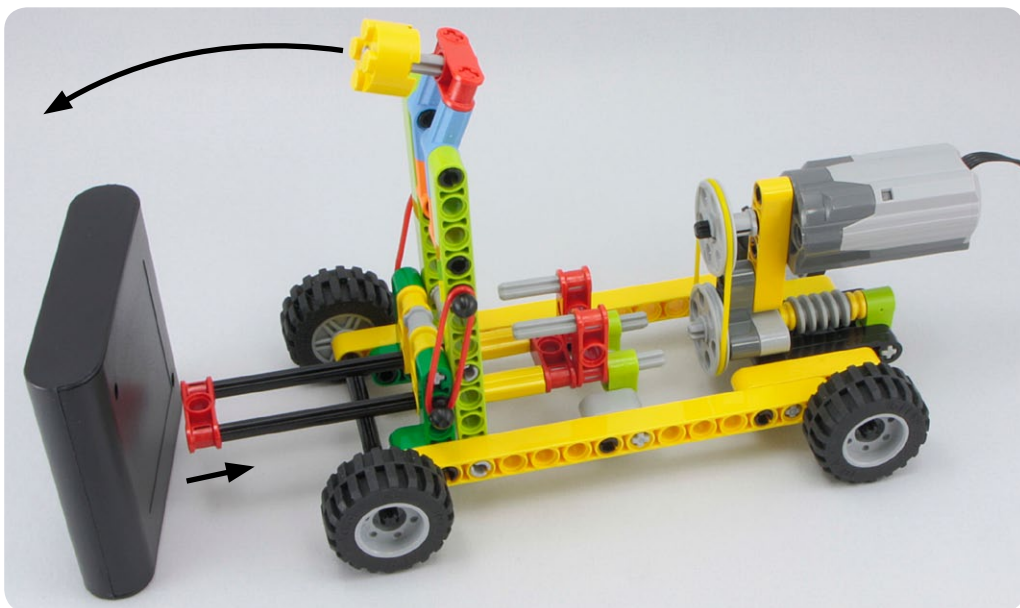
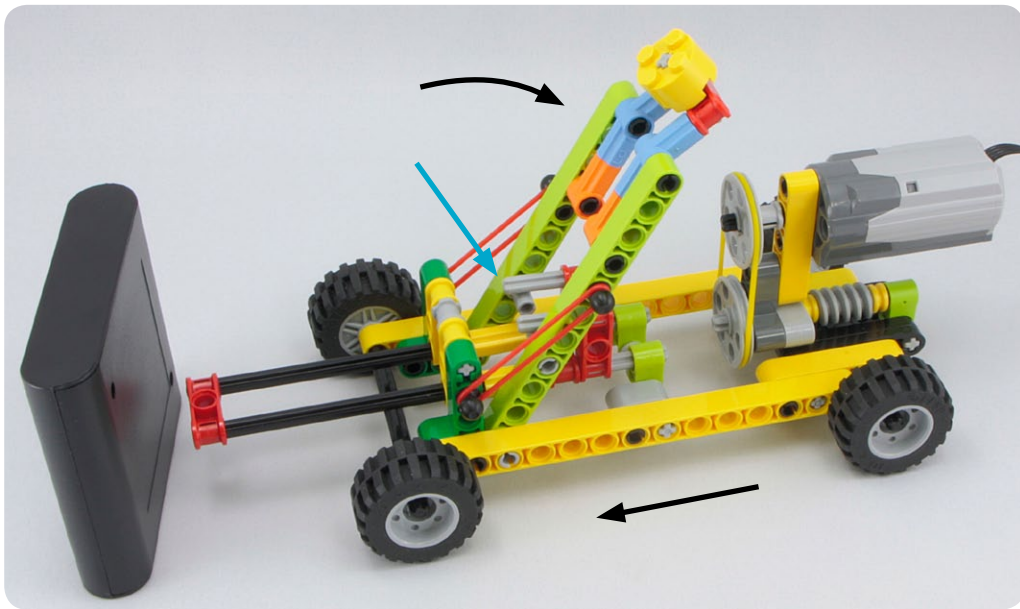
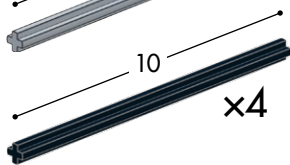
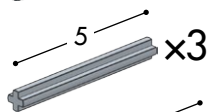
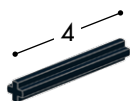
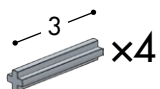
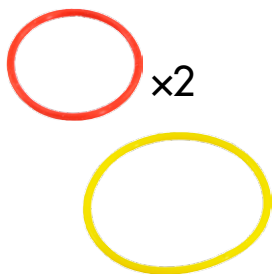
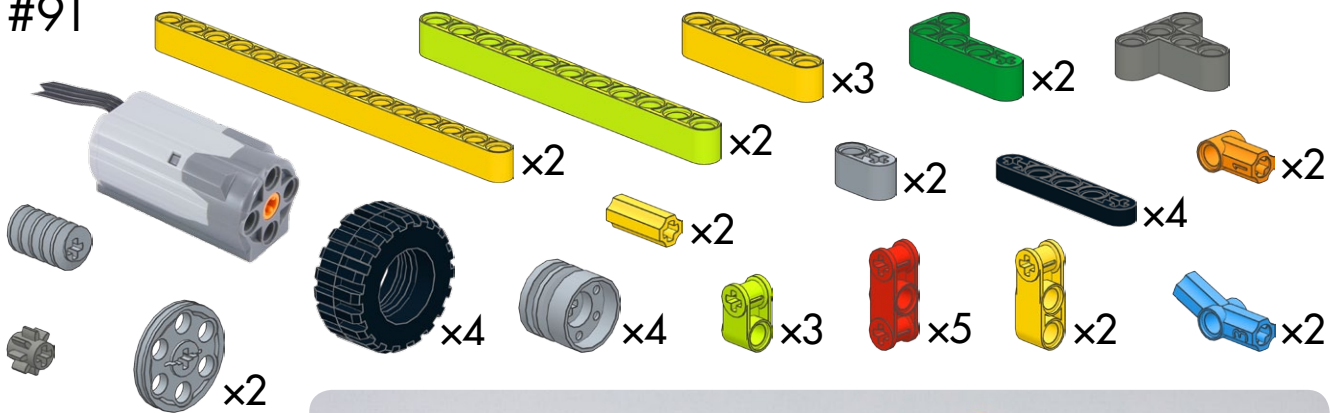




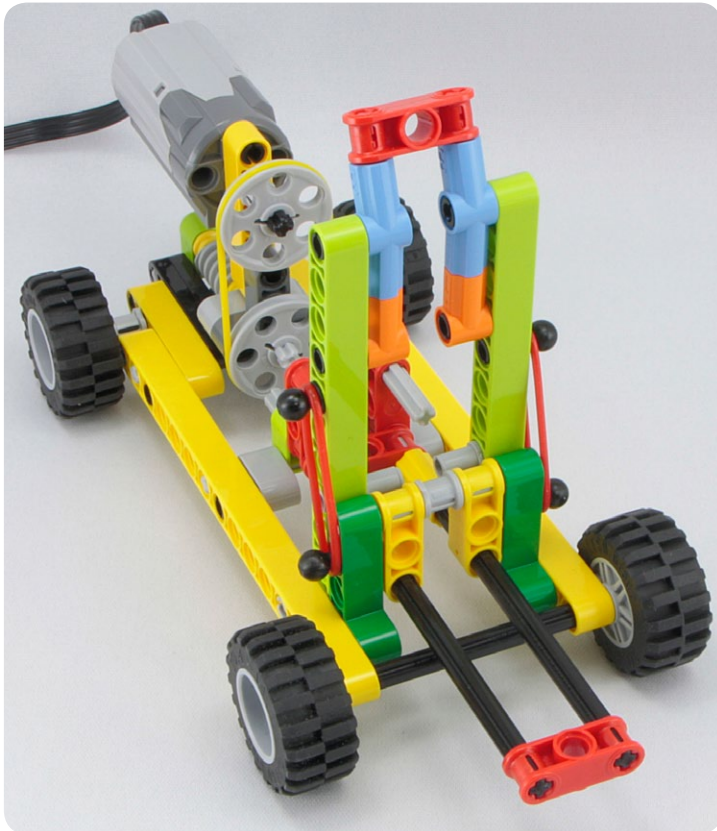
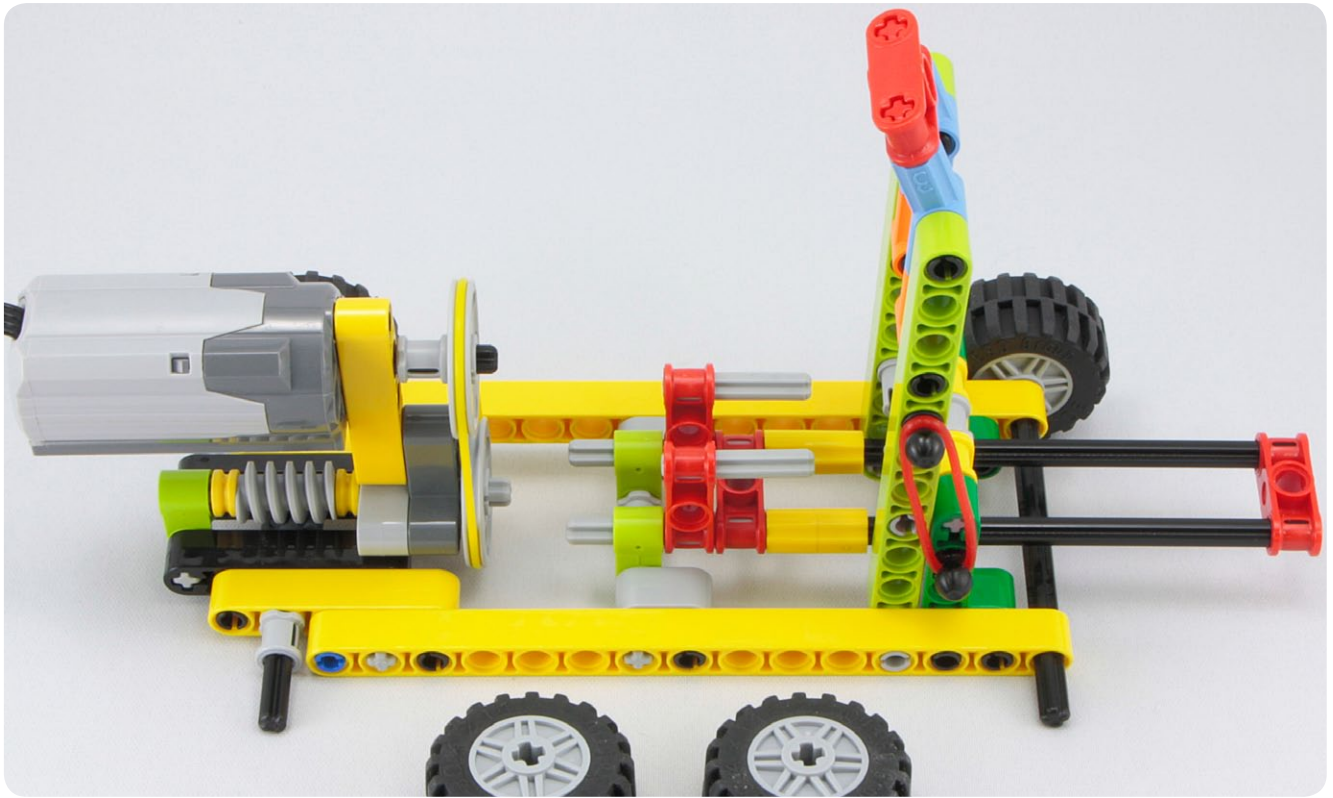


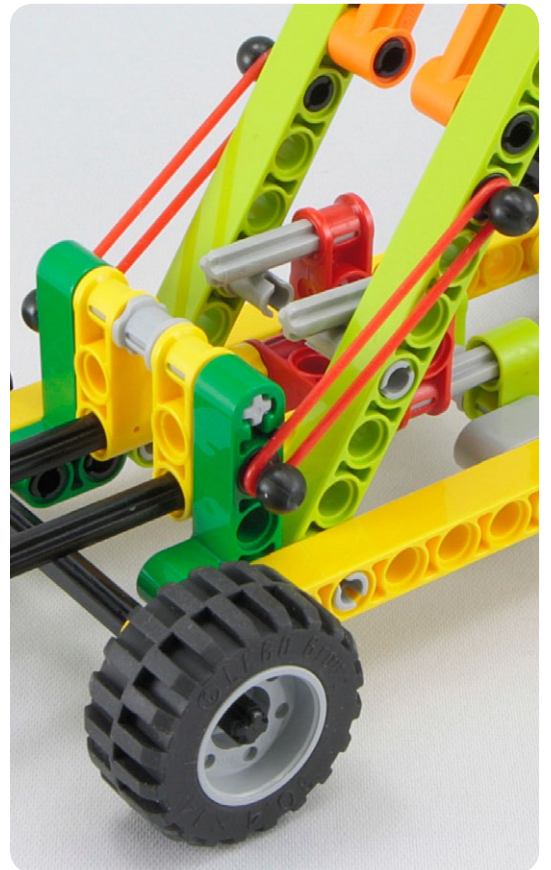
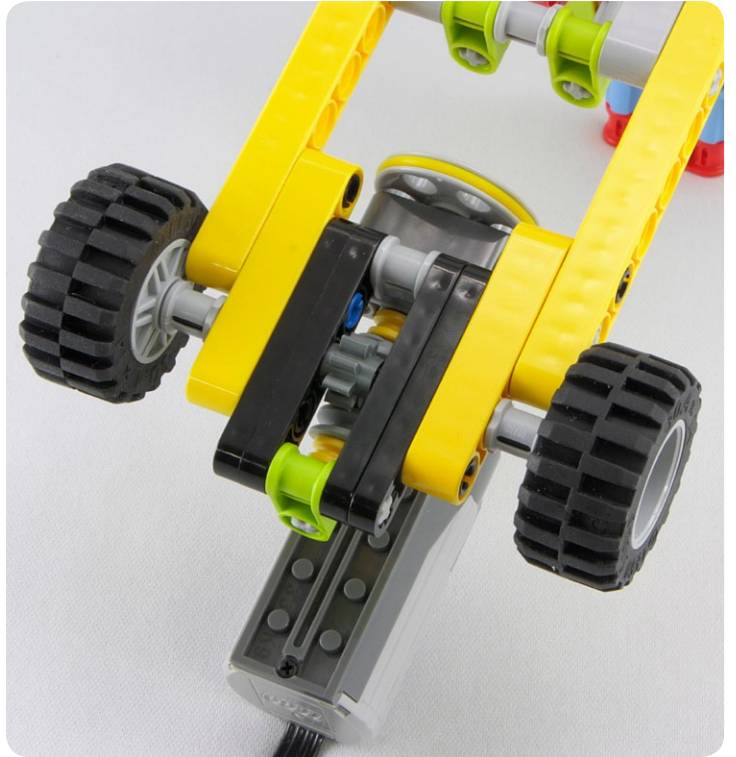
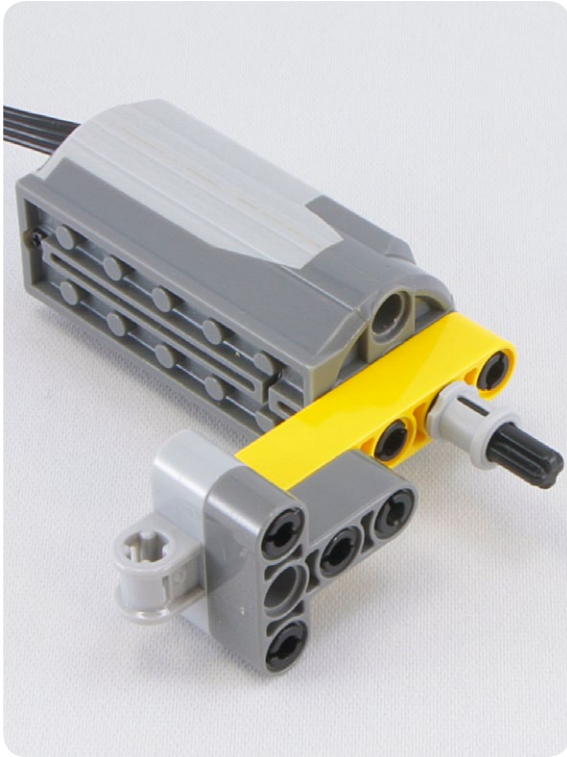


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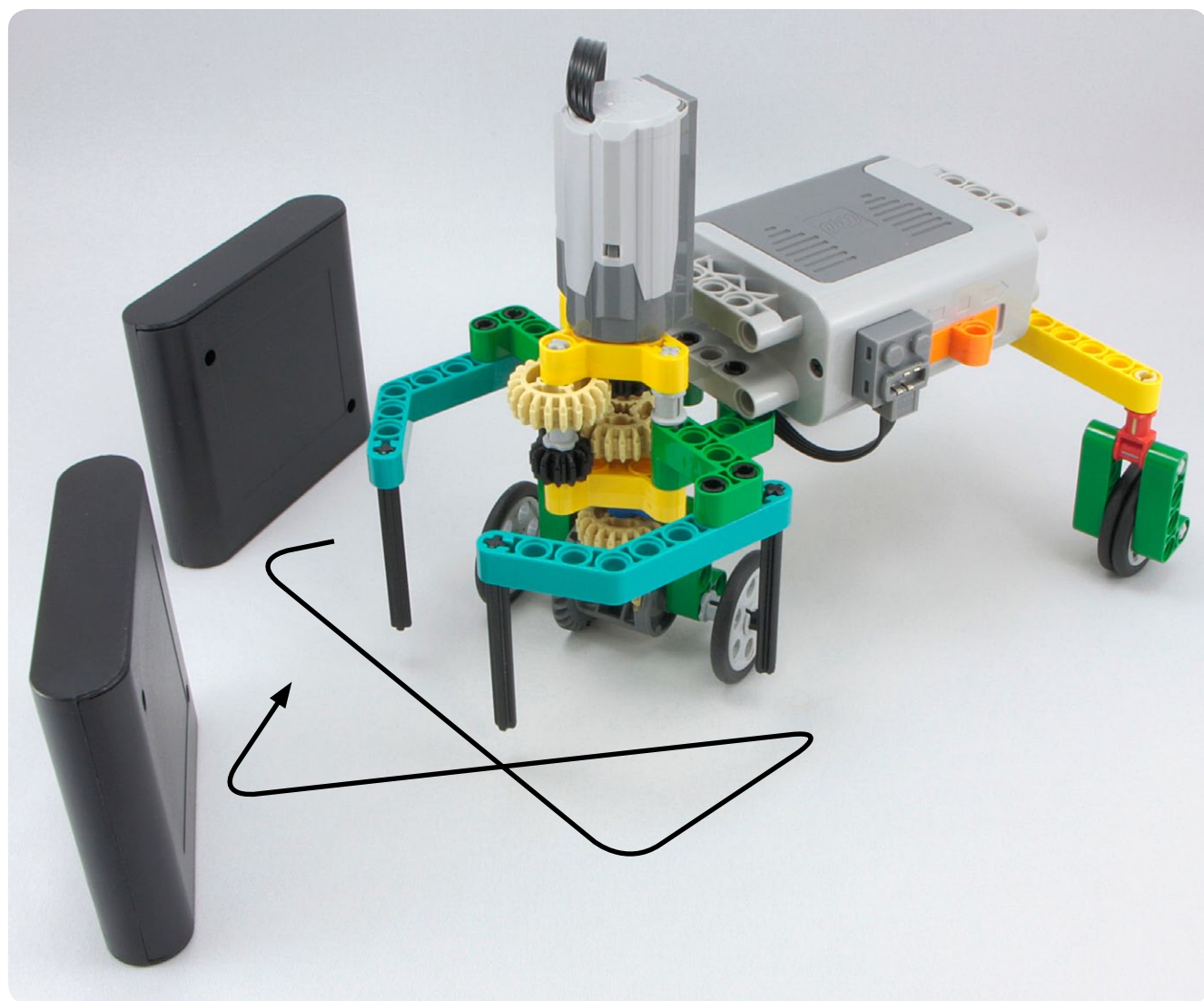
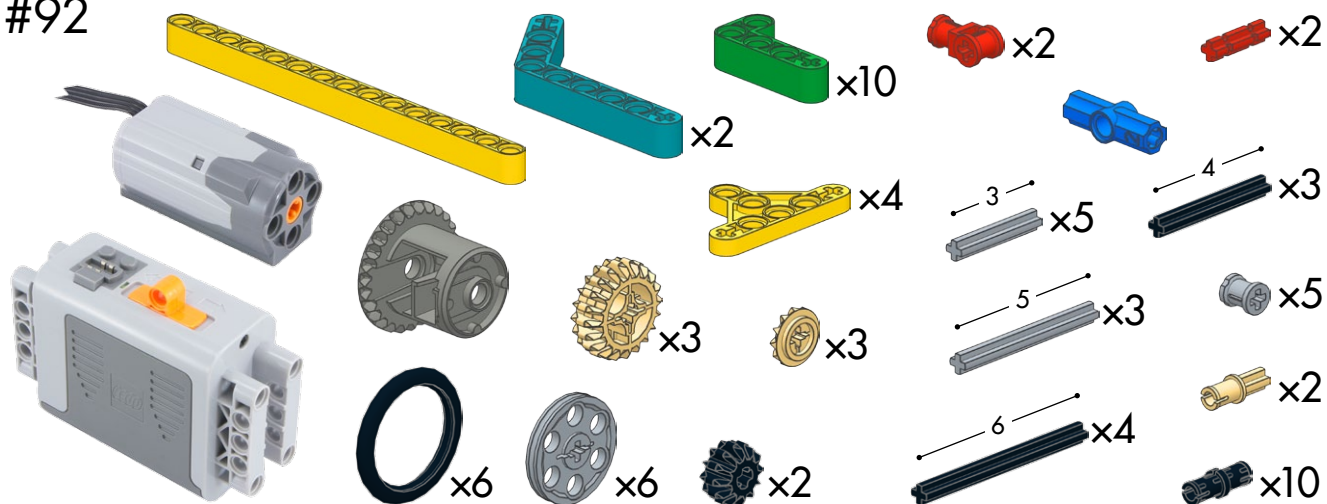


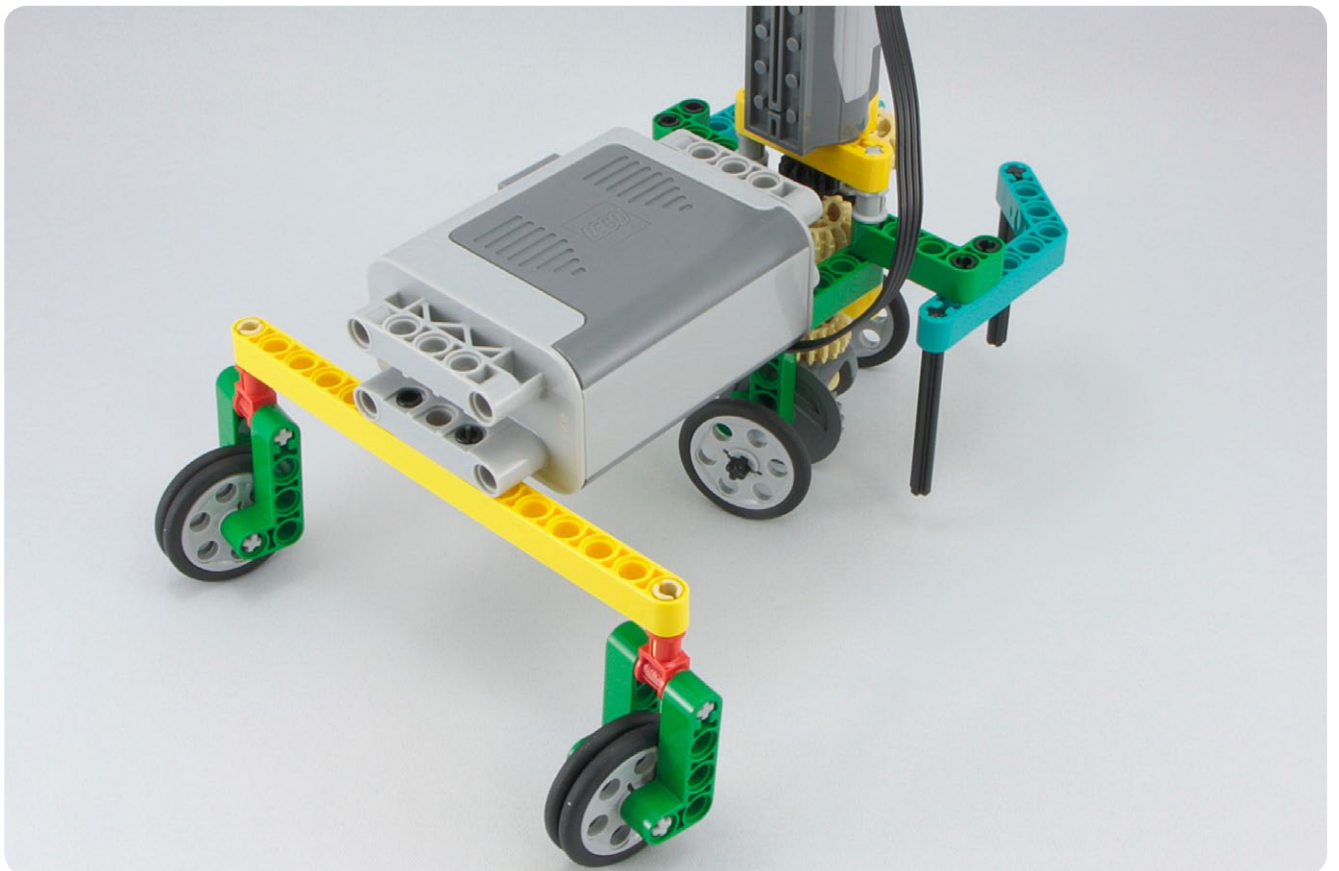
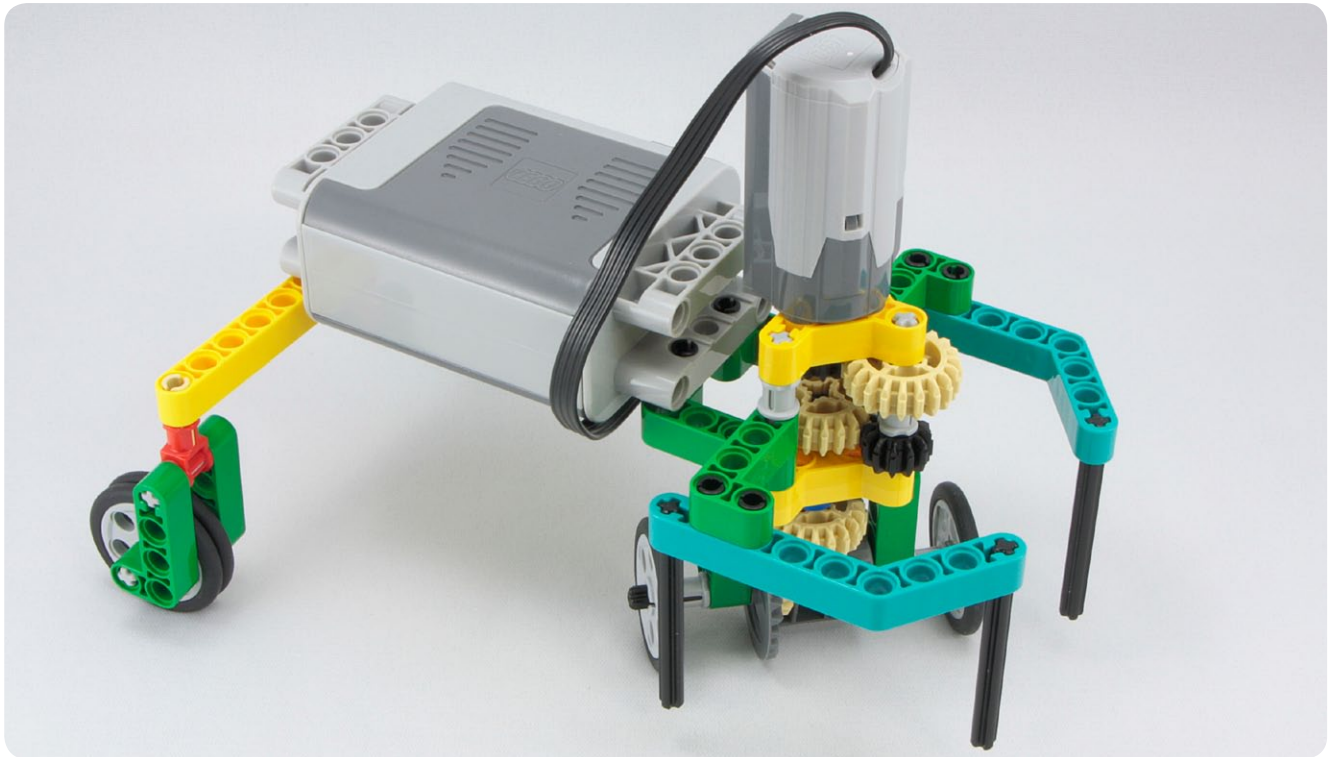


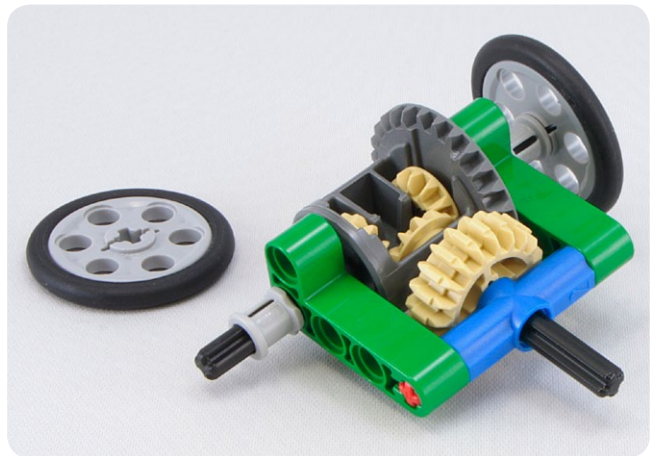
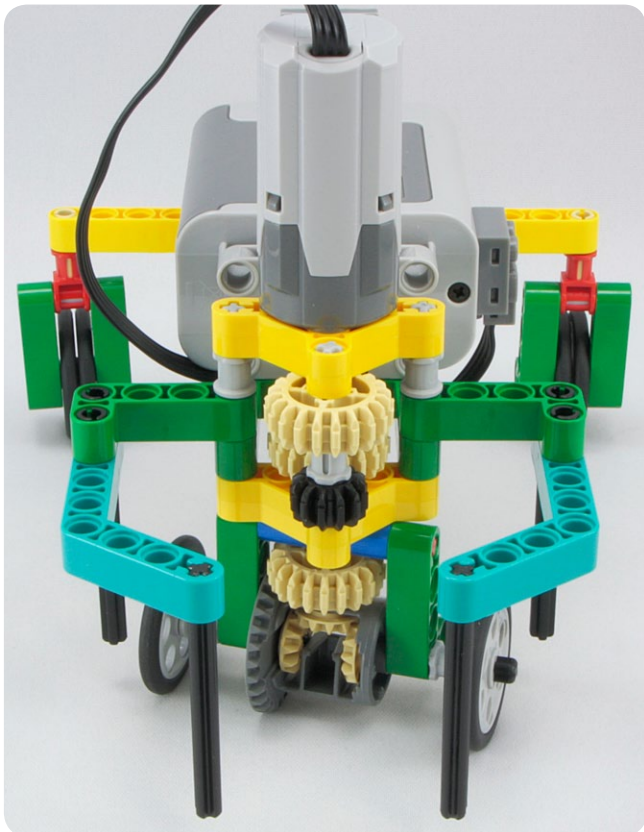


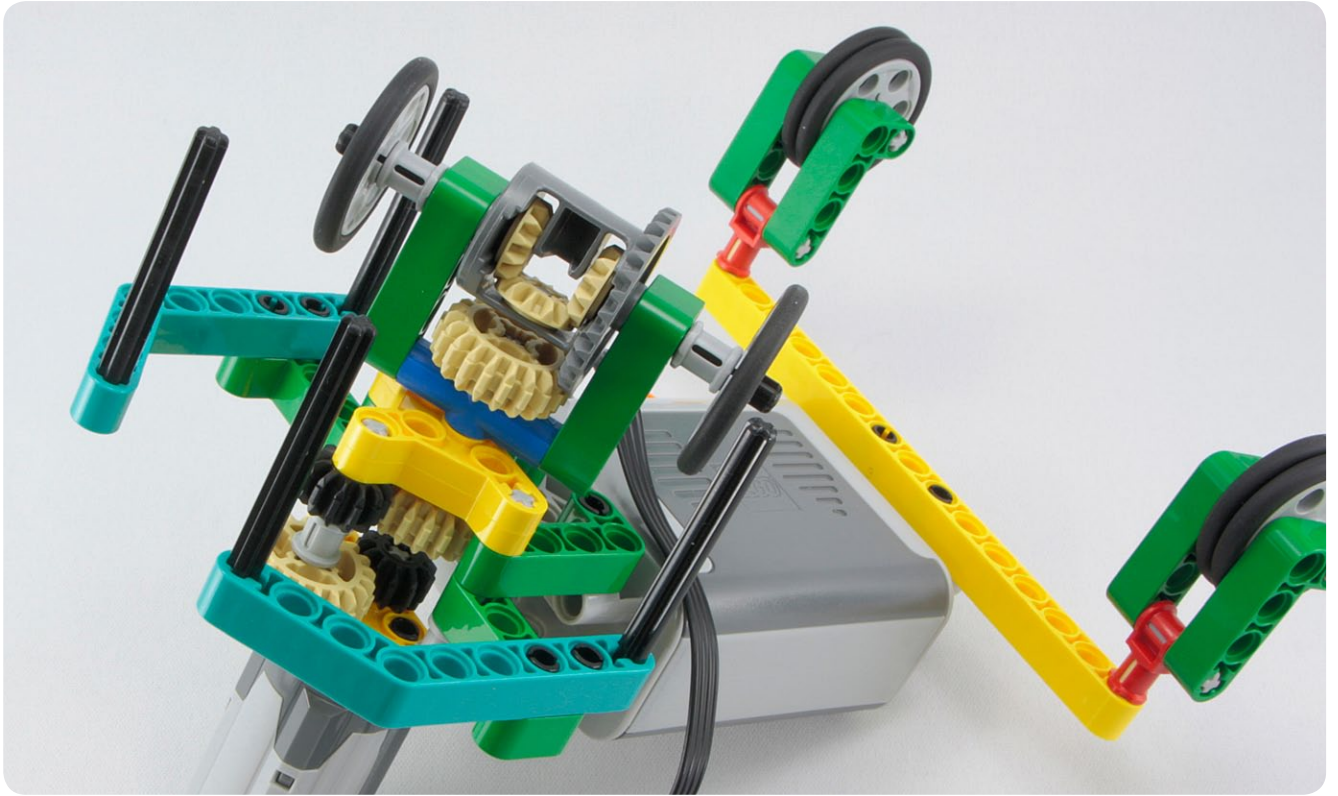


#92



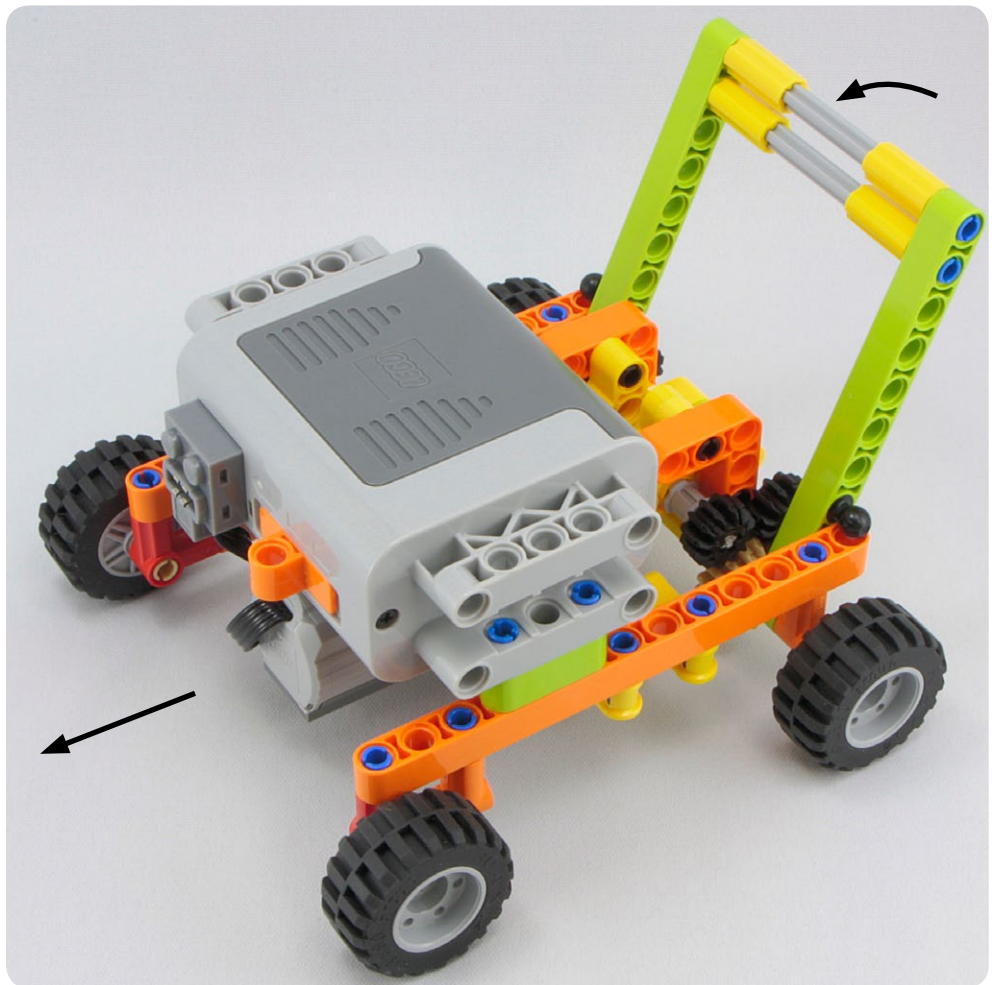


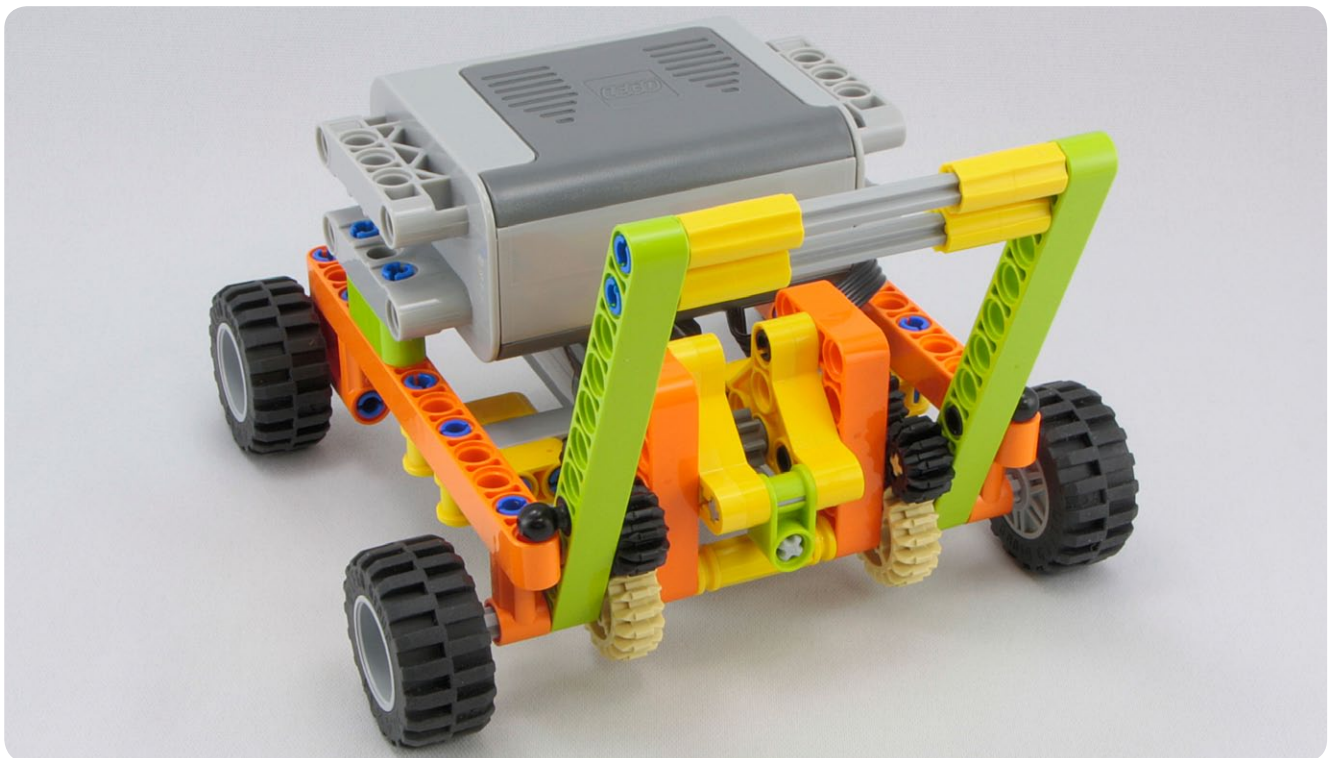


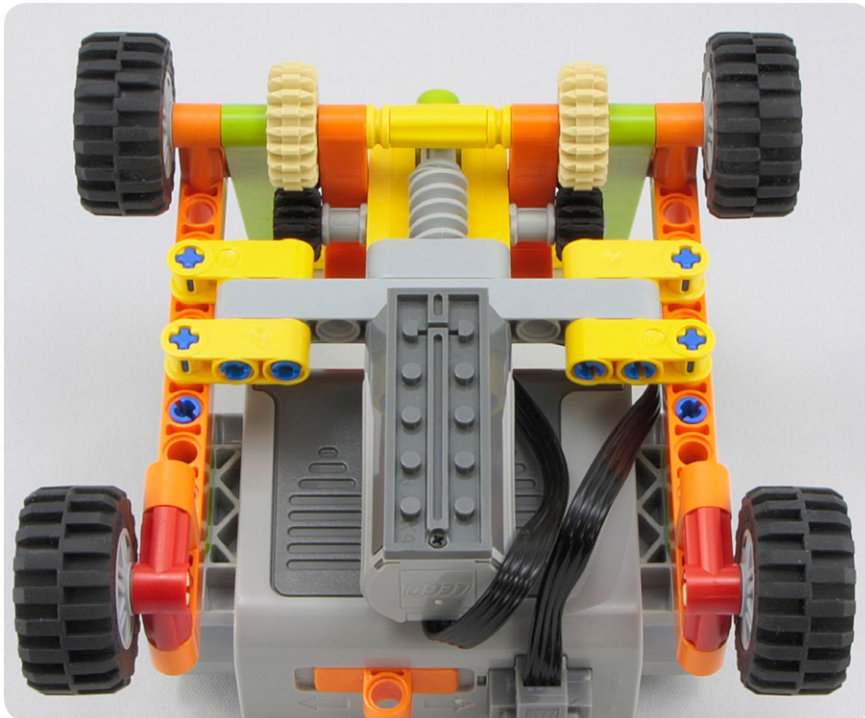
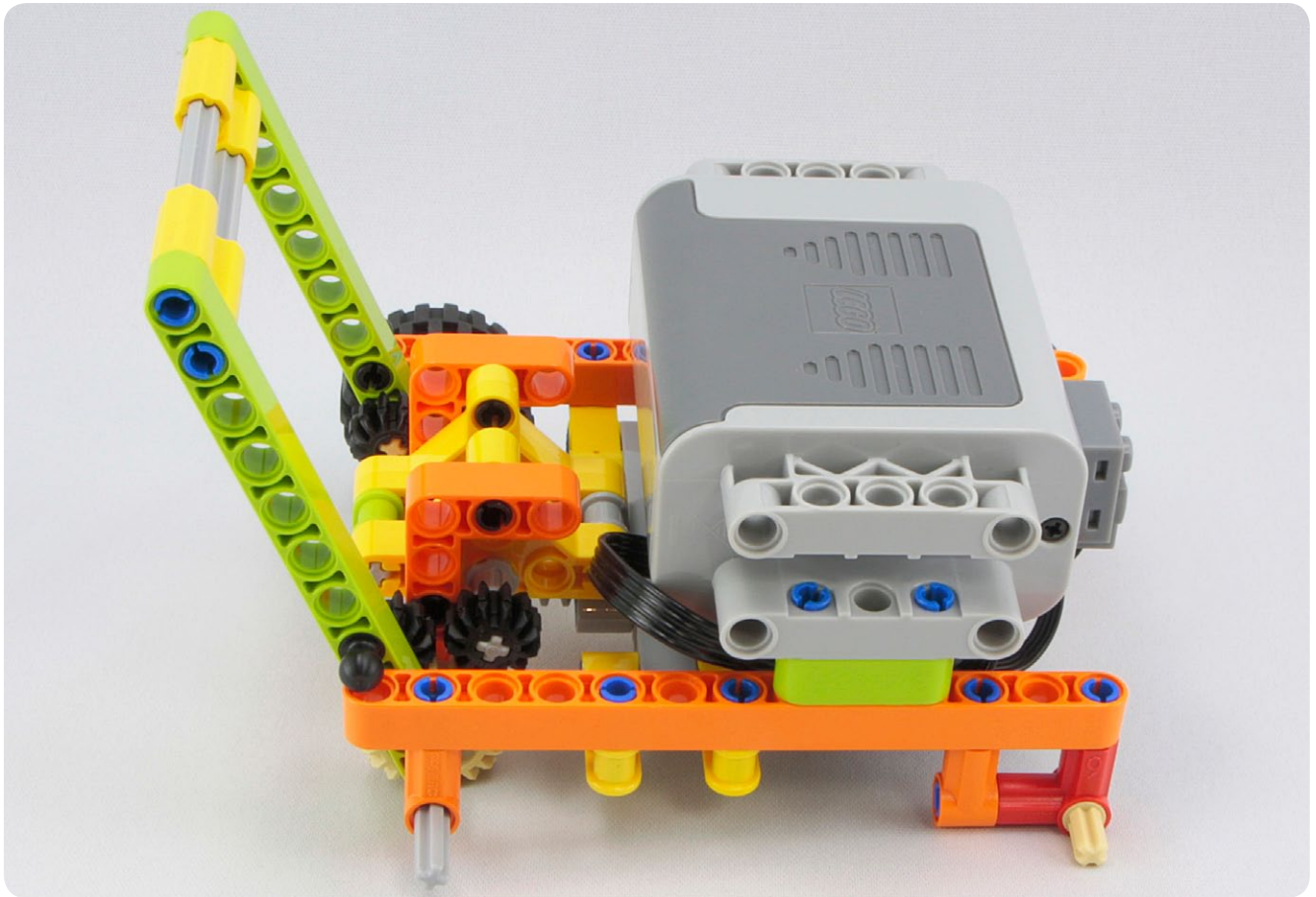


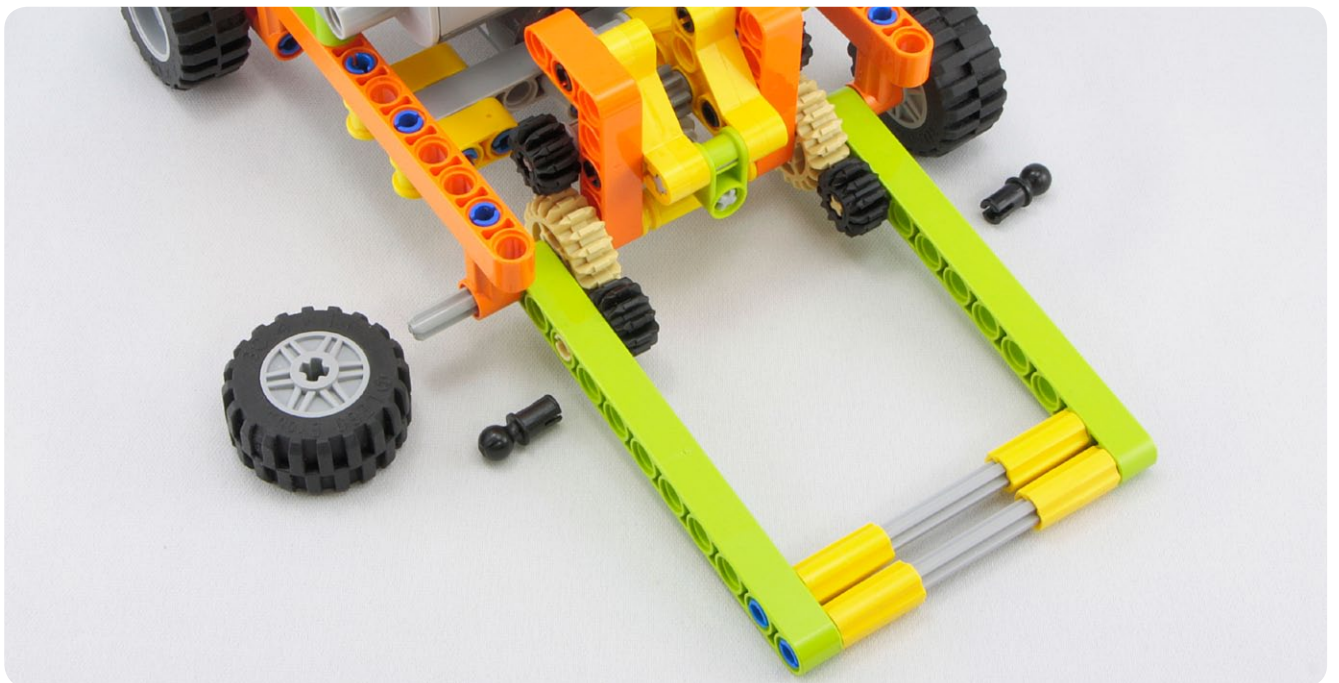


#93

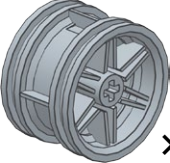





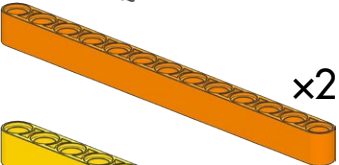
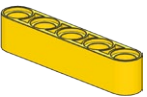
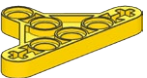






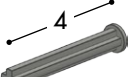








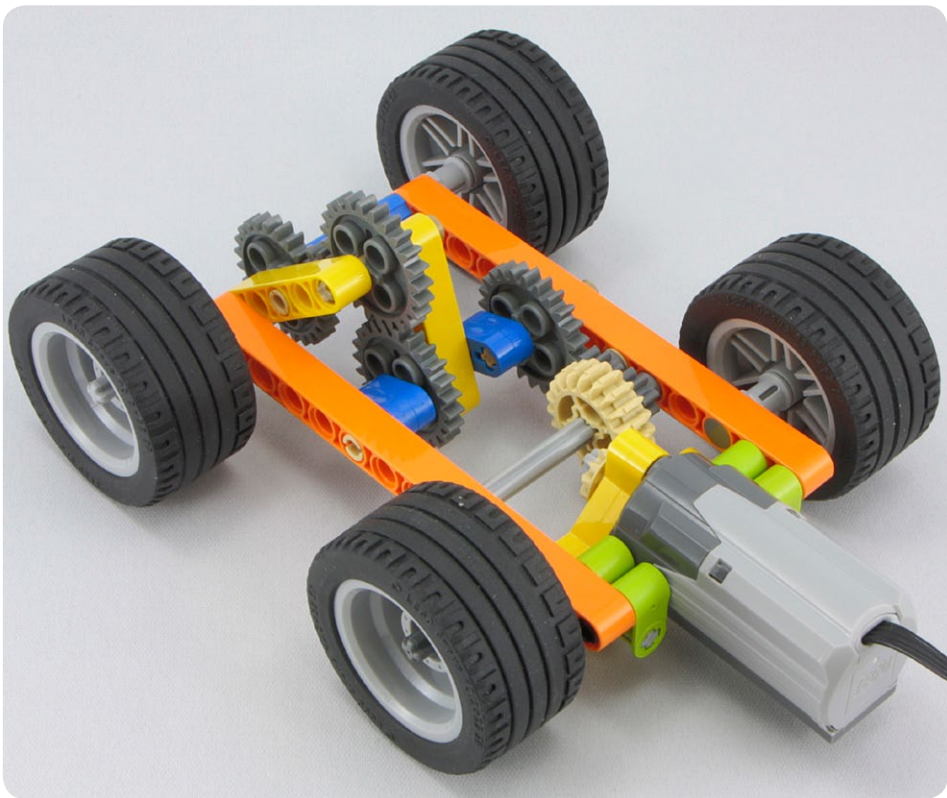
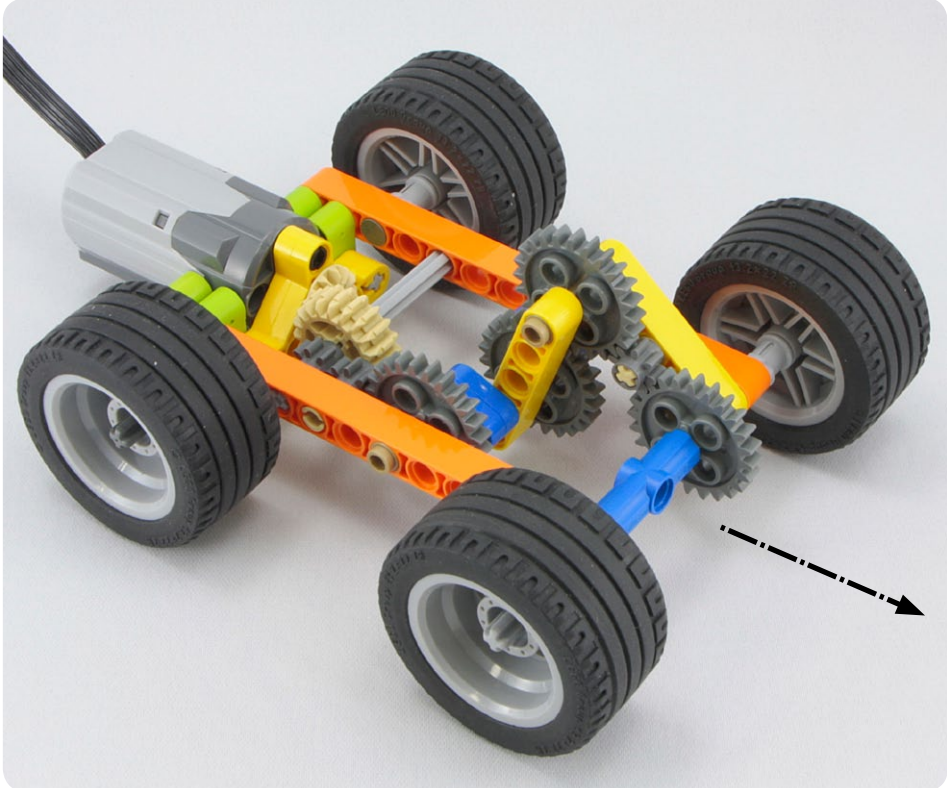


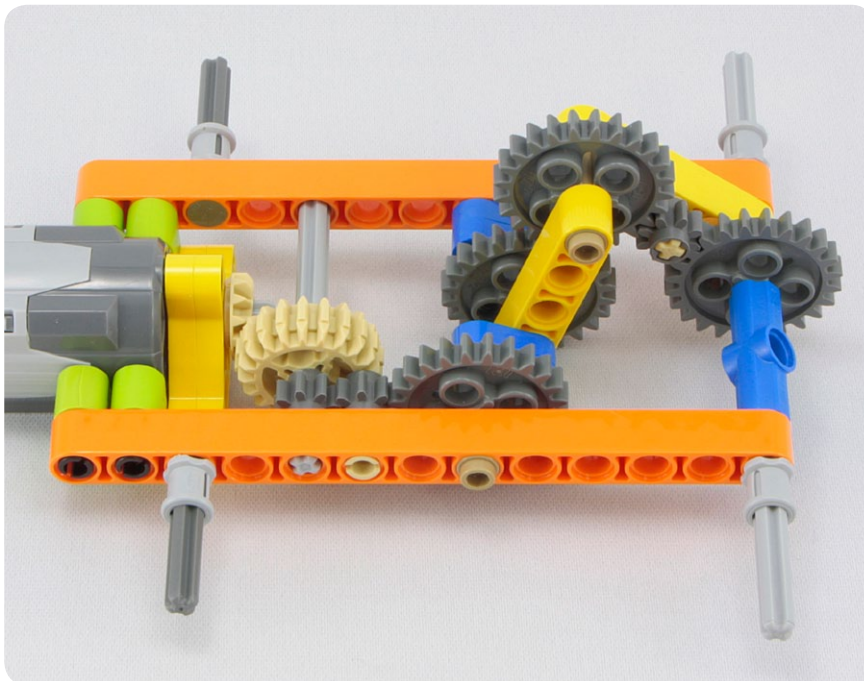
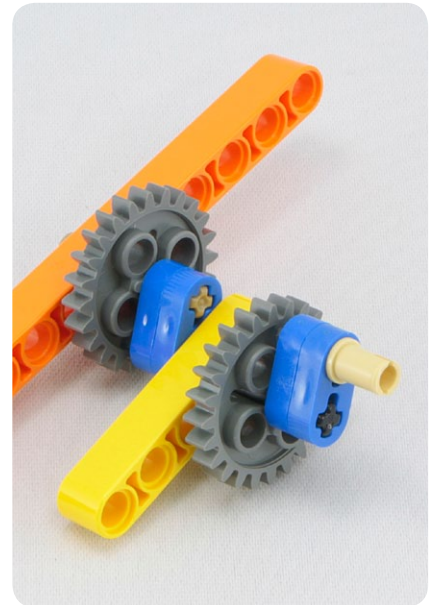
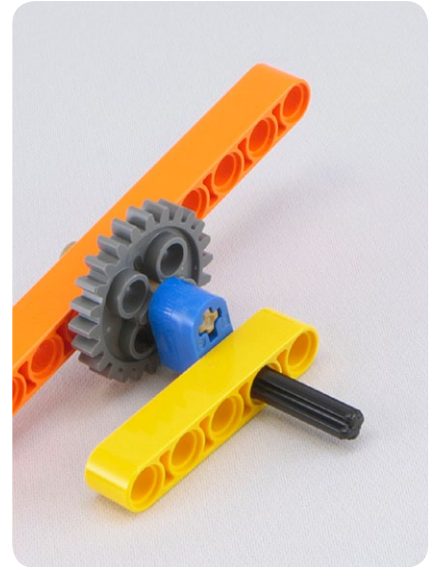
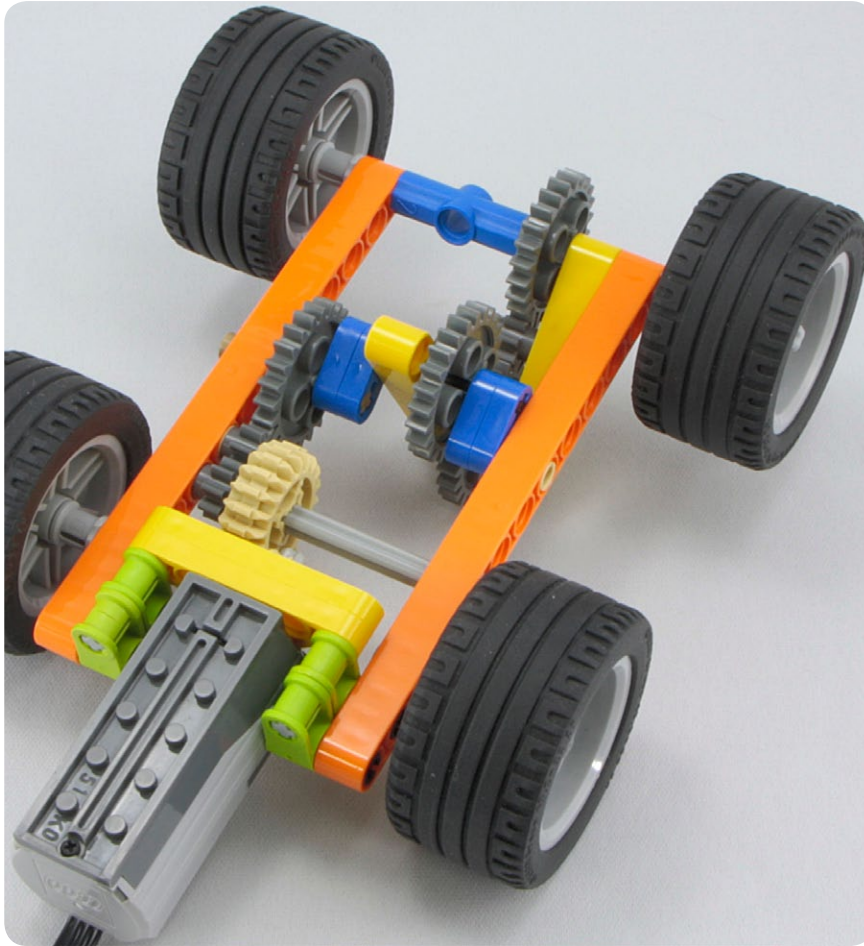




#94

-  x4
-  x4
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-  x3
- 
-  x4
-  x2
-  x2
-  x2
- 
-  x4
-  x4
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-  x4
-  5
-  x3
-  7
-  x2
-  x6

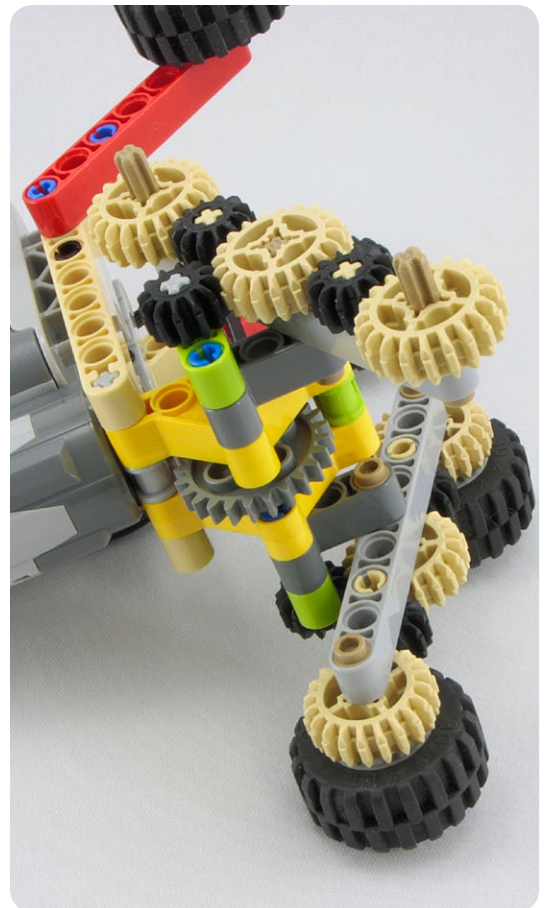
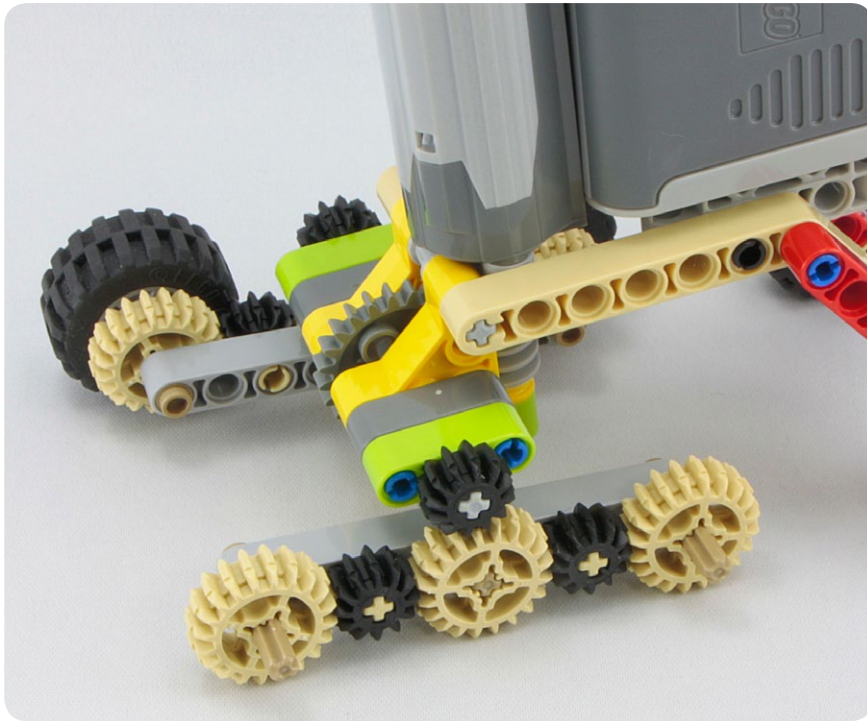




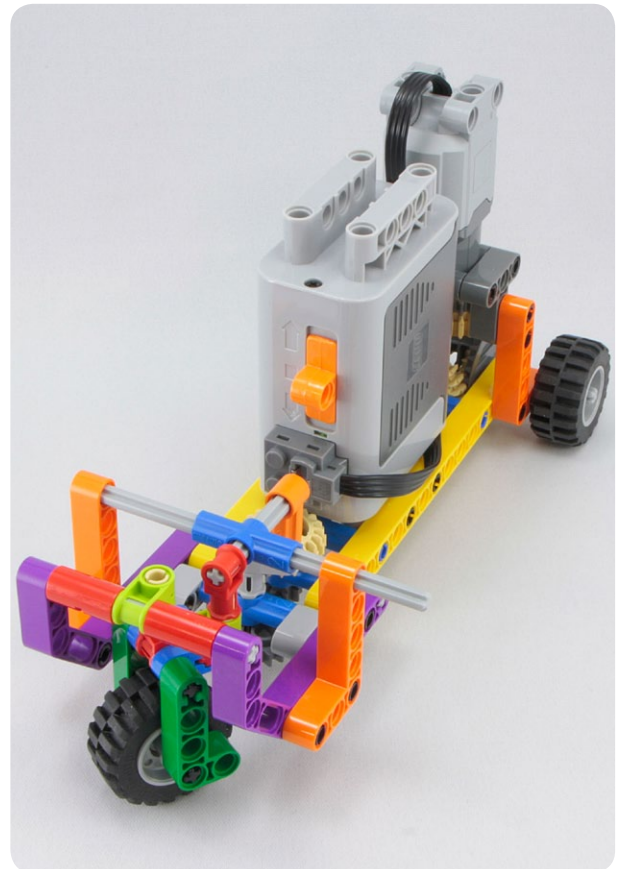
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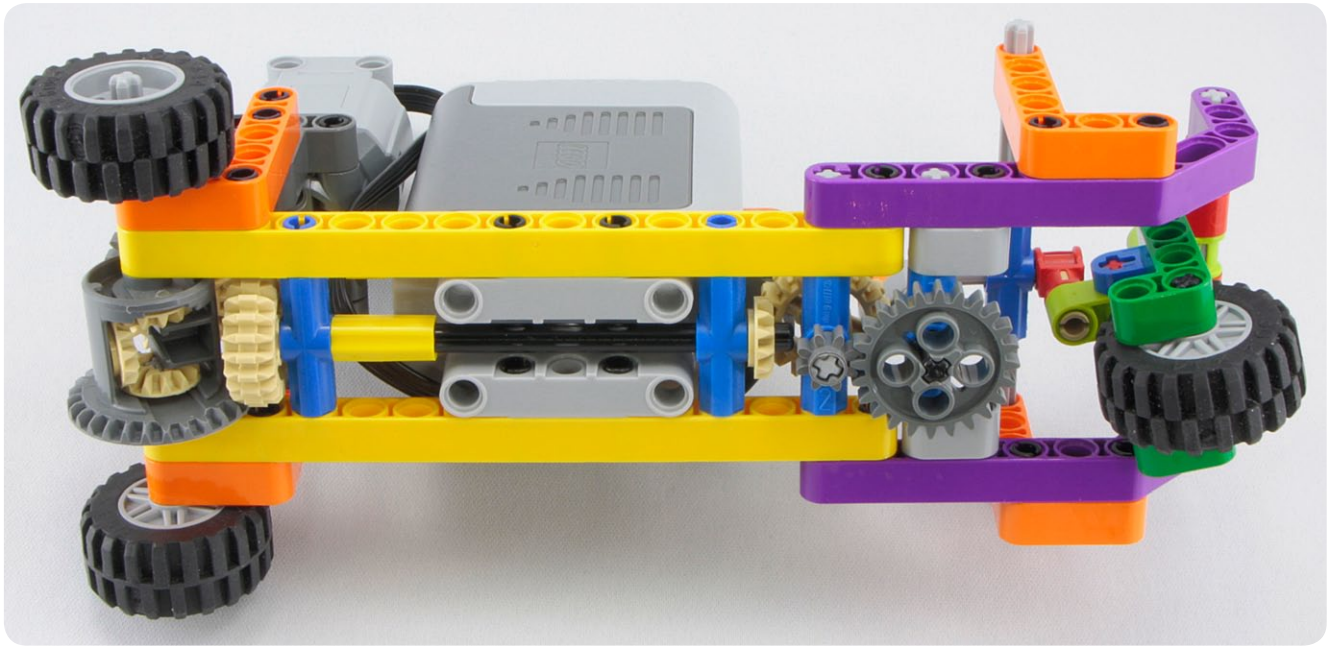
- Black gear x6
- Grey motor
- Grey connector
- Yellow gear x6
- Grey axle
- Grey gear
- Green connector
- Black tire x6
- Grey axle
- Grey axle
- Grey beam x2
- Red beam x2
- Green beam x2
- Yellow beam x2
- Grey beam x2
- Yellow beam x4
- Yellow pin x2
- Grey connector
- Blue pin x6
- Grey pin x6
- Grey pin x2
- Blue pin x2
- Grey pin x4
- Grey beam 3
- Grey beam 5
- Grey beam 6
- Grey beam 9

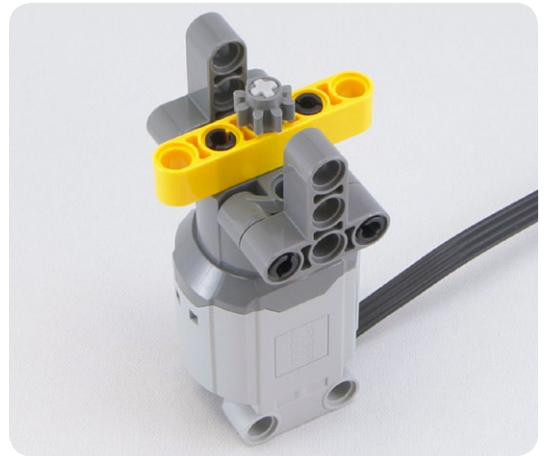
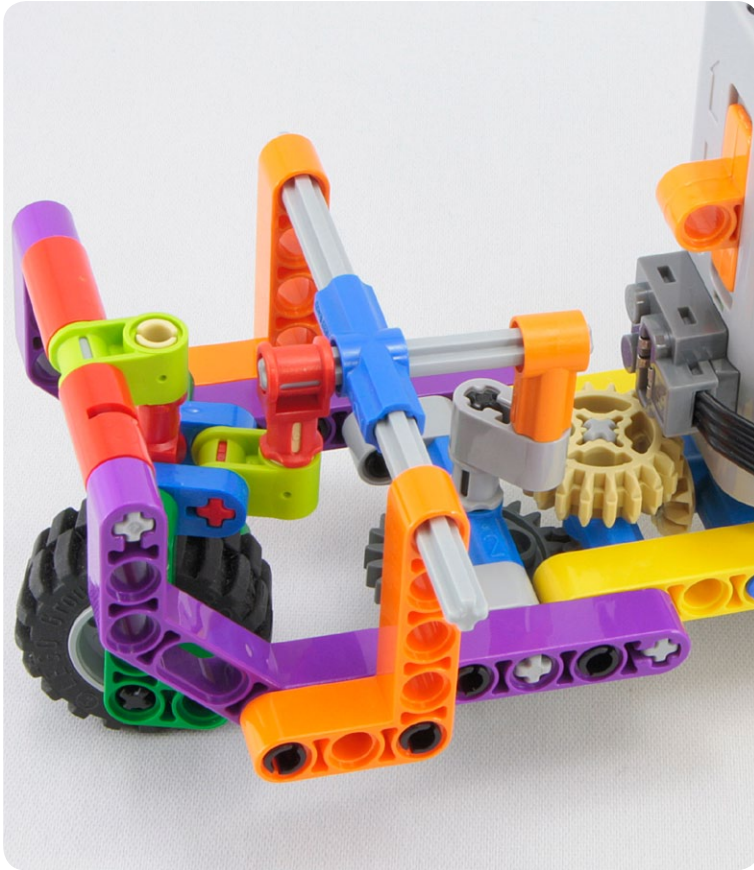


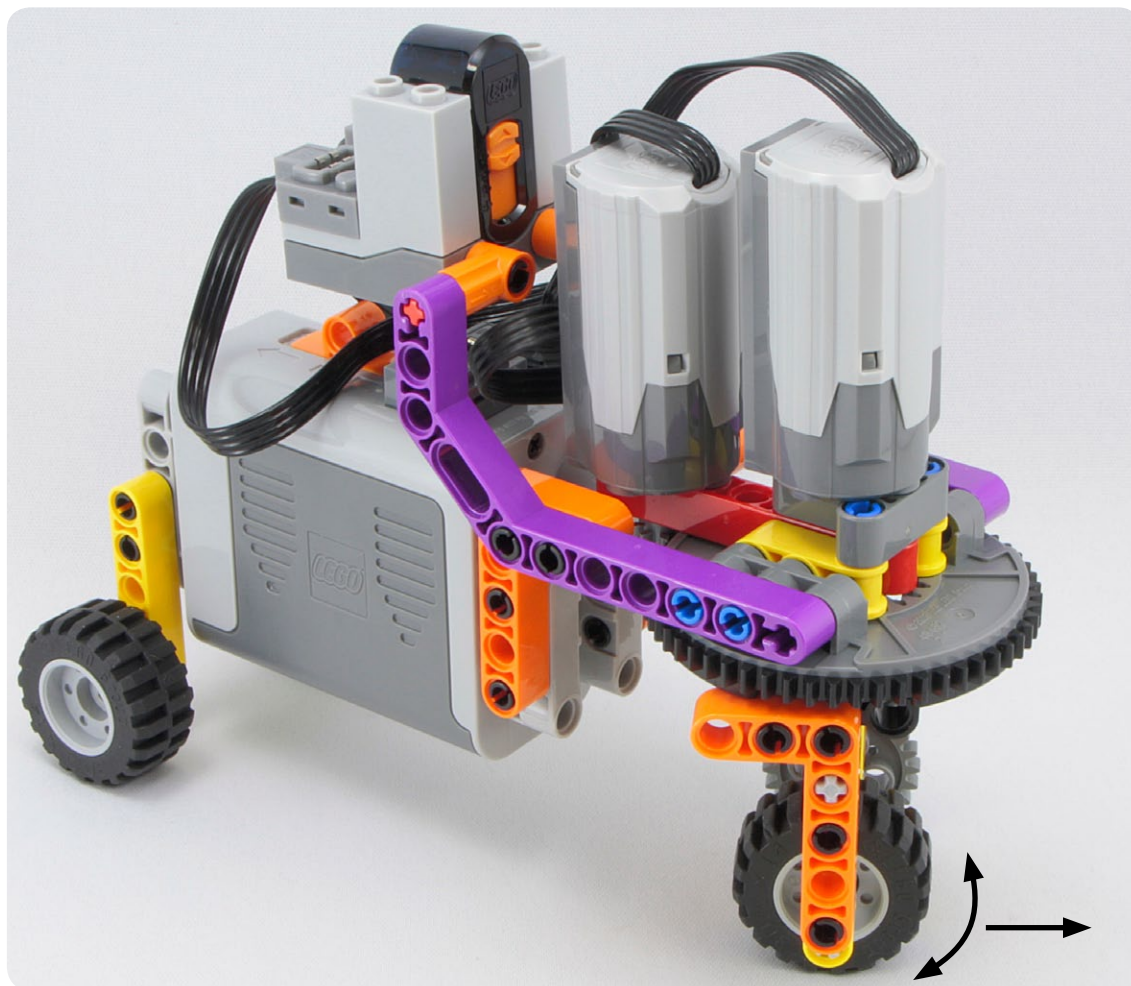


[illegible]



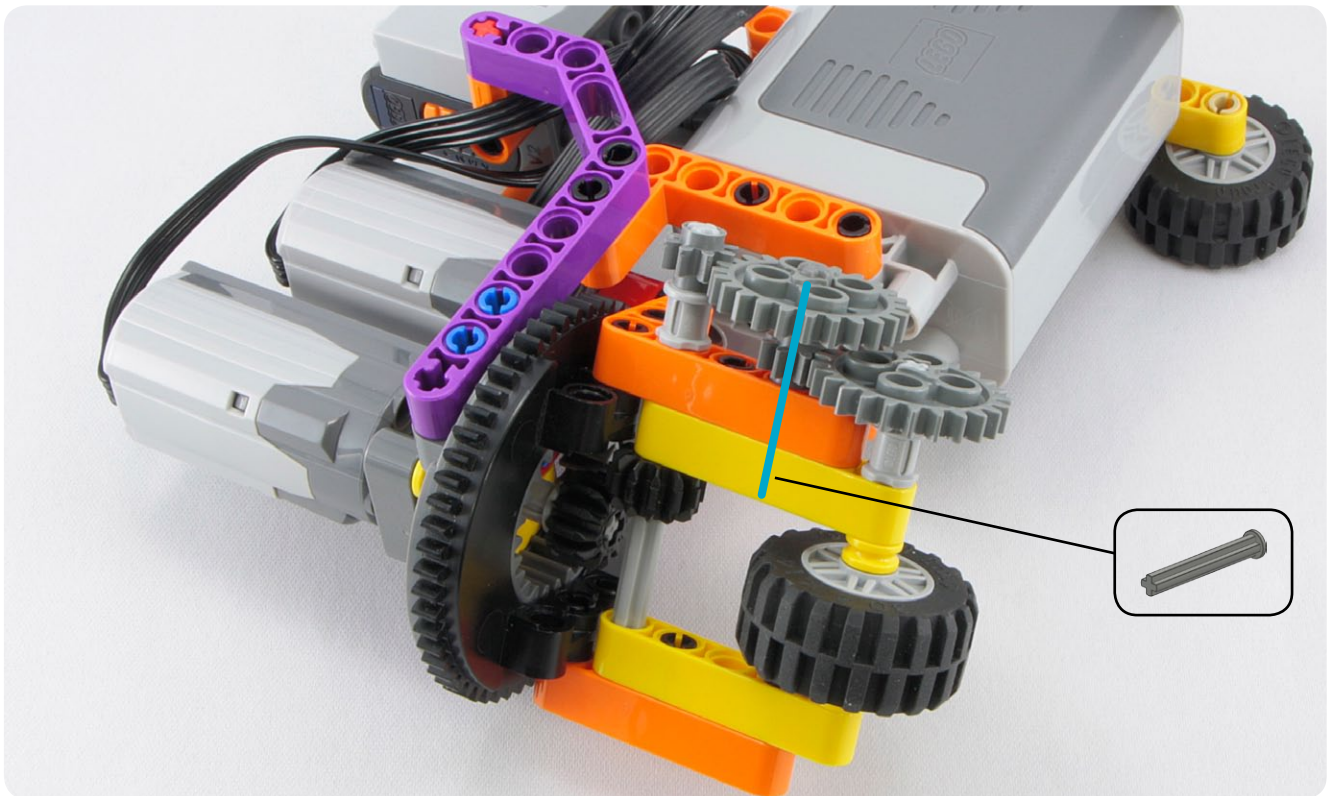
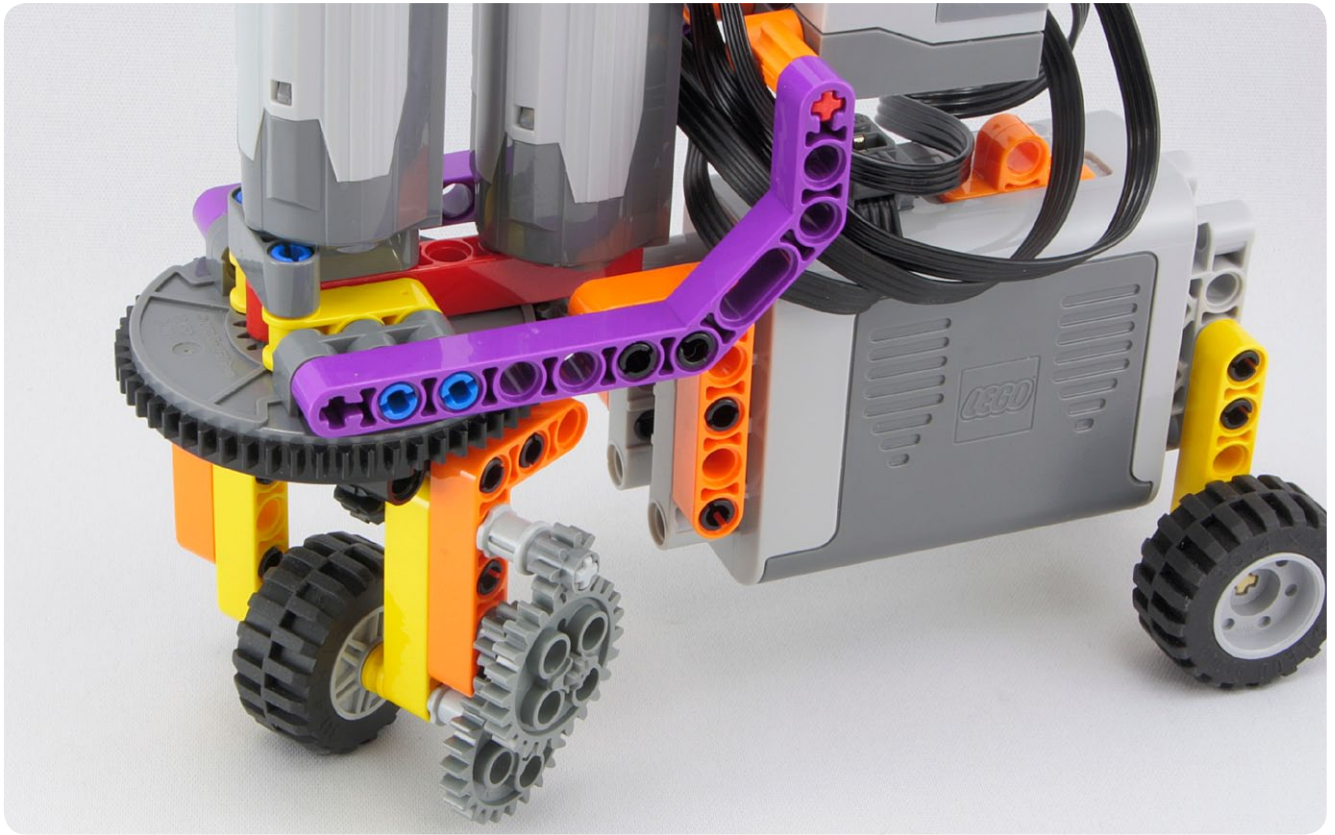


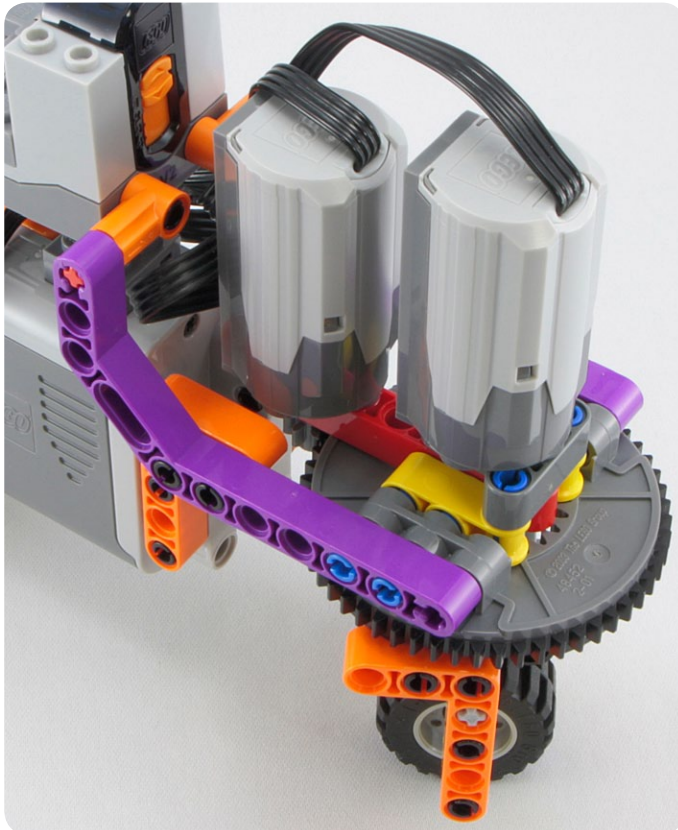
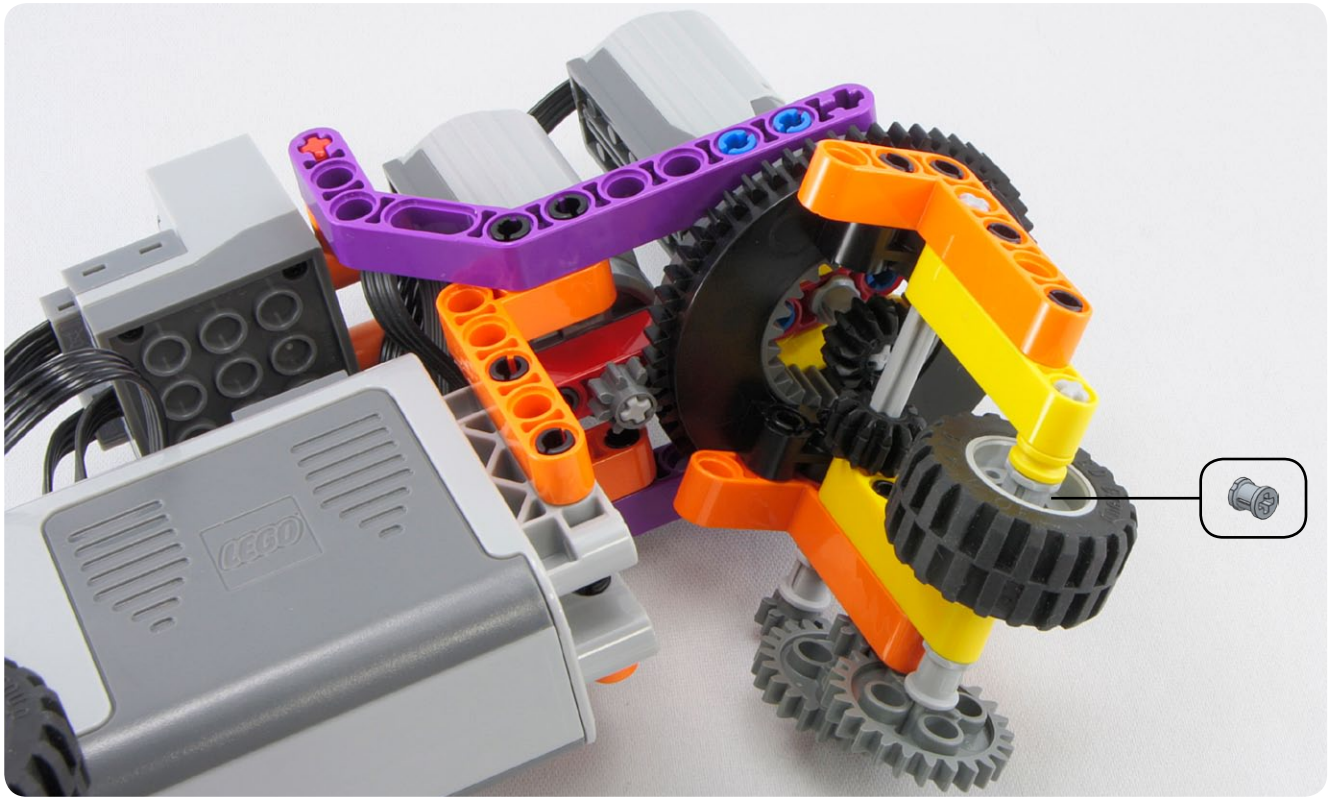


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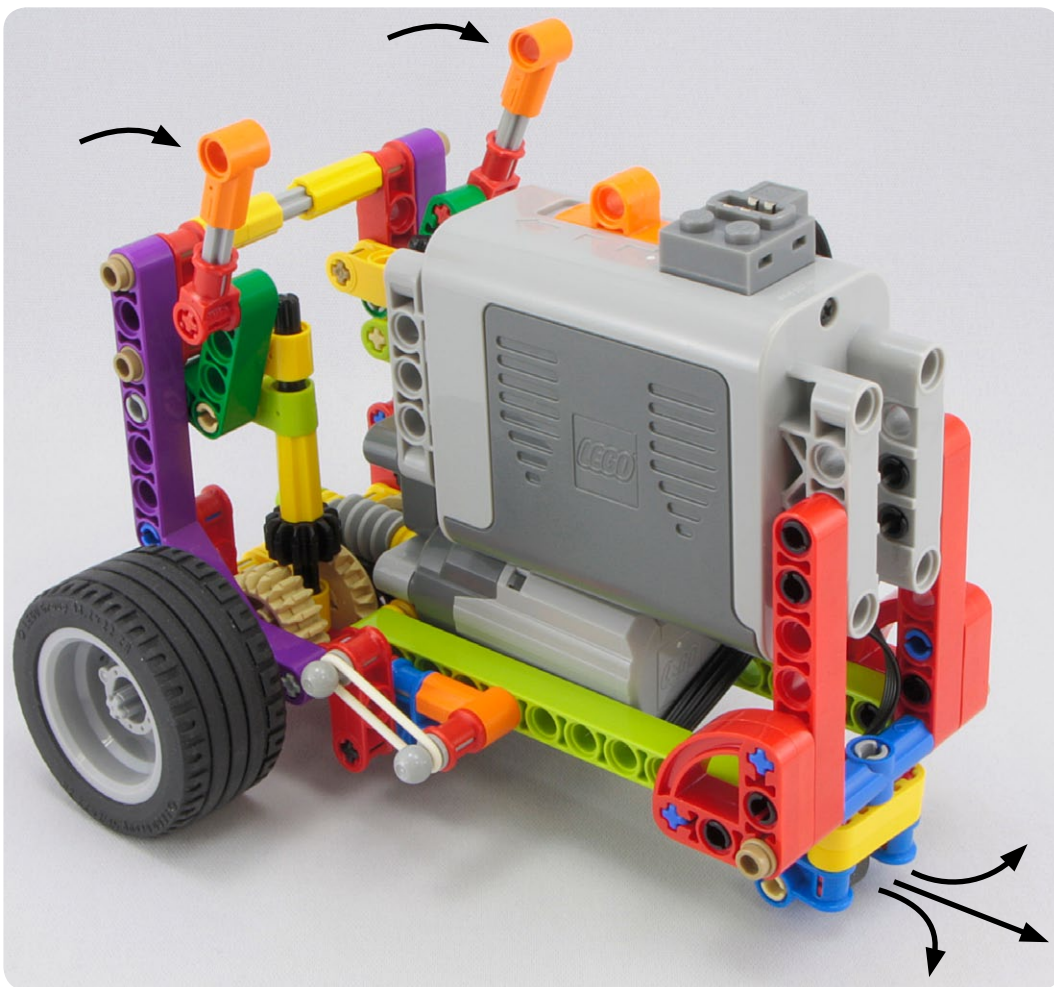
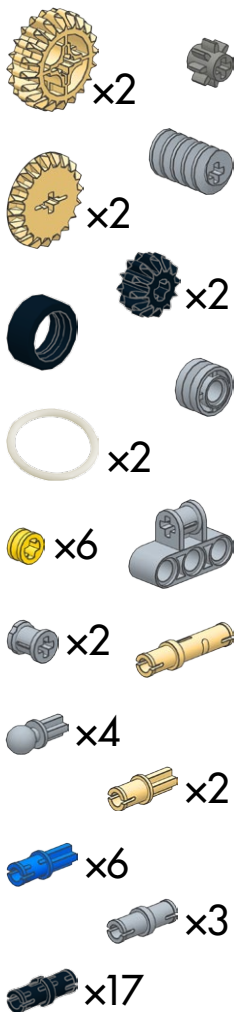
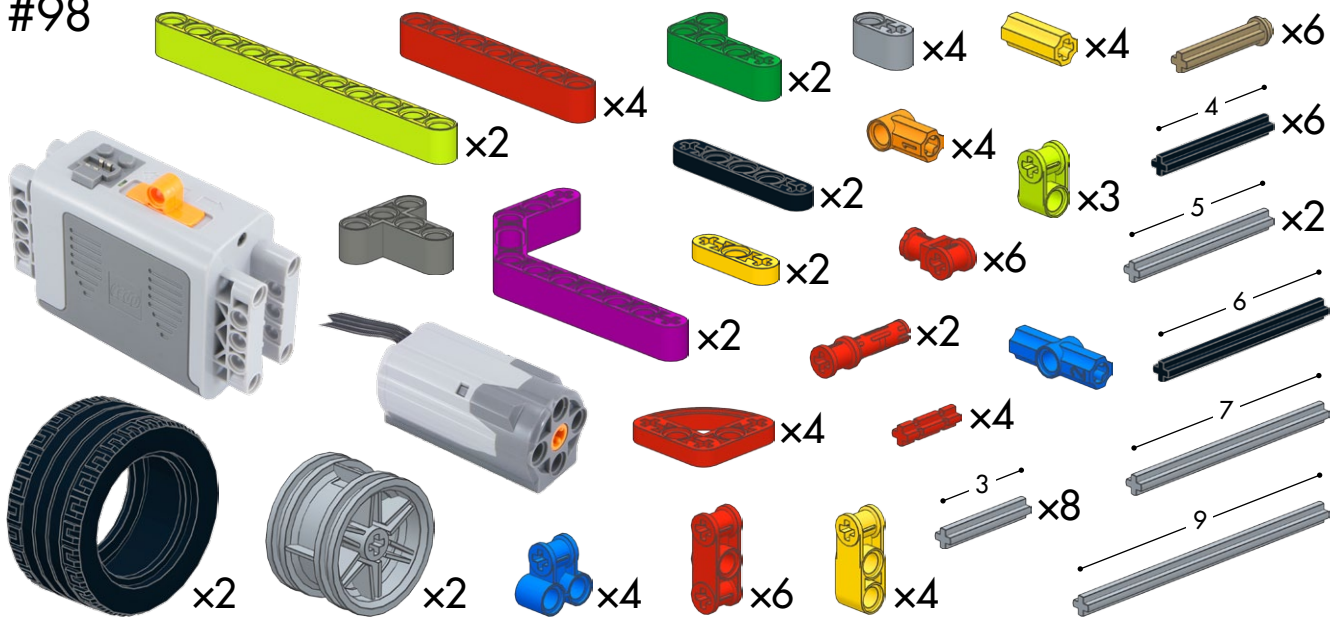
184 Cool cars





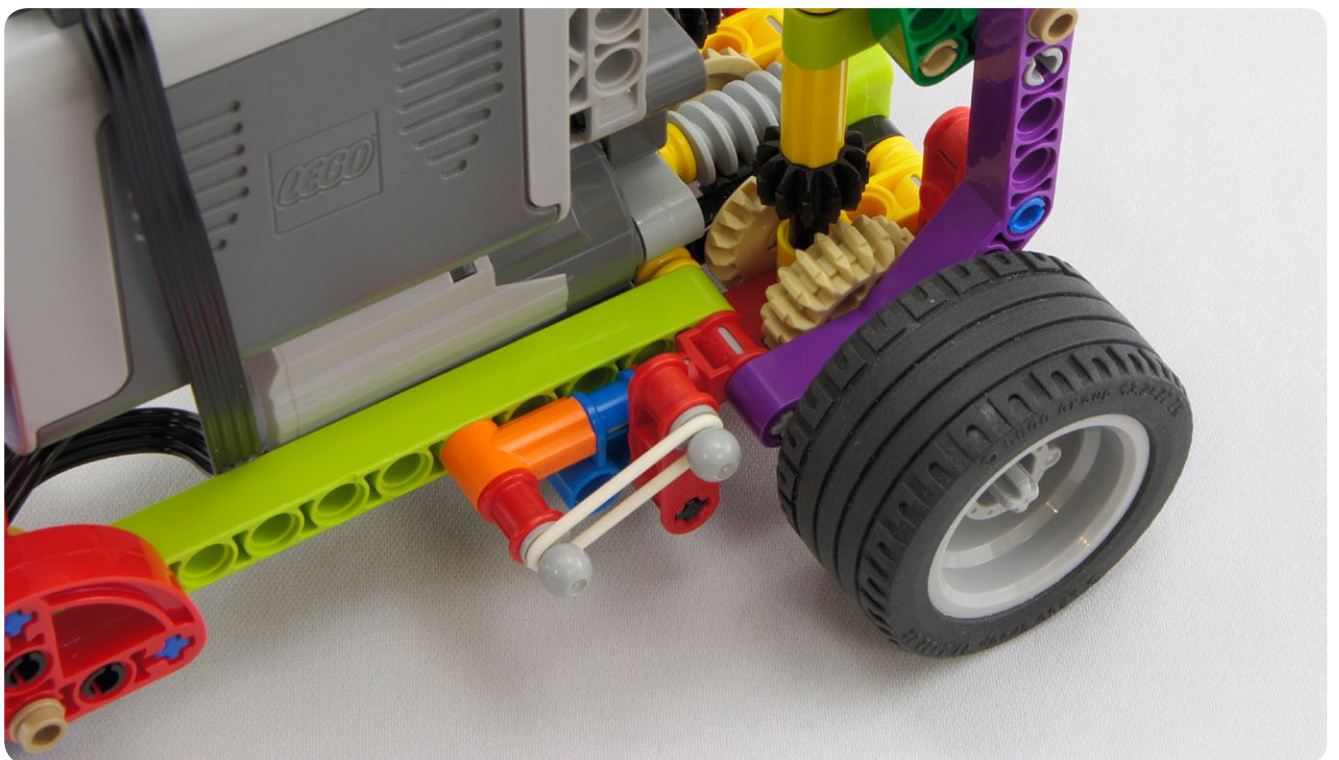
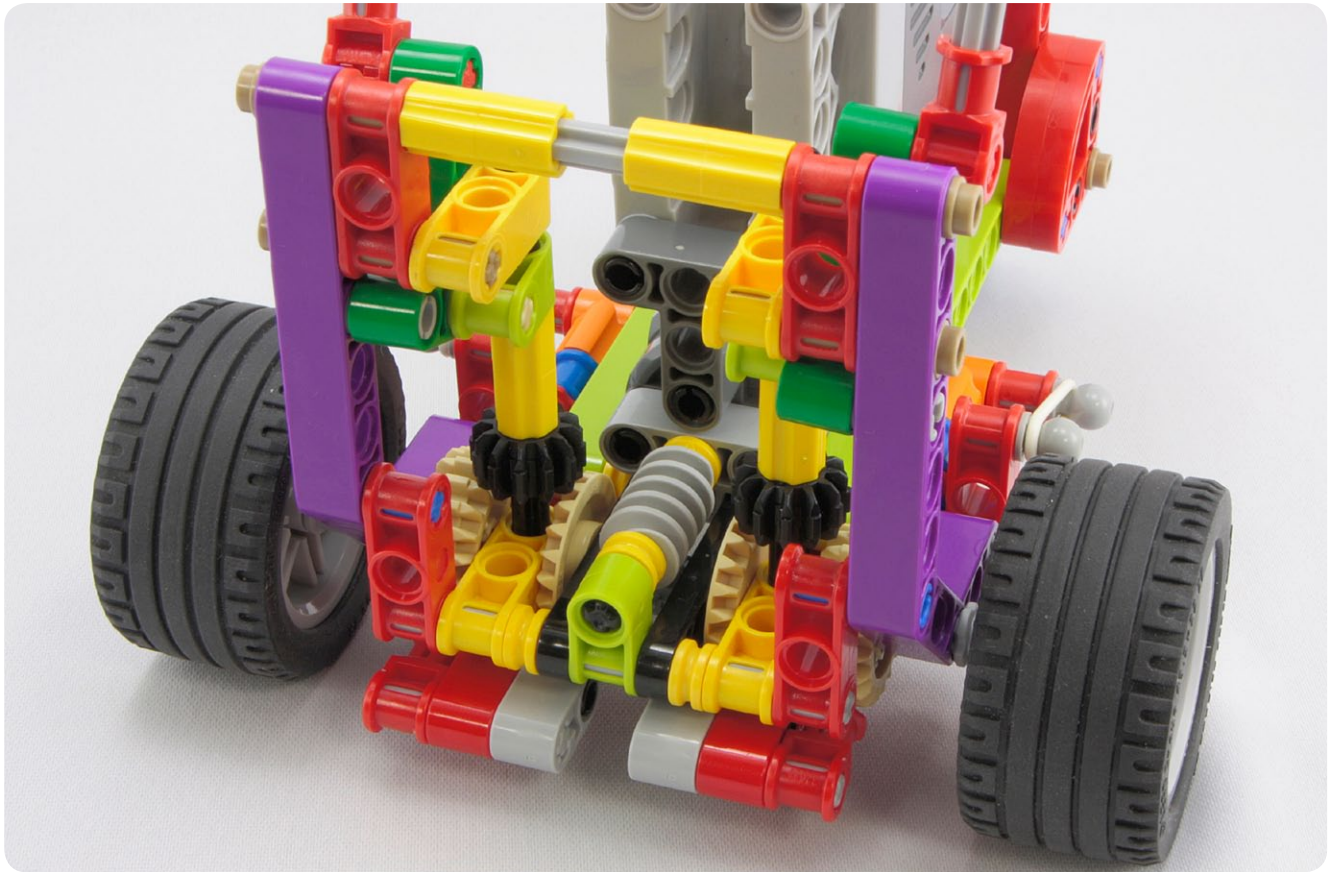


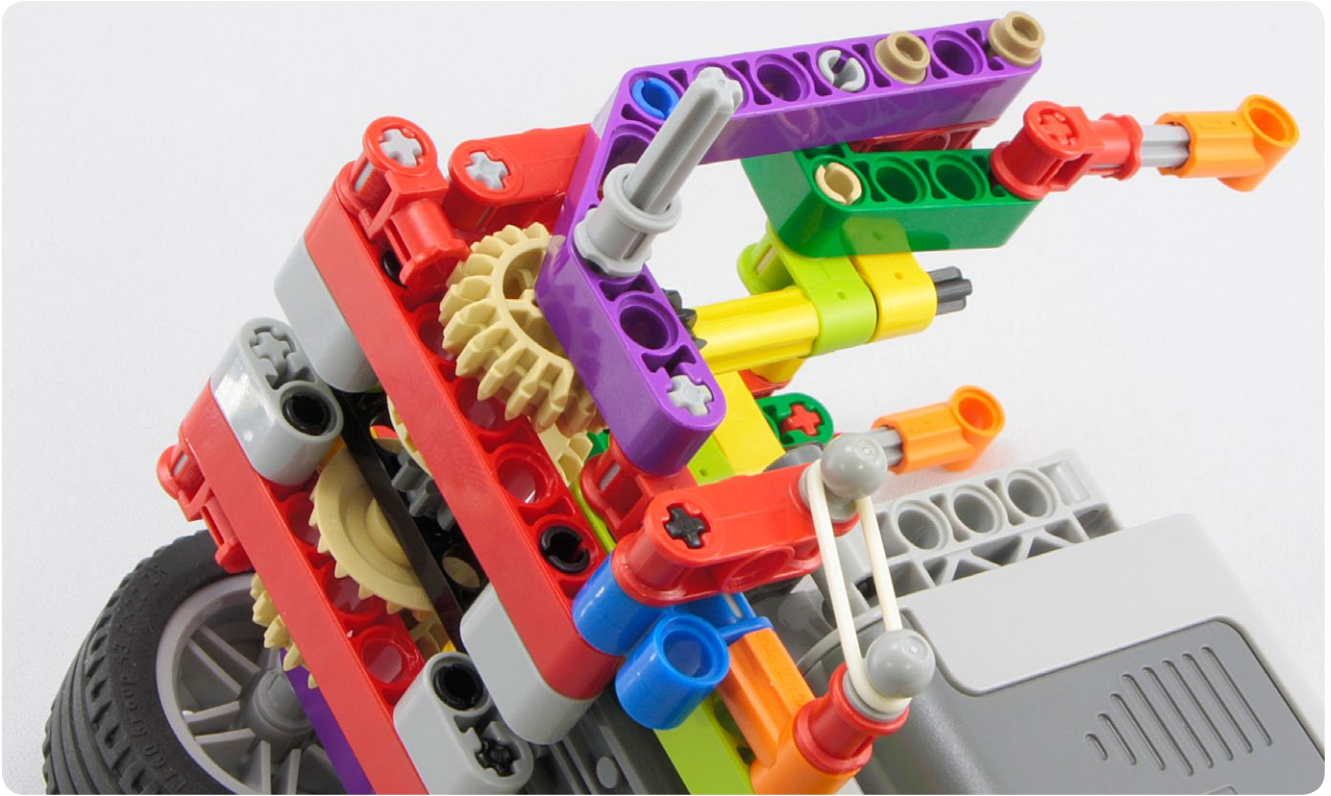
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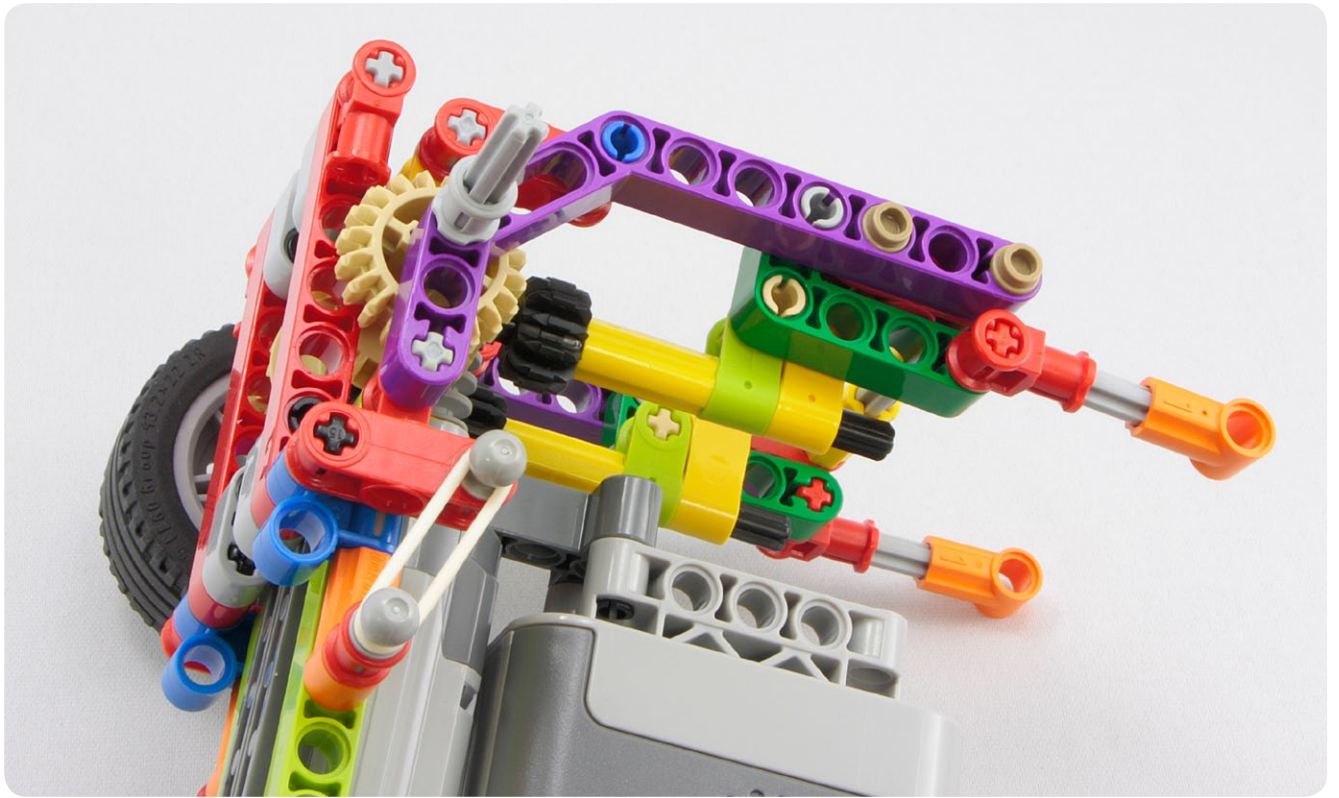














PART 2

Moving Without Tires



196



220



234



244



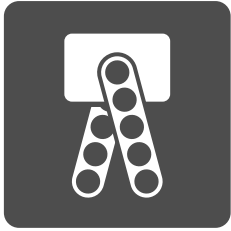
208



224

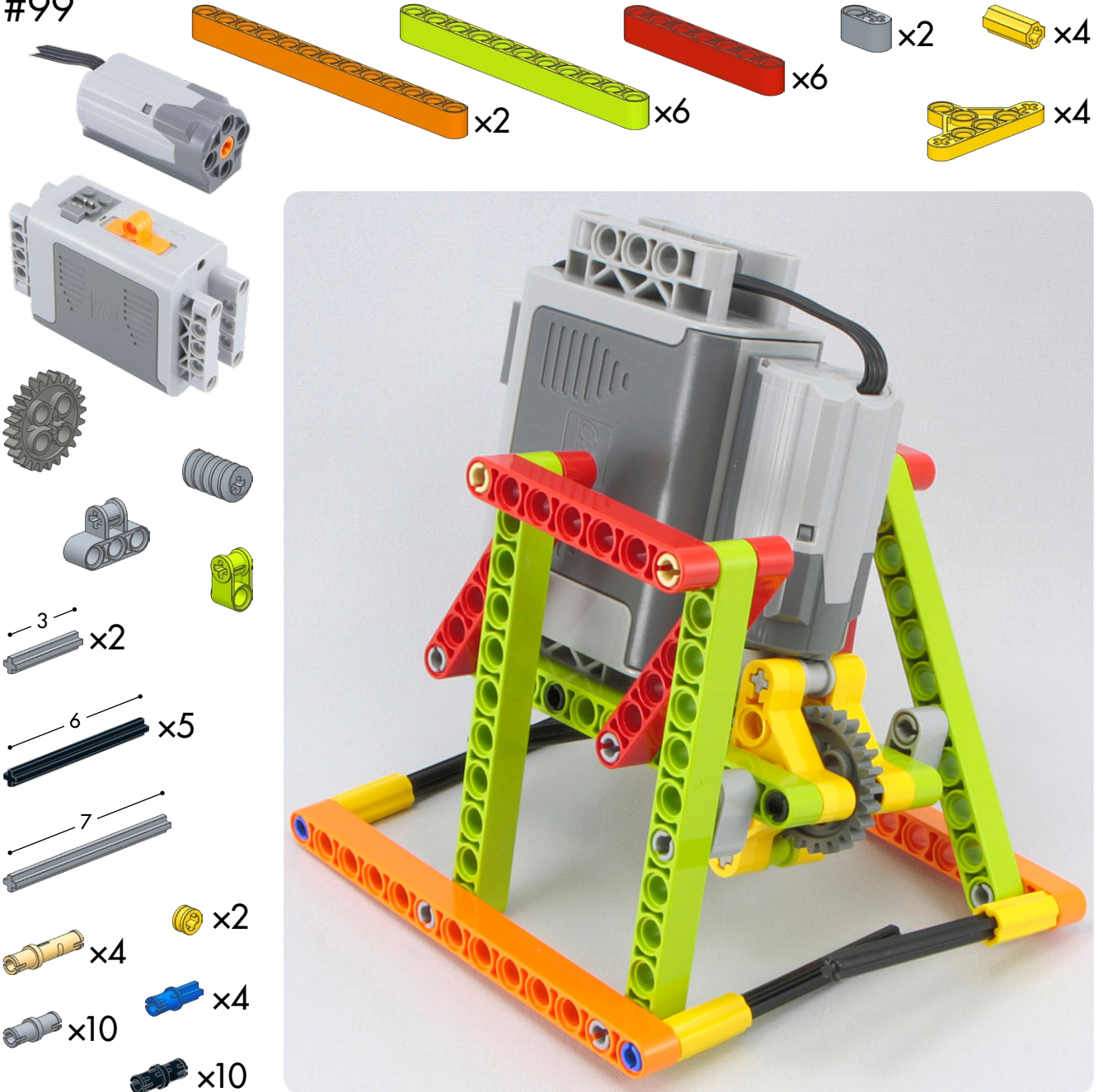


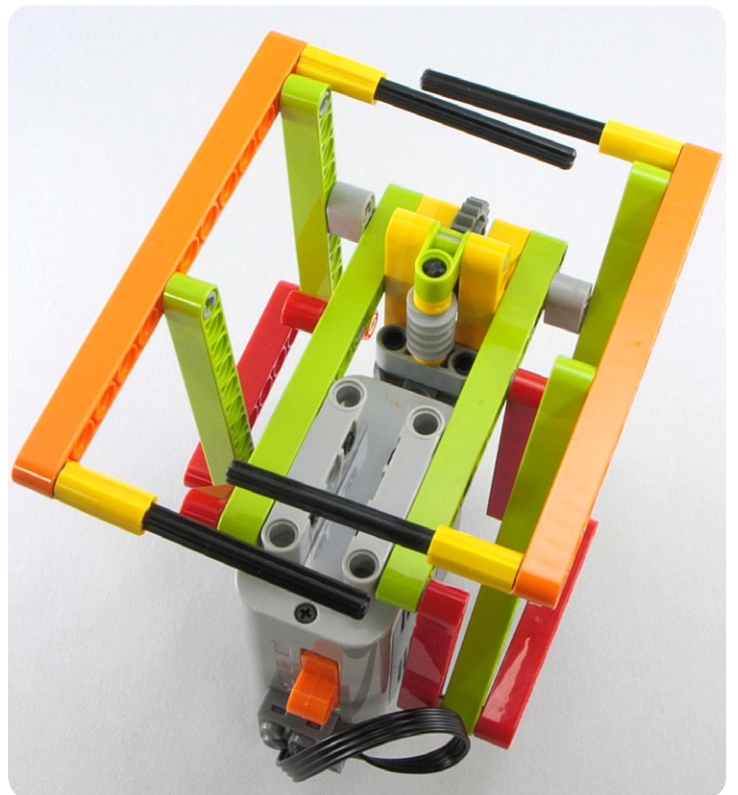
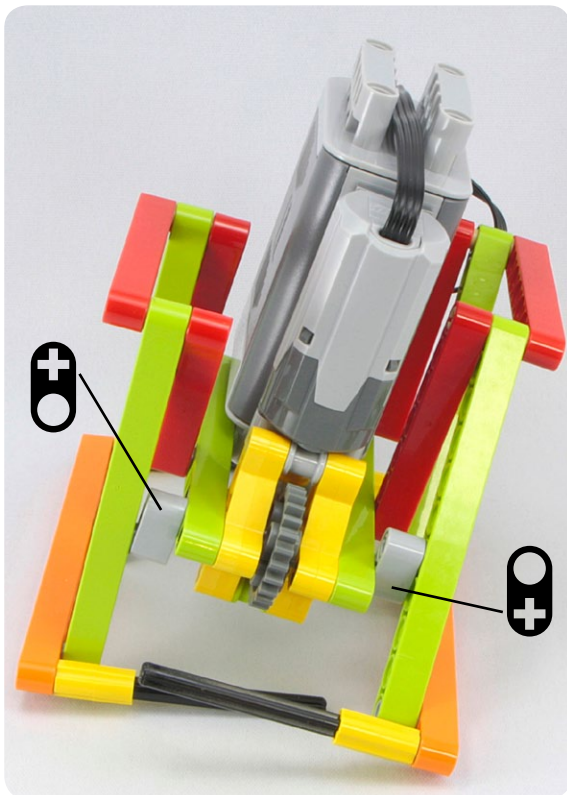
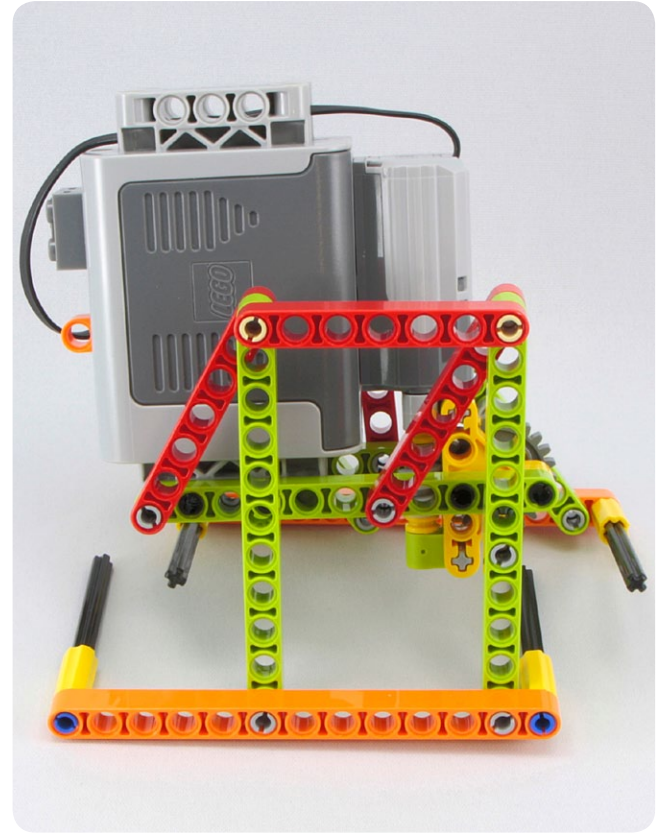
240



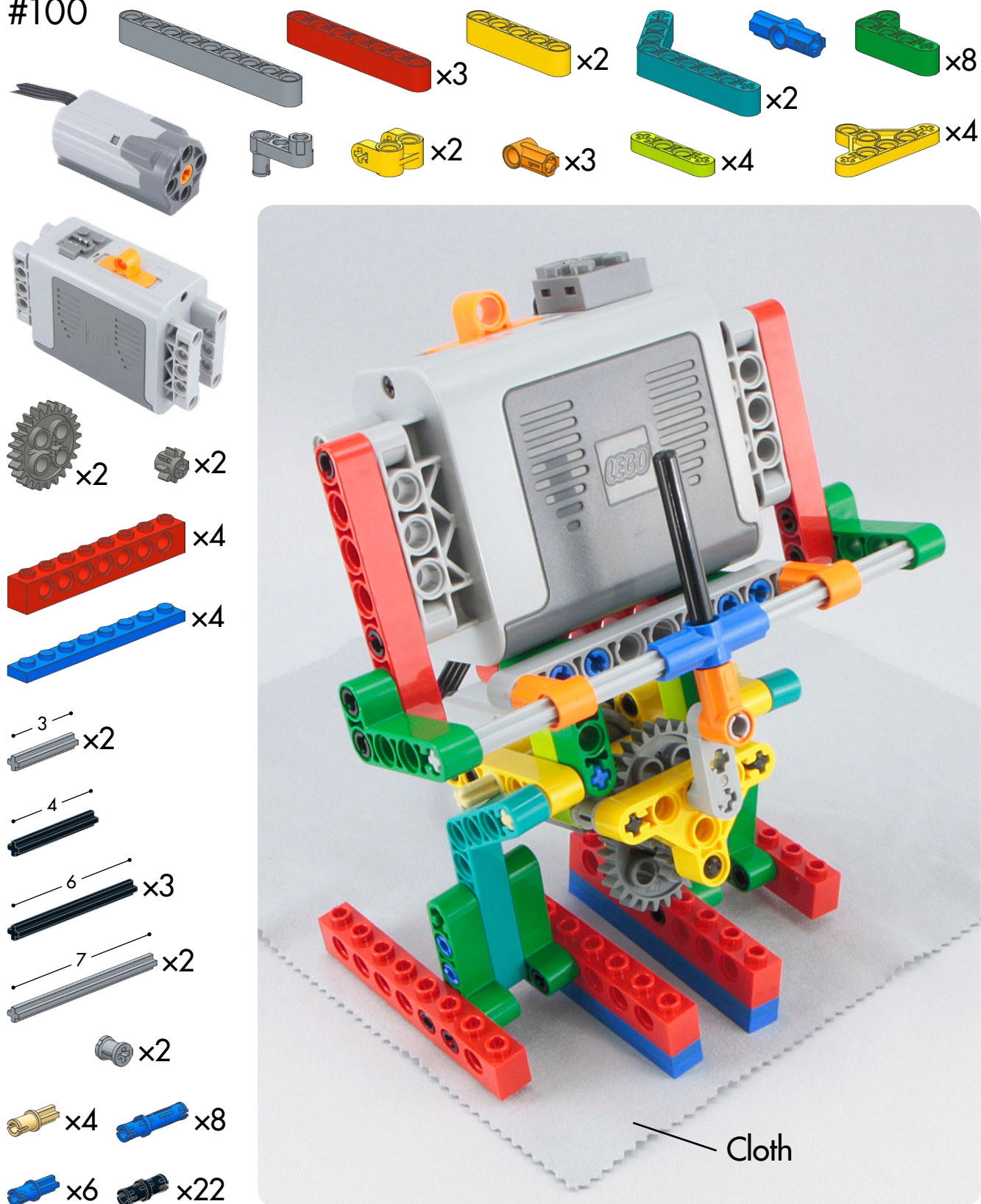
Two-legged walkers

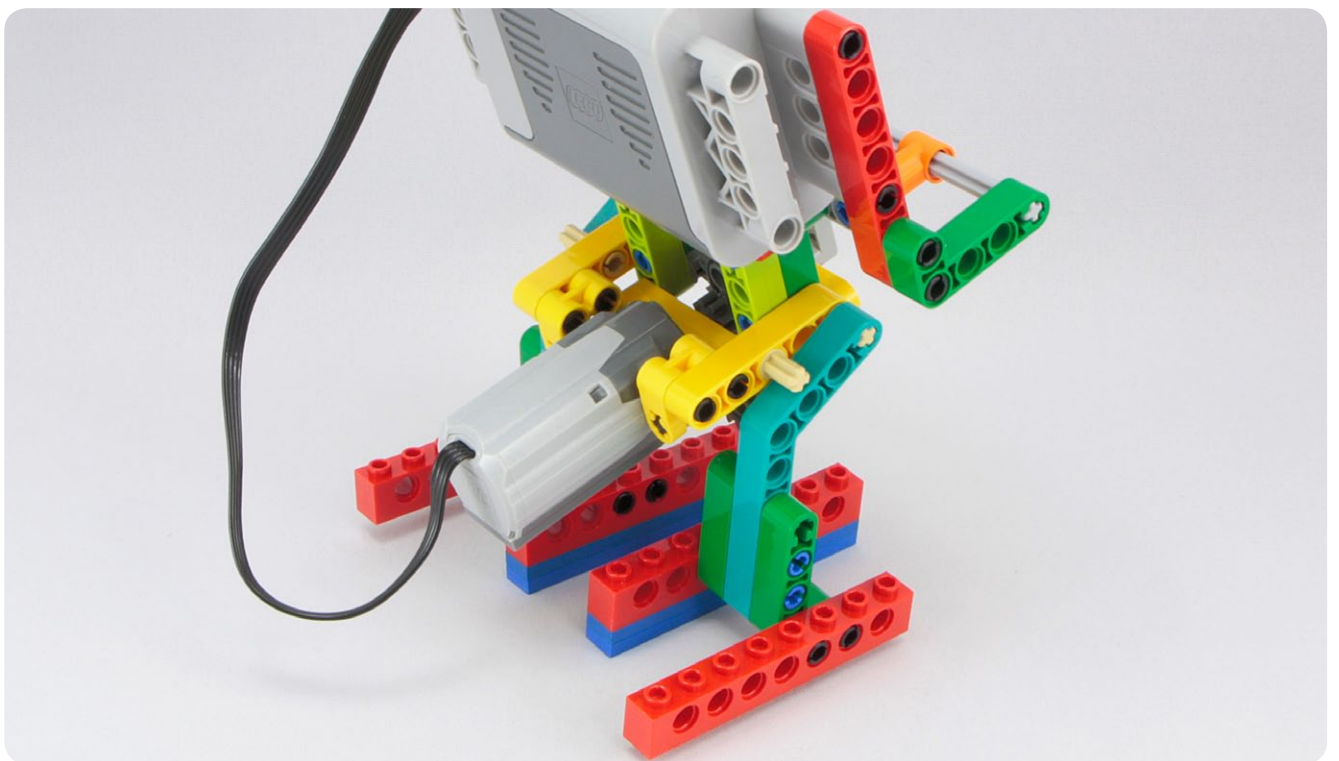
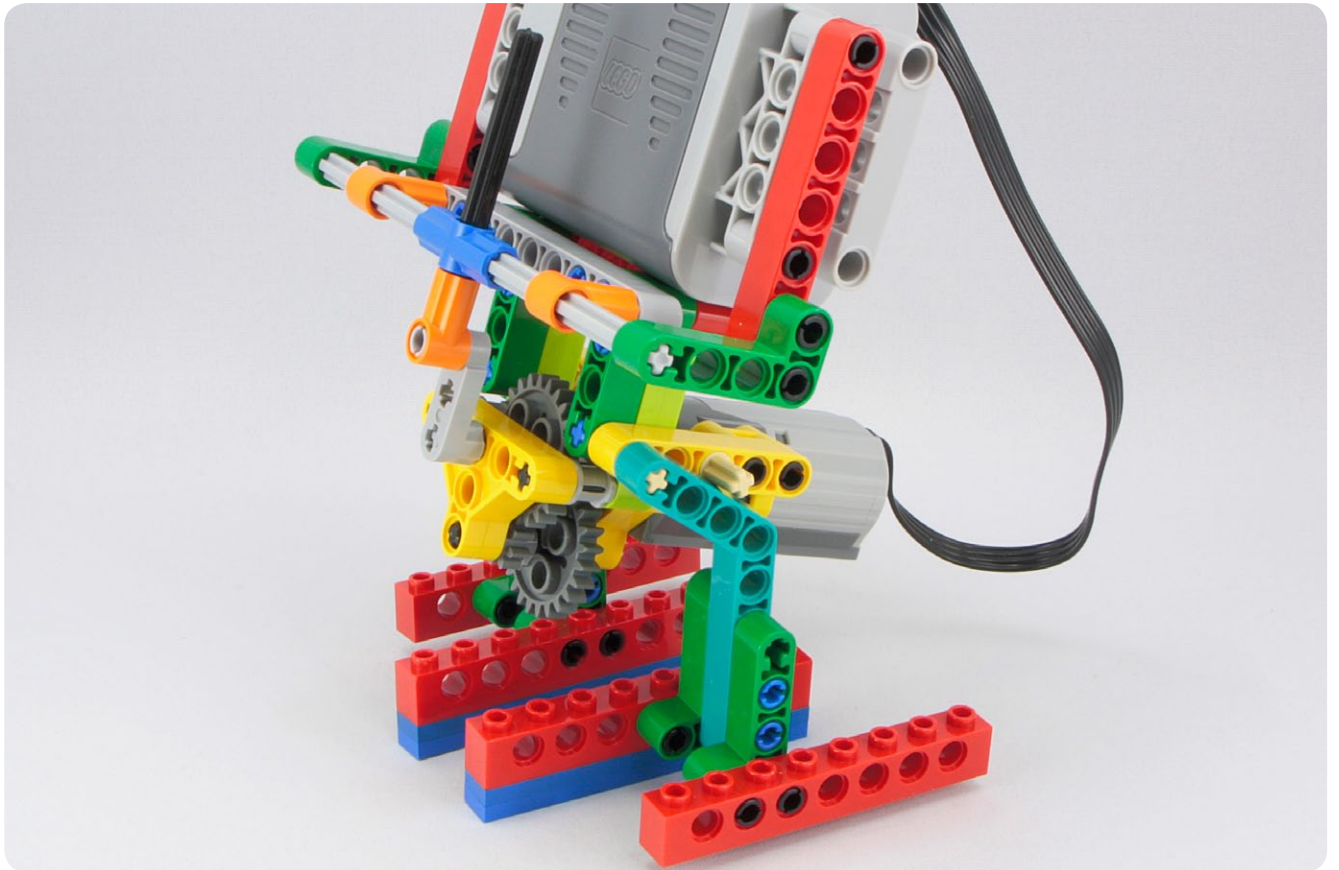
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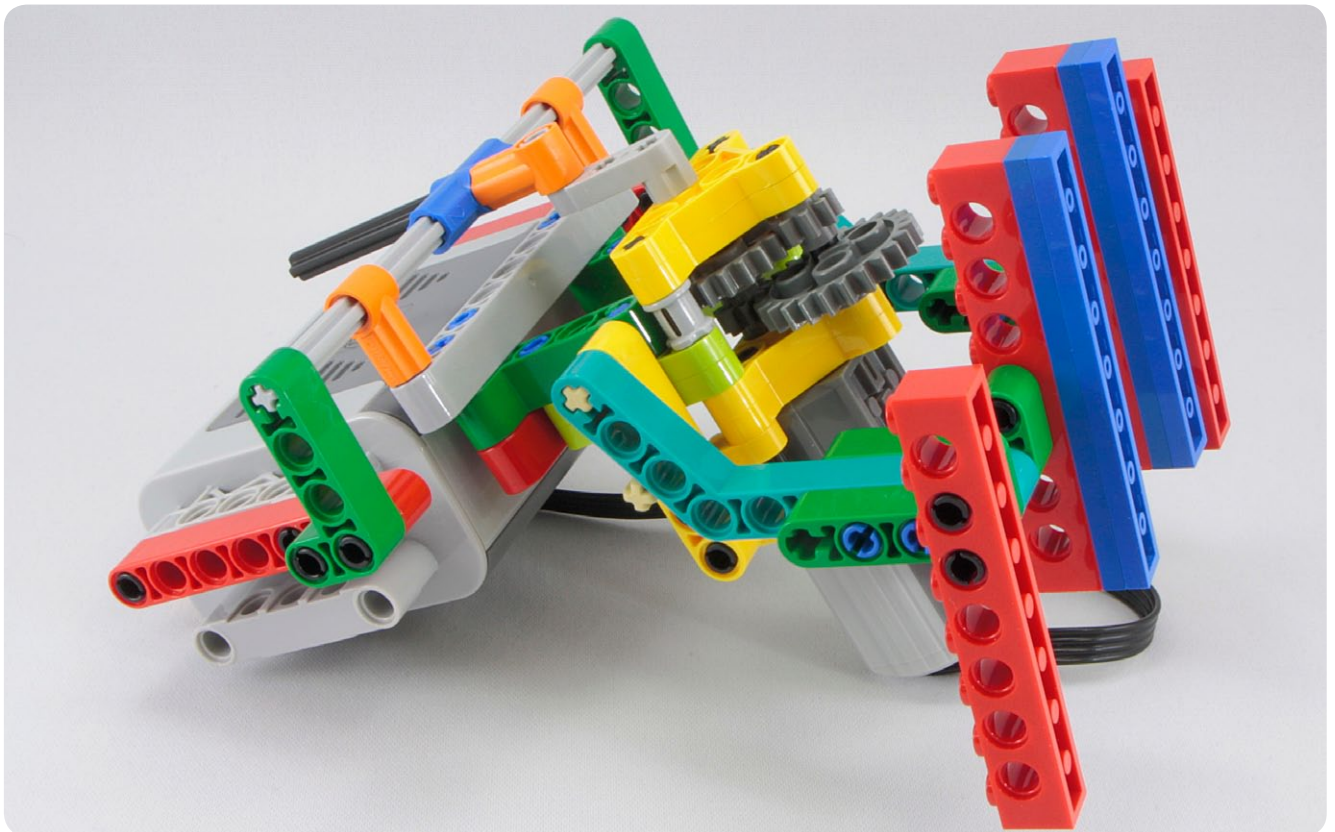
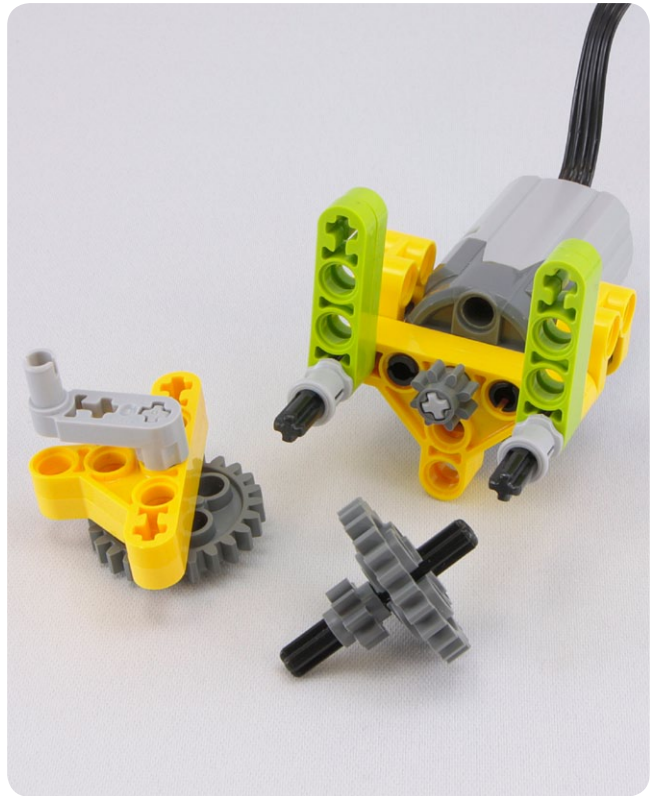
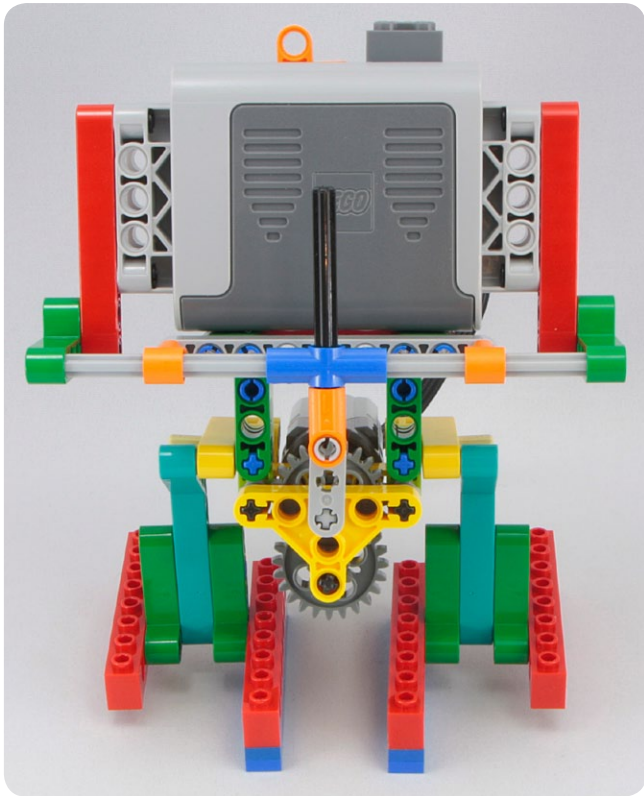


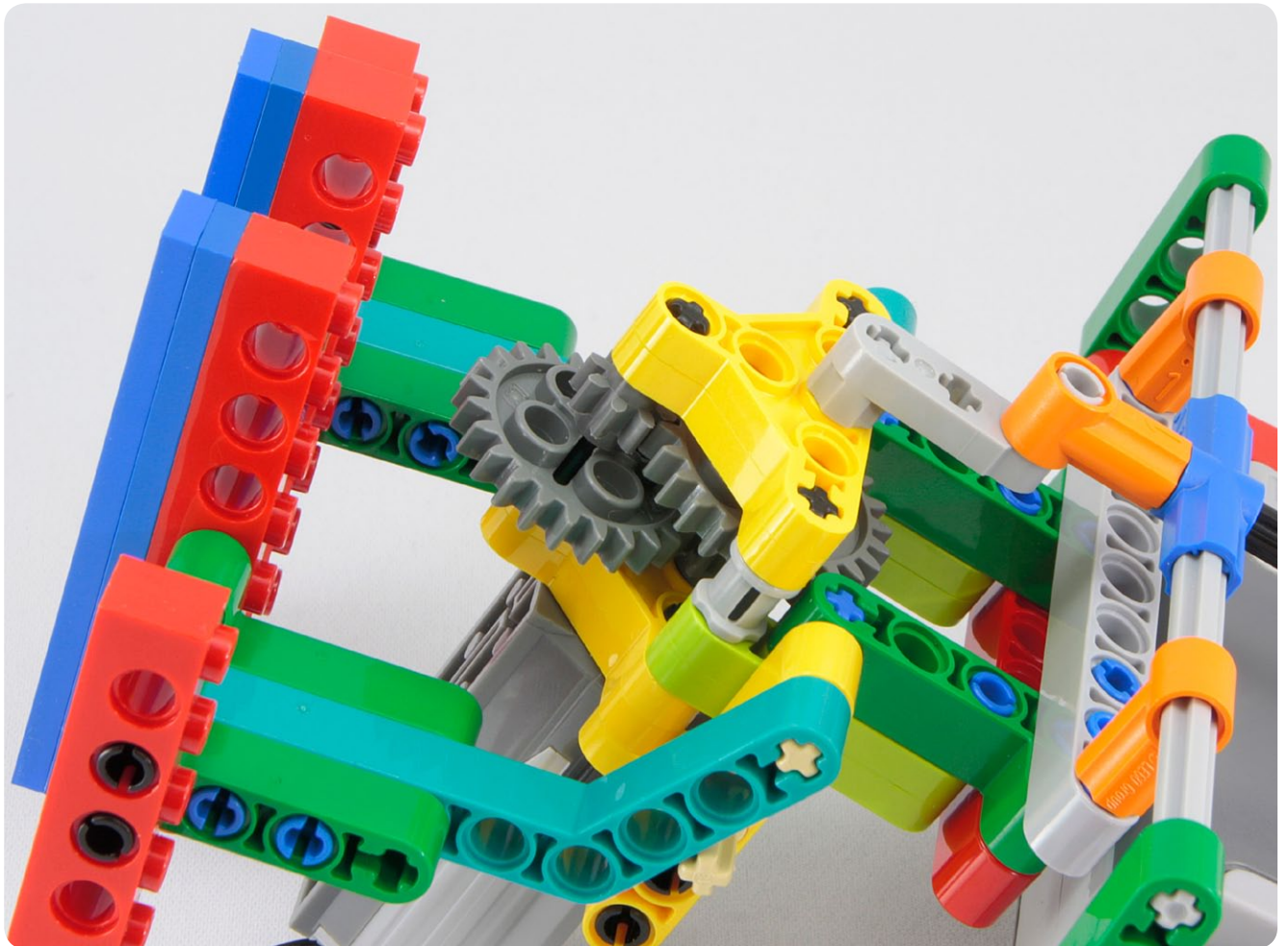
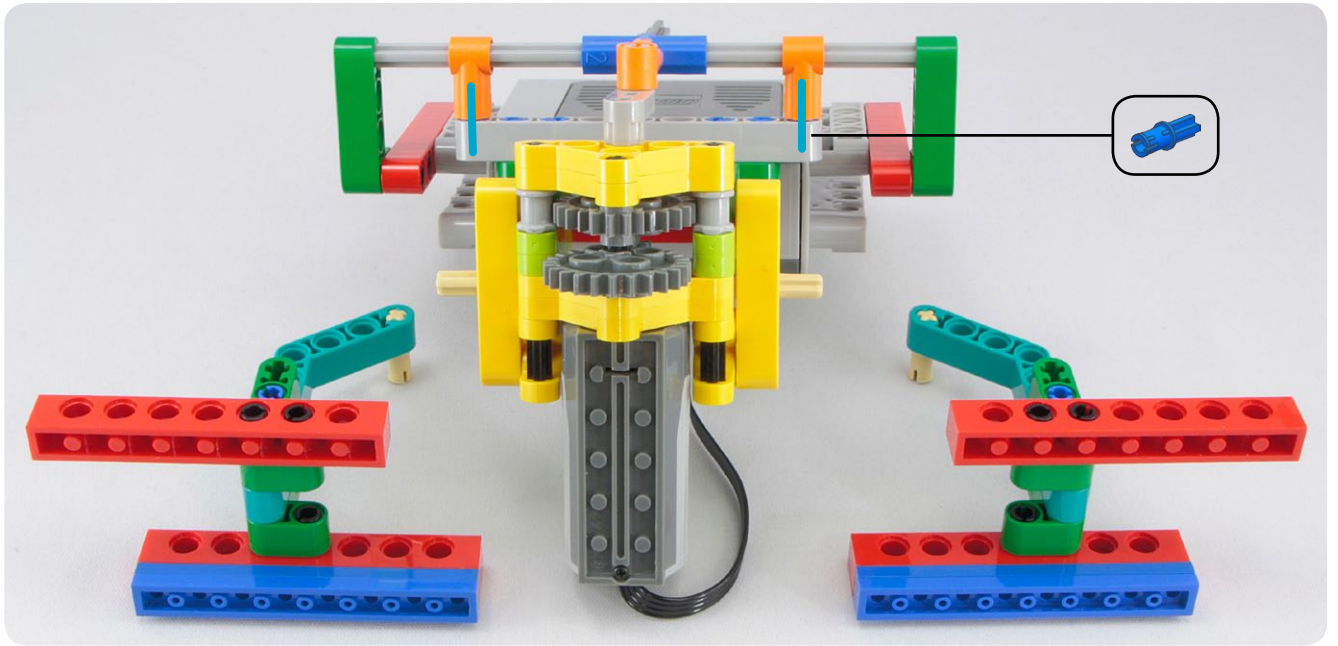


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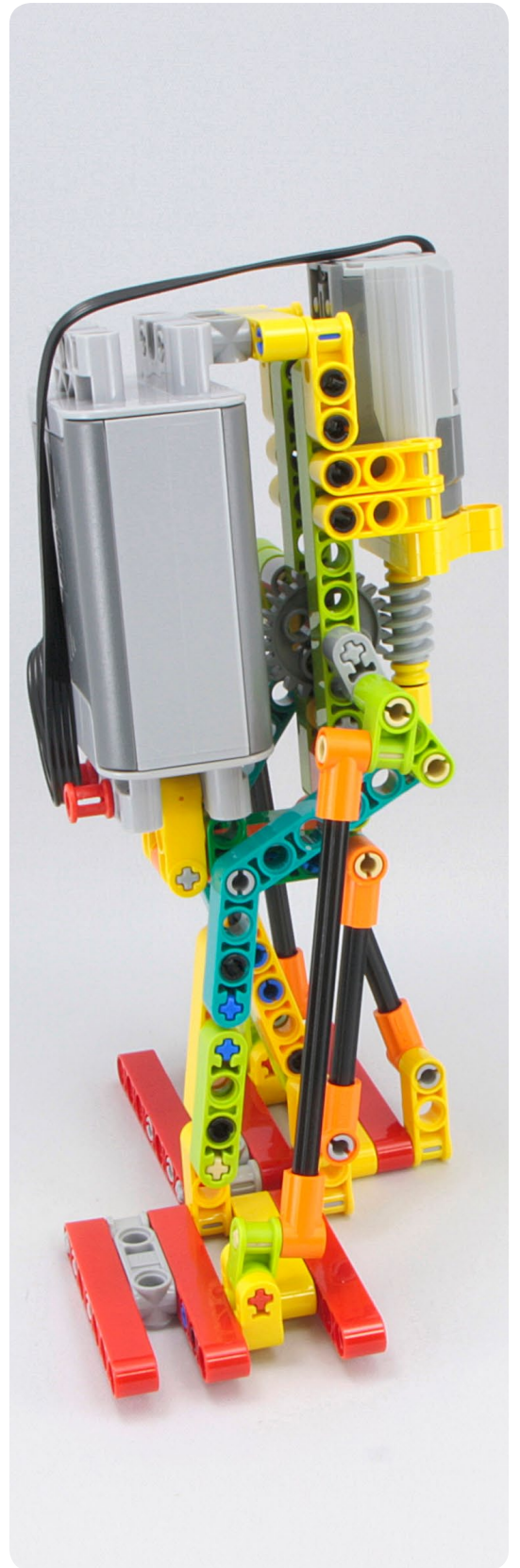
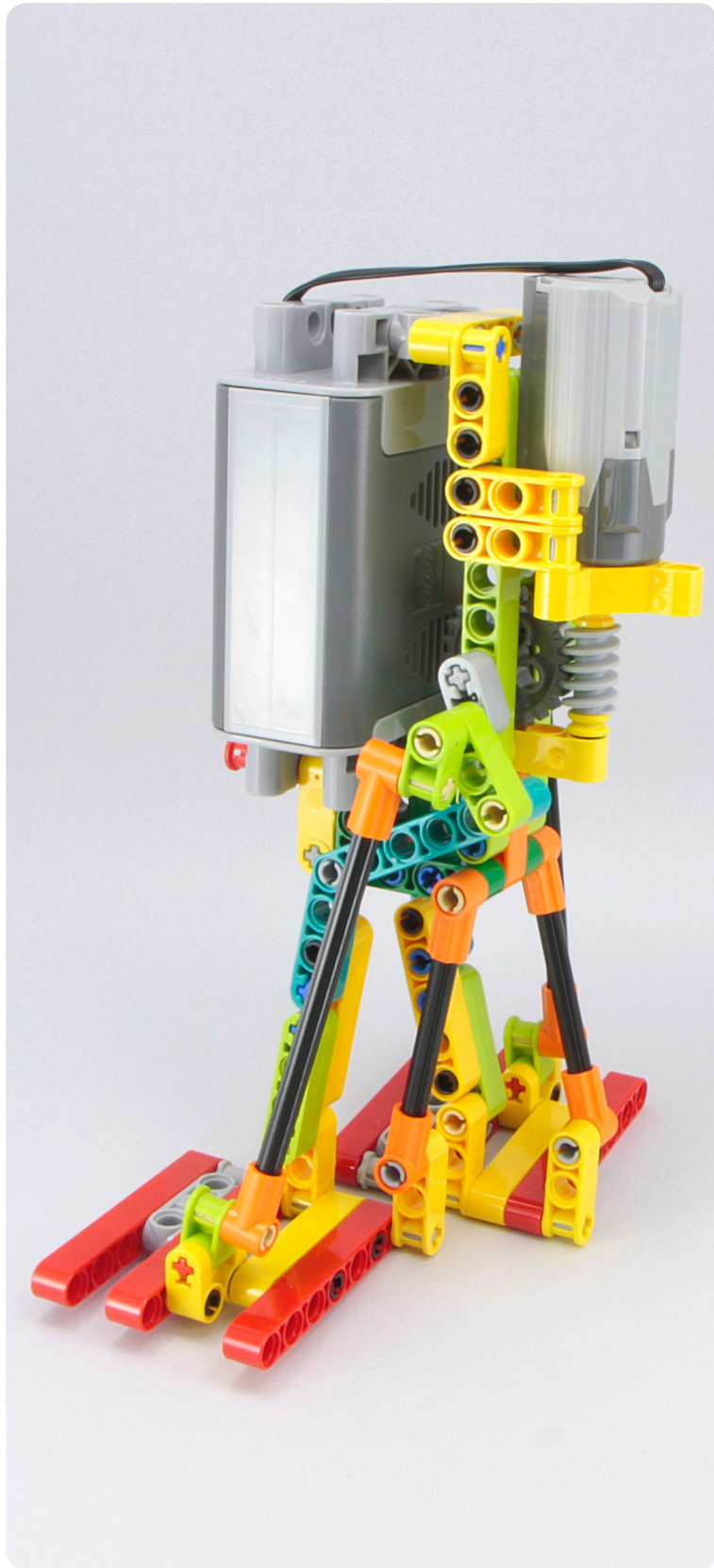


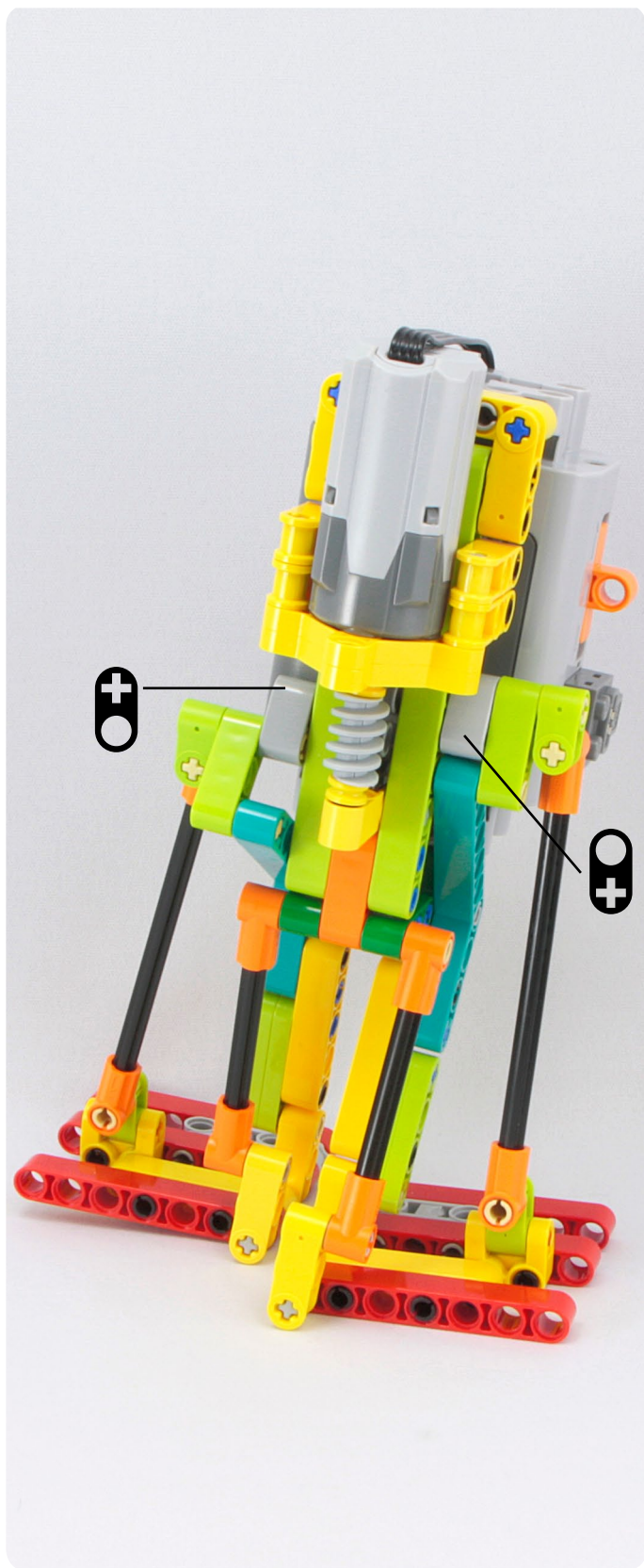


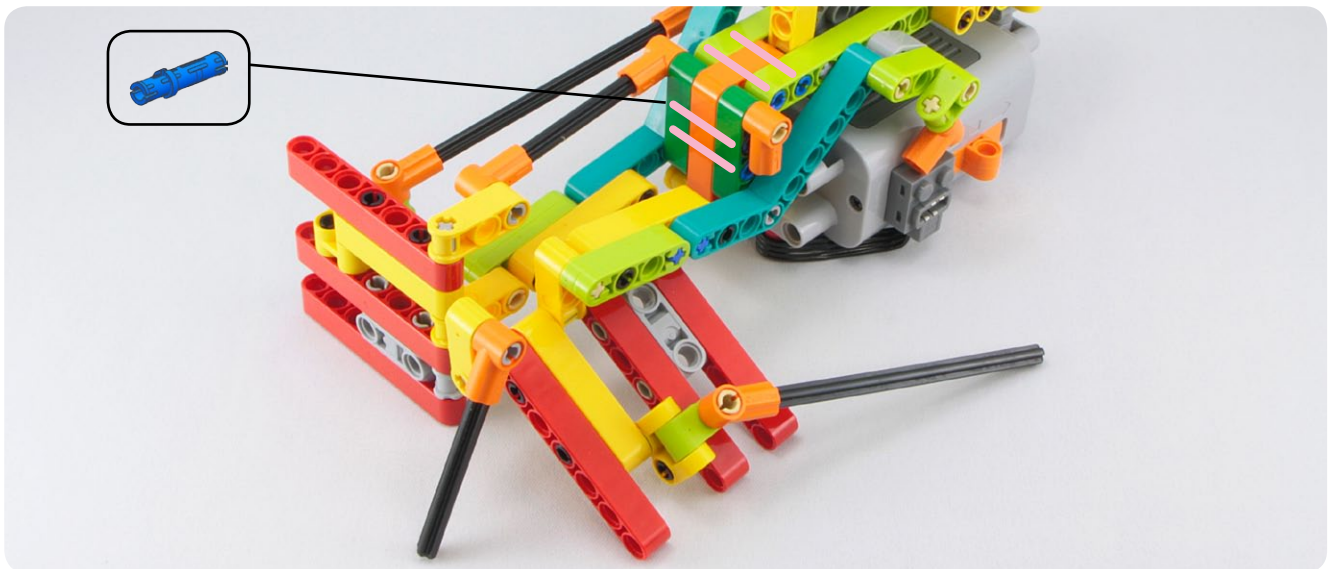
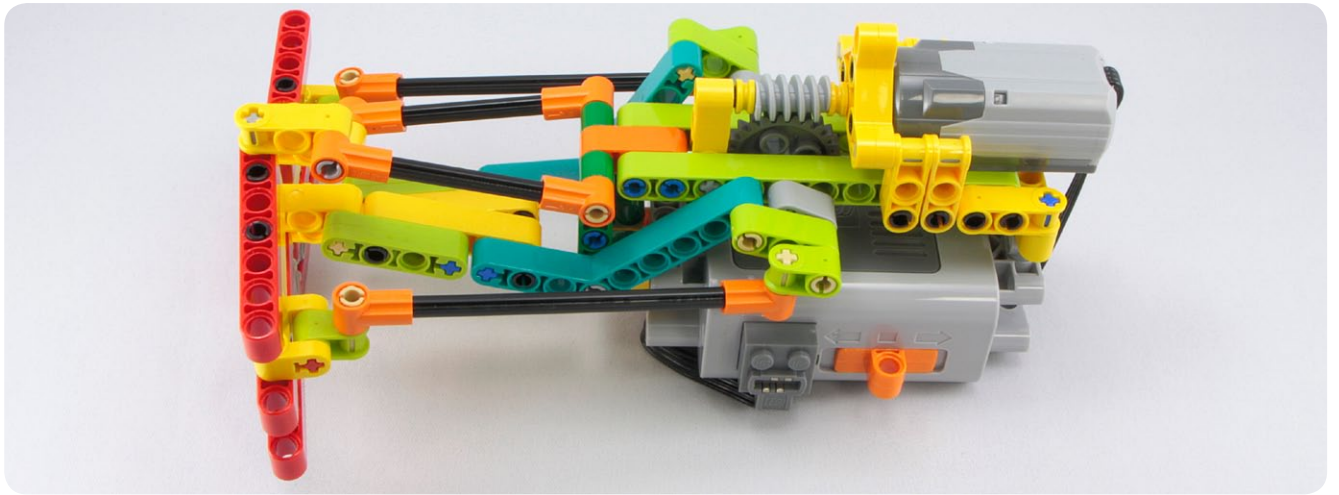


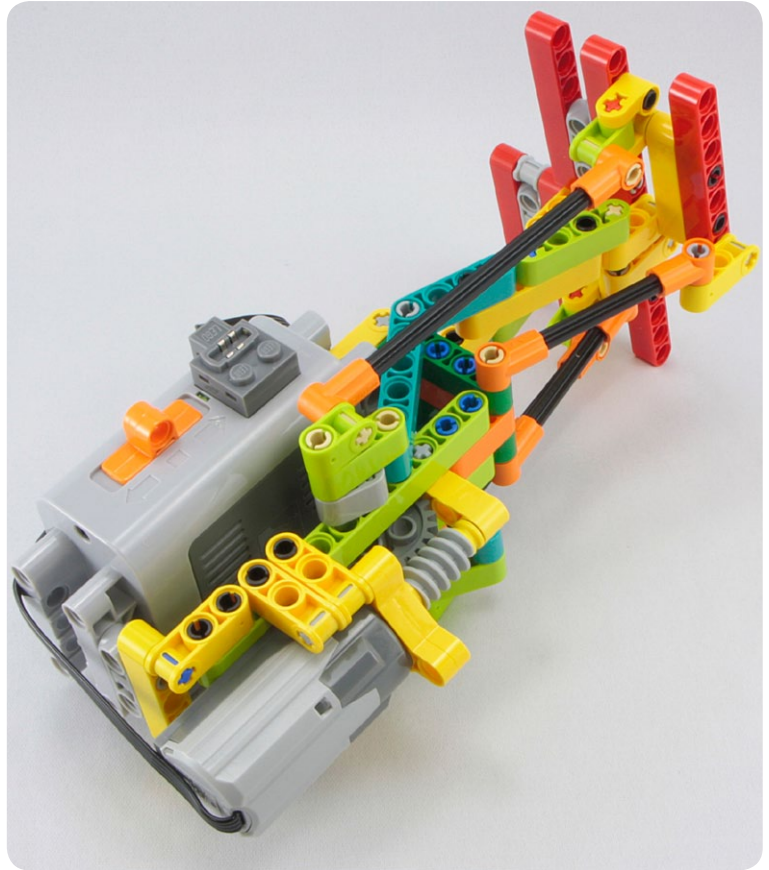
#101

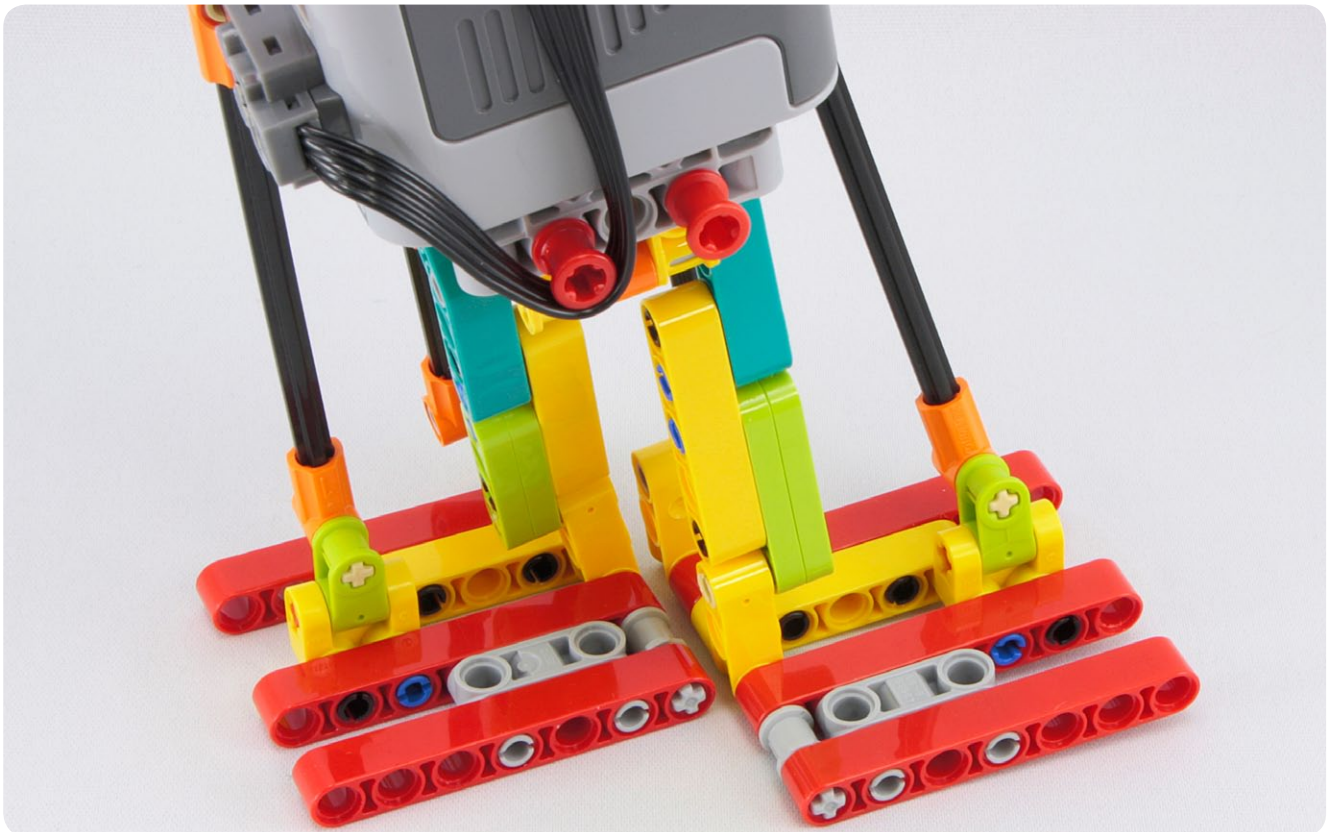




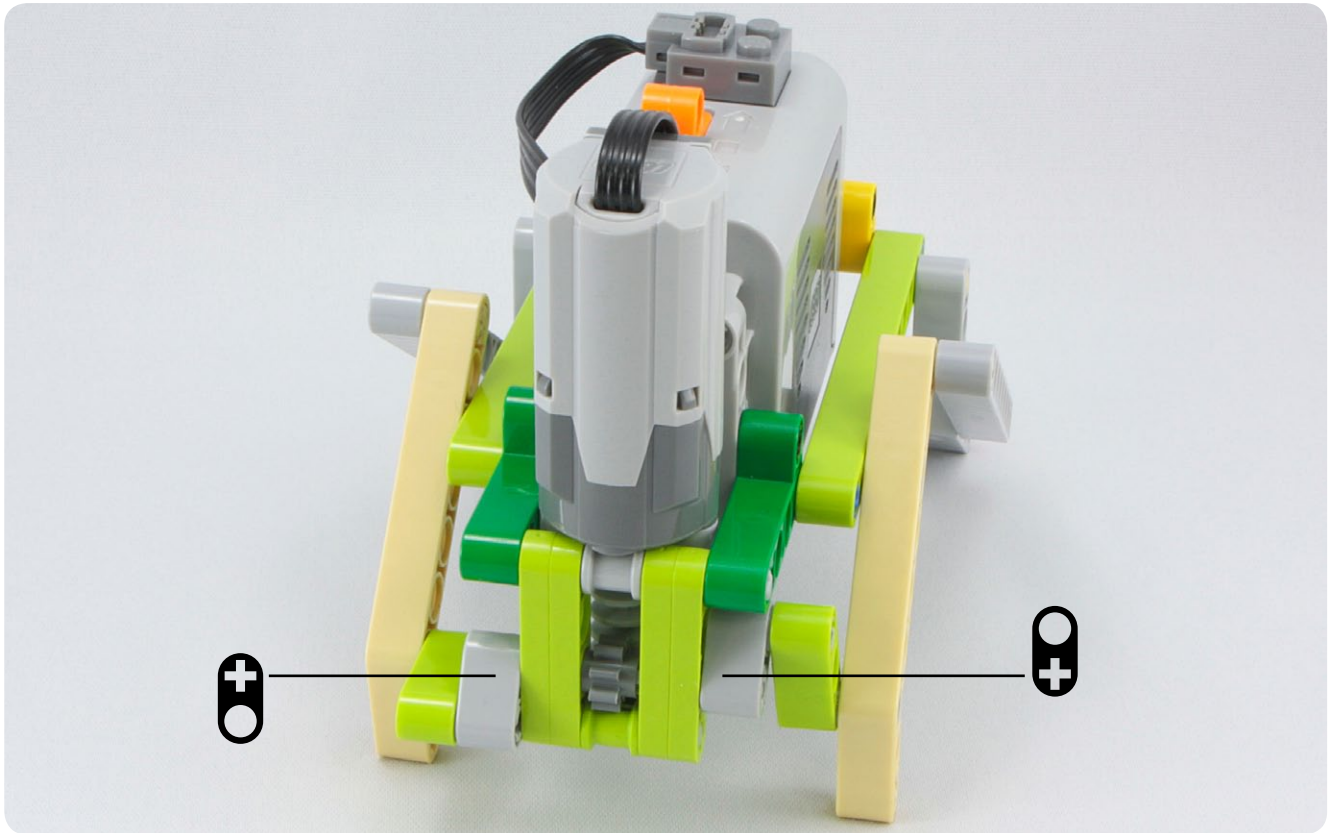




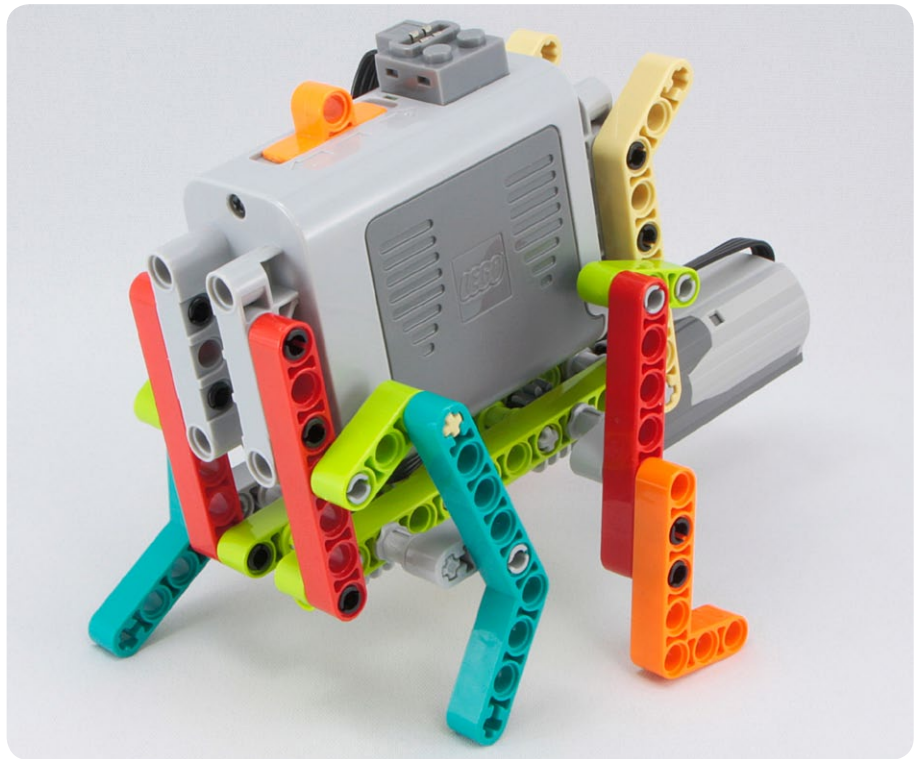
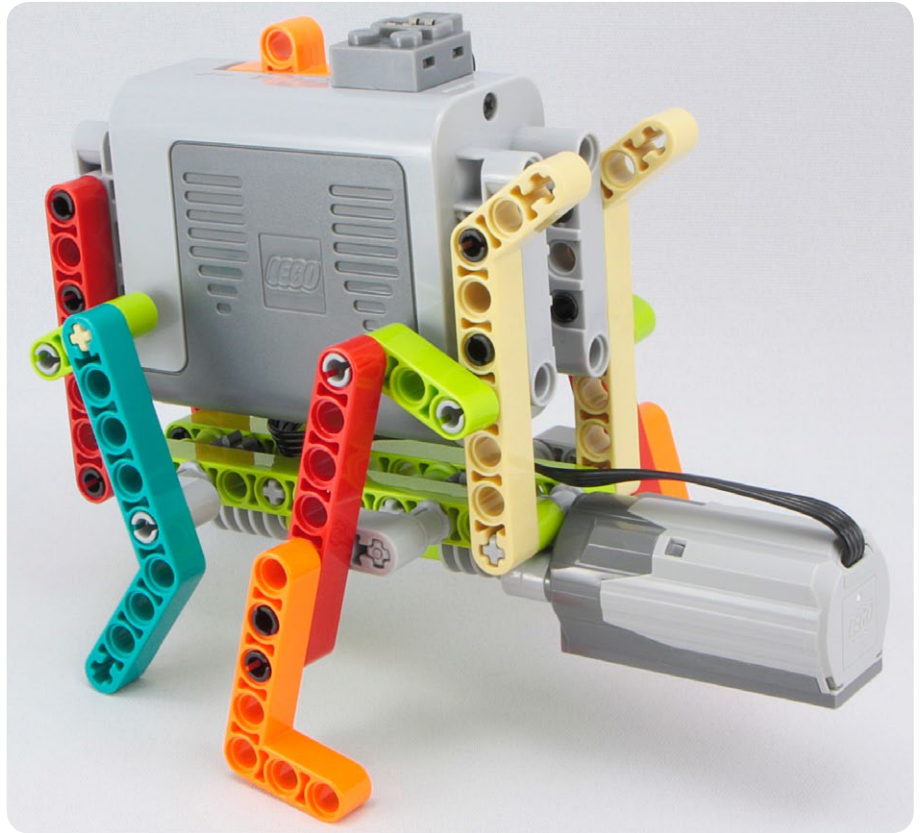
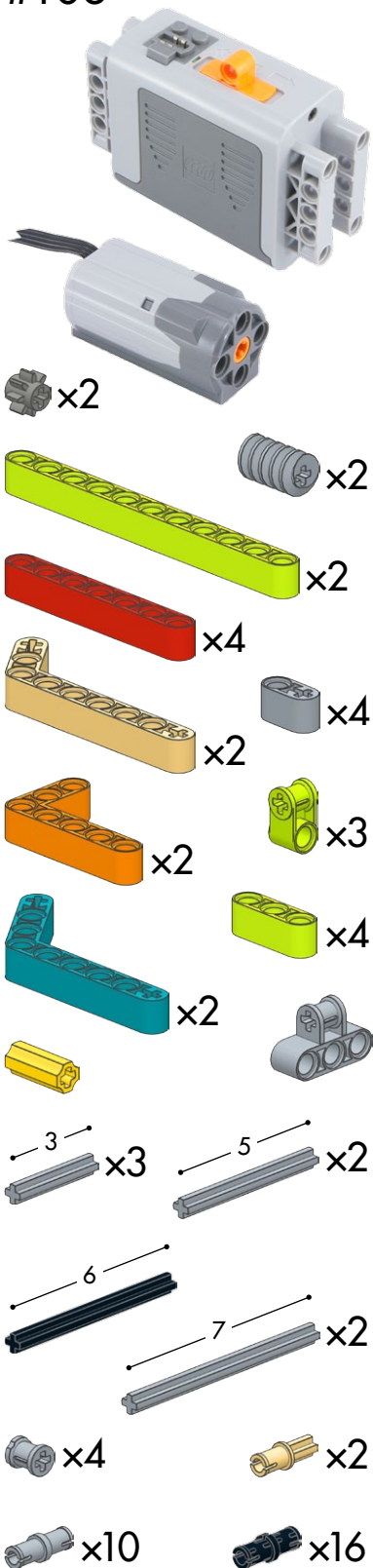


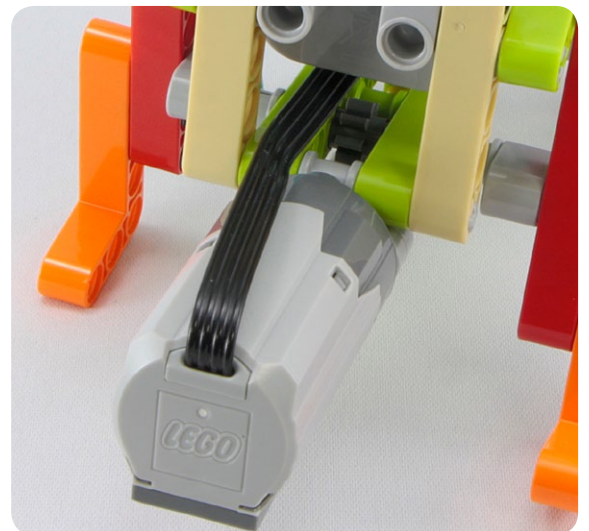
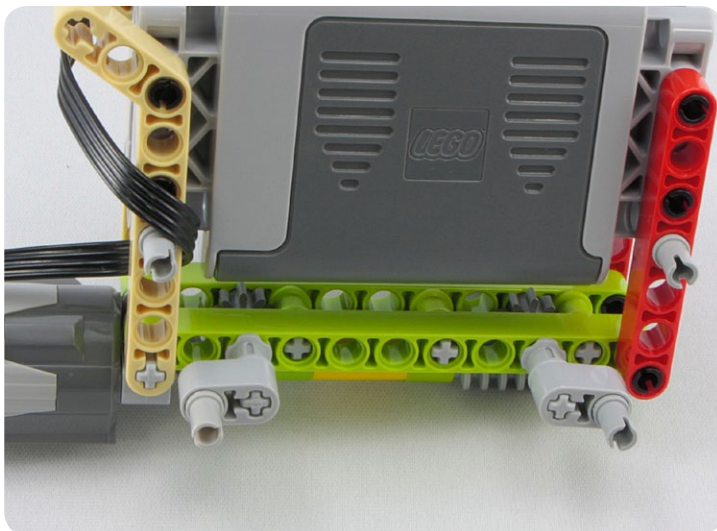
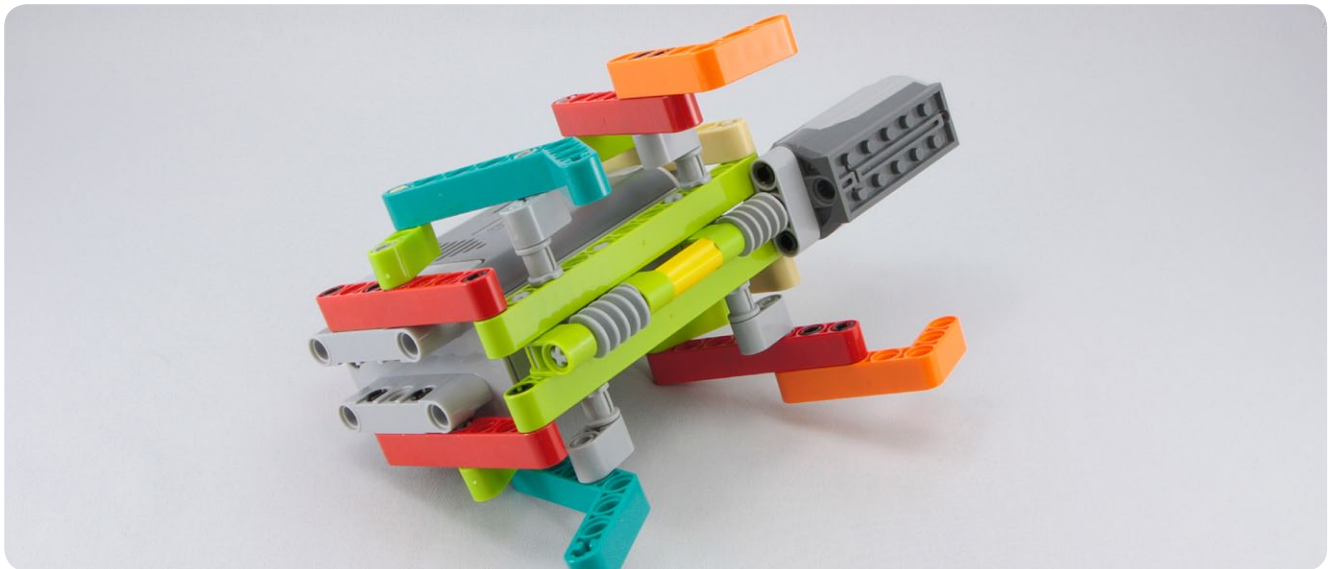
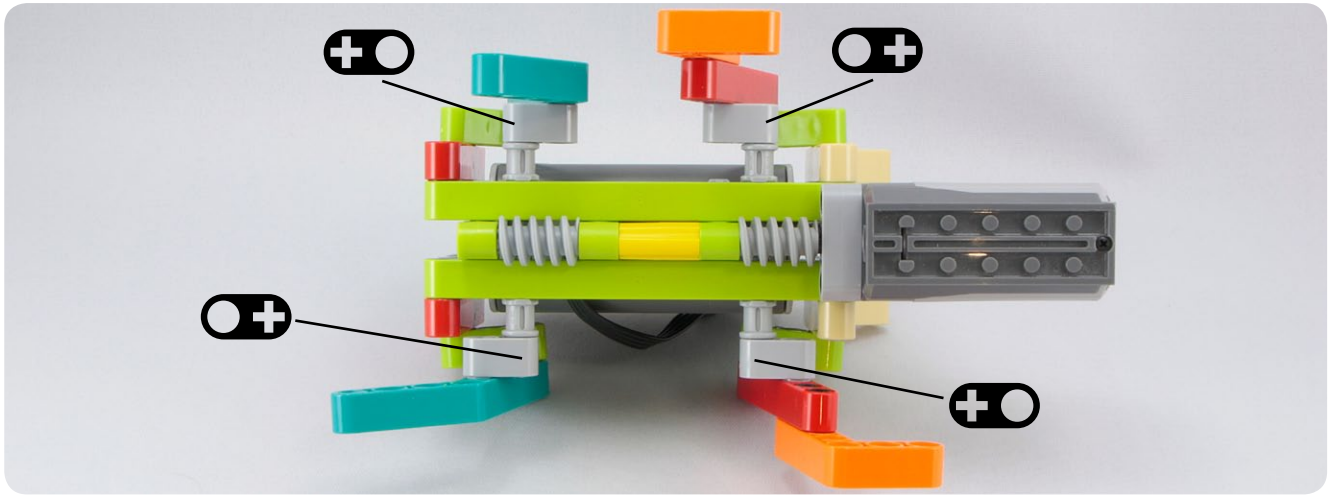


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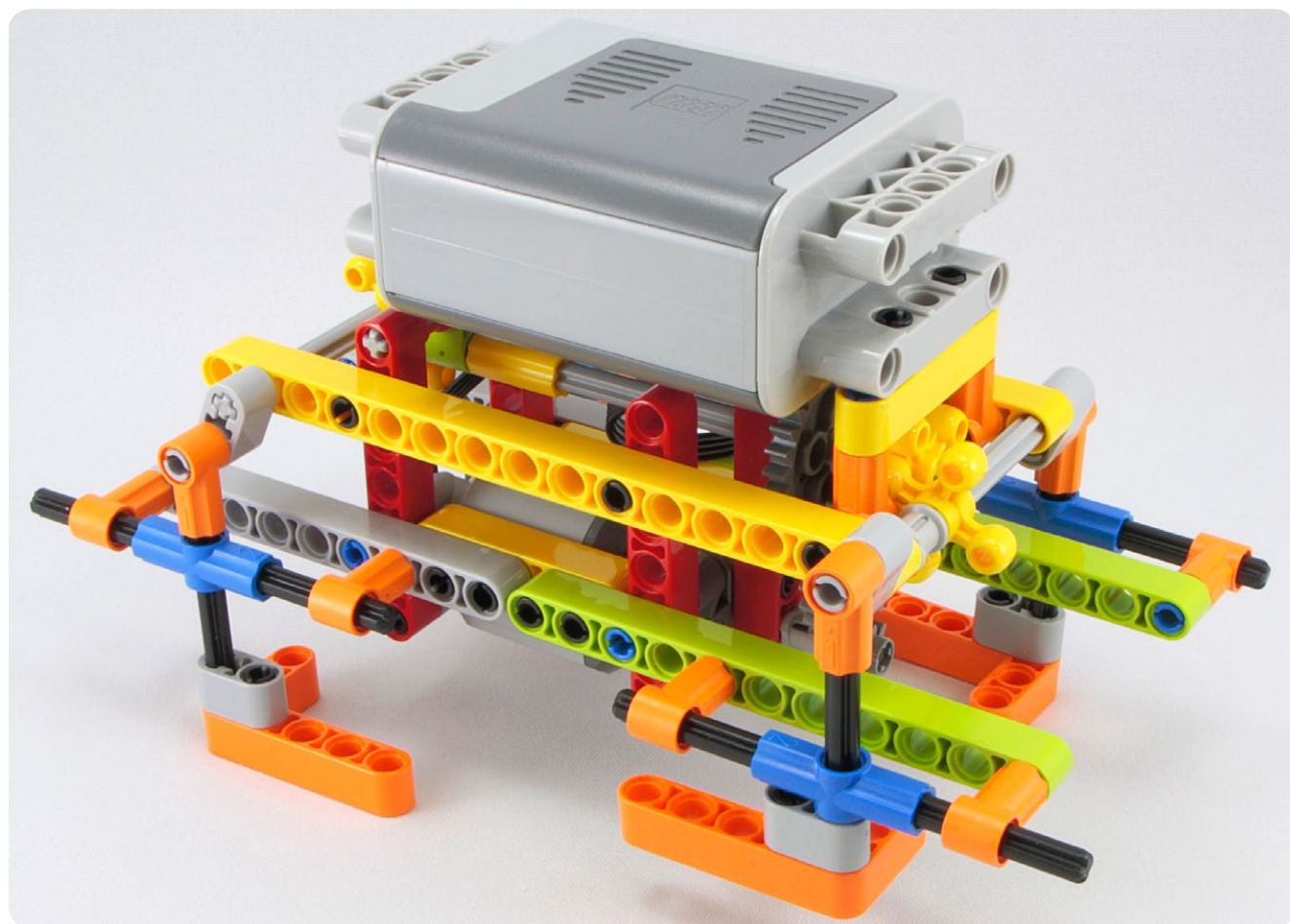
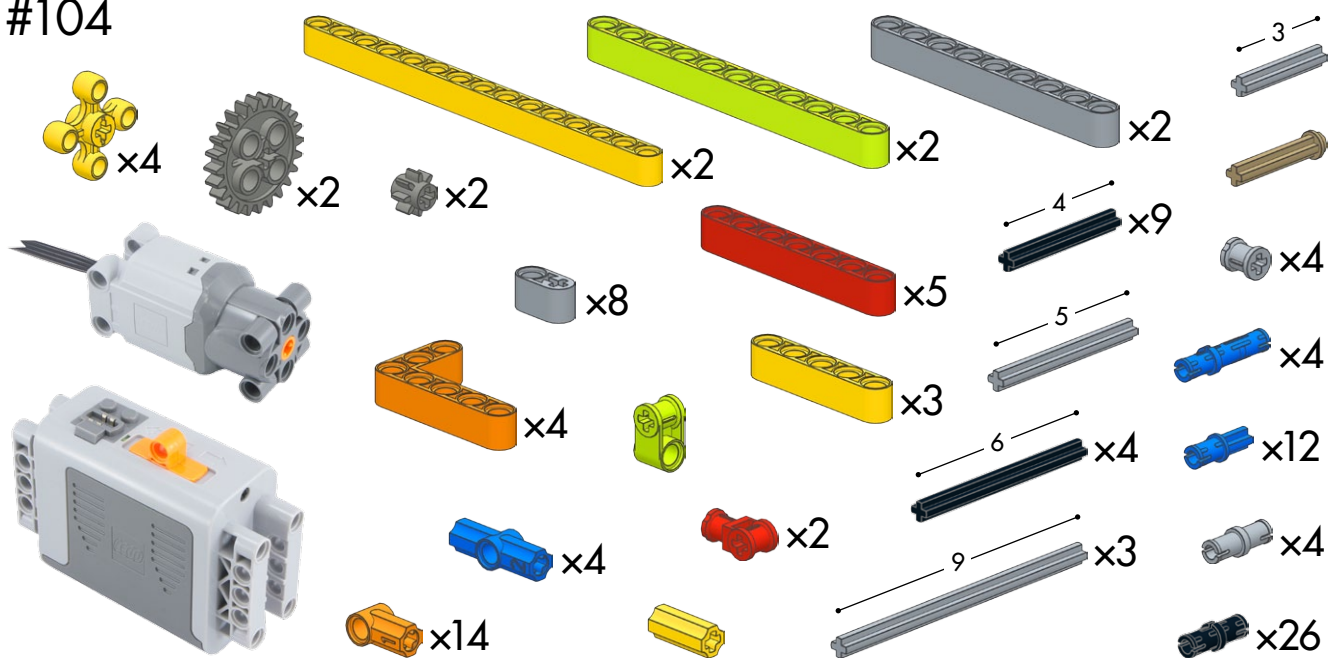


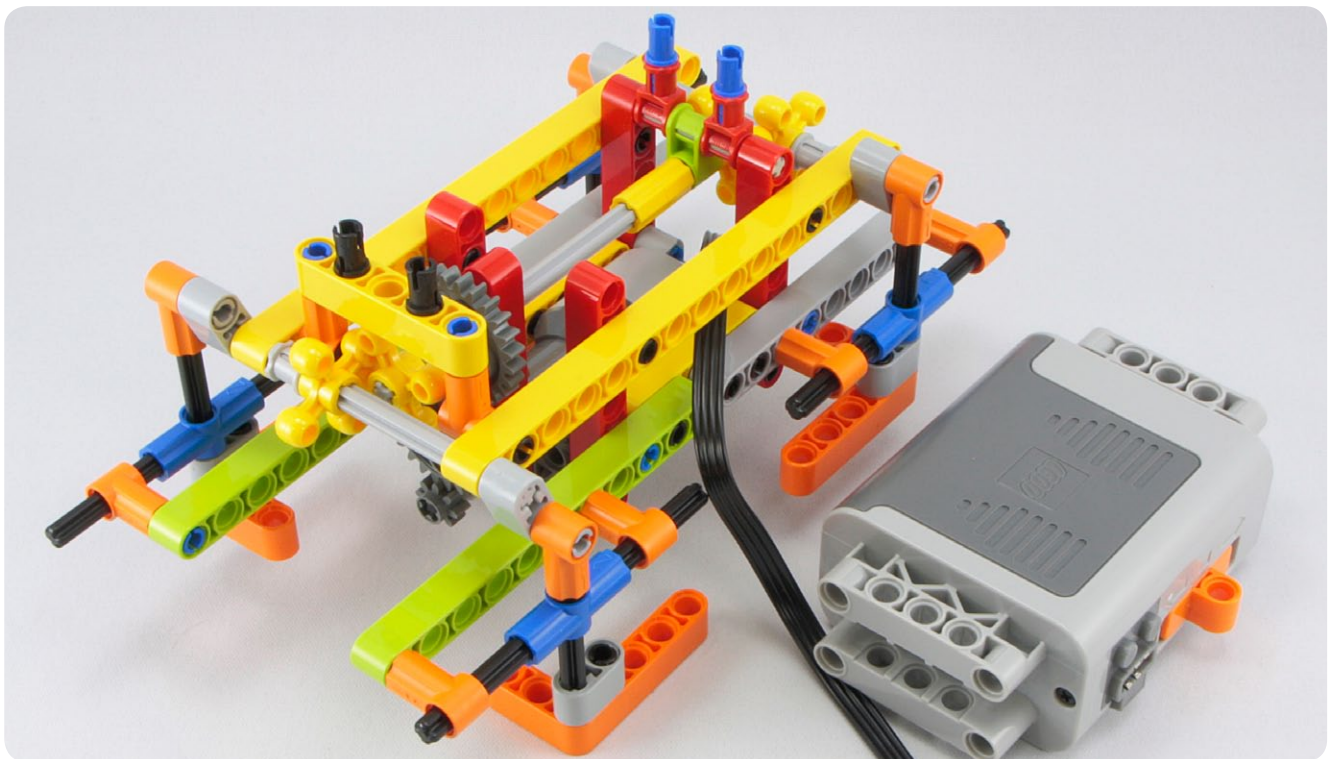
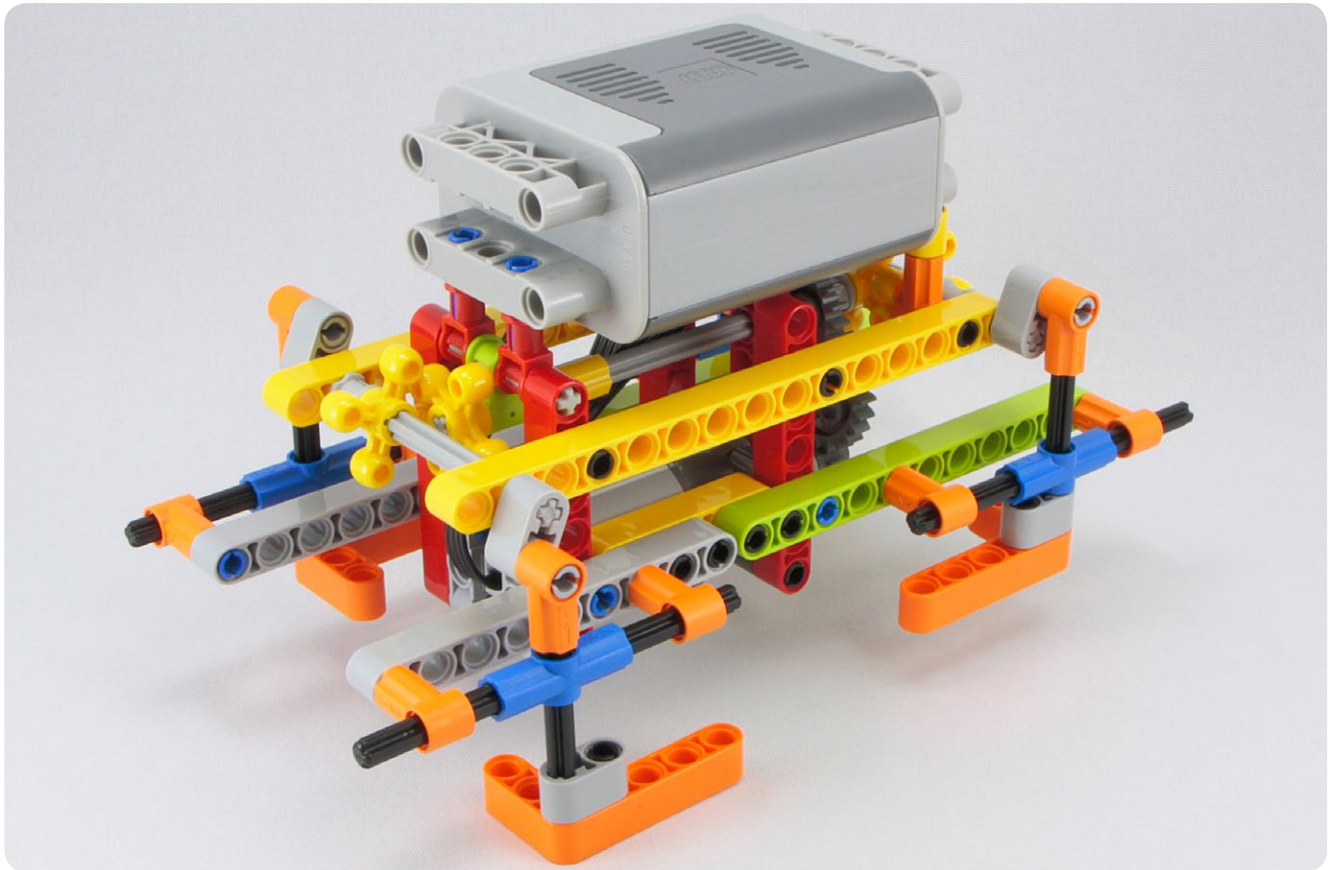
#103

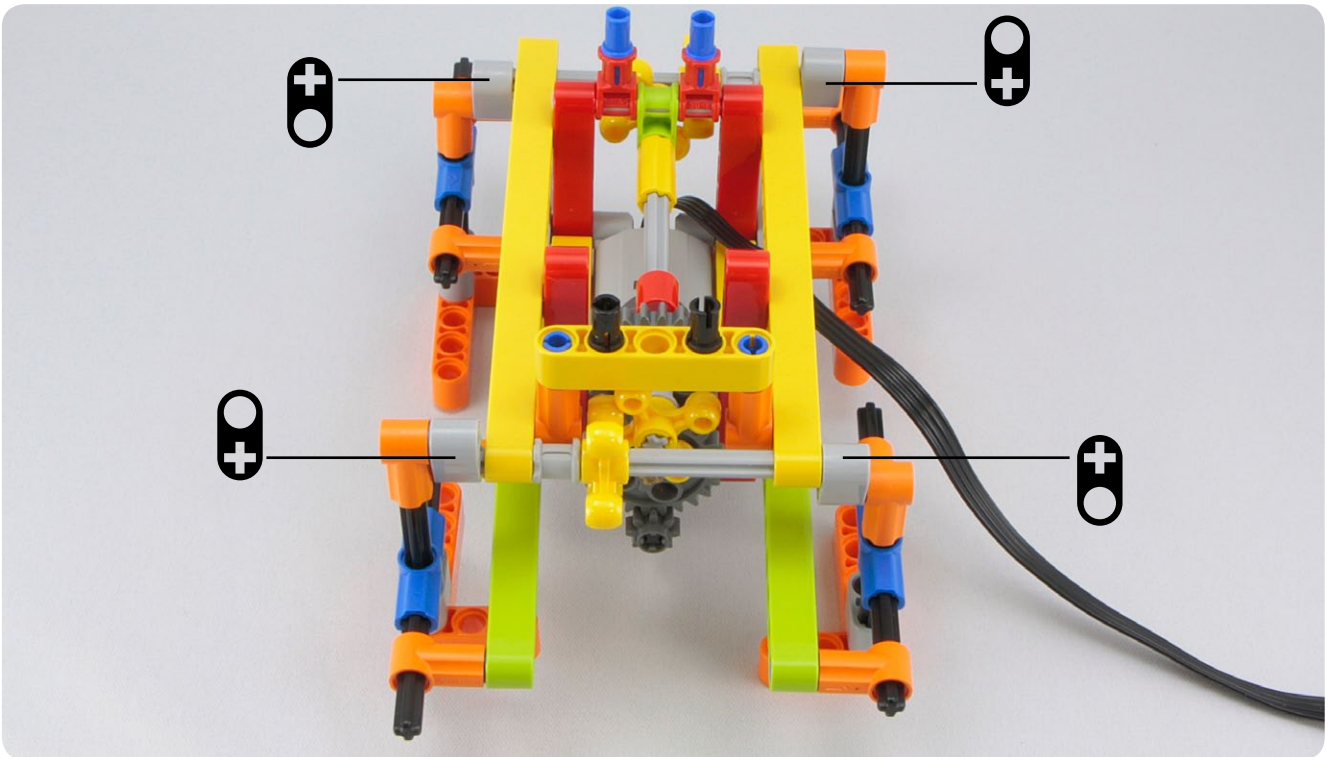
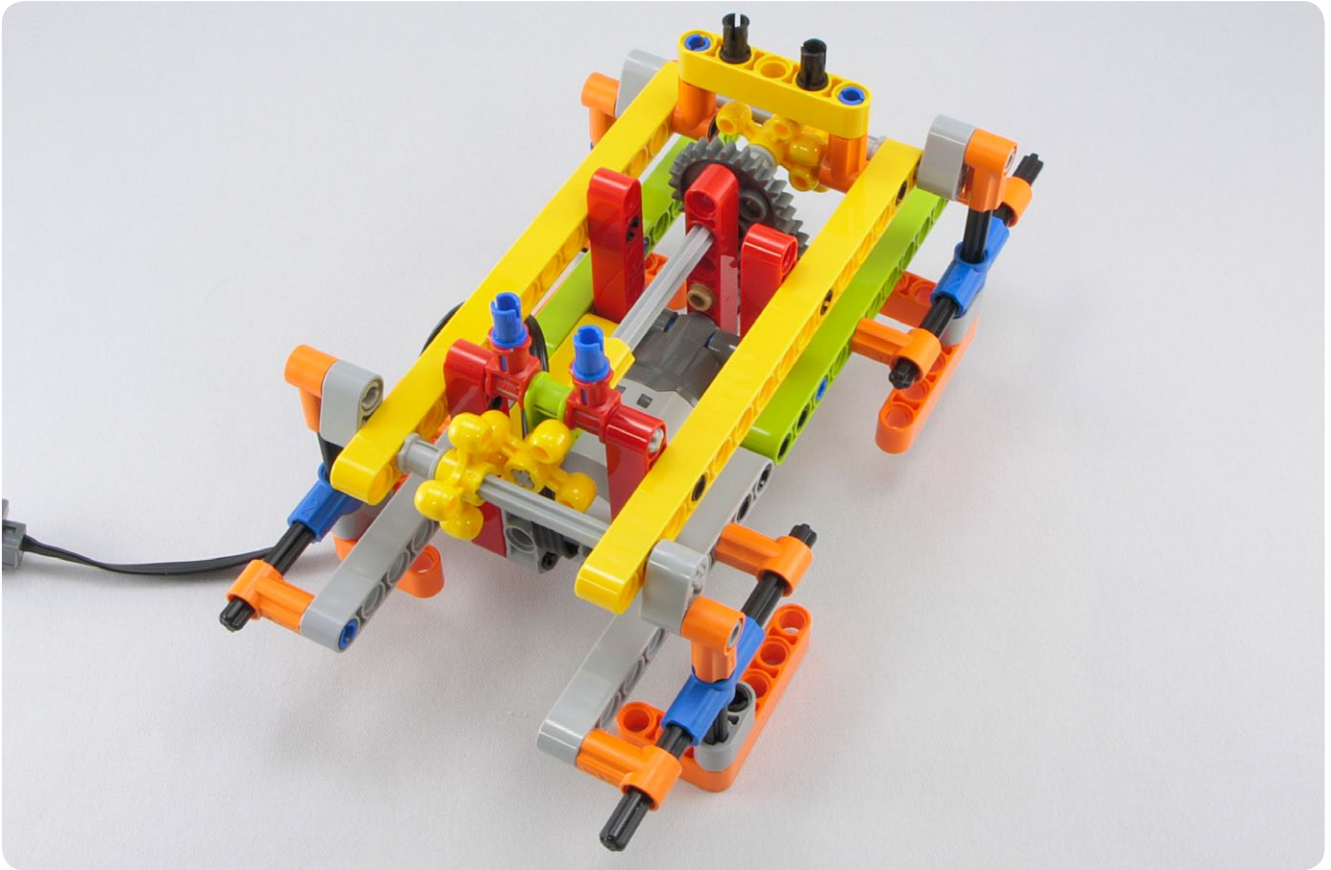


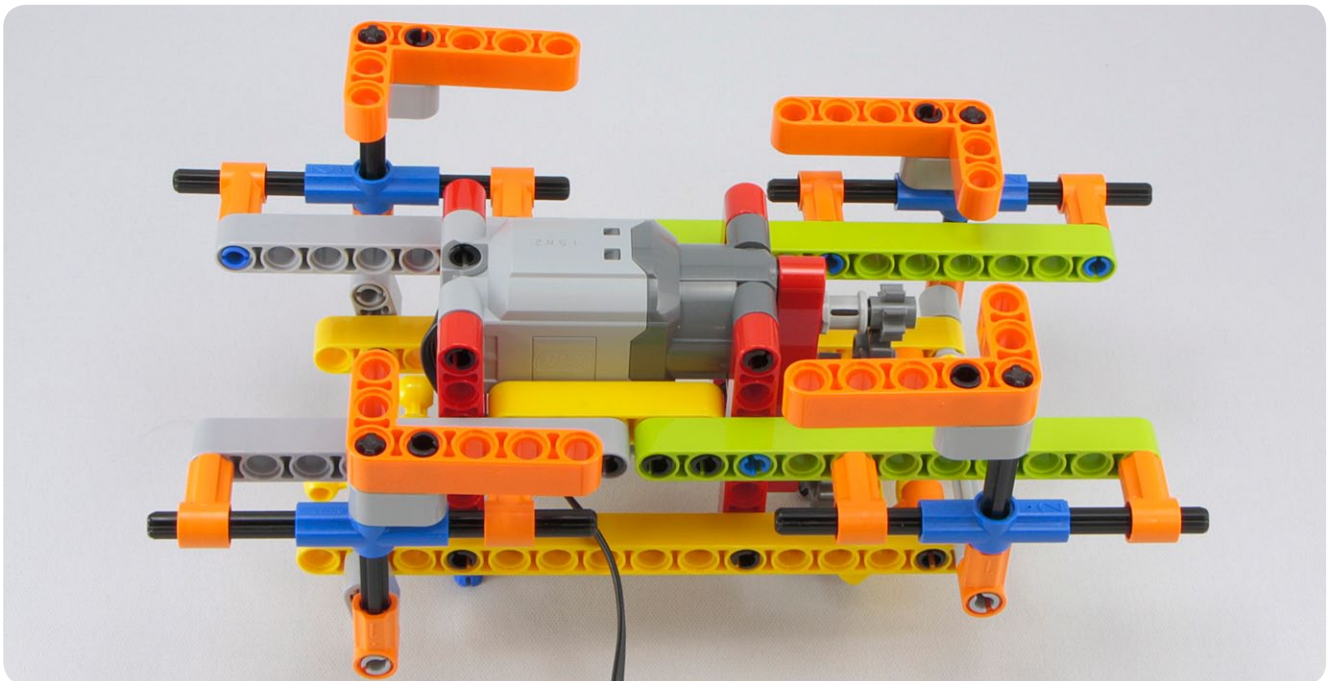
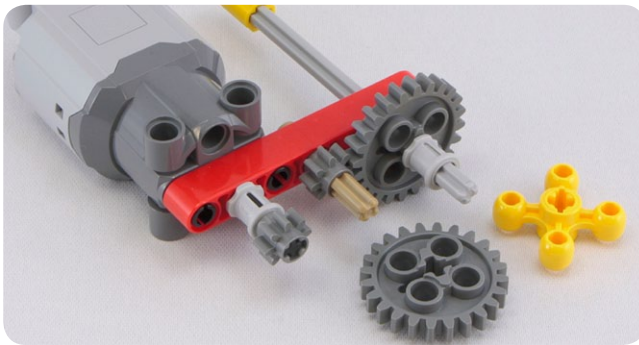
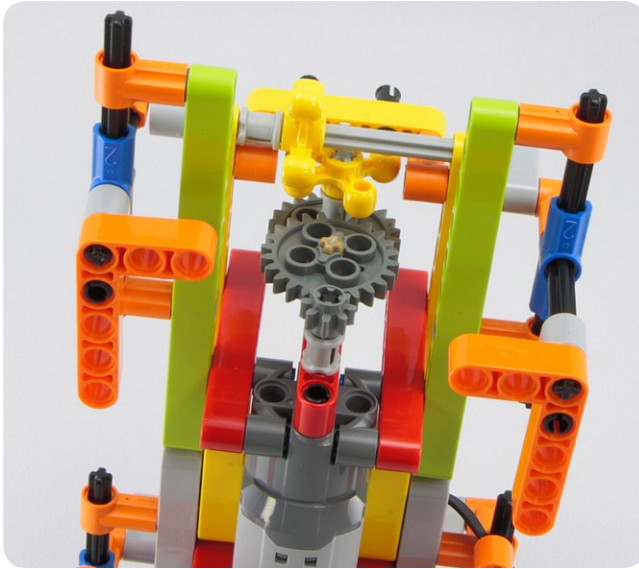


#104

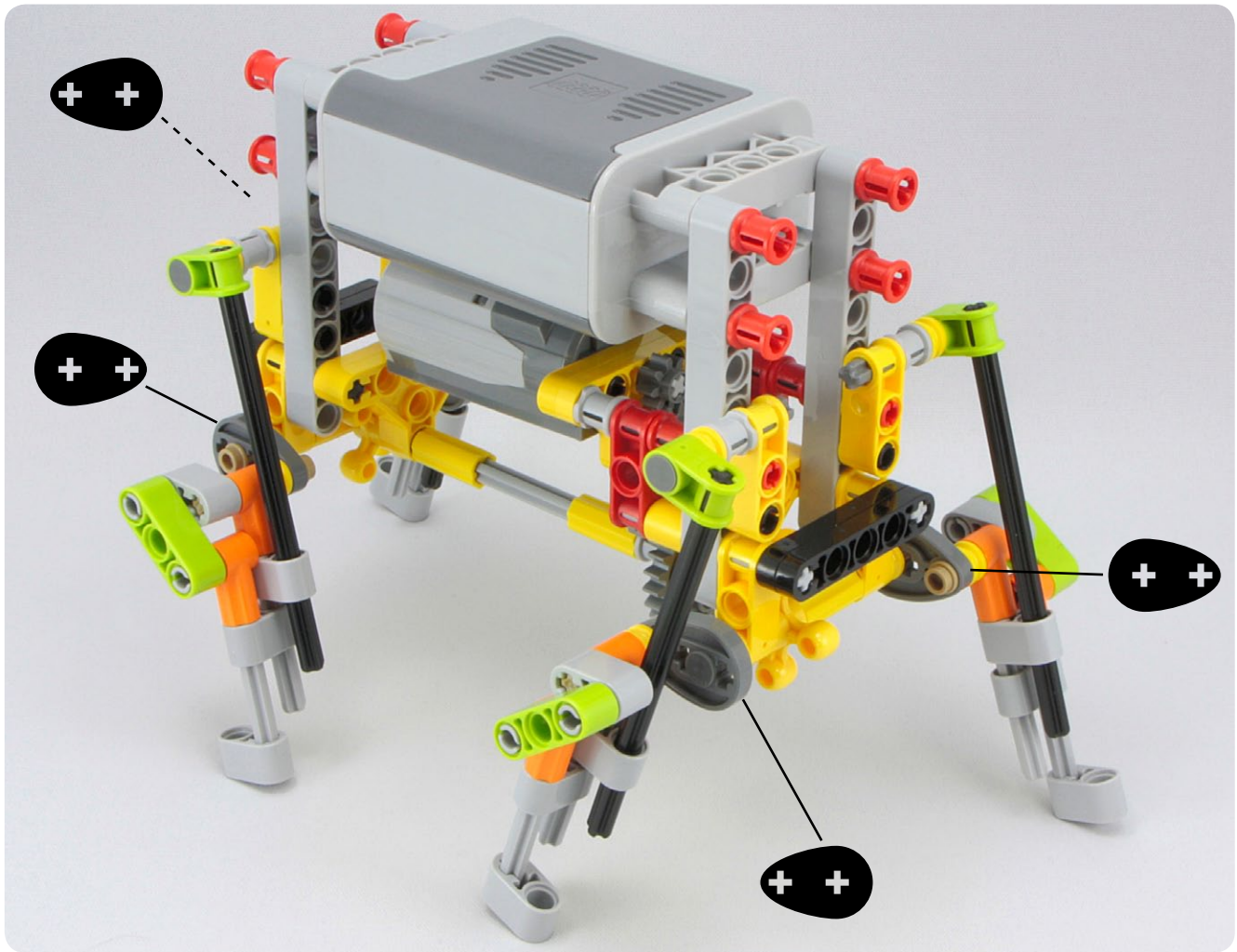
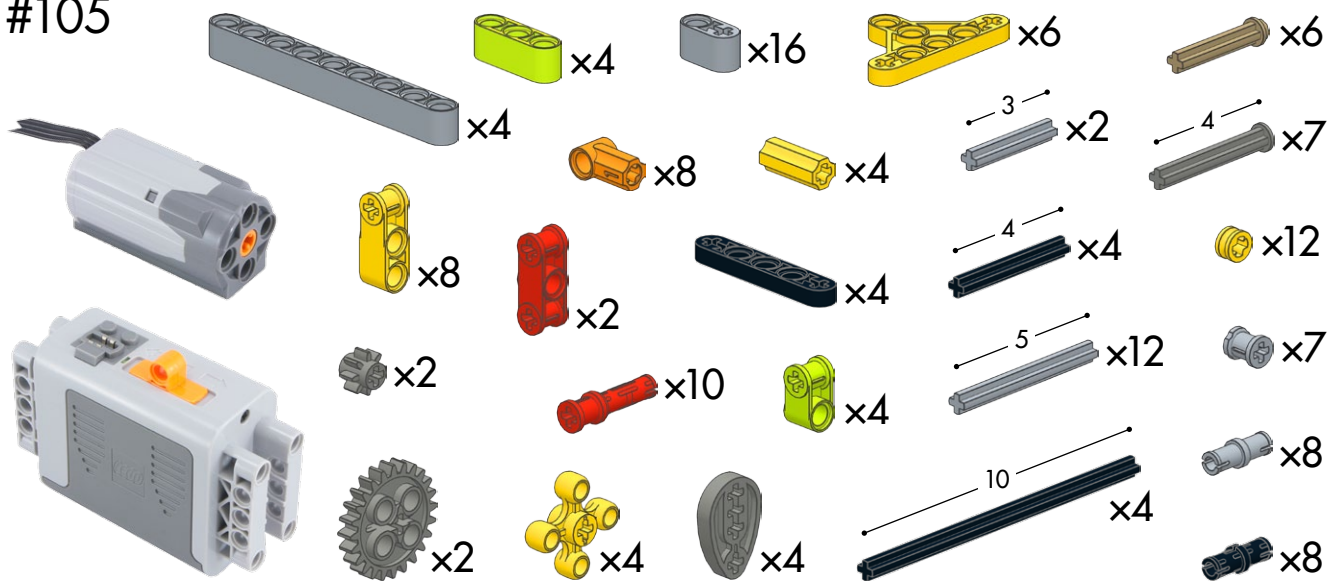


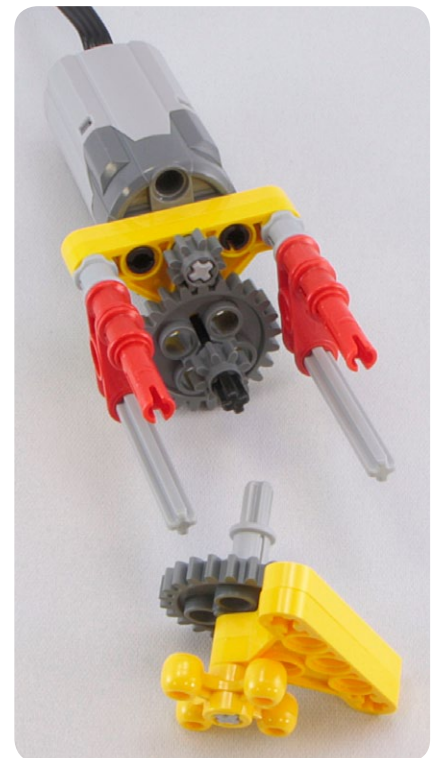
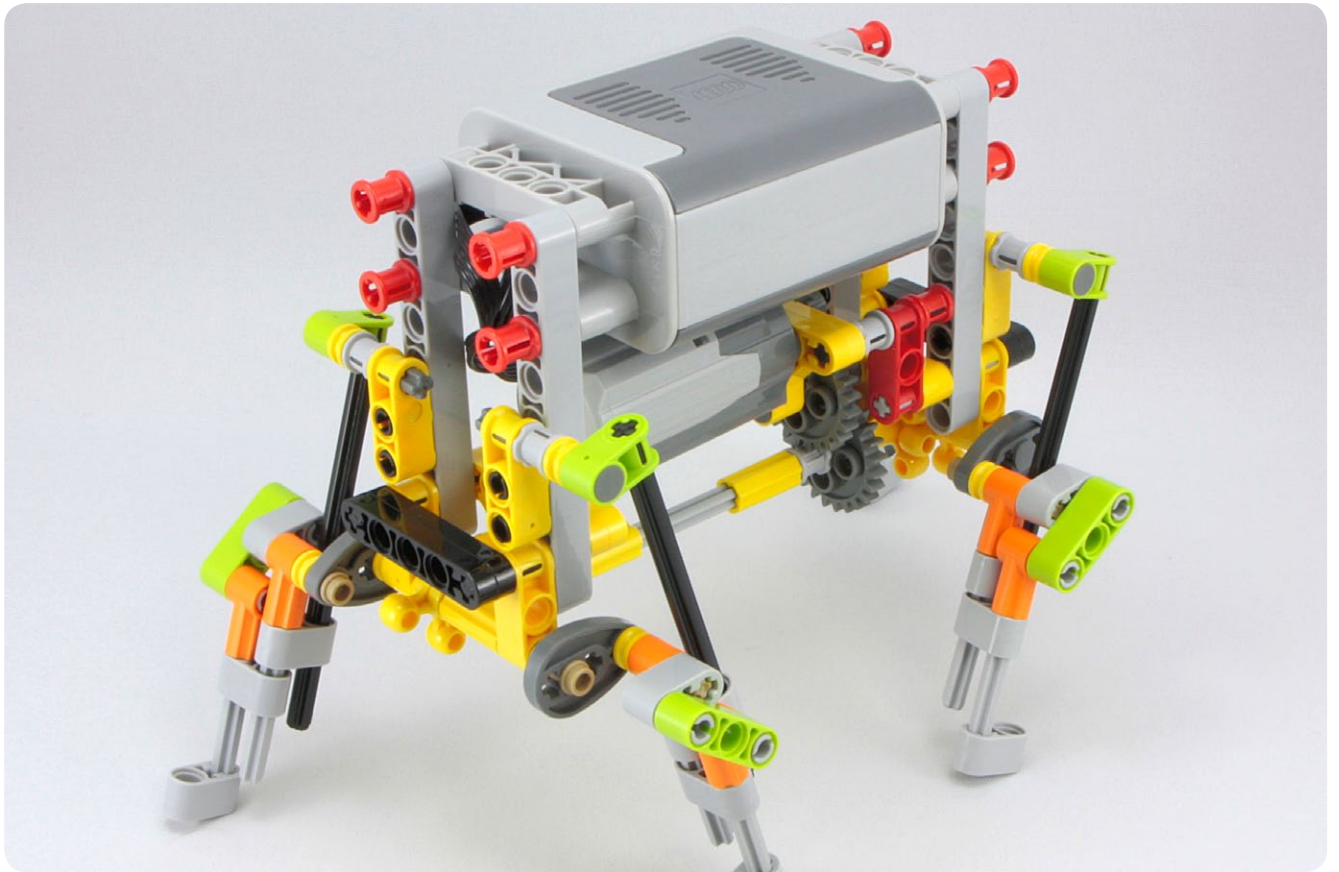


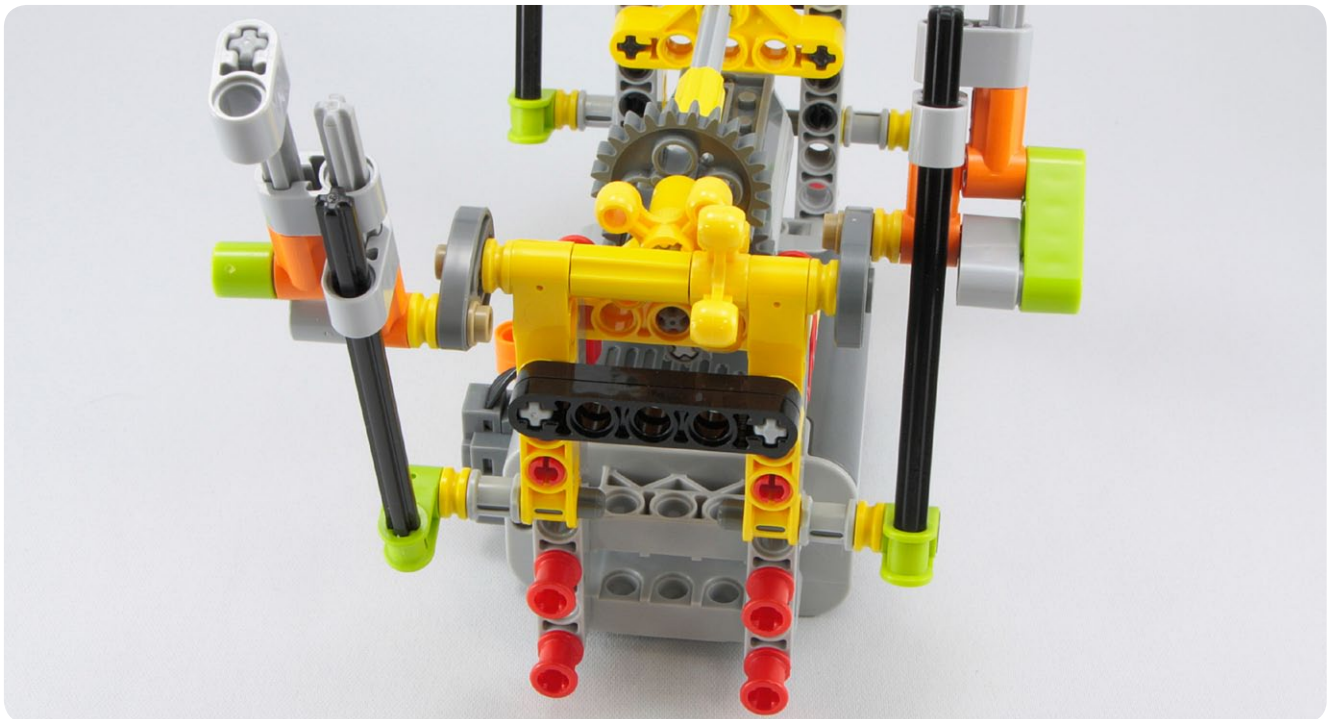
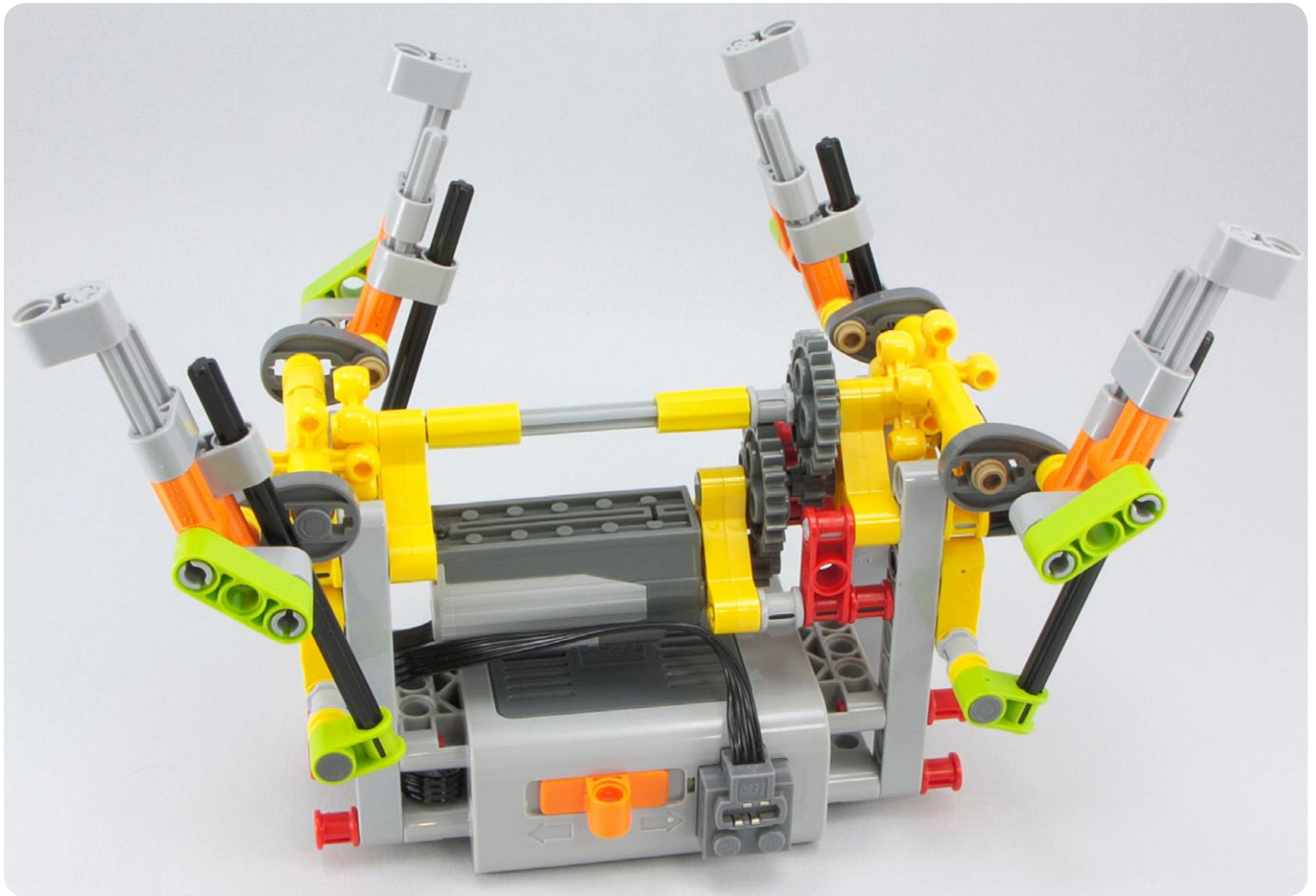


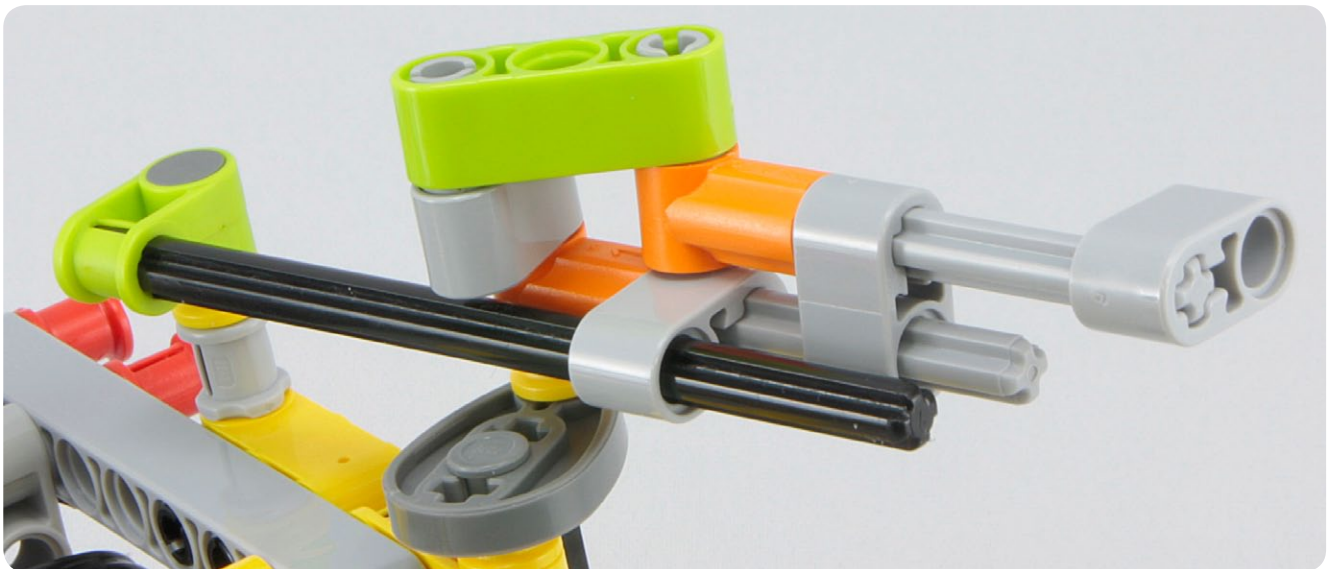
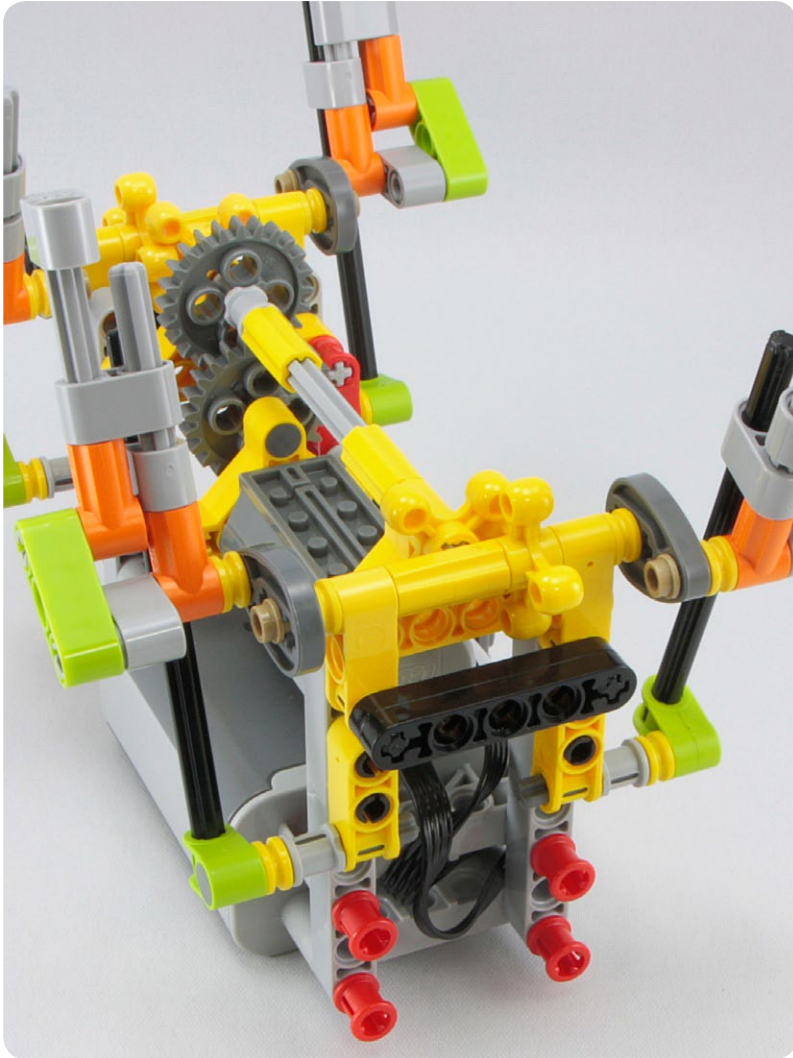


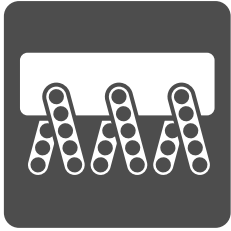
#105





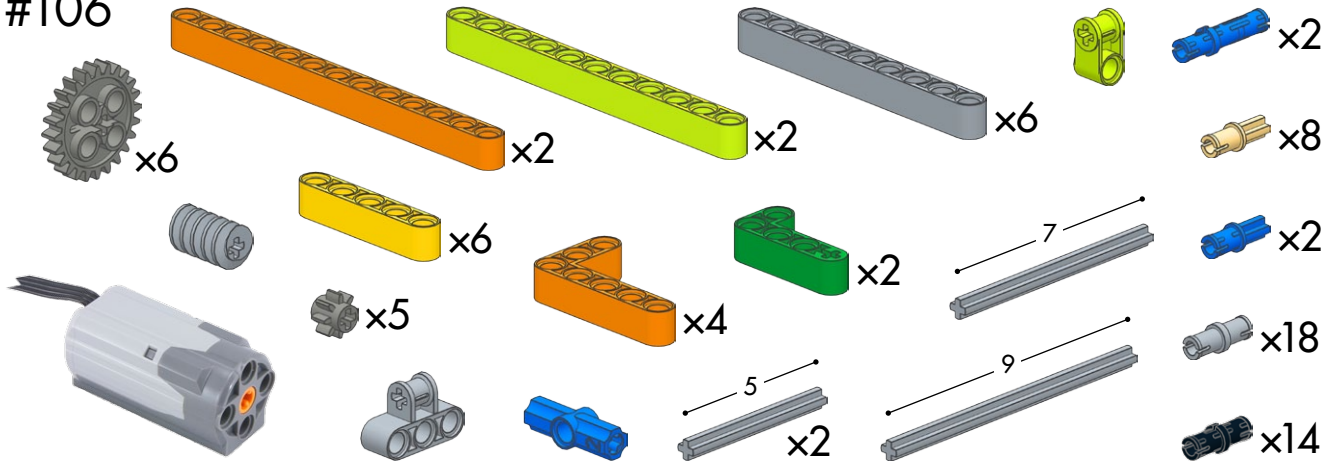


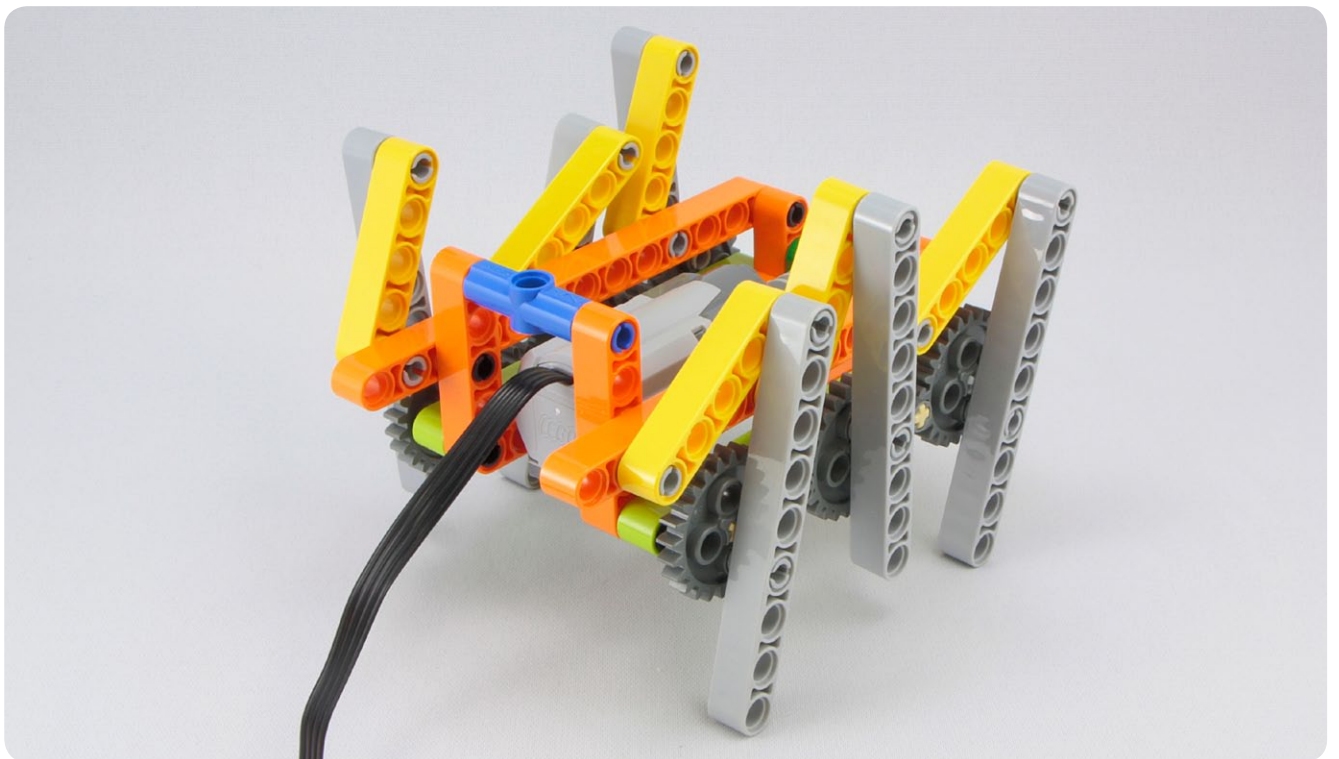
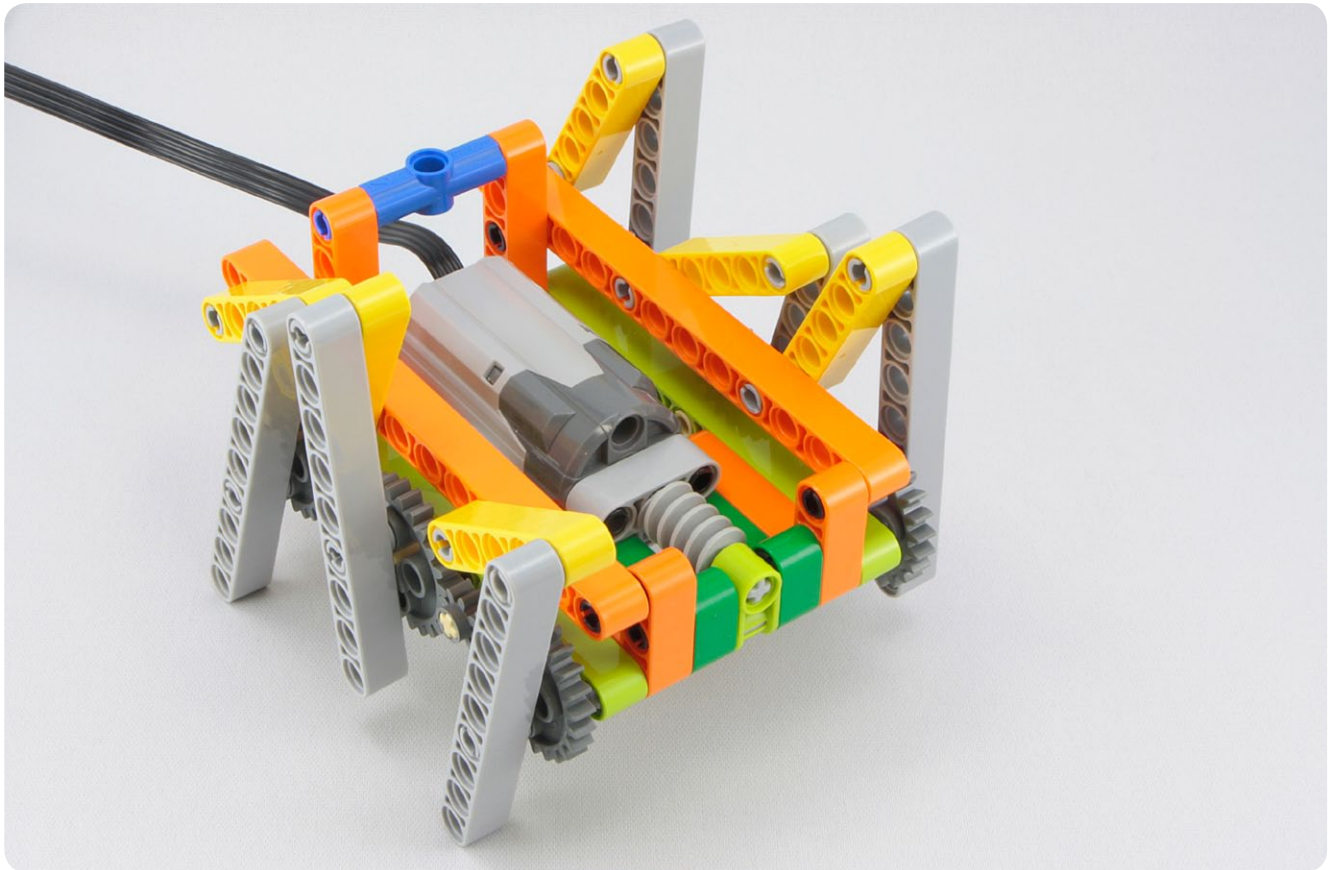


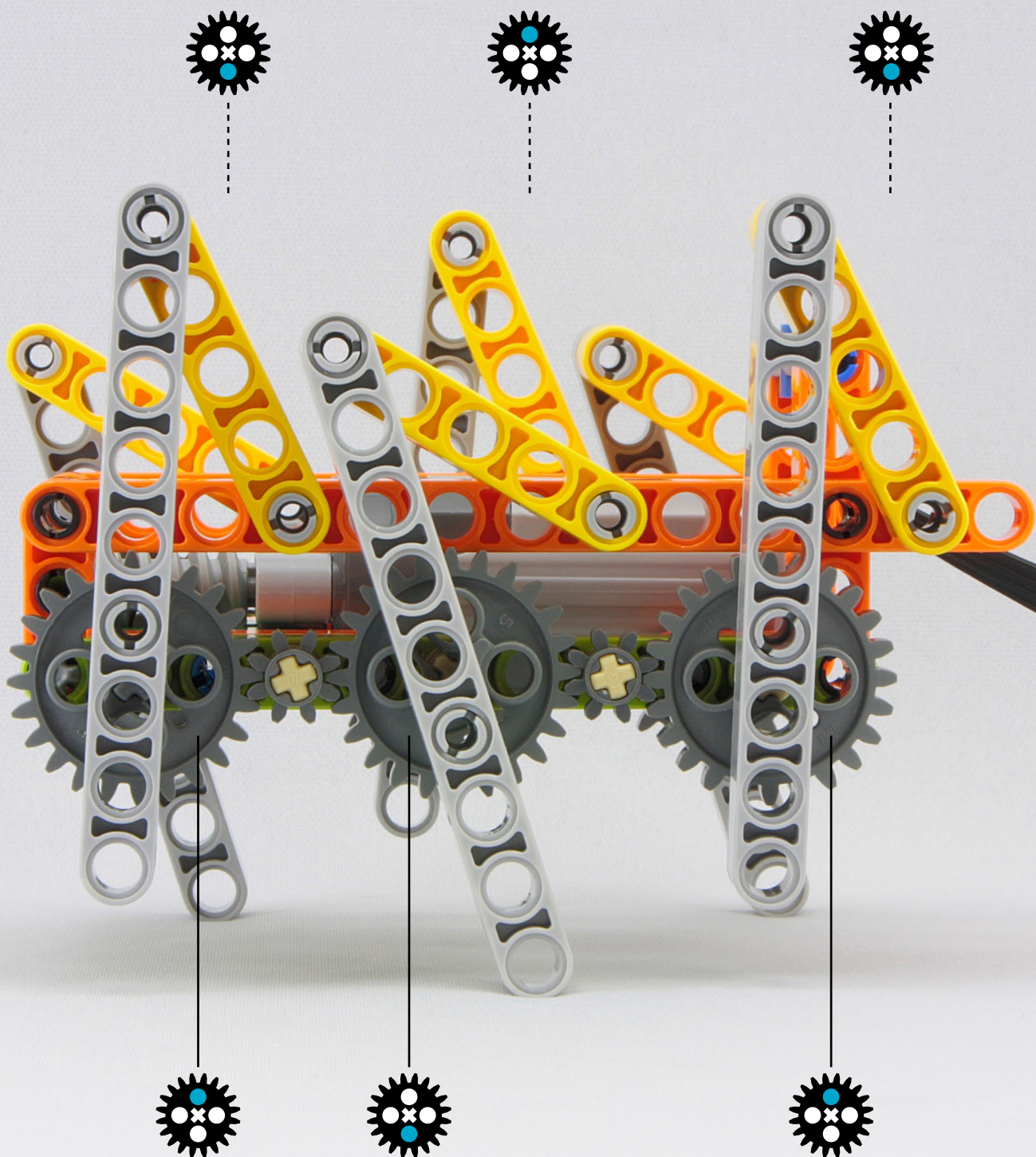


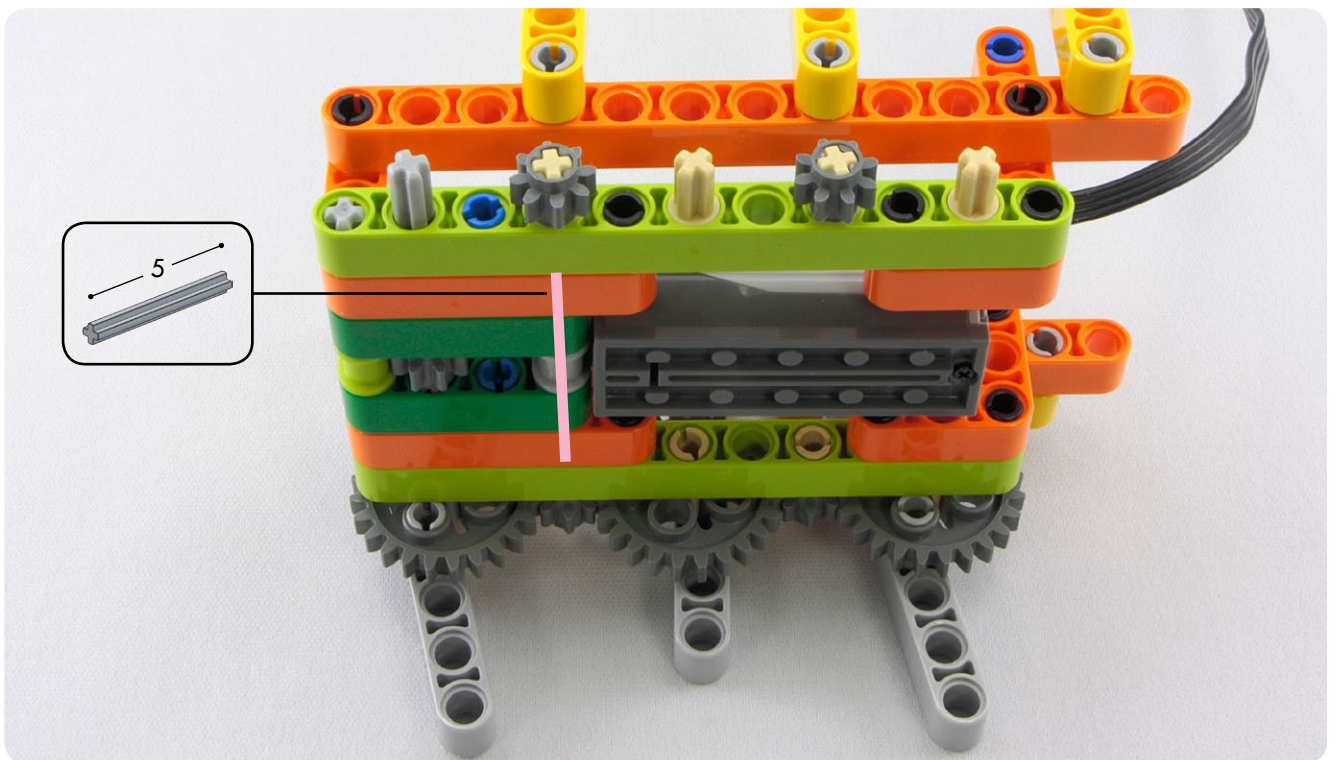
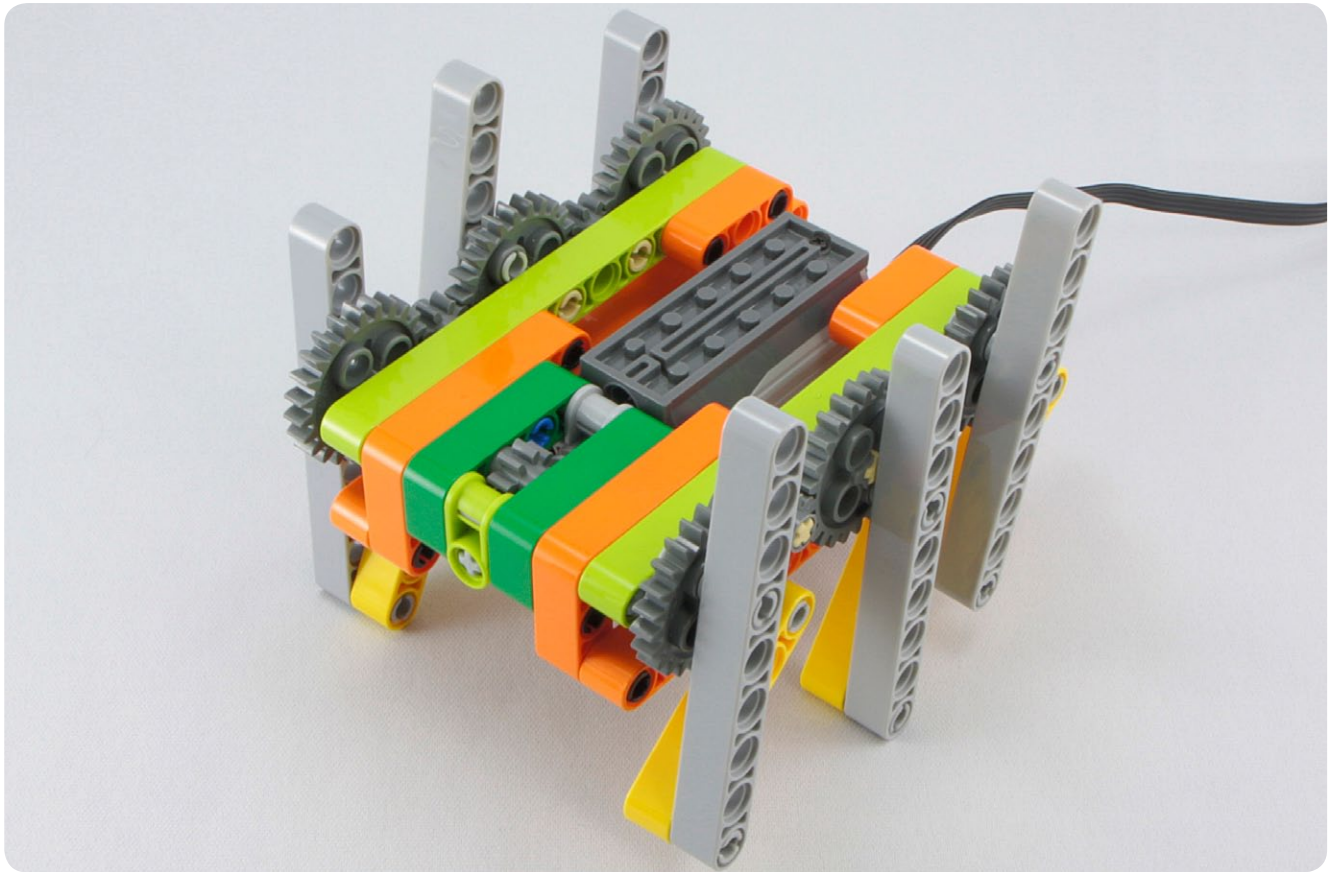
Six-legged walkers

#106

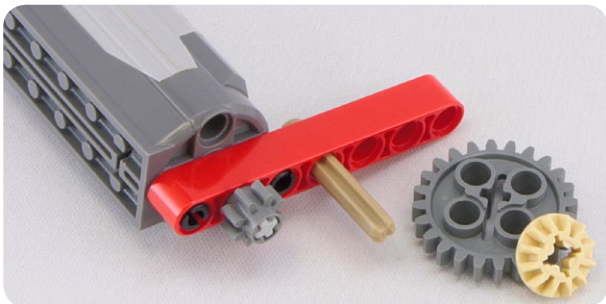
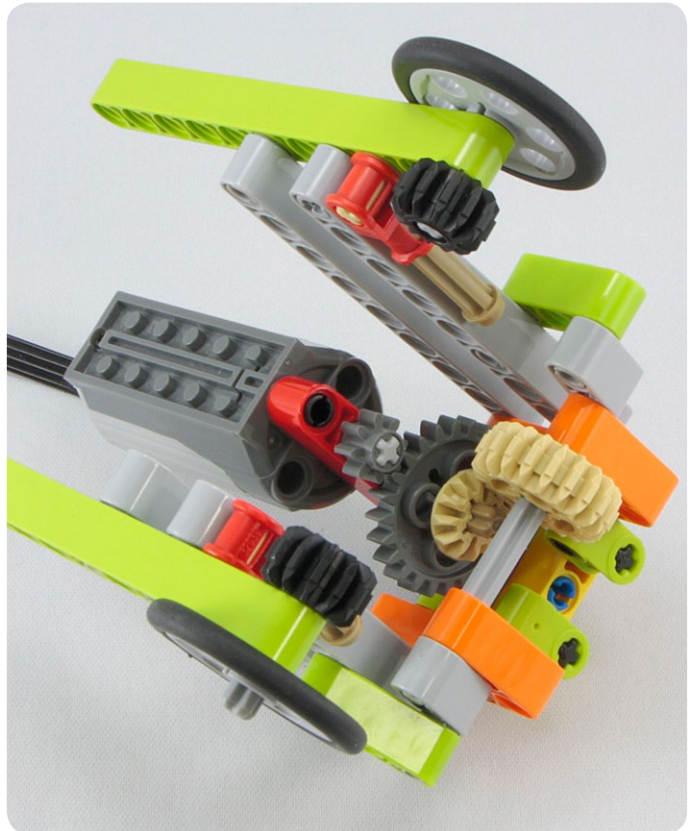
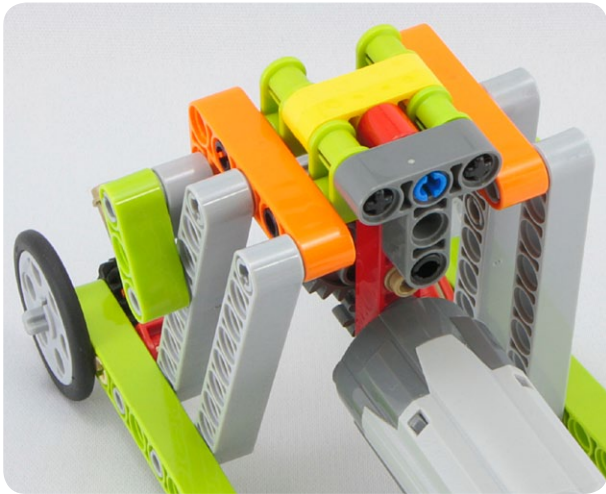
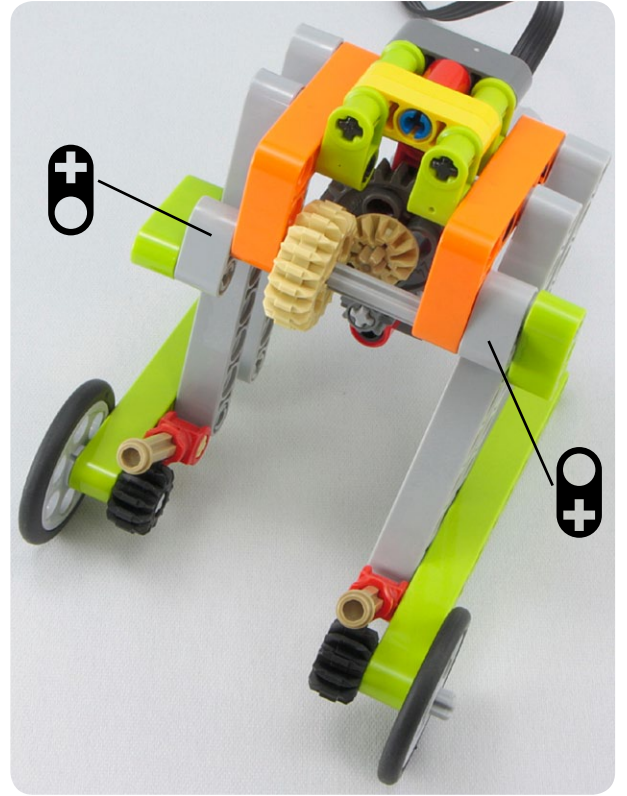
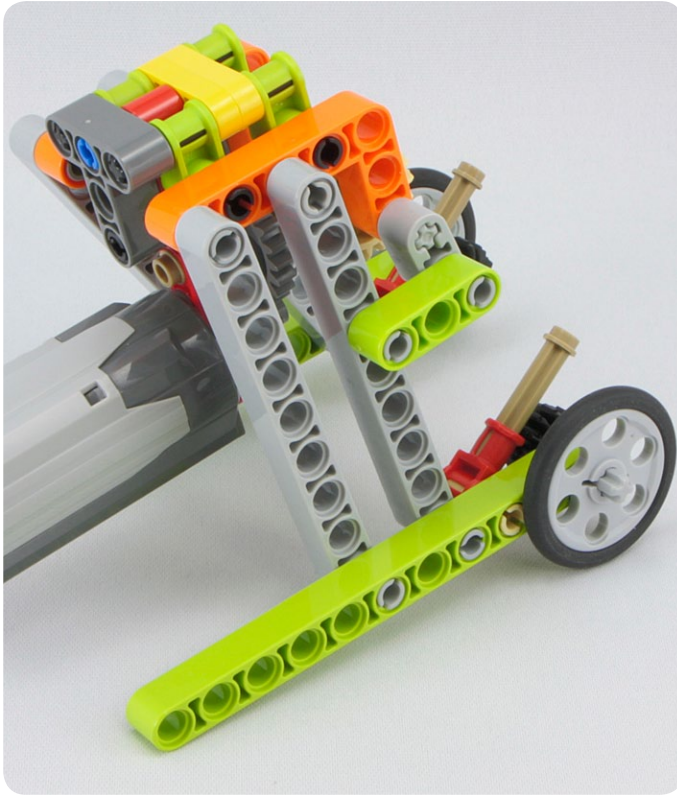


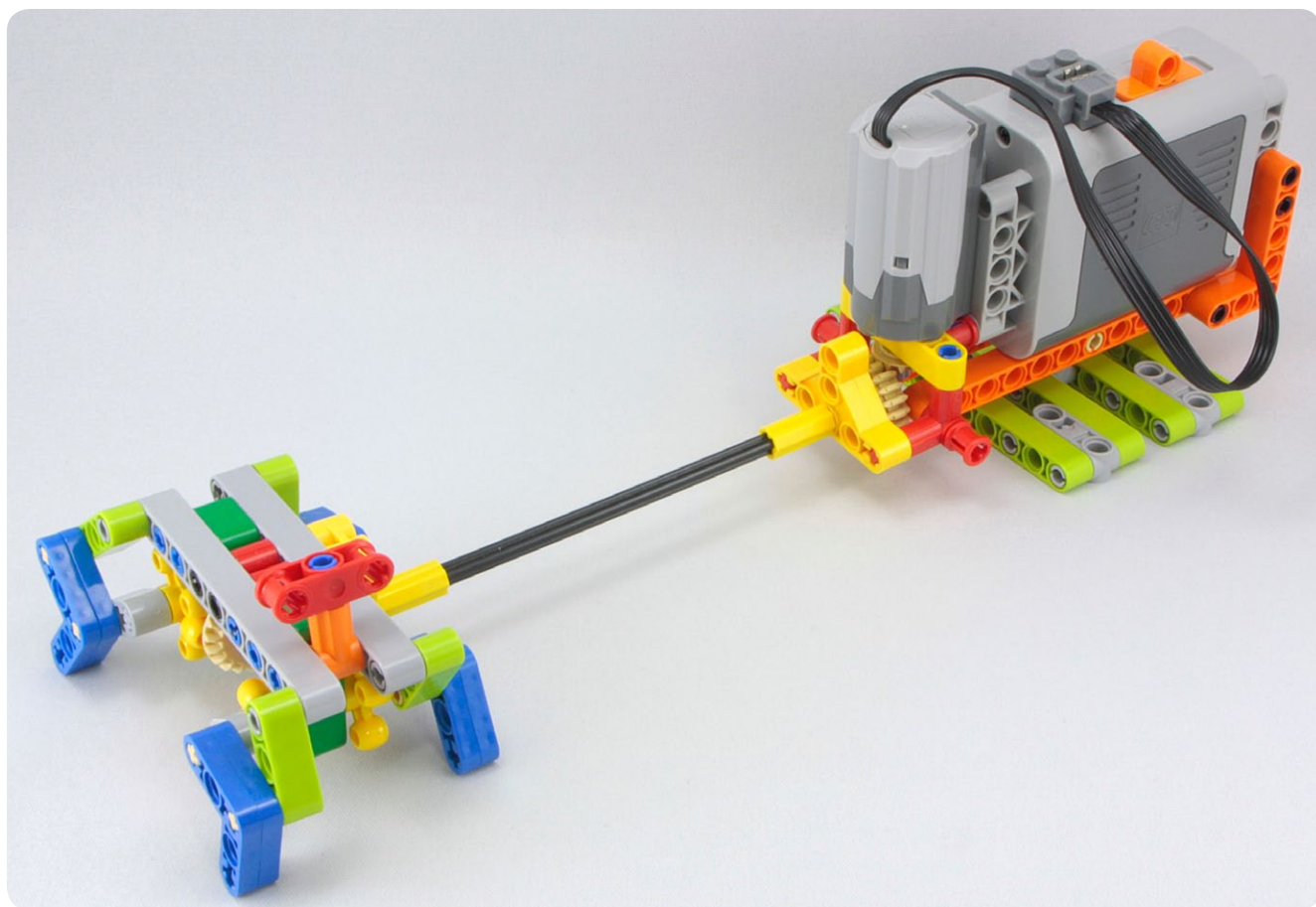


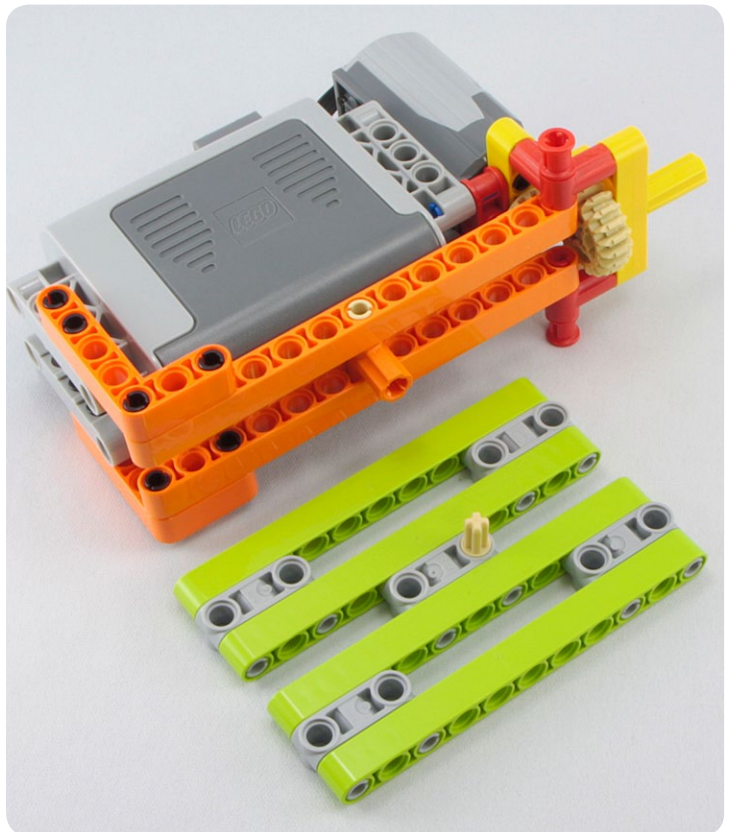
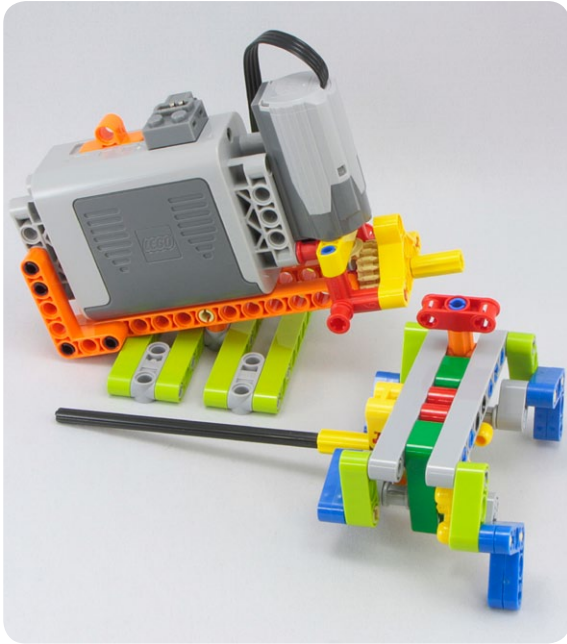


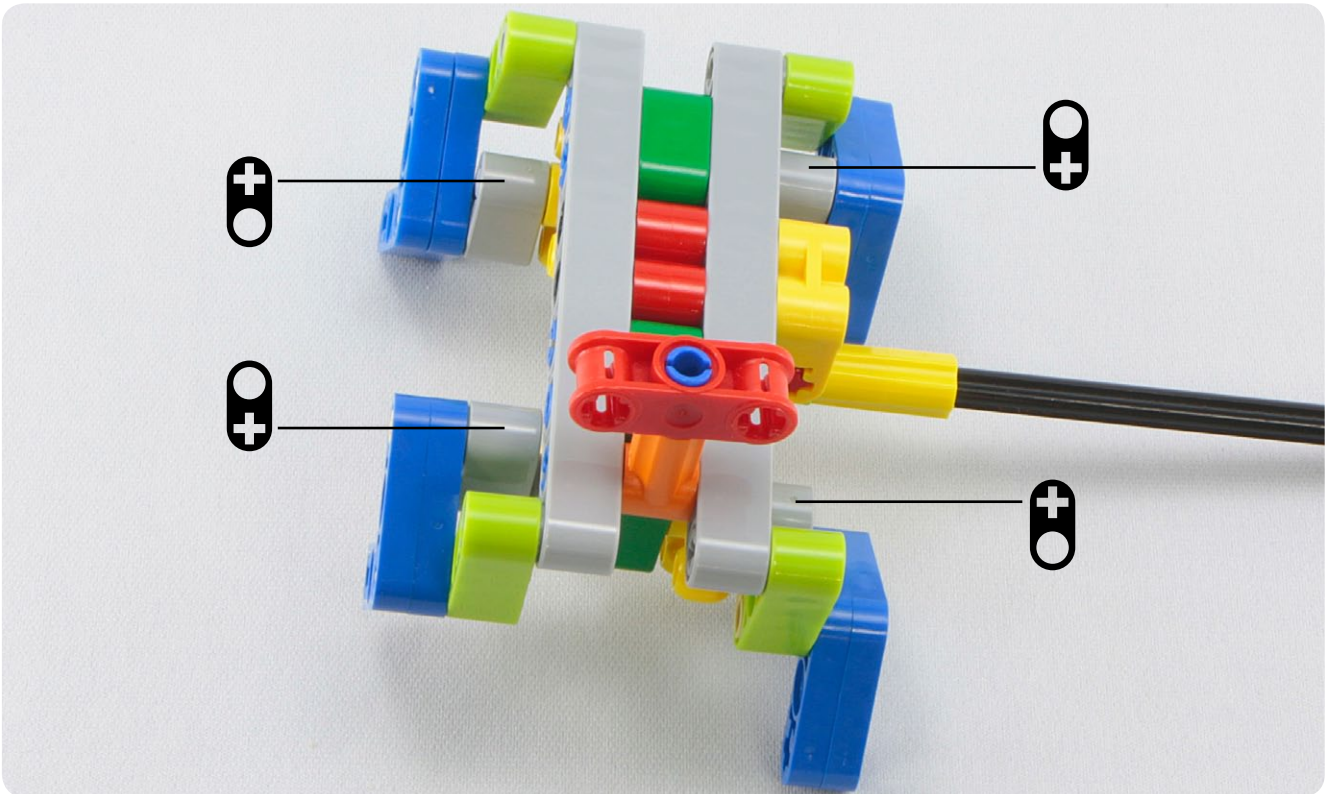
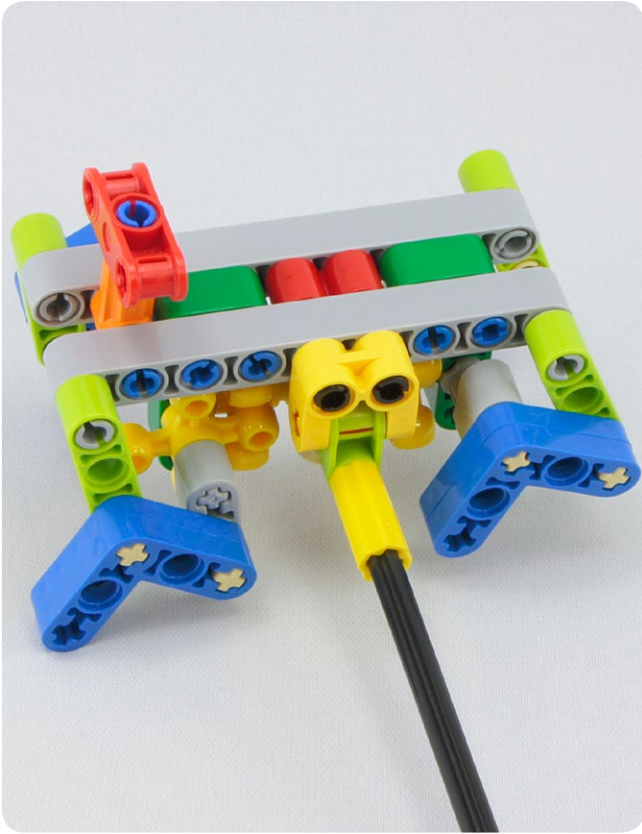


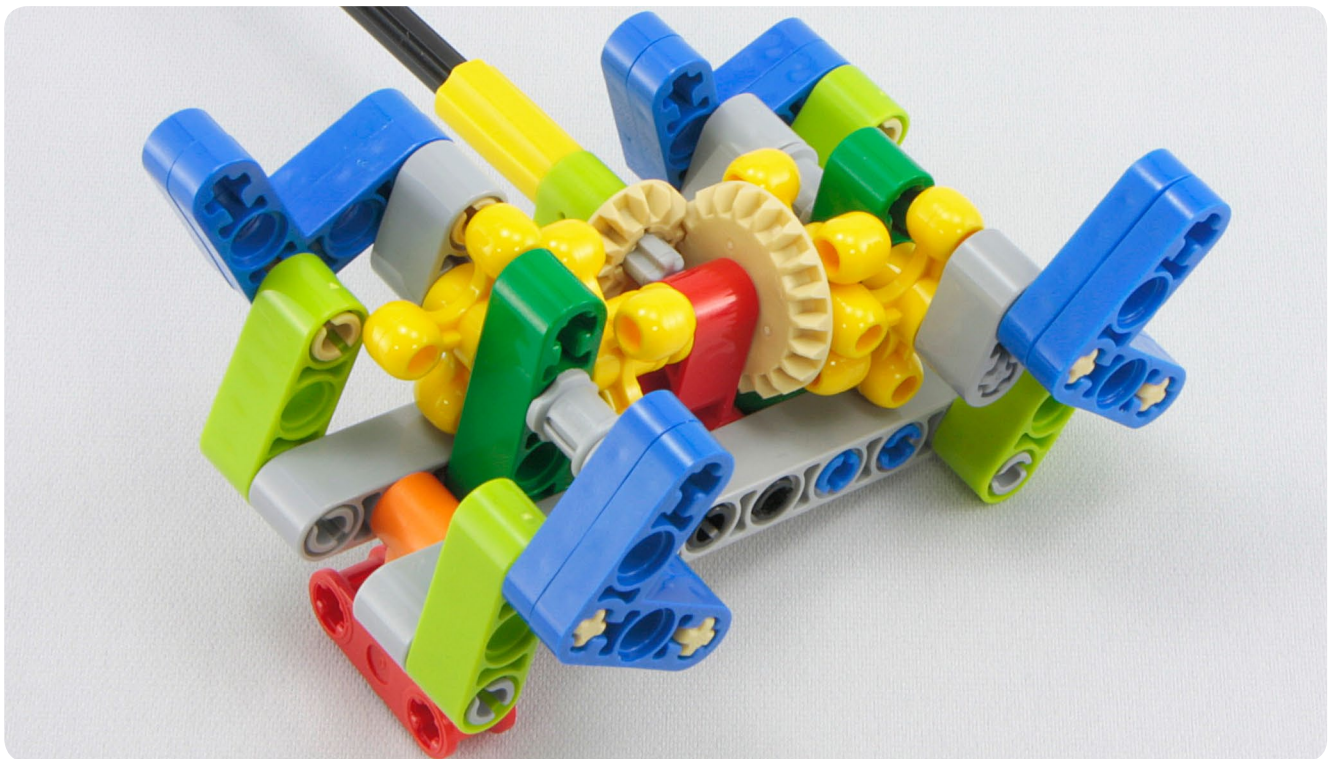
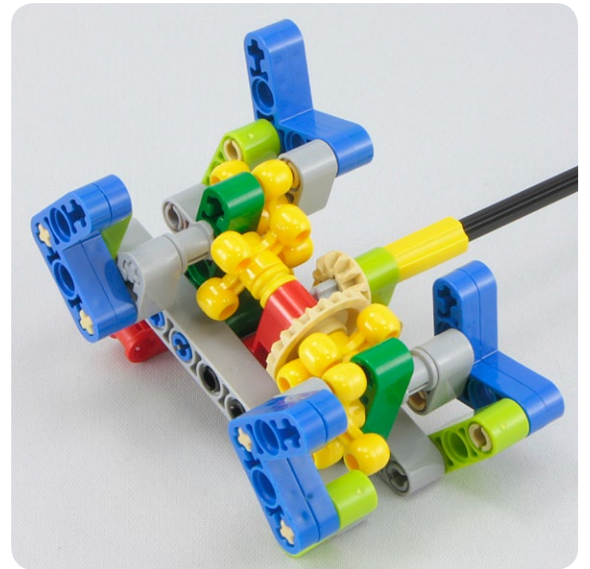
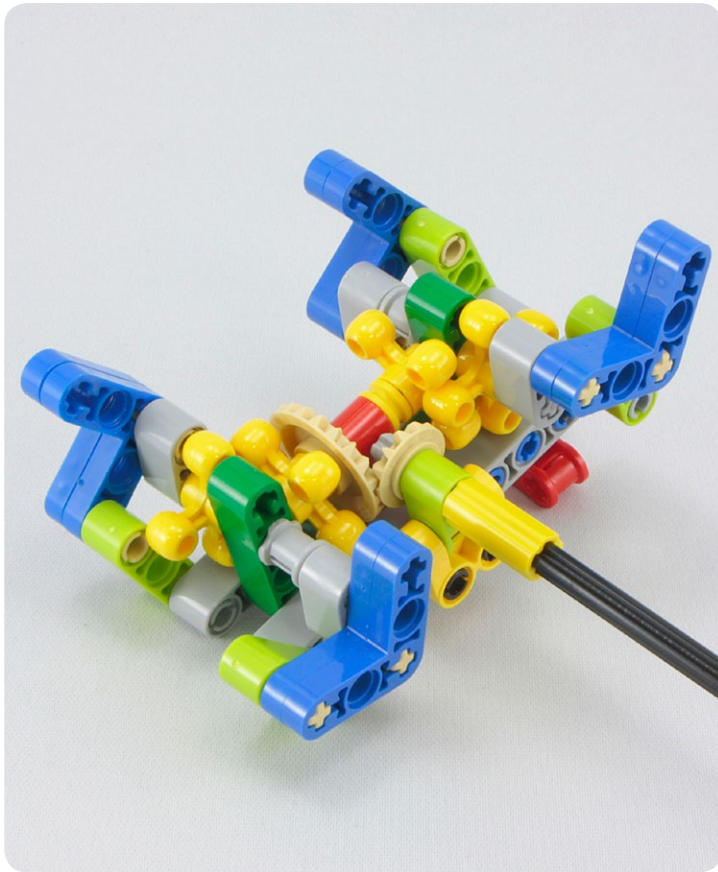
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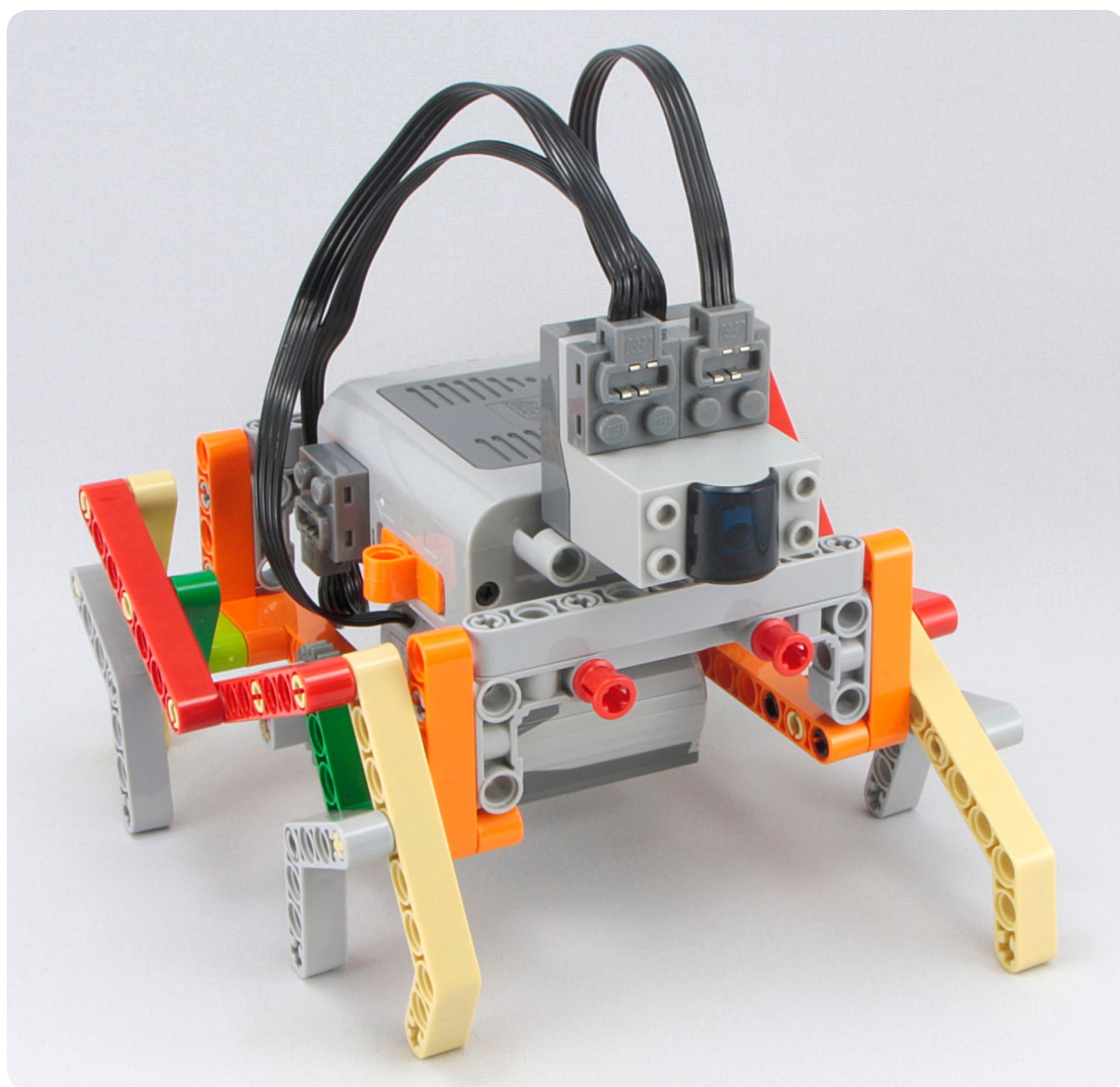
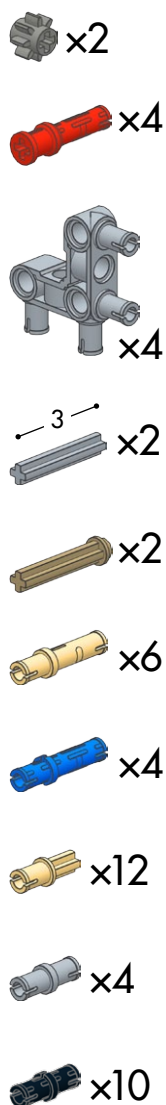
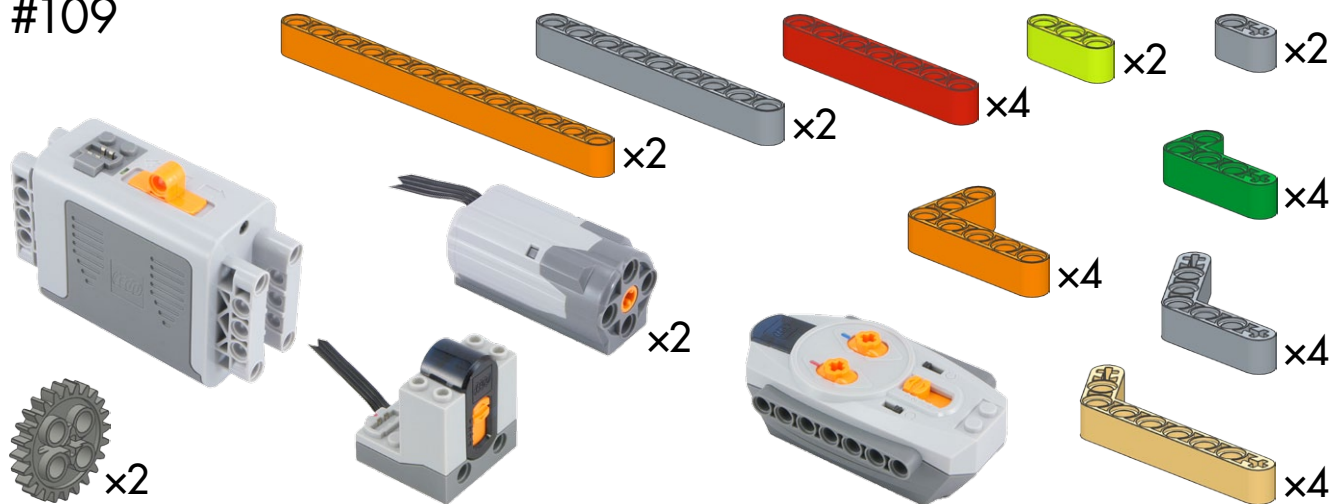
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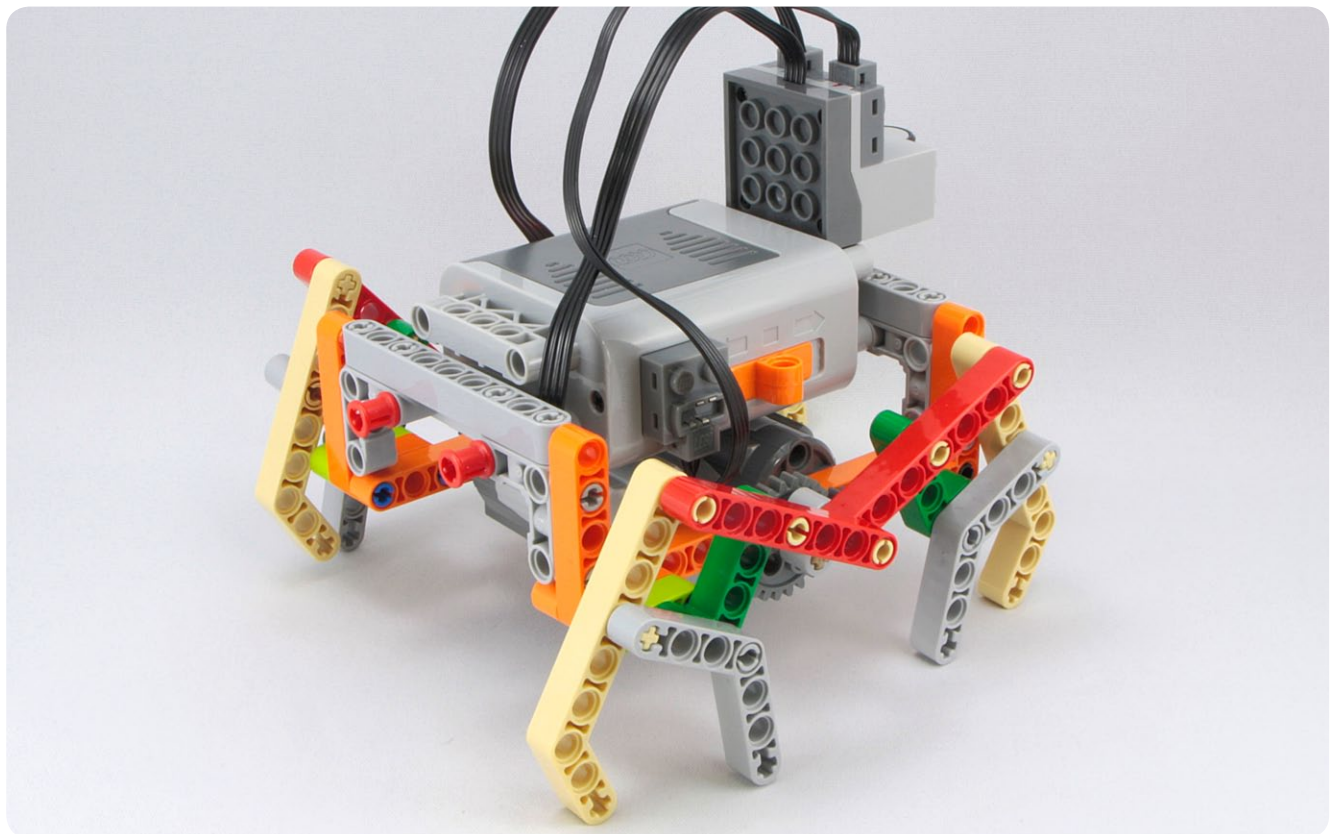
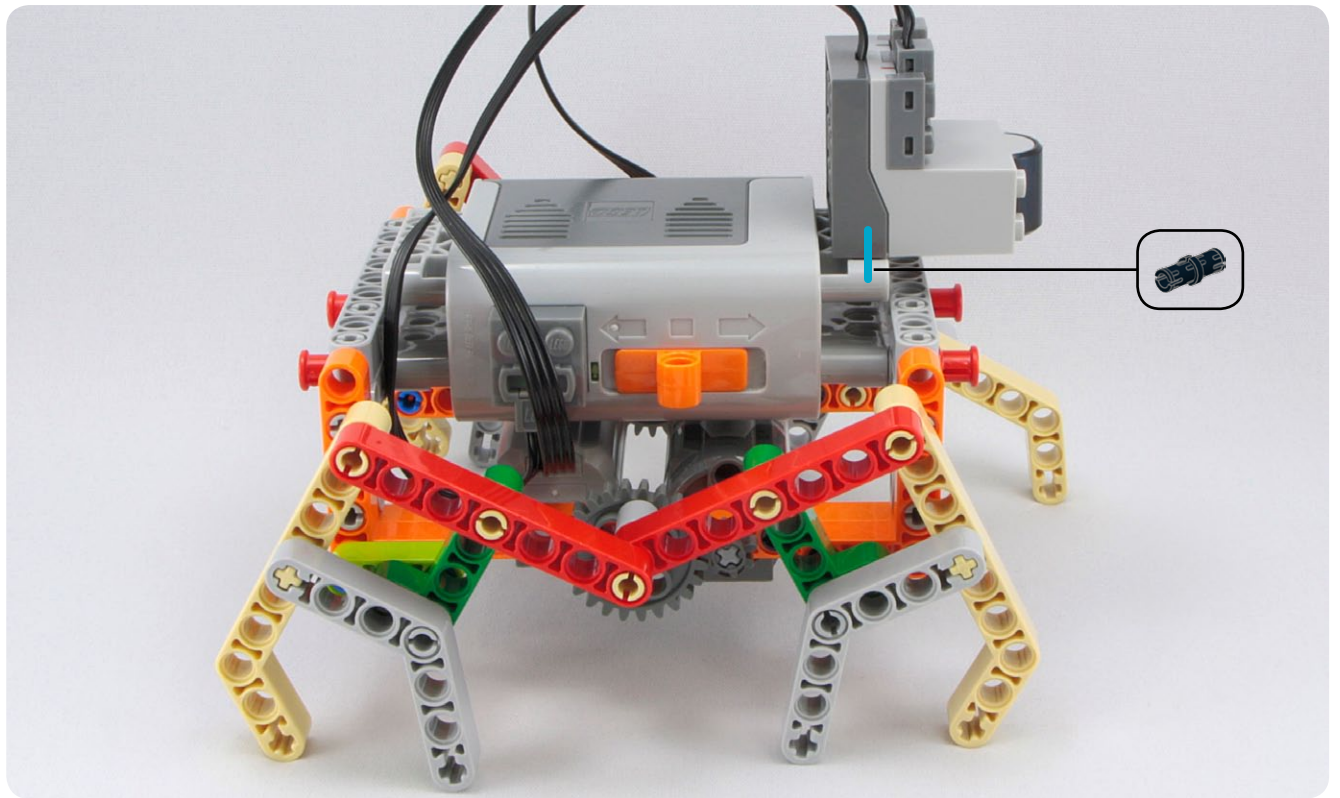


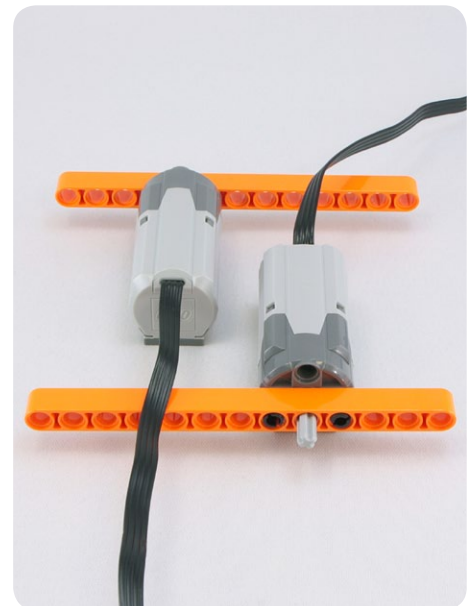
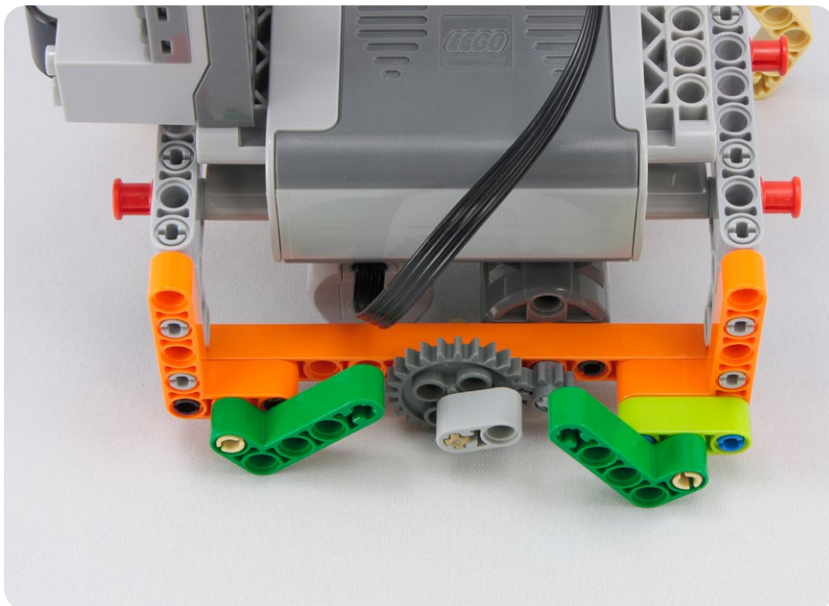
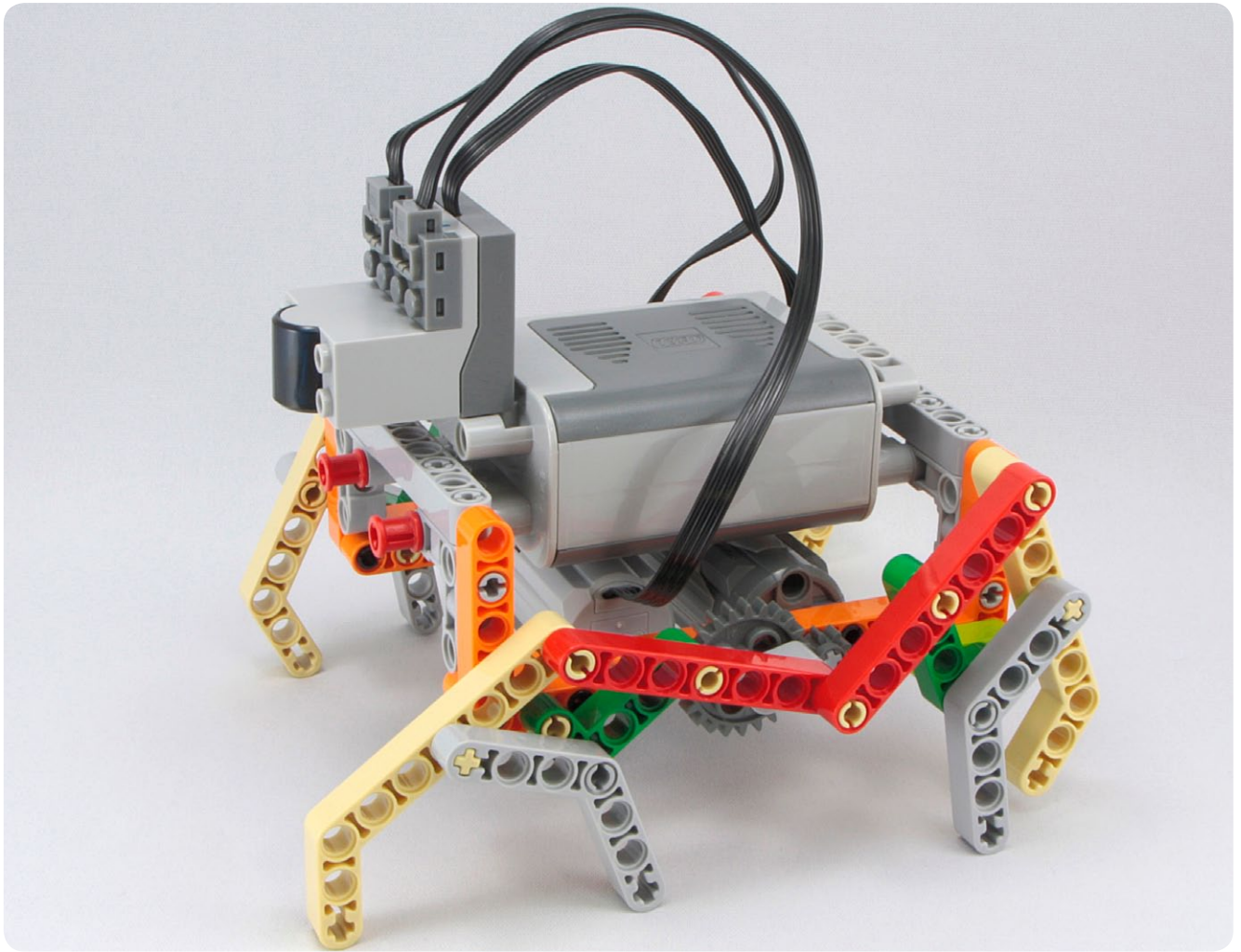


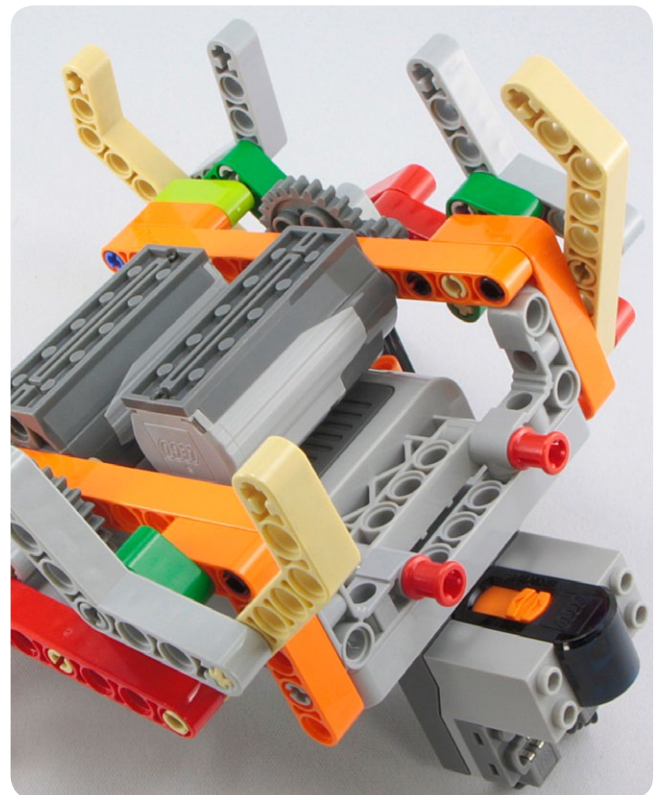
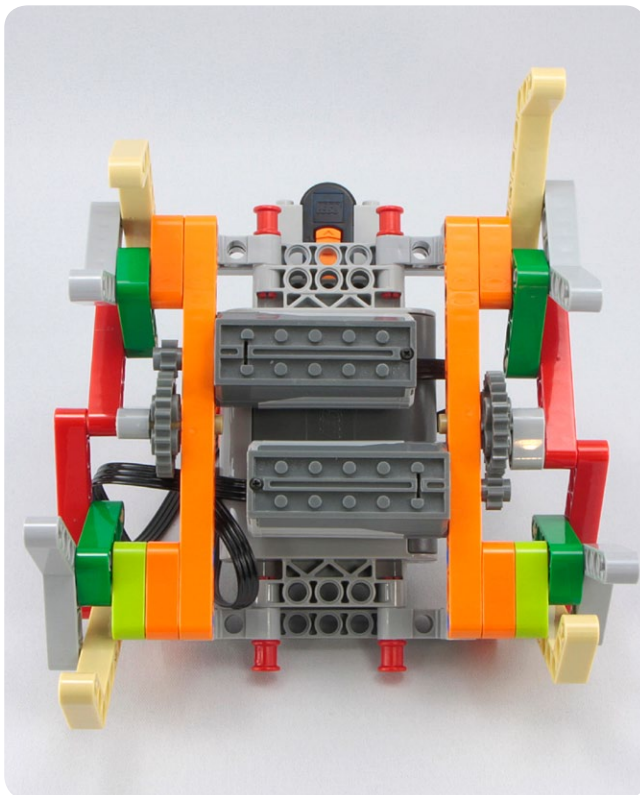
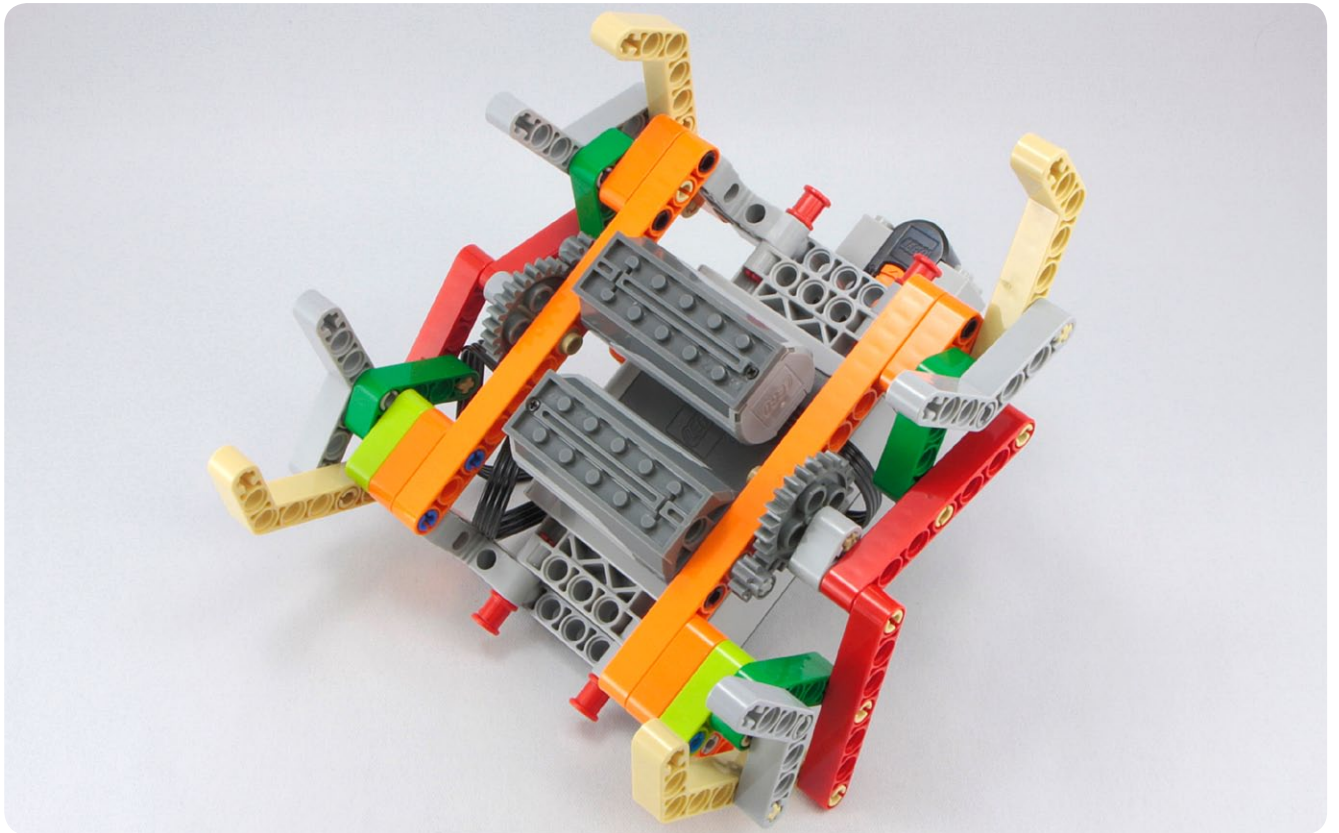


#109

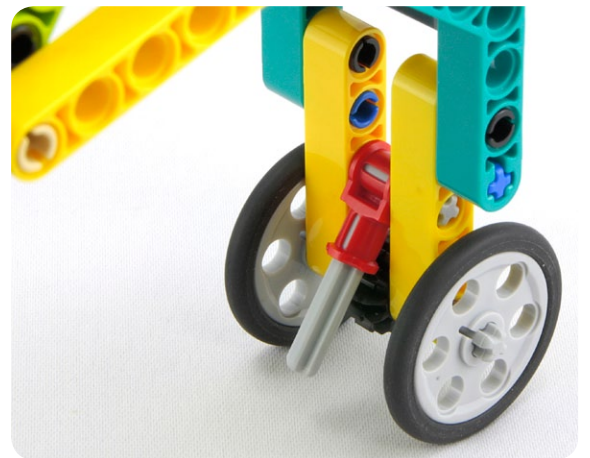
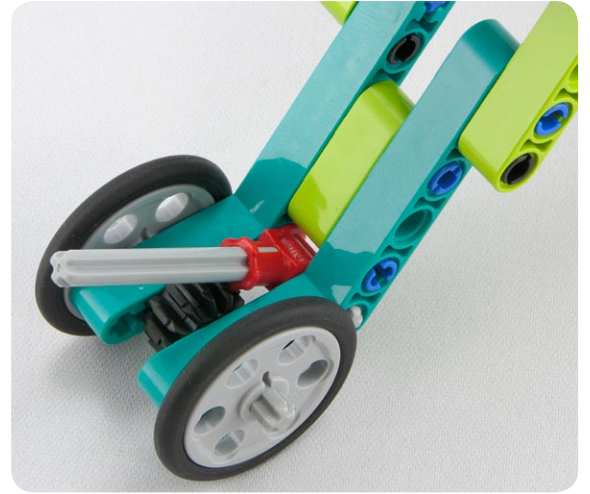




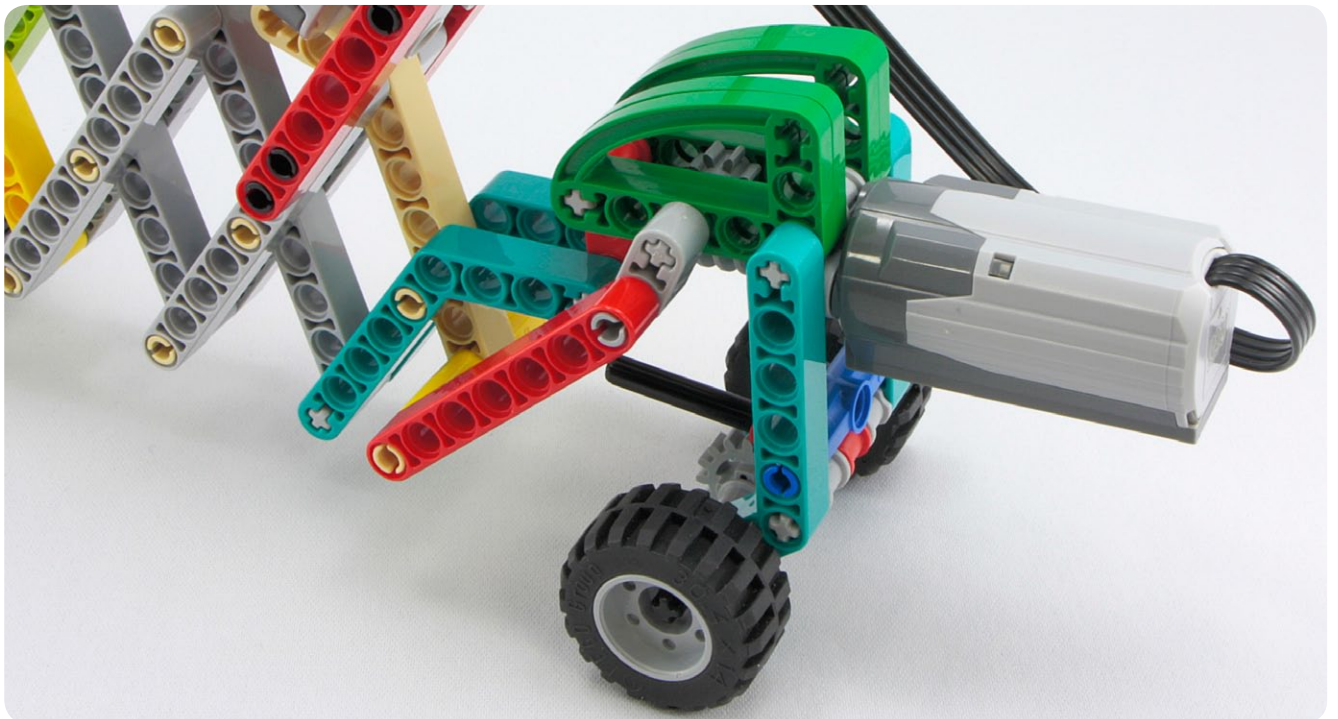
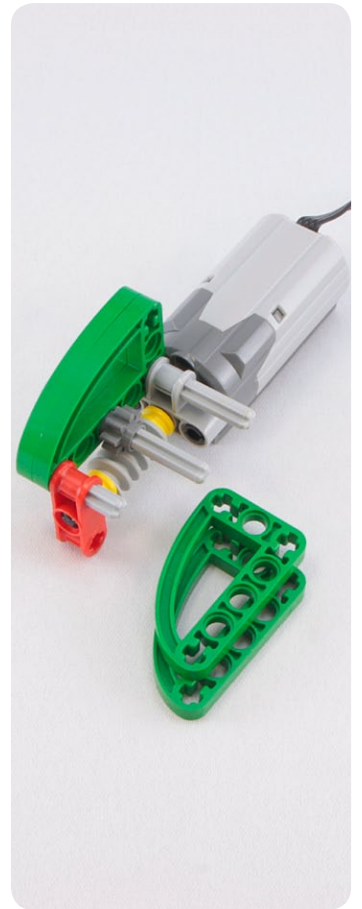


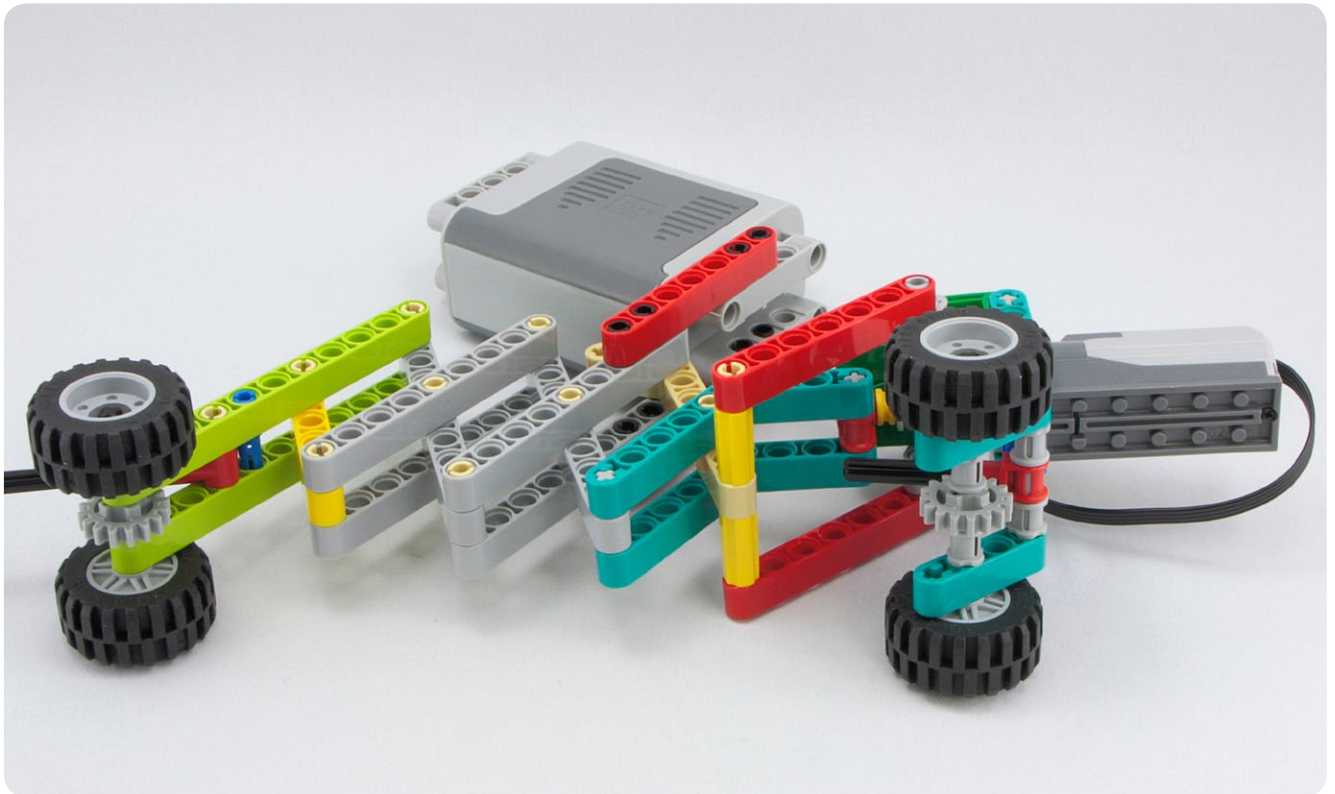
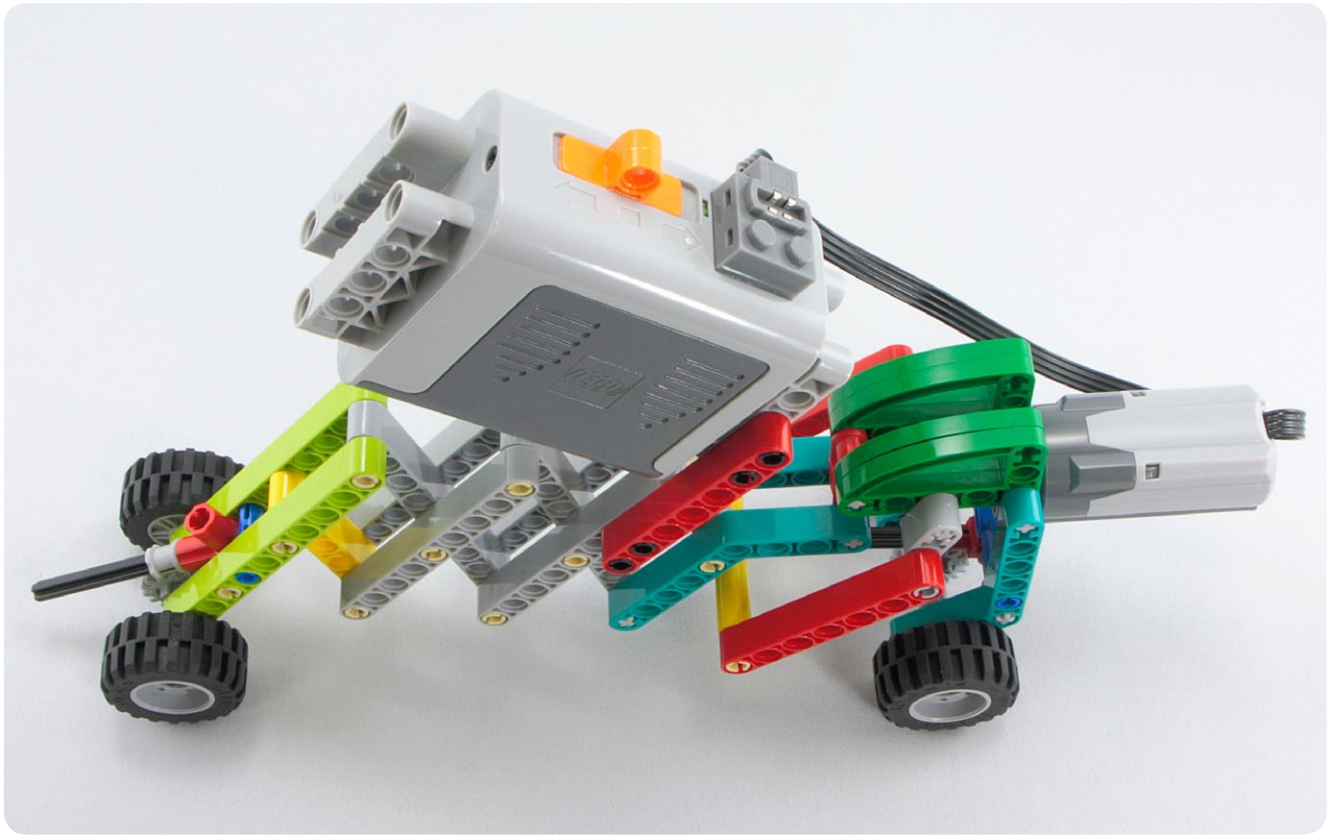


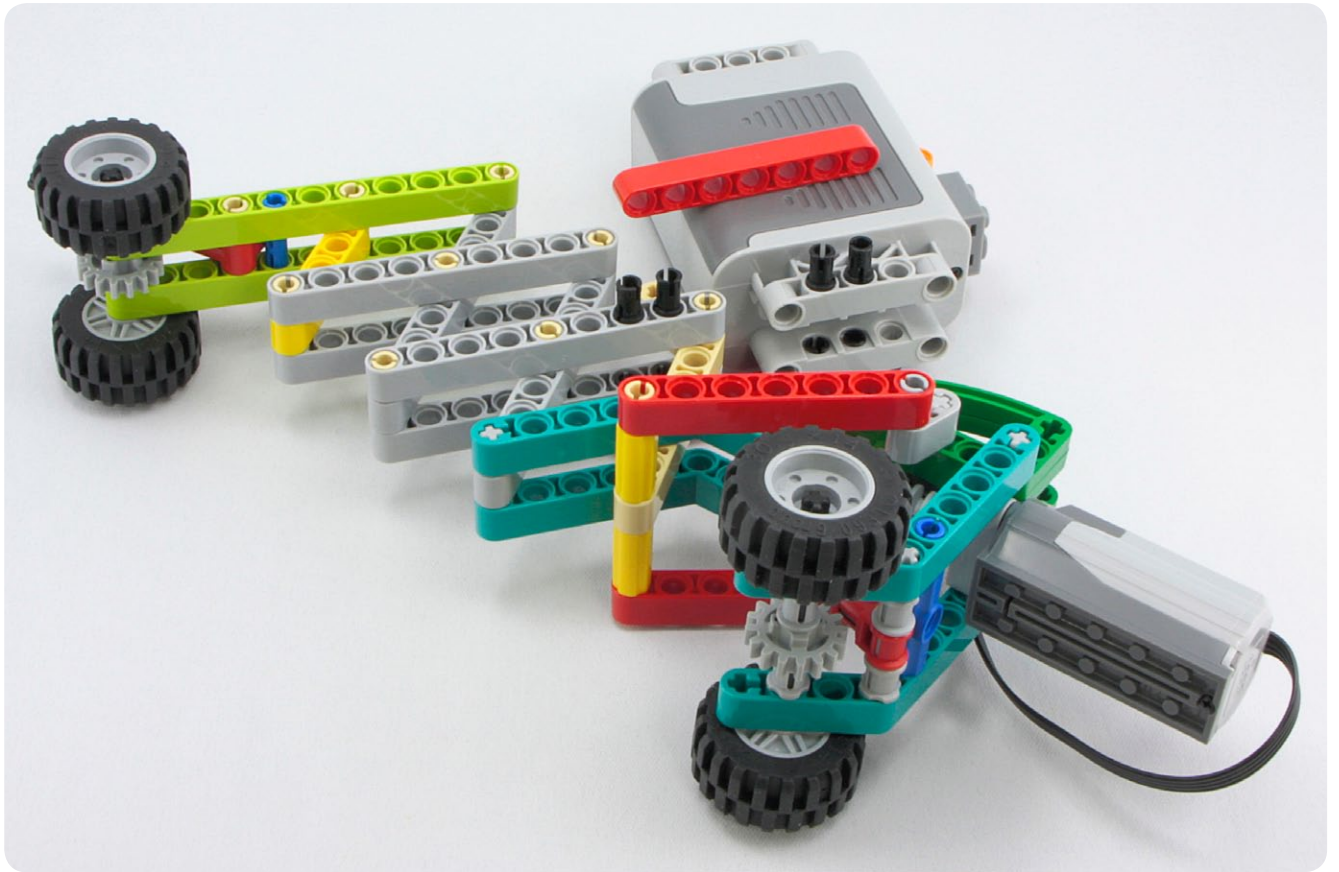
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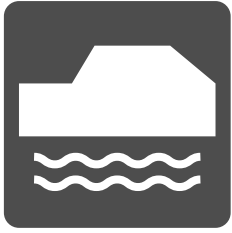


[illegible]



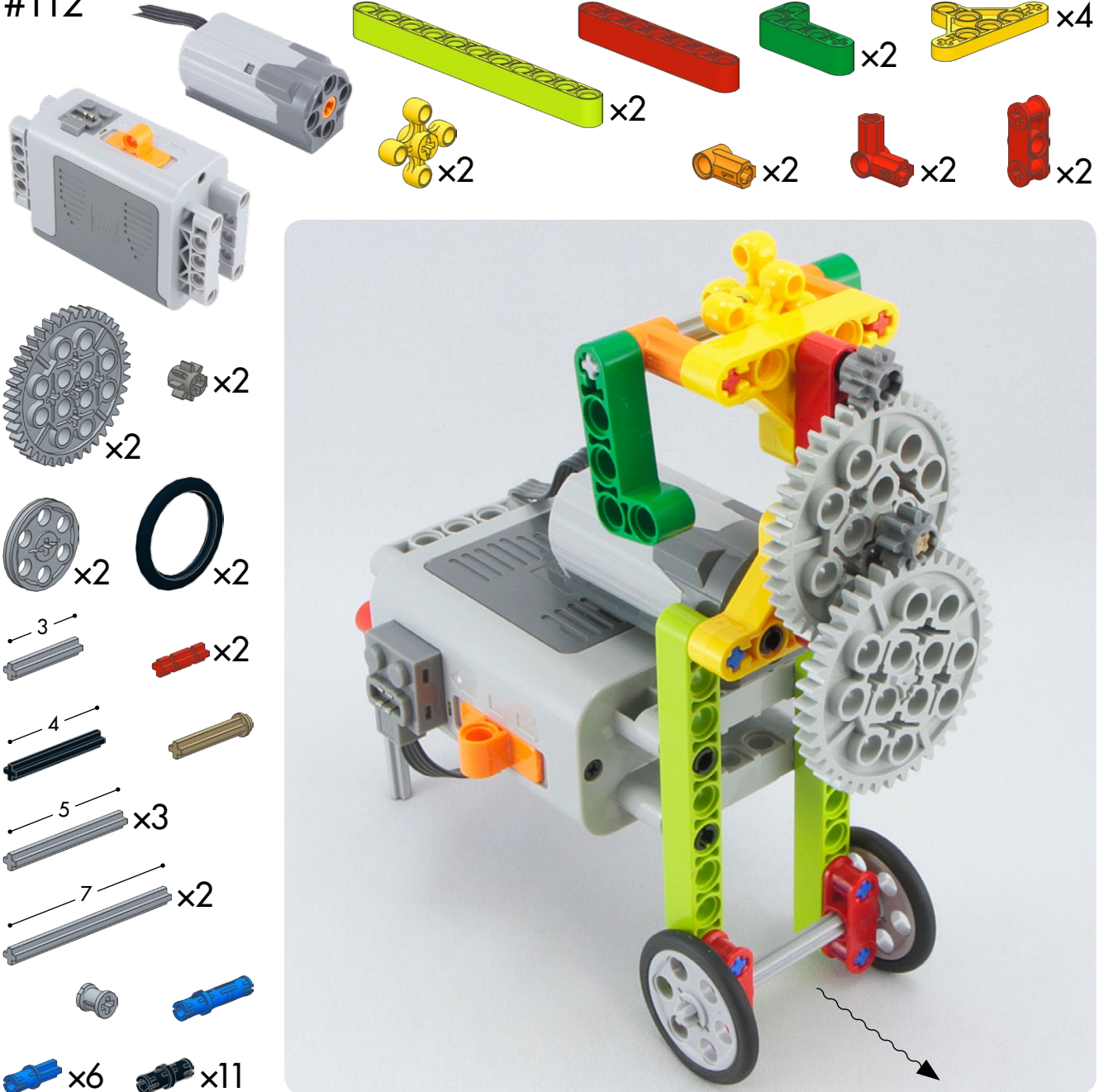


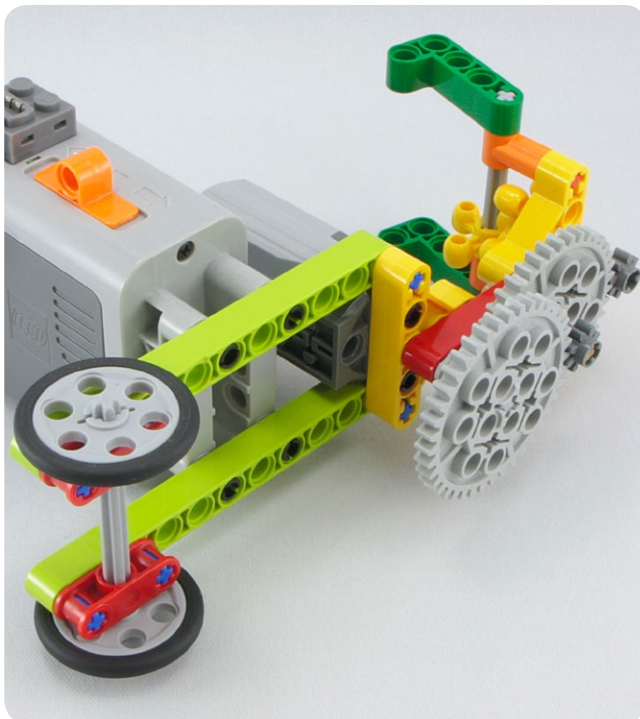
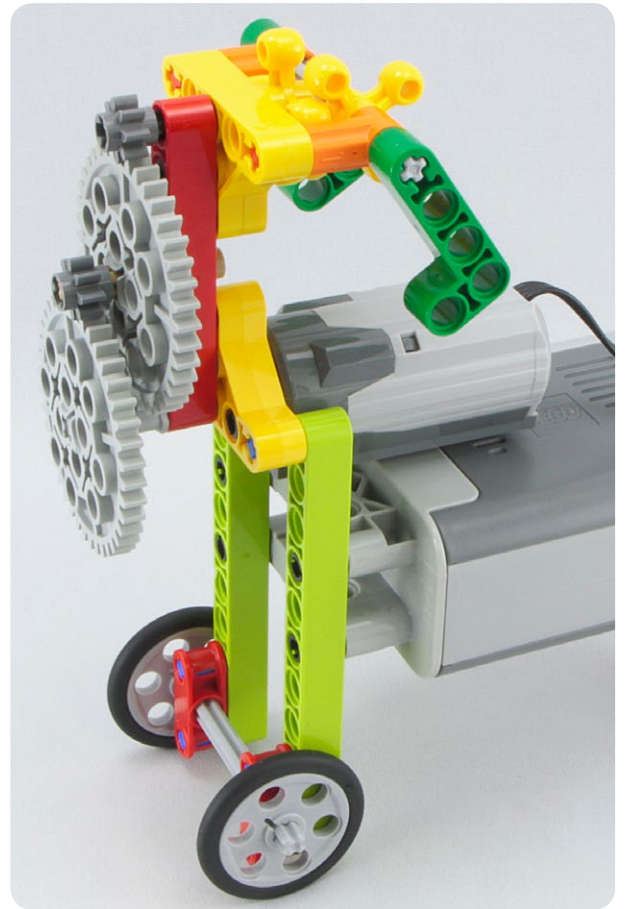




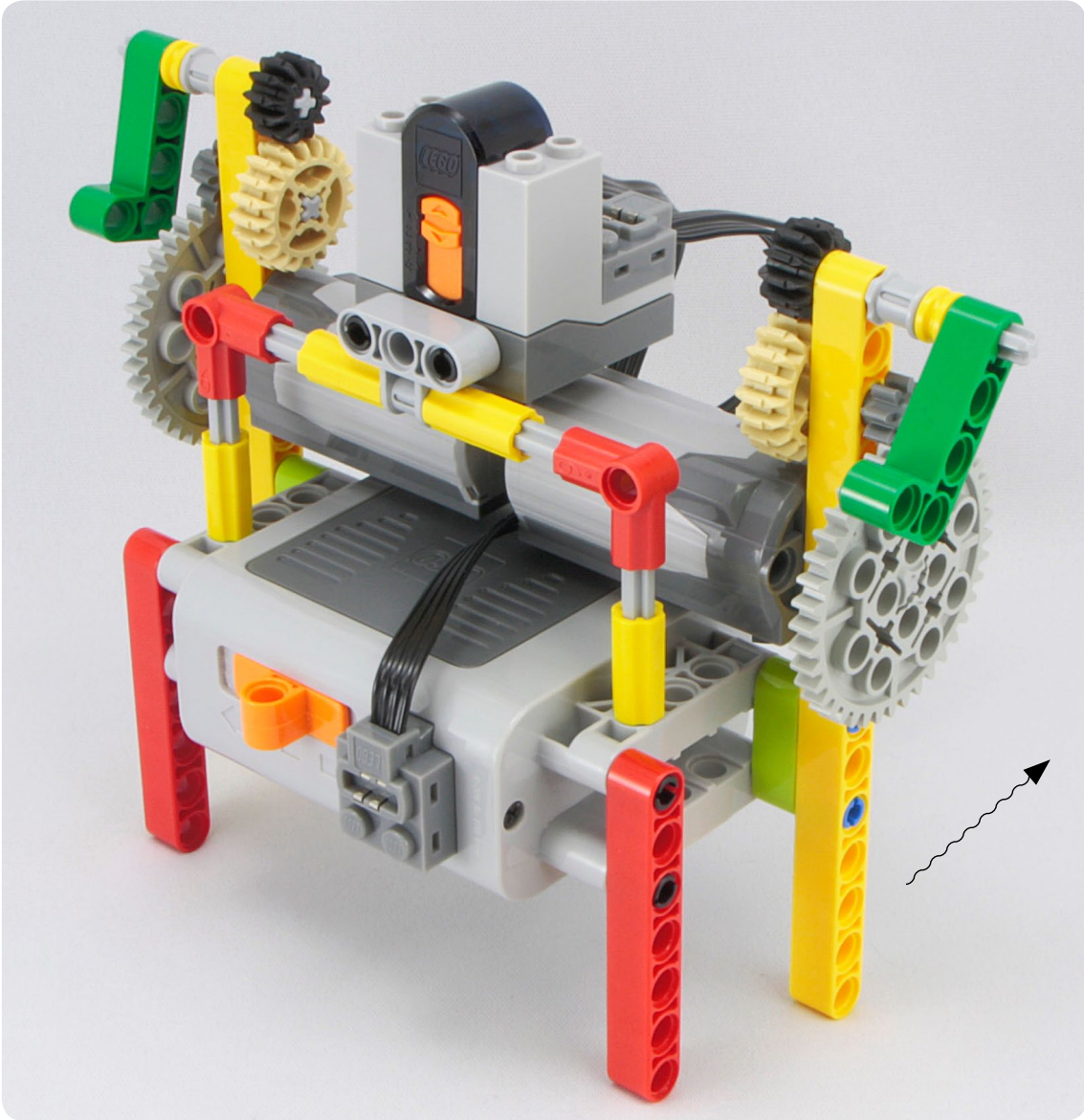
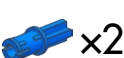
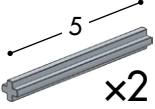
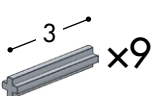
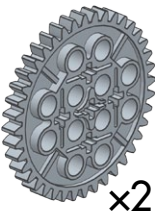
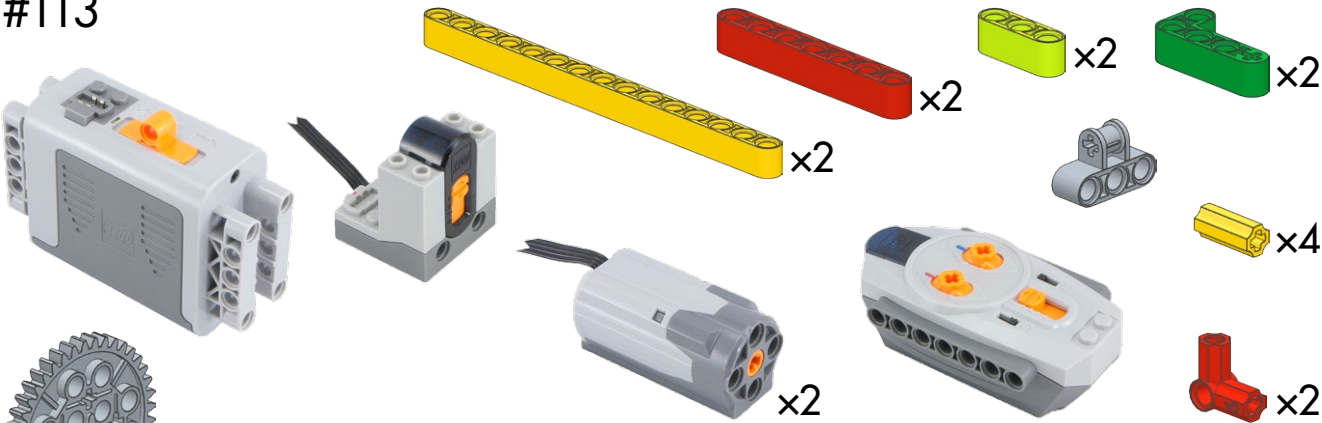
Moving through vibration

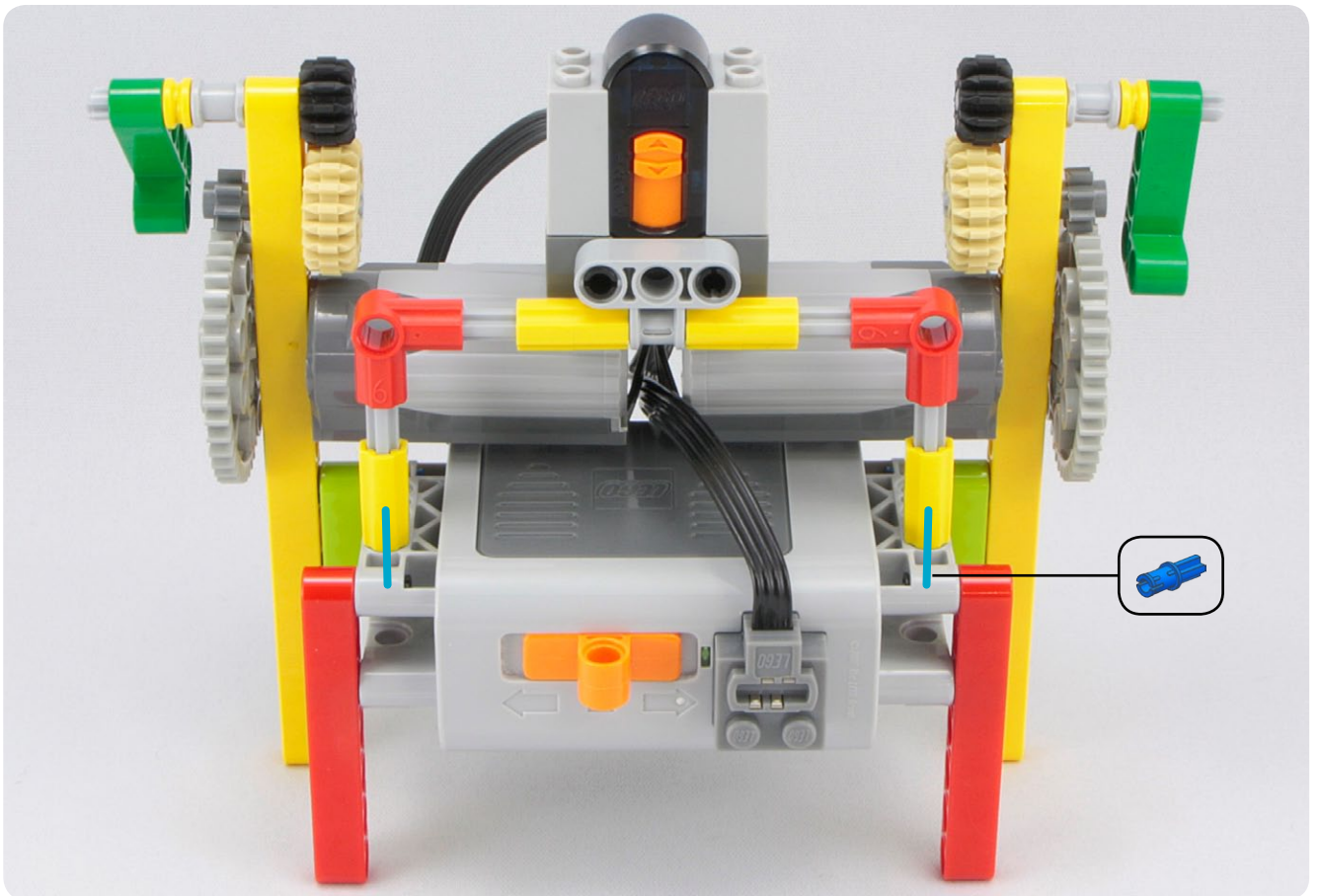
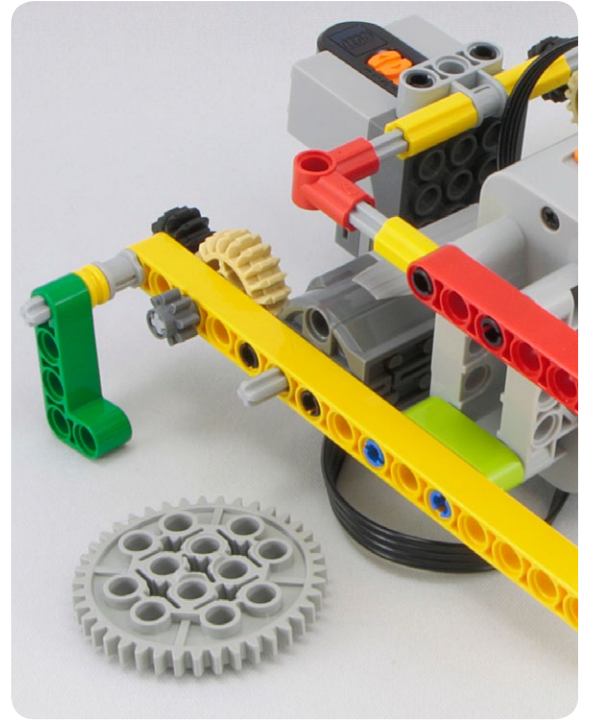
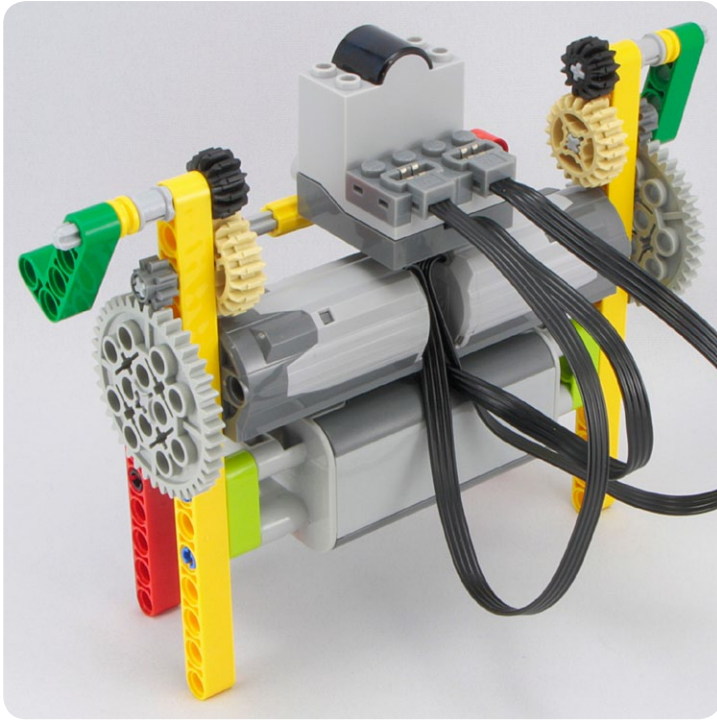
#112





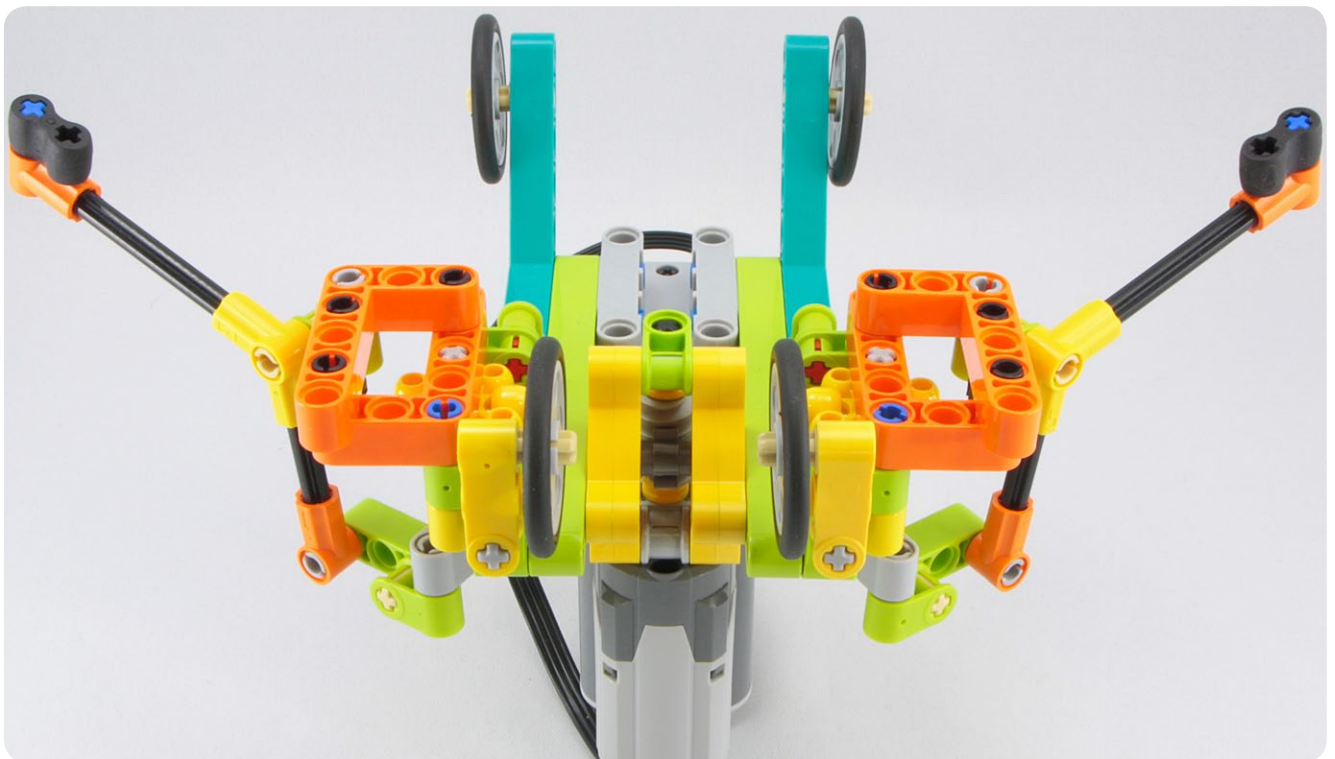
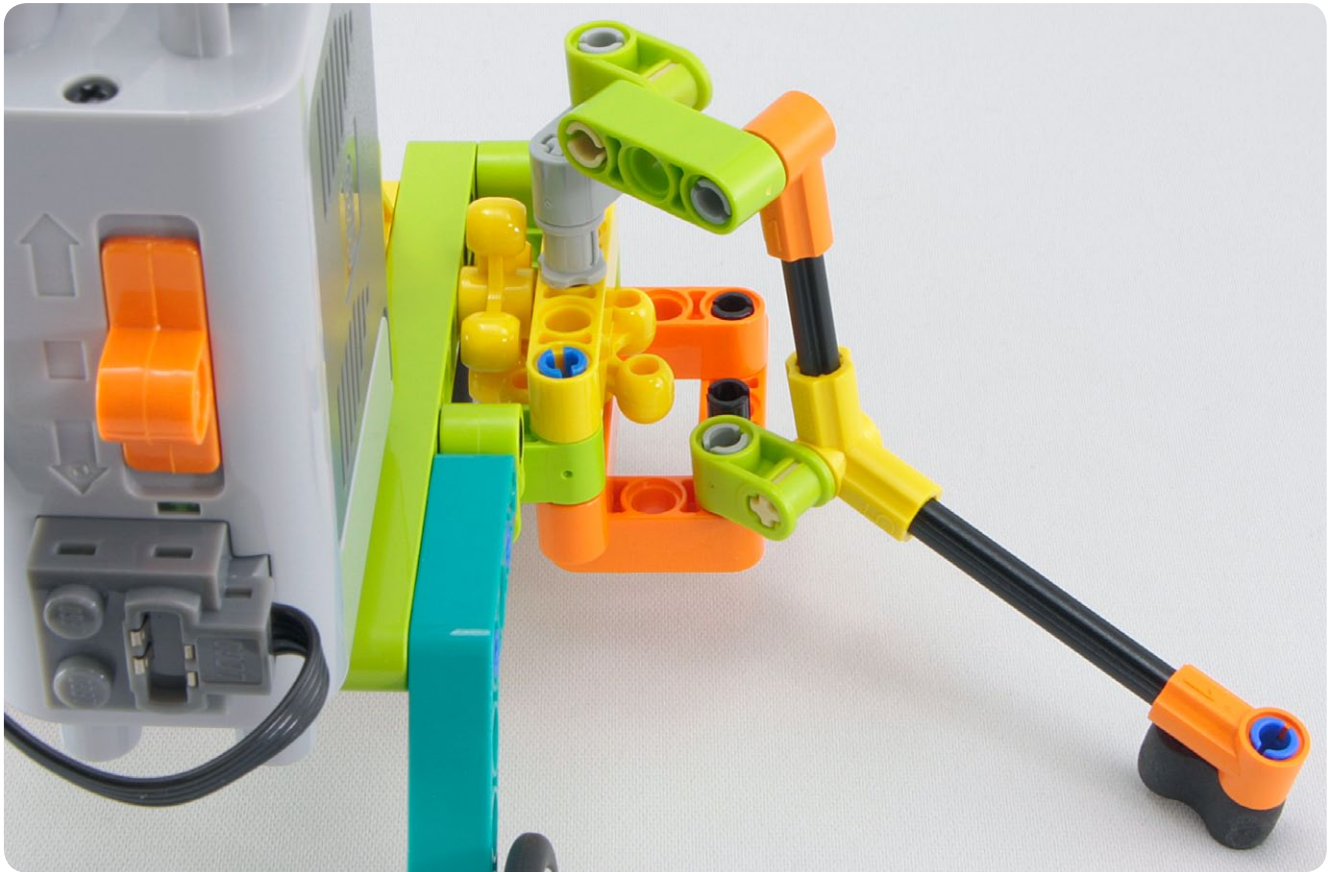
#113

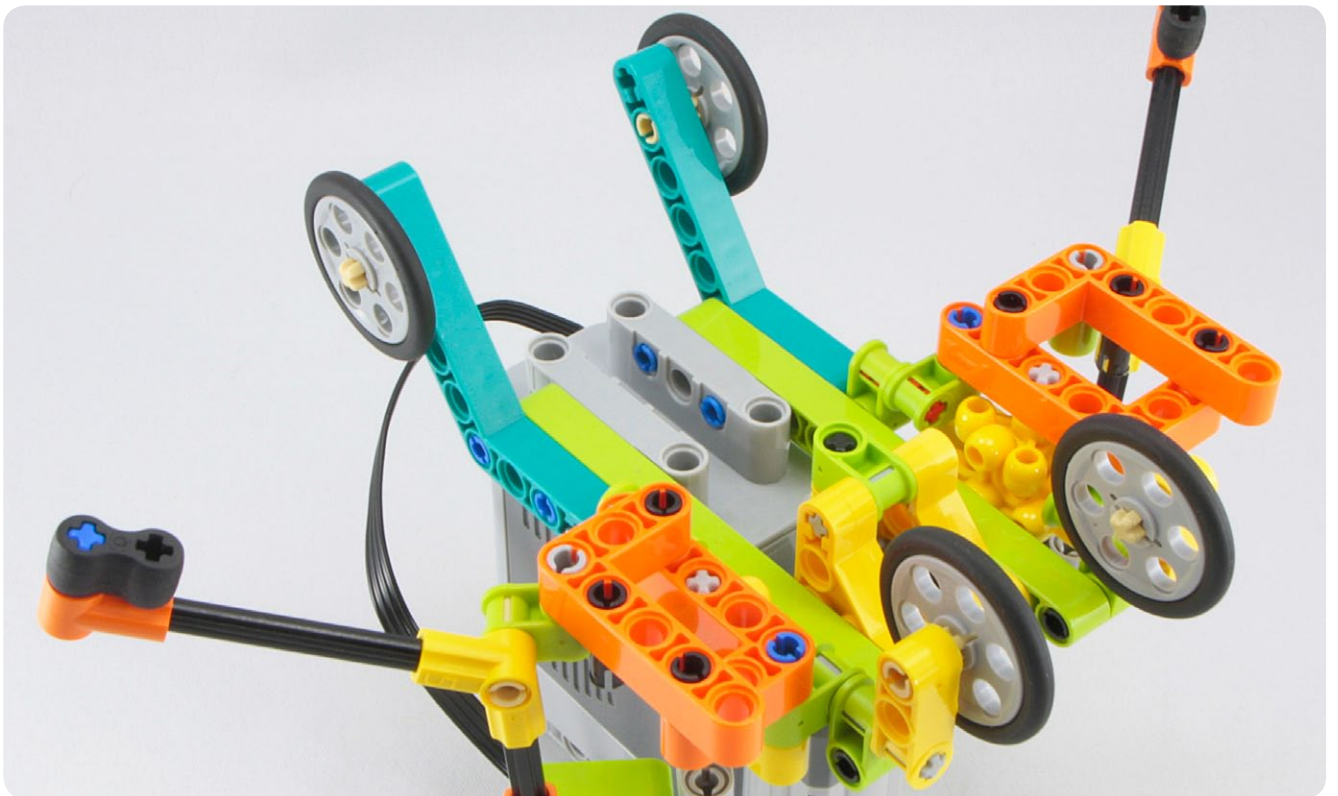




[illegible]









PART 3

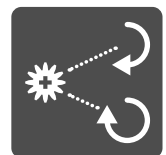
Special Mechanisms



250



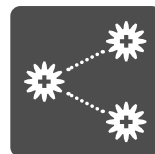
264



288



256



272

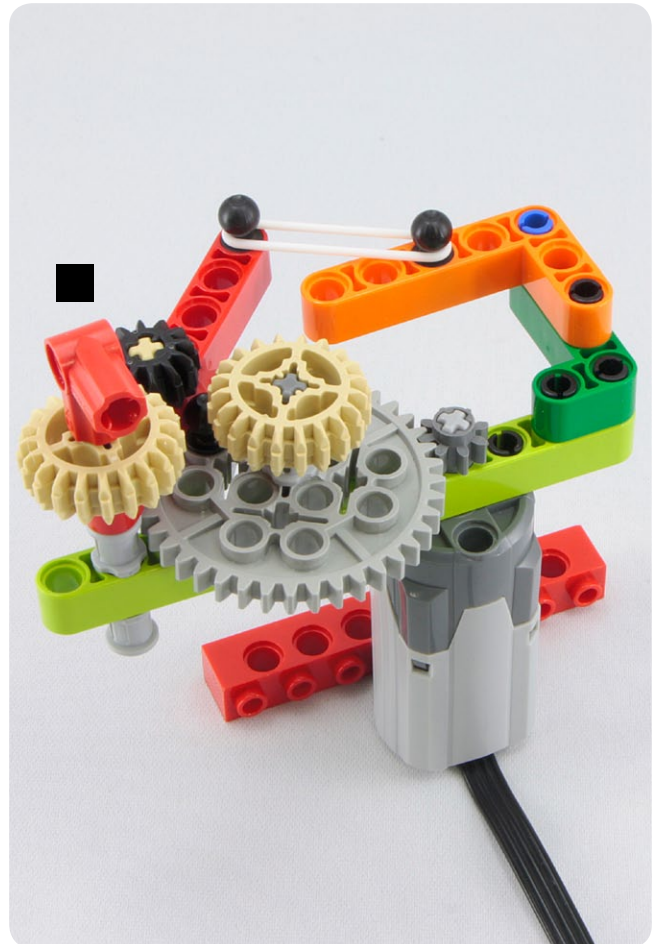
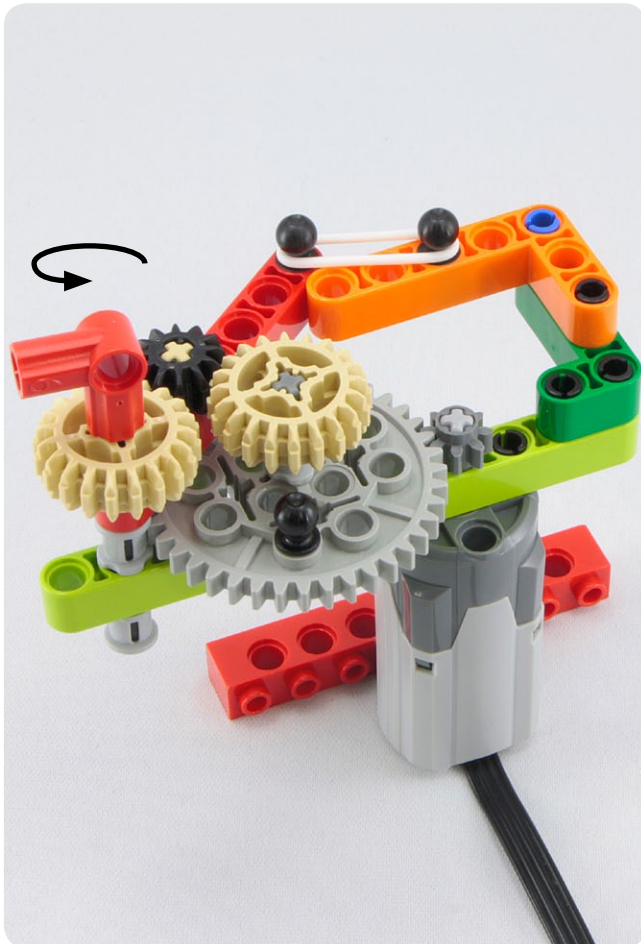
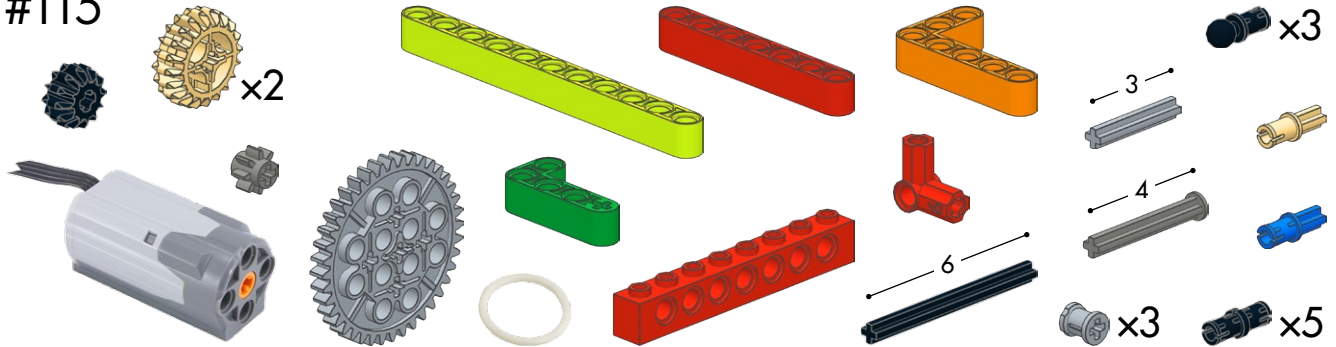


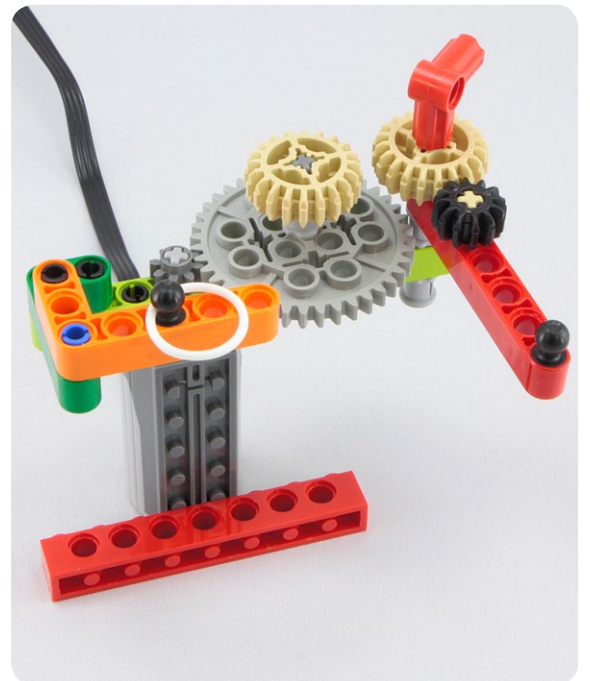
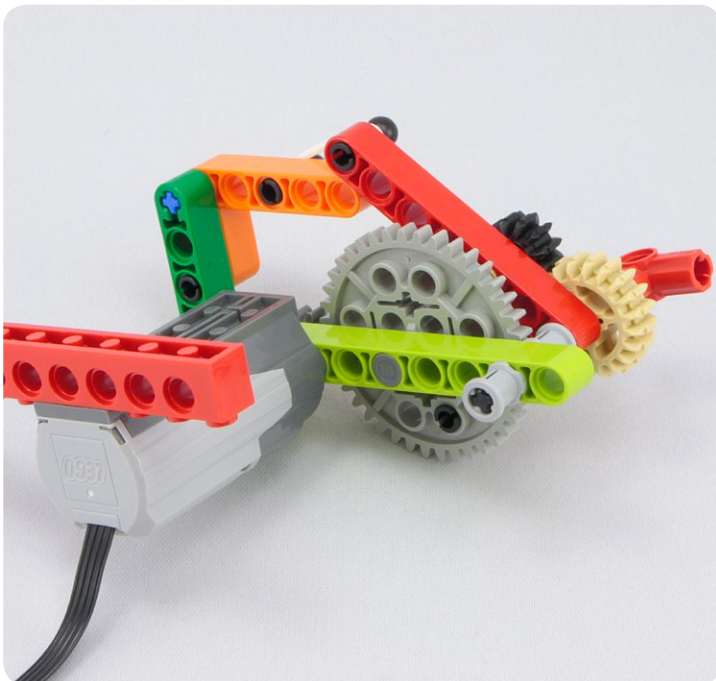
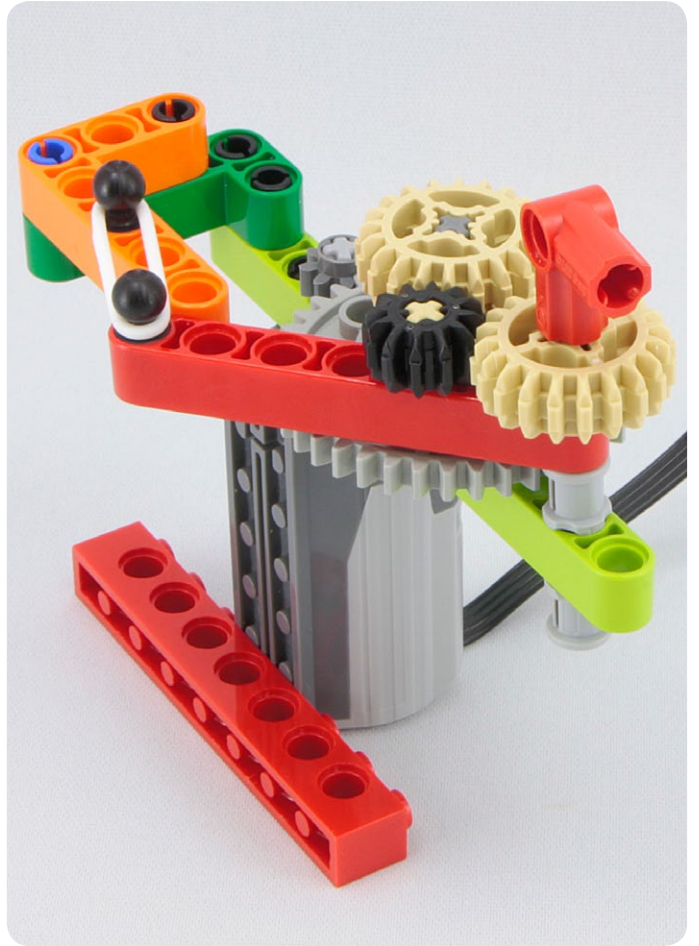
308



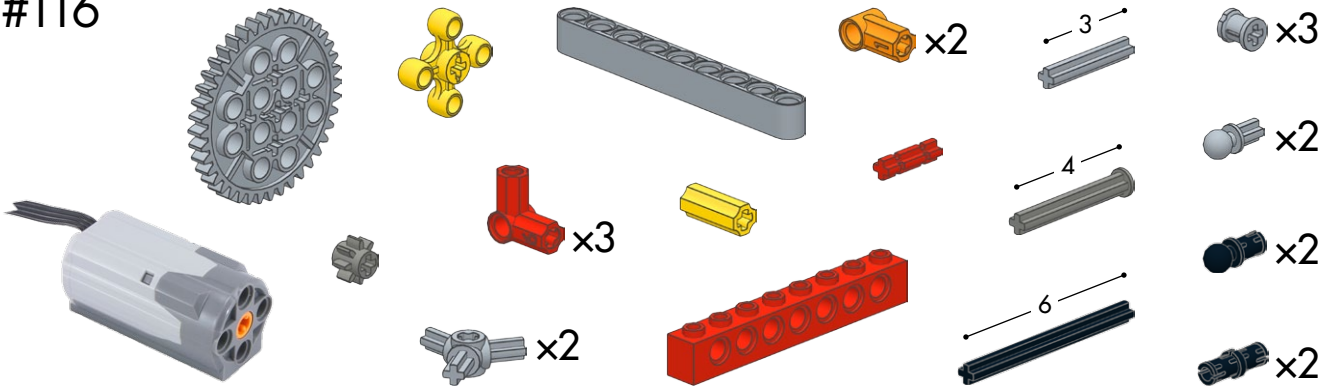
Intermittent motion

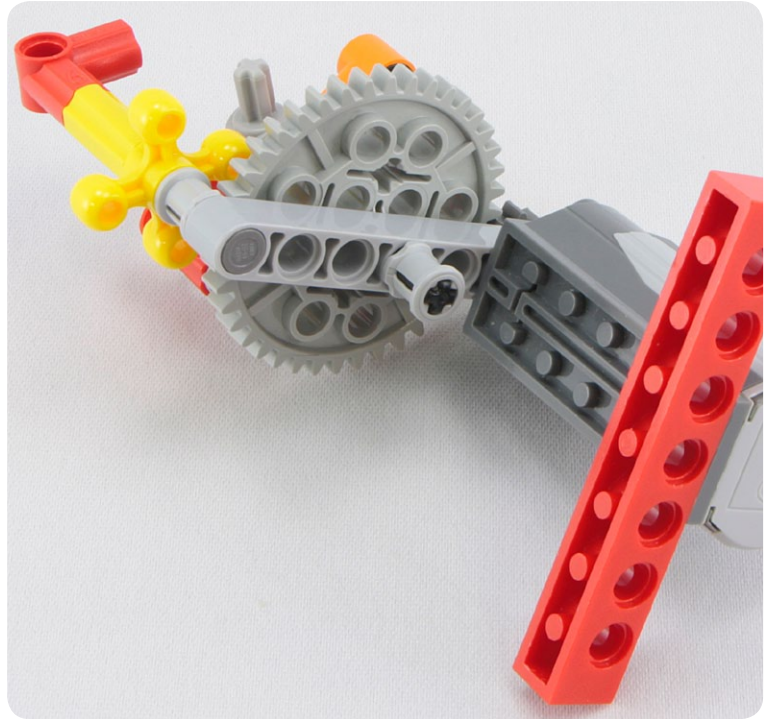
#115

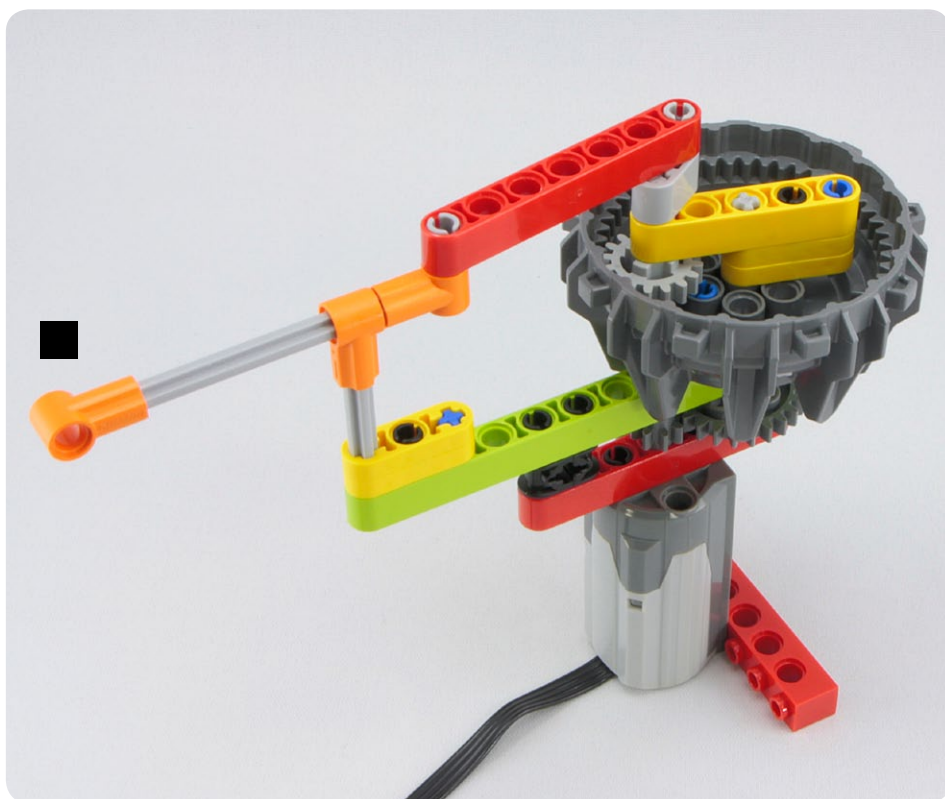
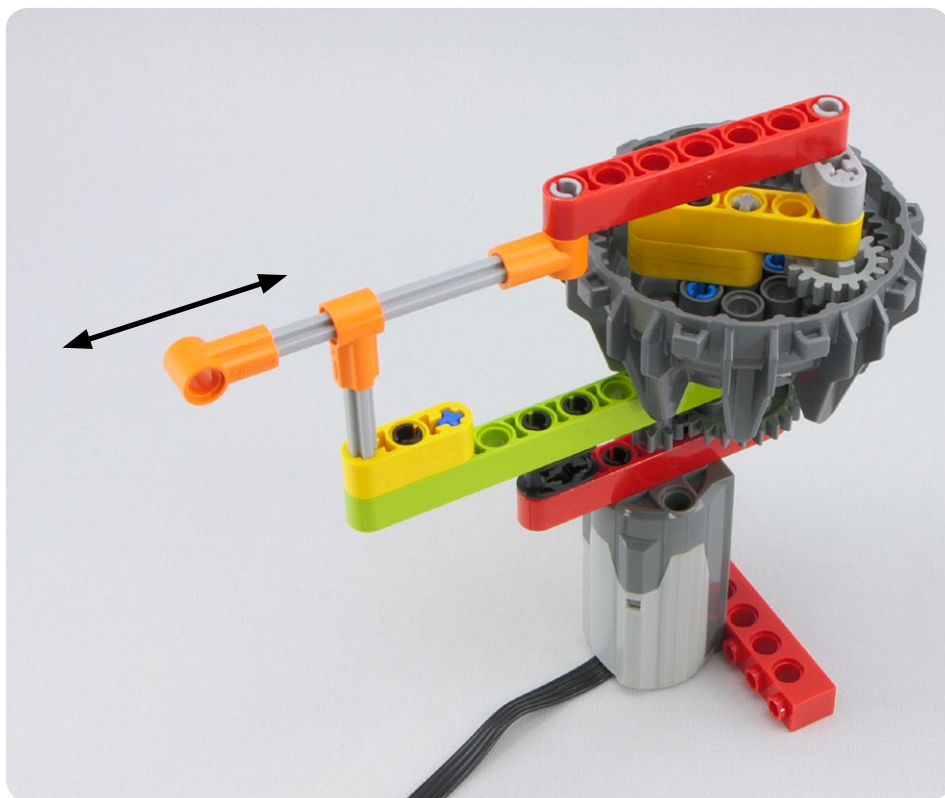
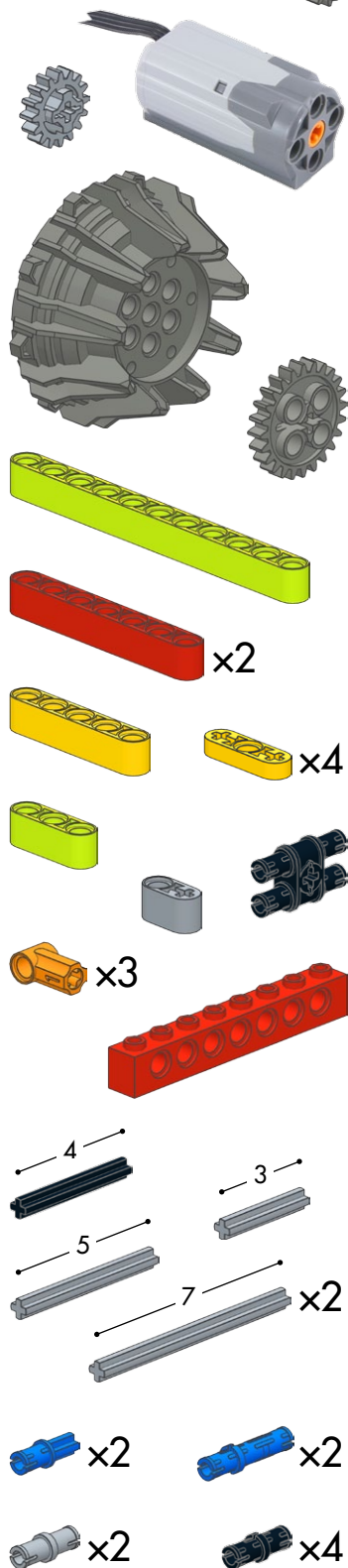


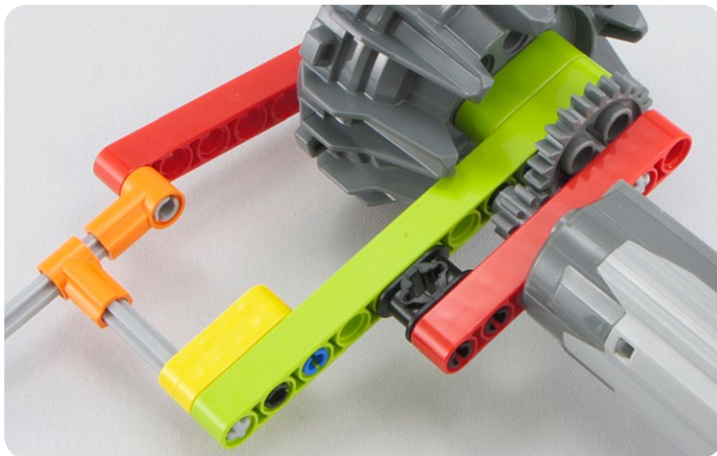
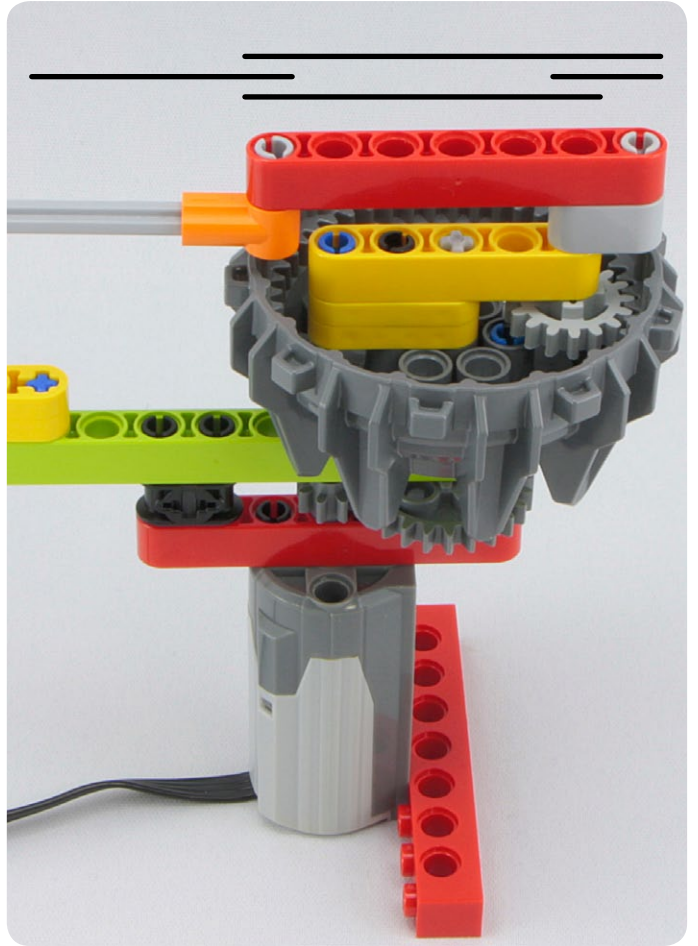
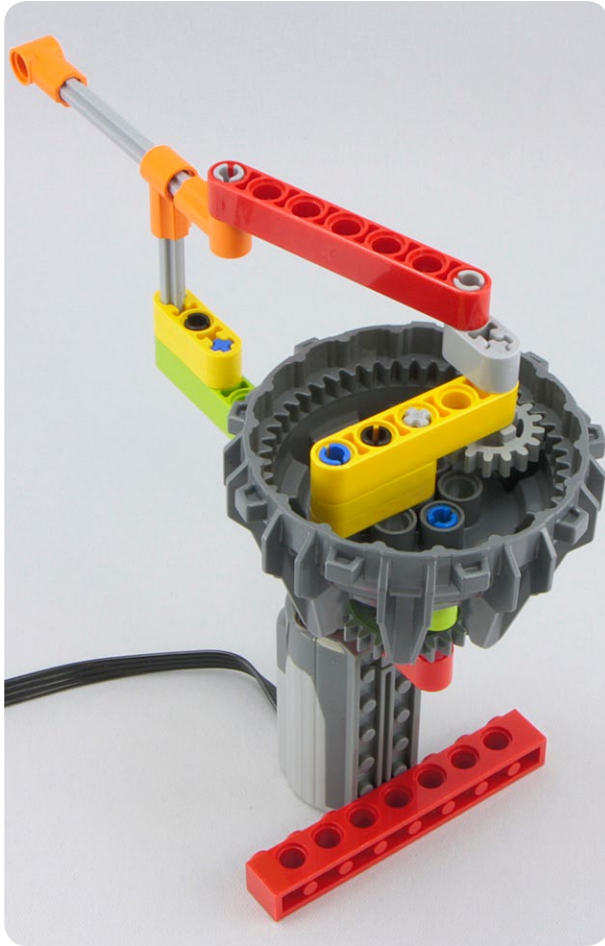


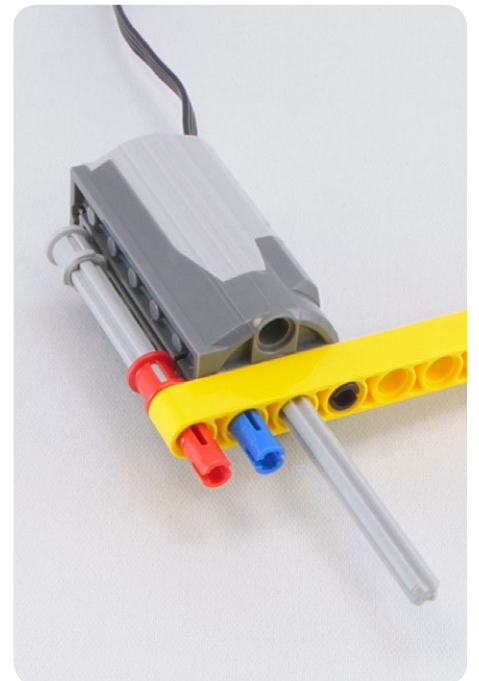
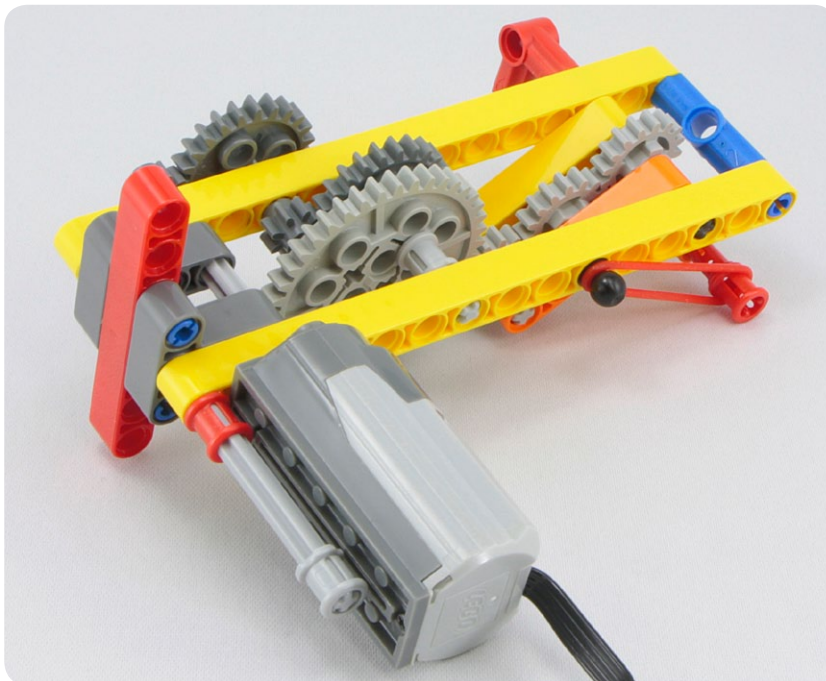
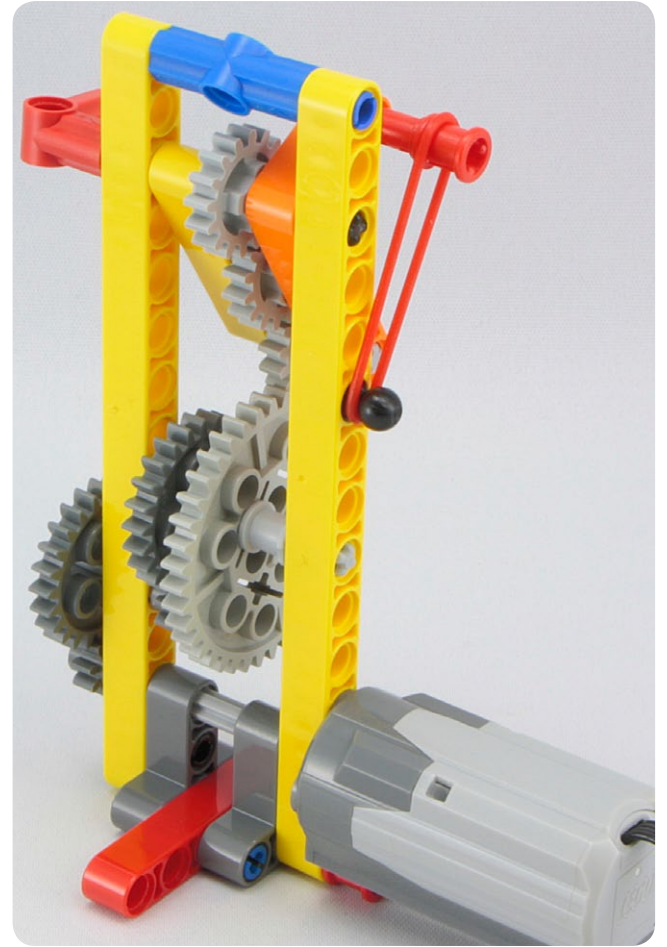
#116



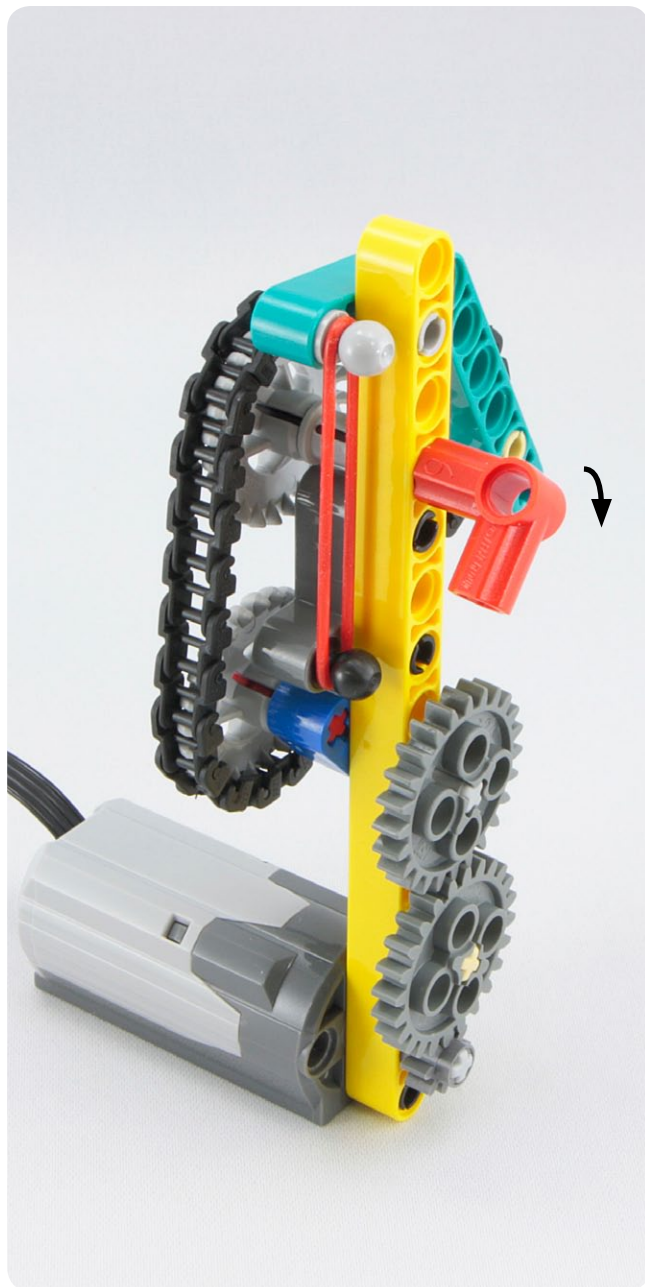
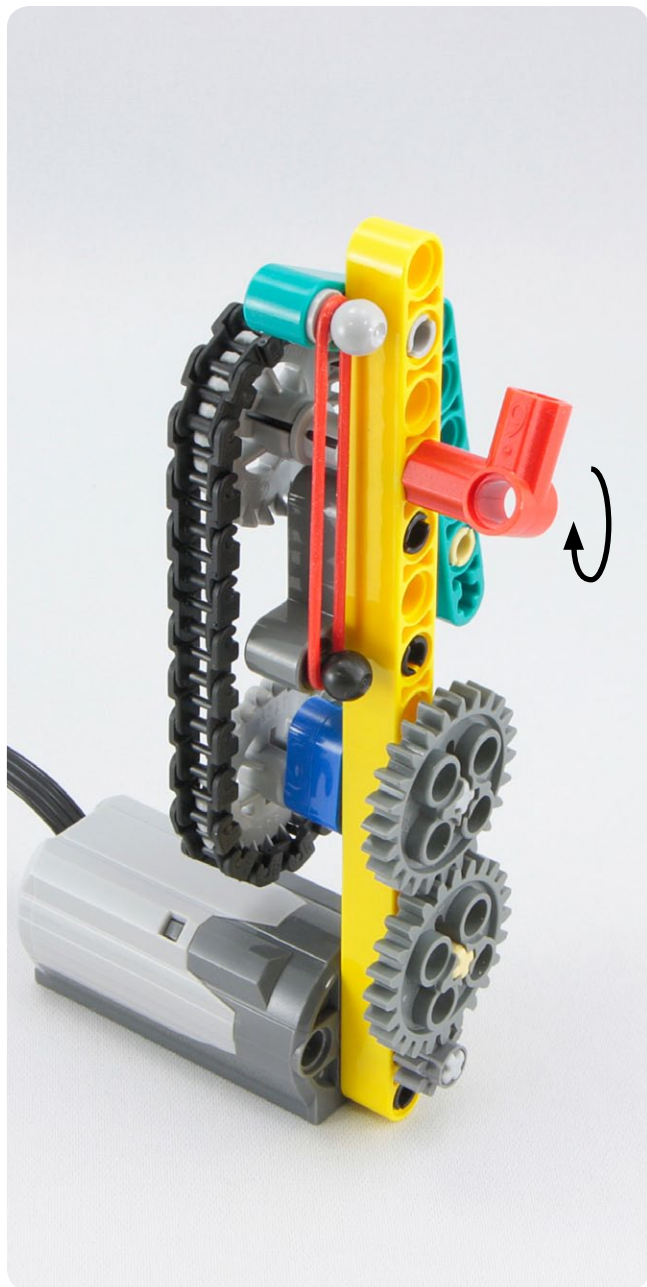
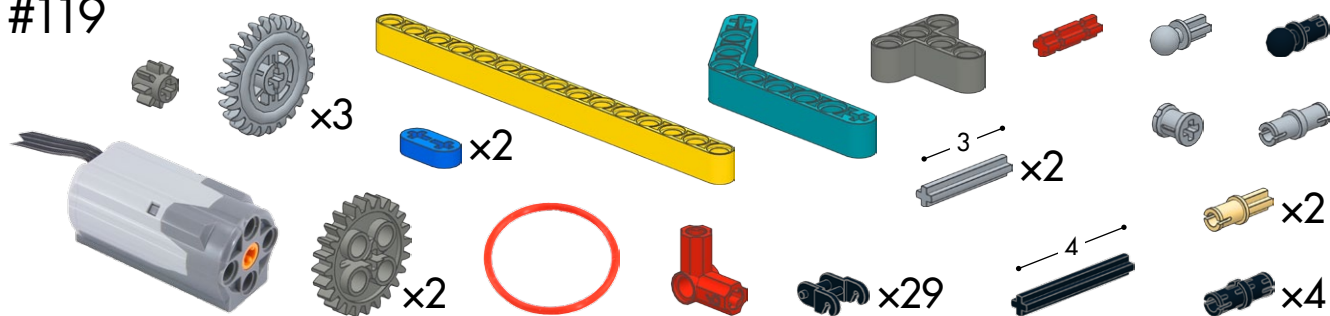


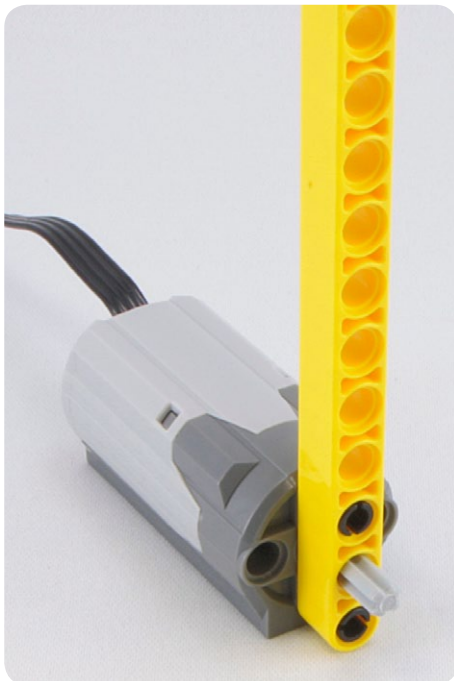
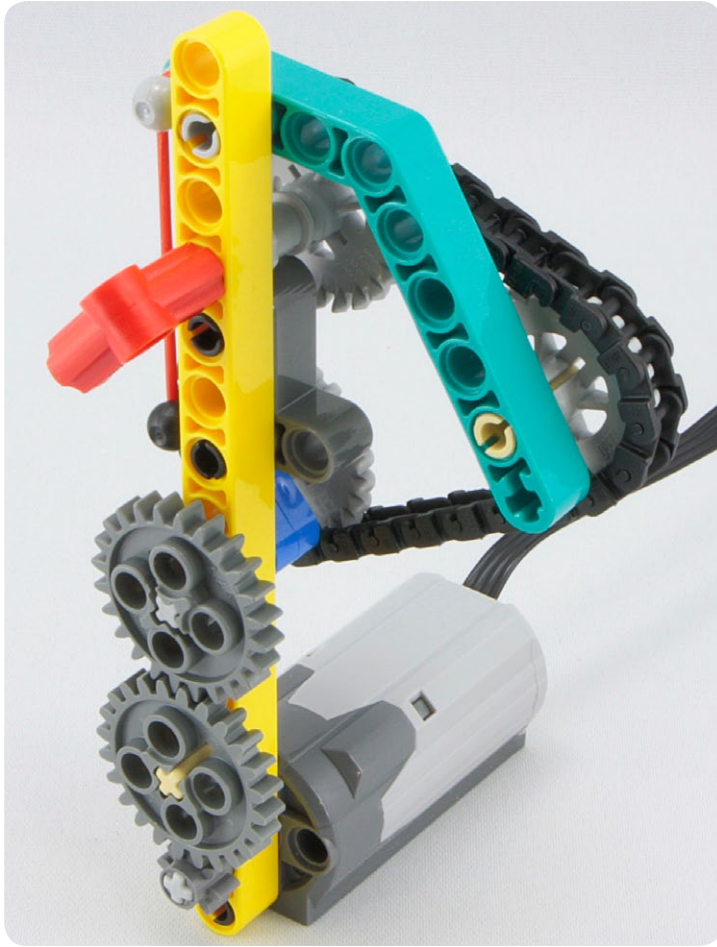






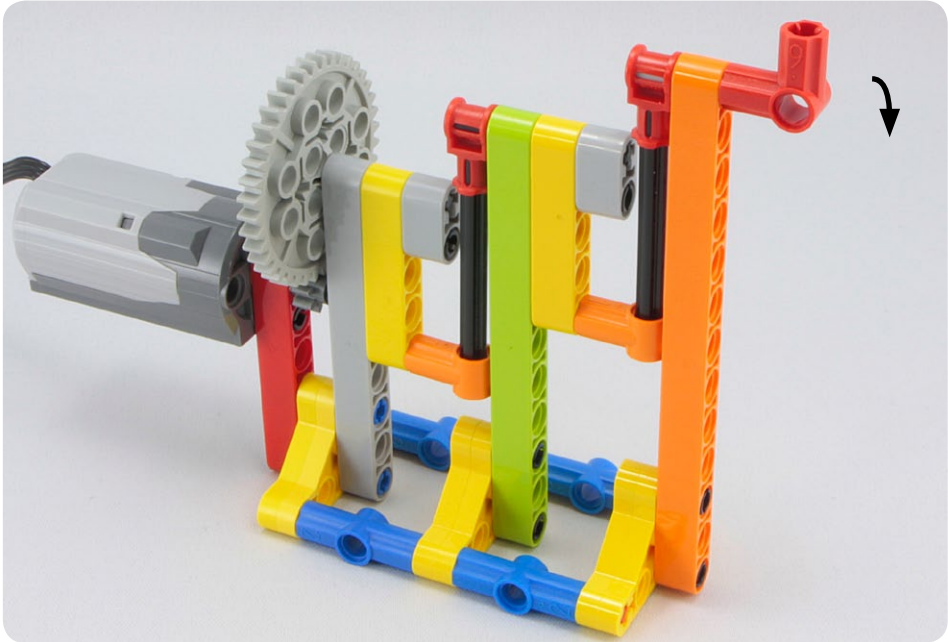
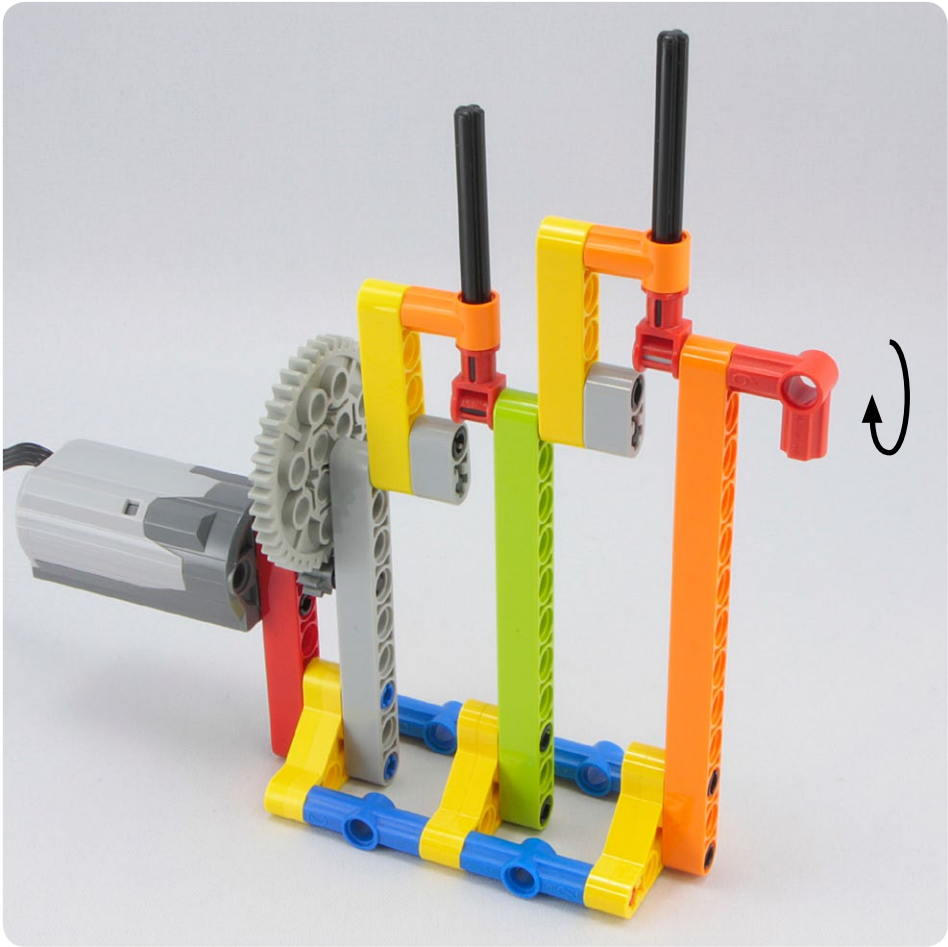
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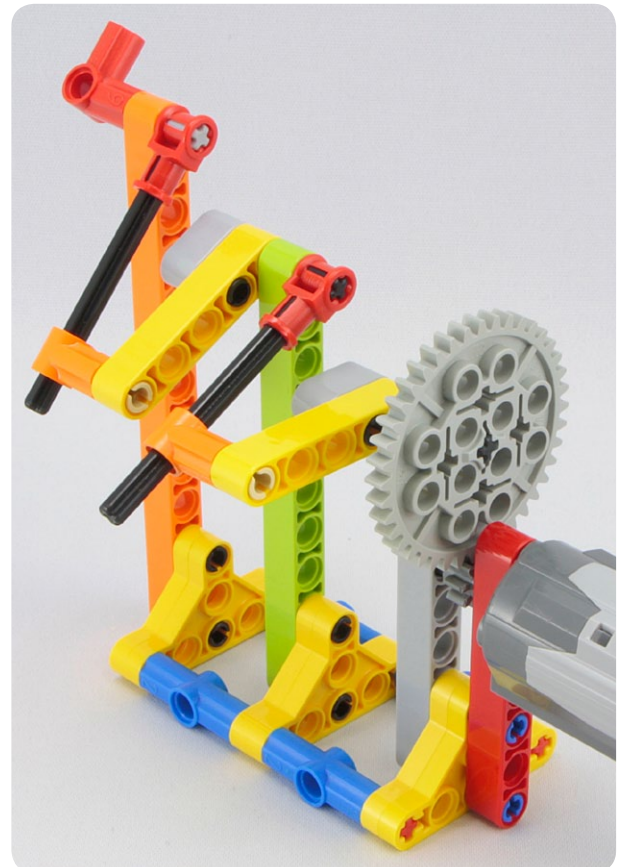
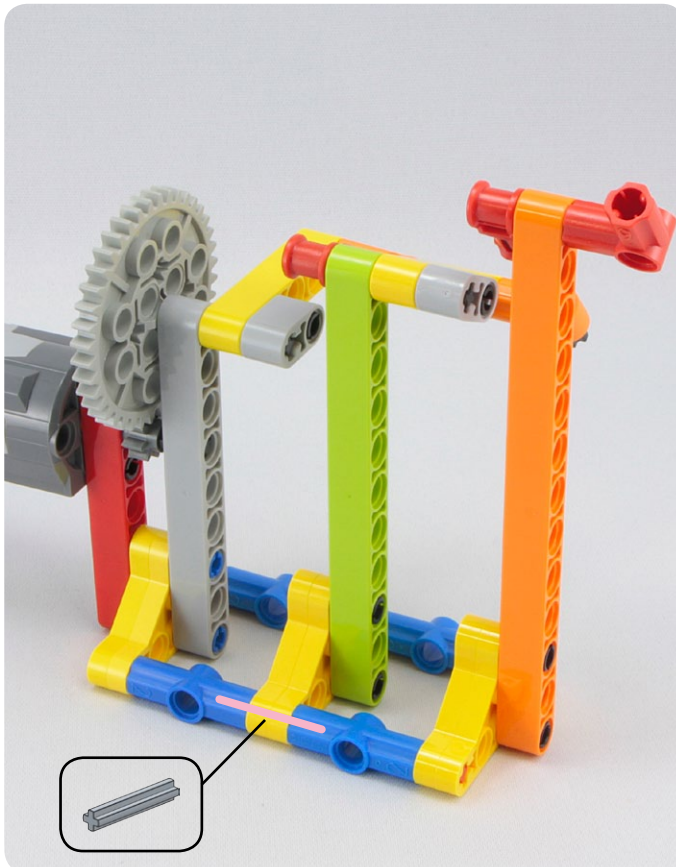
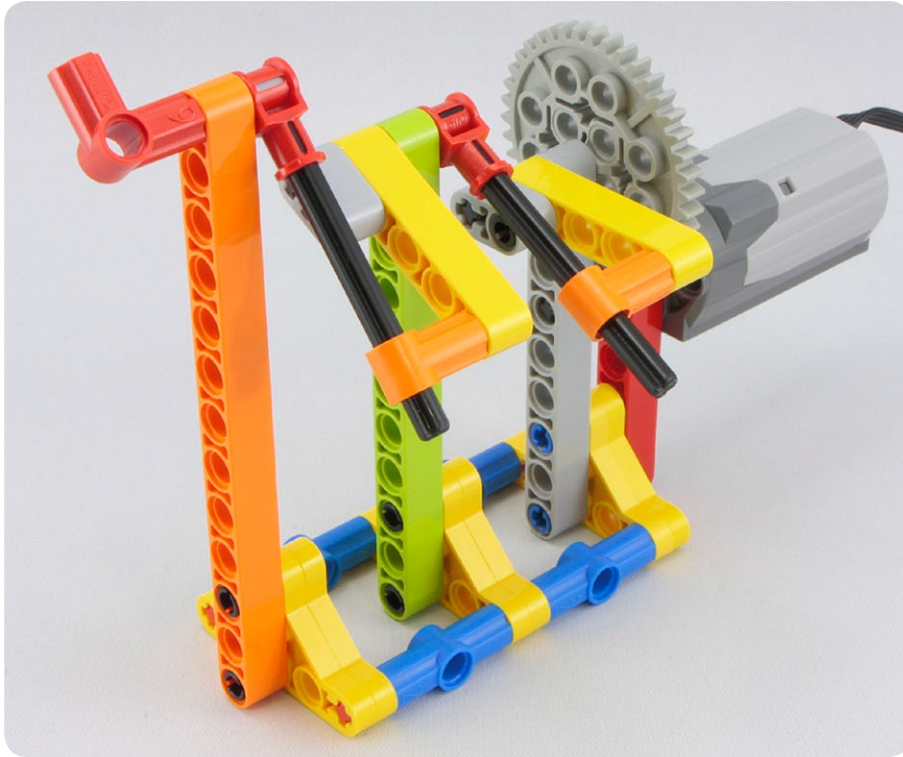




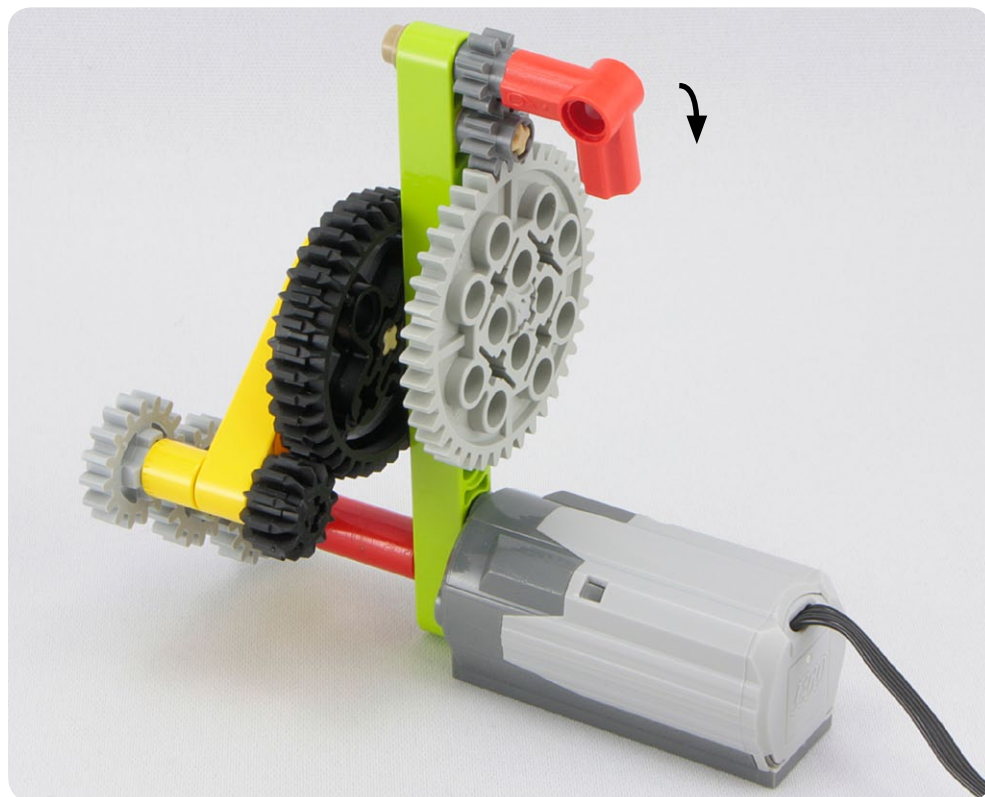
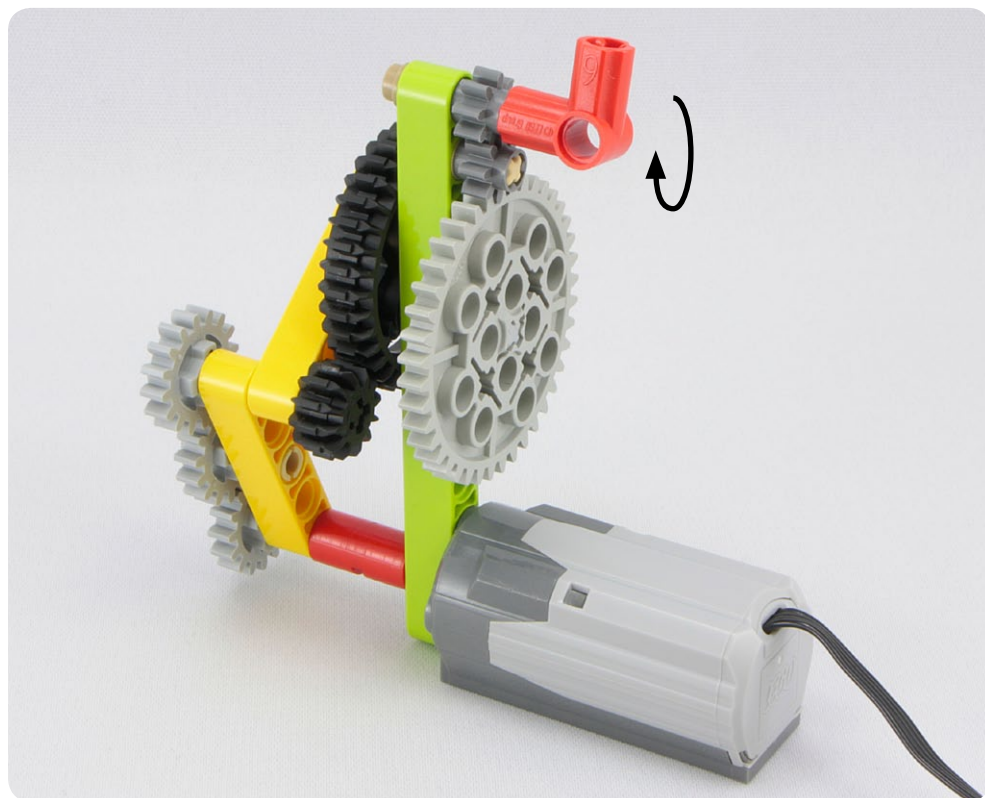
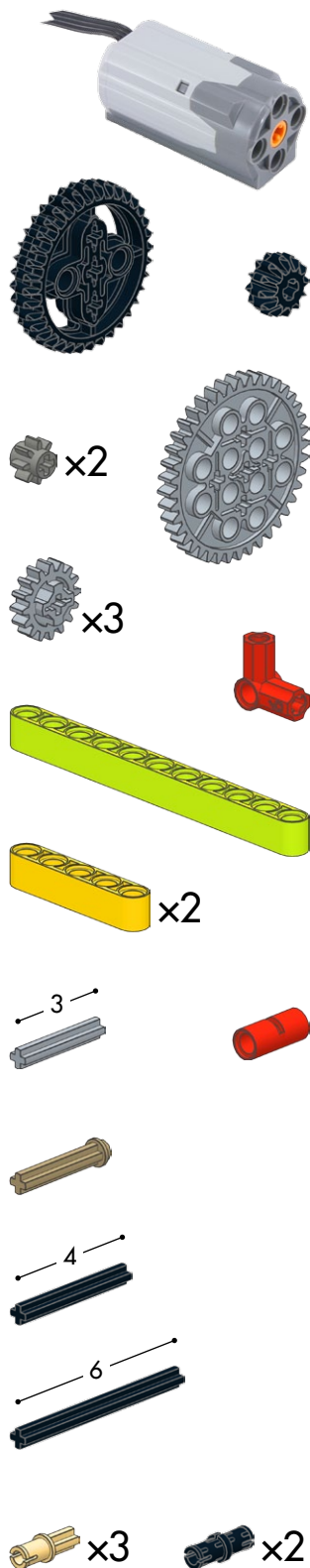
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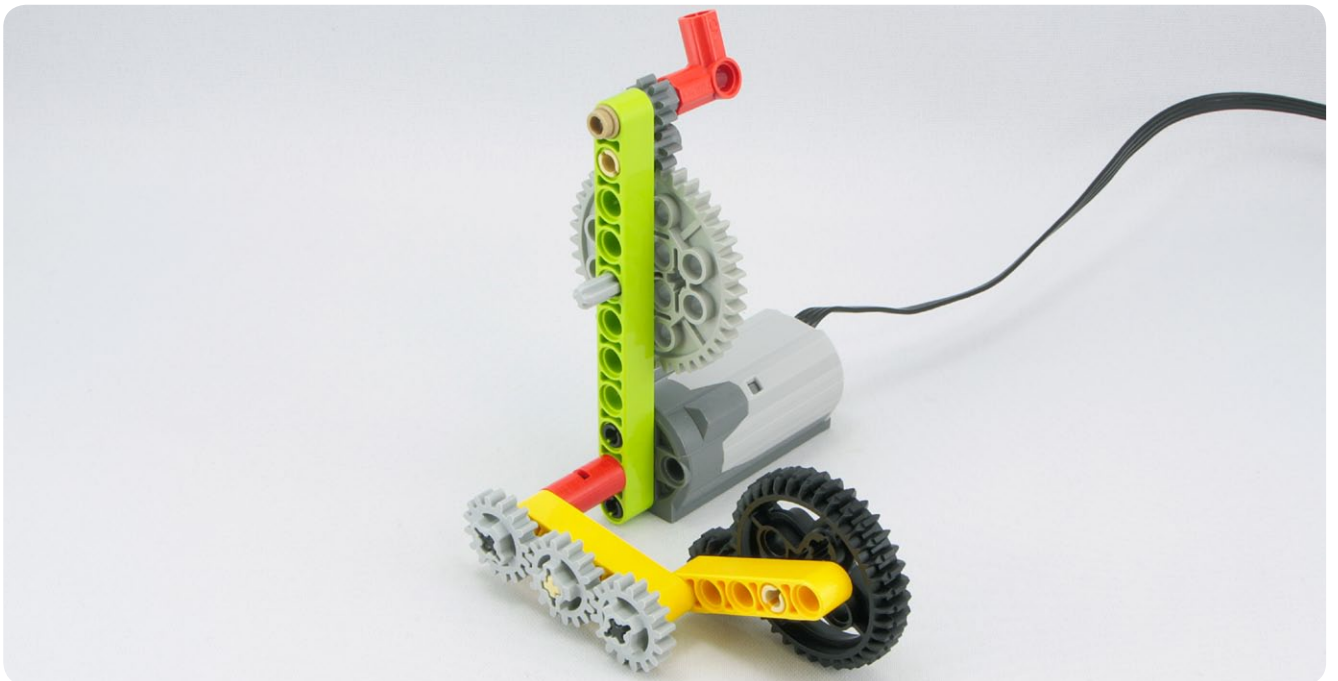
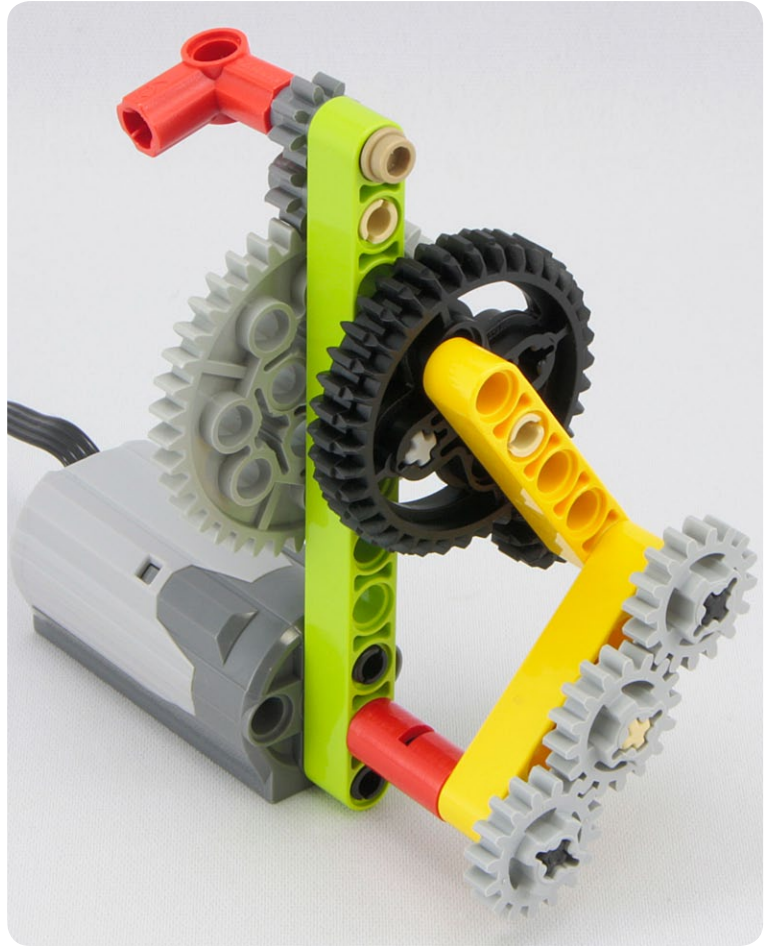
-
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- x6
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- x2
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- x2
- x2
- x4
- x2
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- x4
- x3
- x4
- x2
- x2
- x2
- x8

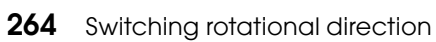


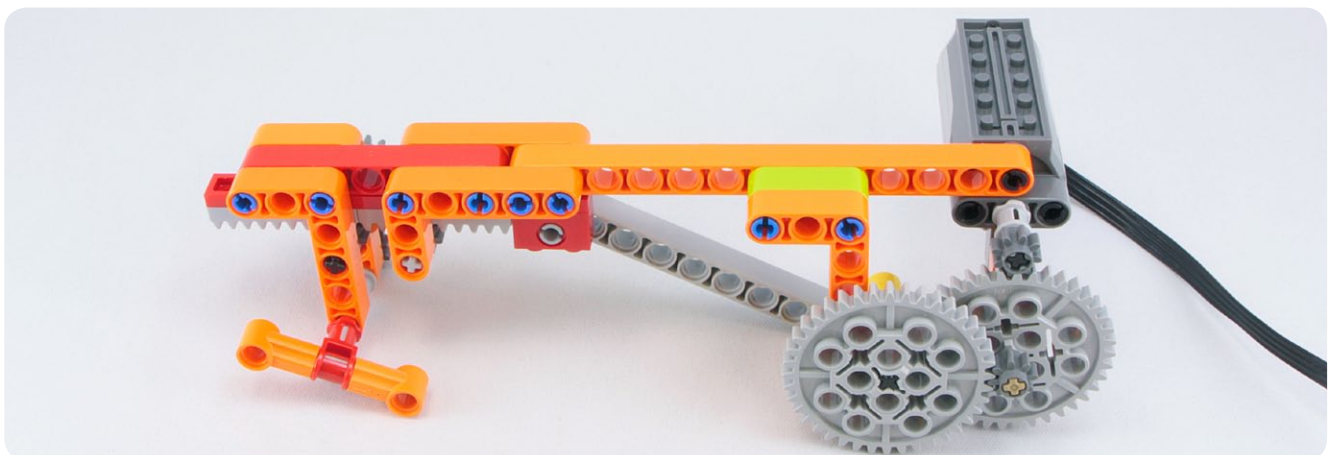
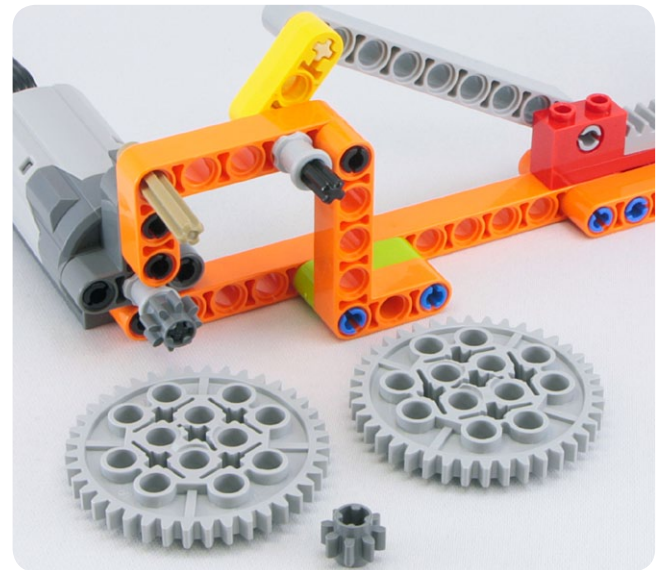
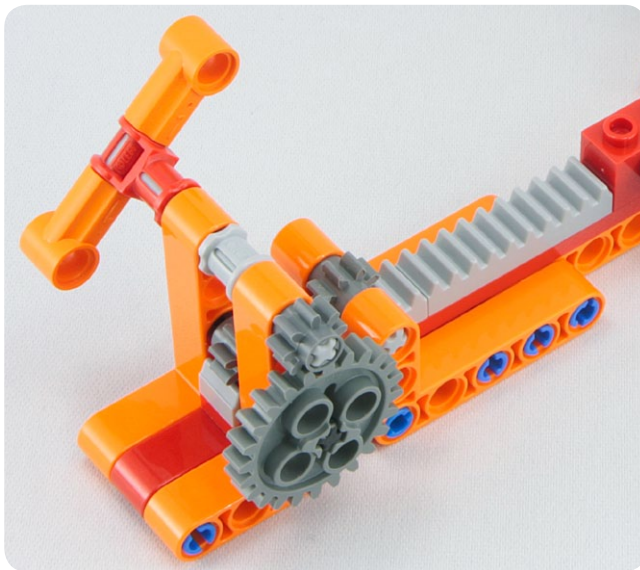
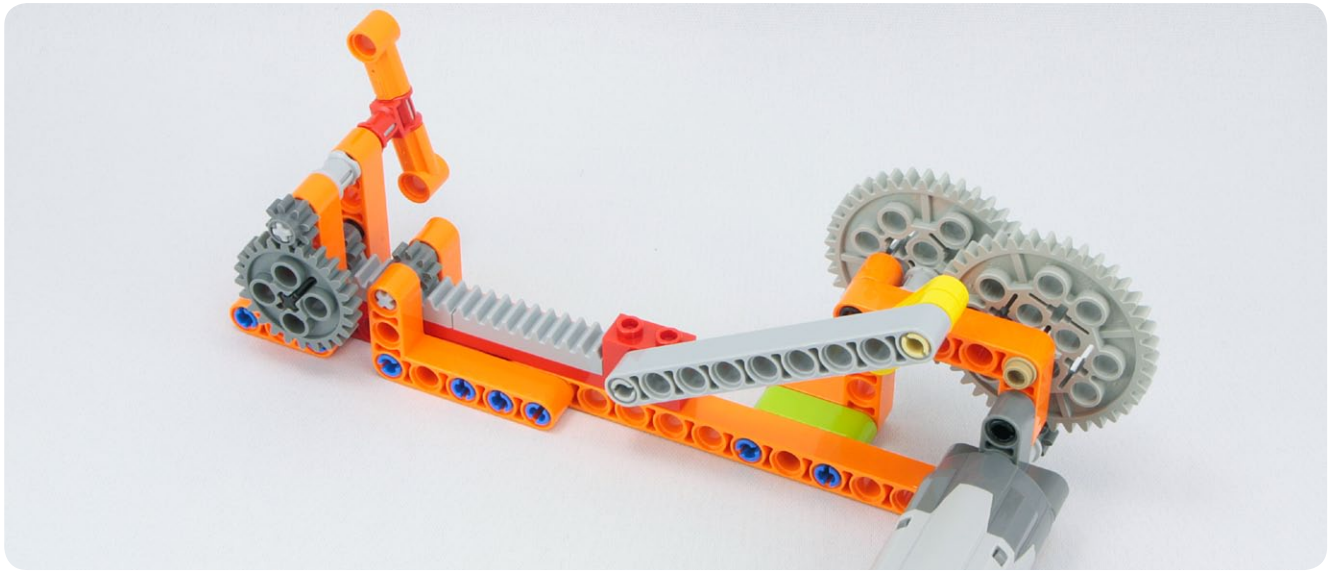


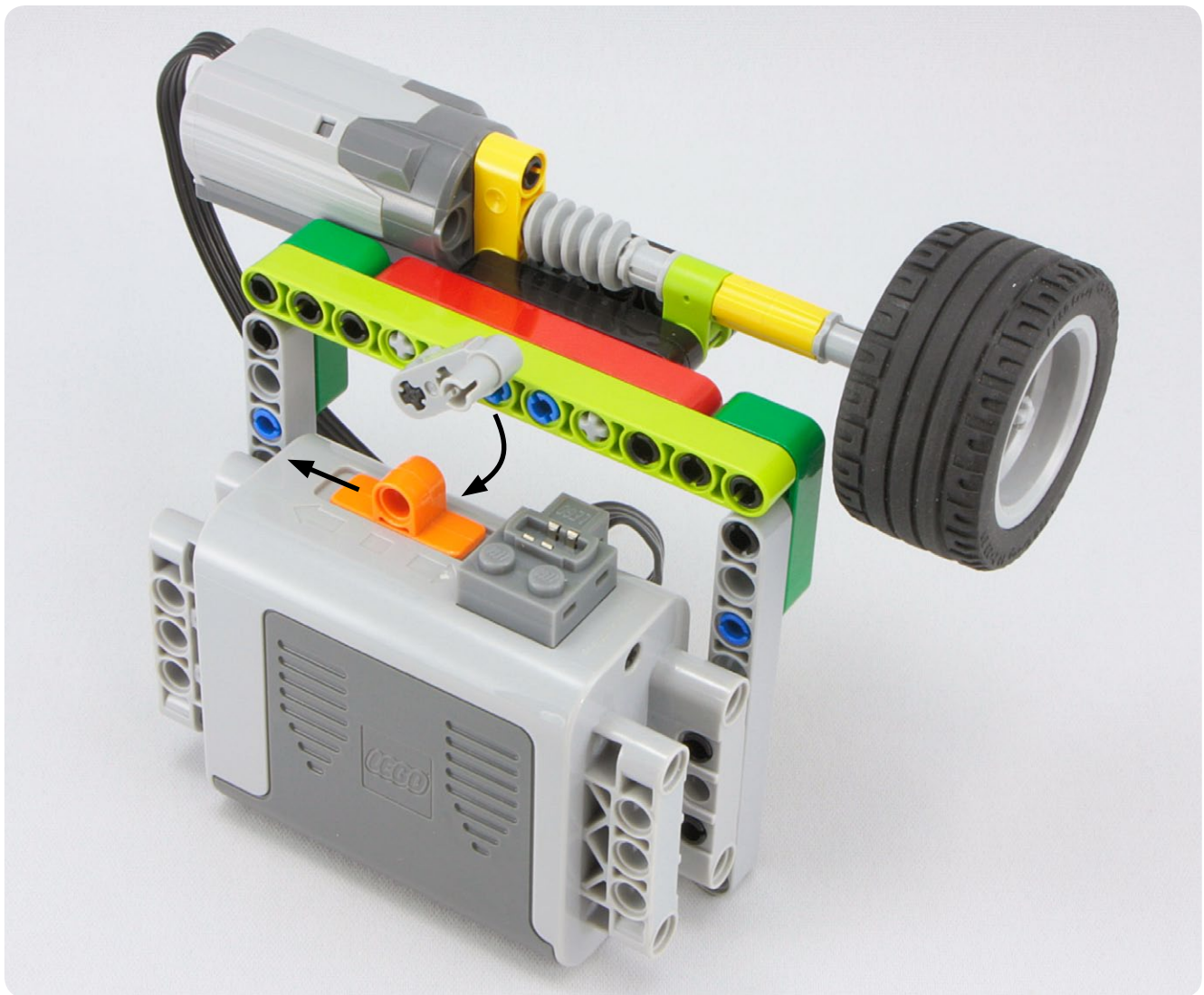
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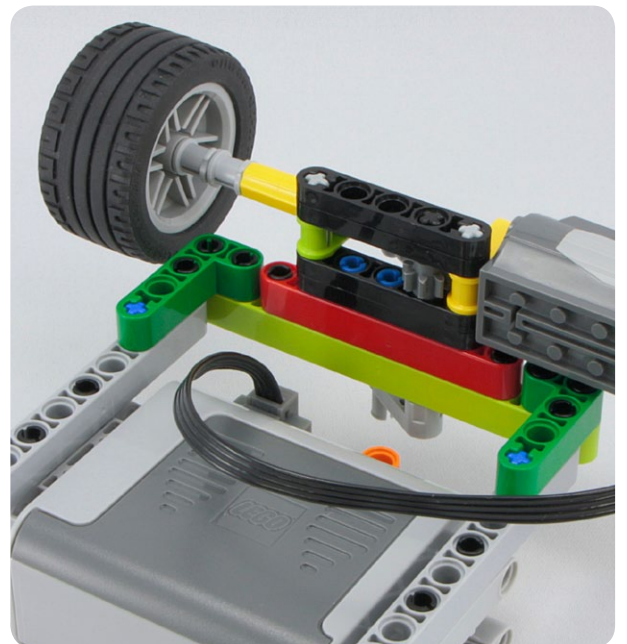
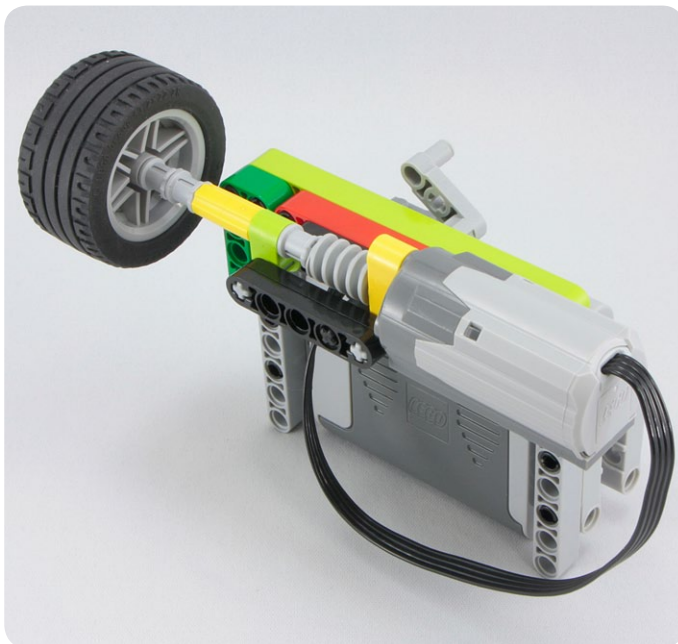
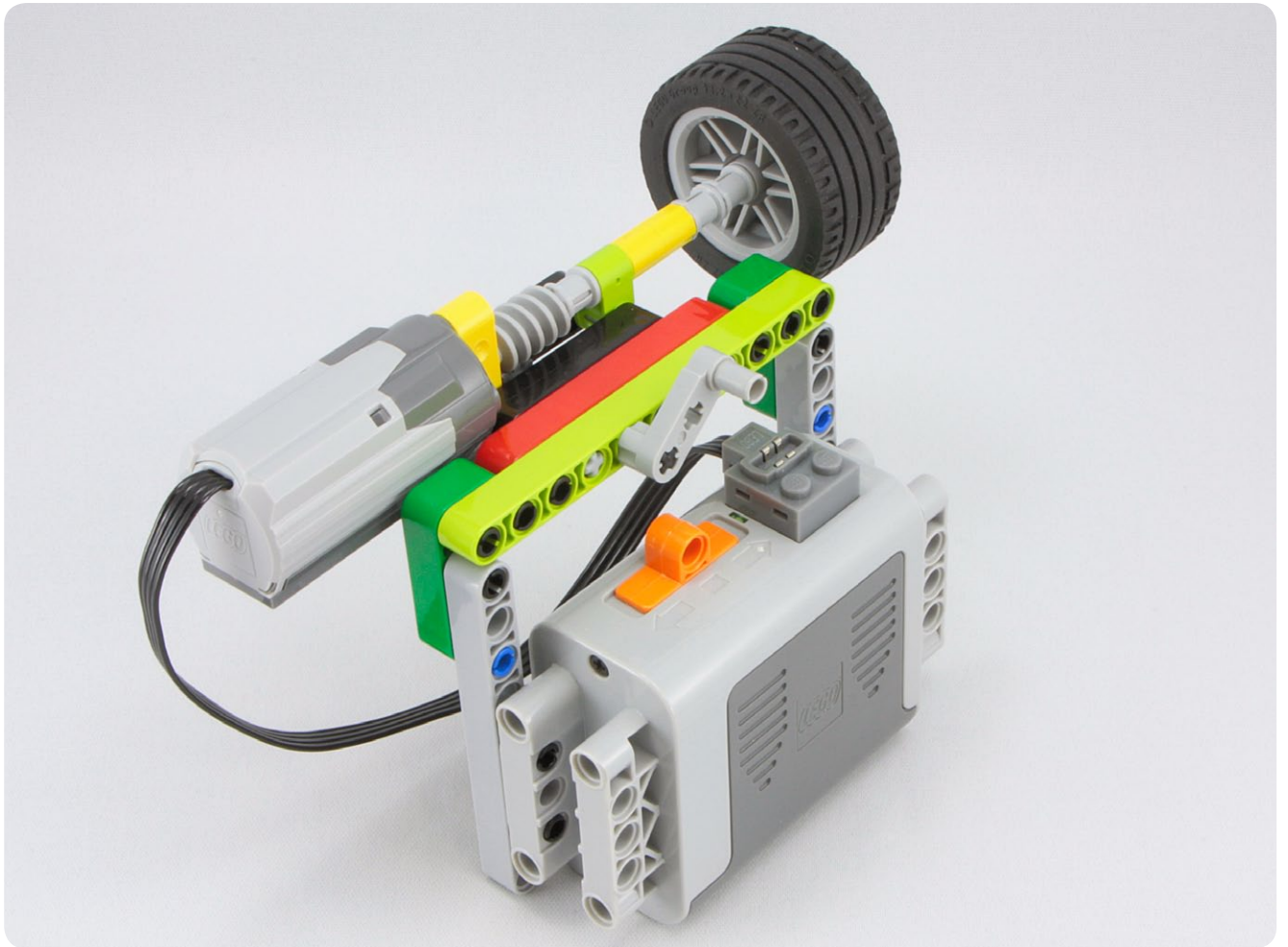




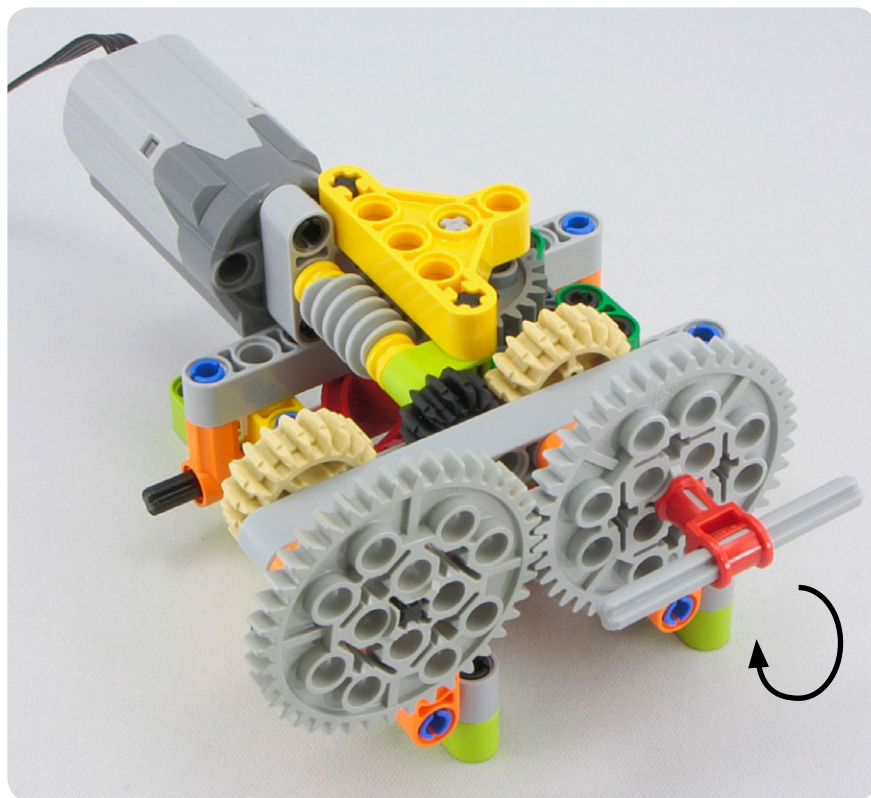
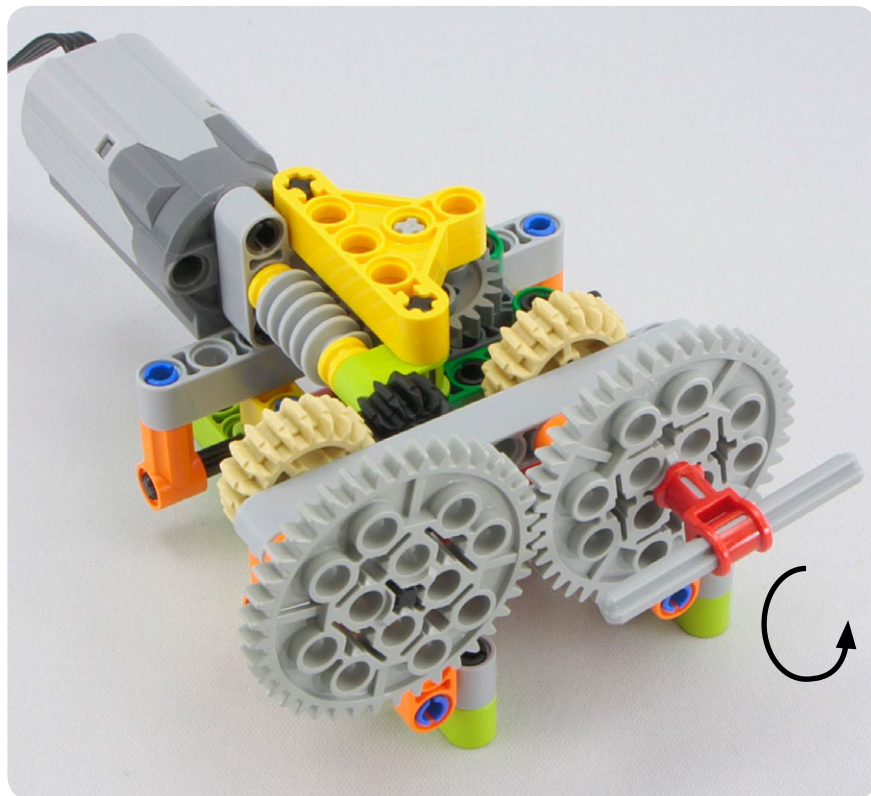
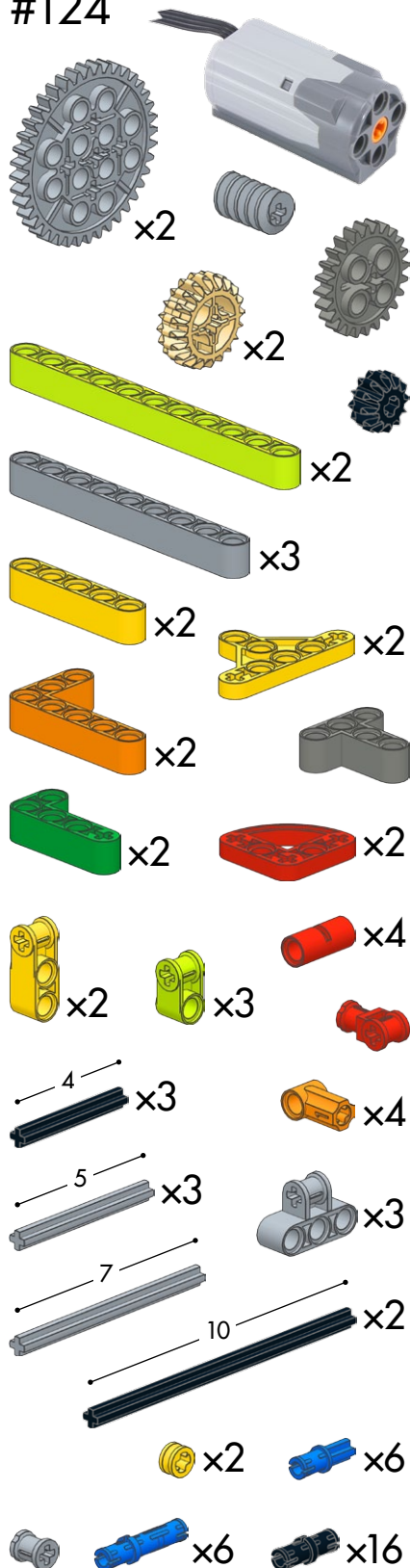
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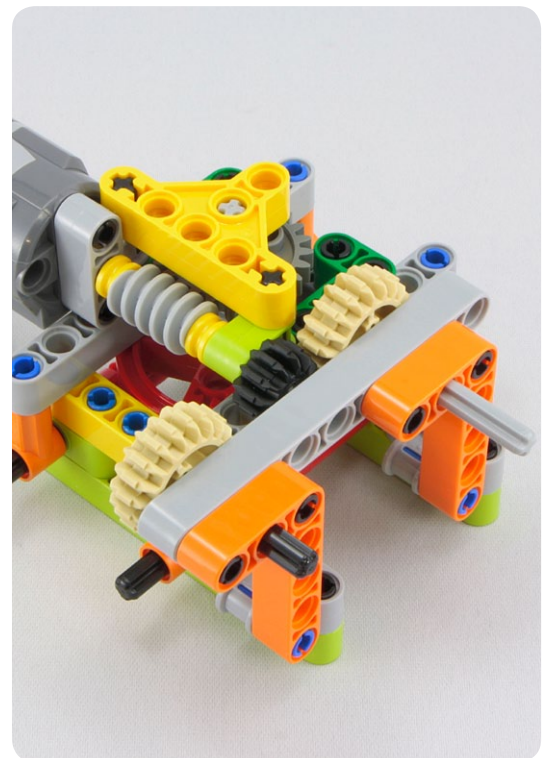
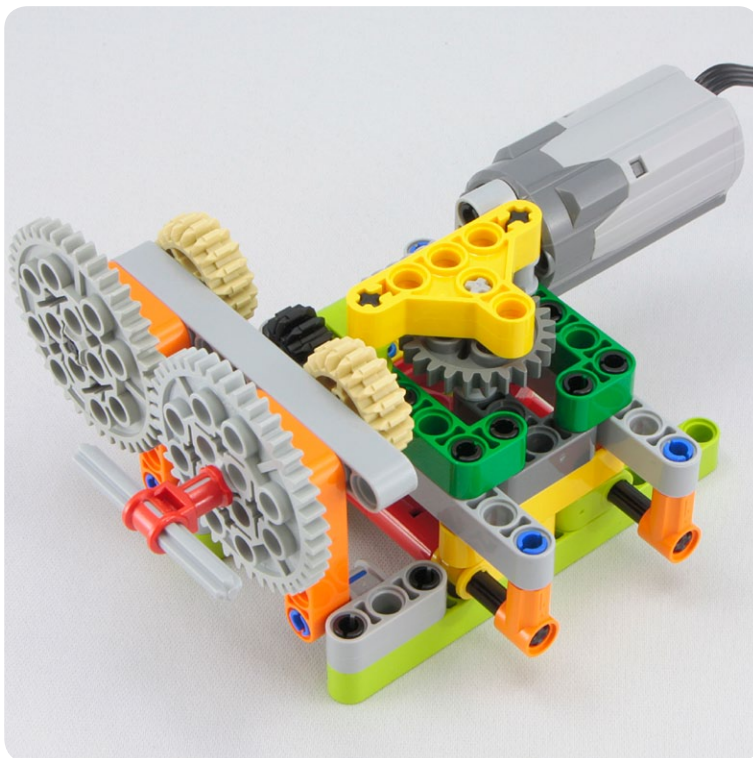
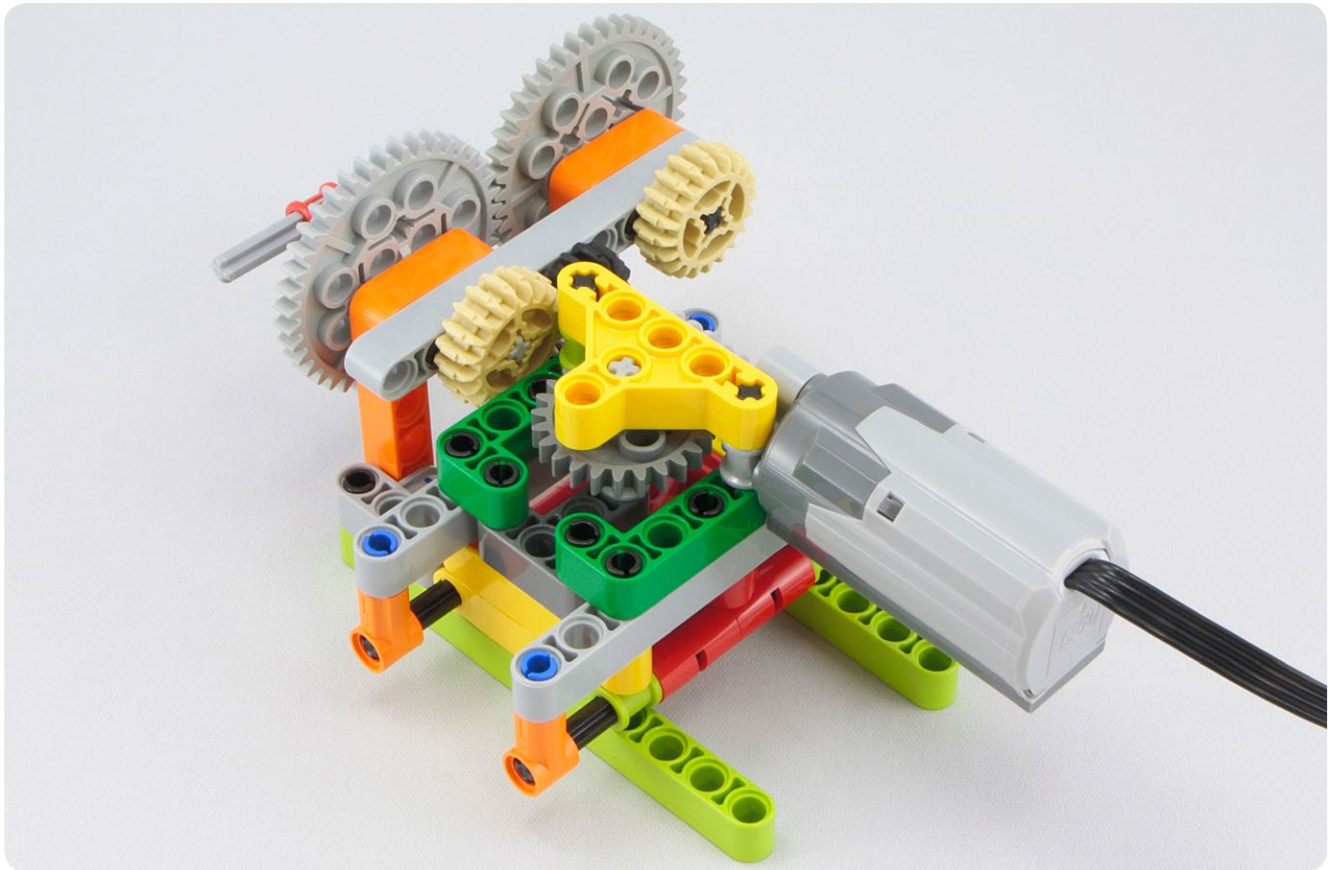


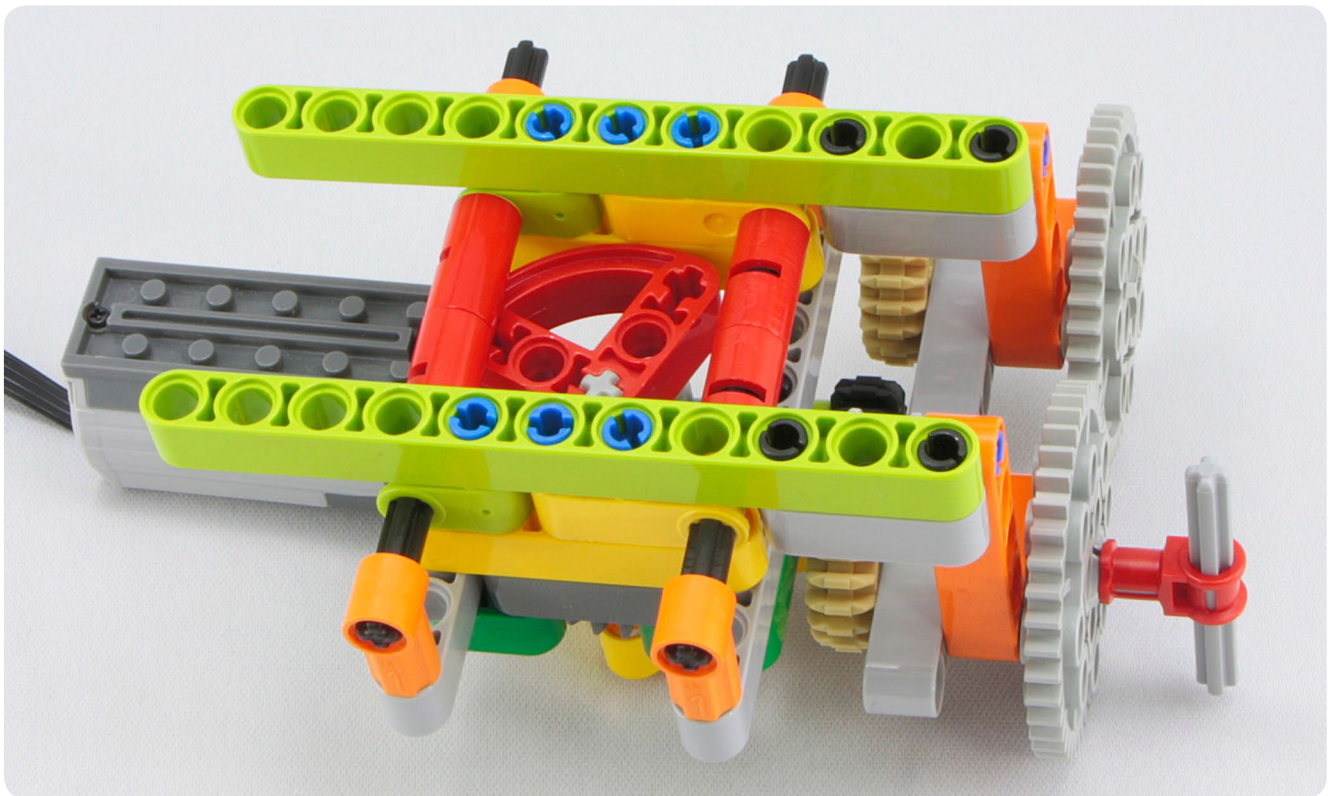
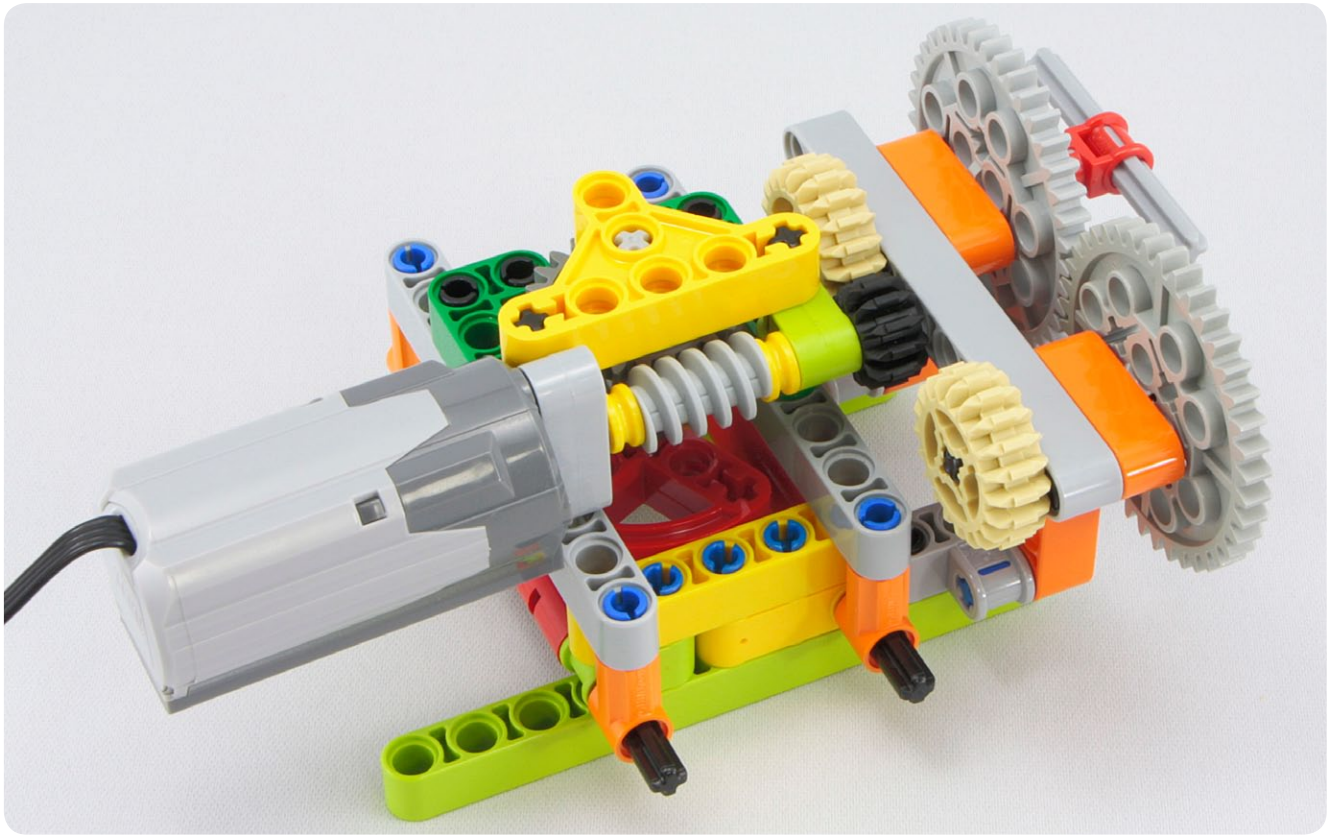
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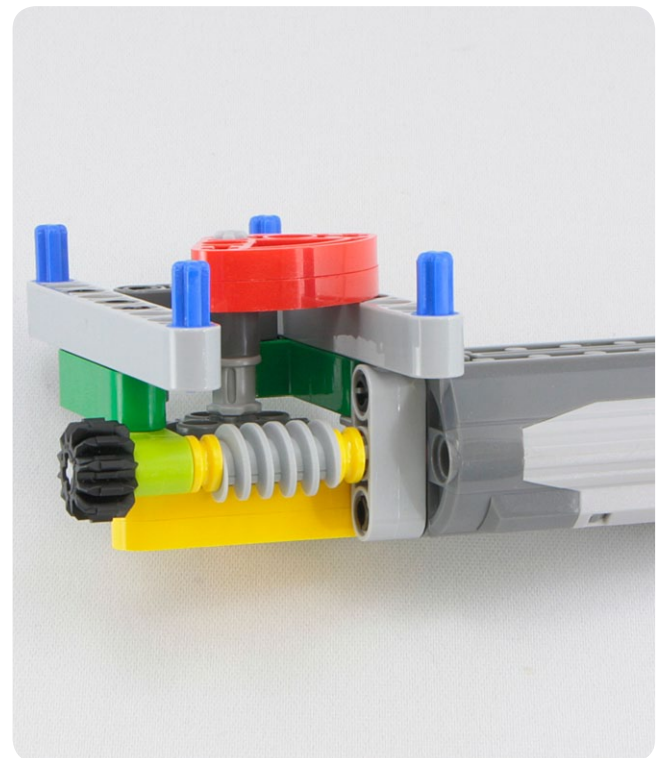
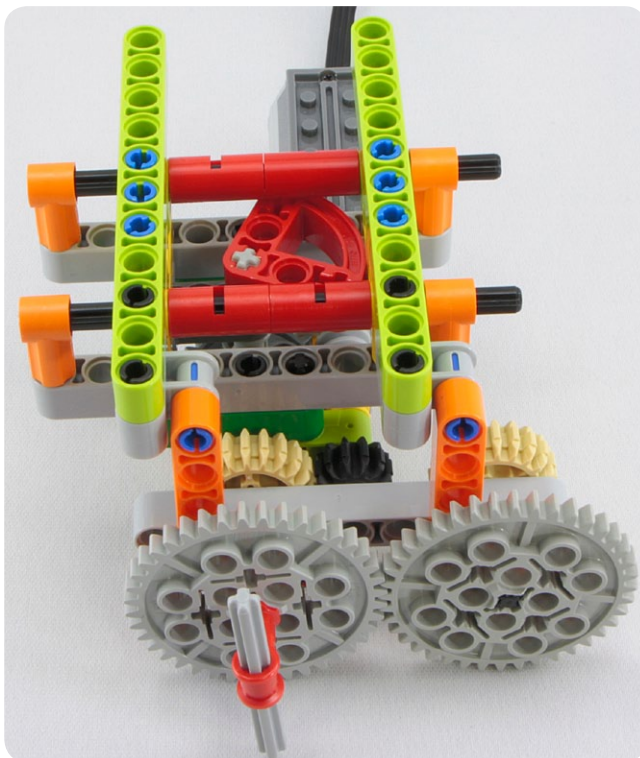
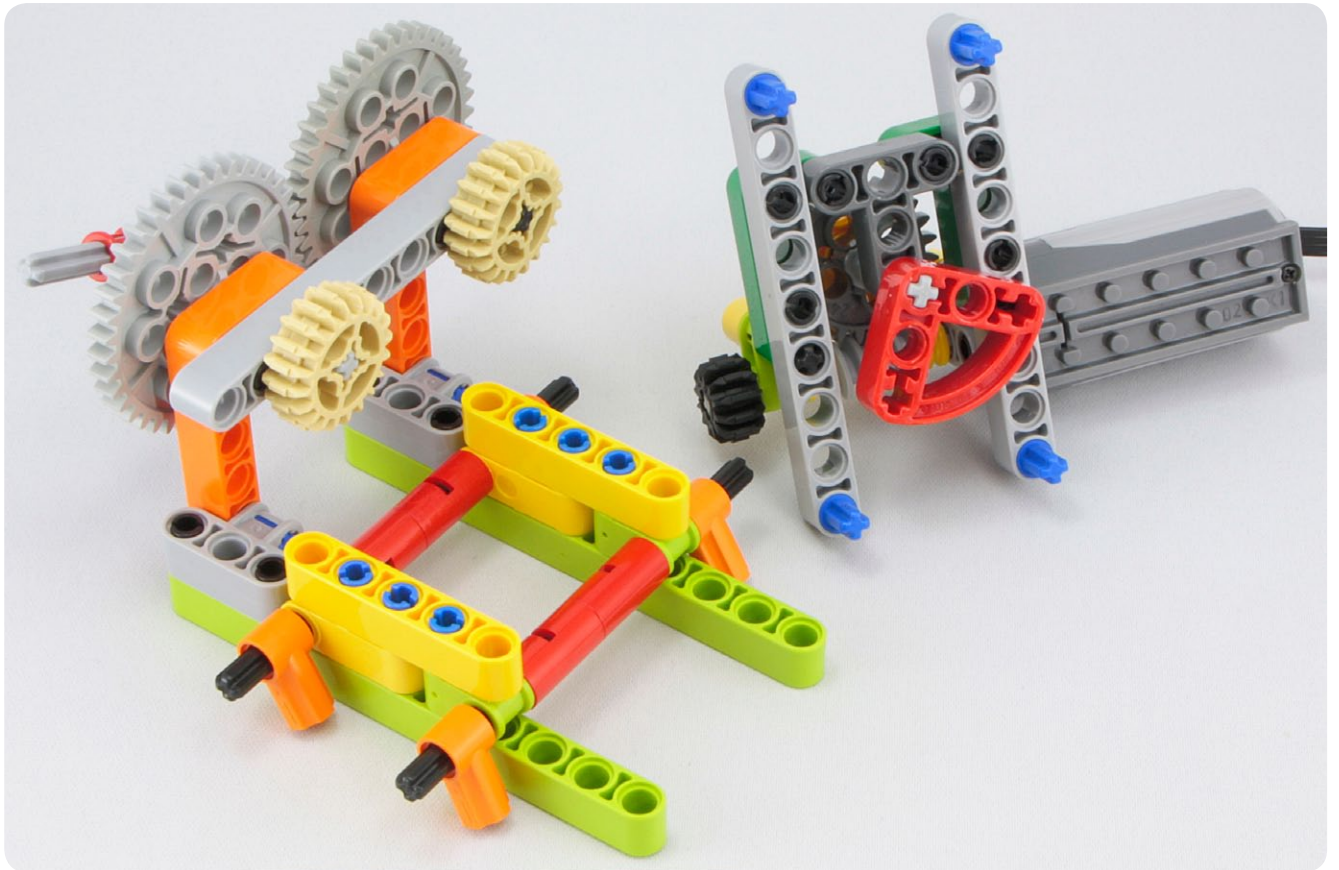


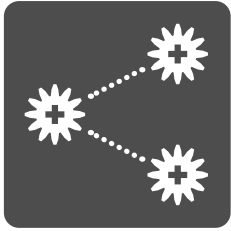
#124





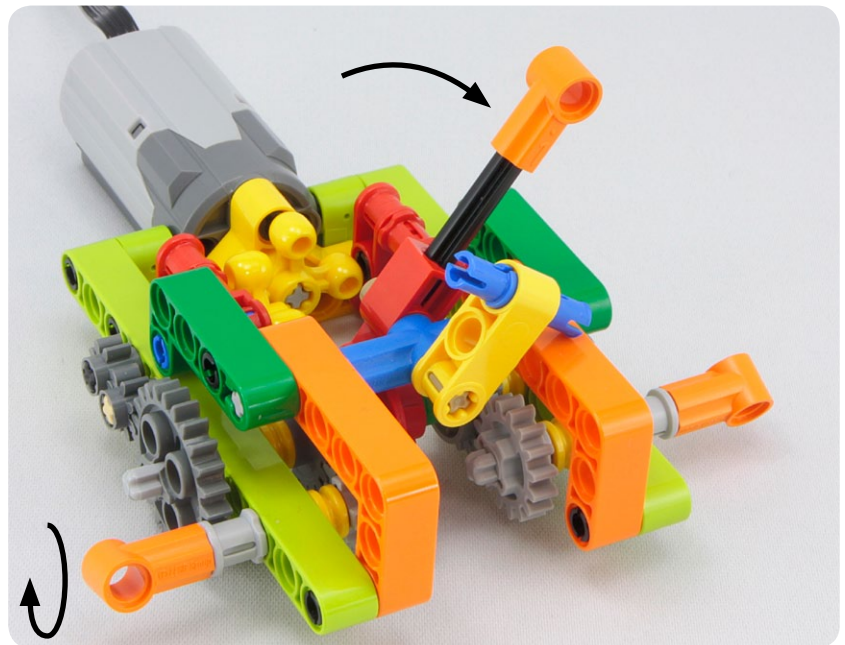
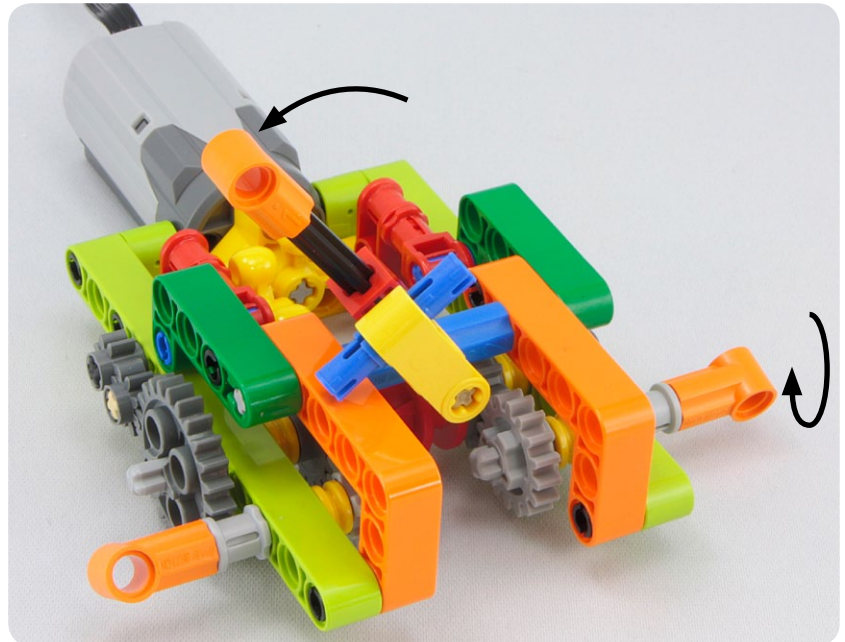
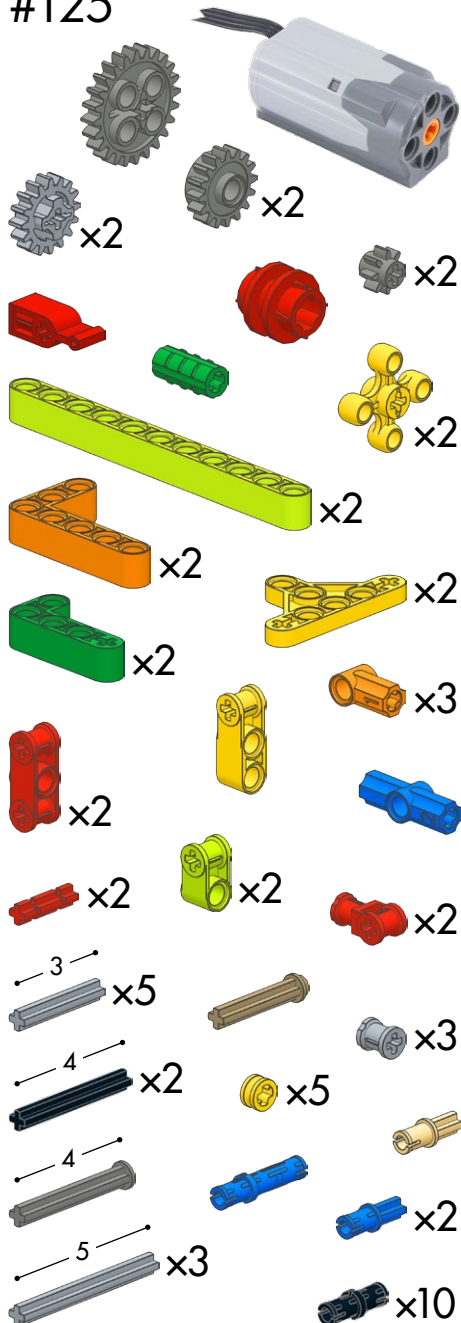


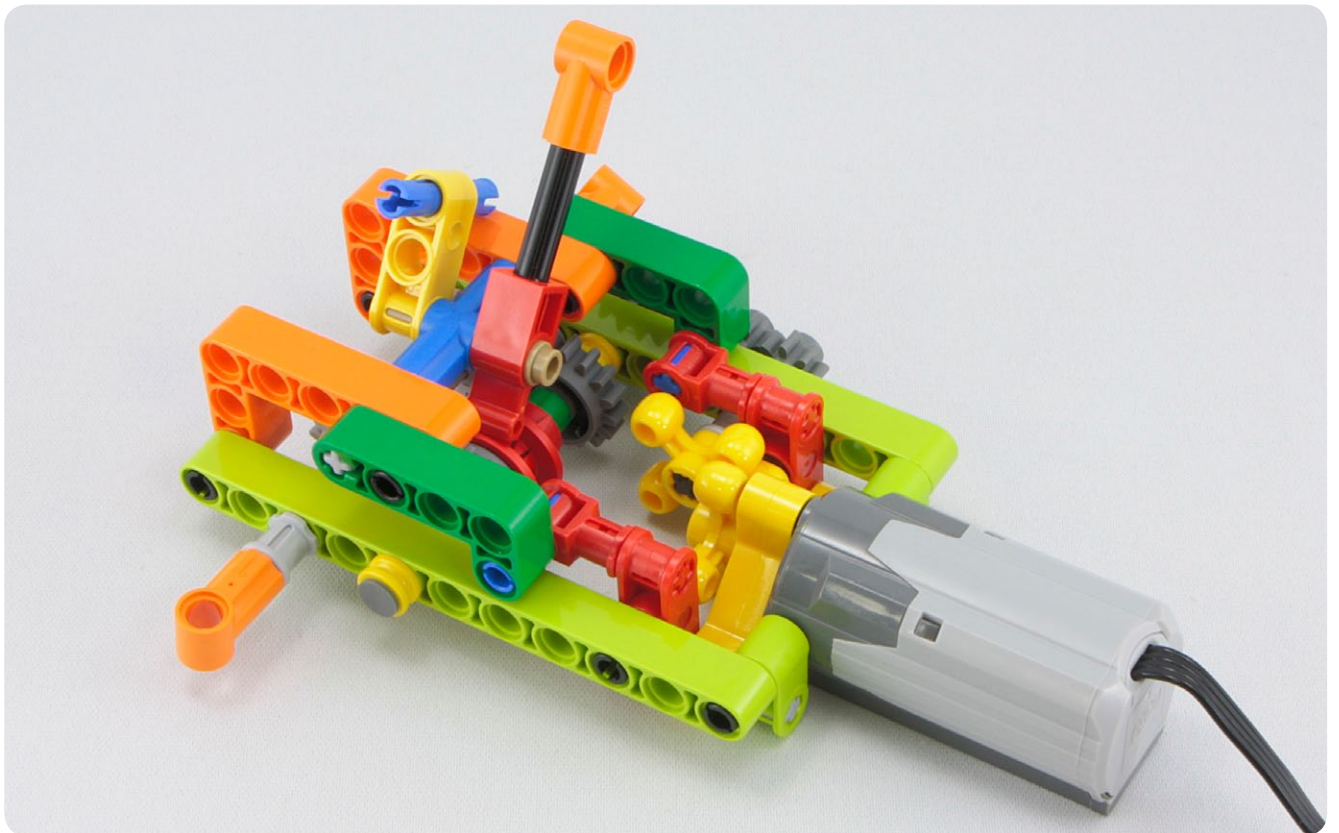
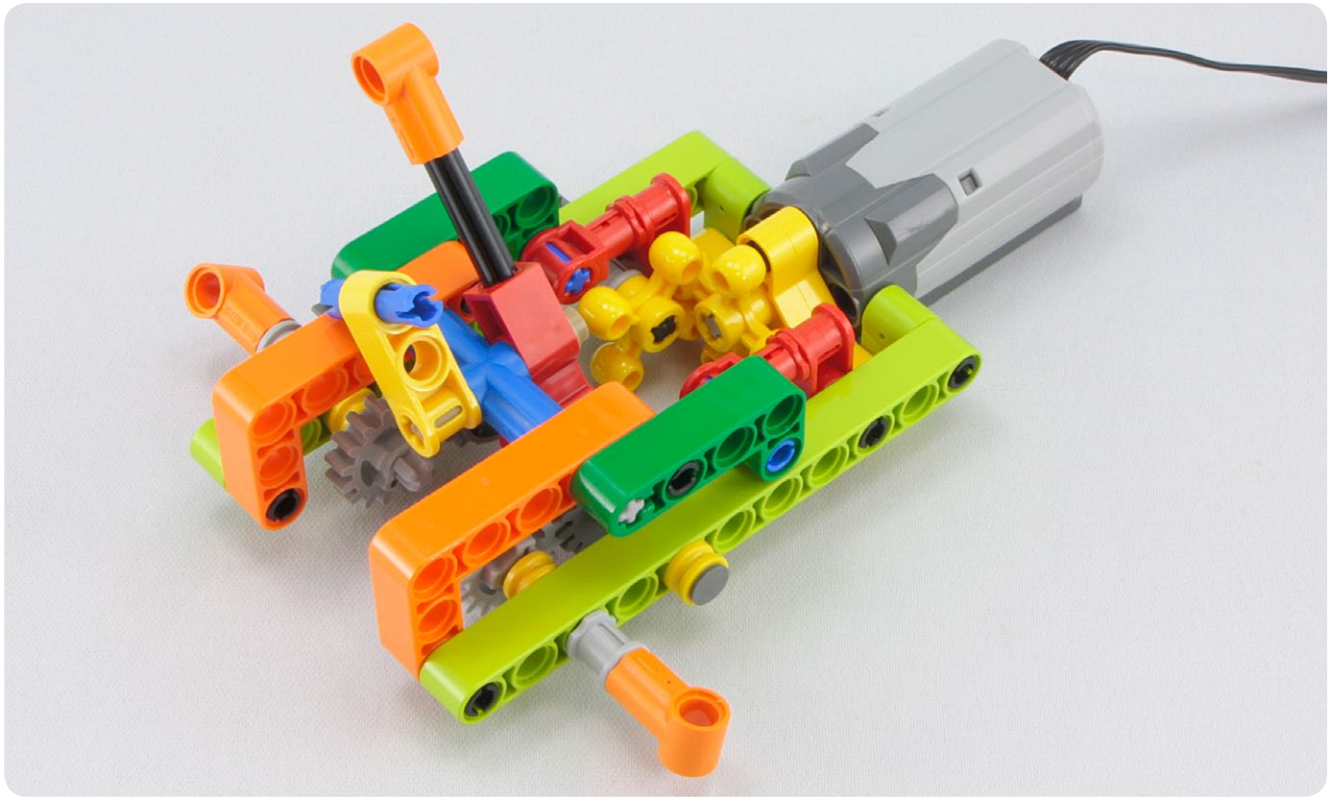


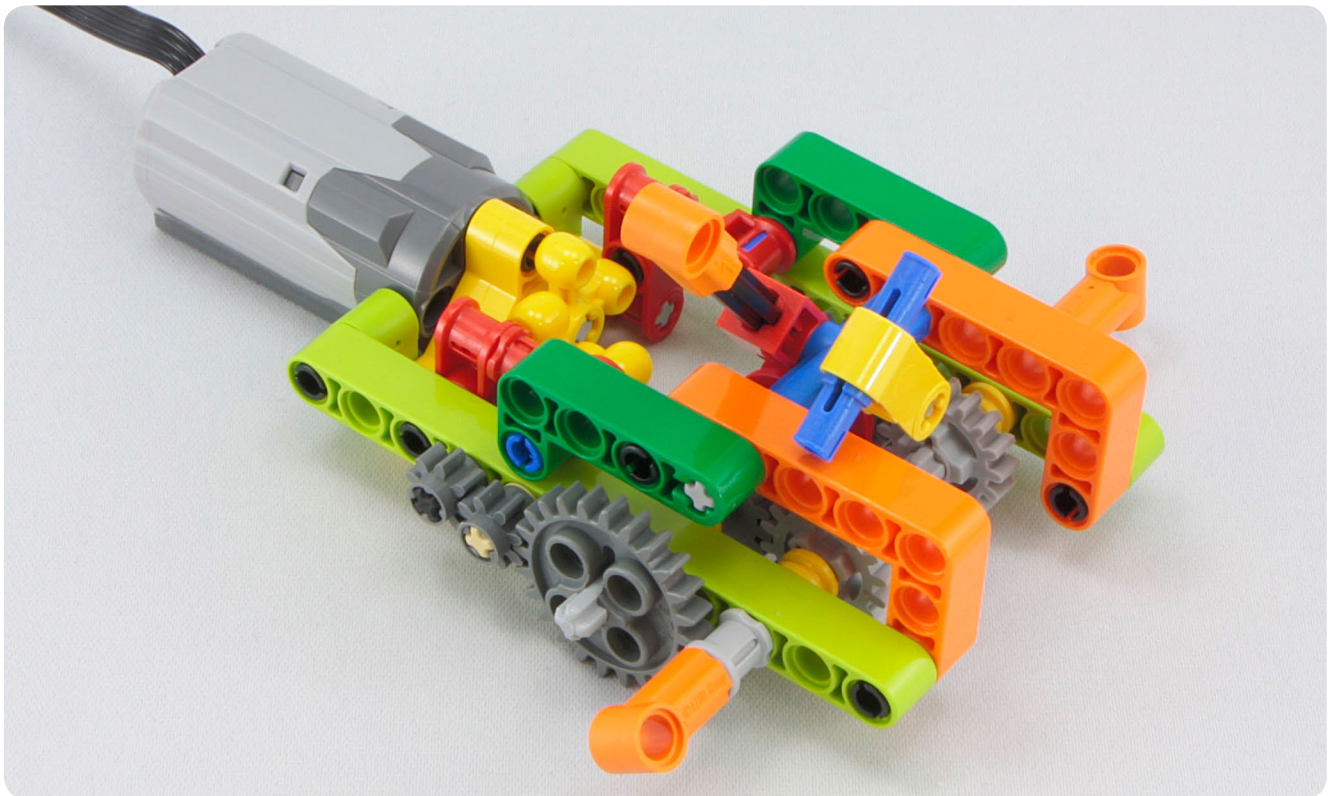
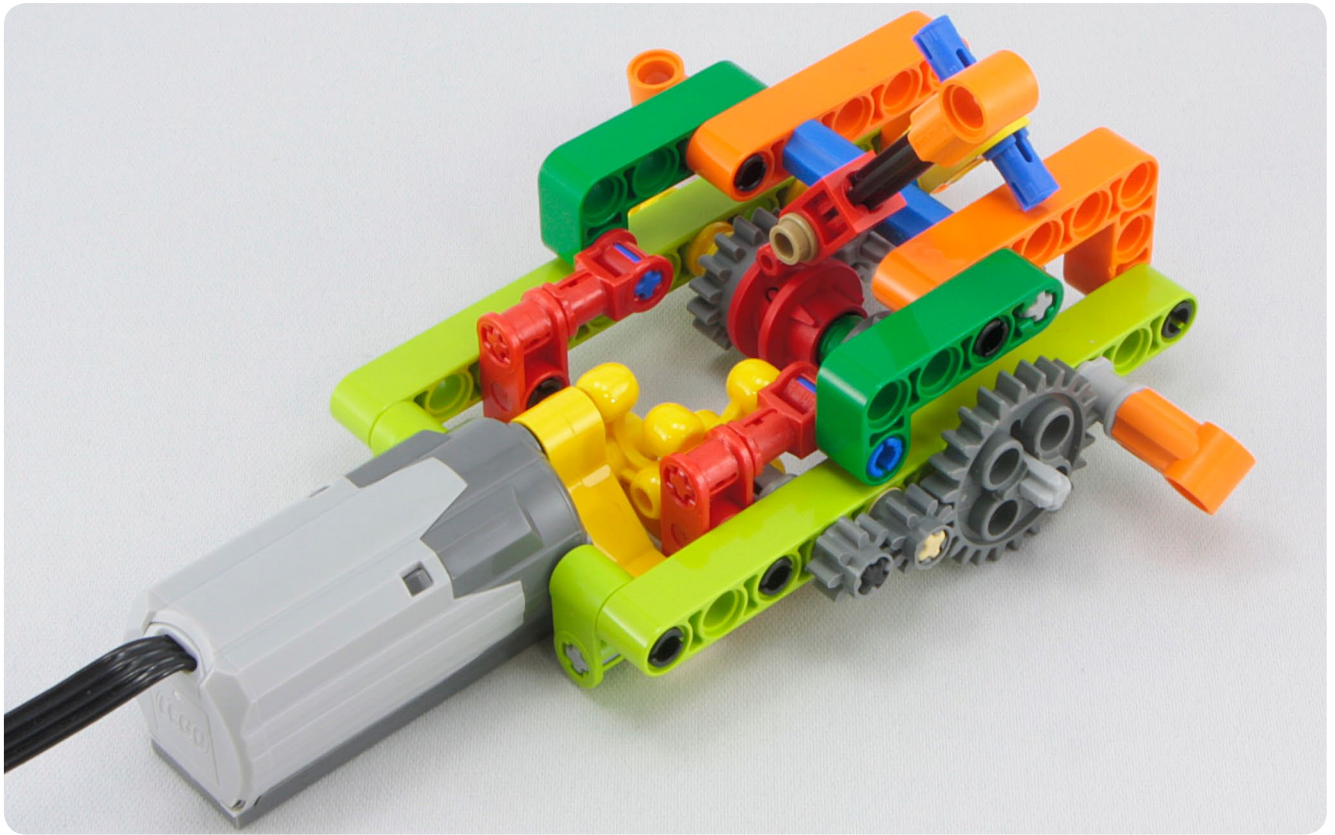


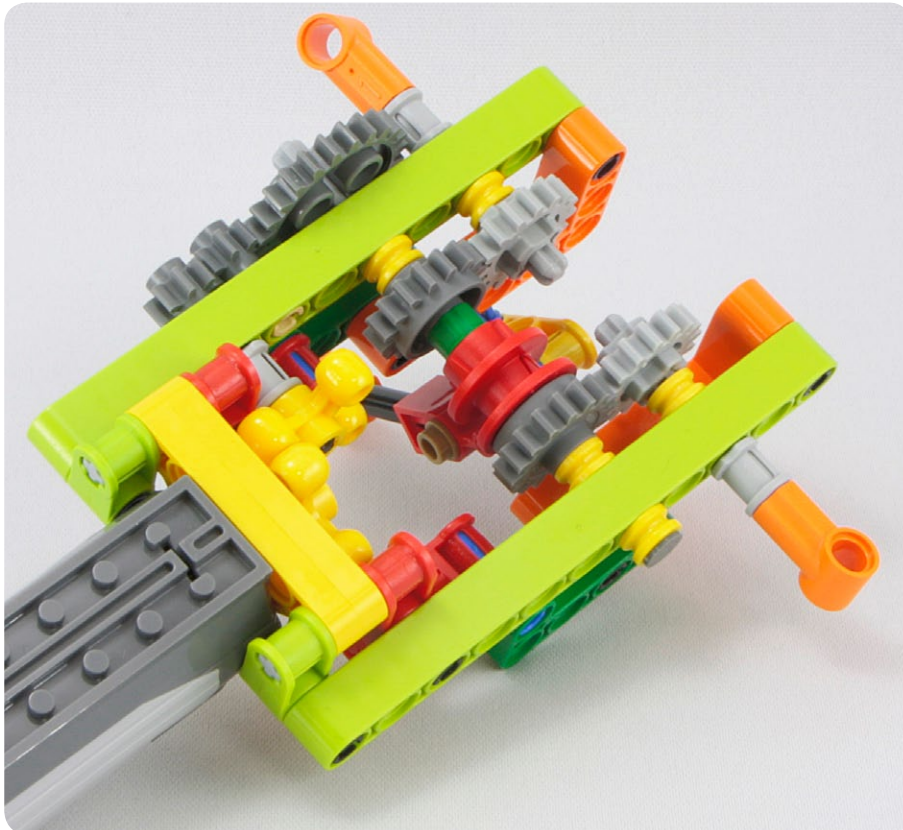
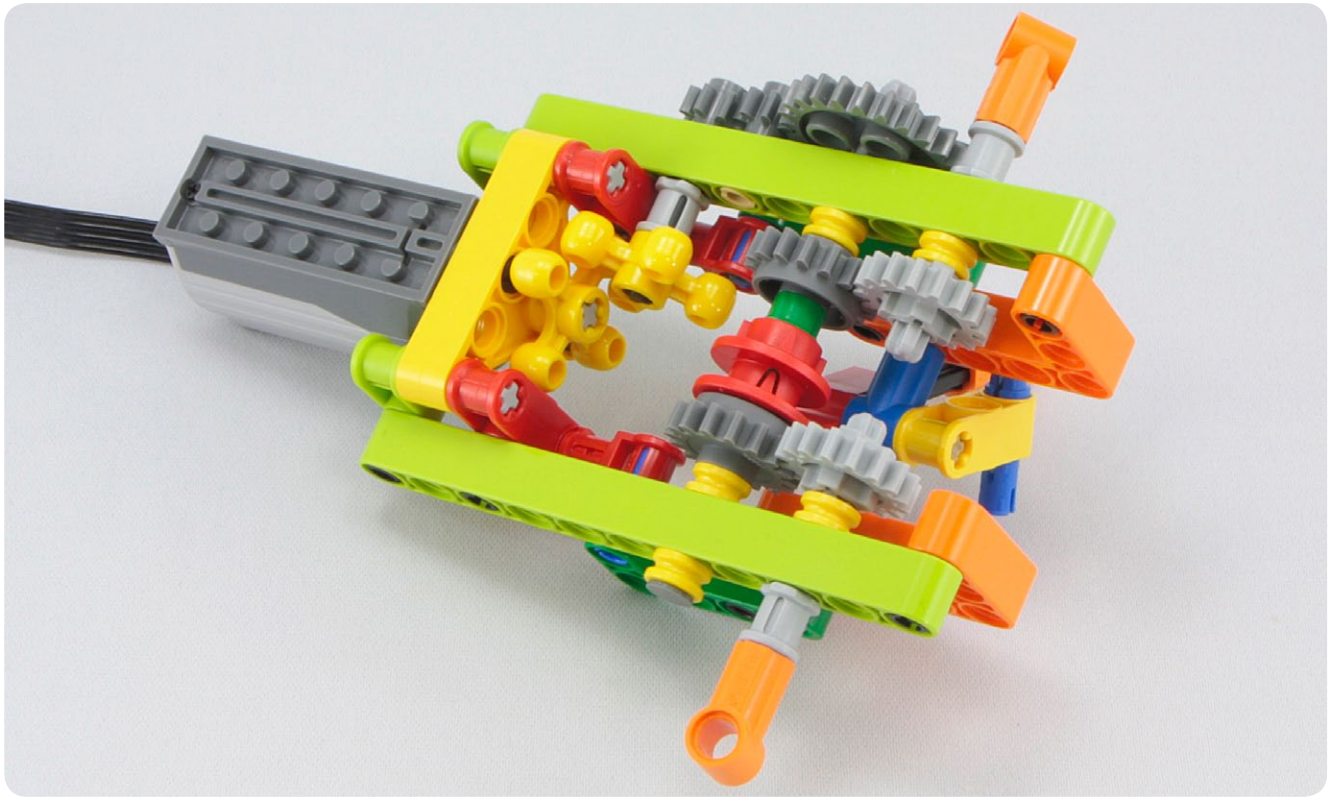
Changeover mechanisms using a switch

#125

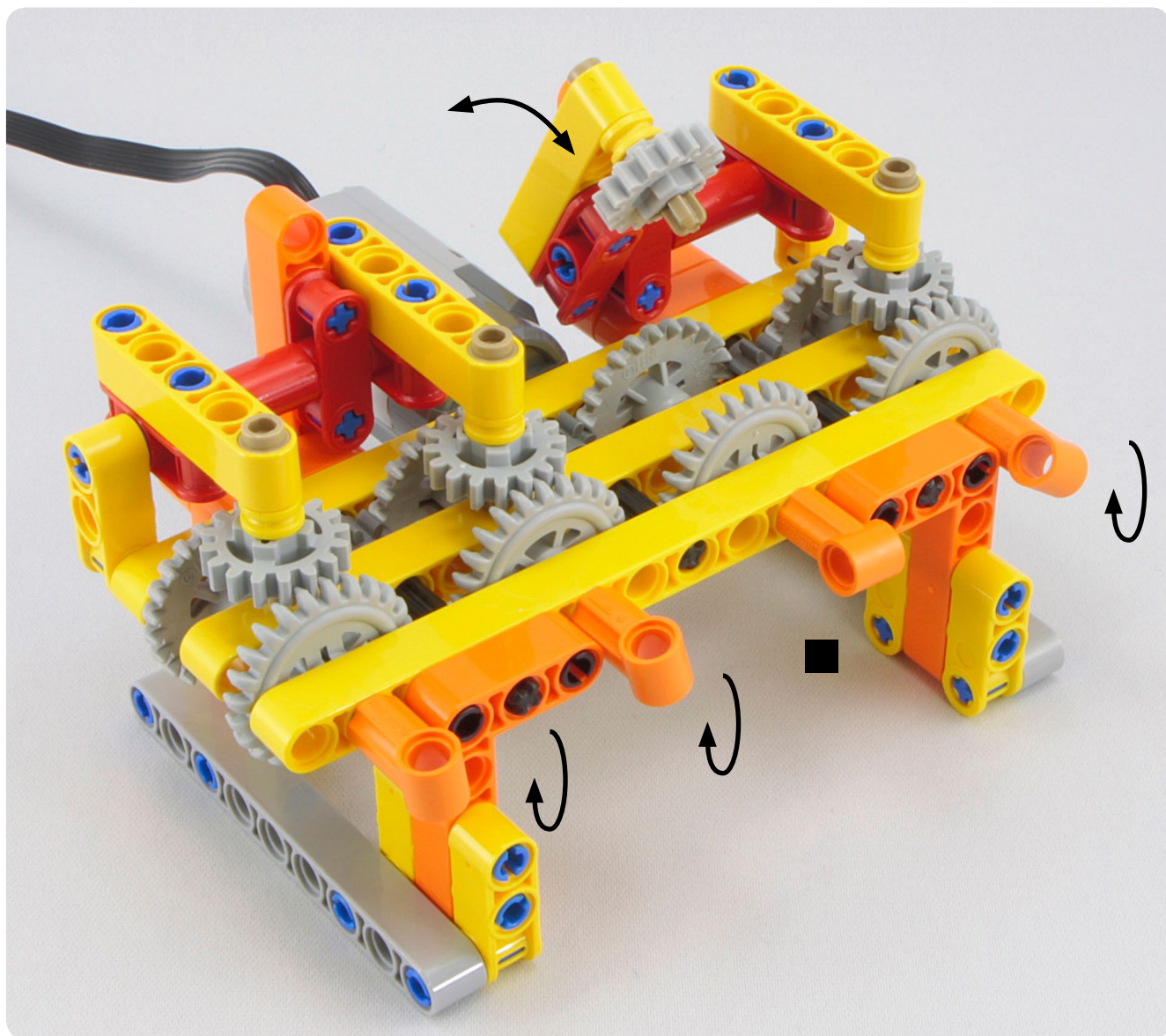
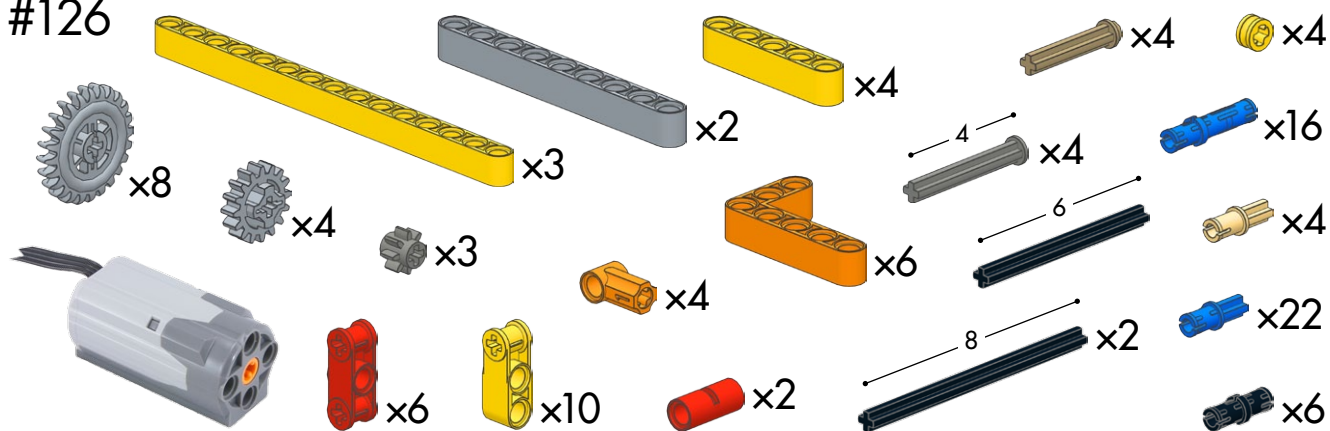


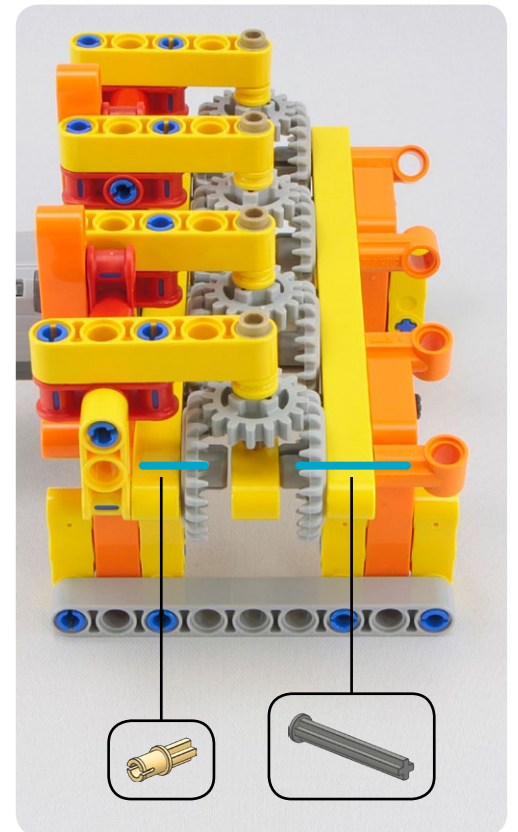
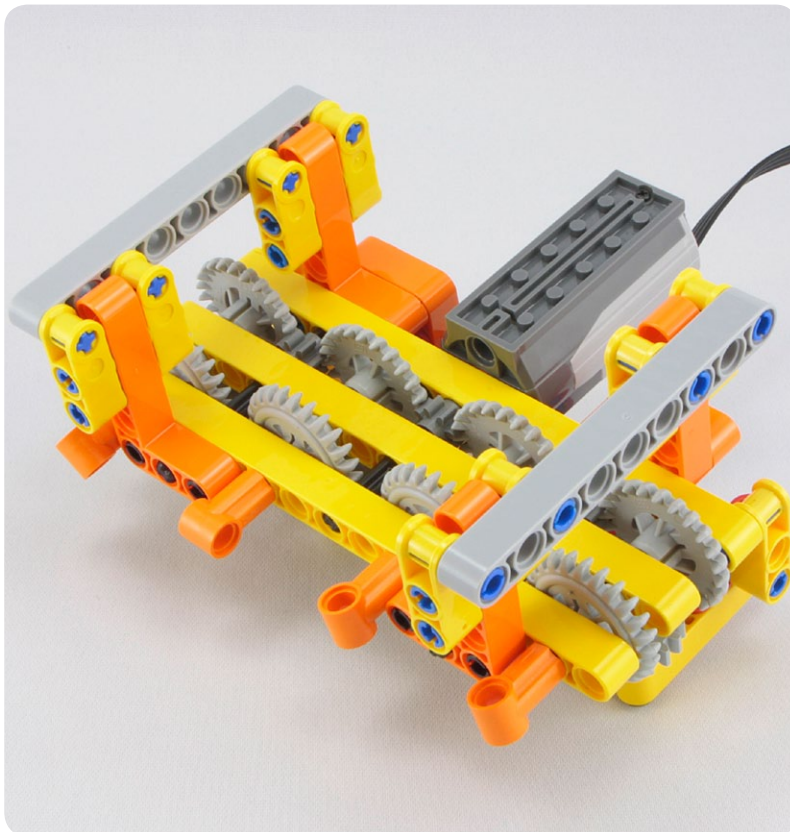
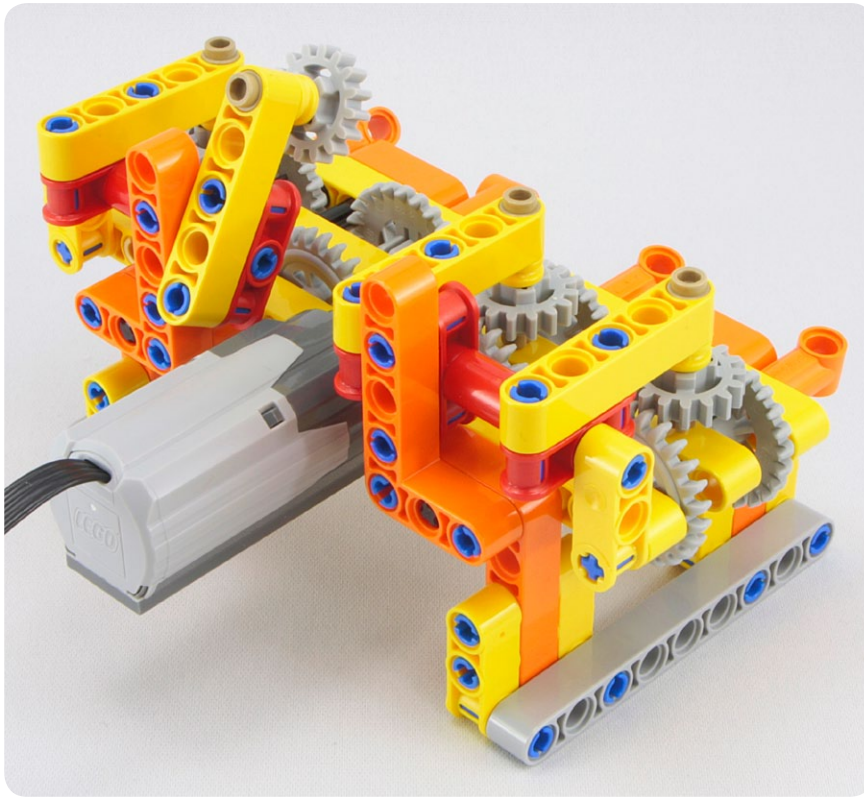




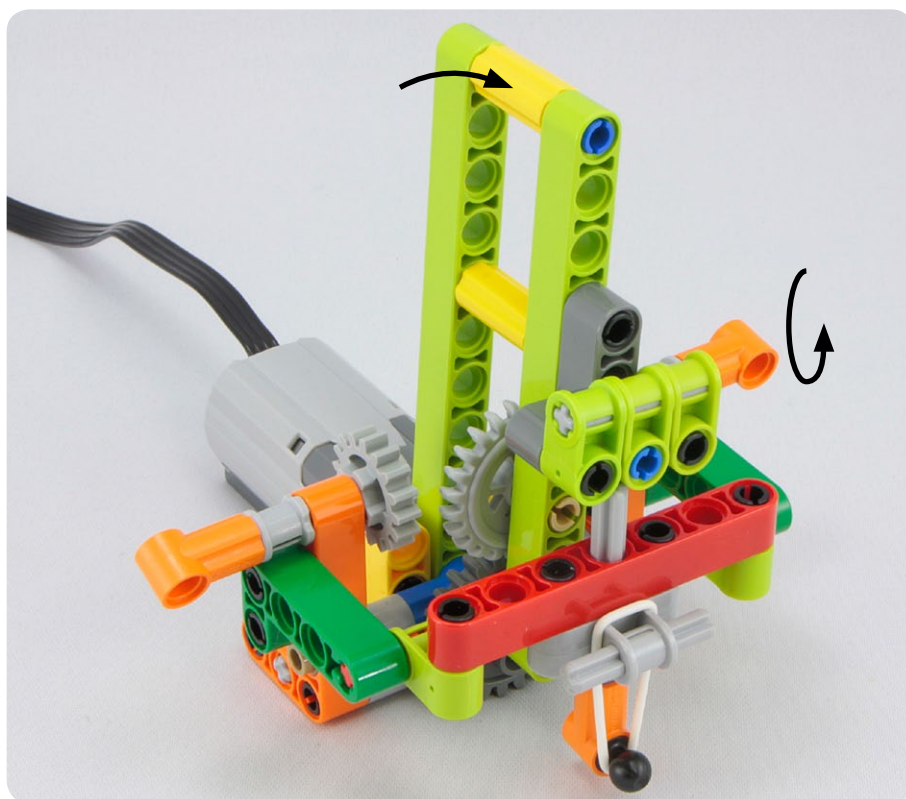
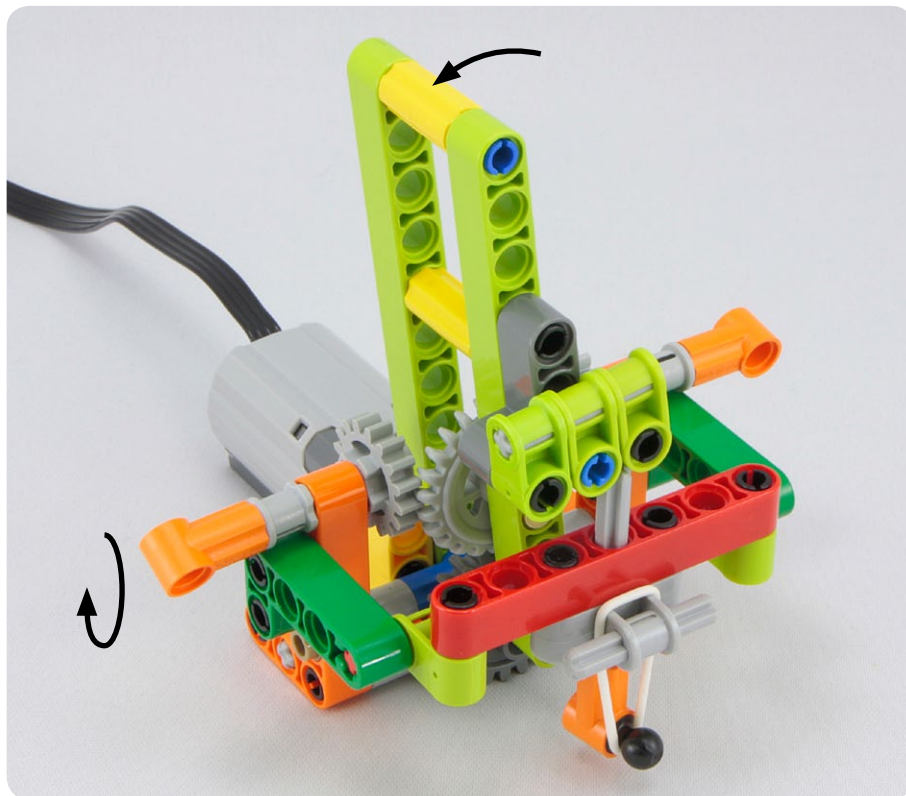
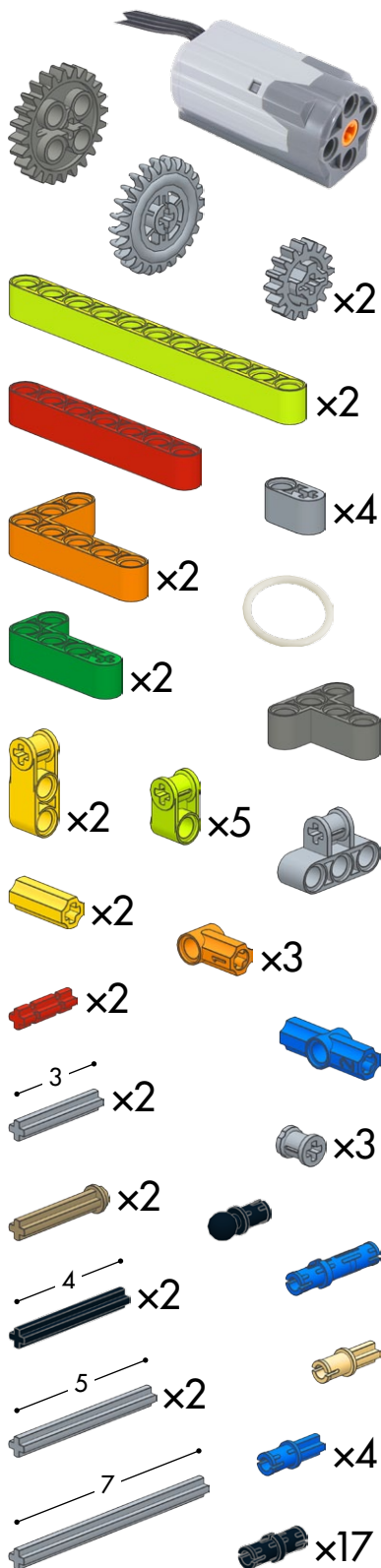


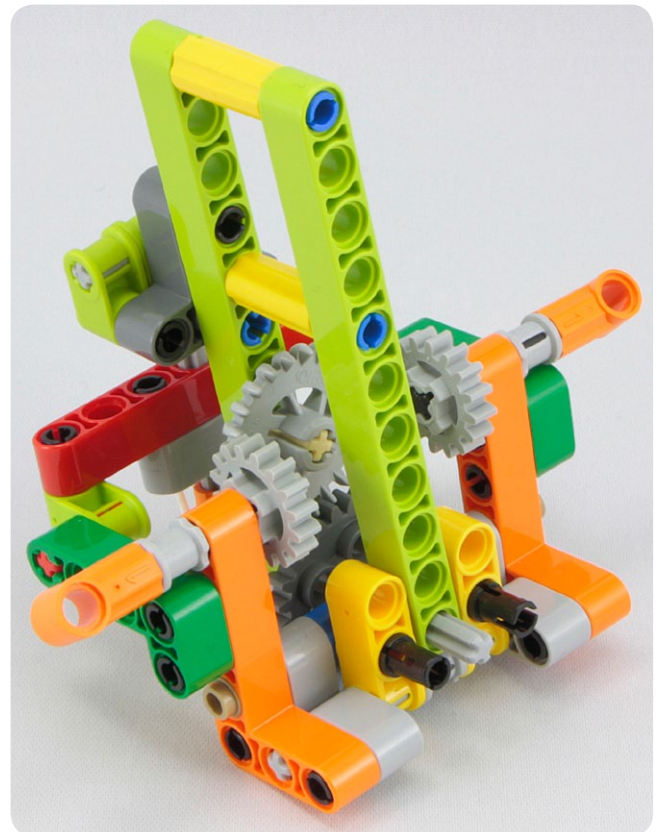
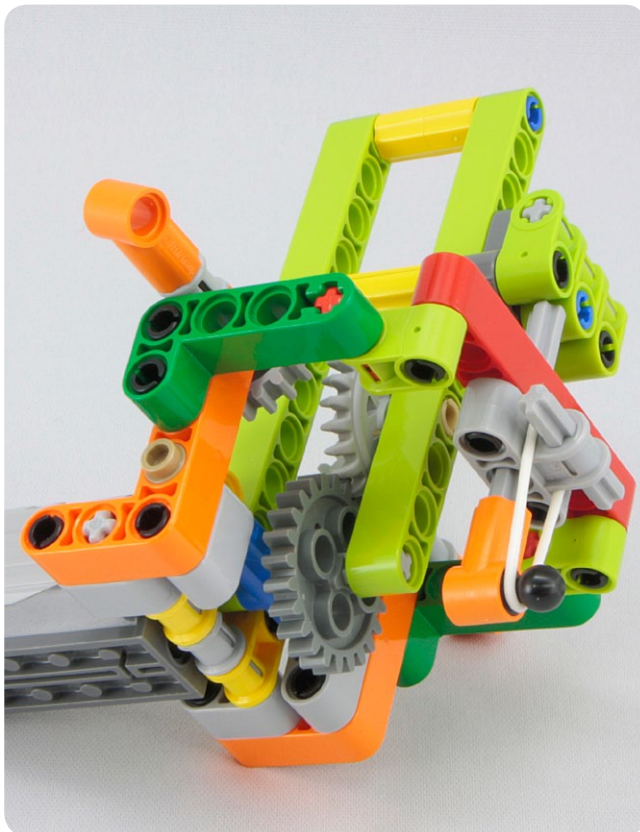
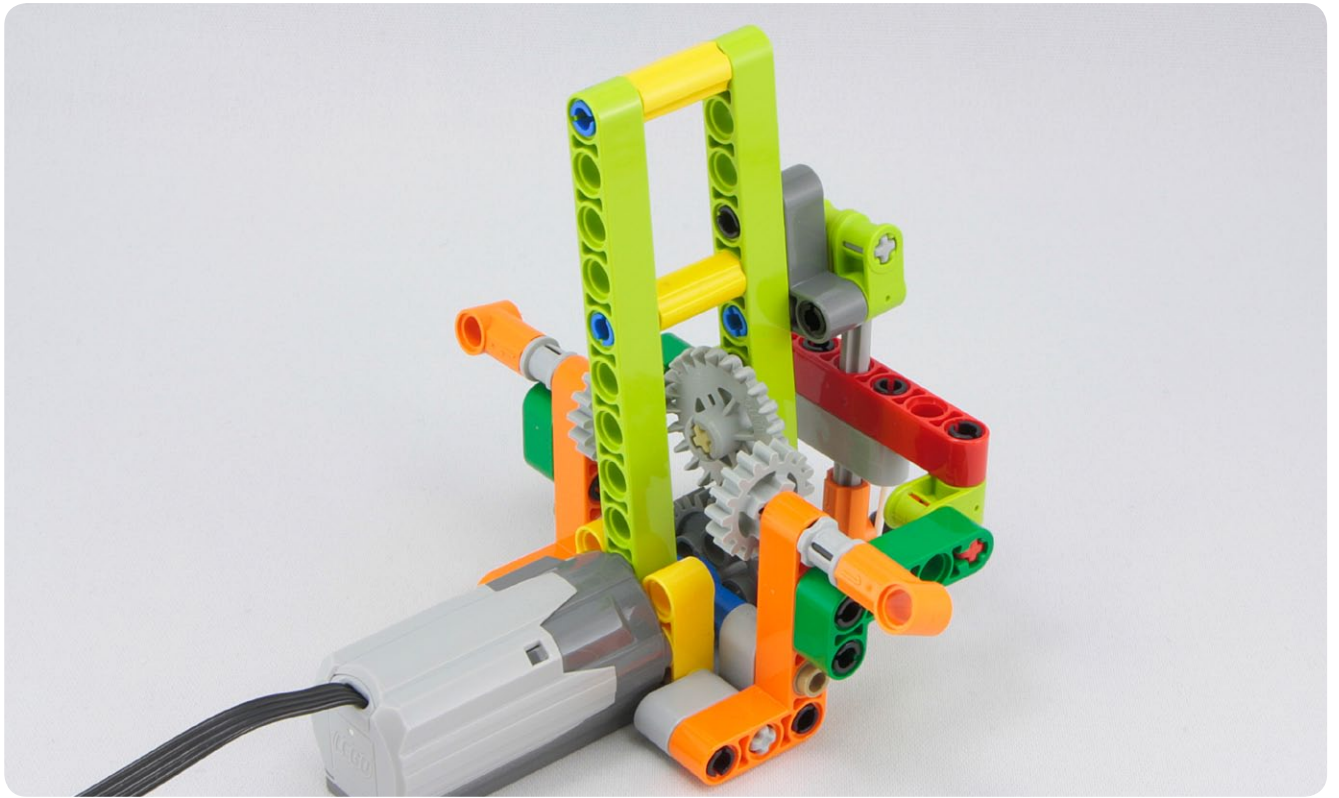
#126

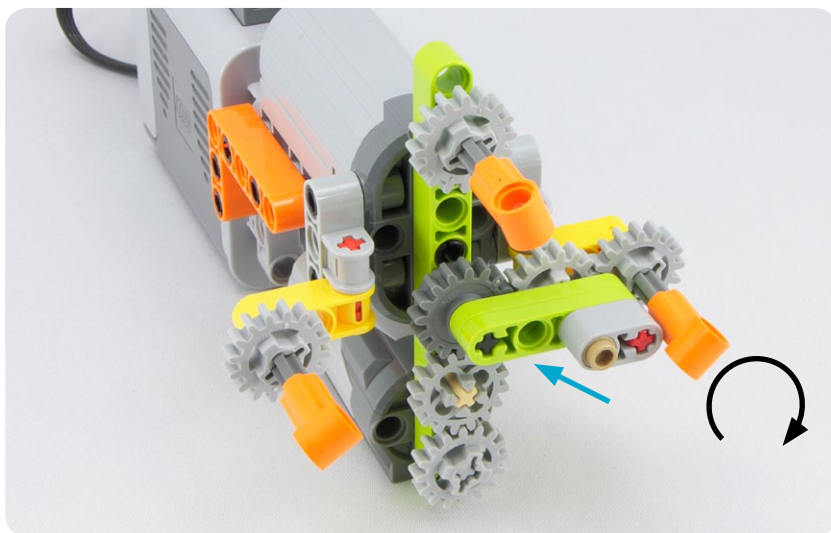
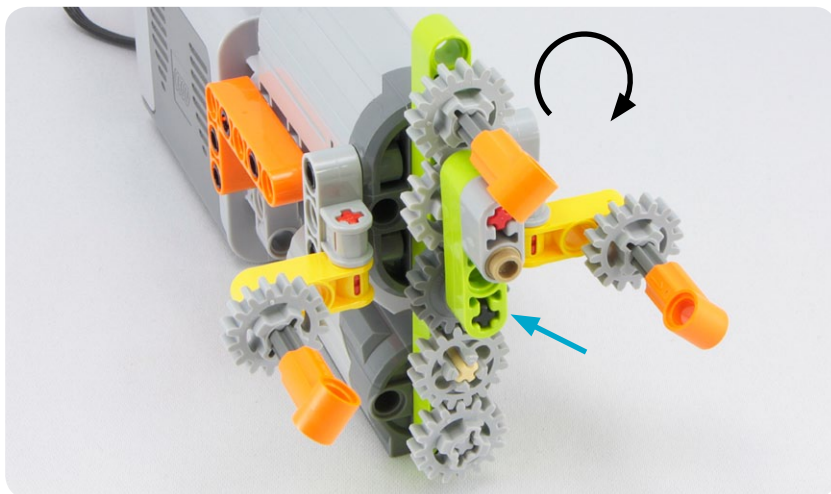
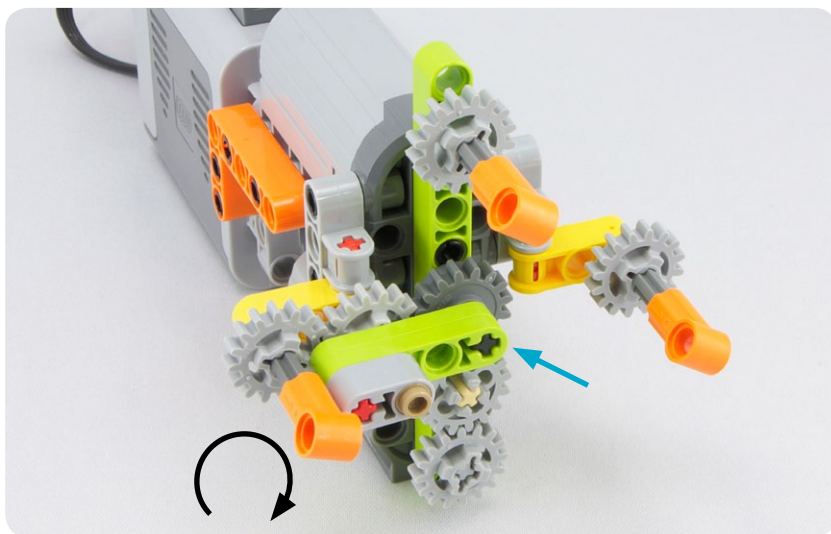


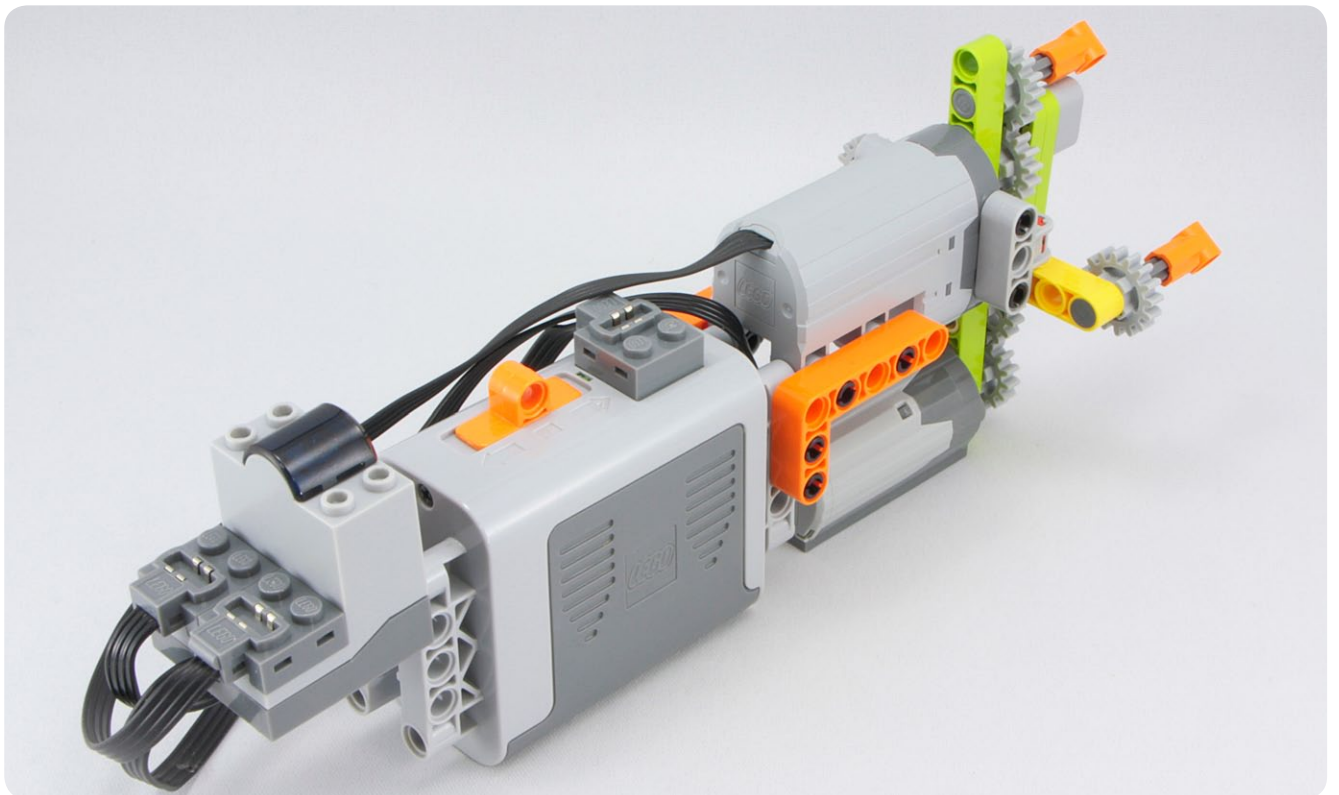
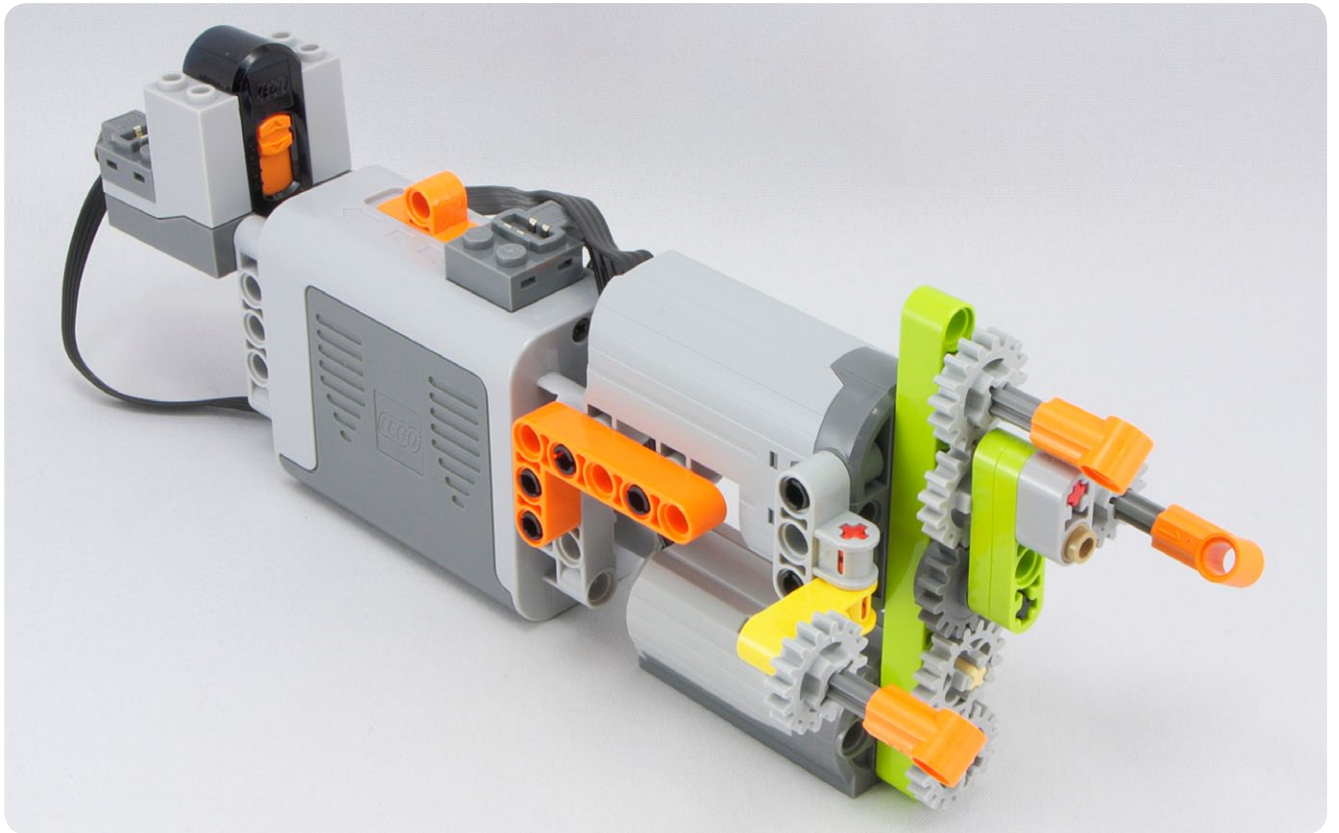


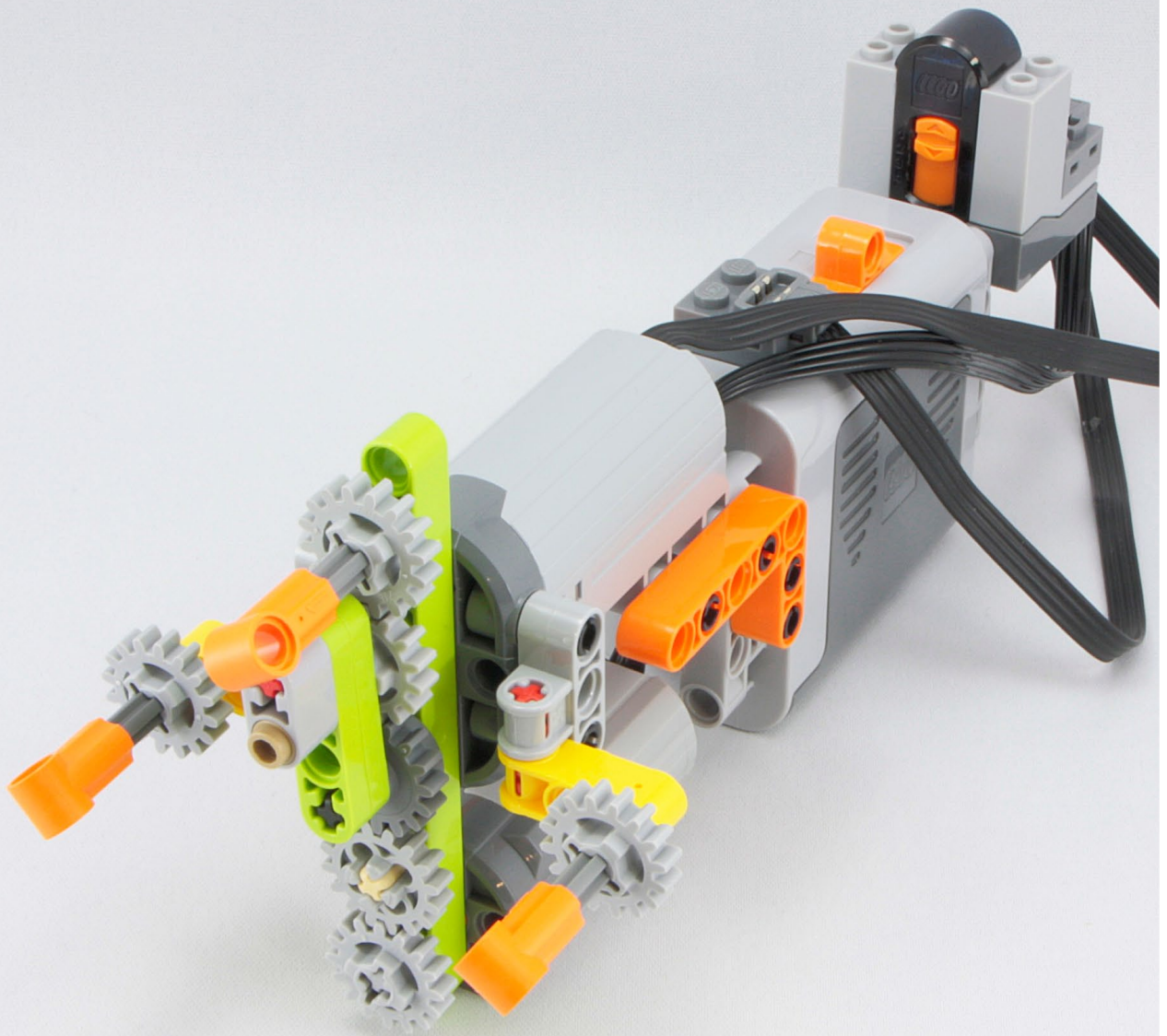
#127

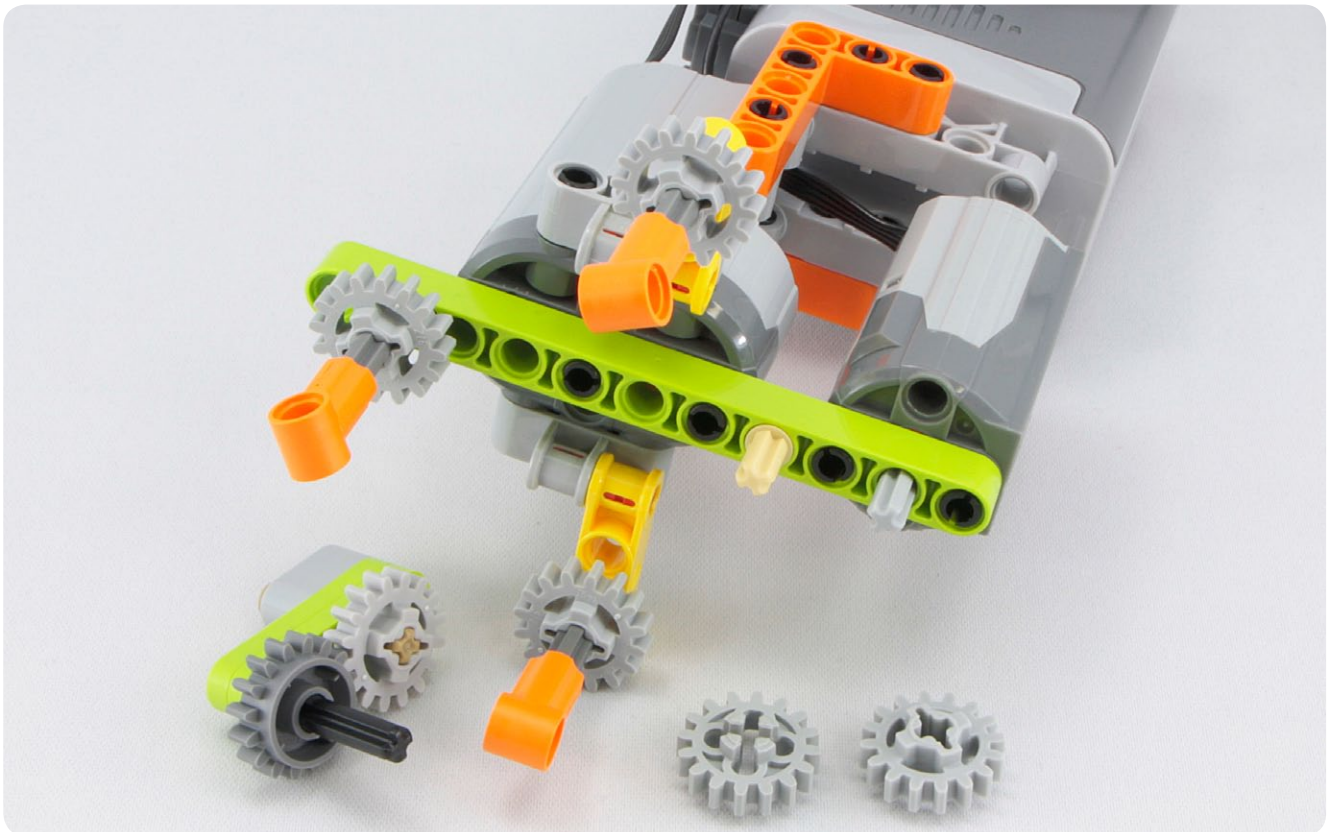


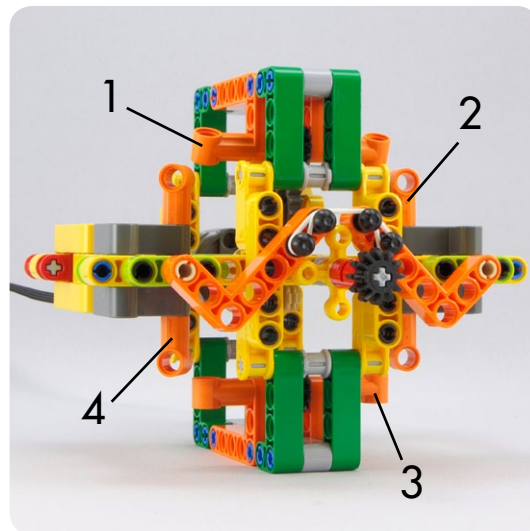
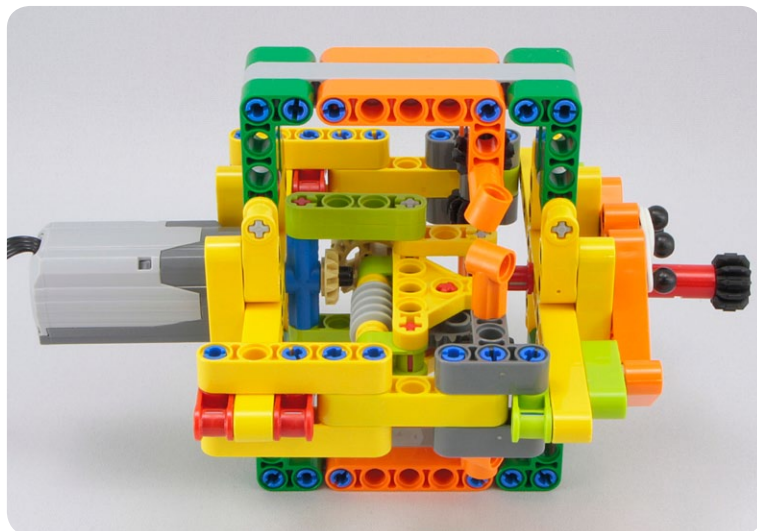
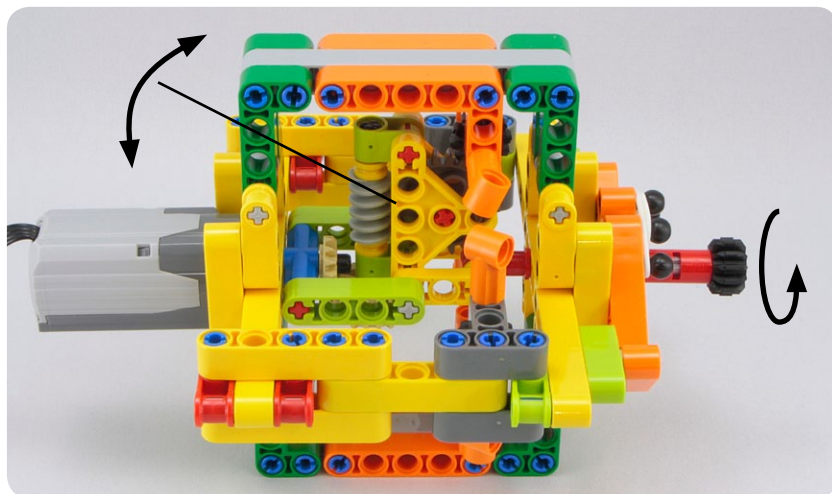


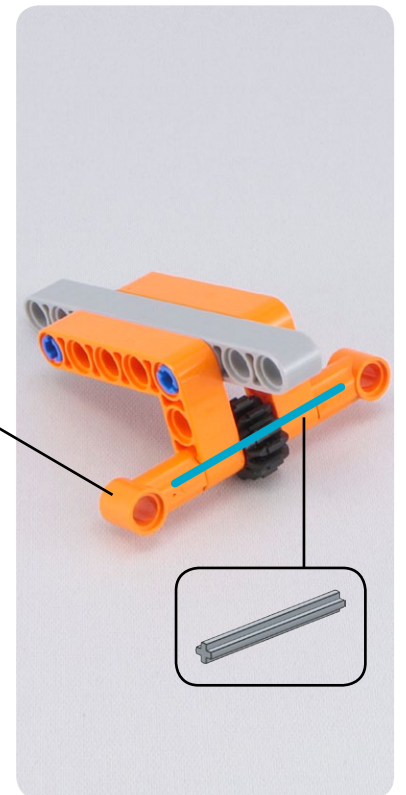
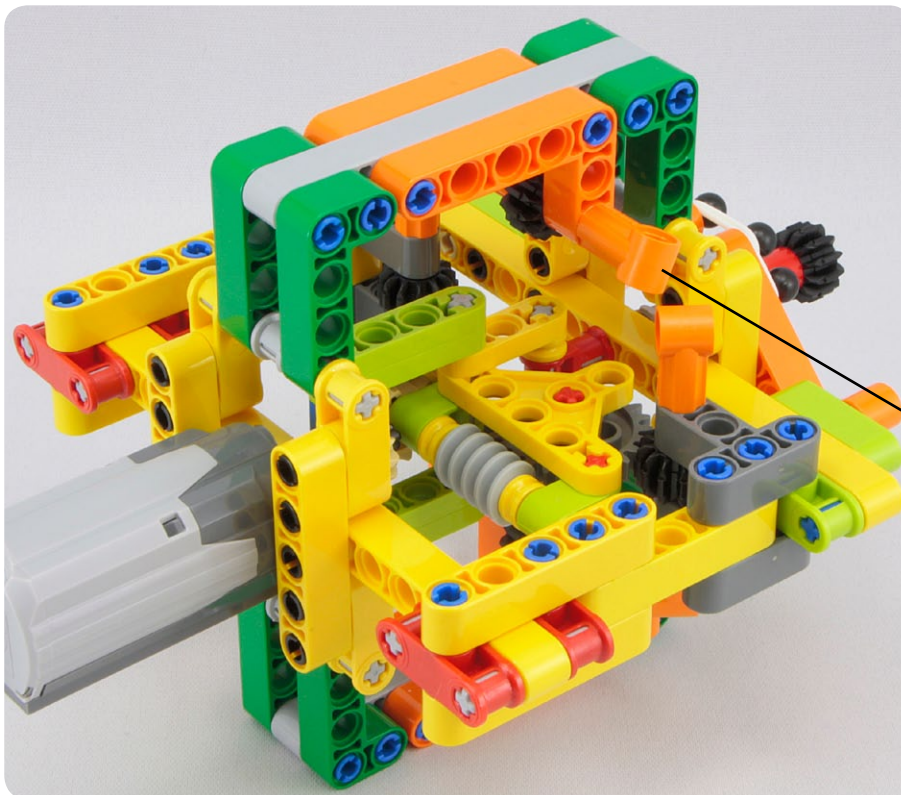
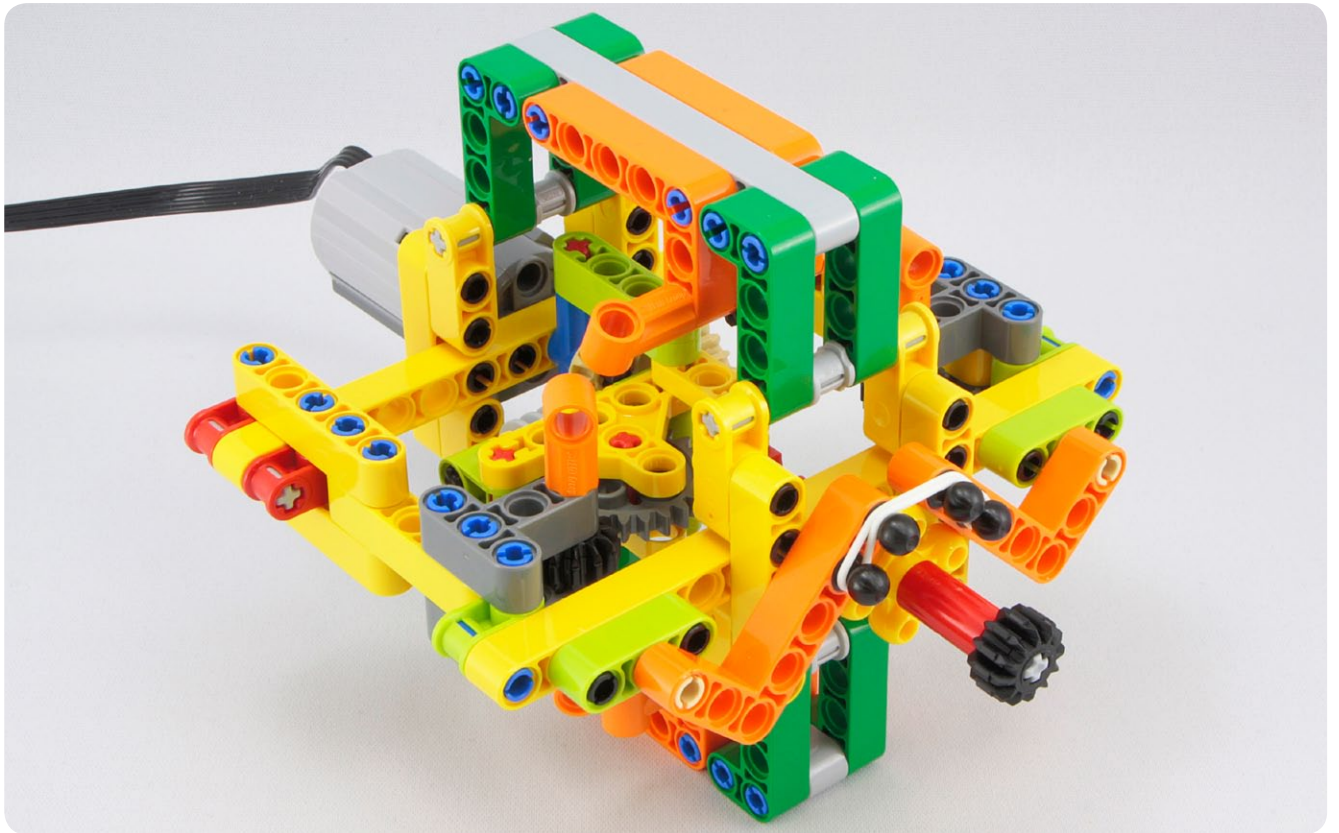
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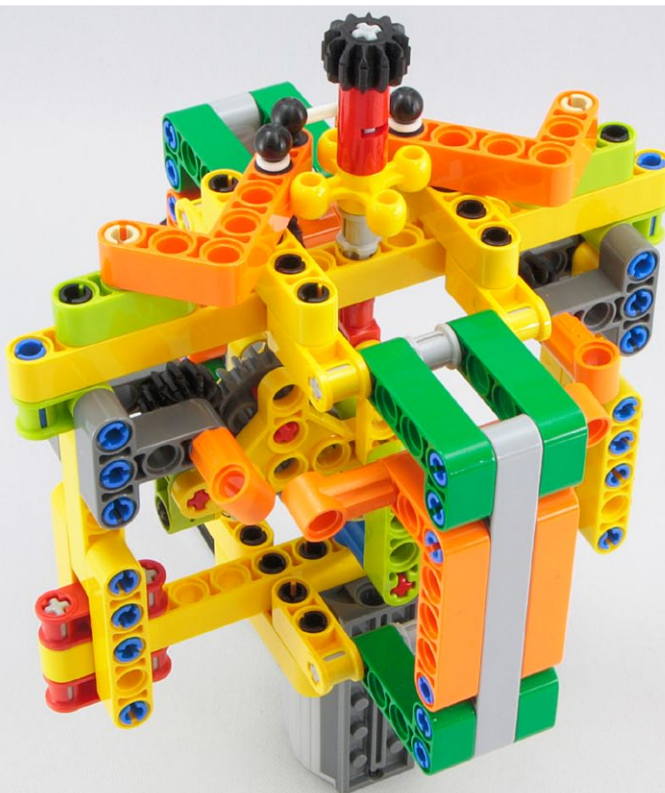
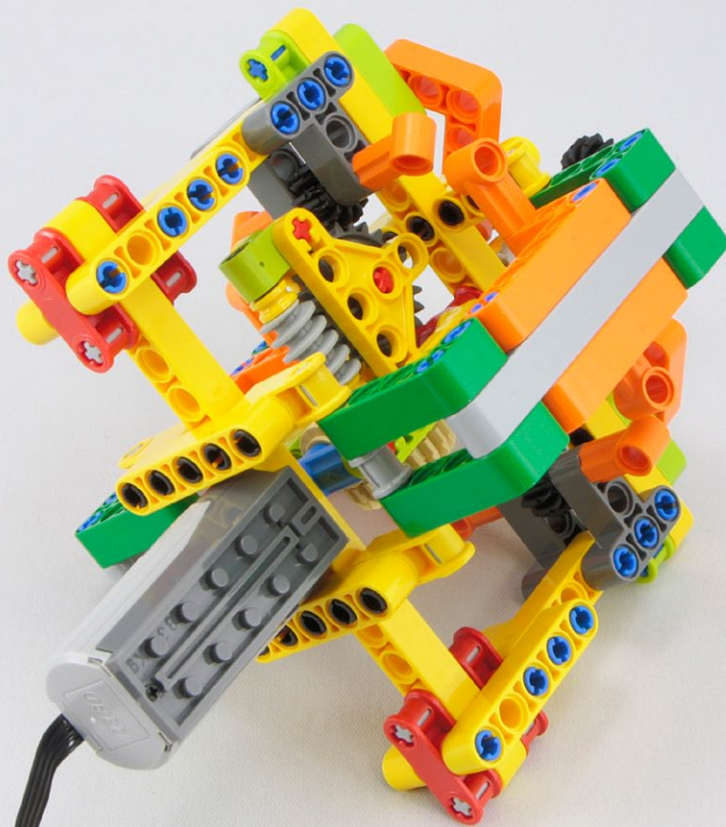


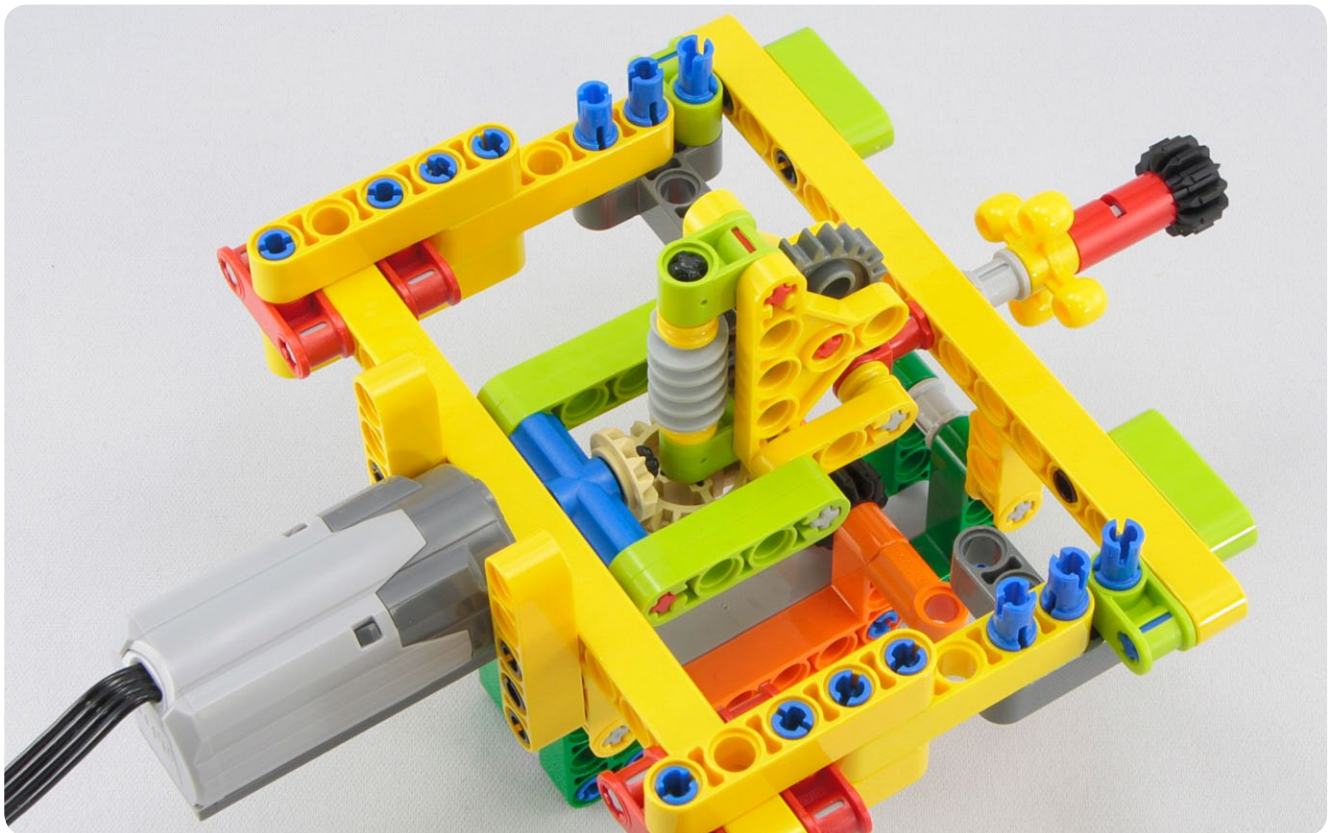
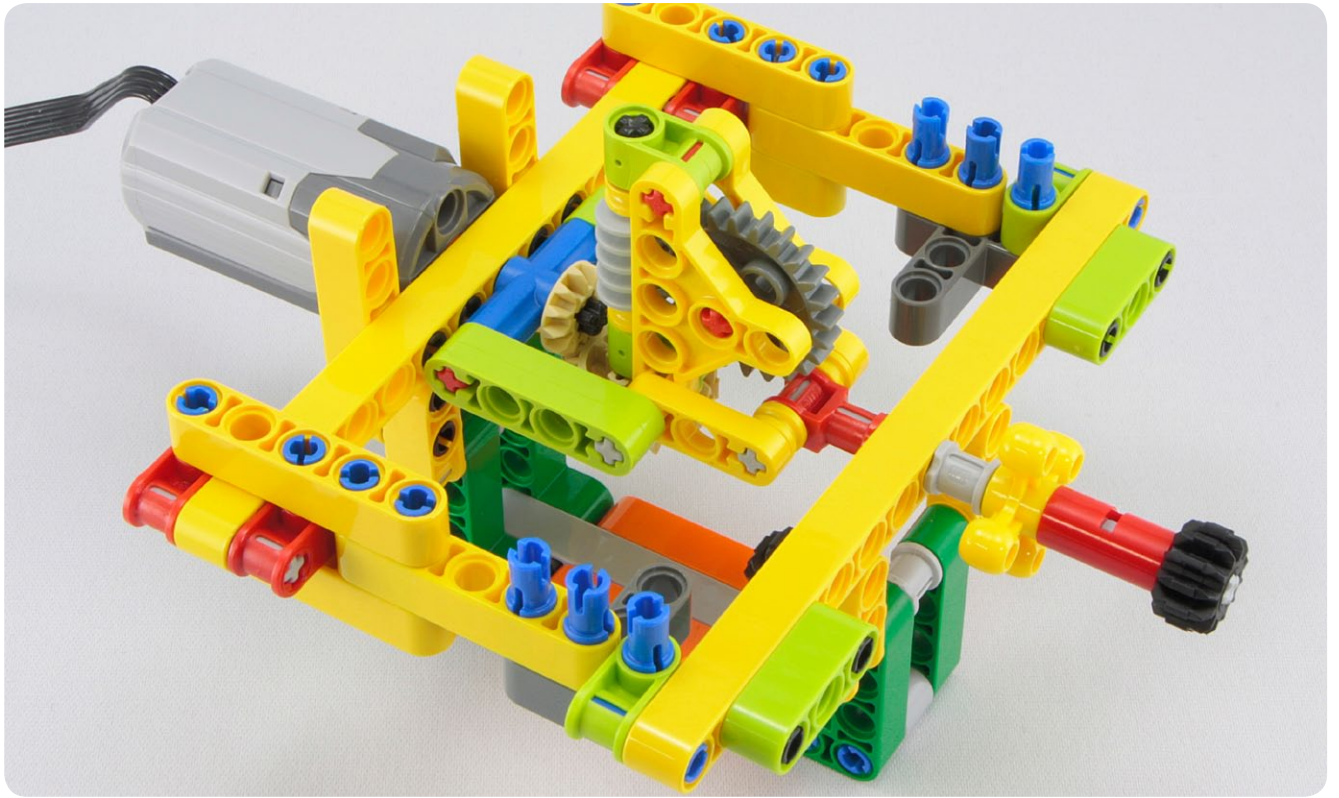


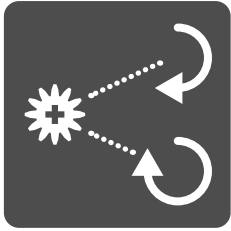


[illegible]



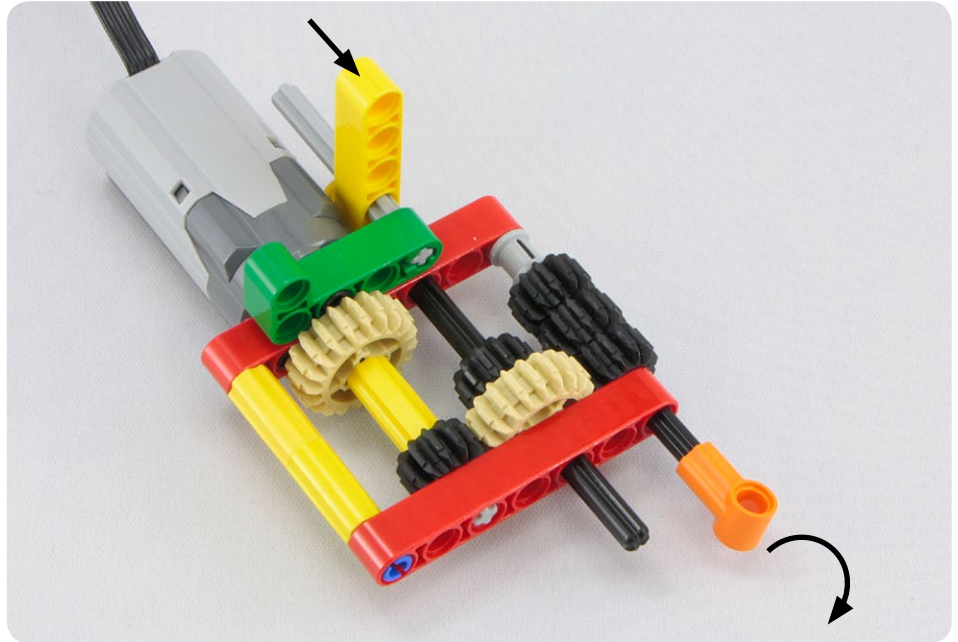
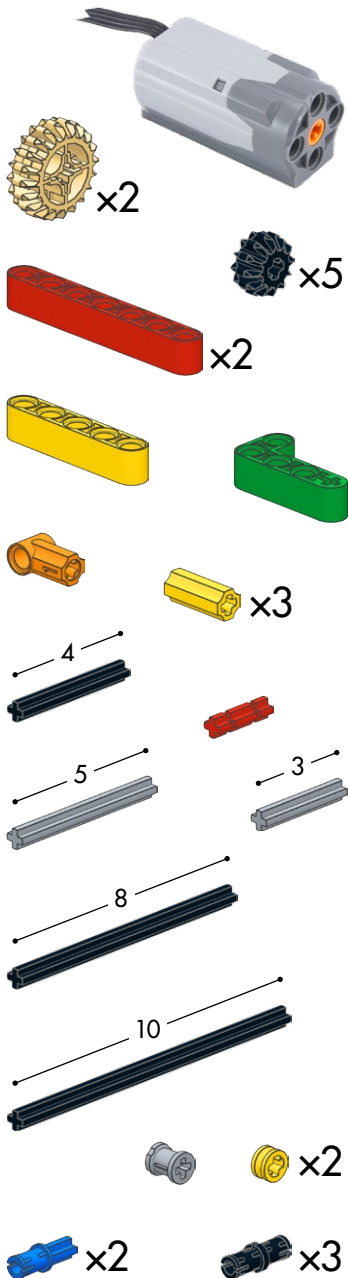


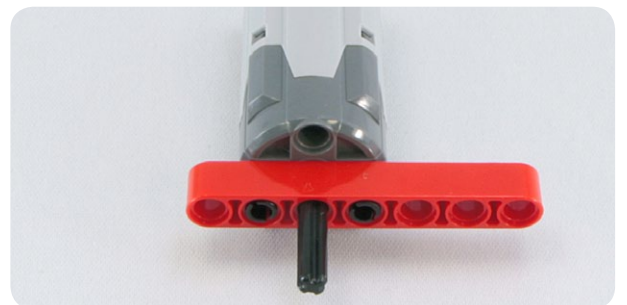
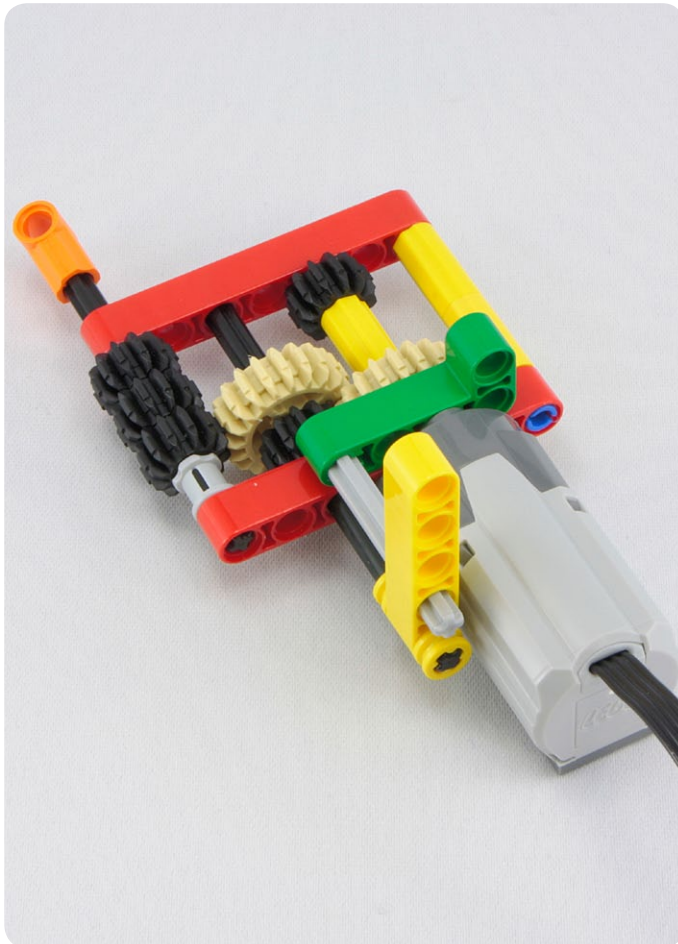
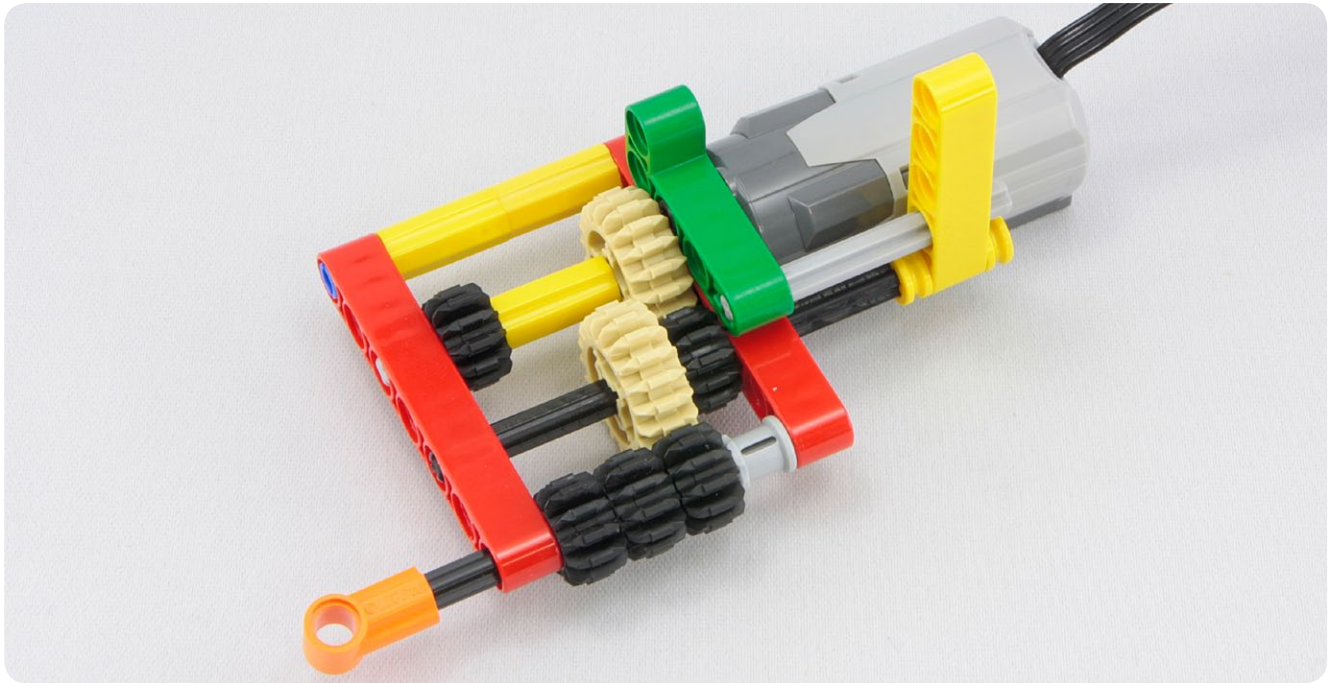


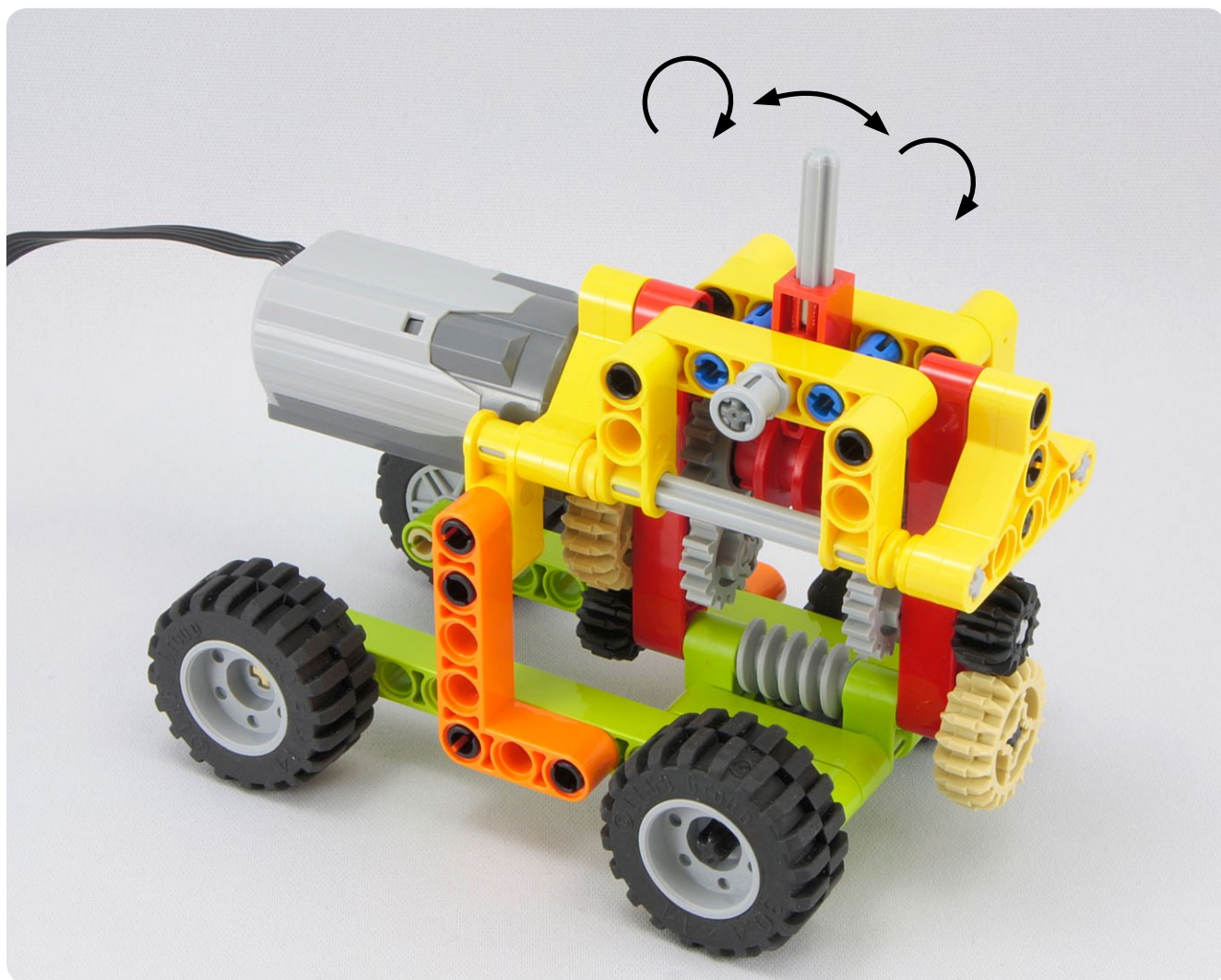


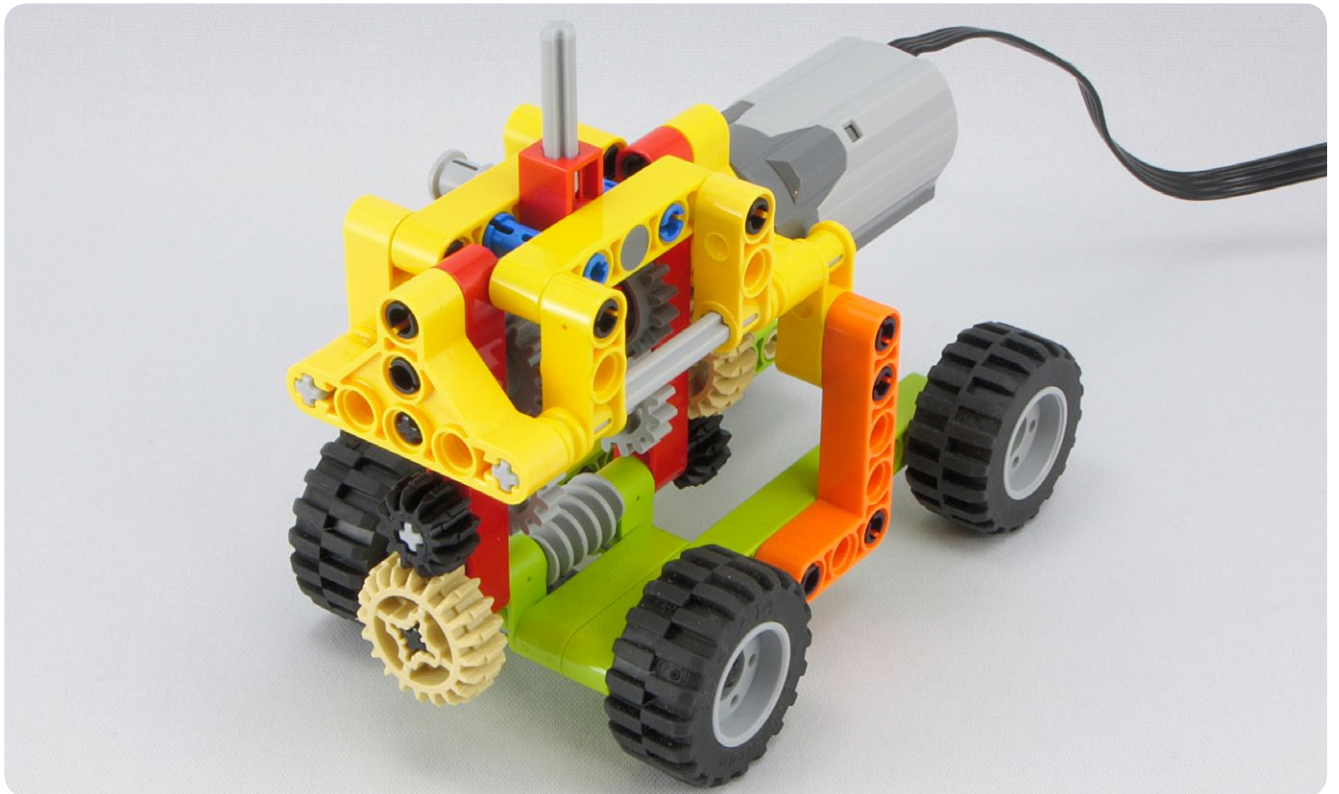
Transmissions

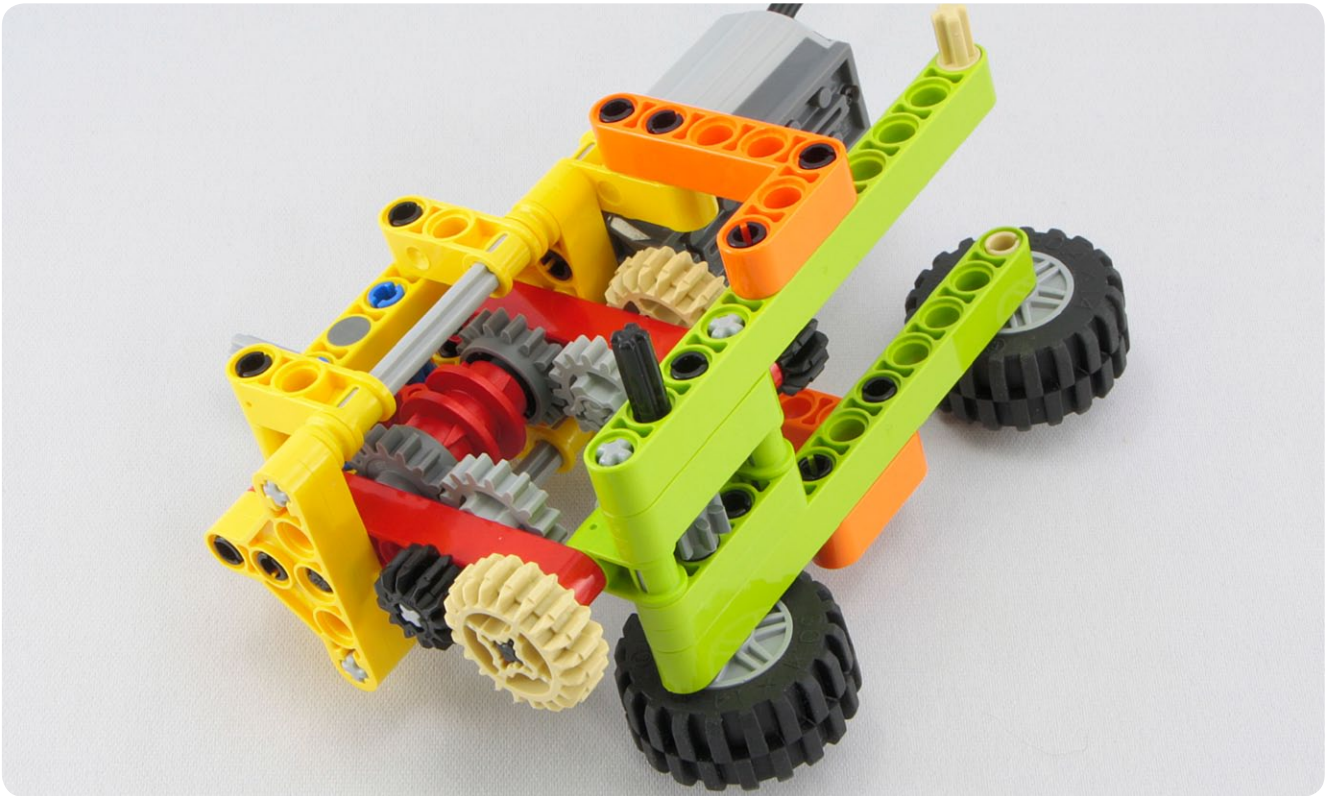
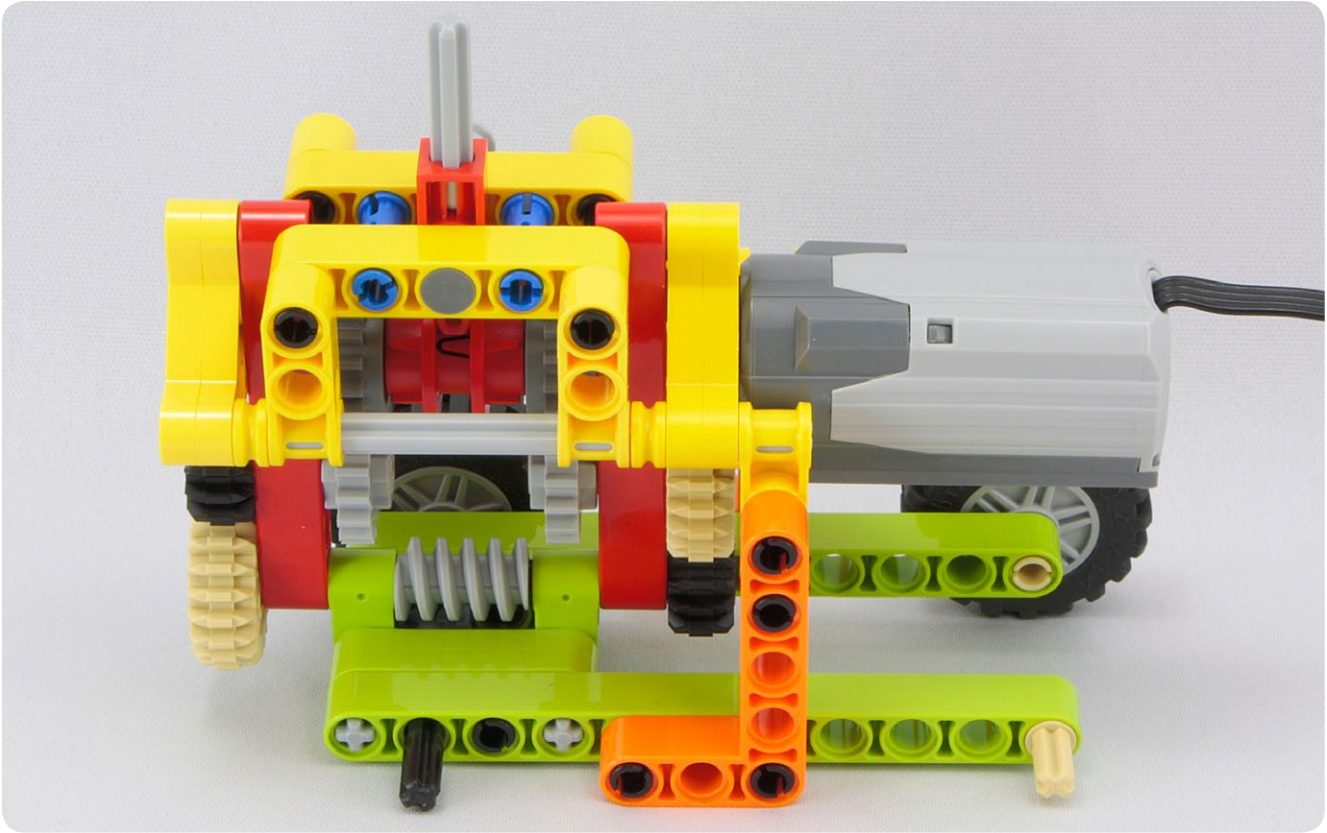
#130

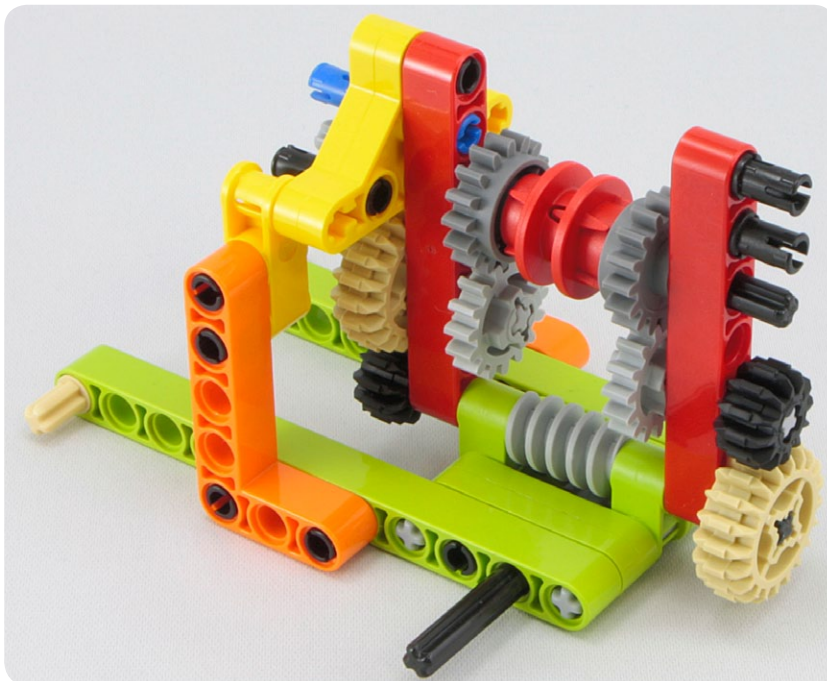


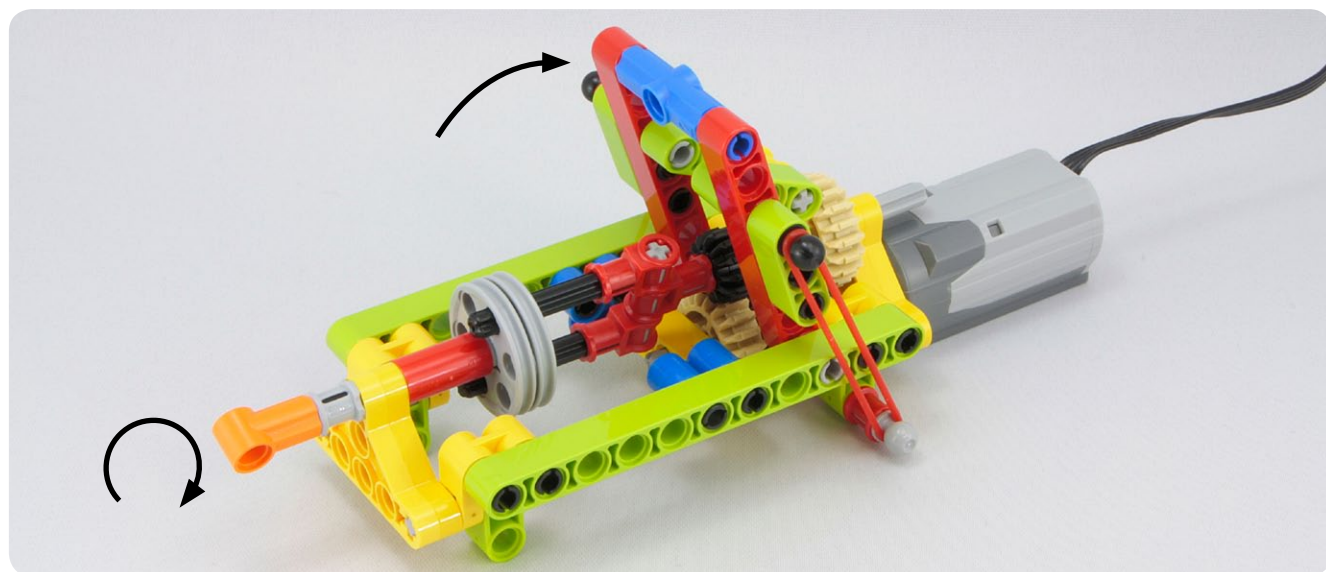
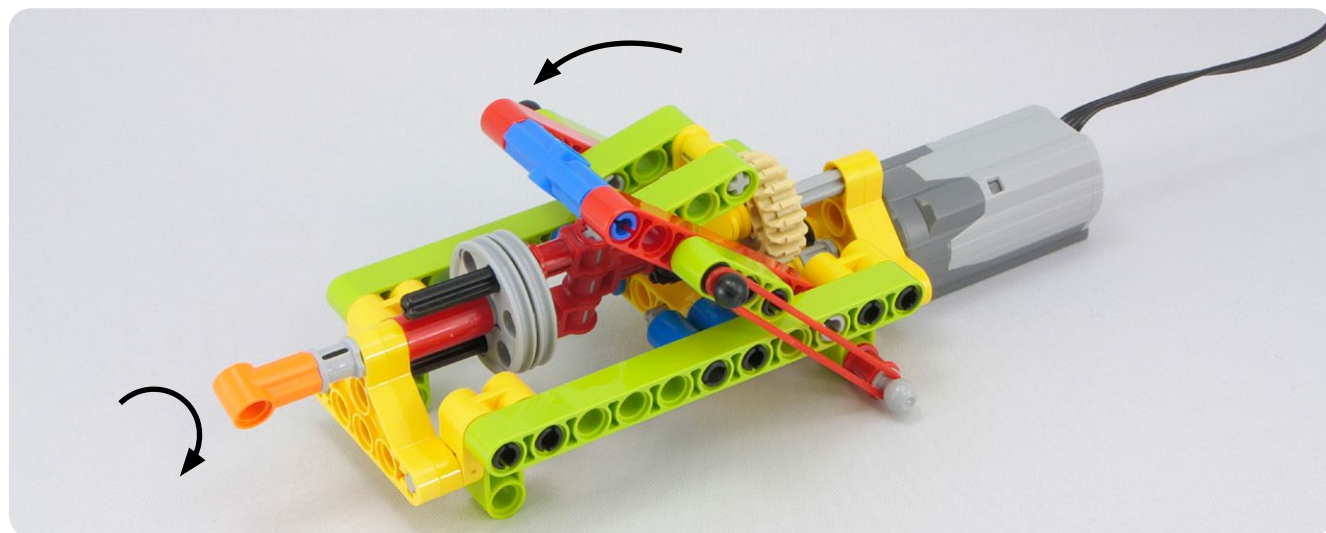


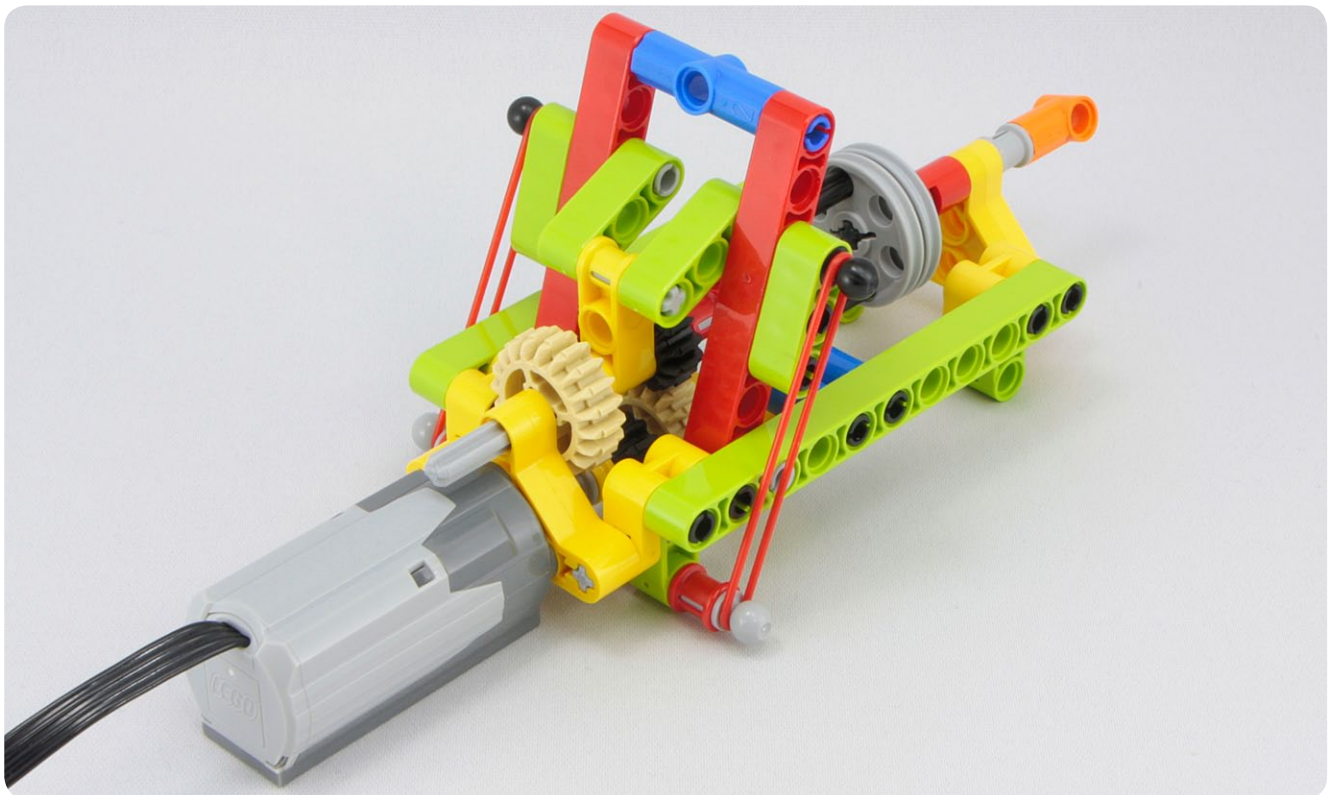
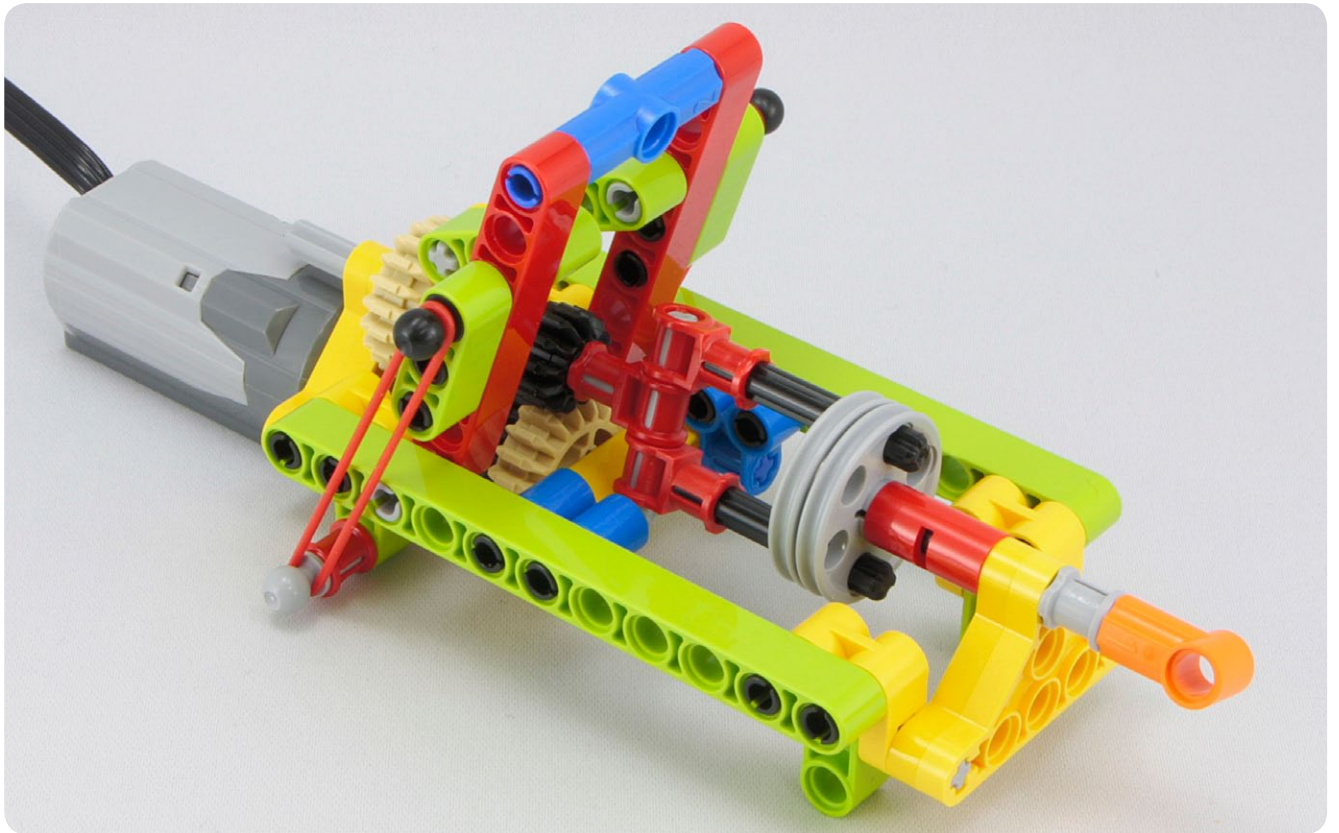
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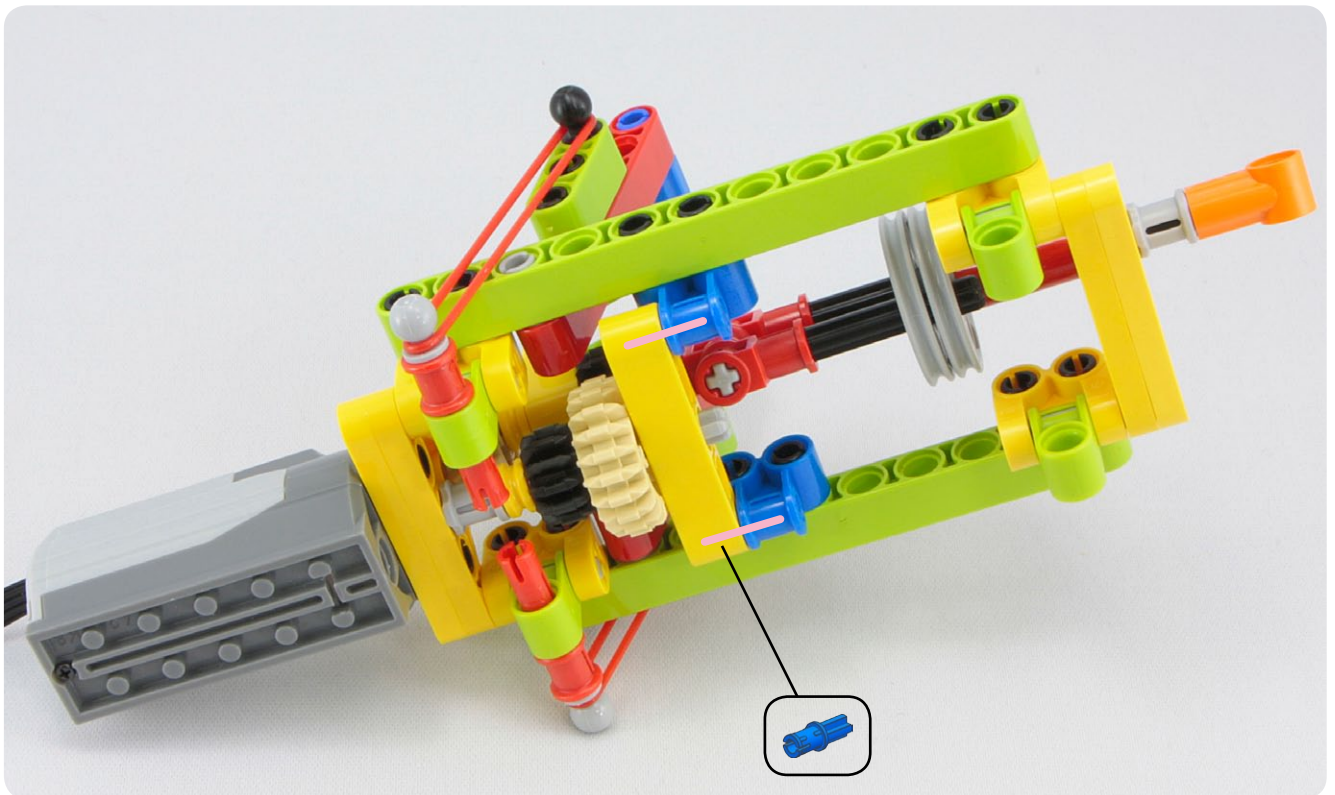
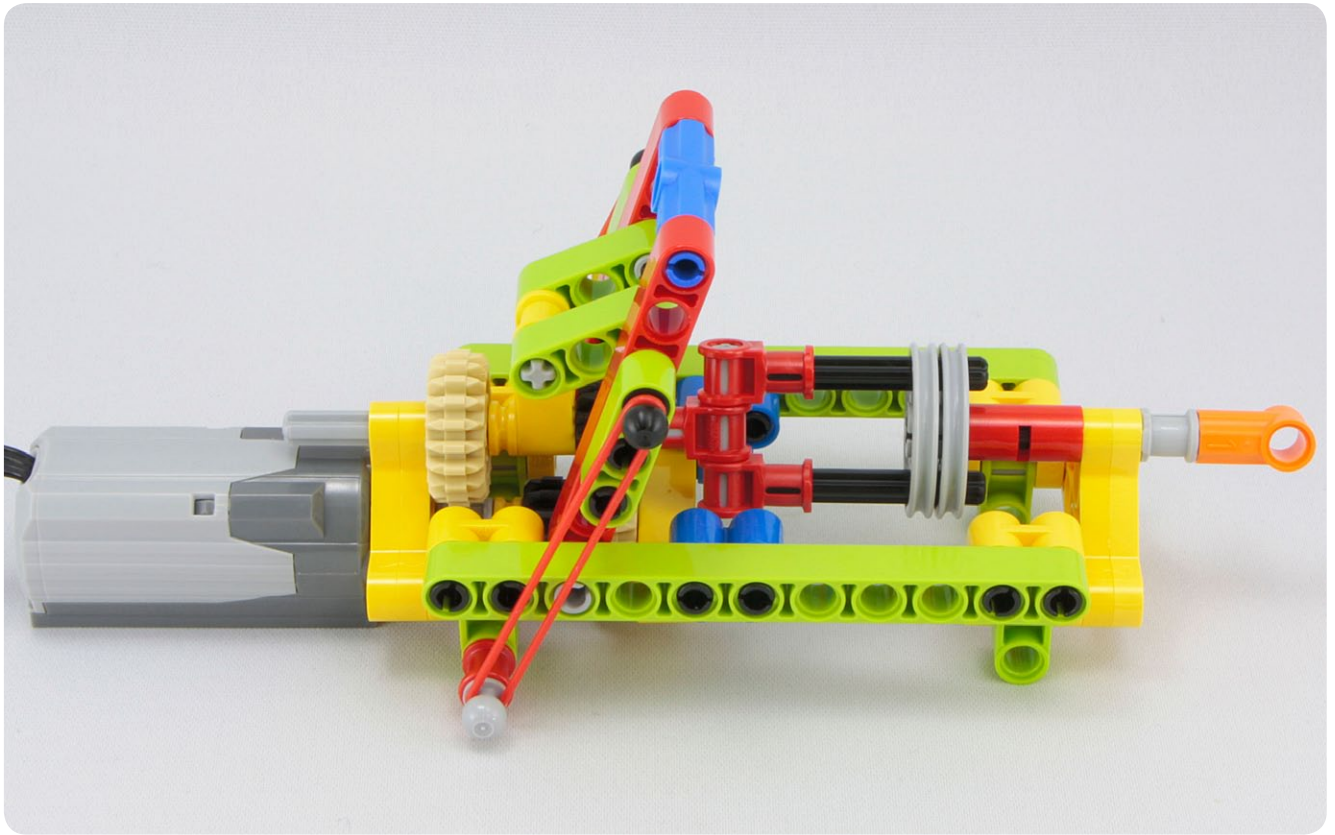


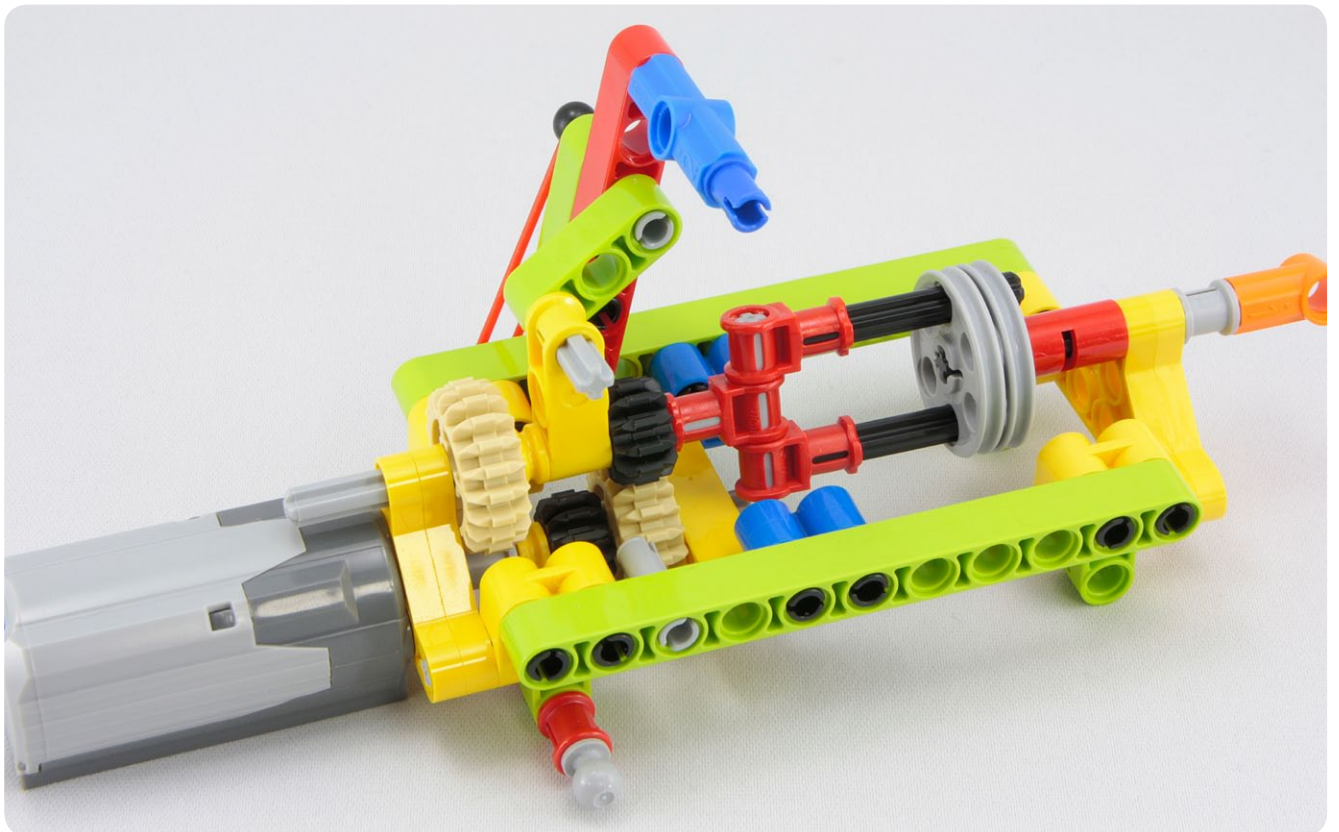
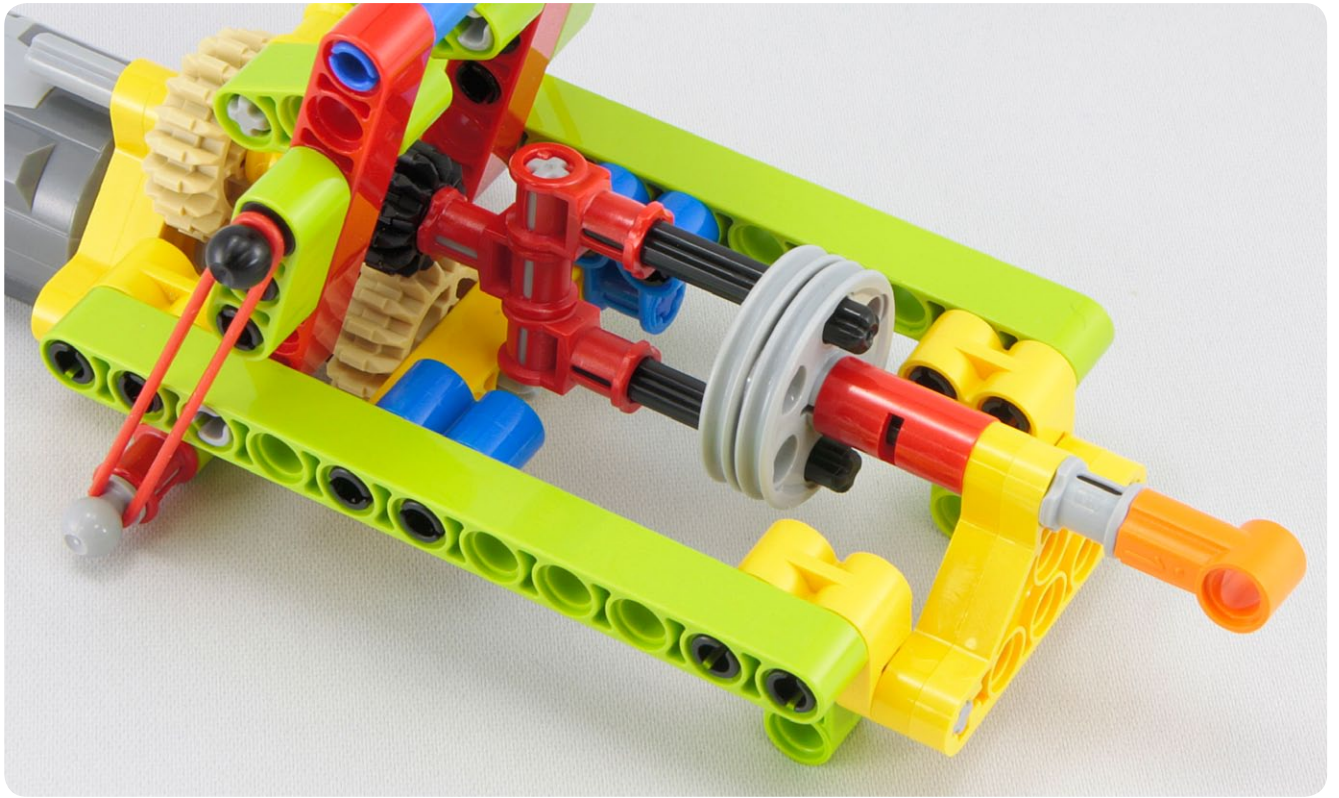




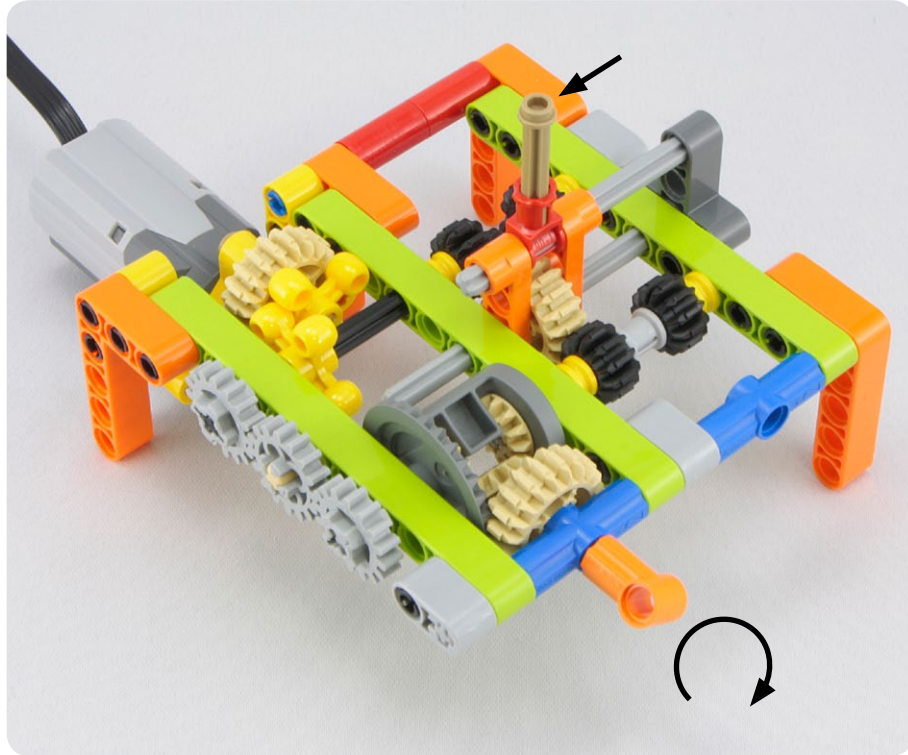
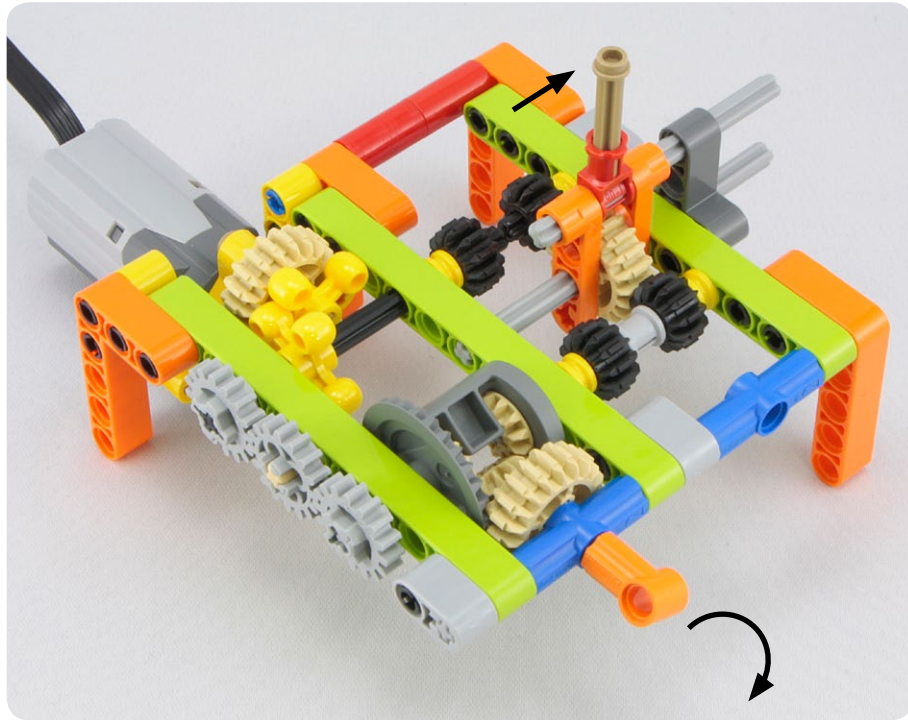
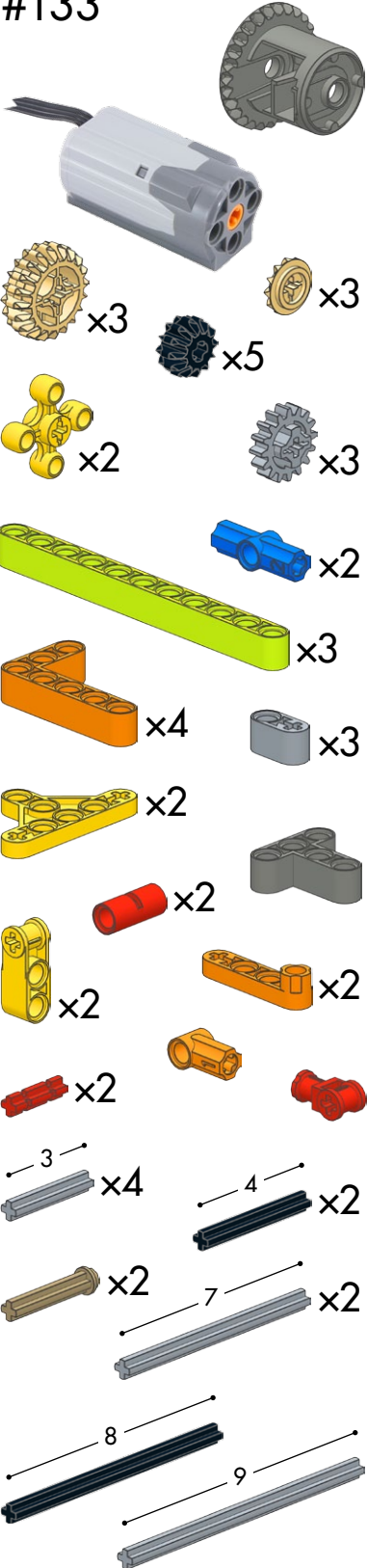
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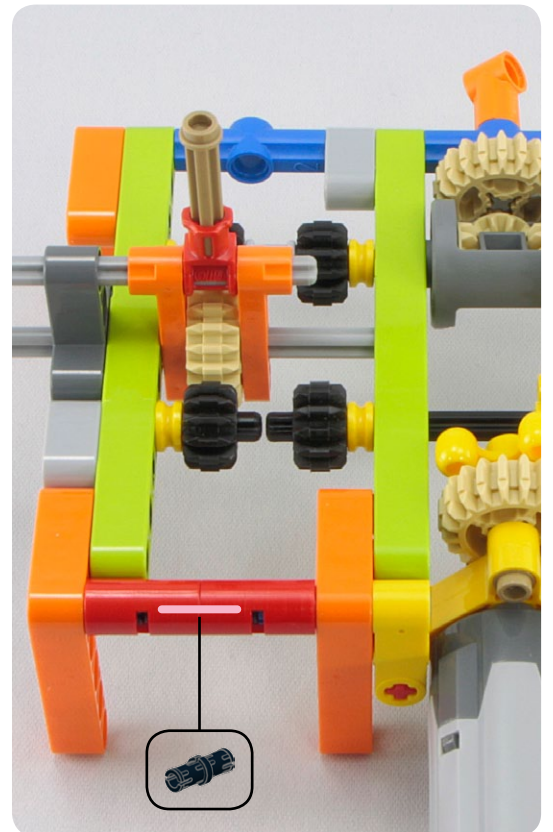
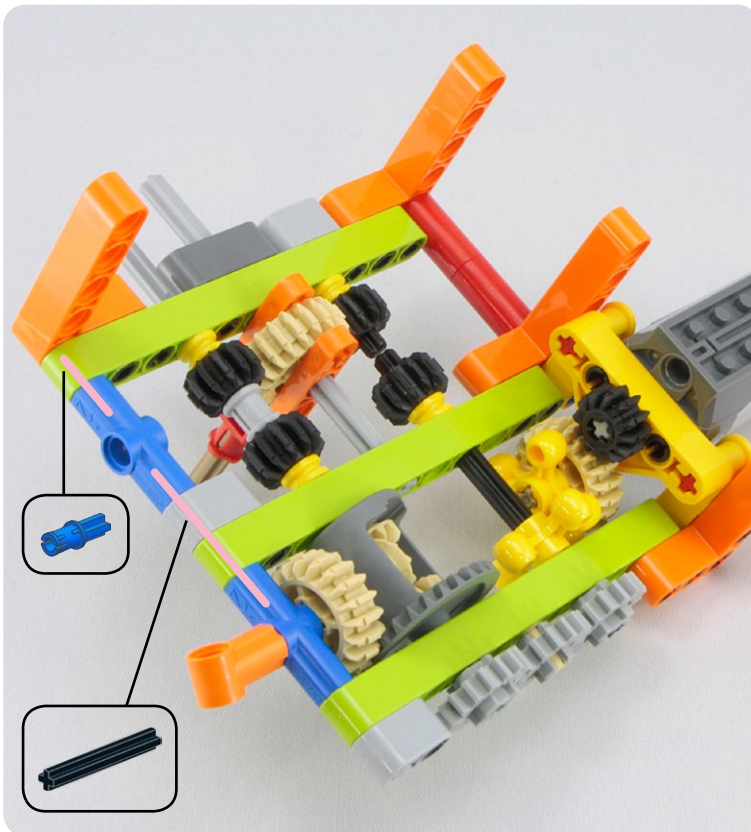
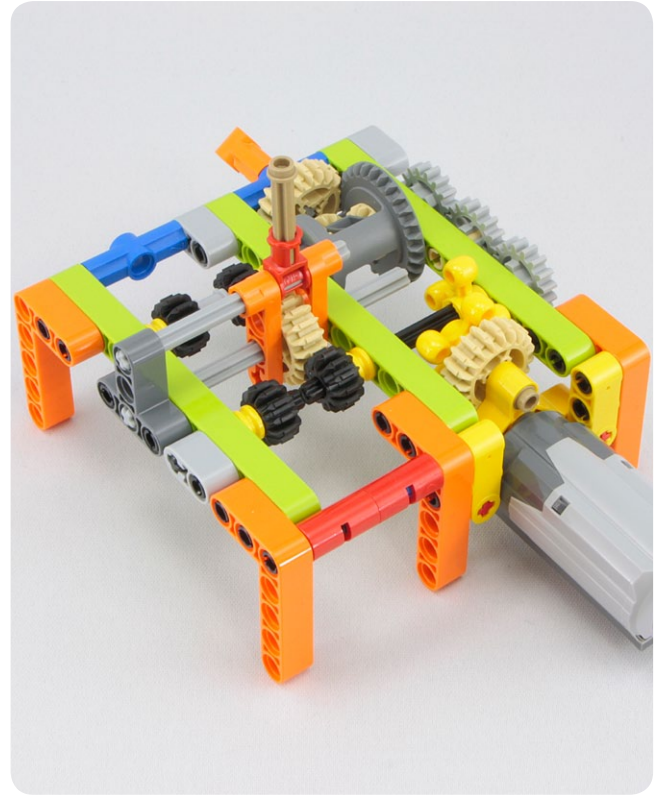




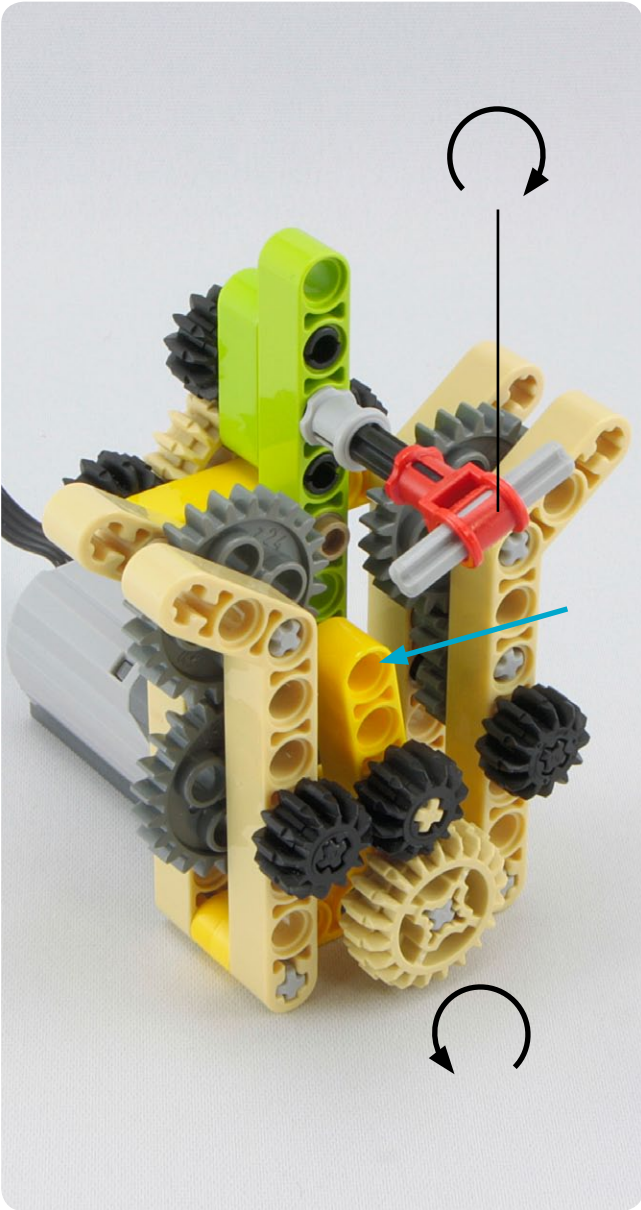
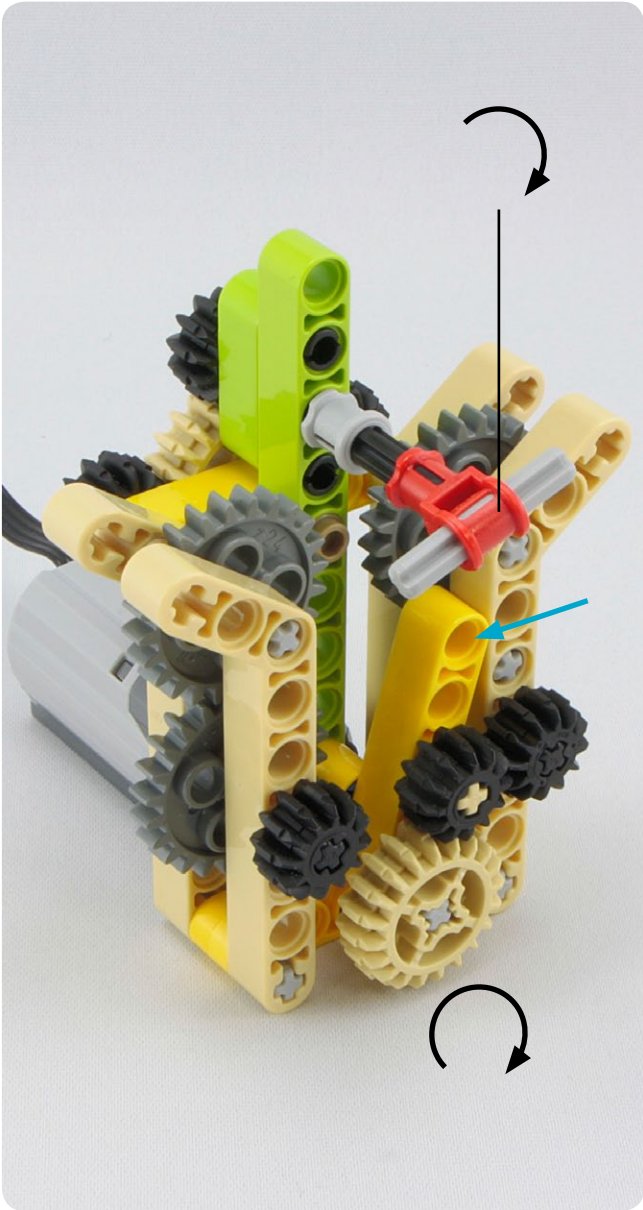
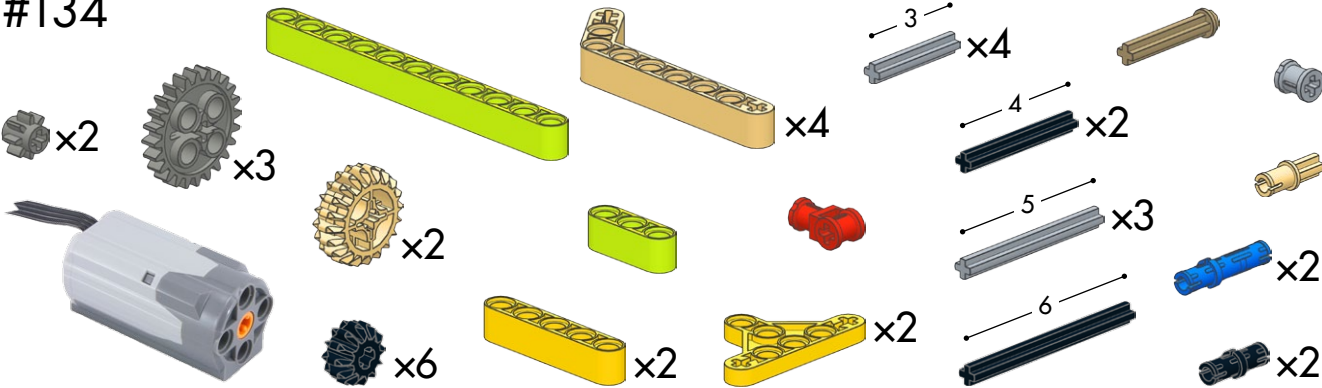


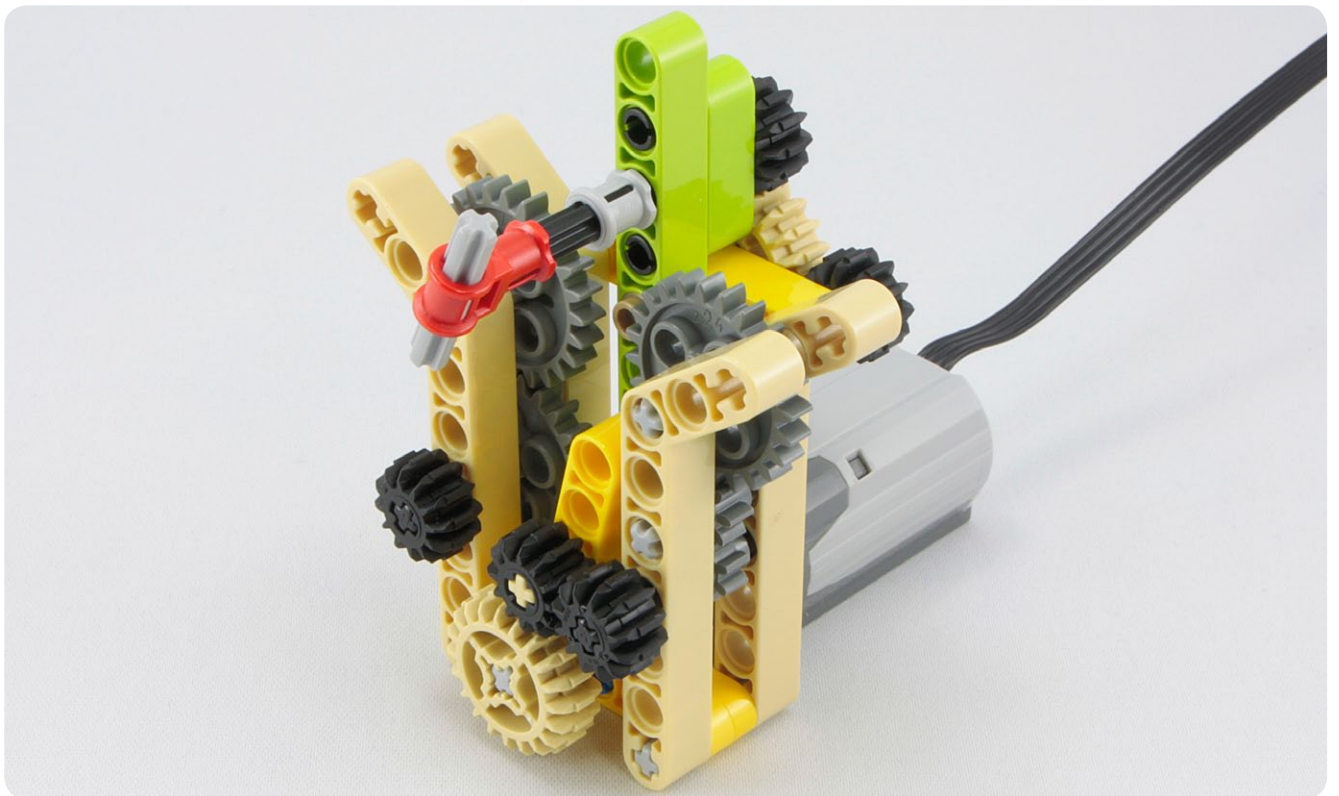
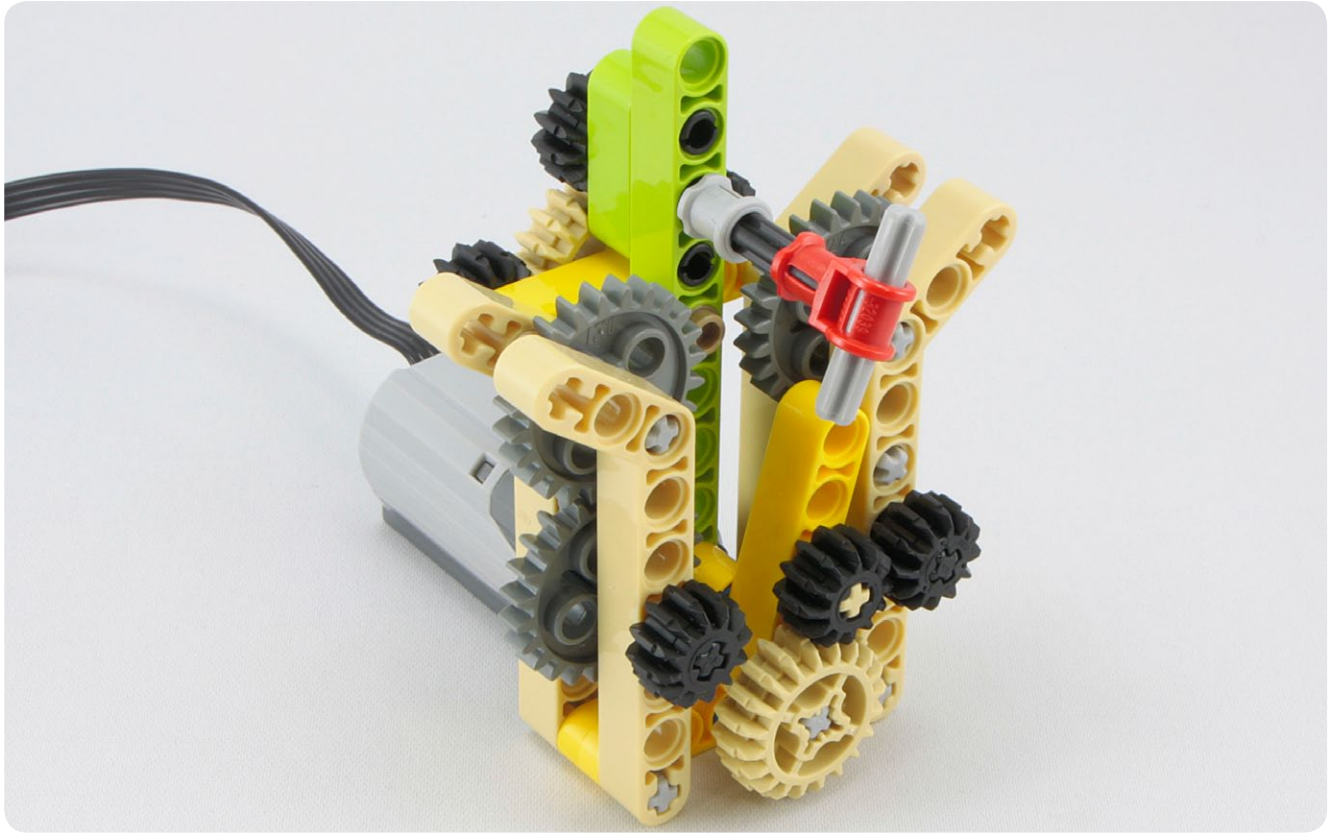
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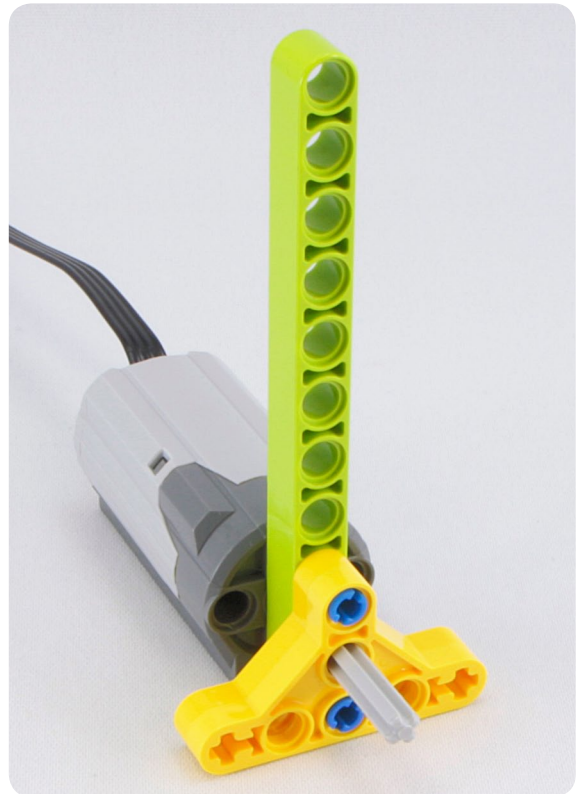
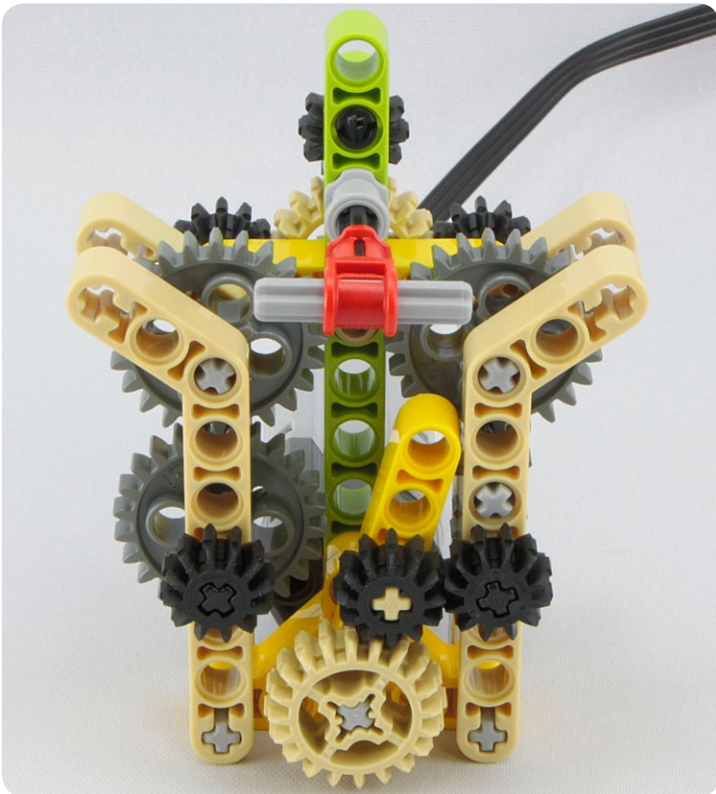
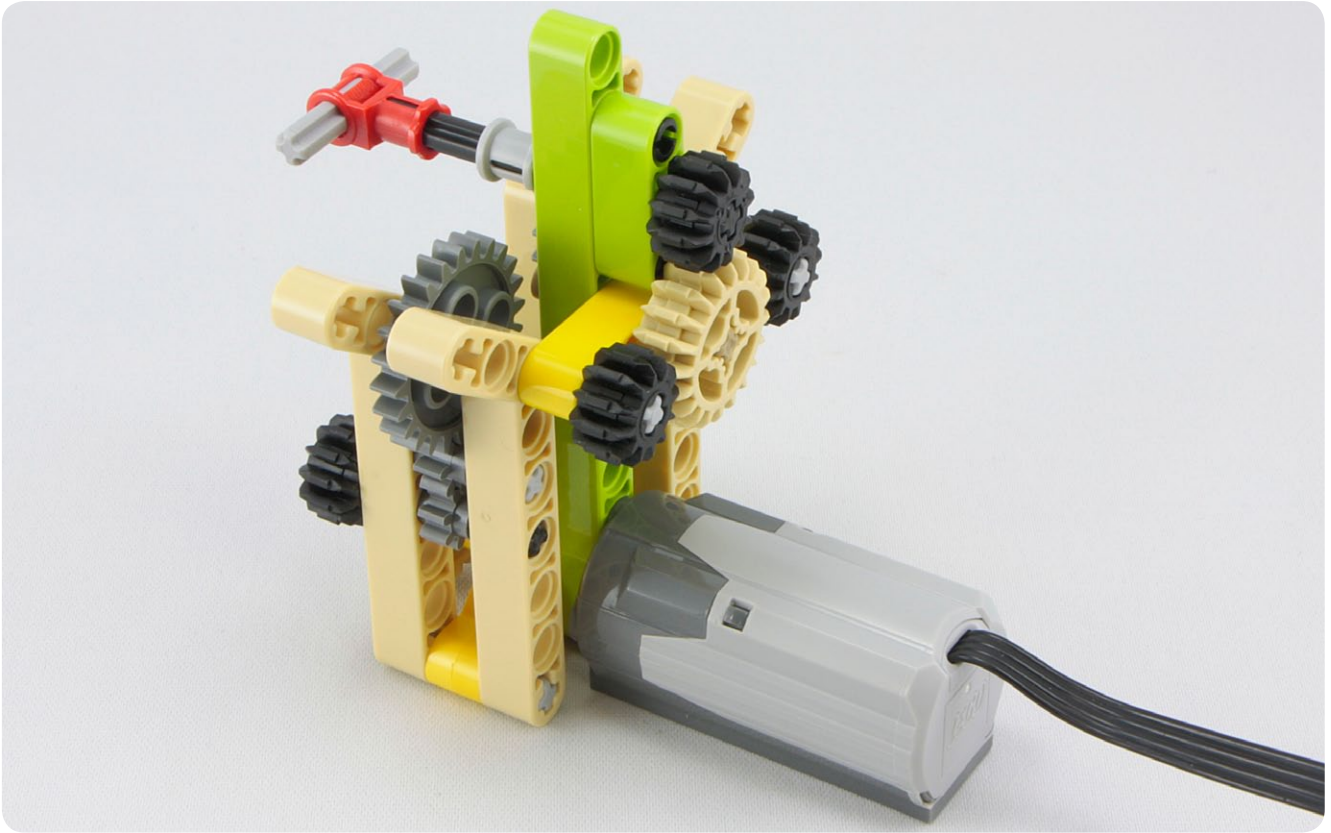


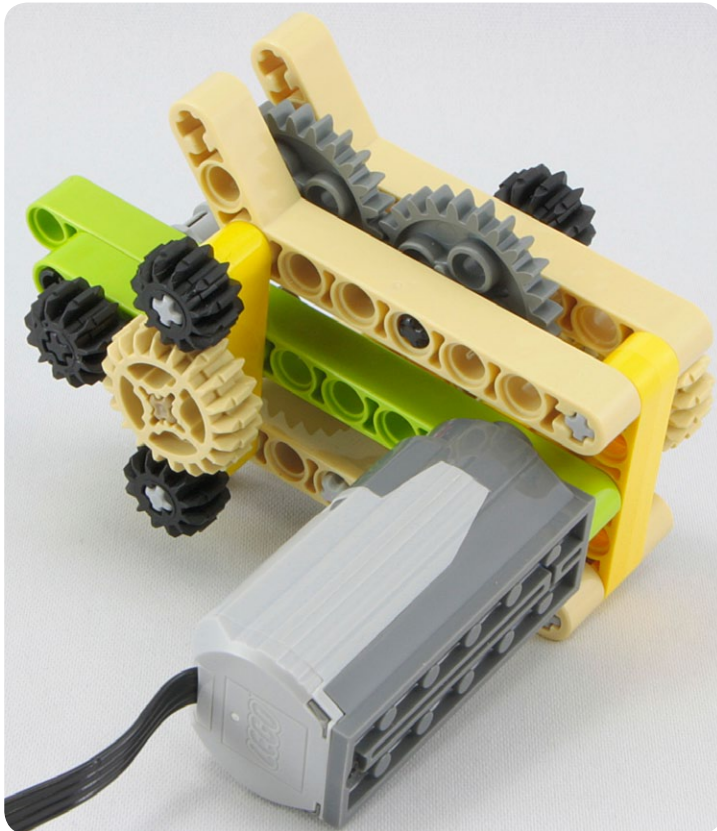
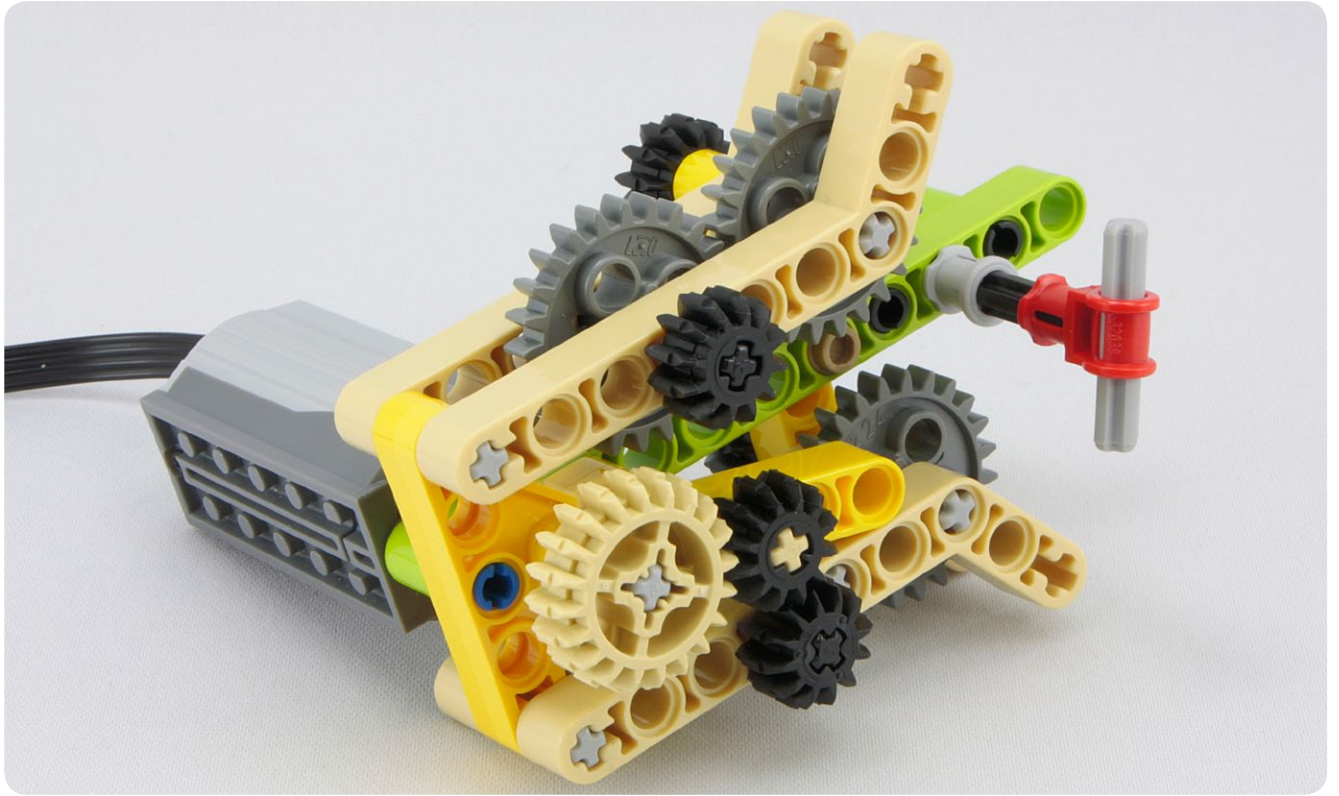


#134

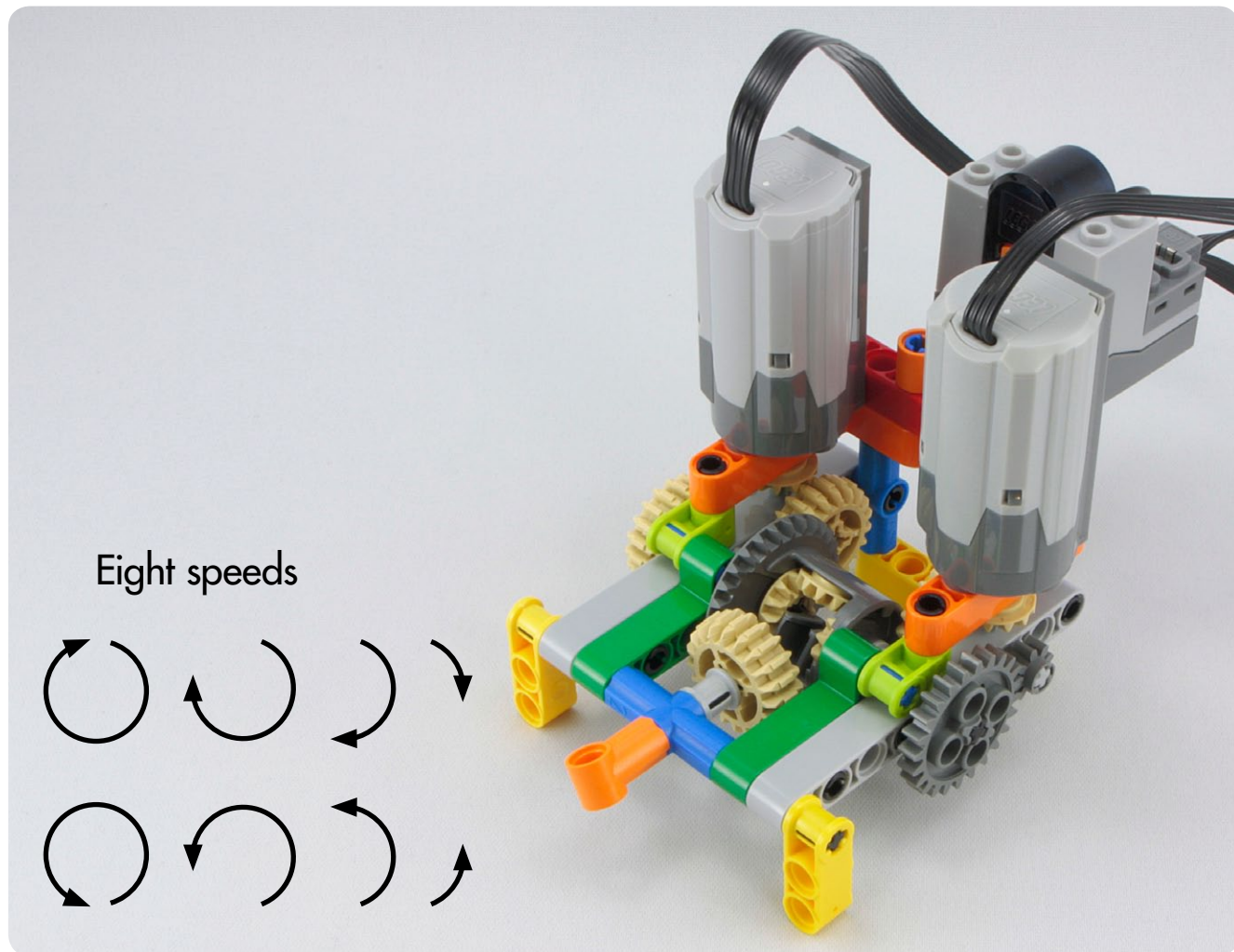
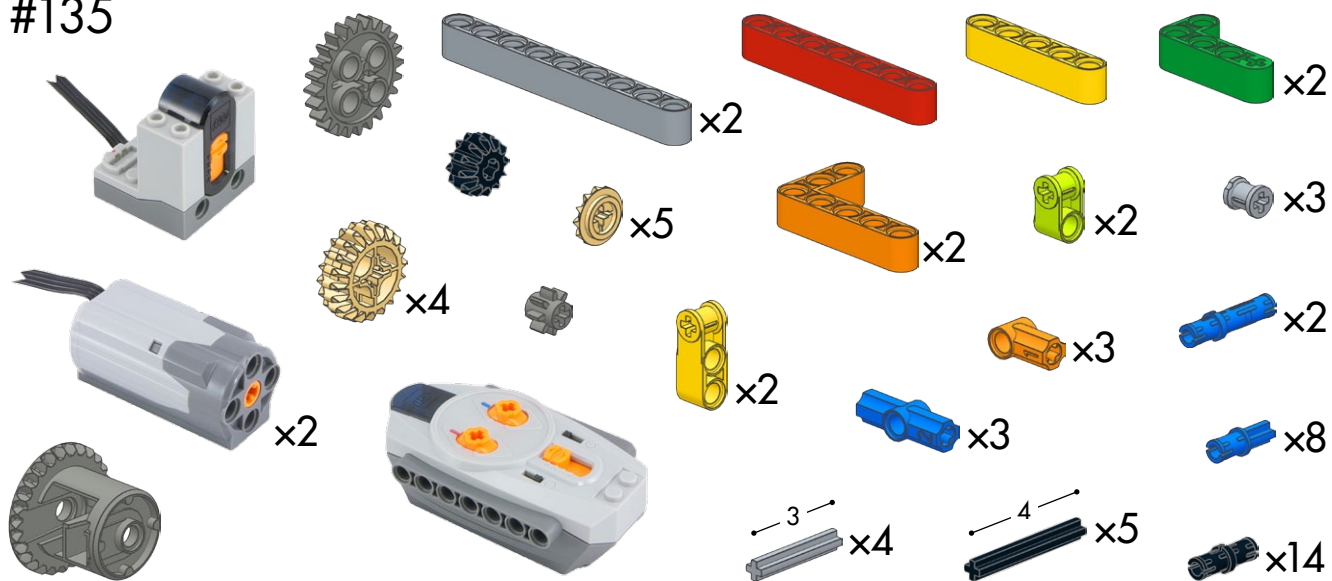


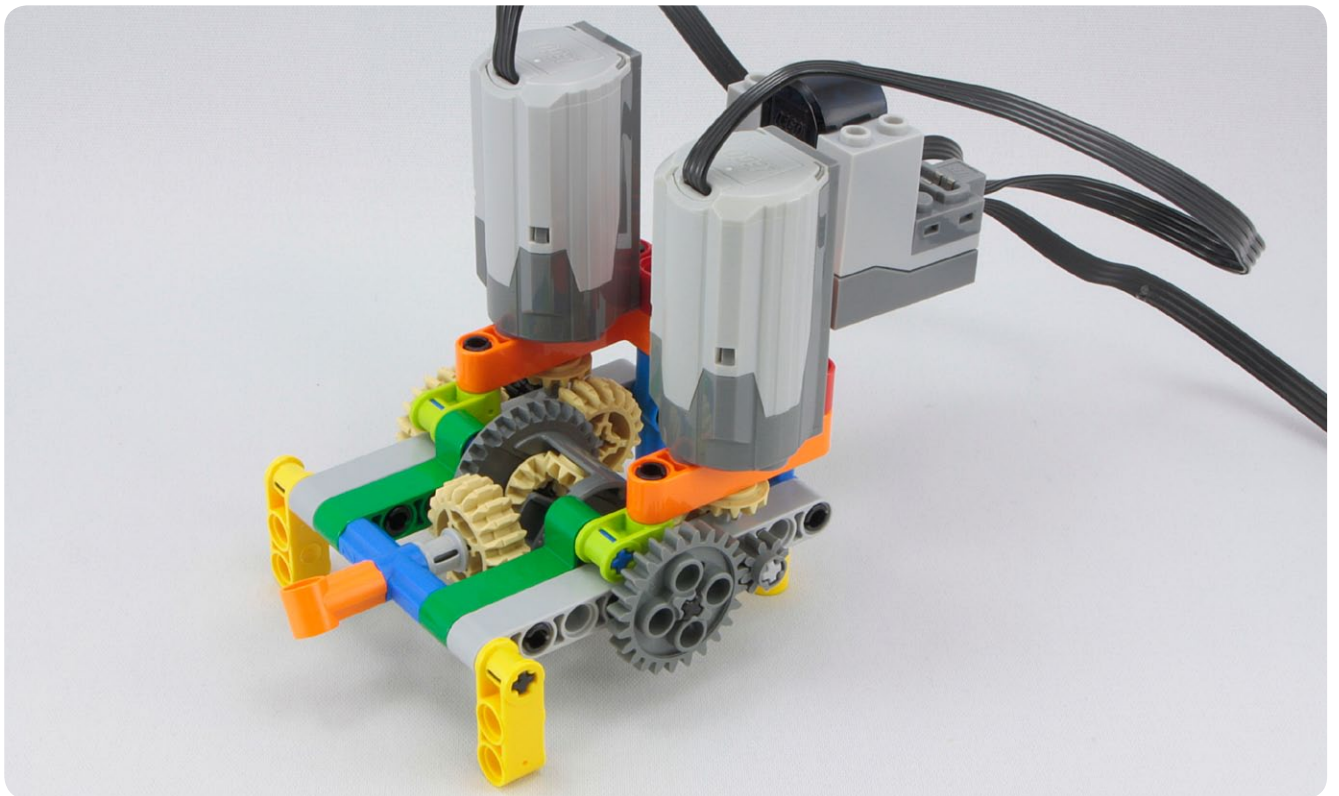
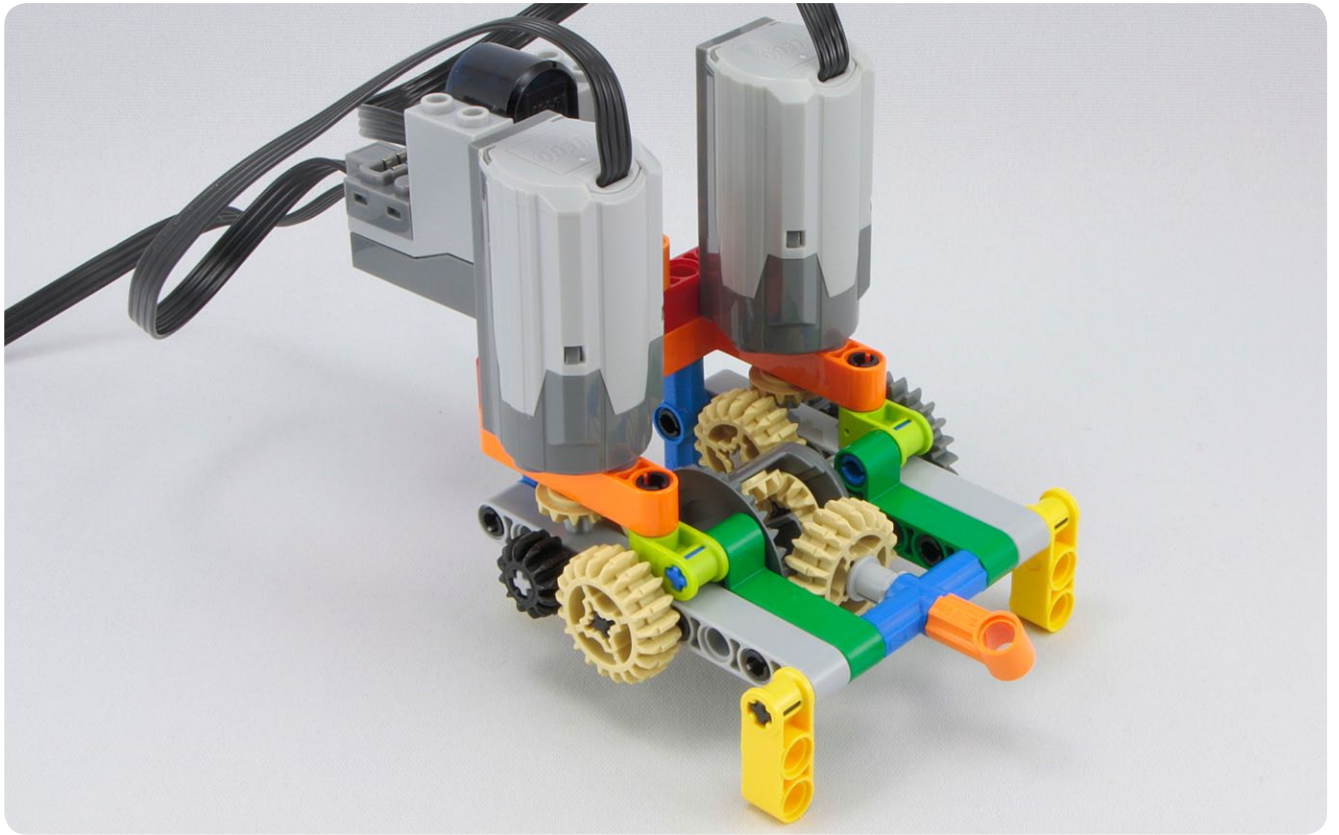


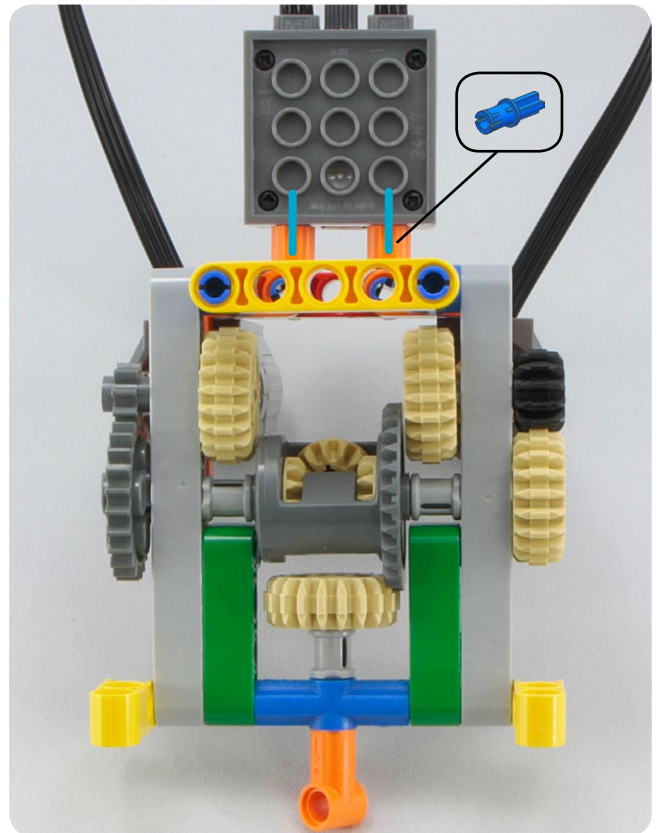
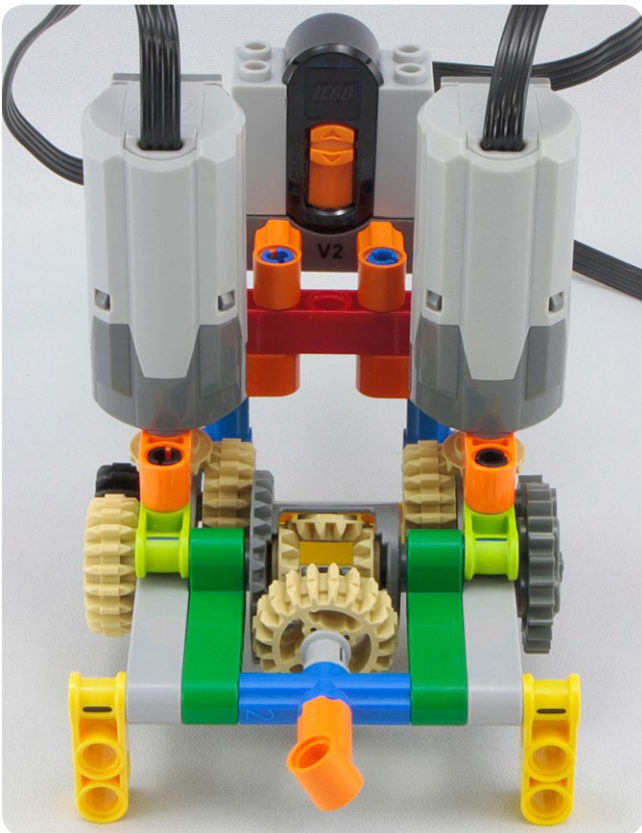
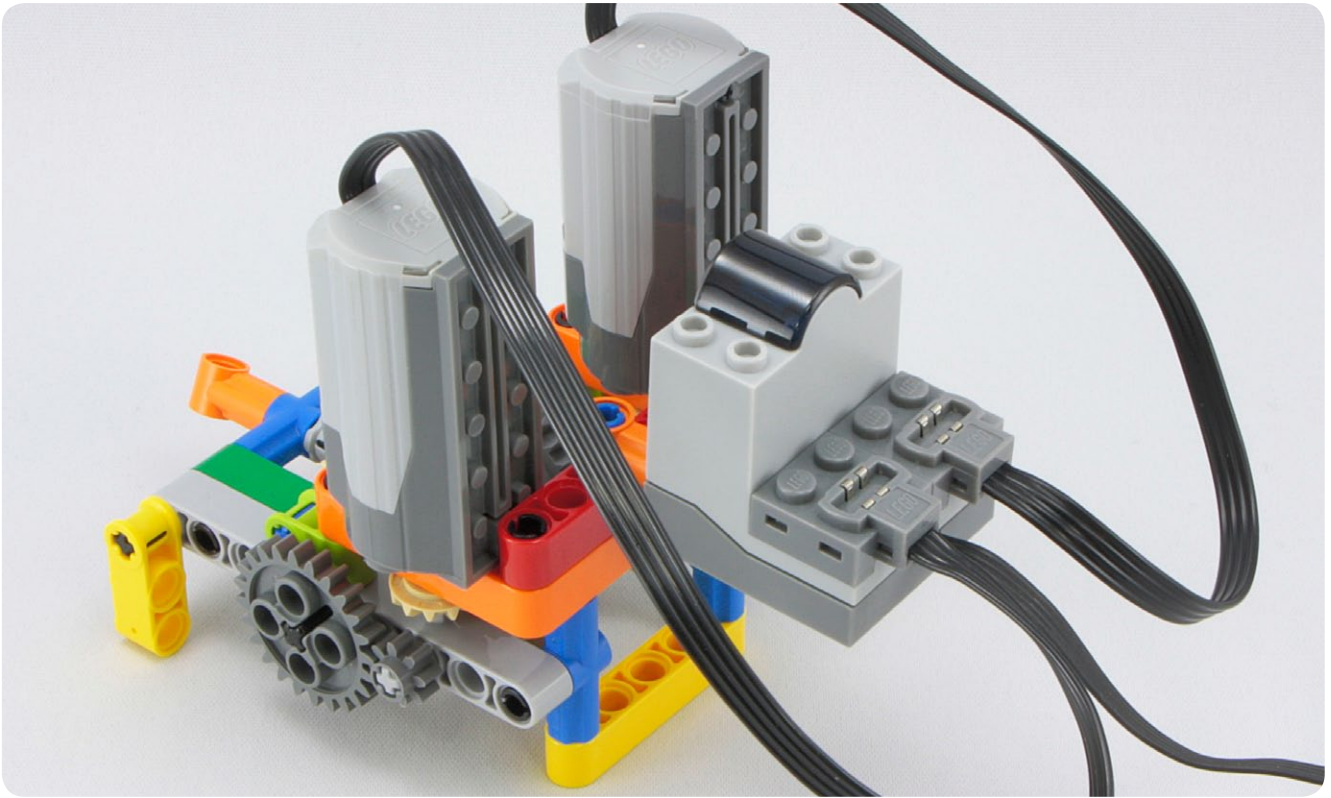


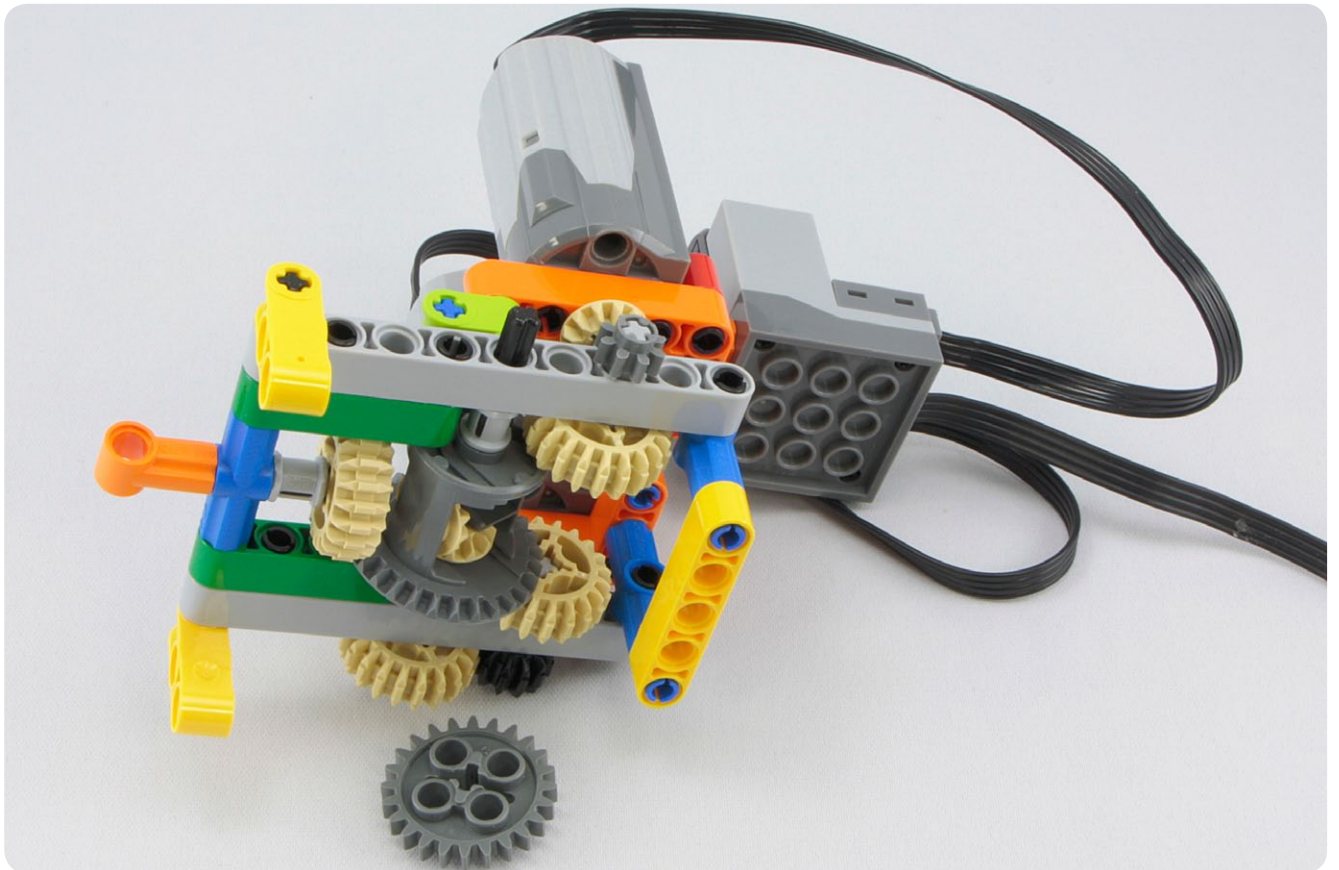
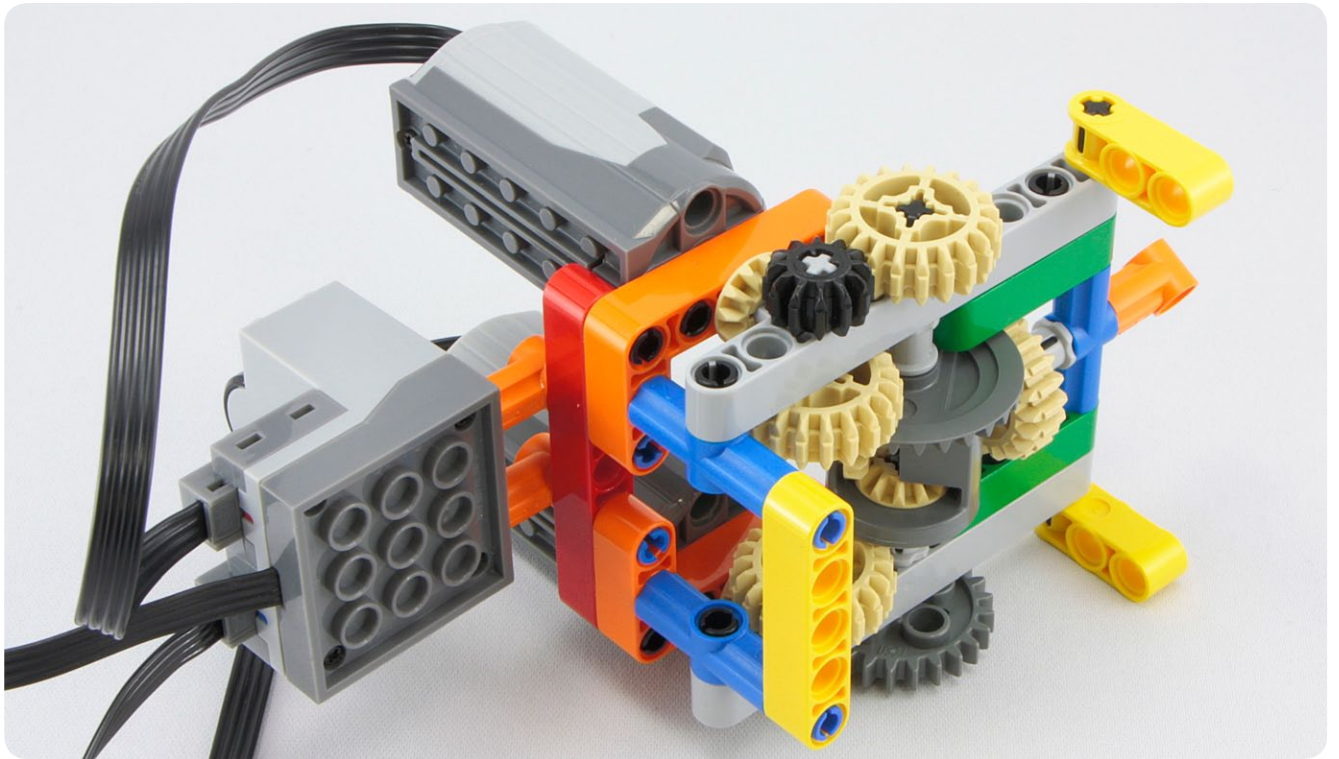


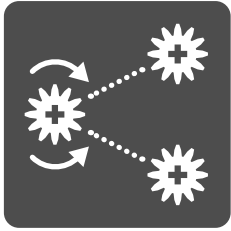
#135





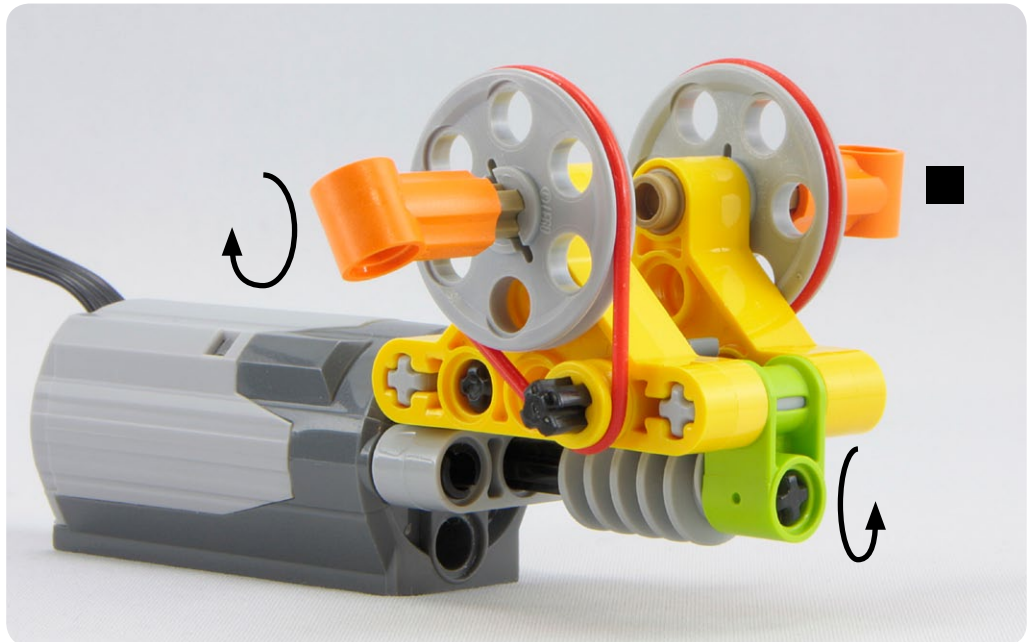
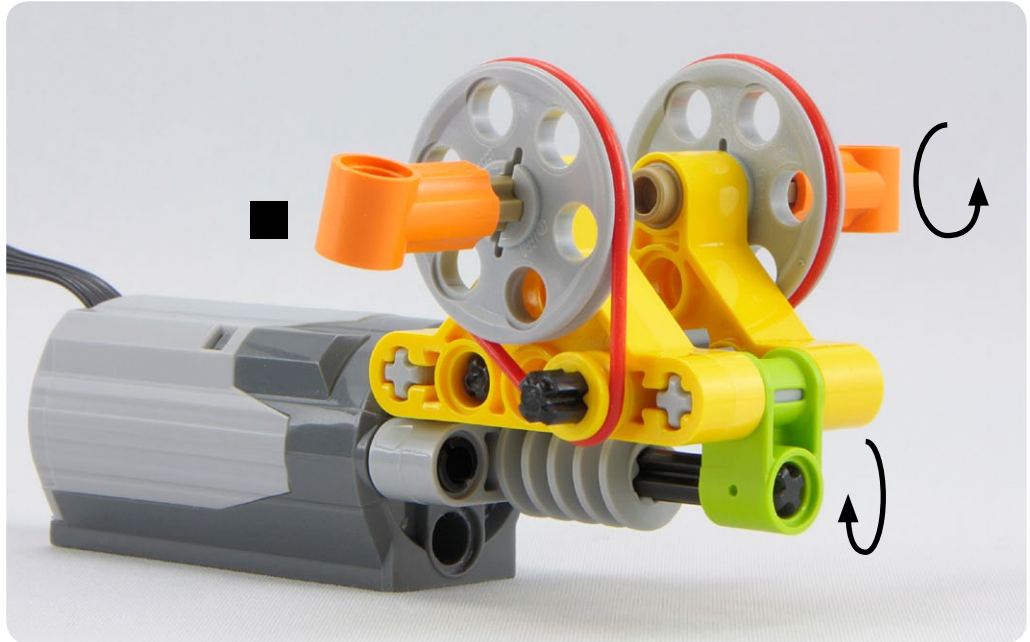
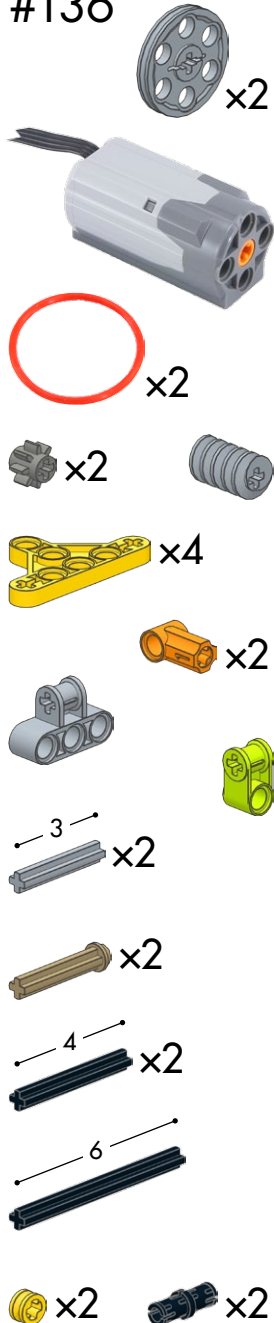


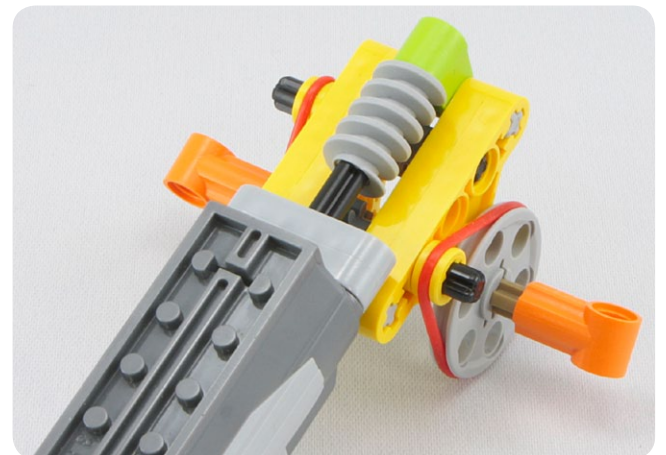
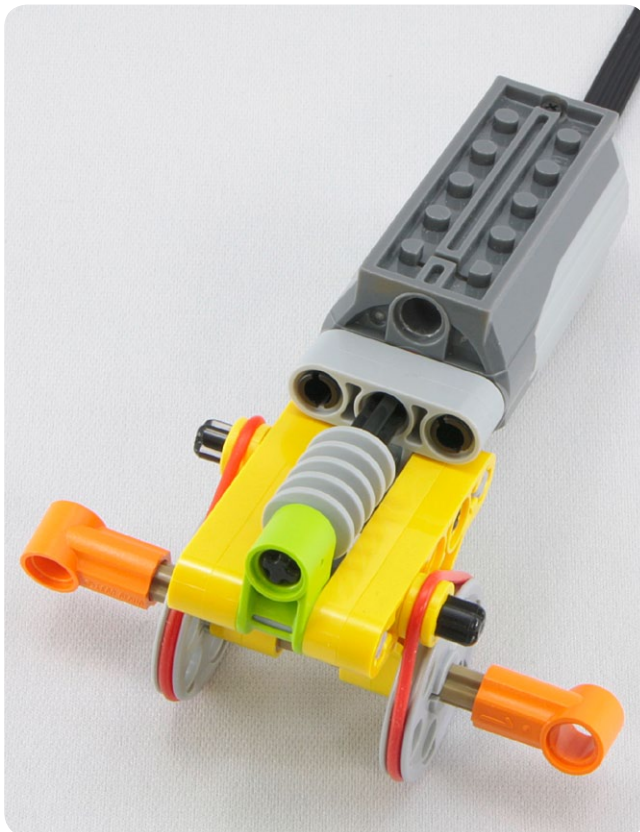
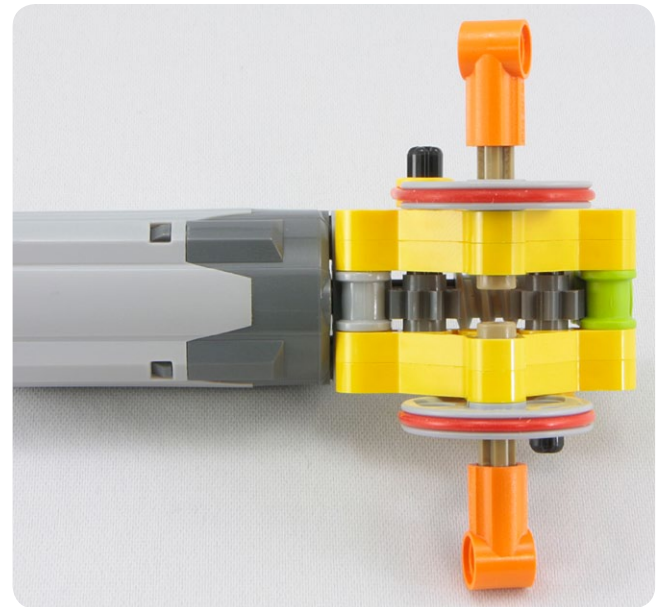
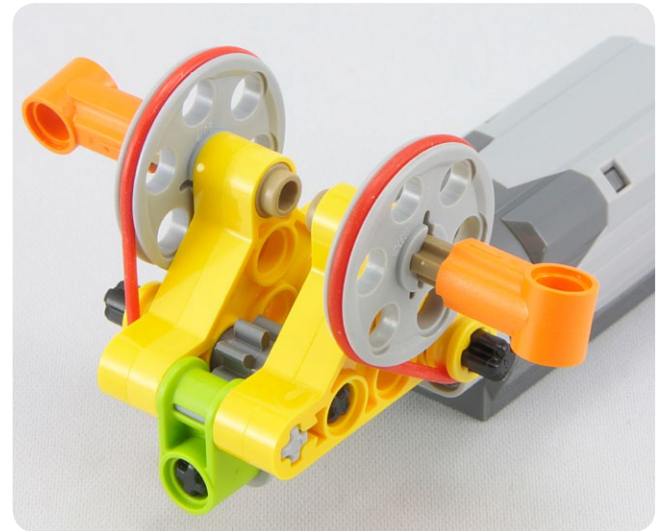






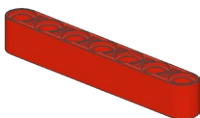
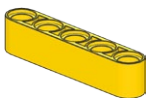


Changeover mechanisms using rotational direction




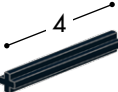
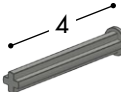



#136

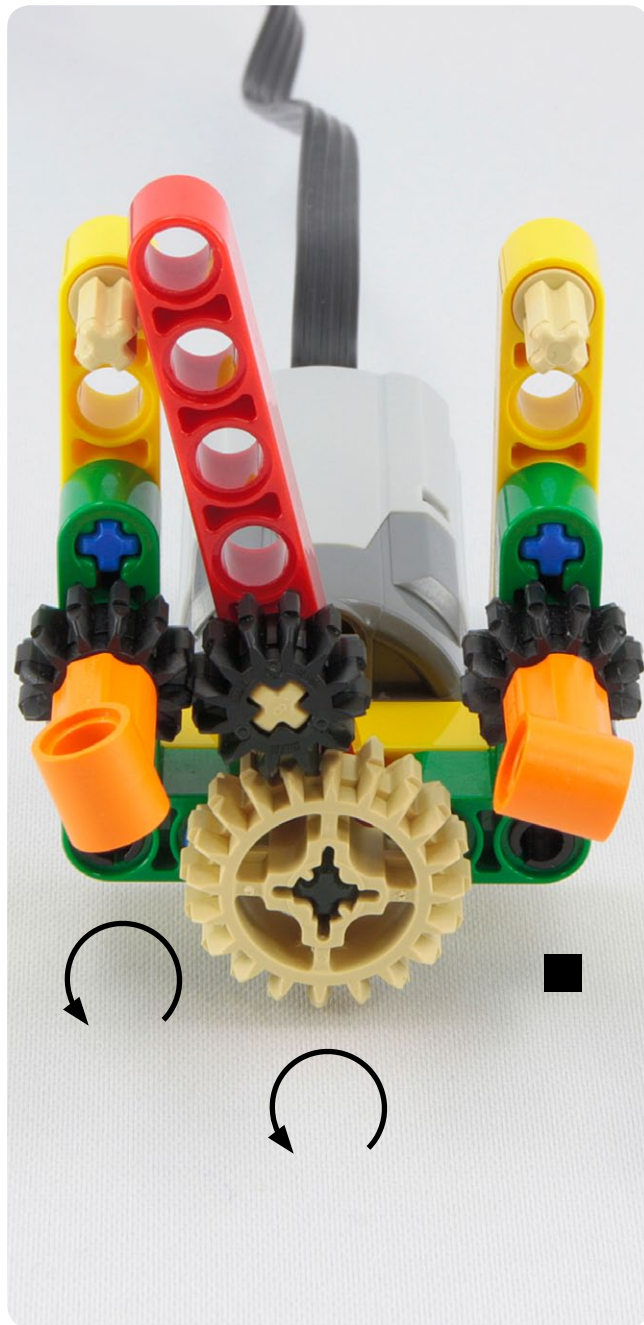


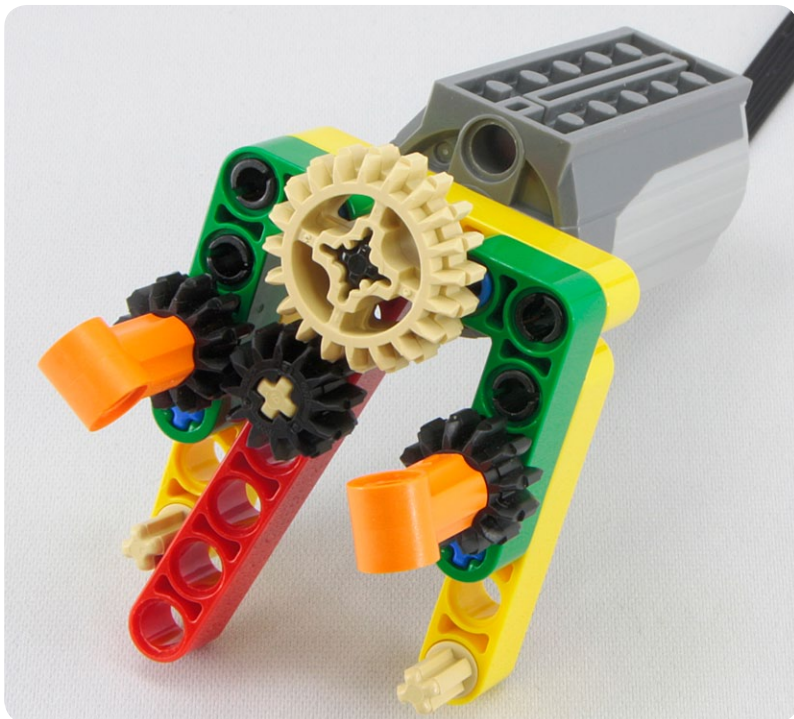
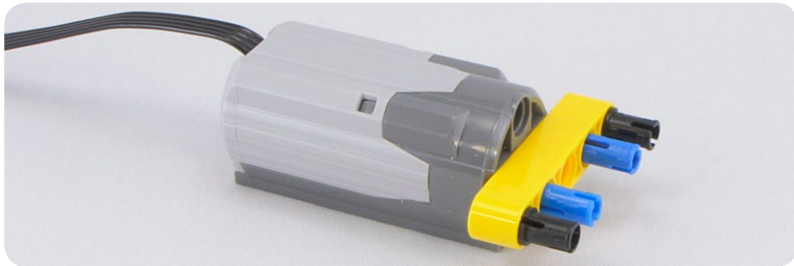
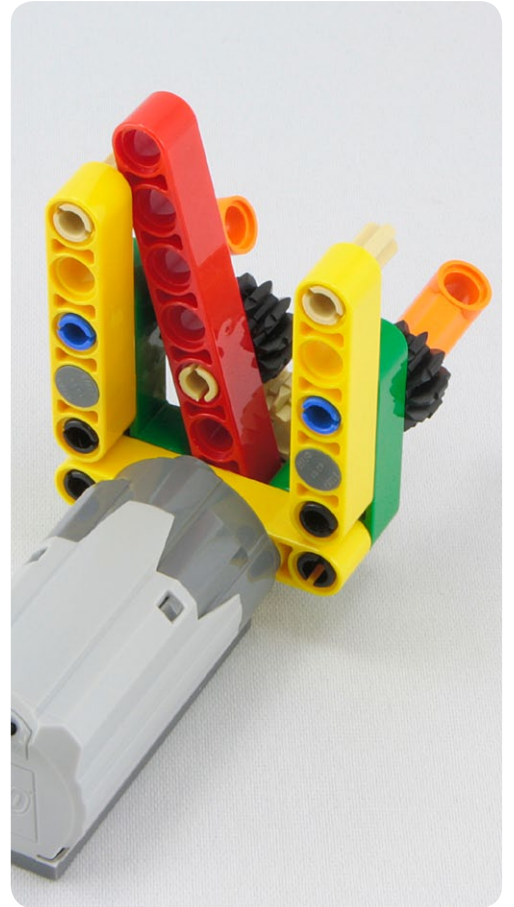
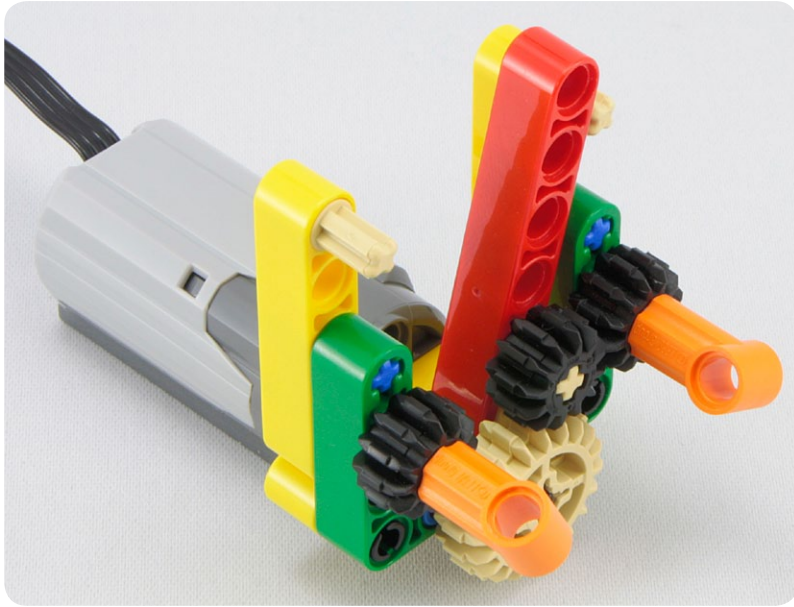


#137

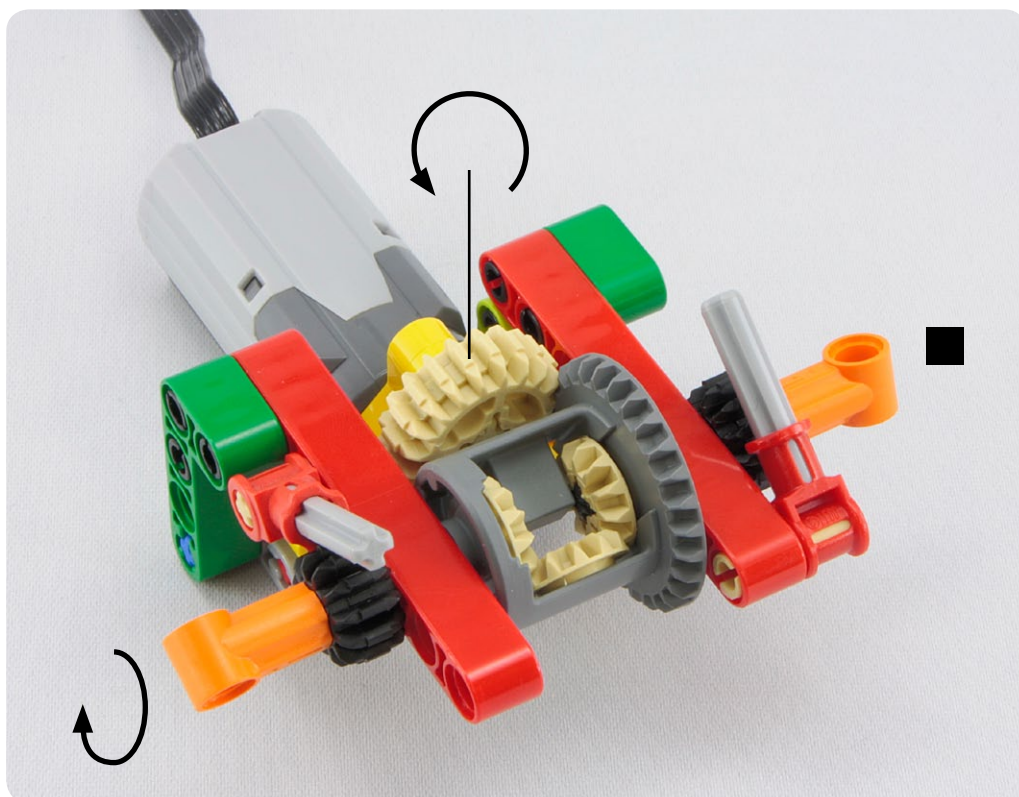
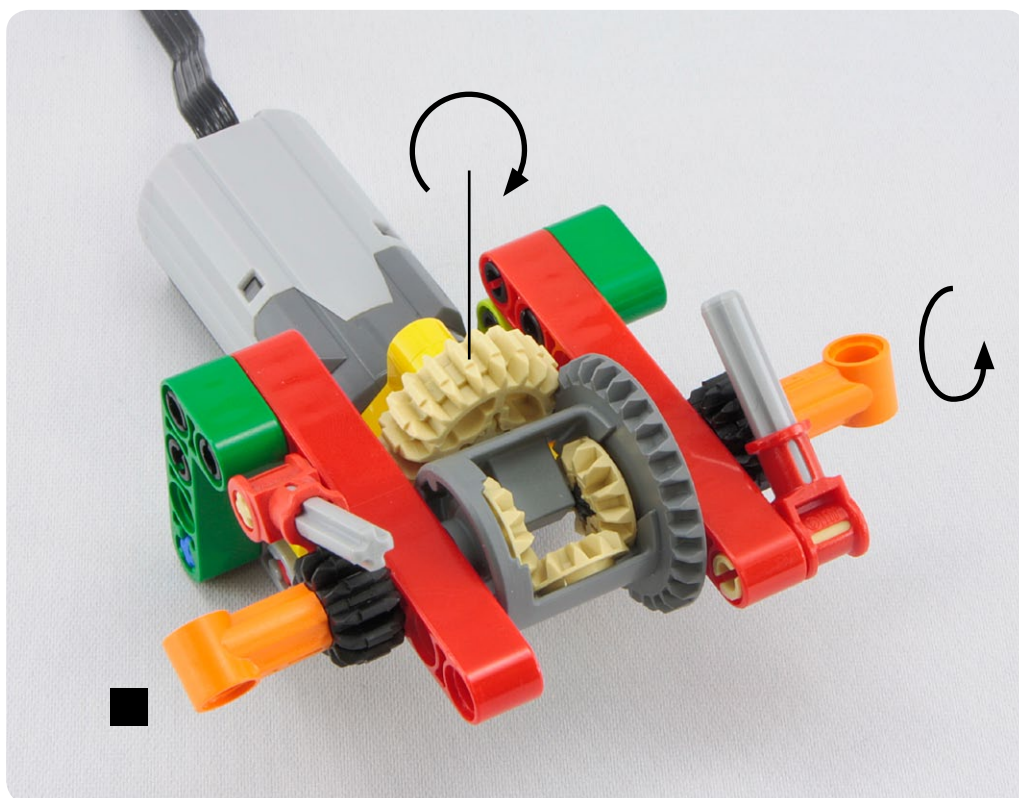
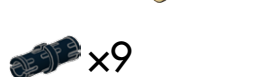
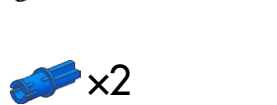
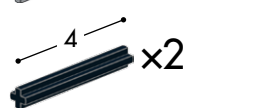
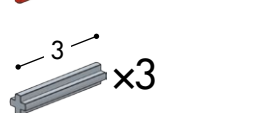
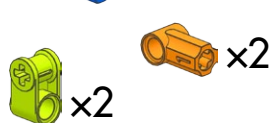
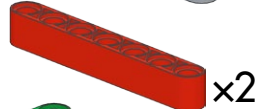
    x3  x2  x2

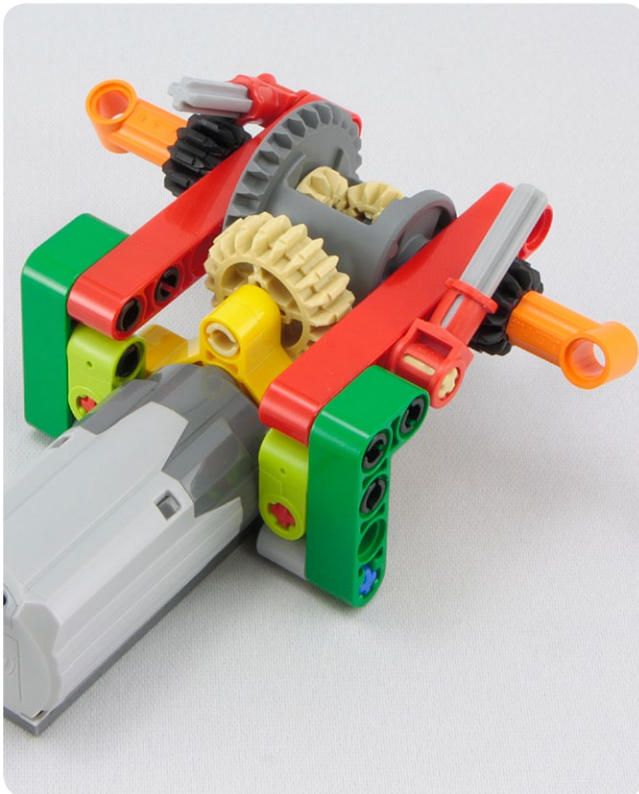
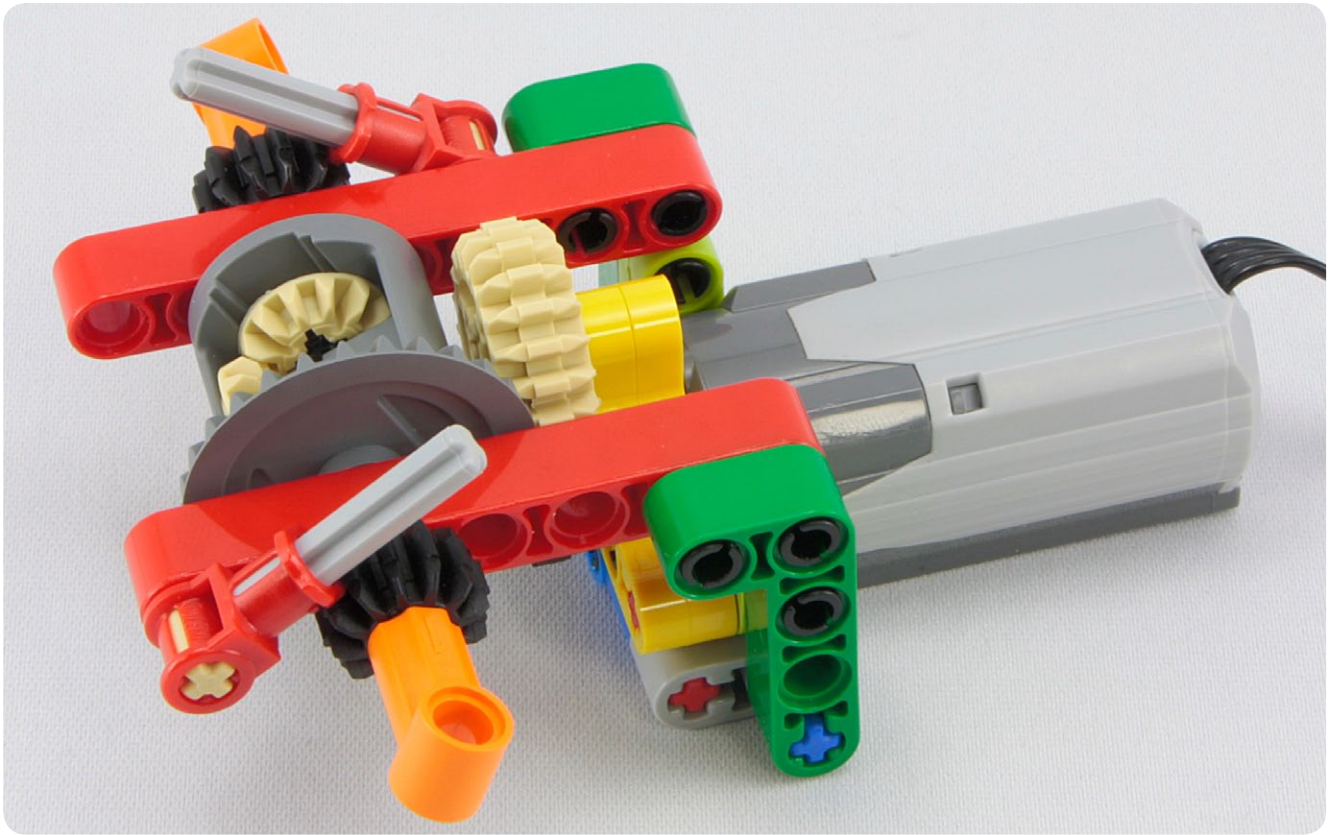
  x3  x2  4  x2  x3  x2  x4





#138

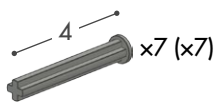
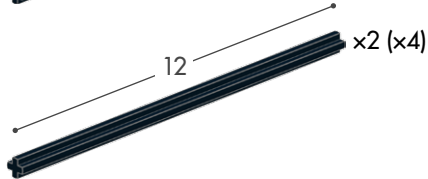
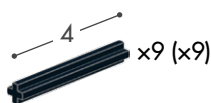
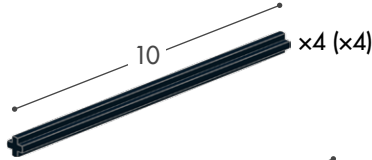
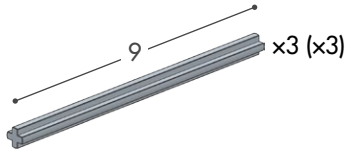
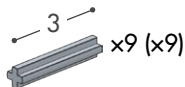
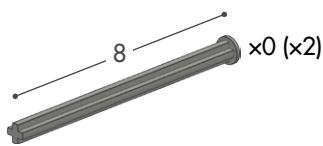
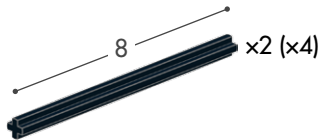
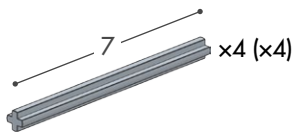
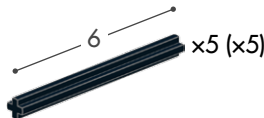
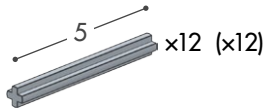
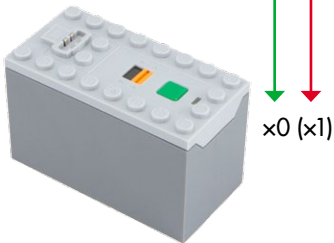


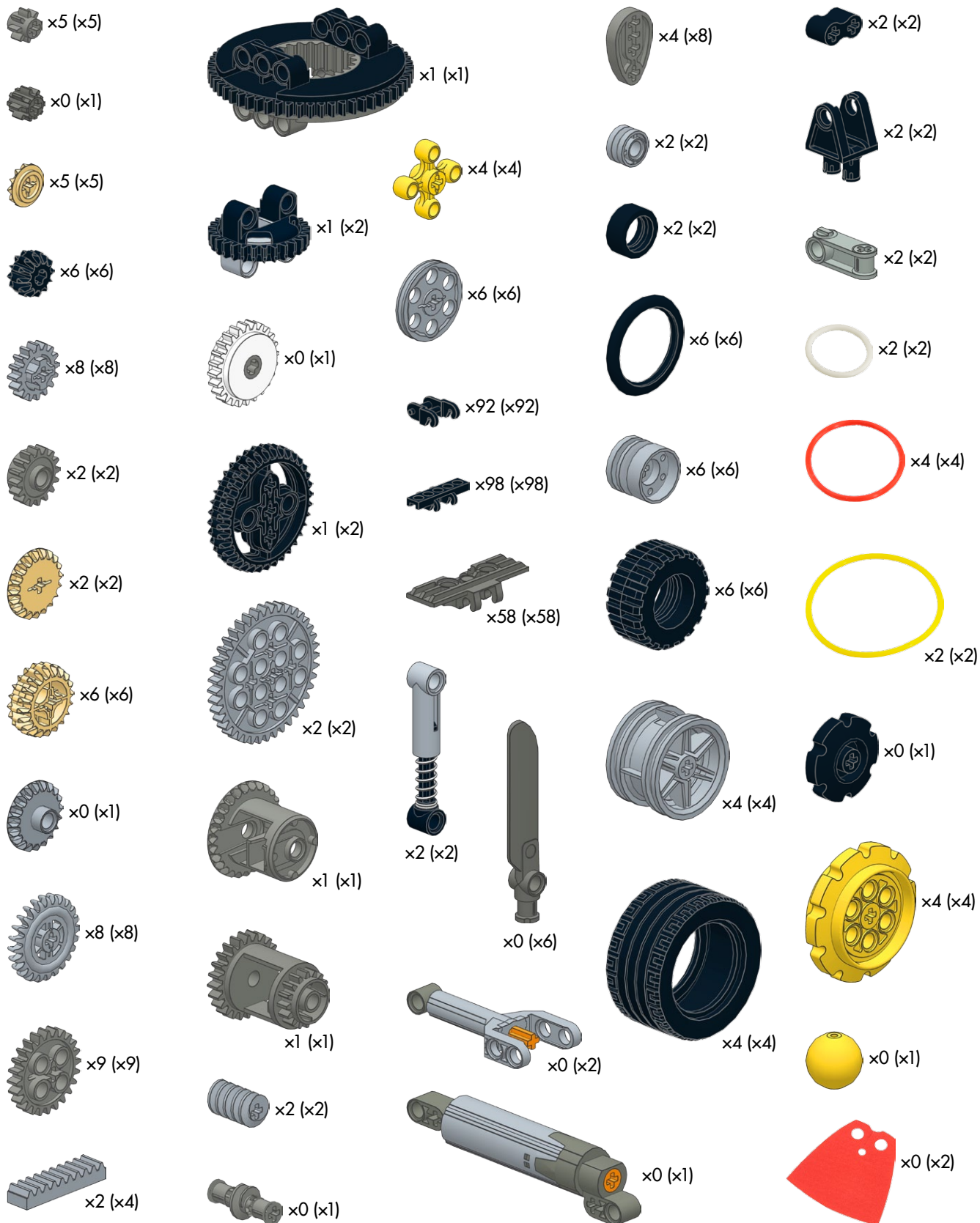


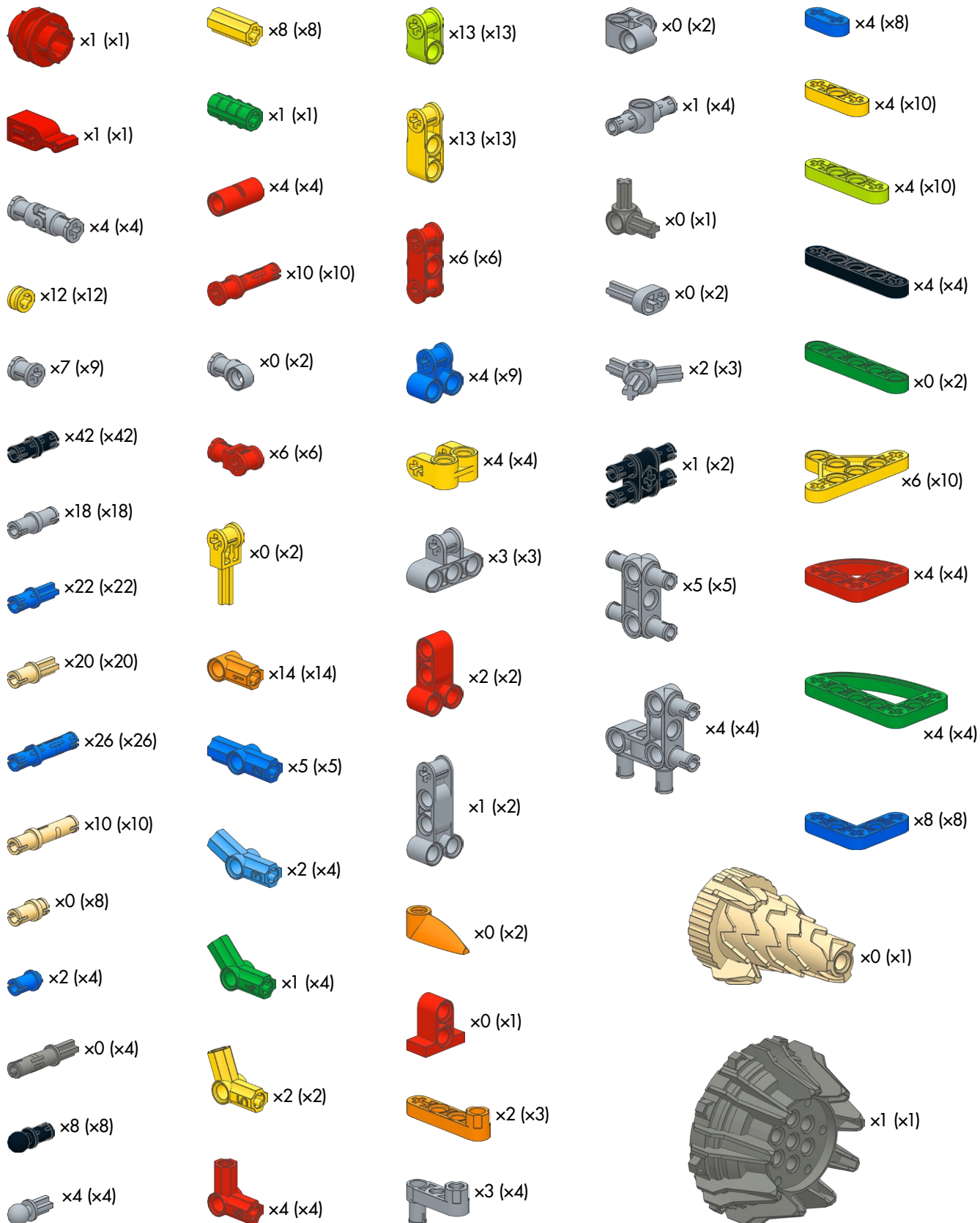
Parts list

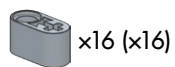
This is the maximum number of this part needed to build any single model in this book.

This is the maximum number of this part needed to build any single model in *both* volumes of *The LEGO Power Functions Idea Book* (*Machines and Mechanisms* and *Cars and Contraptions*).

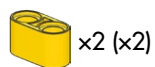




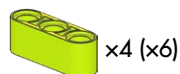




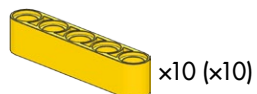
x16 (x16)



x2 (x2)



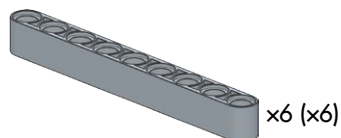
x4 (x6)



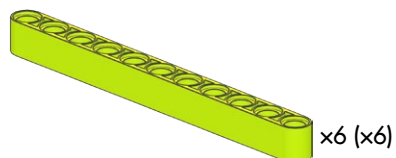
x10 (x10)



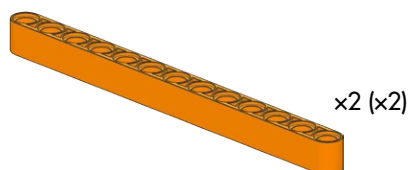
x6 (x7)



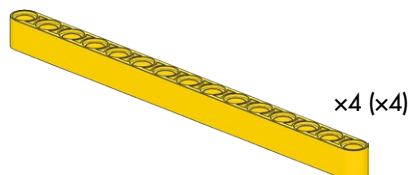
x6 (x6)



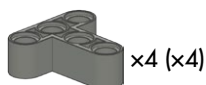
x6 (x6)



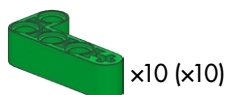
x2 (x2)



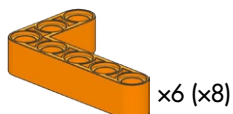
x4 (x4)



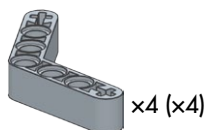
x4 (x4)



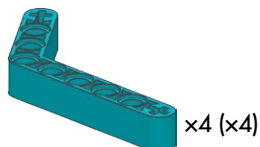
x10 (x10)



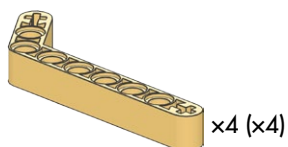
x6 (x8)



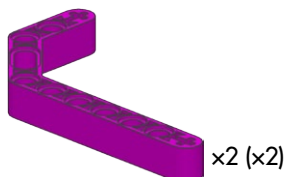
x4 (x4)



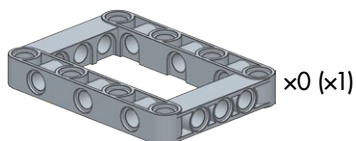
x4 (x4)



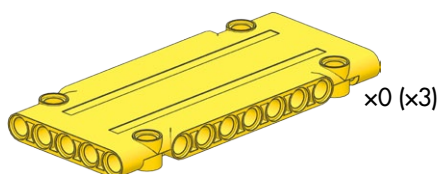
x4 (x4)



x2 (x2)



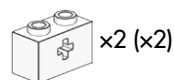
x0 (x1)



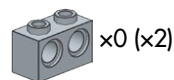
x0 (x3)



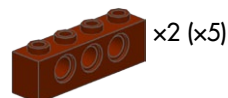
x2 (x2)



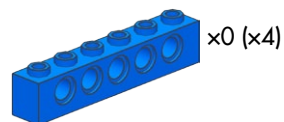
x2 (x2)



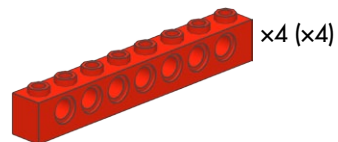
x0 (x2)



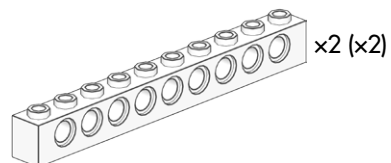
x2 (x5)



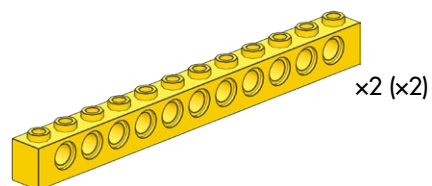
x0 (x4)



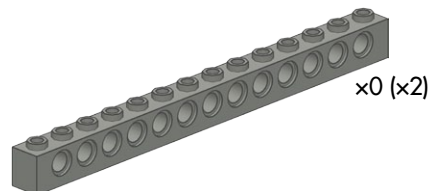
x4 (x4)



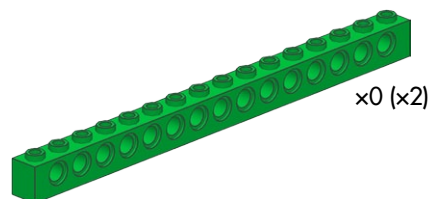
x2 (x2)



x2 (x2)



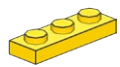
x0 (x2)



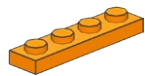
x0 (x2)



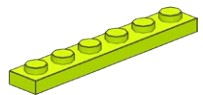
x2 (x2)



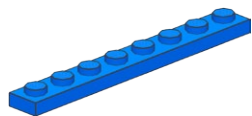
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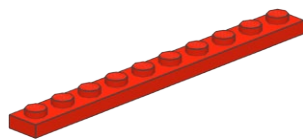
x2 (x4)



x2 (x2)



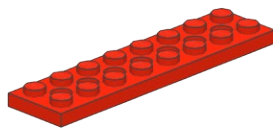
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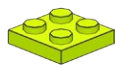
x1 (x2)



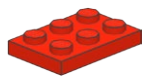
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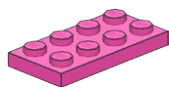
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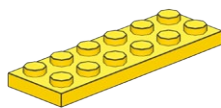
x0 (x2)



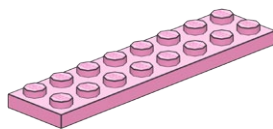
x1 (x1)



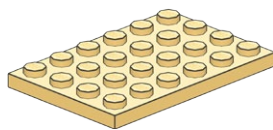
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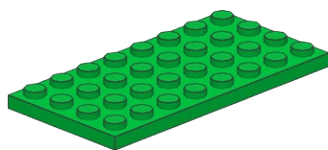
x0 (x1)



x1 (x1)



x1 (x1)



x0 (x2)



x0 (x2)



x1 (x1)



x1 (x1)



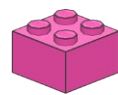
x0 (x1)



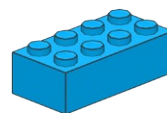
x0 (x2)



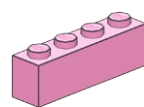
x3 (x3)



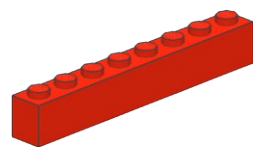
x0 (x3)



x1 (x1)



x0 (x10)



x0 (x1)

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