

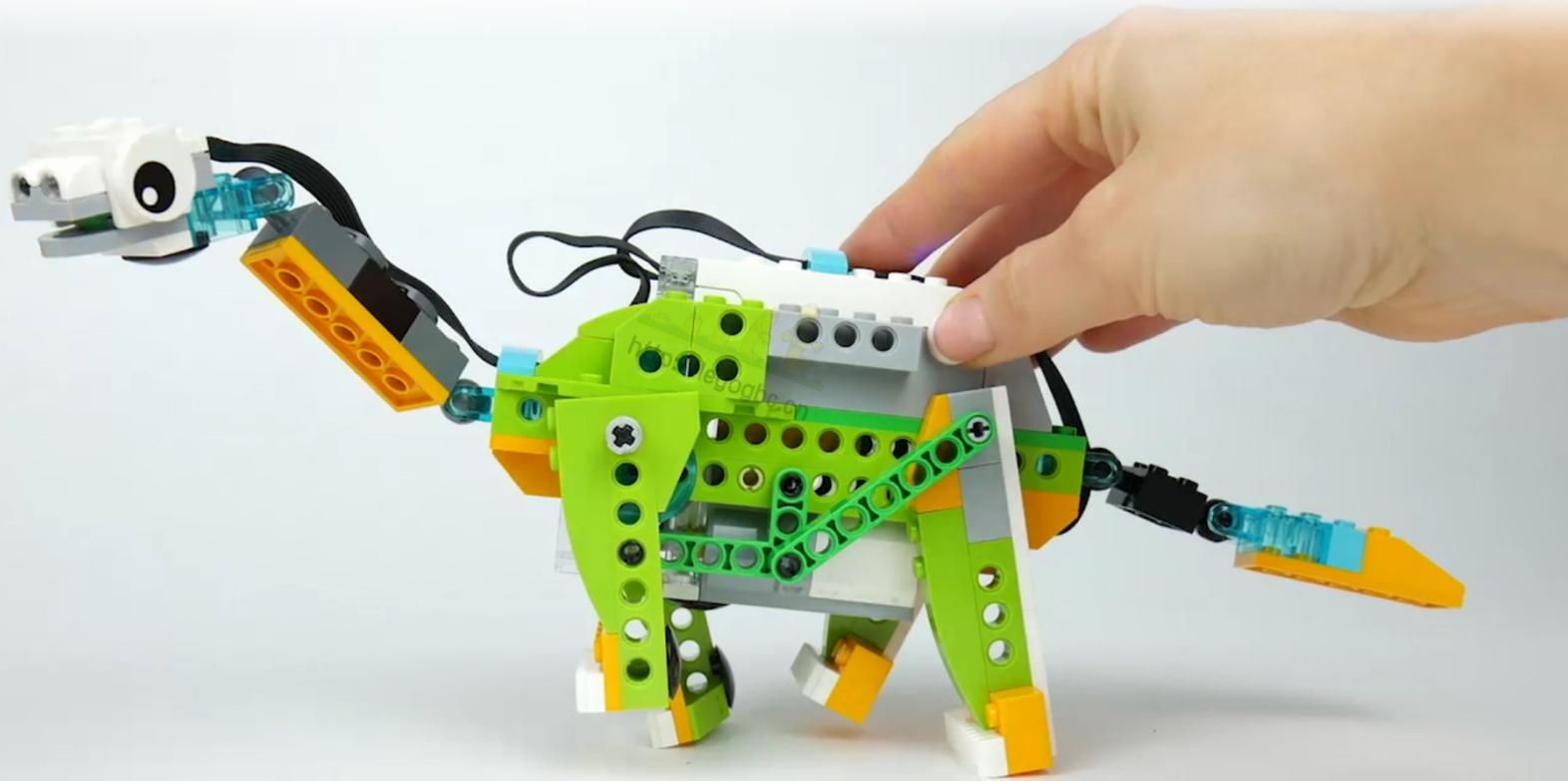


# Design features



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The robot has a moving head and tail. So it can exactly imitate the real dinosaur.



roboriseit.com



3



34



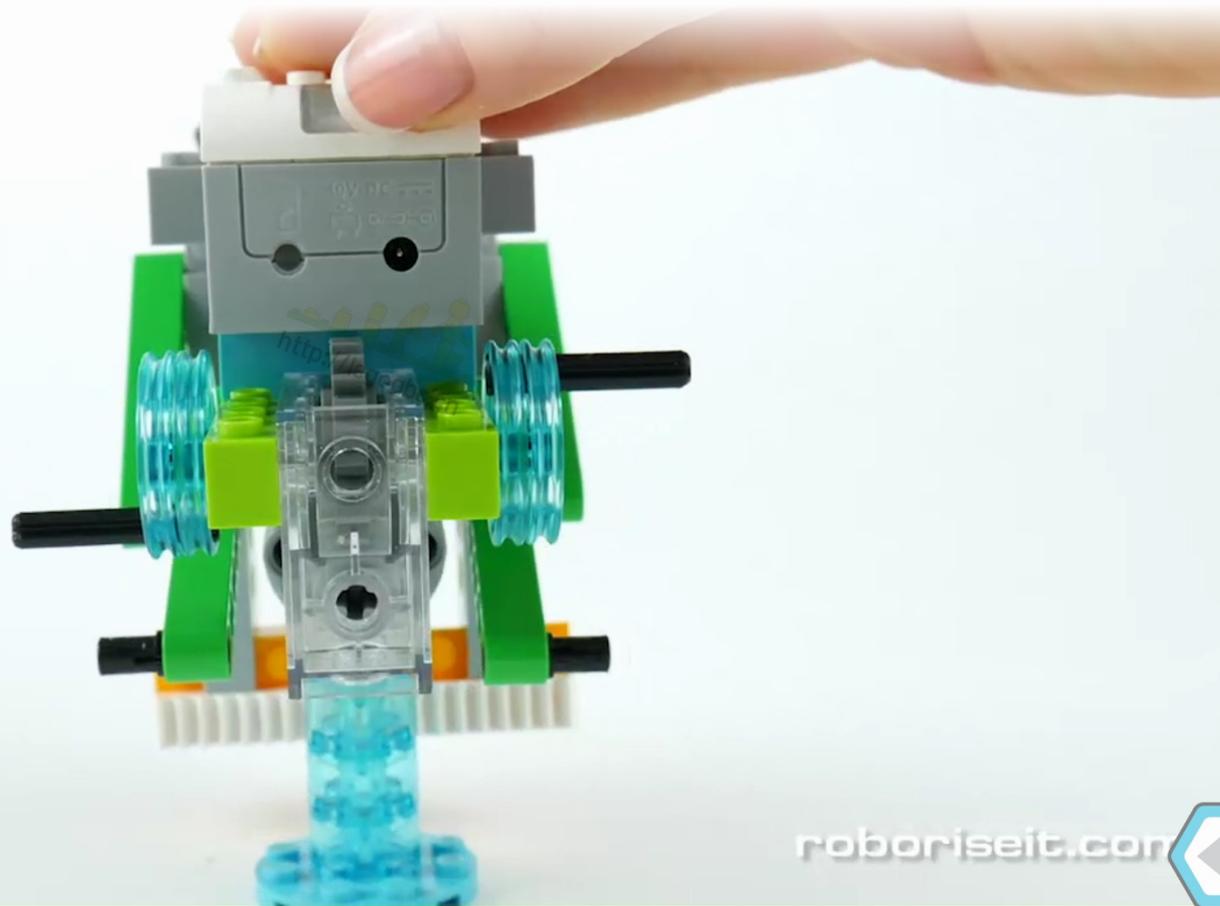


# Pay attention!



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When building the robot correctly fix the crank mechanism. If on the left it is at the top point, on the right it should be in the bottom, and vice versa:



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3



35





# Build the robot!



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## Sauropod



3

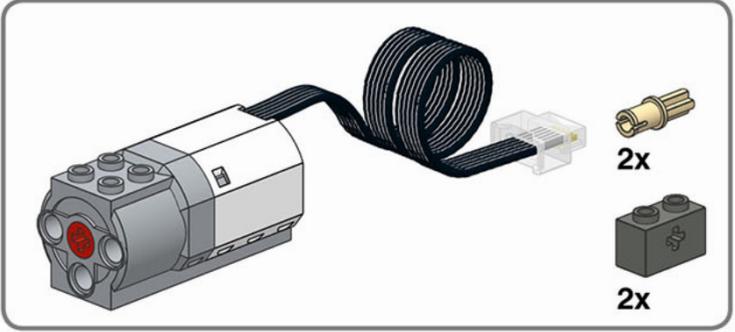


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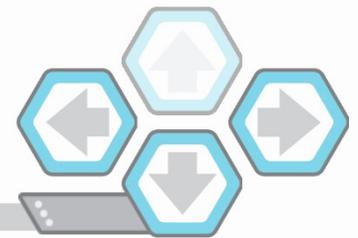
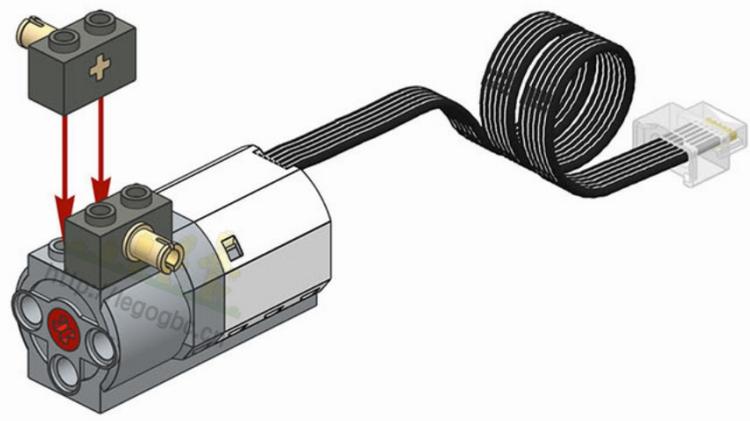




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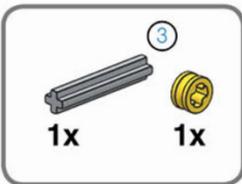


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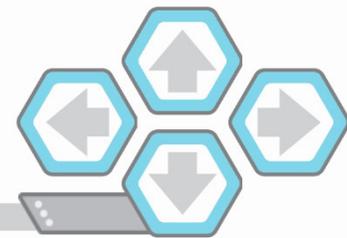
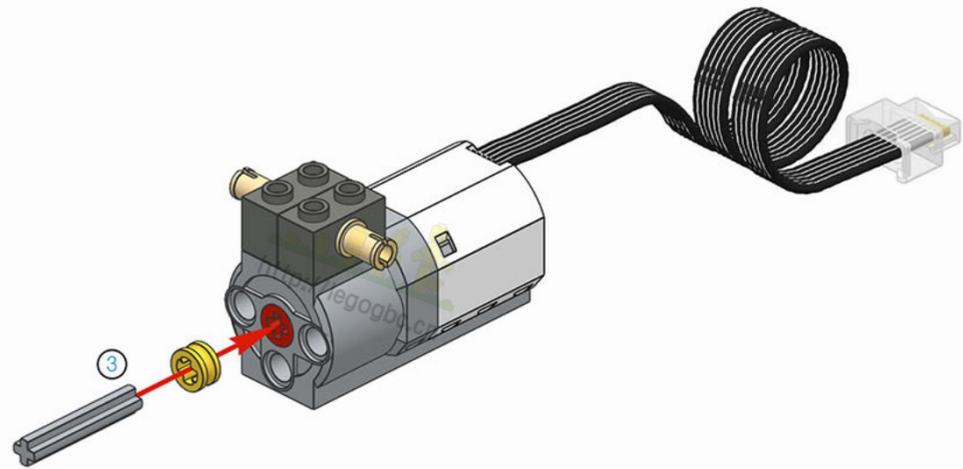




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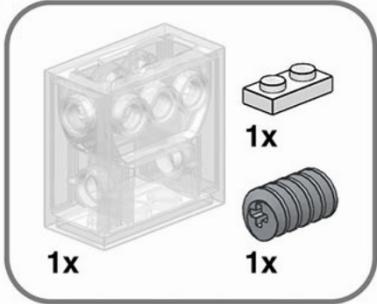


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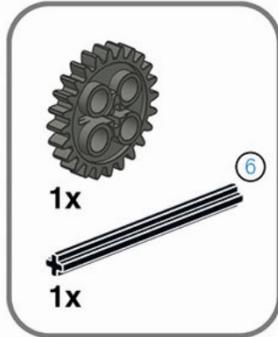
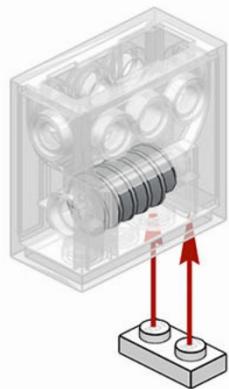




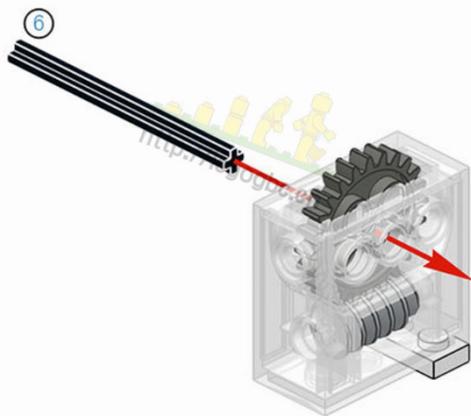
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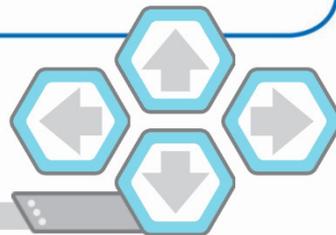
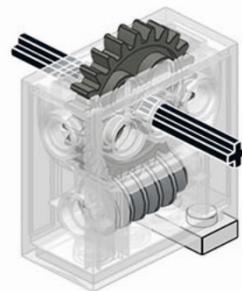
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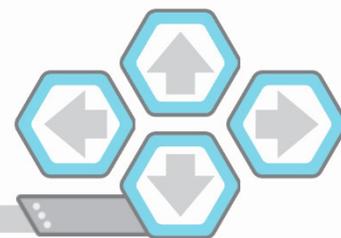
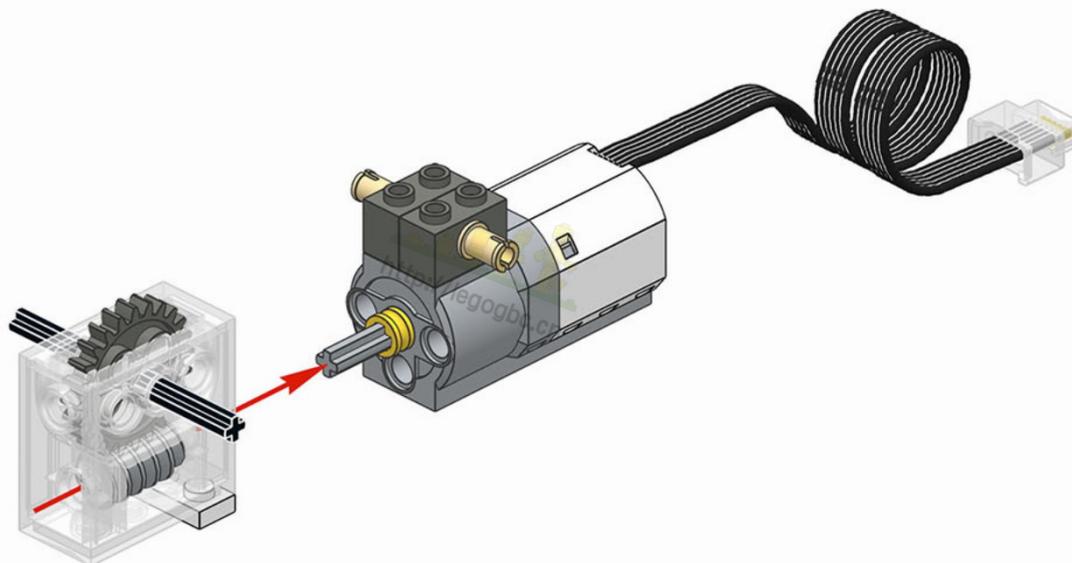
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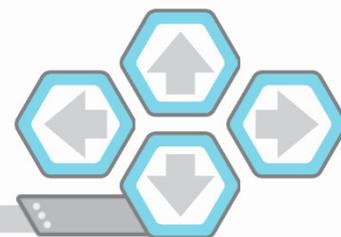
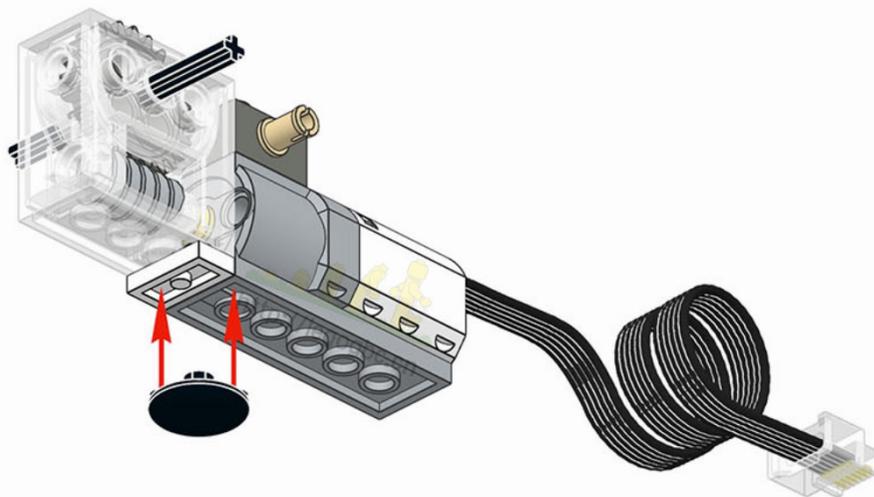




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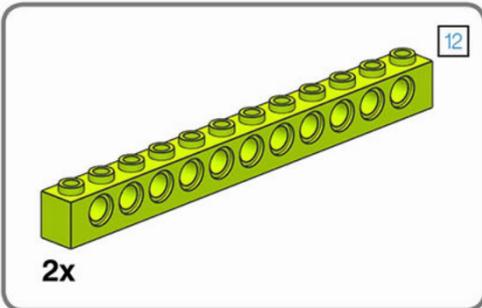


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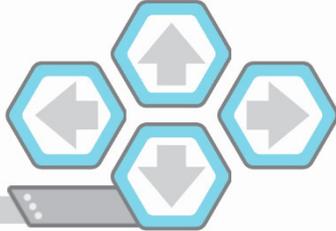
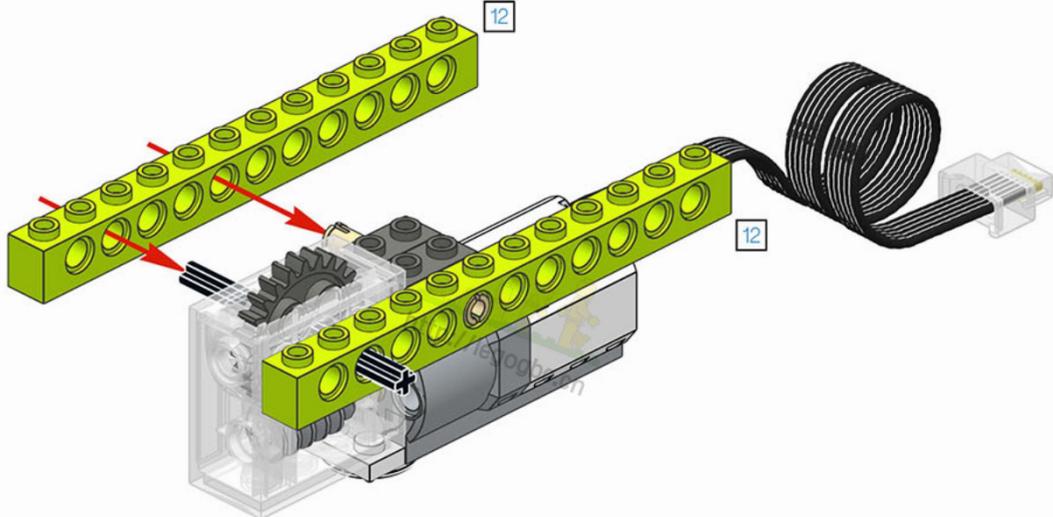




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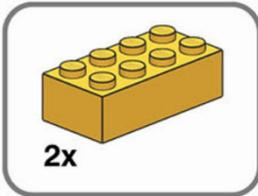


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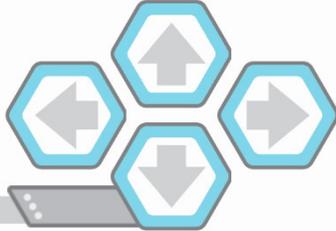
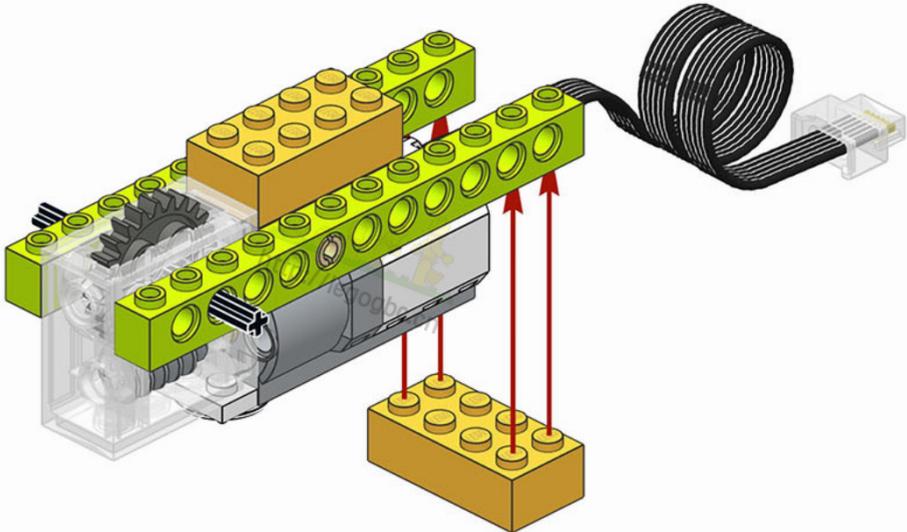




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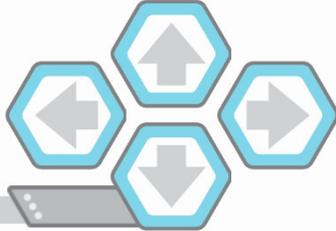
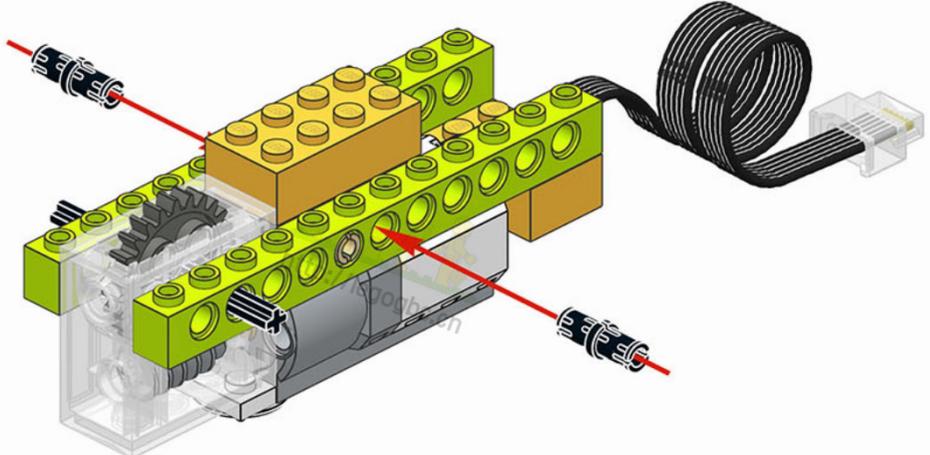




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8





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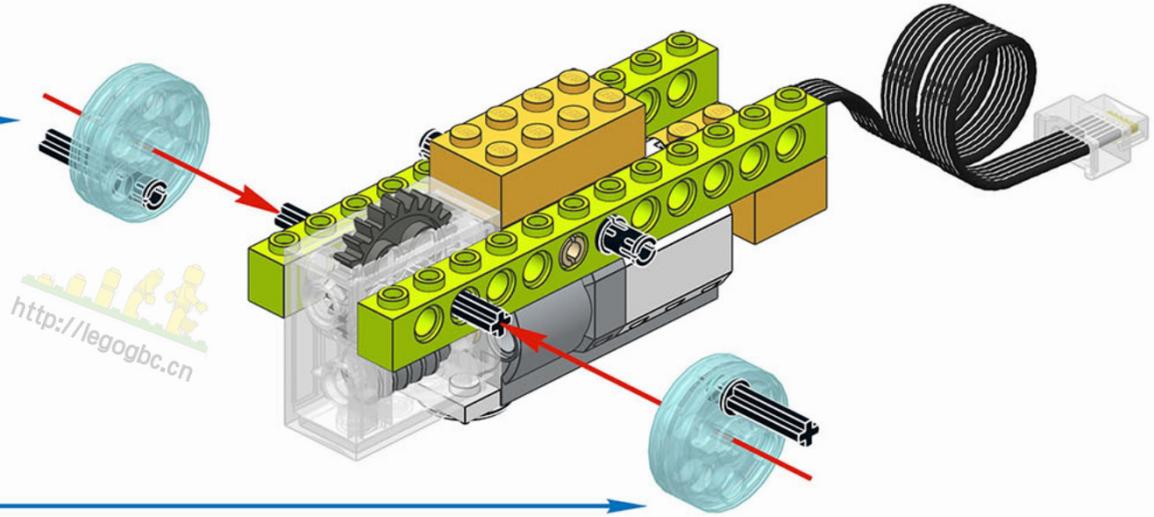
**1x** **2x**

**1**

**2**

**2x**

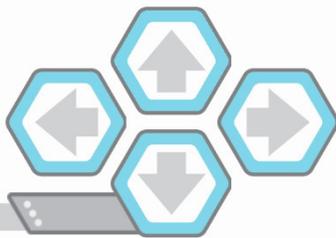
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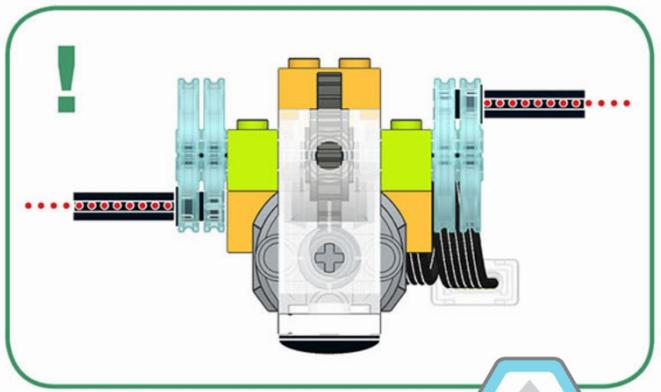
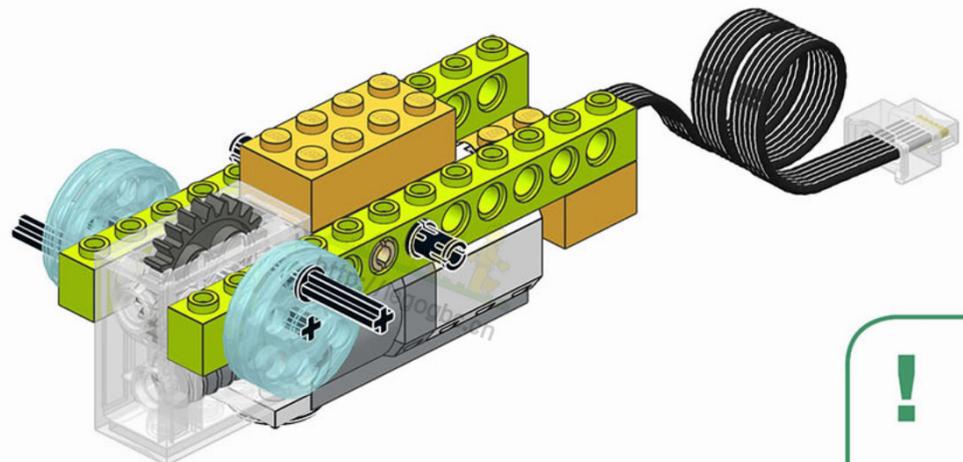
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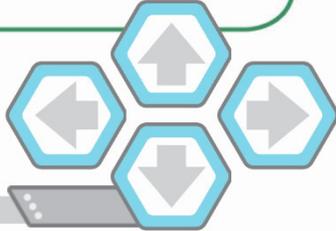
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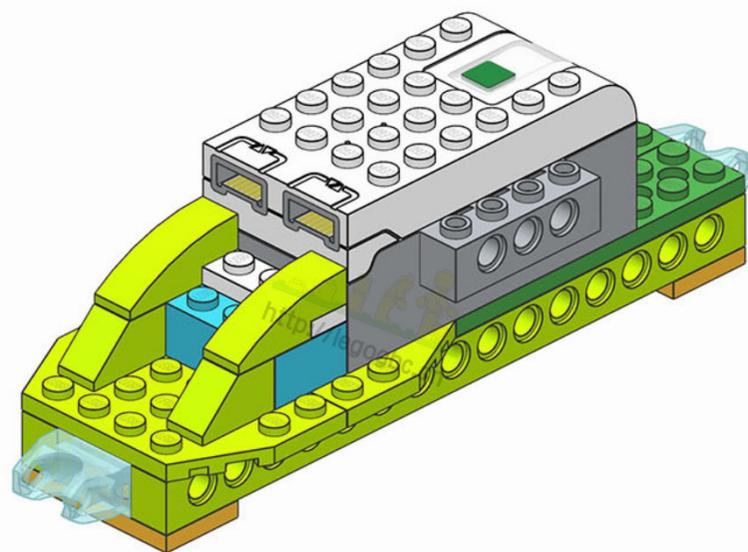
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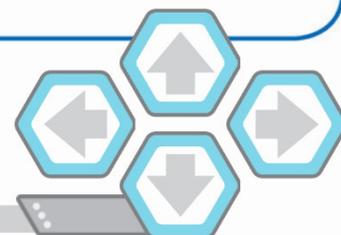
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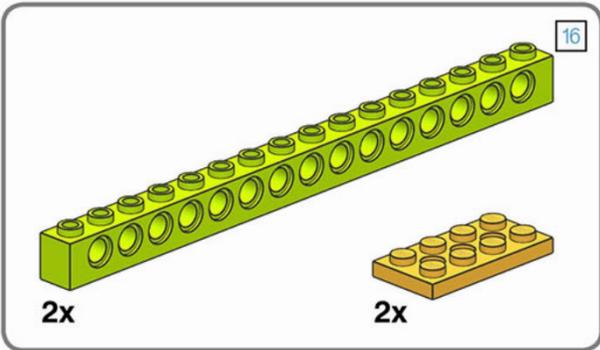
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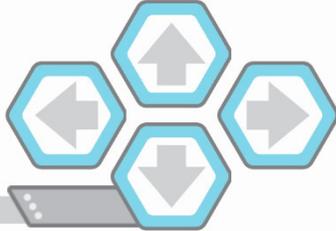
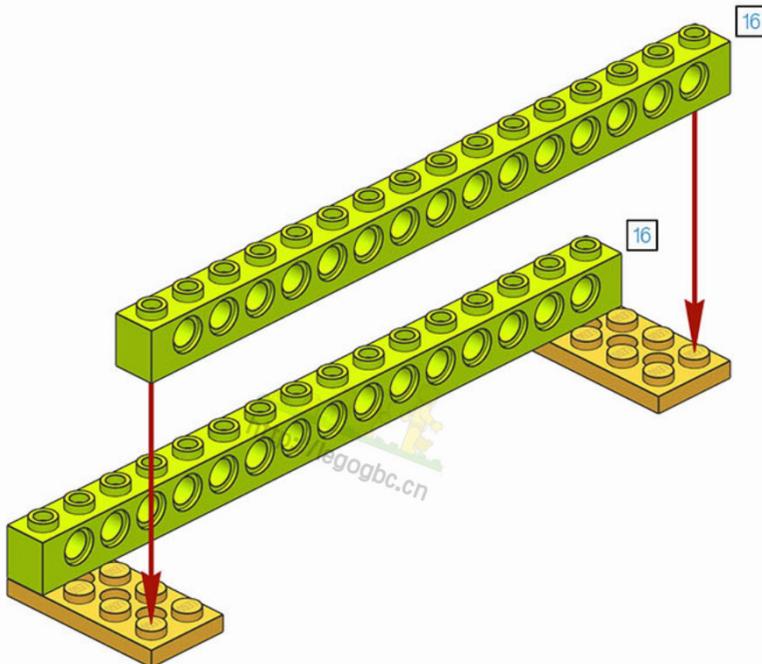




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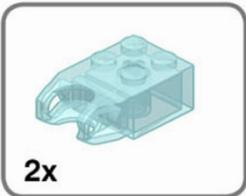


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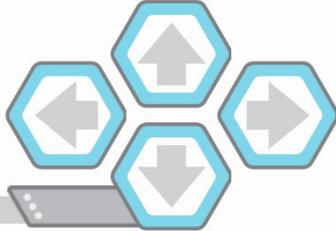
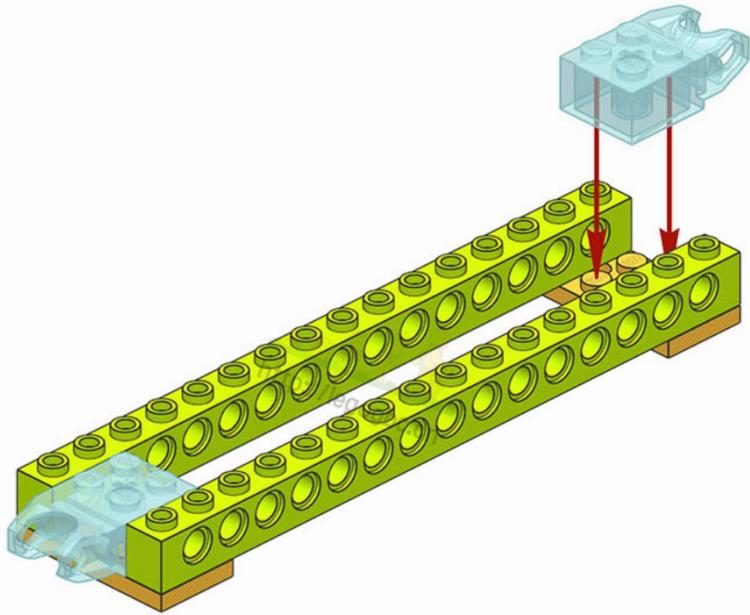




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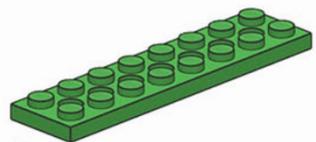


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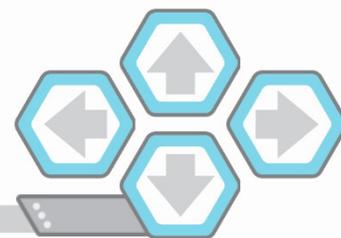
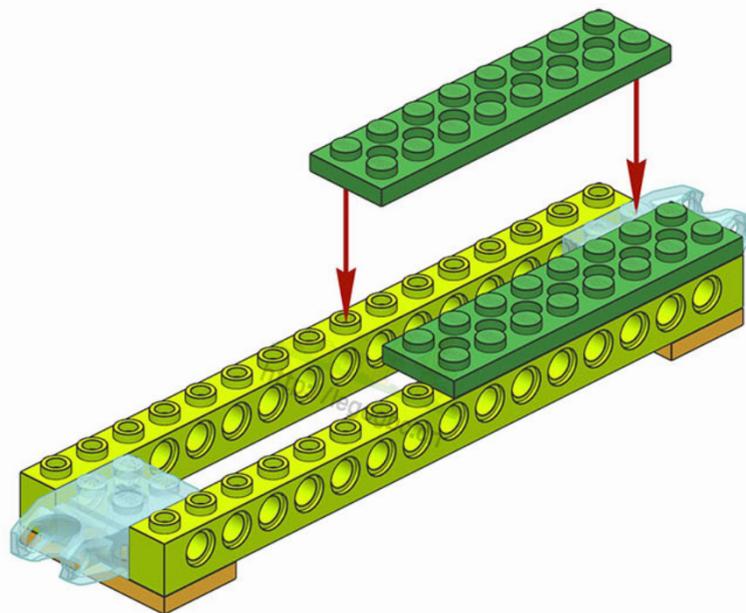


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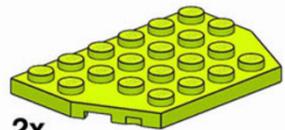
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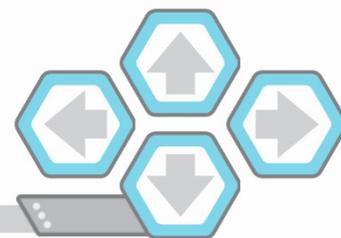
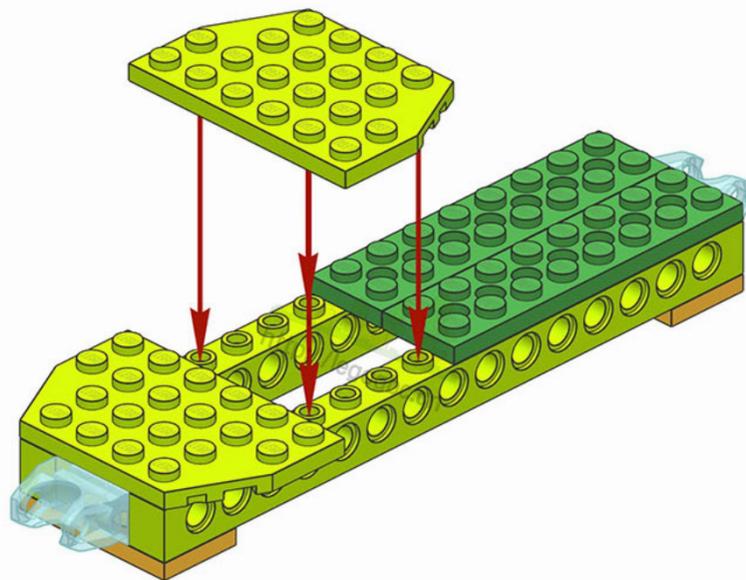


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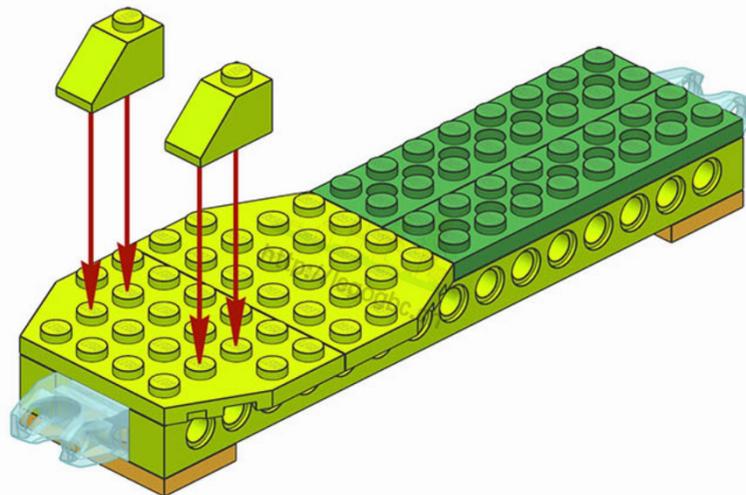


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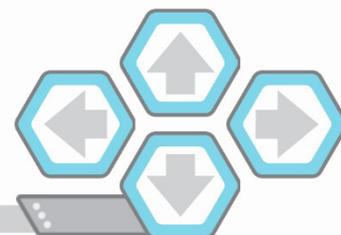
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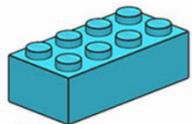
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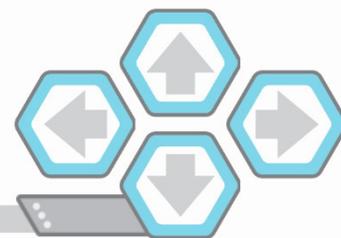
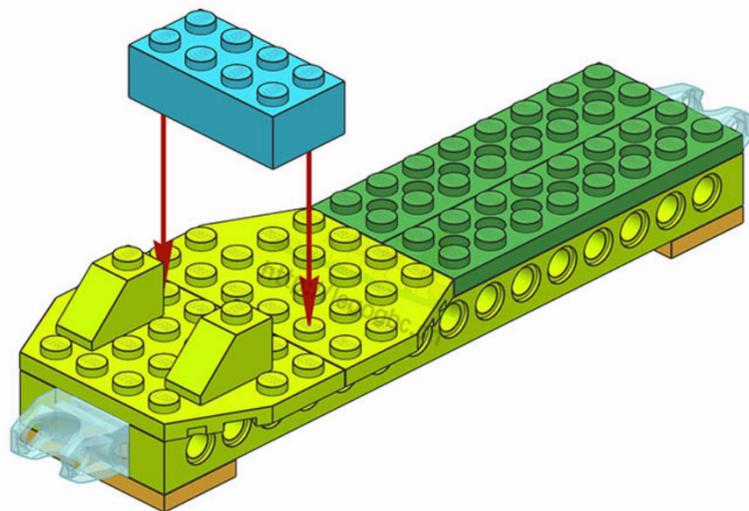


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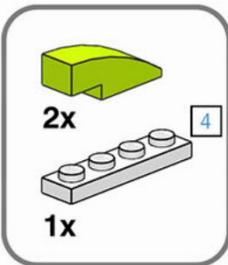
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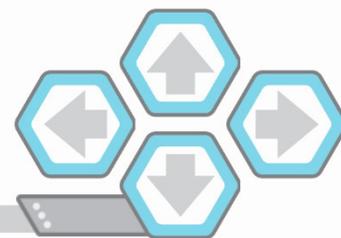
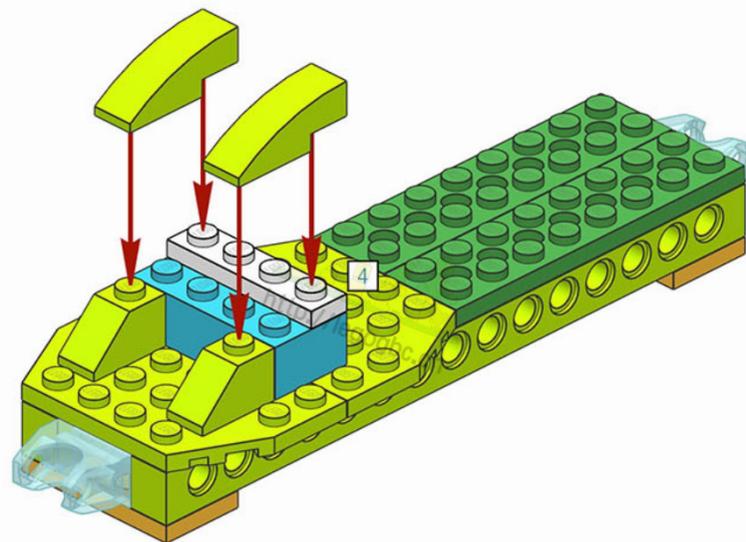




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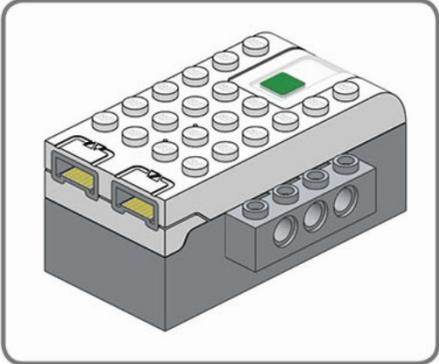


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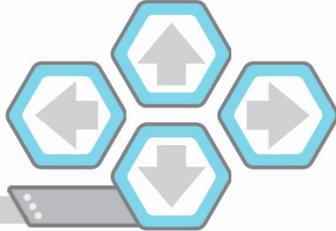
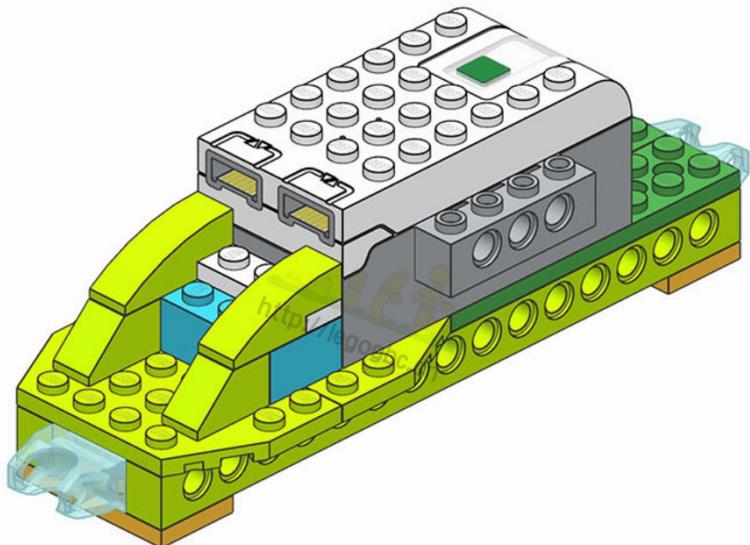




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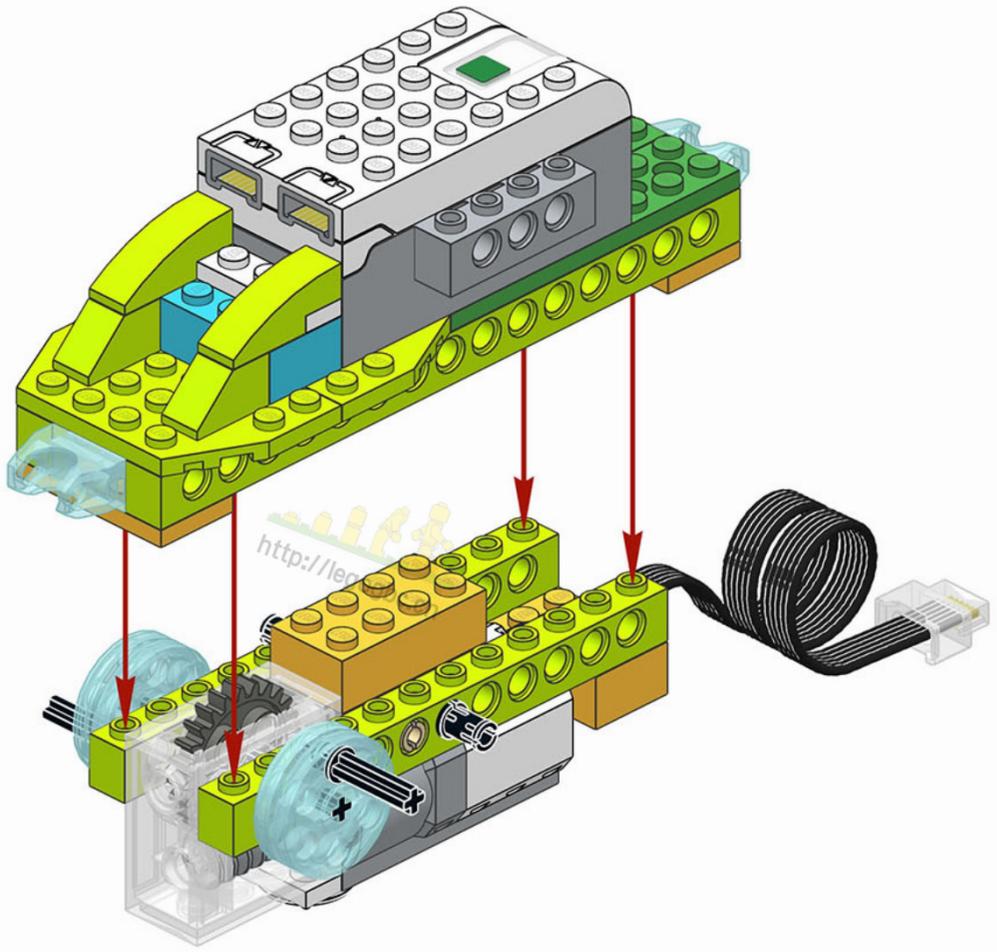
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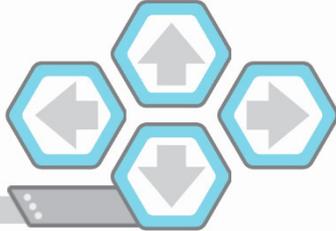


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20/56

3

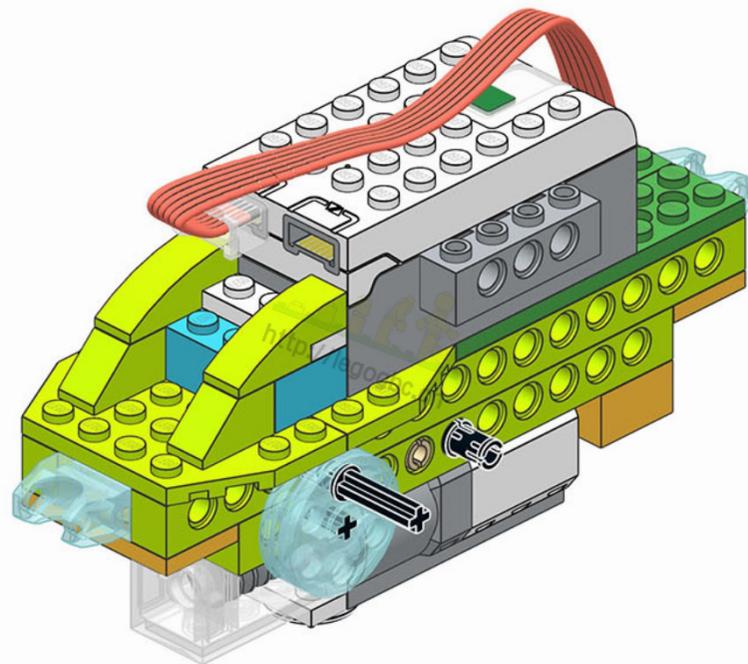
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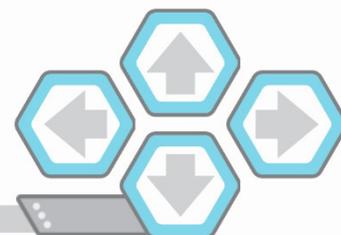
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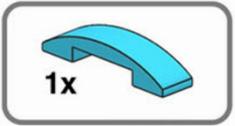
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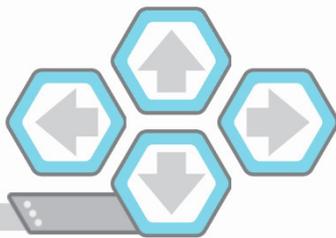
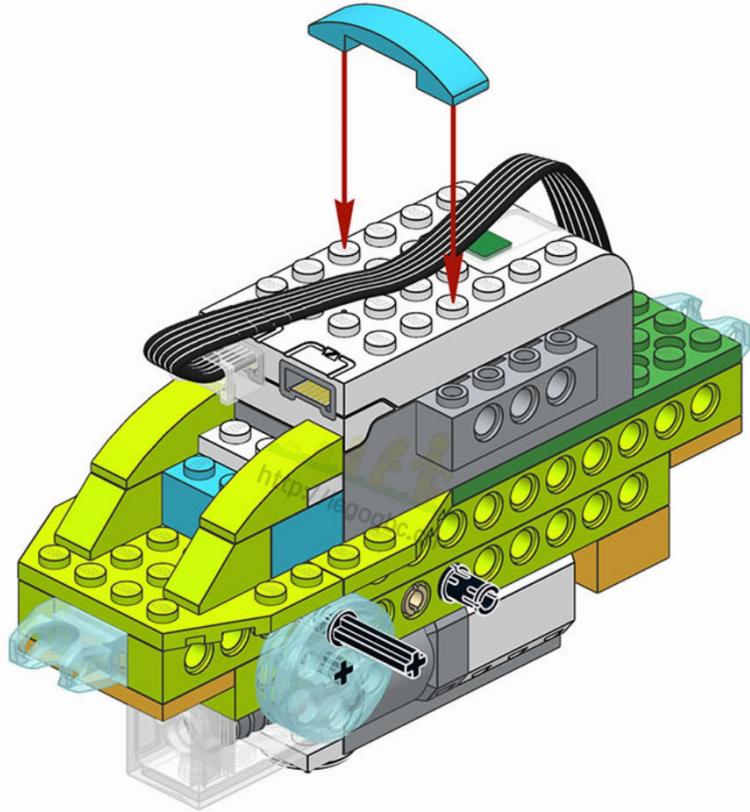




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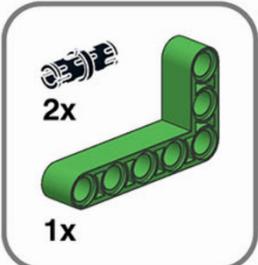


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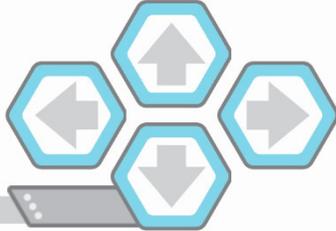
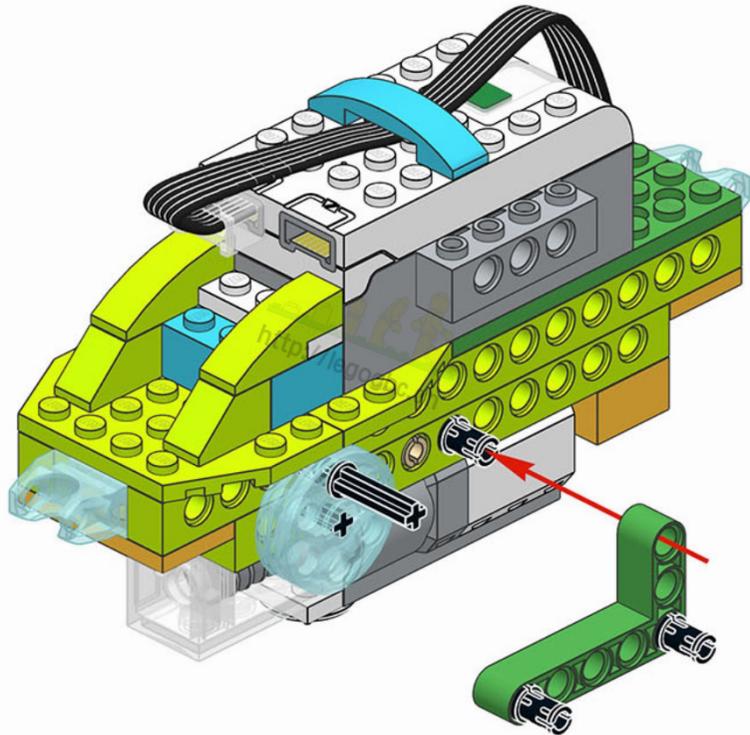




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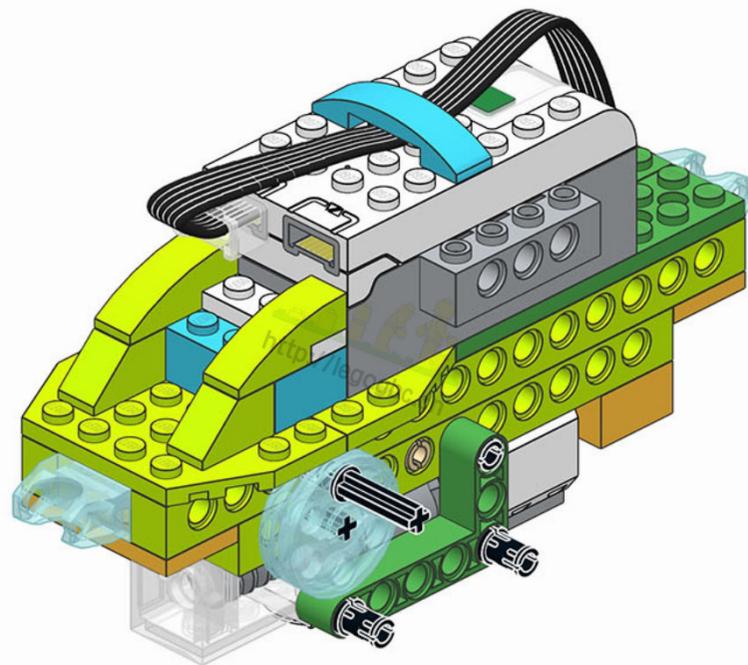
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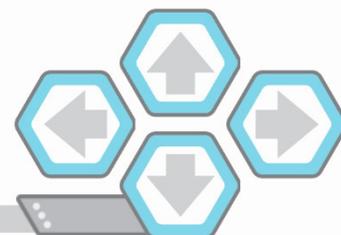
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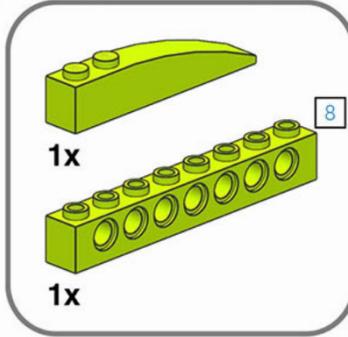
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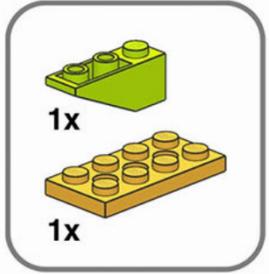
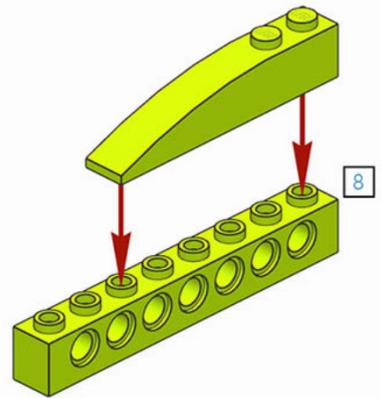




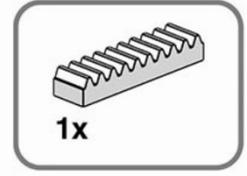
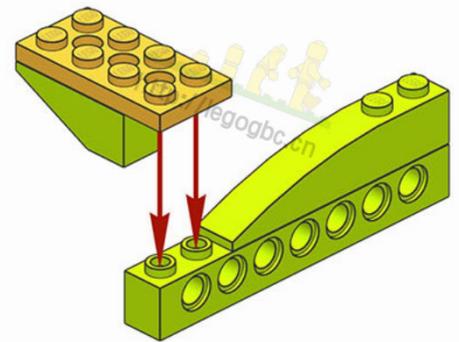
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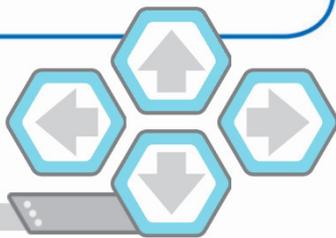
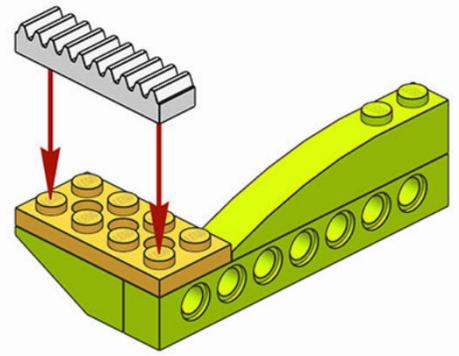
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2



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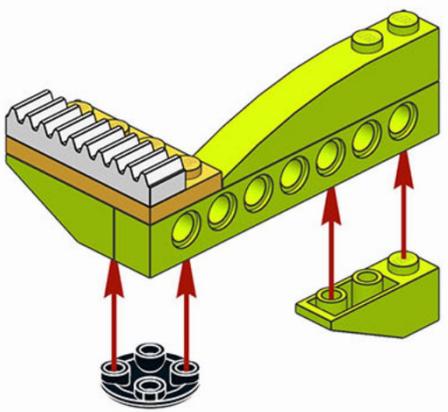




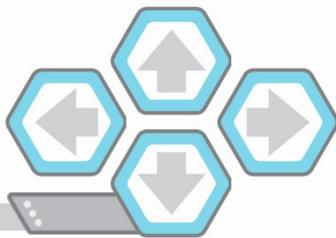
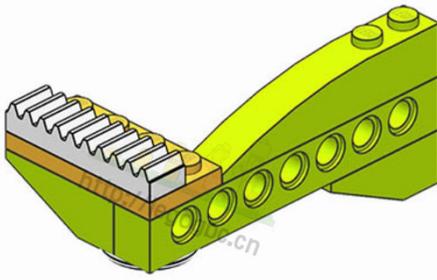
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4



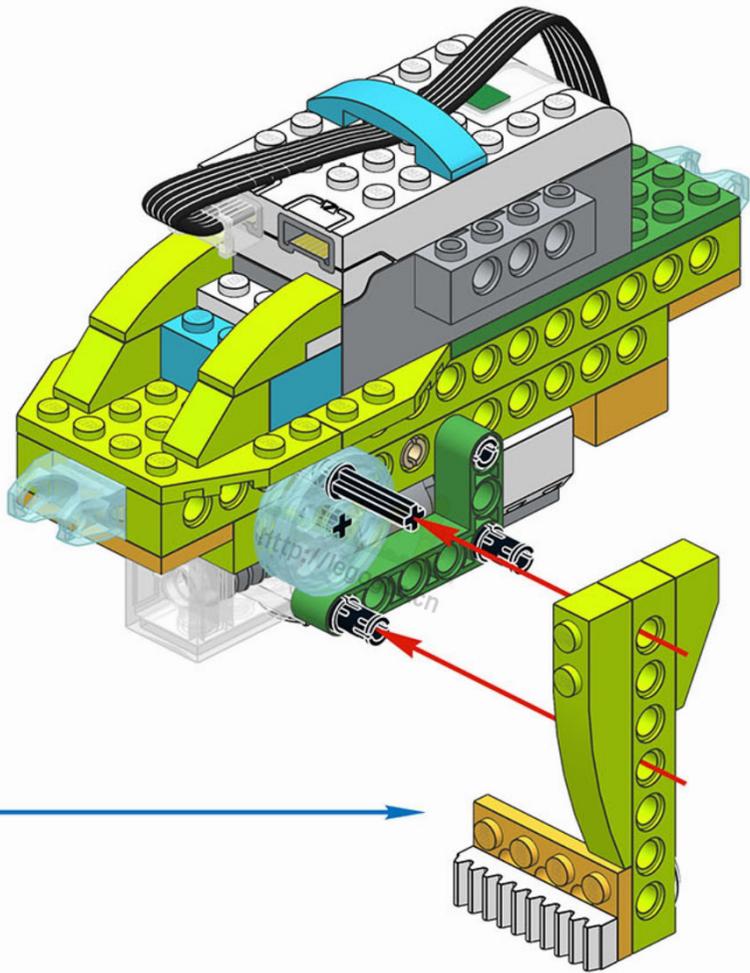
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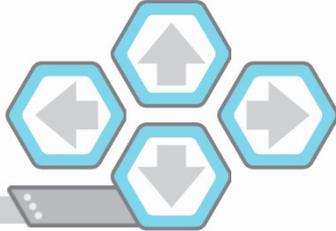
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3

63



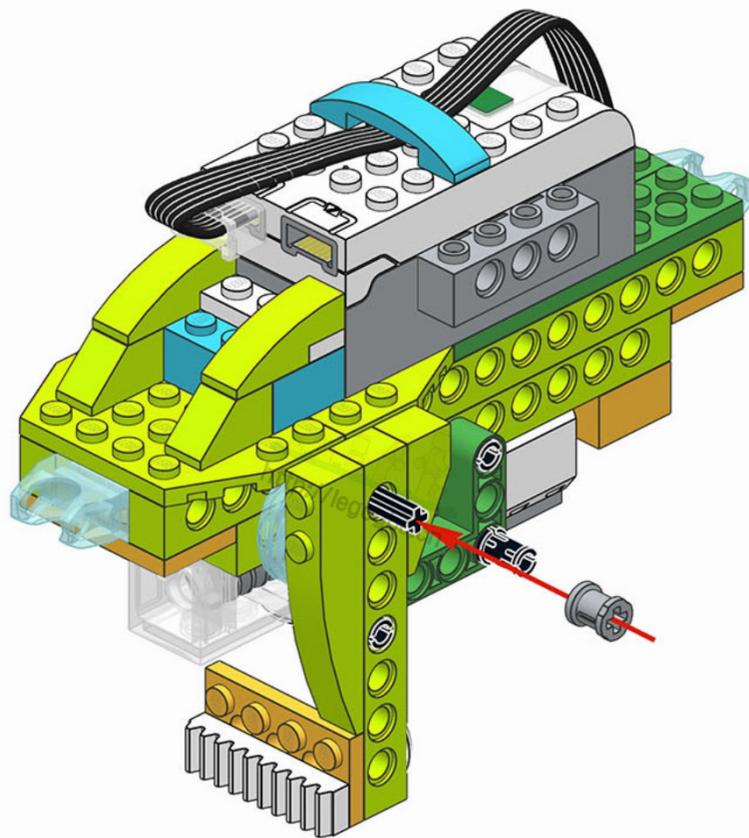


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1x

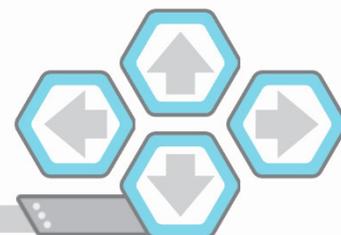
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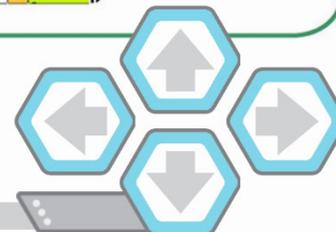
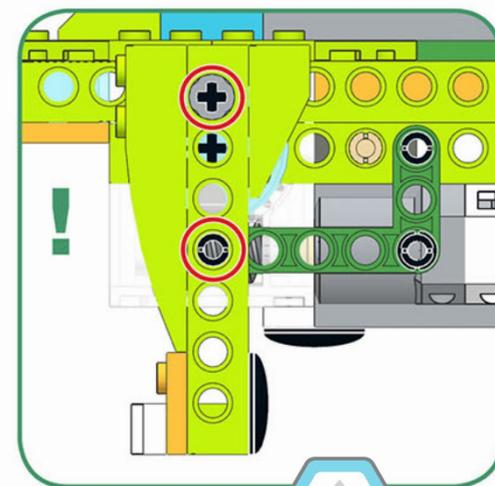
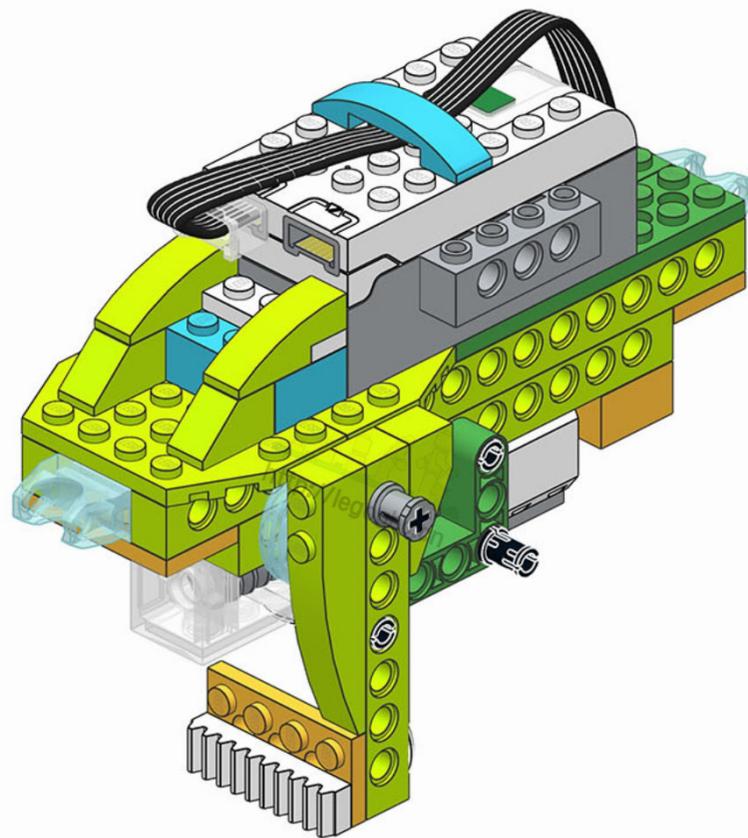
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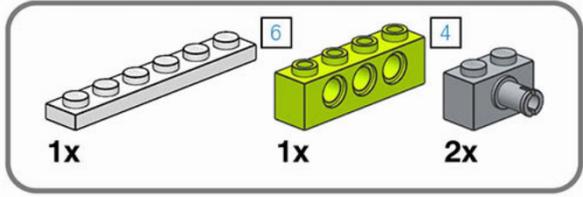
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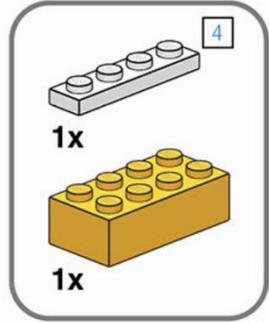
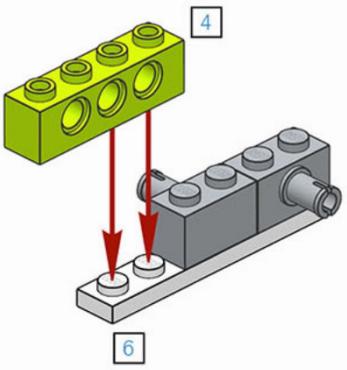




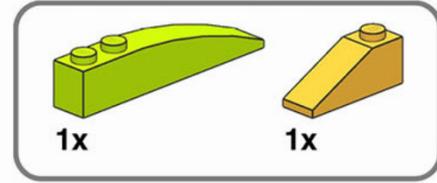
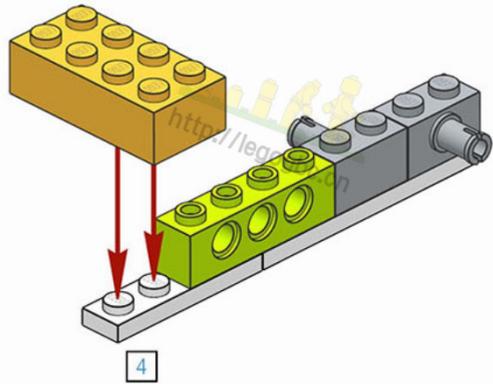
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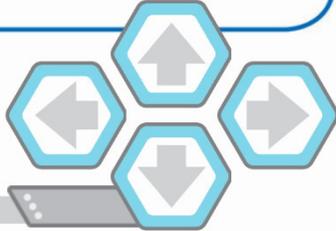
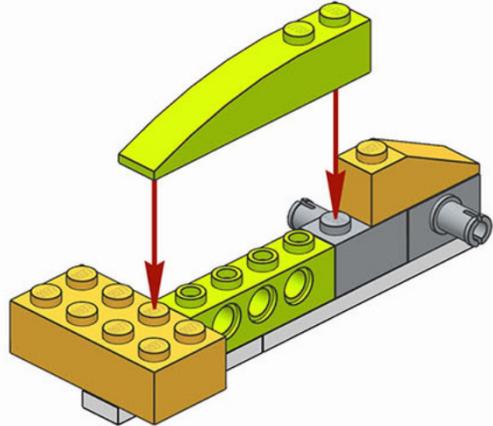
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2

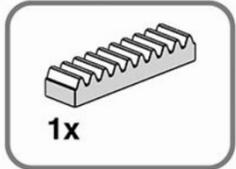


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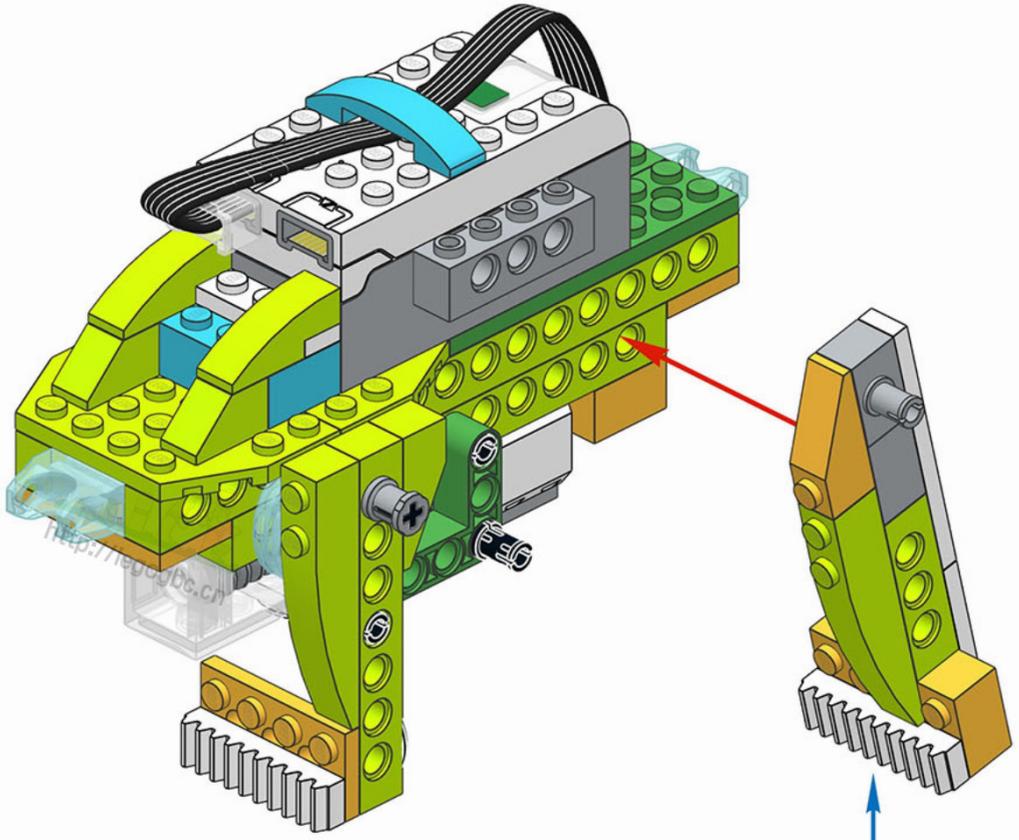
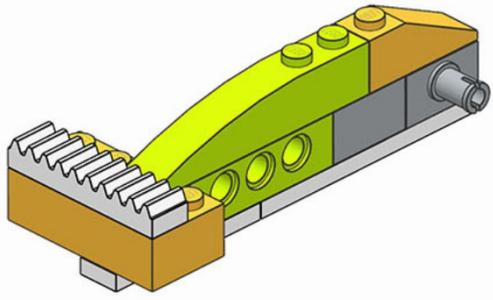


关注公众号获取更多



1x

4



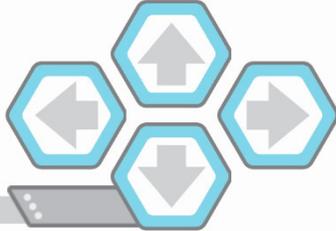
31/56



3

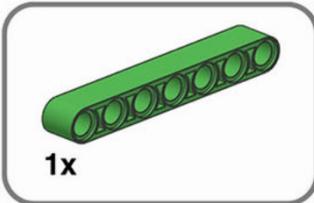


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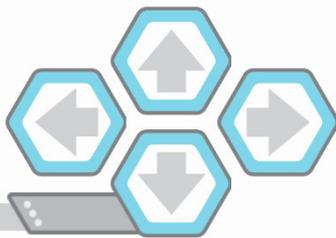
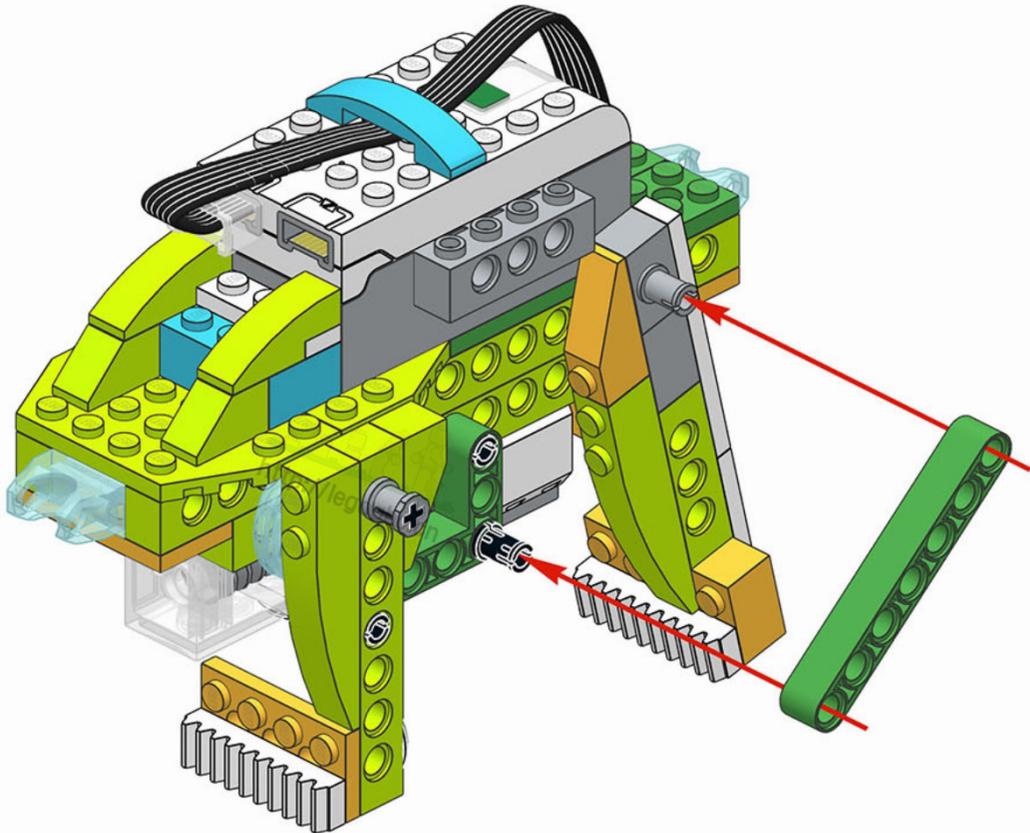


关注公众号获取更多



1x

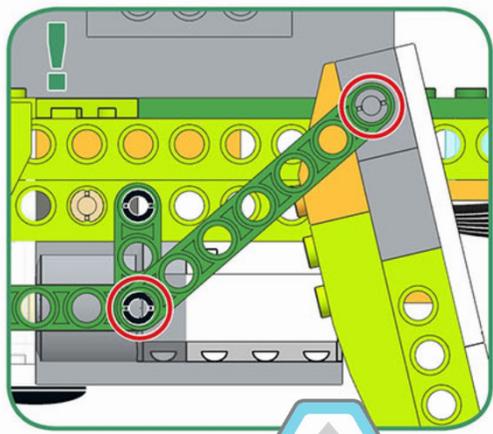
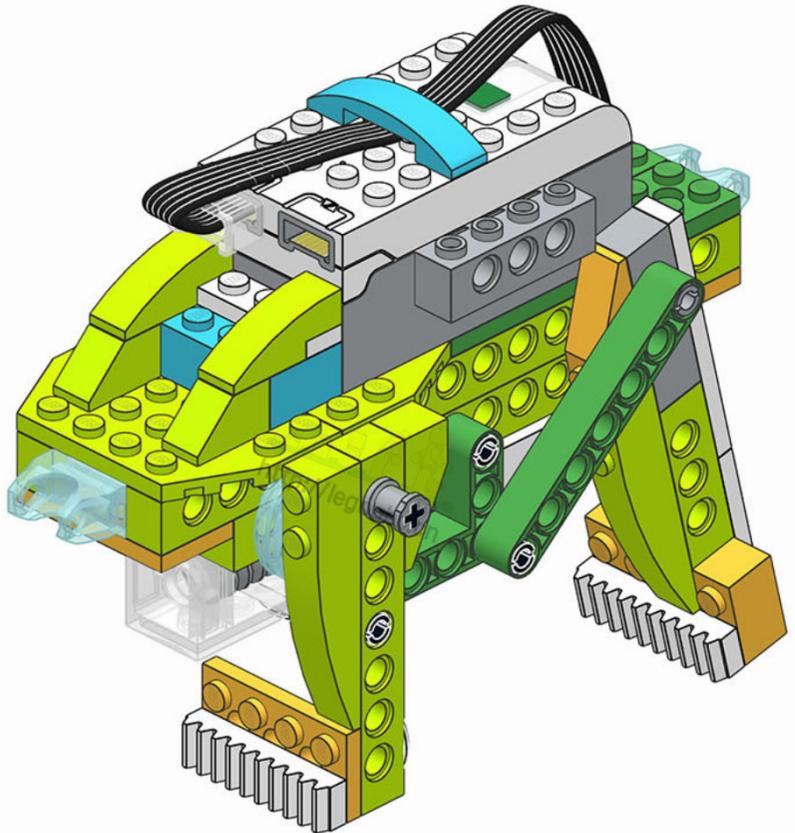
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关注公众号获取更多

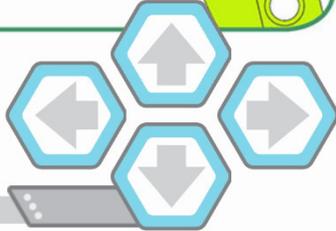
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33/56

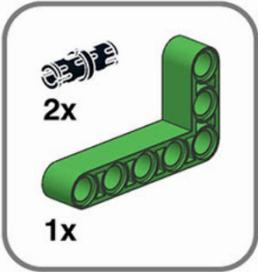
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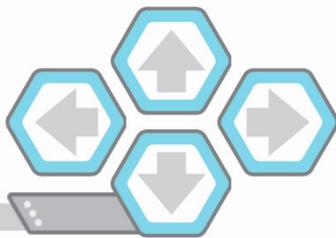
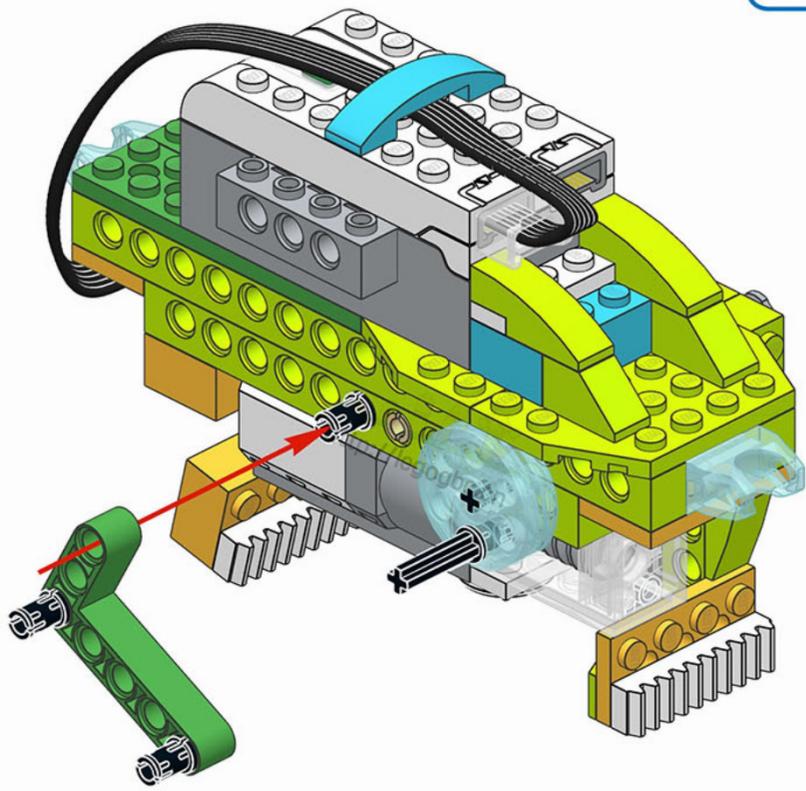




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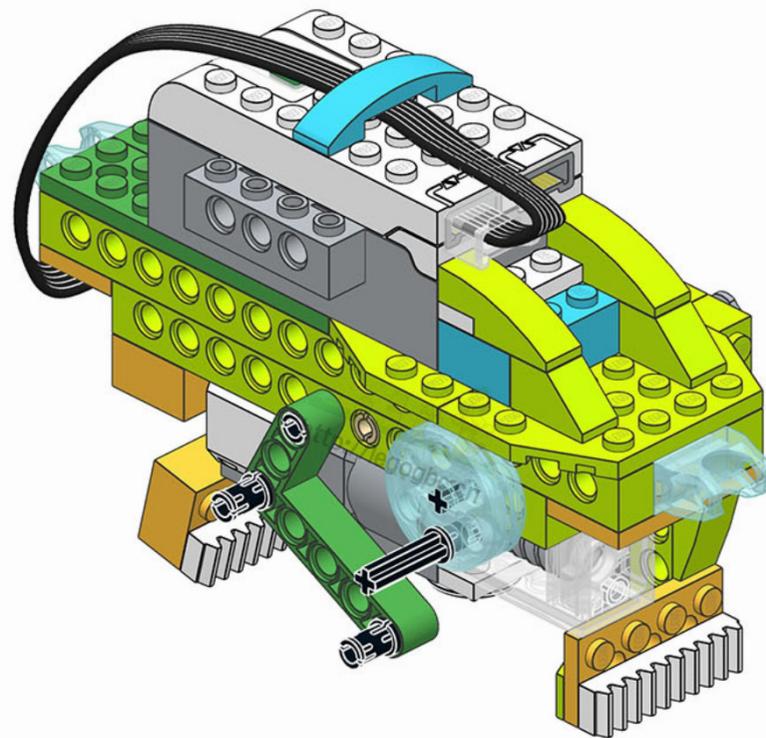
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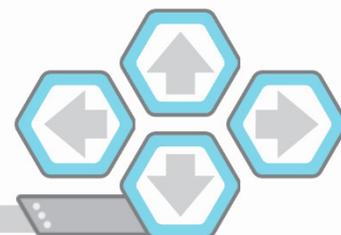
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35/56

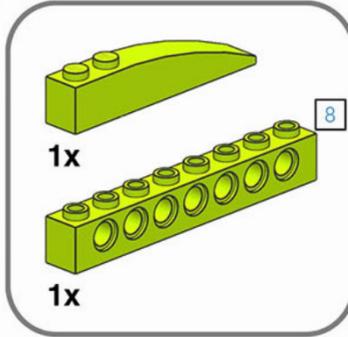
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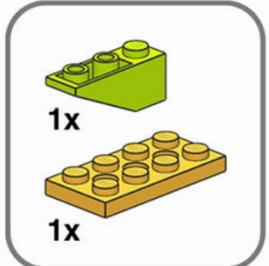
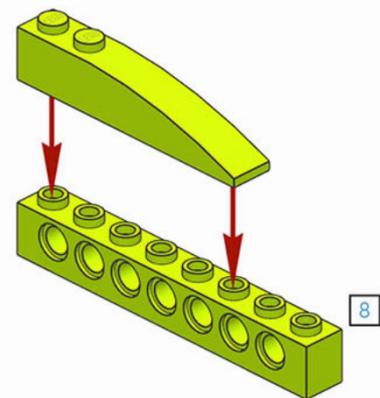




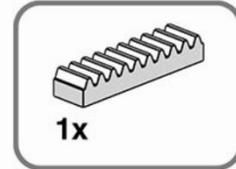
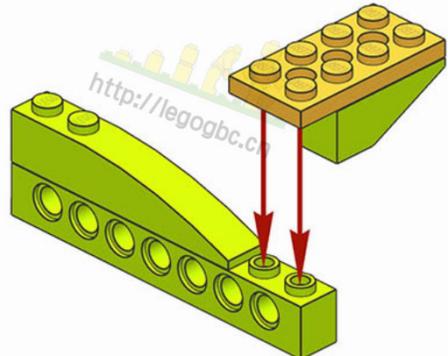
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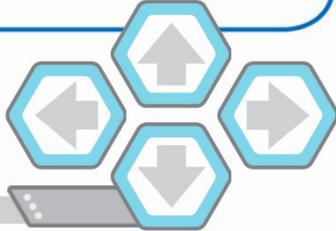
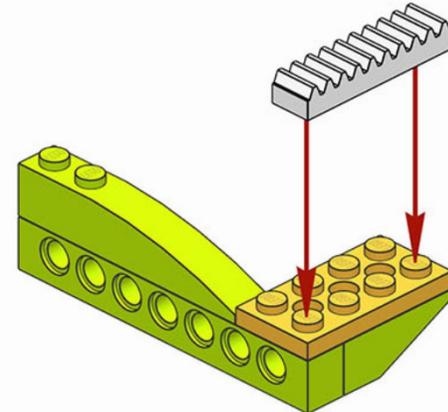
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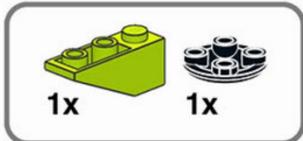


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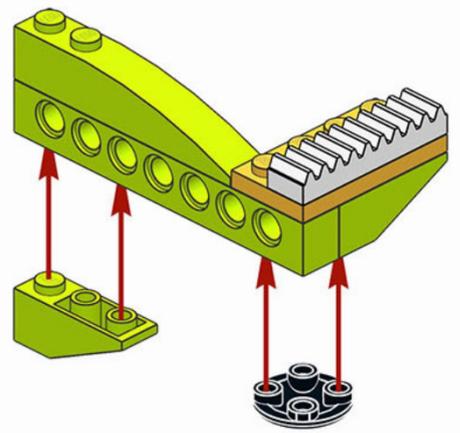




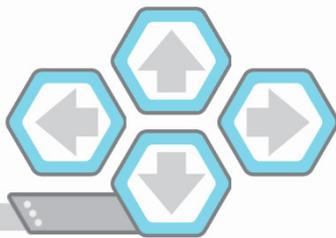
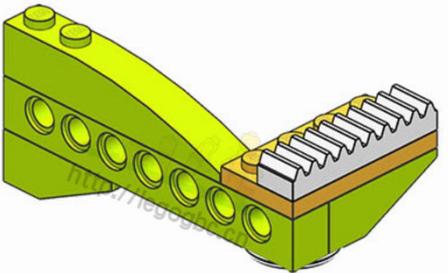
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4



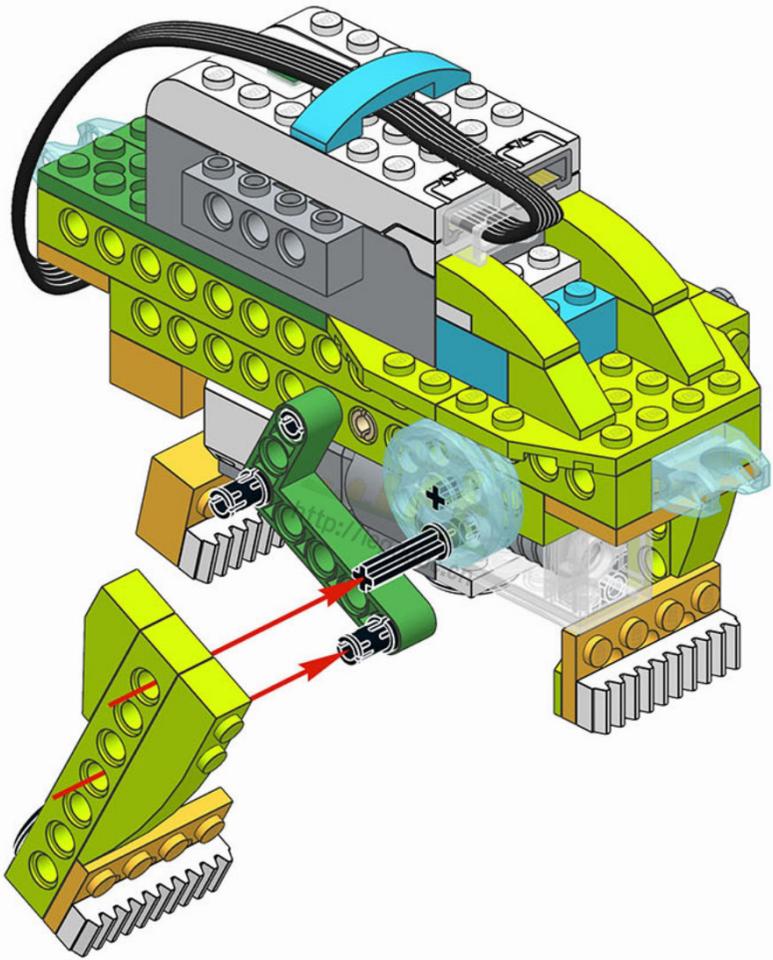
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关注公众号获取更多

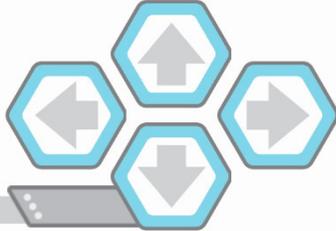
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3

74

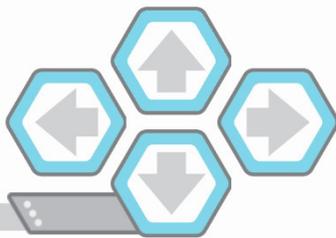
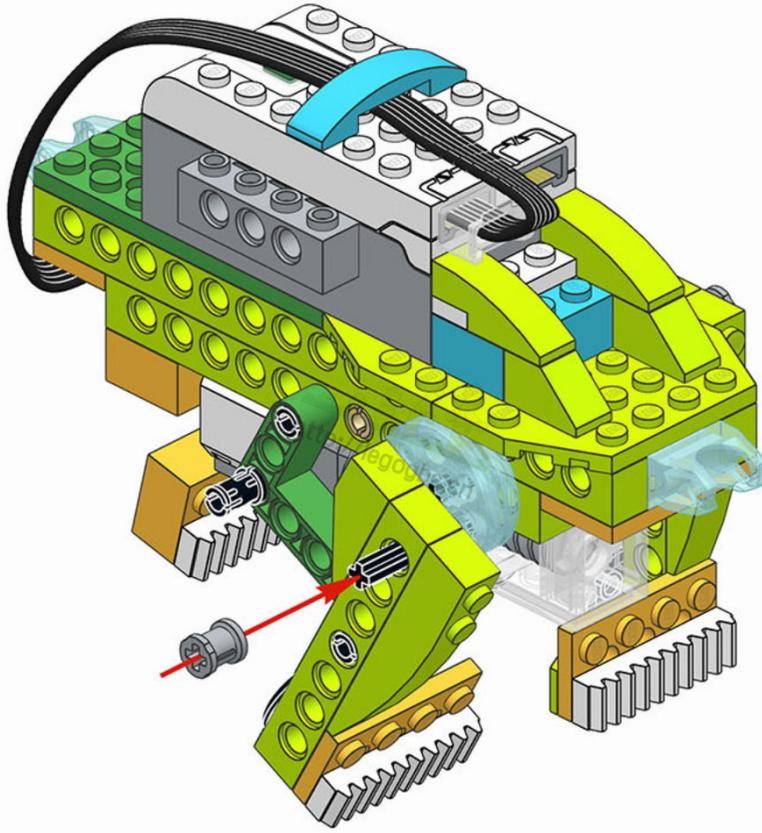




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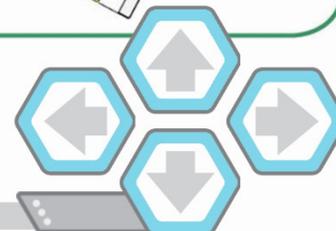
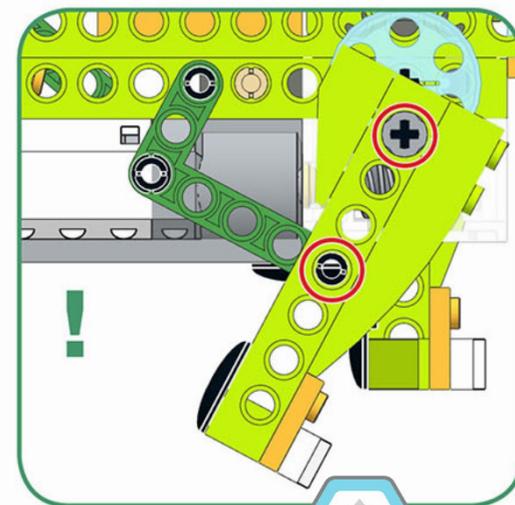
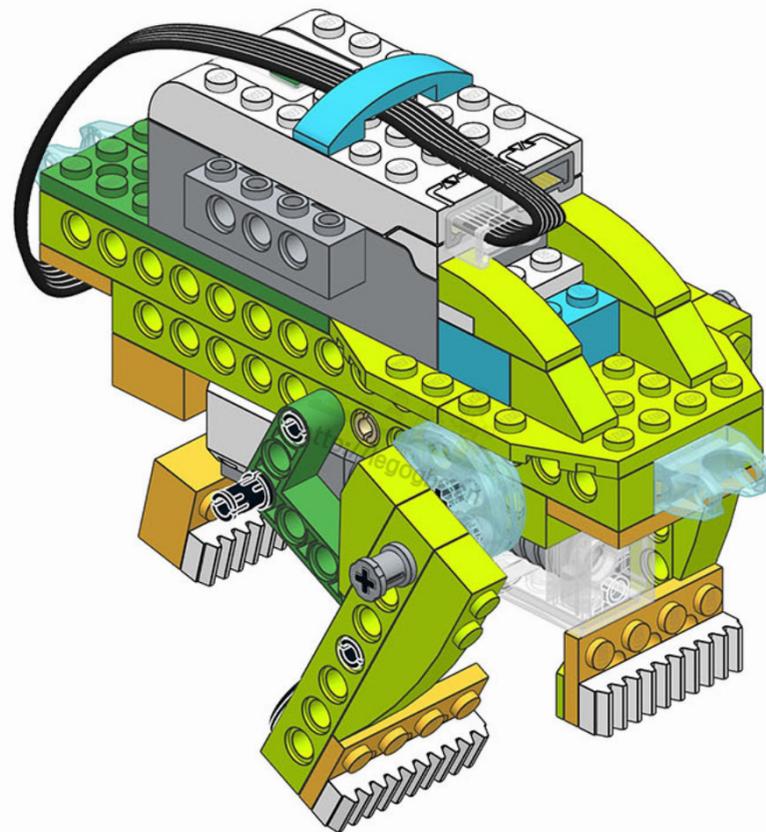
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# 40



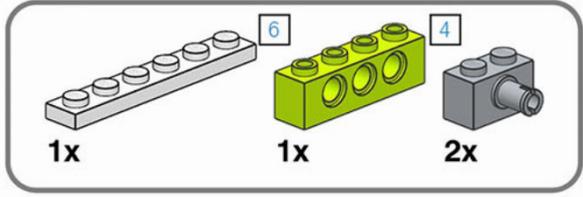
40/56

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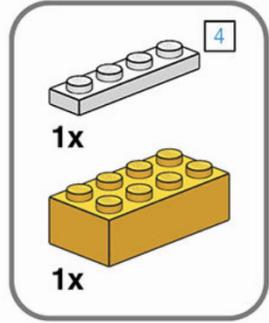
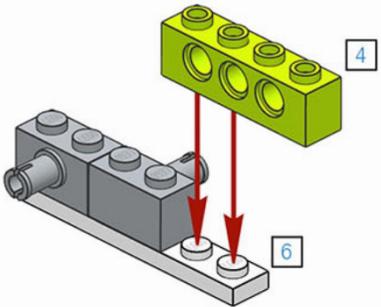
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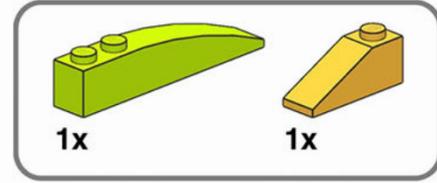
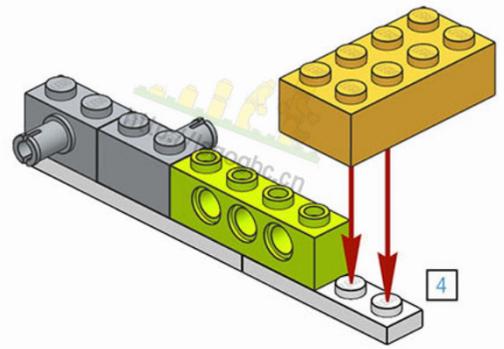
关注公众号获取更多



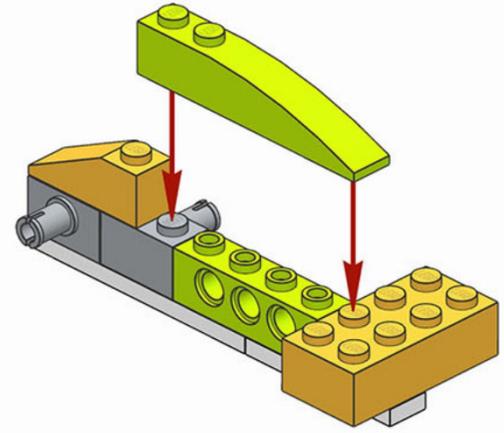
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2



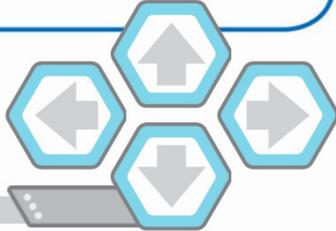
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41/56

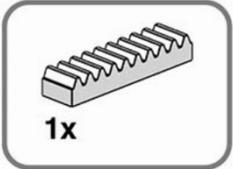
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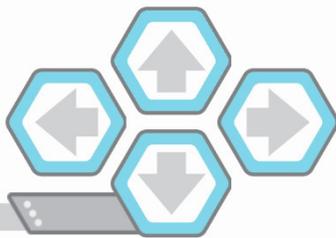
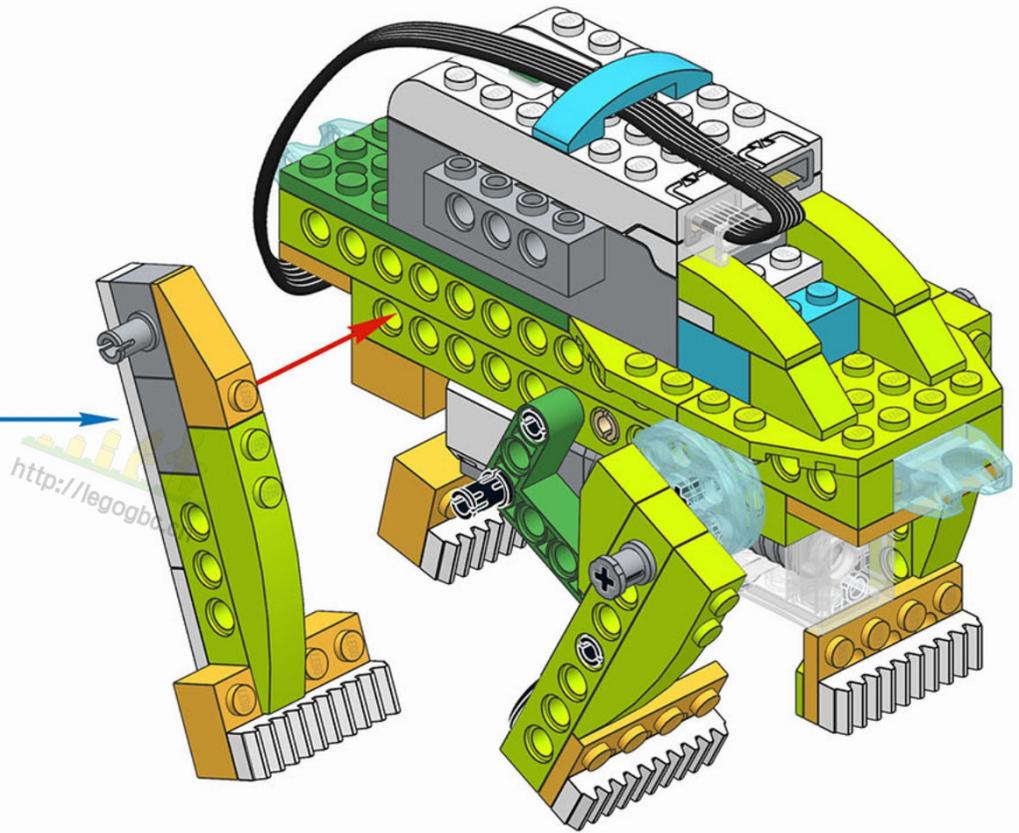
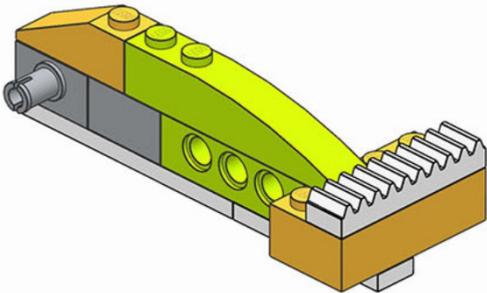


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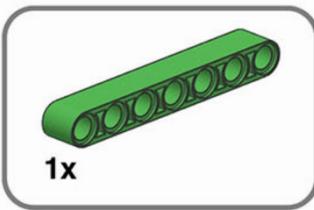
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4



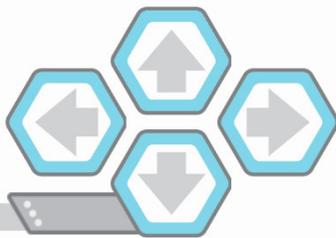
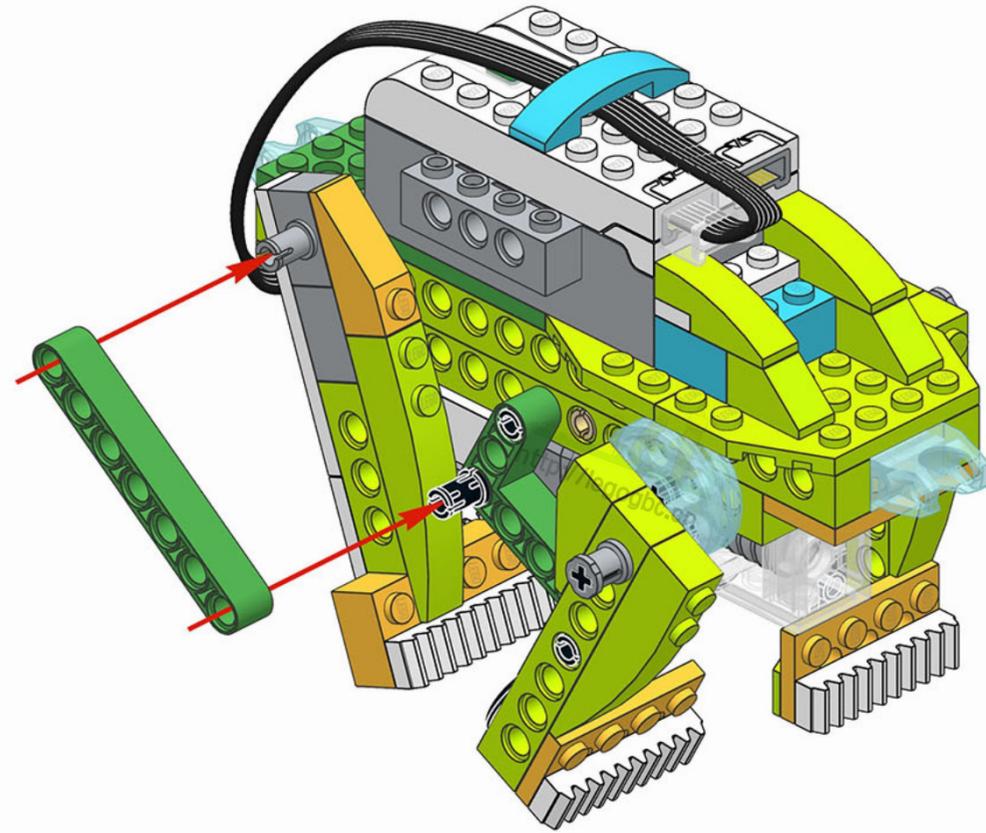


关注公众号获取更多



1x

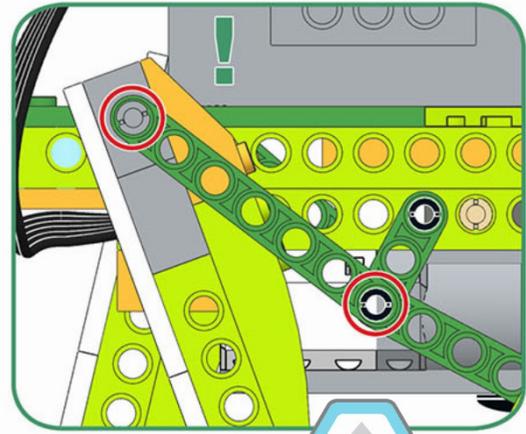
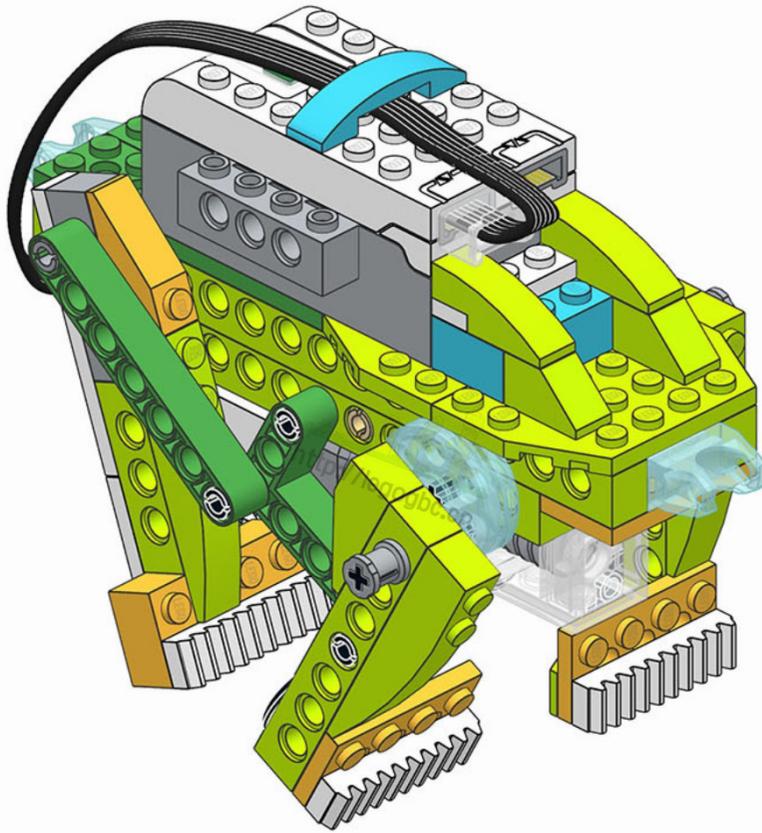
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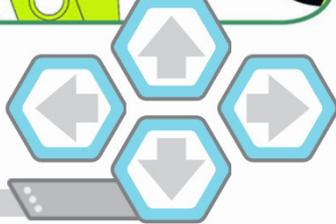
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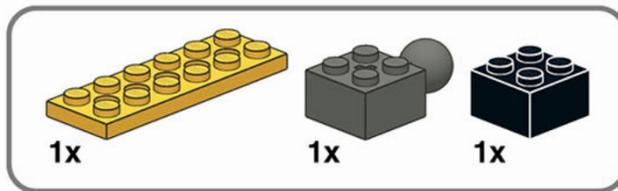
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80

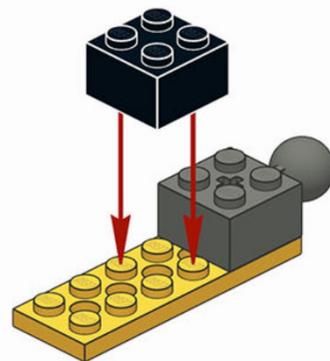




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45

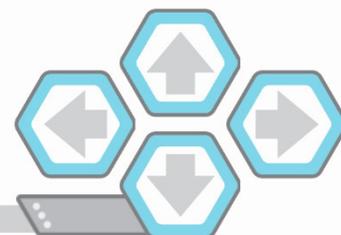


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45/56

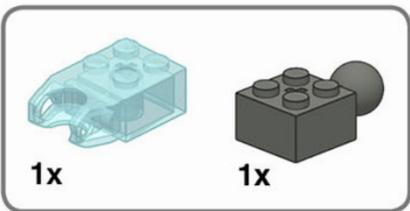
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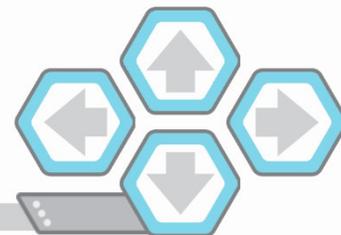
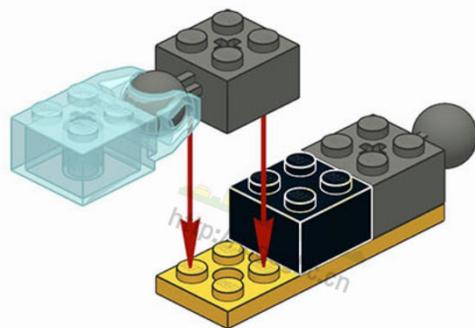




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46



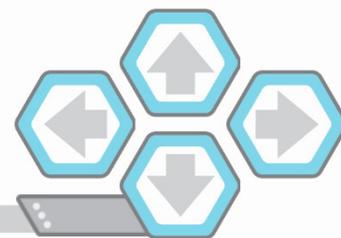
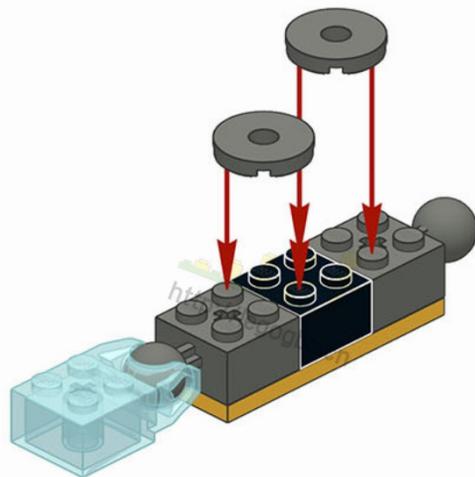


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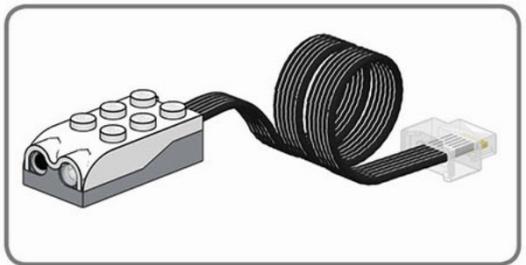
2x

47

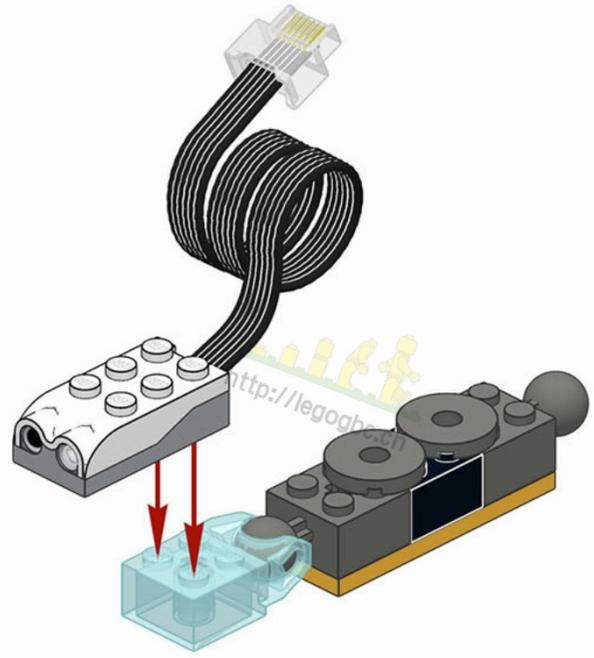




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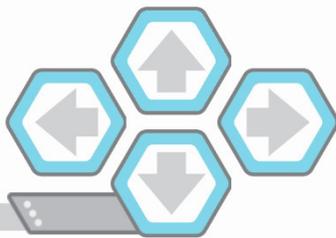
48



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3

84

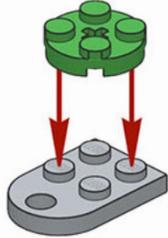




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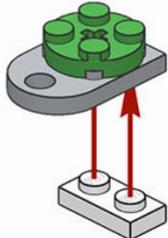
**1**

1x  1x 



**2**

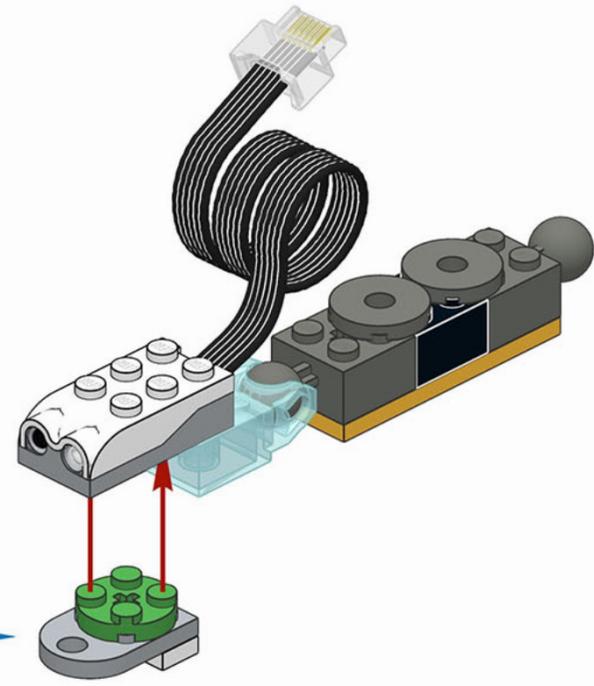
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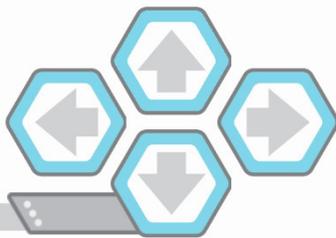
<http://legogbc.cn>



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3

85



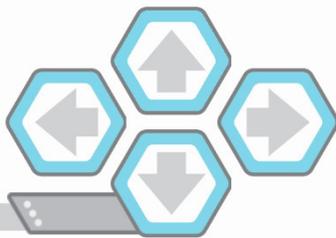
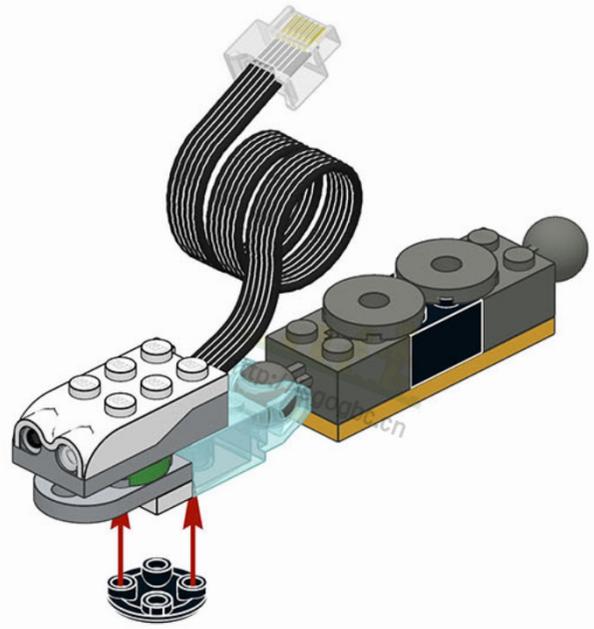


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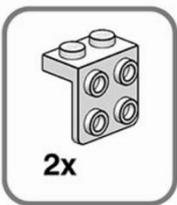
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50



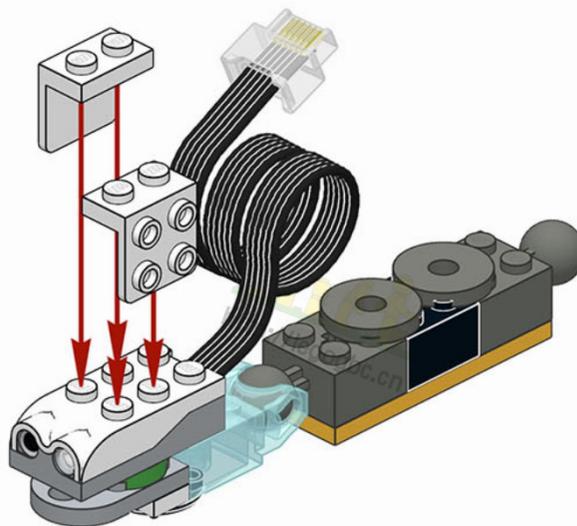


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2x

# 51



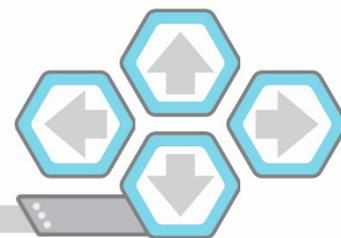
51/56



3



87

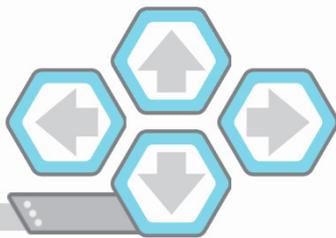
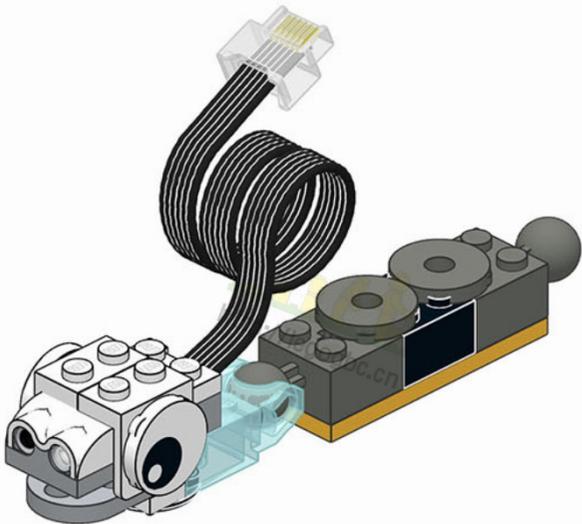




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52

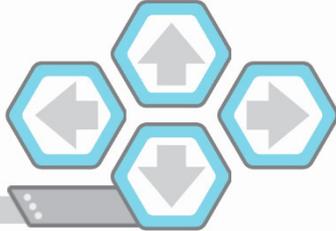
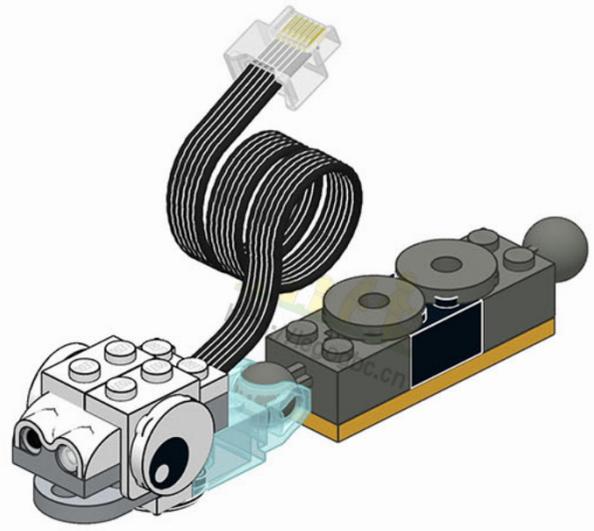




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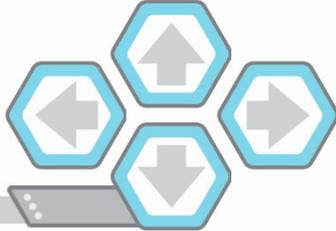
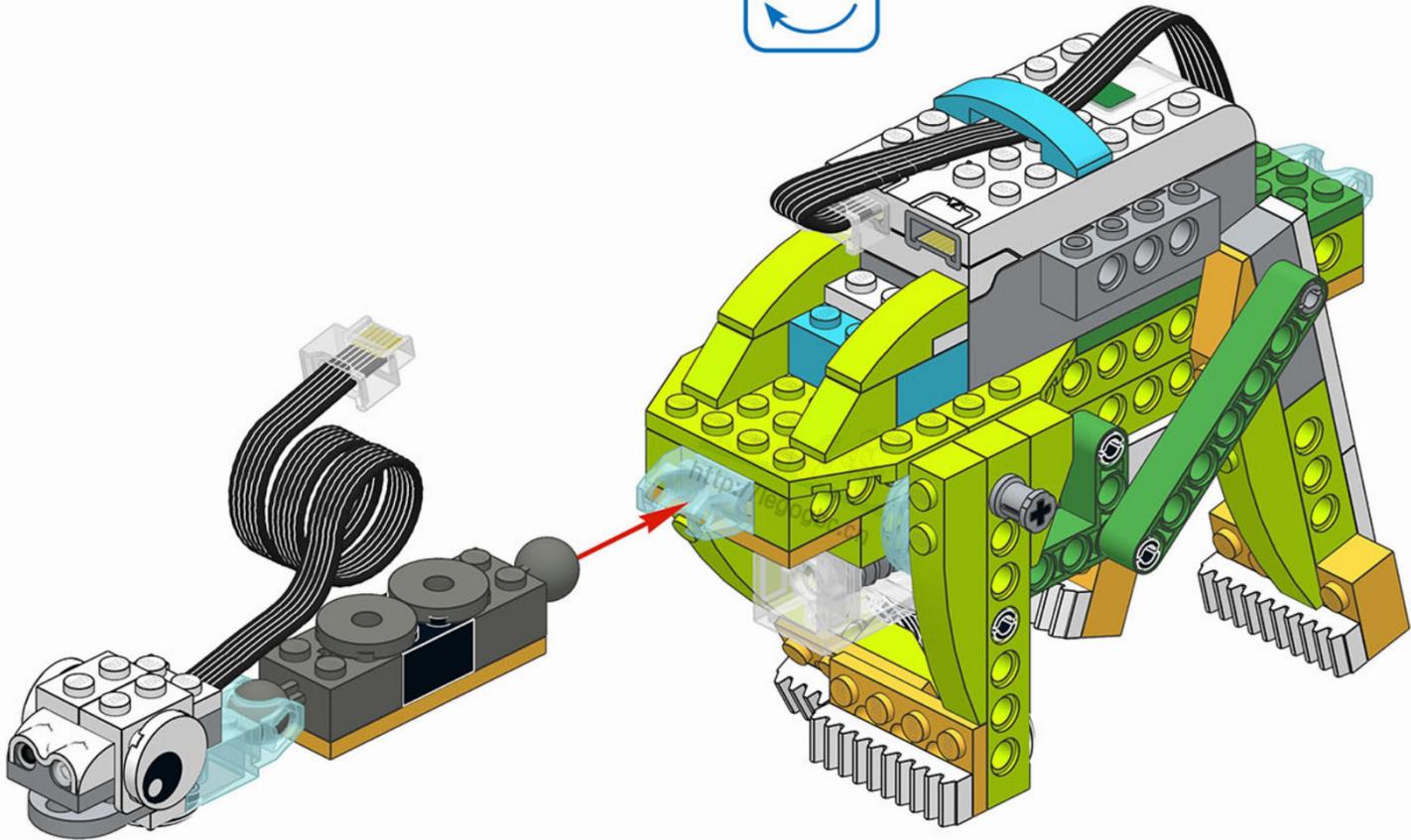
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关注公众号获取更多

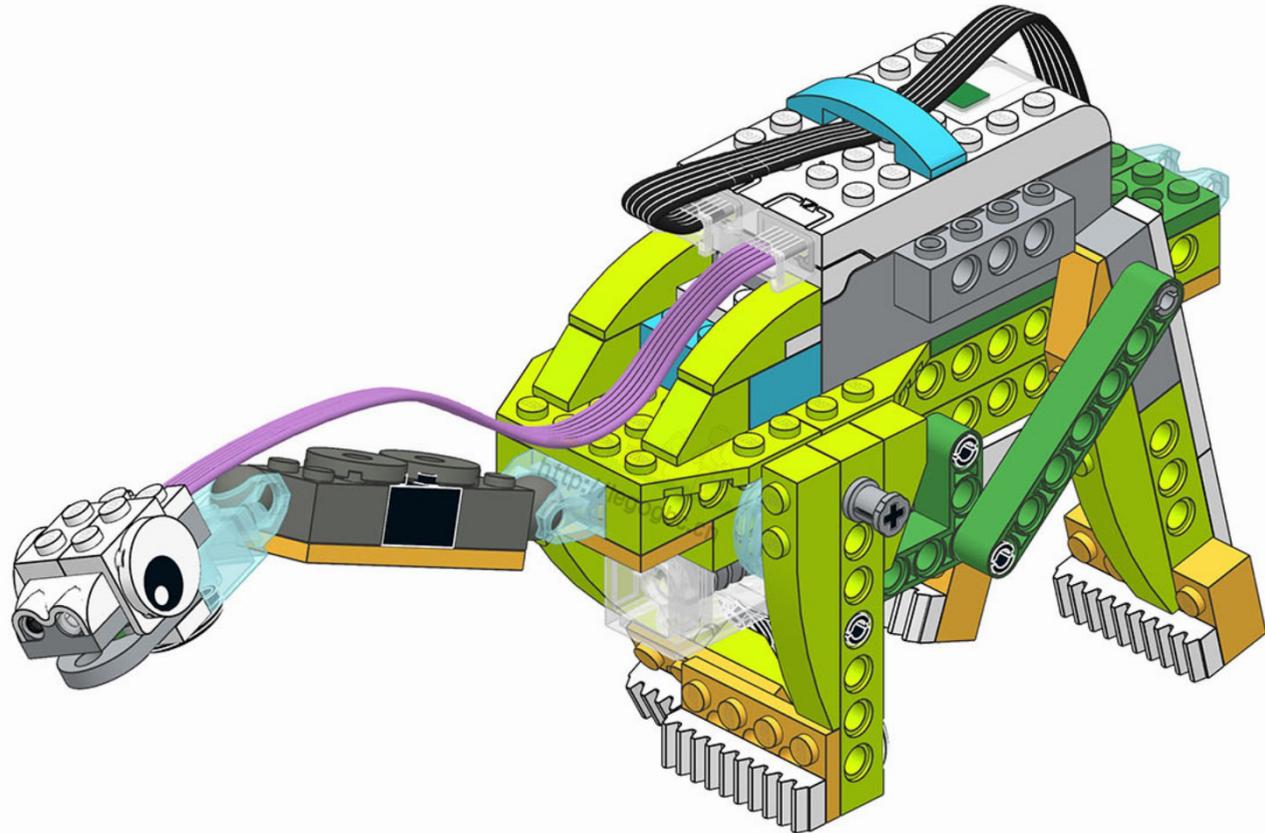
53





关注公众号获取更多

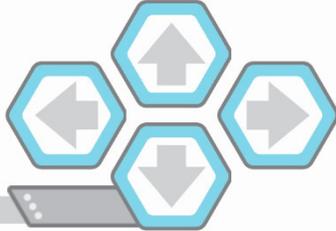
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54/56

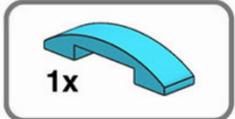
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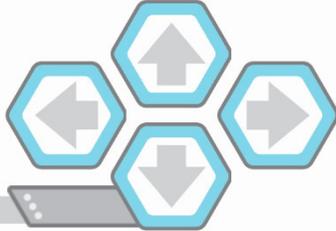
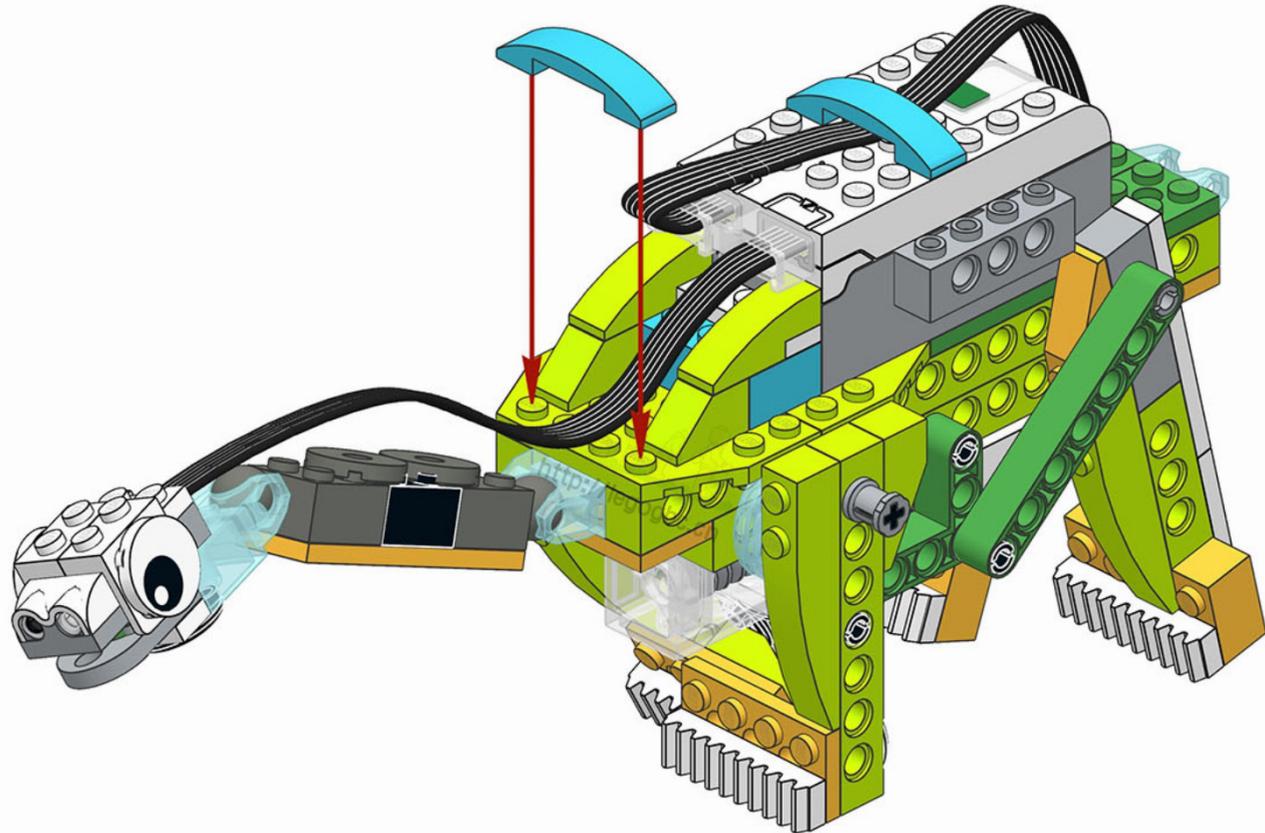




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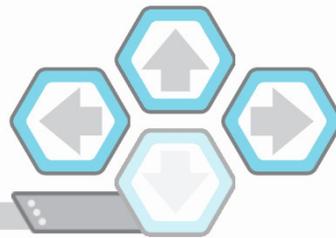
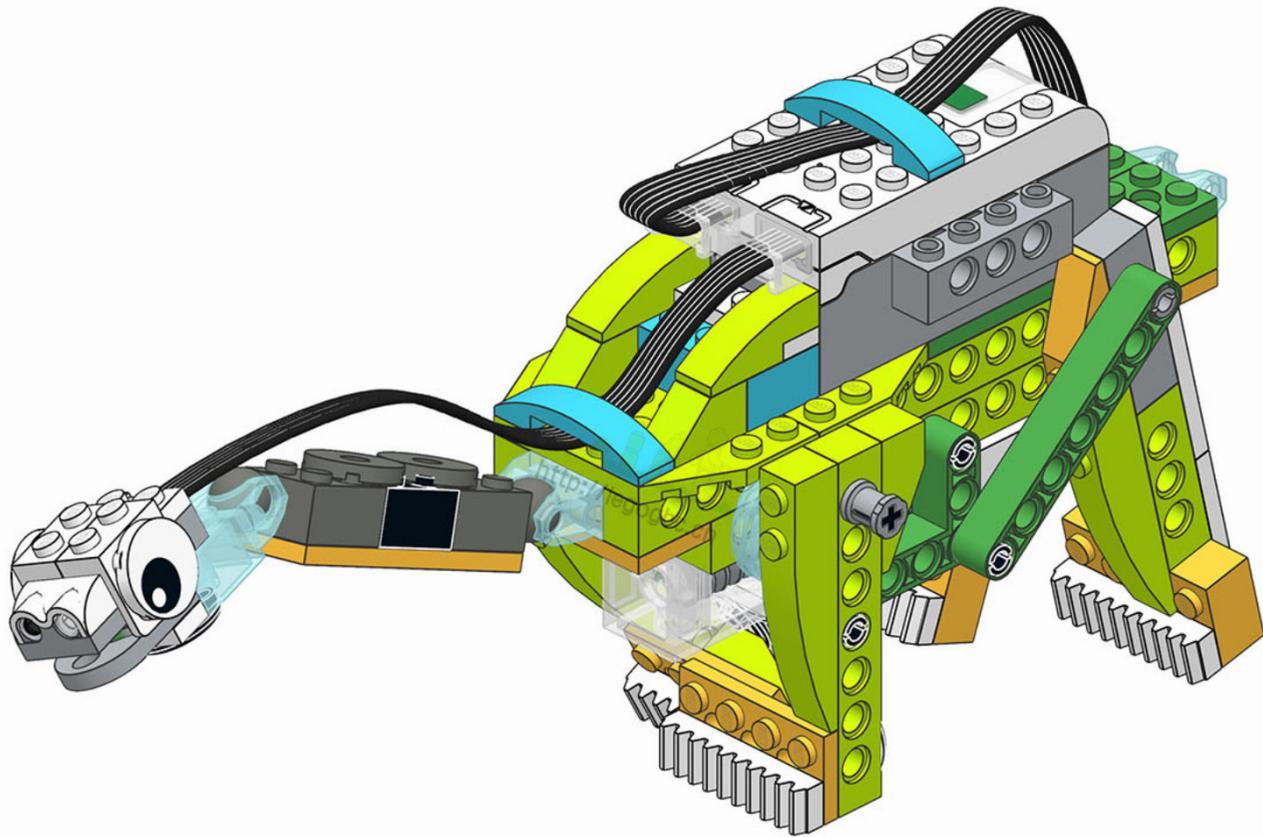
55





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56



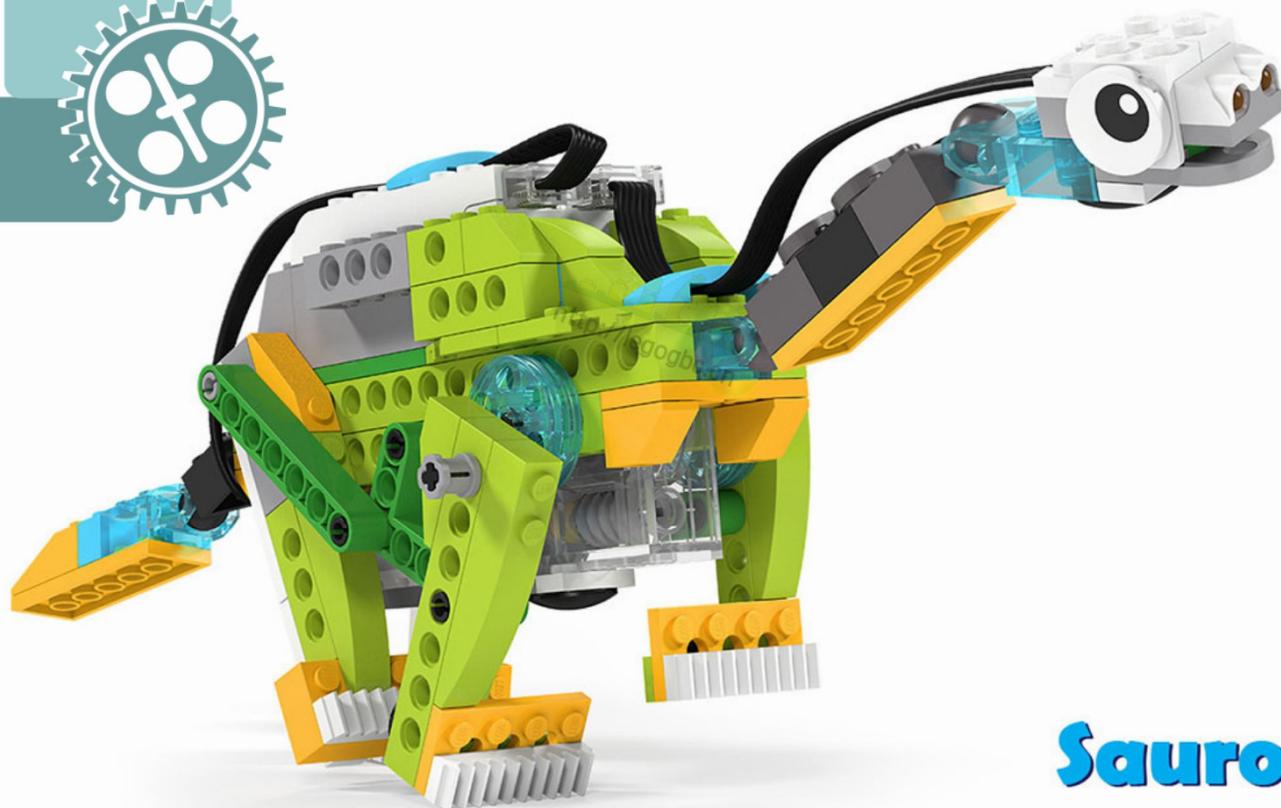
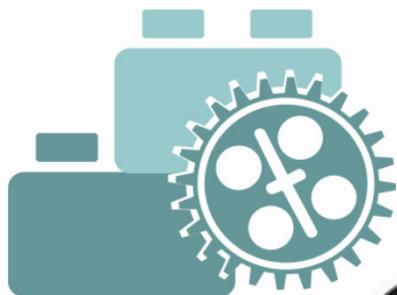


# Enhanced version



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Build the robot tail and add the decorative elements of the trunk.



Sauropod



3

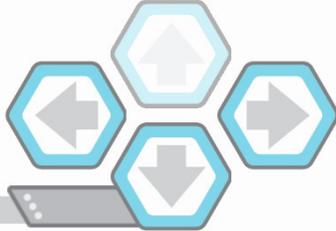
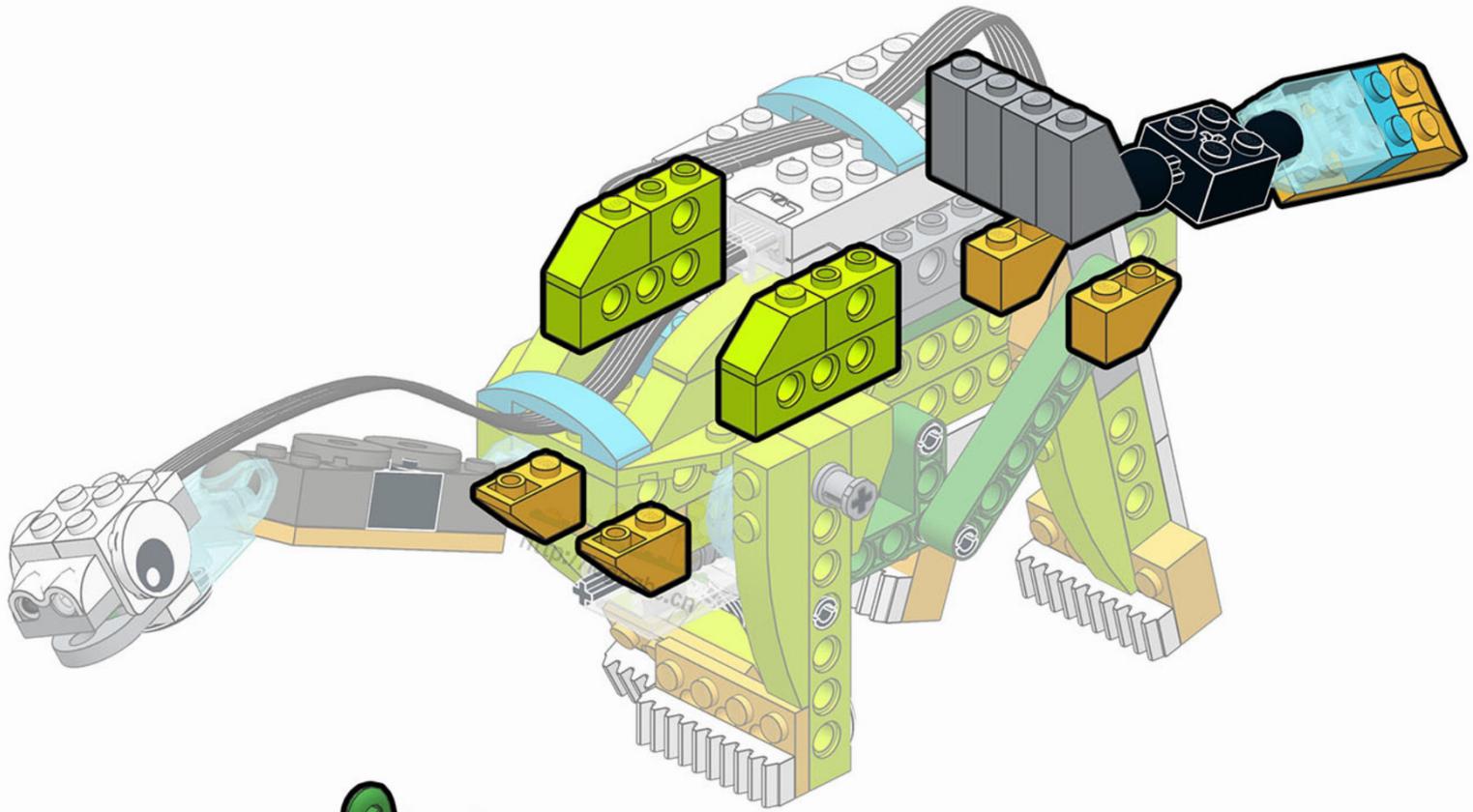


93



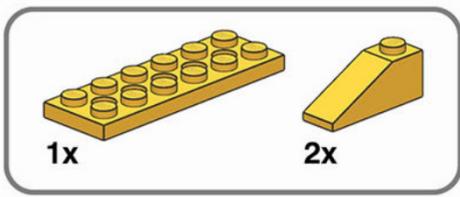


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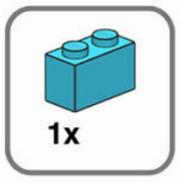
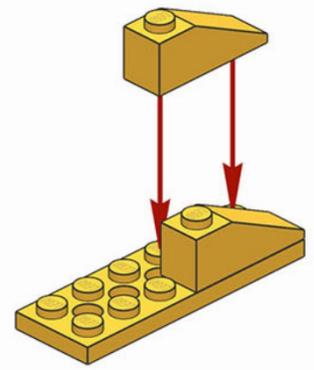




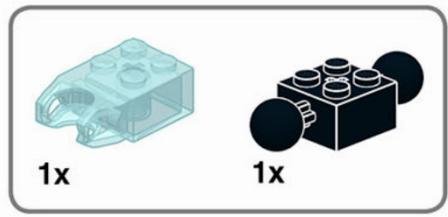
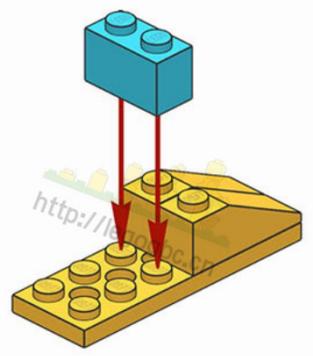
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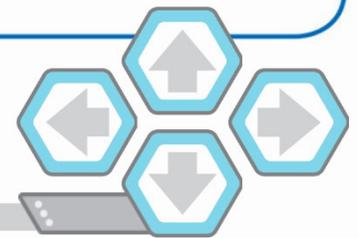
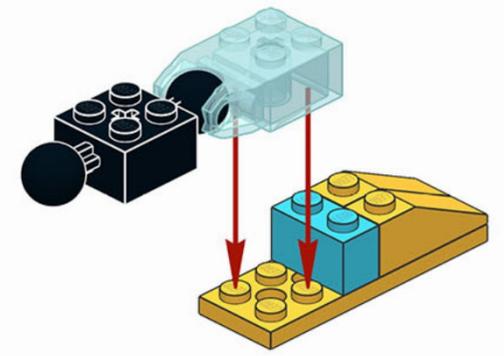
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2



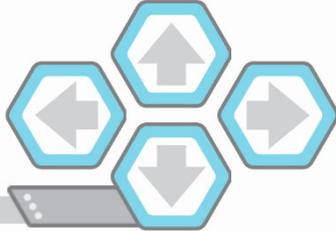
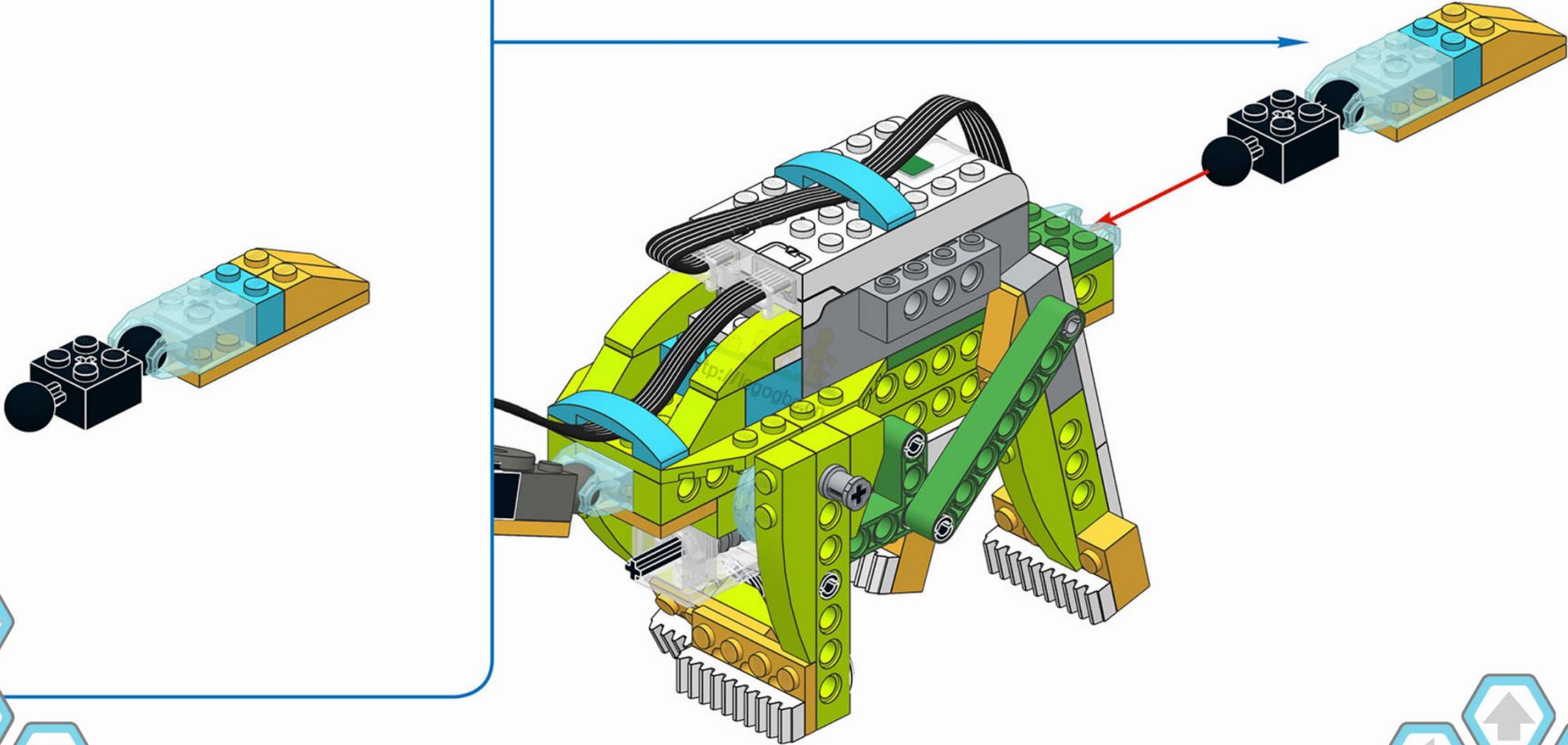
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关注公众号获取更多

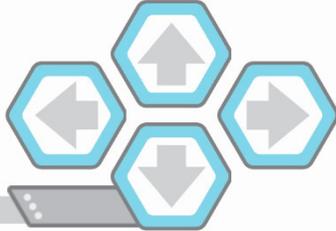
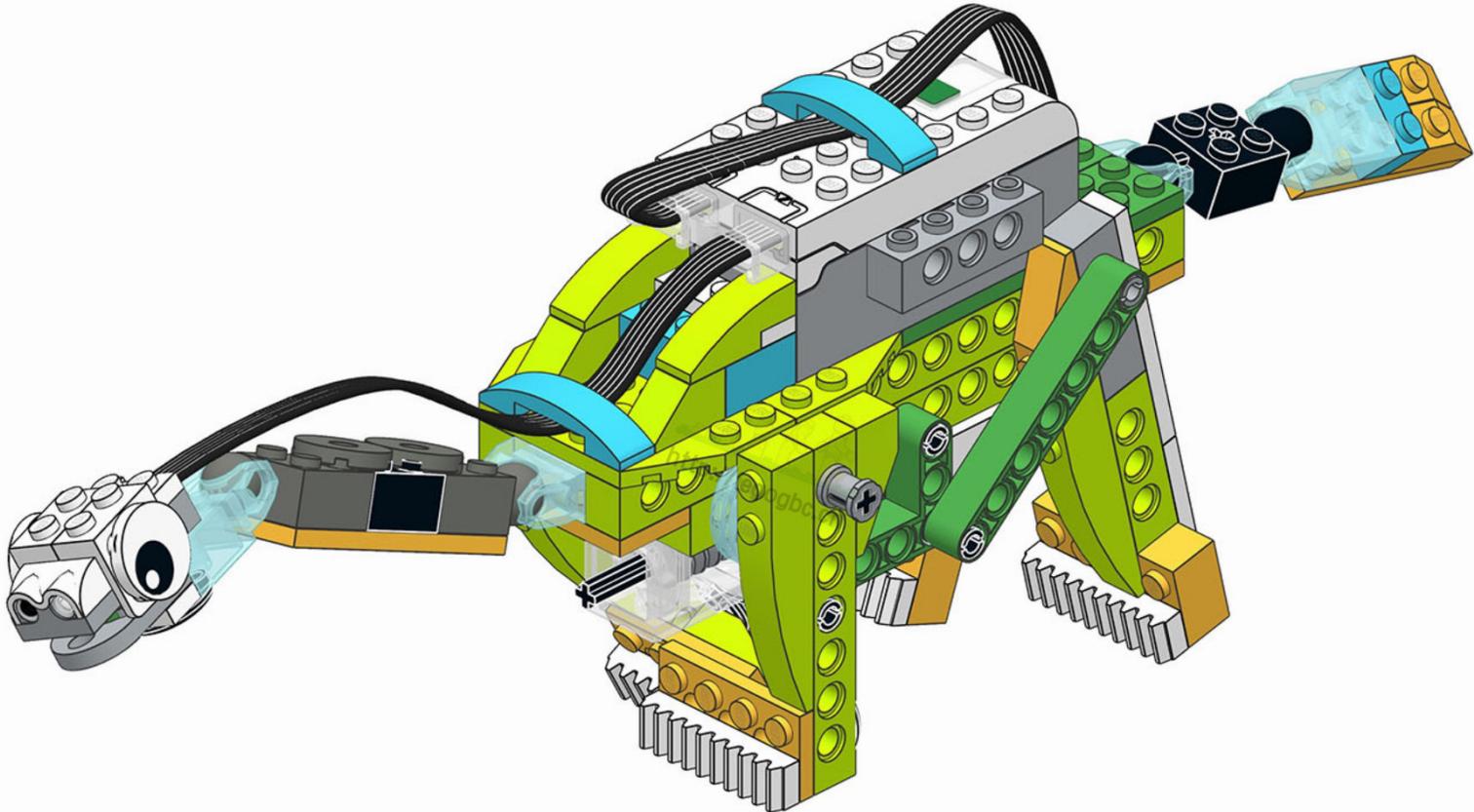
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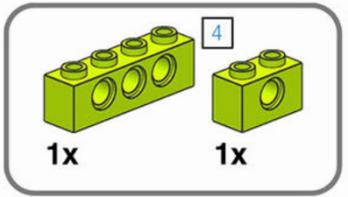
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59

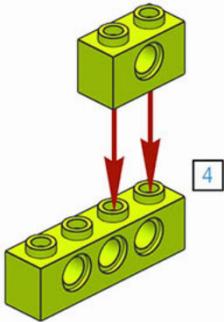




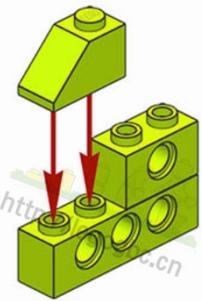
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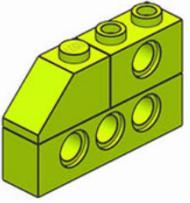
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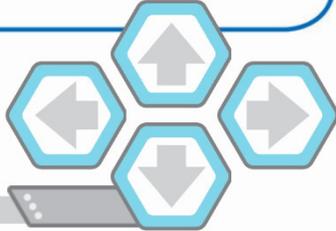
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**3**



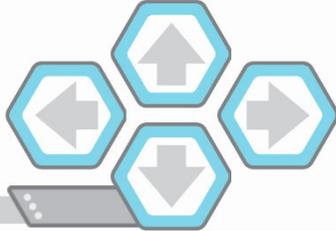
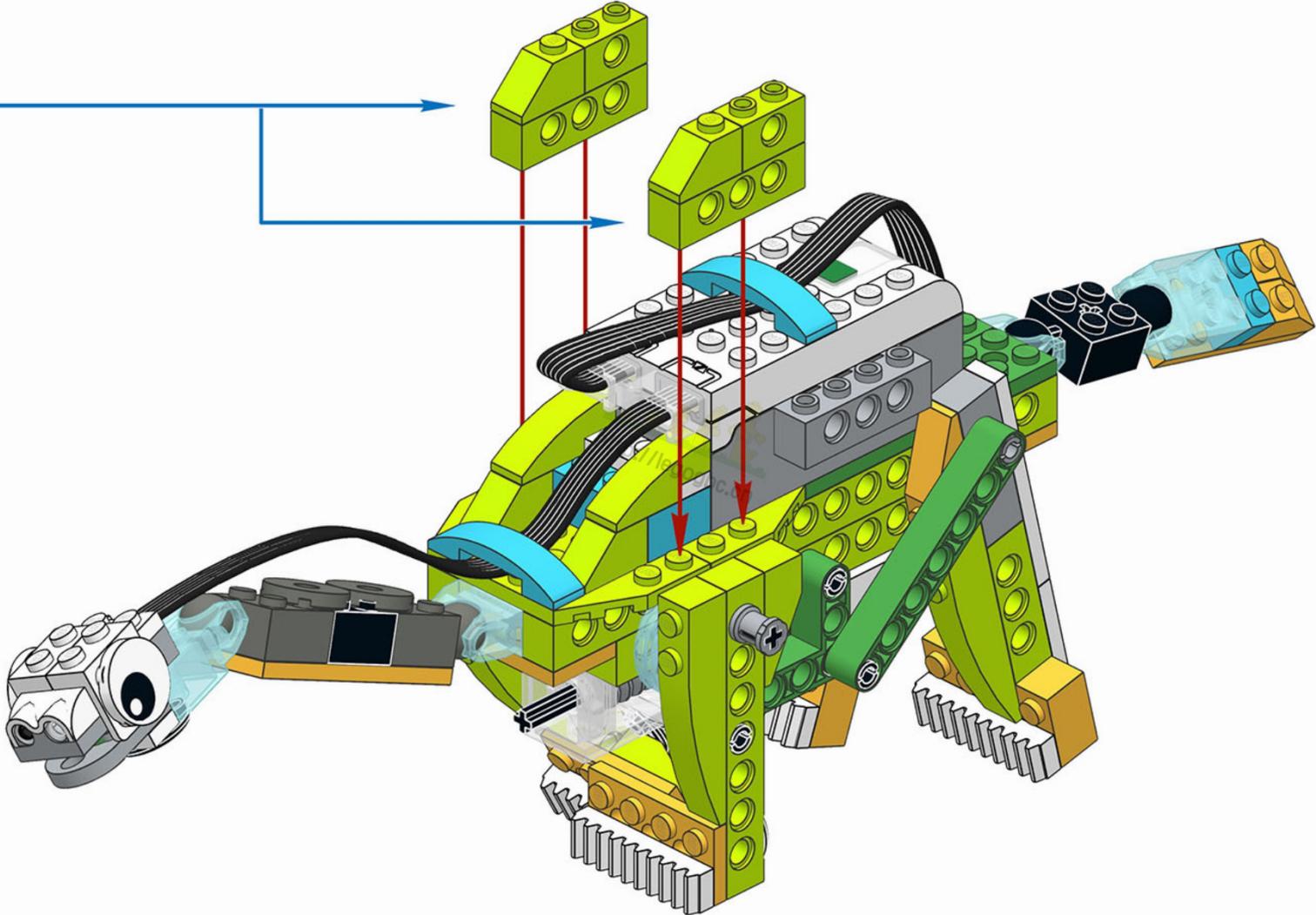
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关注公众号获取更多

61



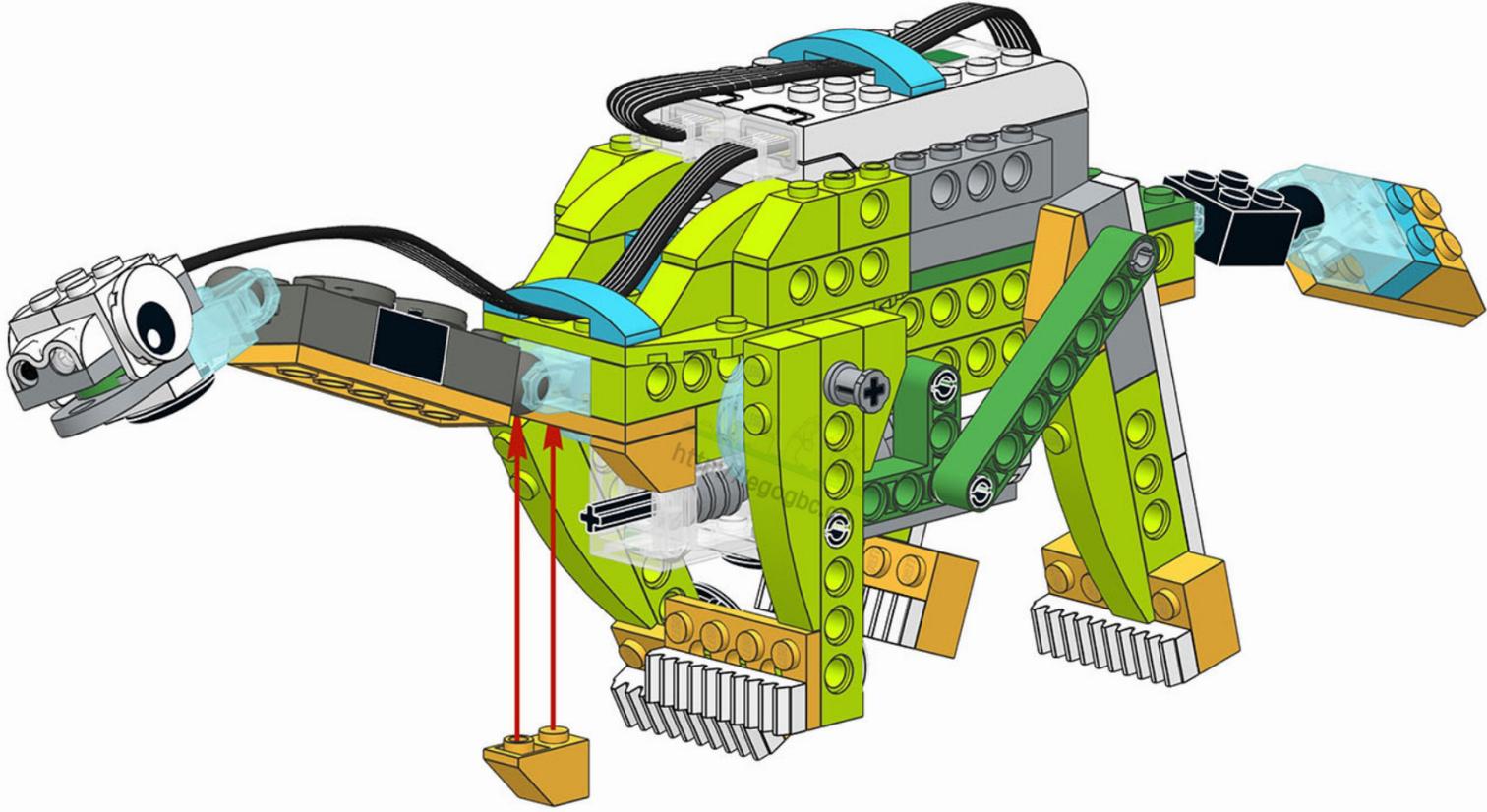


关注公众号获取更多



2x

62



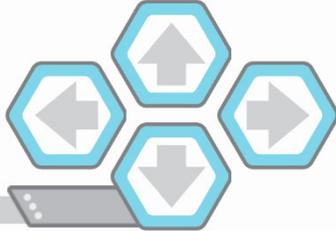
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3

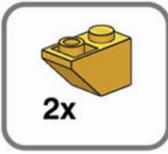


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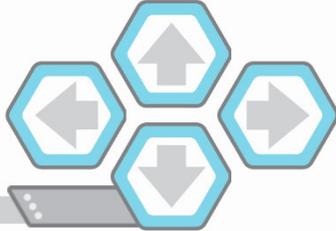
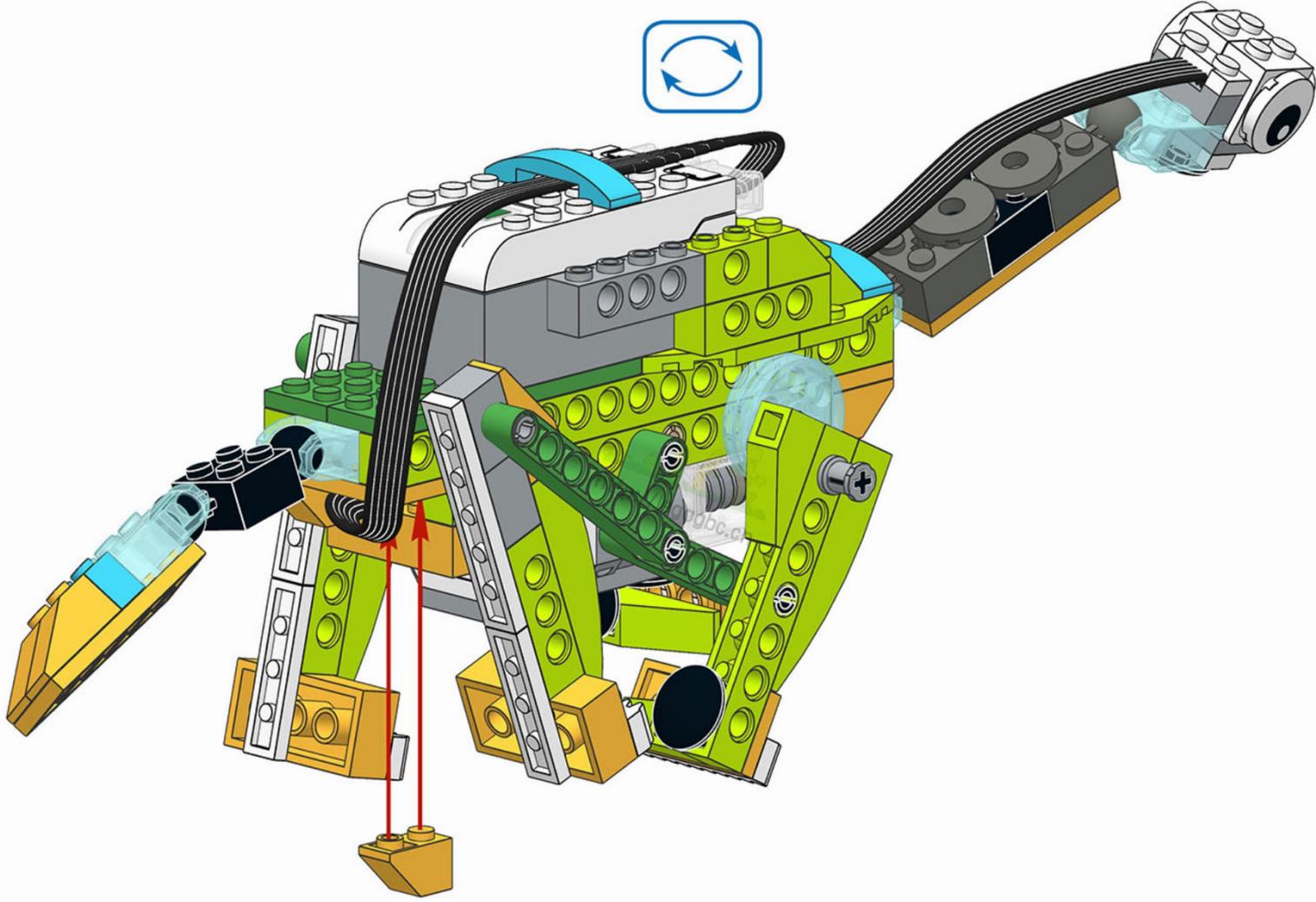




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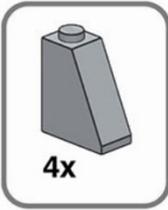


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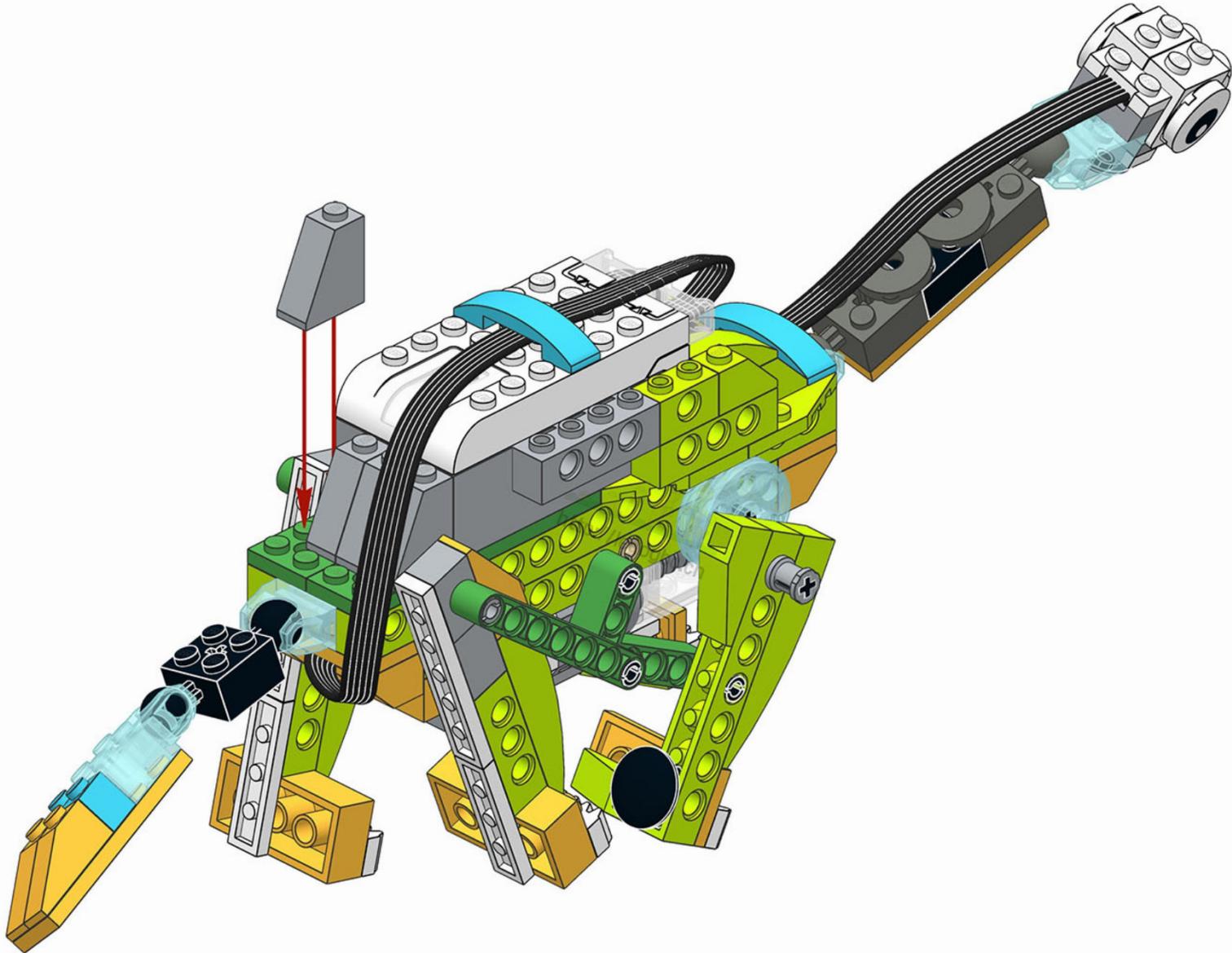


关注公众号获取更多



4x

64



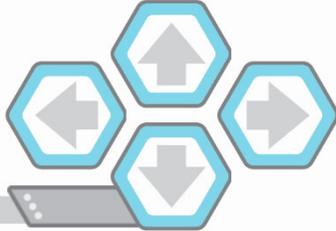
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3



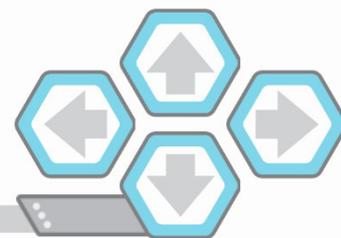
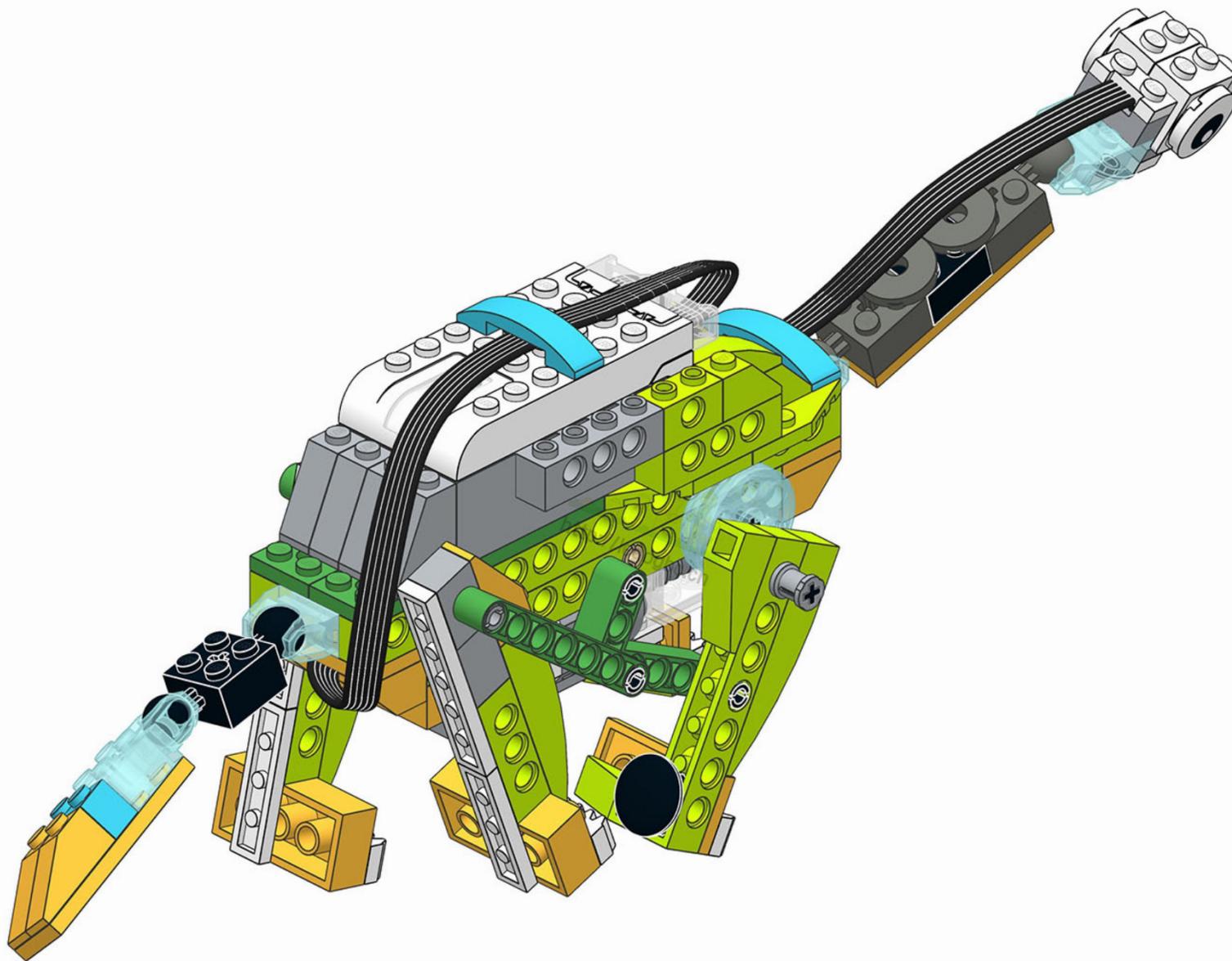
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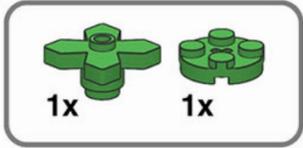
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65

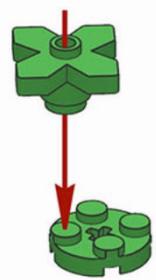




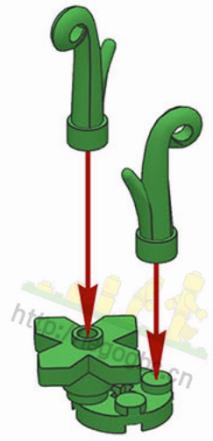
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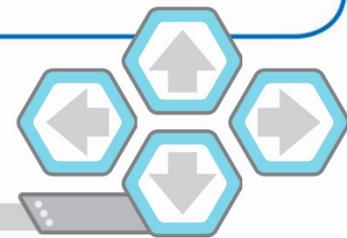
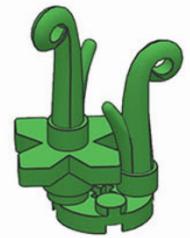
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2



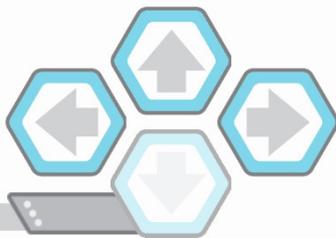
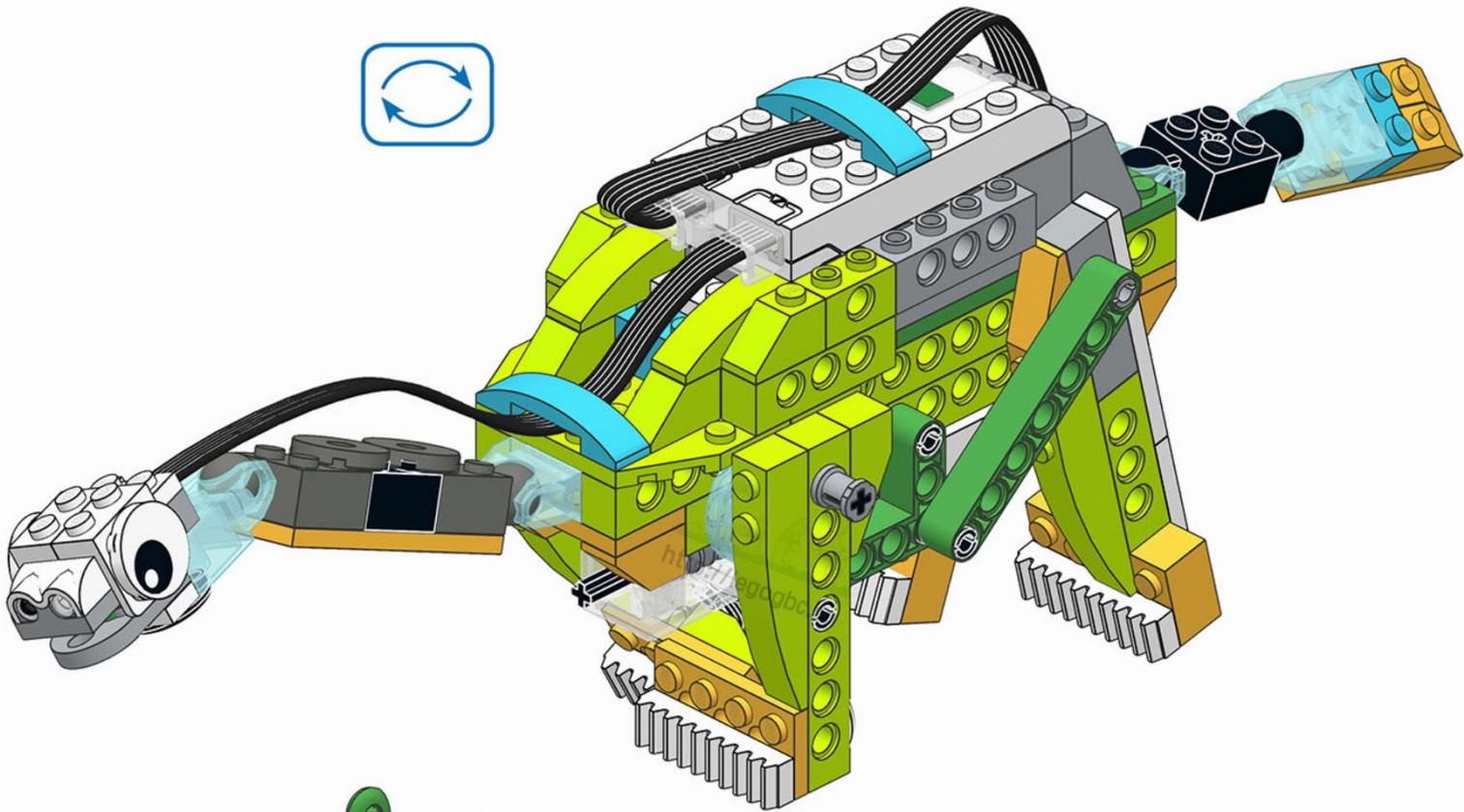
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关注公众号获取更多

67



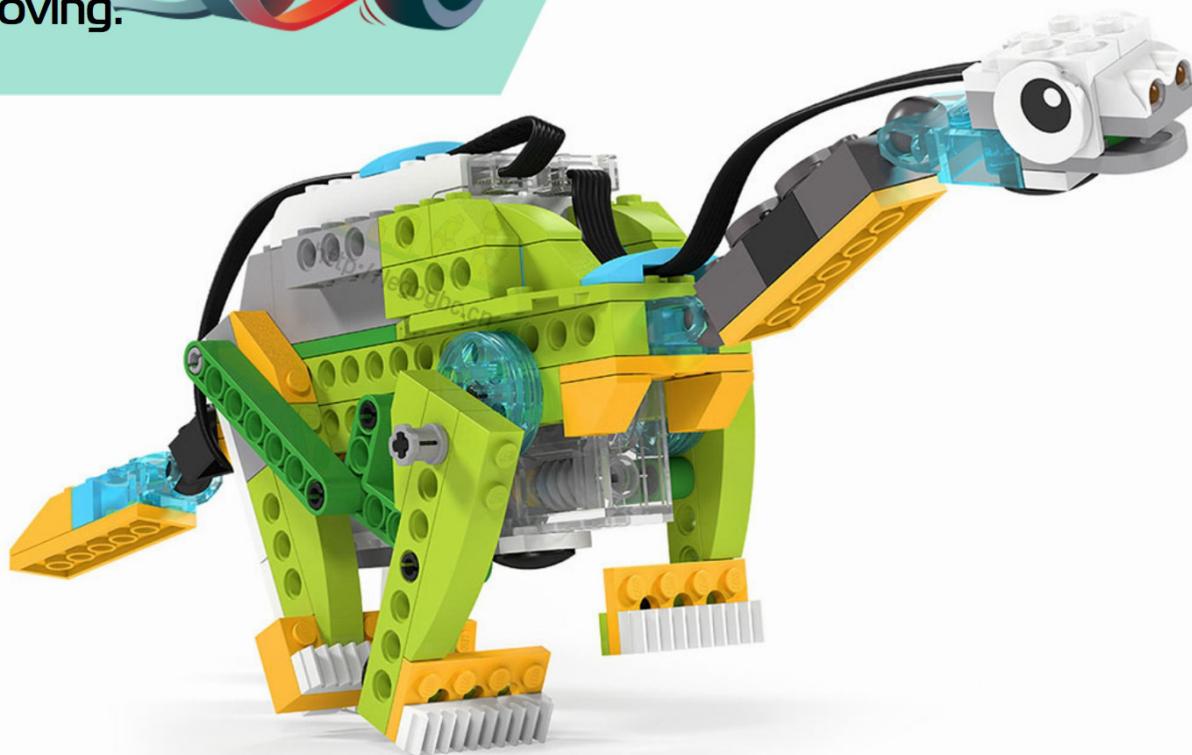


# Check it out!



关注公众号获取更多

Avoid any friction  
between the cables  
while robot is moving.



3



106

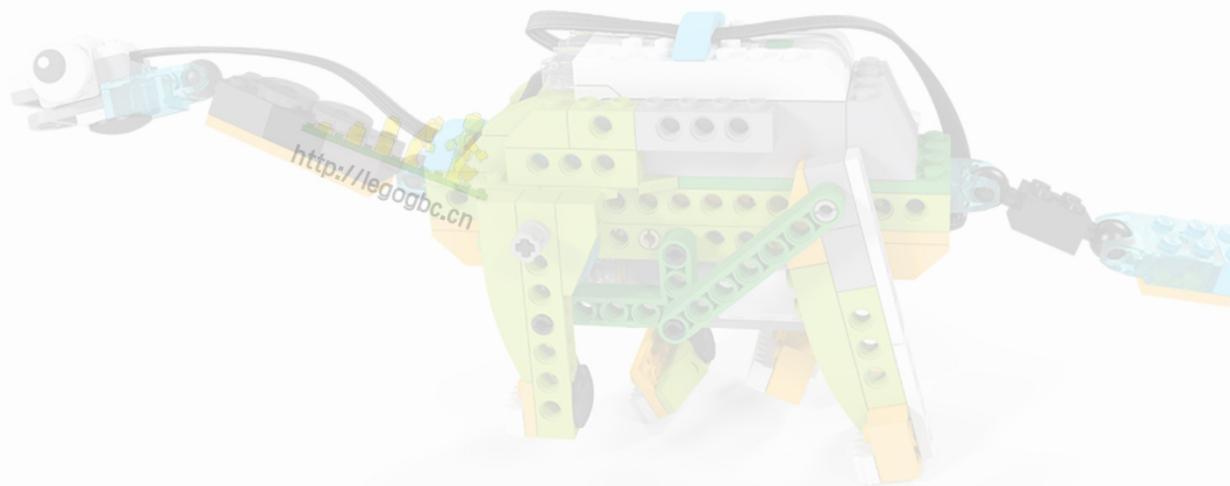




# Task



关注公众号获取更多



Place parts of the robot on the right places



3



107

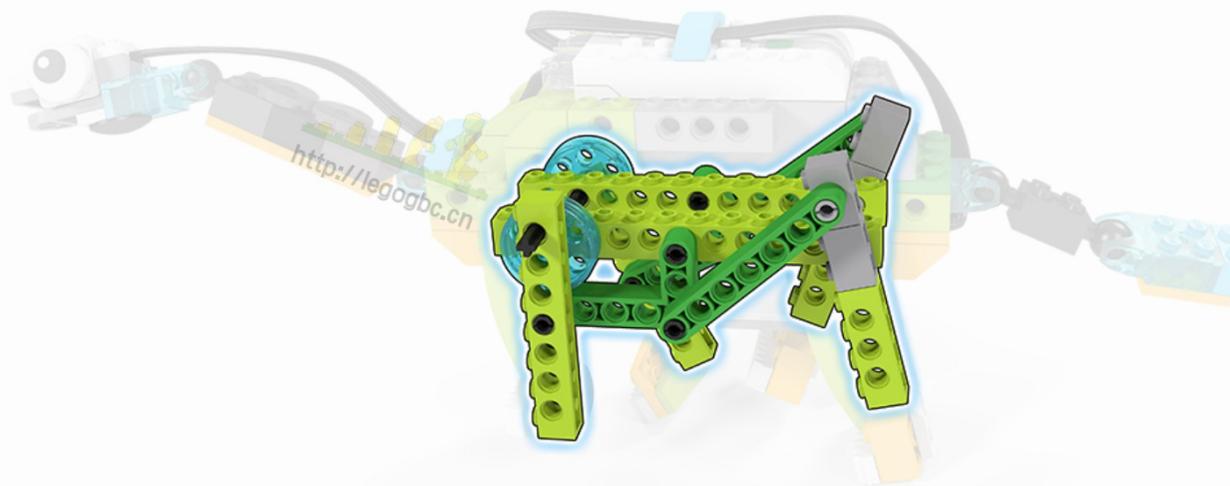




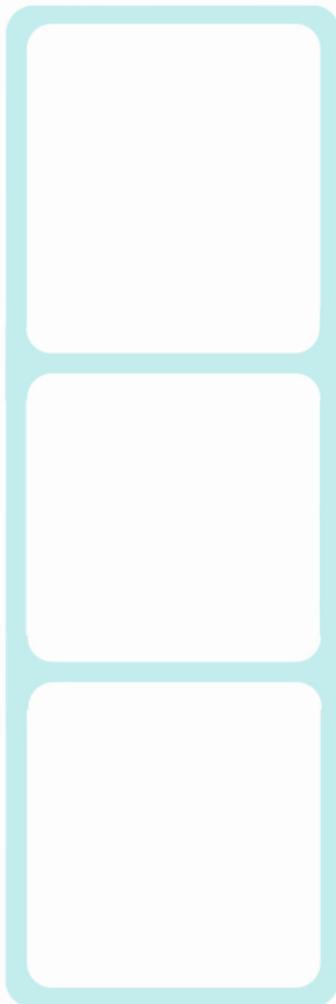
# Task



关注公众号获取更多



Place parts of the robot on the right places



6



107



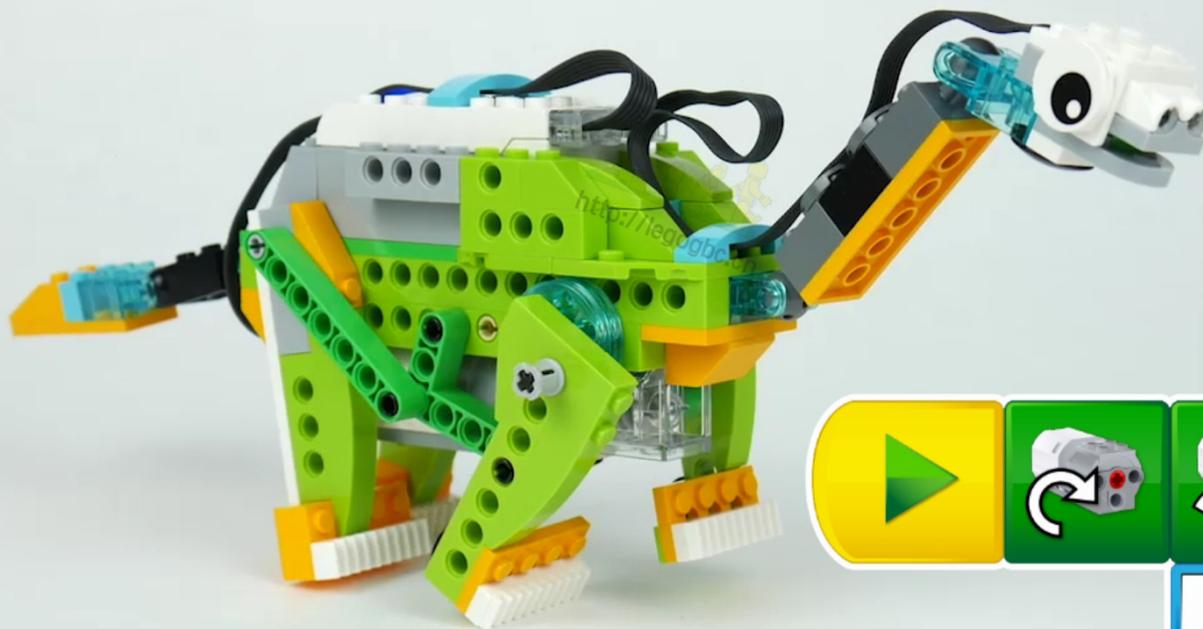


# Task 1



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Program the robot's movement forward for 10 seconds at power 5. Make sure that the mechanism works correctly.



5

10

robotiseit.com



6



108



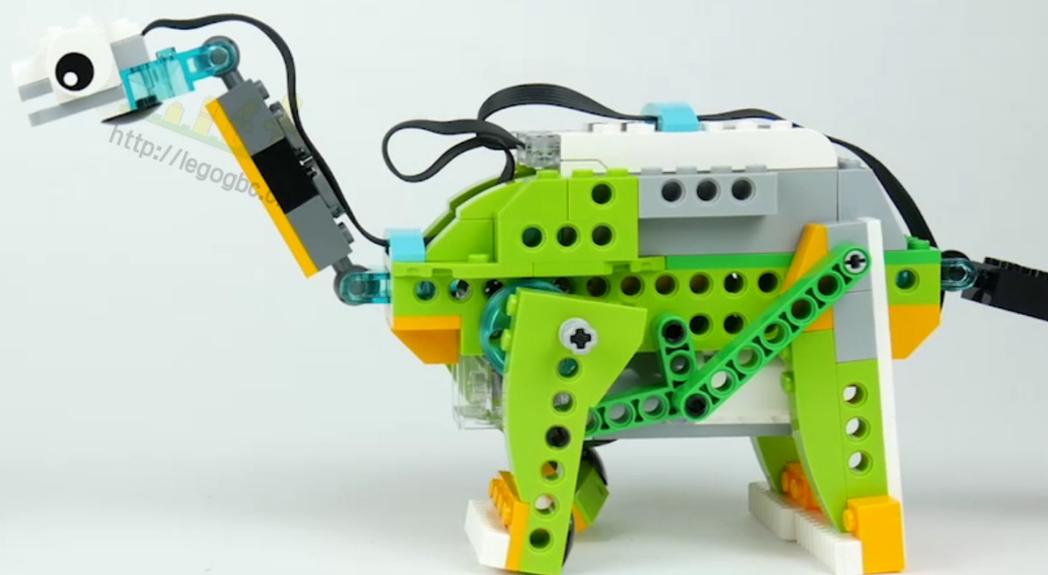


# Task 2



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Program a robot search for food. When it finds it, reproduce the corresponding sound.



robotiseit.com



6



109



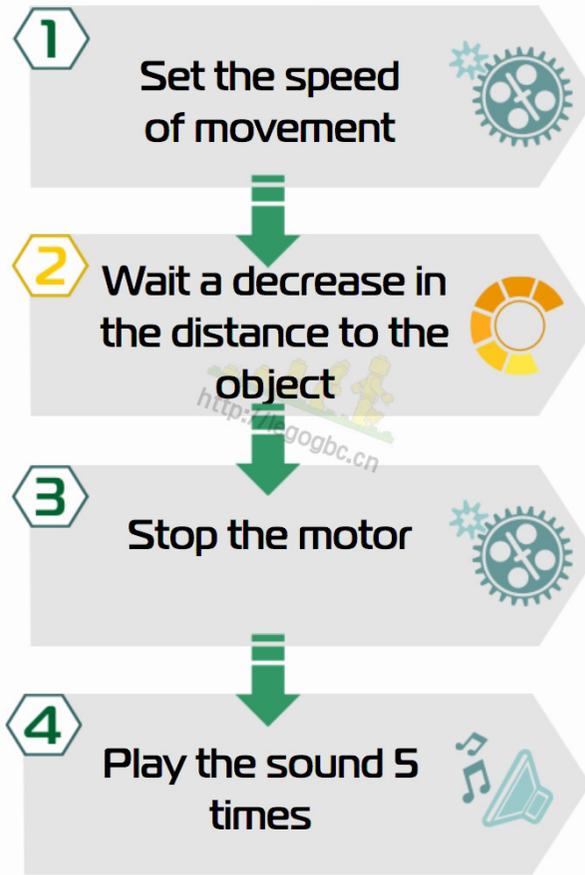


# Task 2. Algorithm



关注公众号获取更多

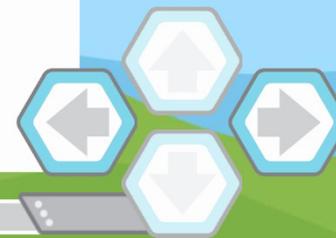
The program is run by the following algorithm:



6



110





# Task 2. Program



关注公众号获取更多

1

Set the speed  
of movement



<http://legogbc.cn>

Step:



6



111





# Task 2. Program



关注公众号获取更多

1

Set the  
of move

2

Wait a decrease in  
the distance to the  
object



Step:



6



111





# Task 2. Program



关注公众号获取更多

- 1 Set the speed of move
- 2 Wait a delay the distance of the object
- 3 Stop the motor 



Step:





# Task 2. Program



关注公众号获取更多

- 1 Set the speed of move
- 2 Wait a delay the distance of the object
- 3 Stop the object
- 4 Play the sound 5 times



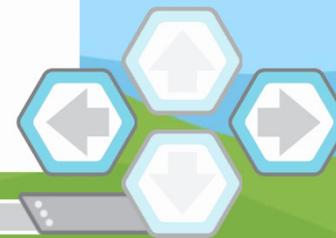
Step:



6



111



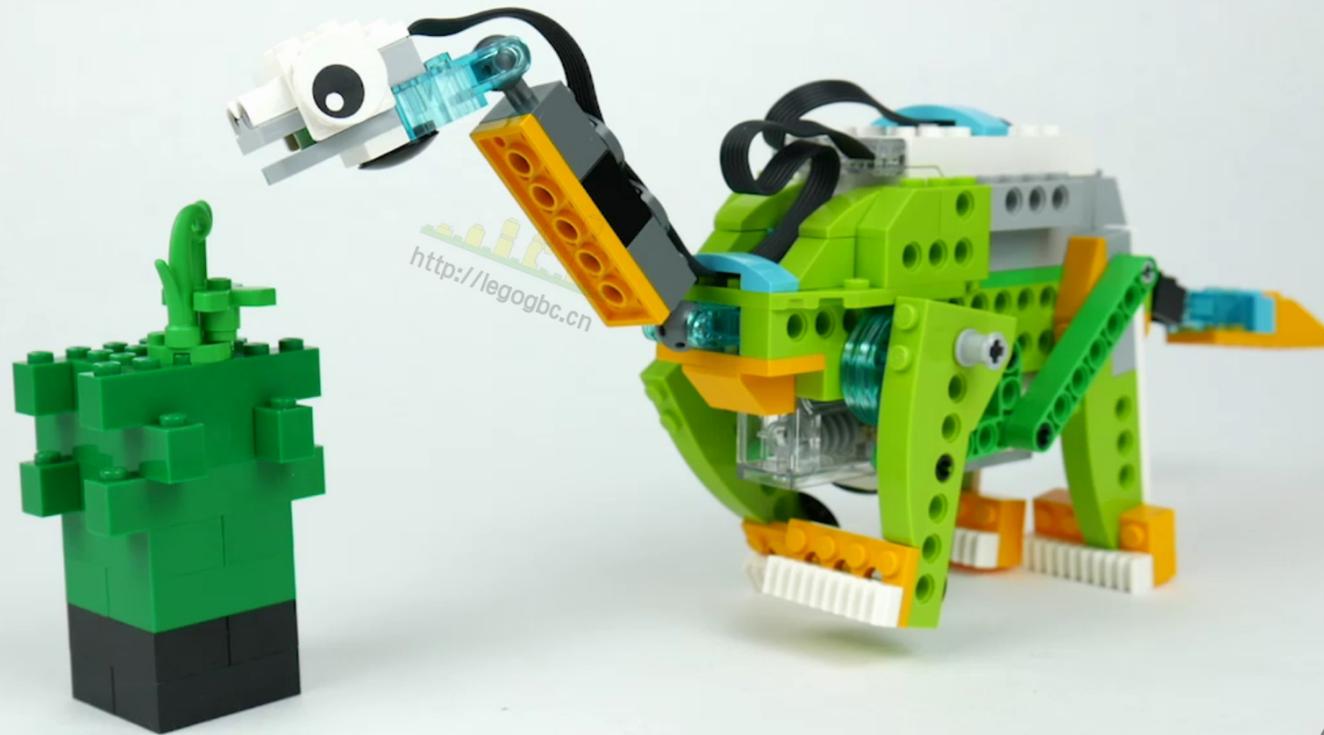


# Task 3



关注公众号获取更多

To grow to its maximum size, Diplodocs had not only much to eat, but also to spot predators and escape in advance. Program a robot escaping from the predator-Tyrannosaurus.



robotiseit.com



6



112



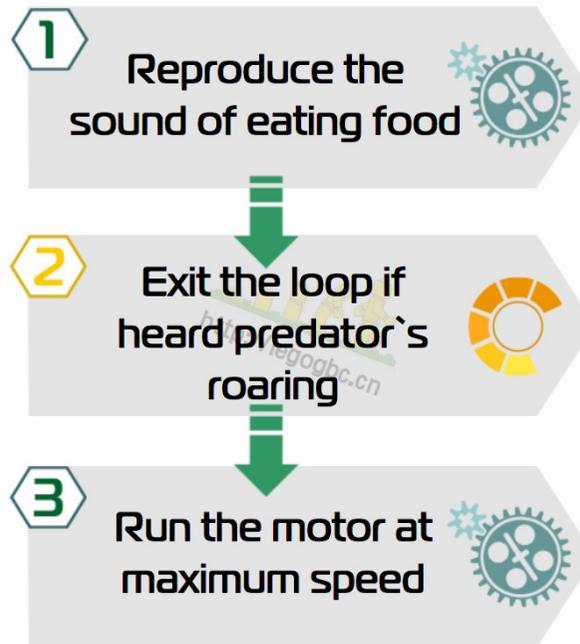


# Task 3. Algorithm



关注公众号获取更多

The program is run by the following algorithm:



6



113





# Task 3. Program



关注公众号获取更多

1

Reproduce the  
sound of eating  
food



Step:



6



114





# Task 3. Program



关注公众号获取更多

- 1 Reprodu sound of foo
- 2 Exit the loop if heard predator's roaring



Step:





# Task 3. Program



关注公众号获取更多

- 1 Reprodu sound of foo
- 2 Exit the heard pre roari
- 3 Run the motor at maximum speed 

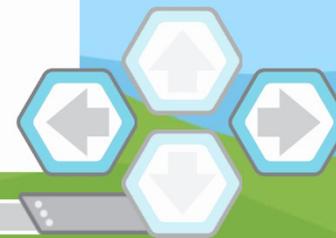
Step:



6



114





# Task 3. Questions



关注公众号获取更多

Where does the robot's reaction to roaring of Tyrannosaurus set?



9 0.7 10 15



# Task 4 \*



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Pay attention! The semiaxis on the left and right crank must be in front of each other. Only that robot will walk right. Experiment. Try changing the position of the semiaxis.



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6



116



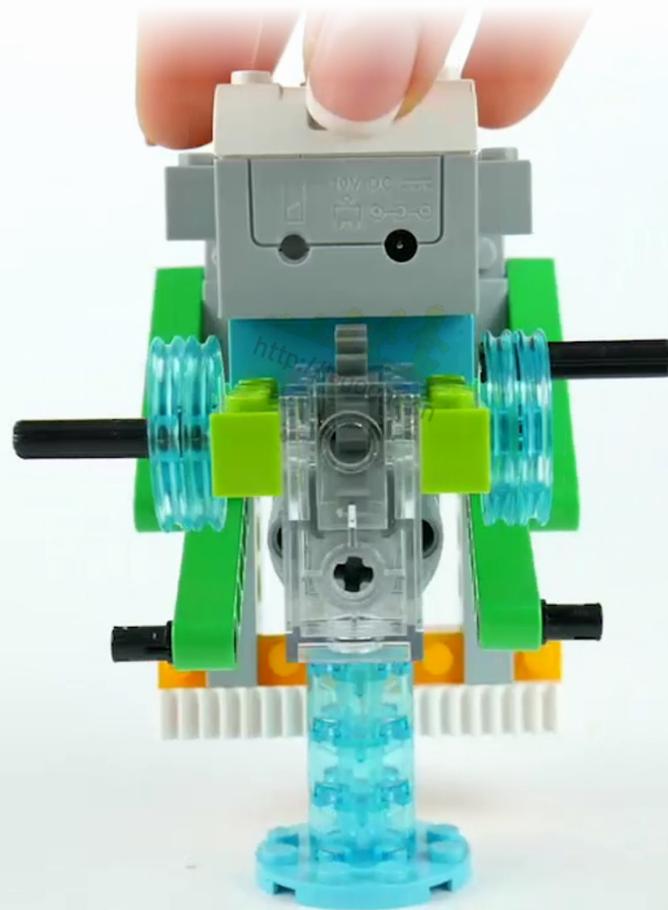


# Task 4 \*



关注公众号获取更多

Pay attention! The semiaxis on the left and right crank must be in front of each other. Only that robot will walk right. Experiment. Try changing the position of the semiaxis.



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6



116



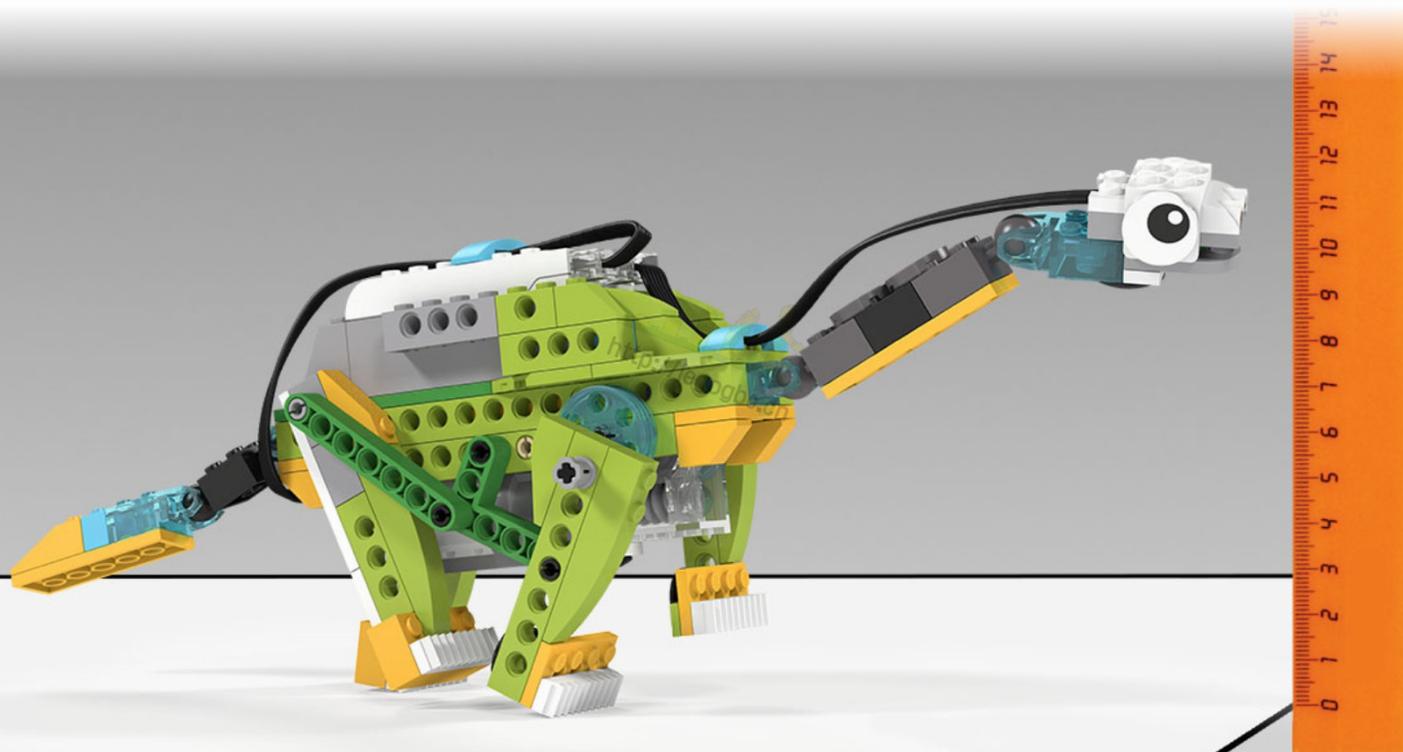


# Task 5



关注公众号获取更多

What the maximum height can the robot's head up? Measure the height and write.



6



117





# Task 6



关注公众号获取更多

Sauropods were large and slow animals. And what speed can your robot move? Run the motor for 60 seconds, count the number of steps the robot will make and measure the distance it will go. Together with the teacher, calculate the speed of the robot's movement.



## Sauropod



6



118



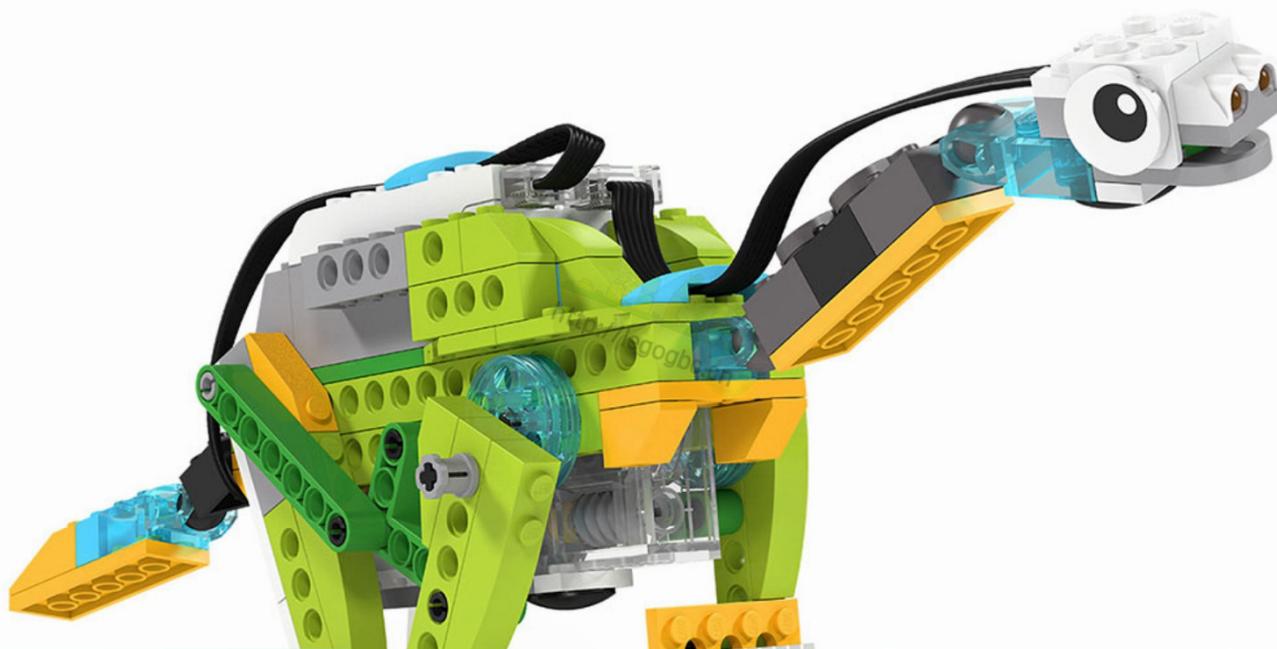


# Question



关注公众号获取更多

To which animal group do Sauropods belong?



Herbivores

Predators

Omnivorous



6



119





# Discuss!



关注公众号获取更多

- ▶ Which two large groups are Sauropods divided? How are they different?
- ▶ What helped Sauropods to mill vegetable food?
- ▶ How did Sauropods keep such long and hard neck?



6



120





# Sauropods



关注公众号获取更多



Sauropod





# Let`s remind! Arthropleura.



关注公众号获取更多



Place parts of the robot on the right places



3



2

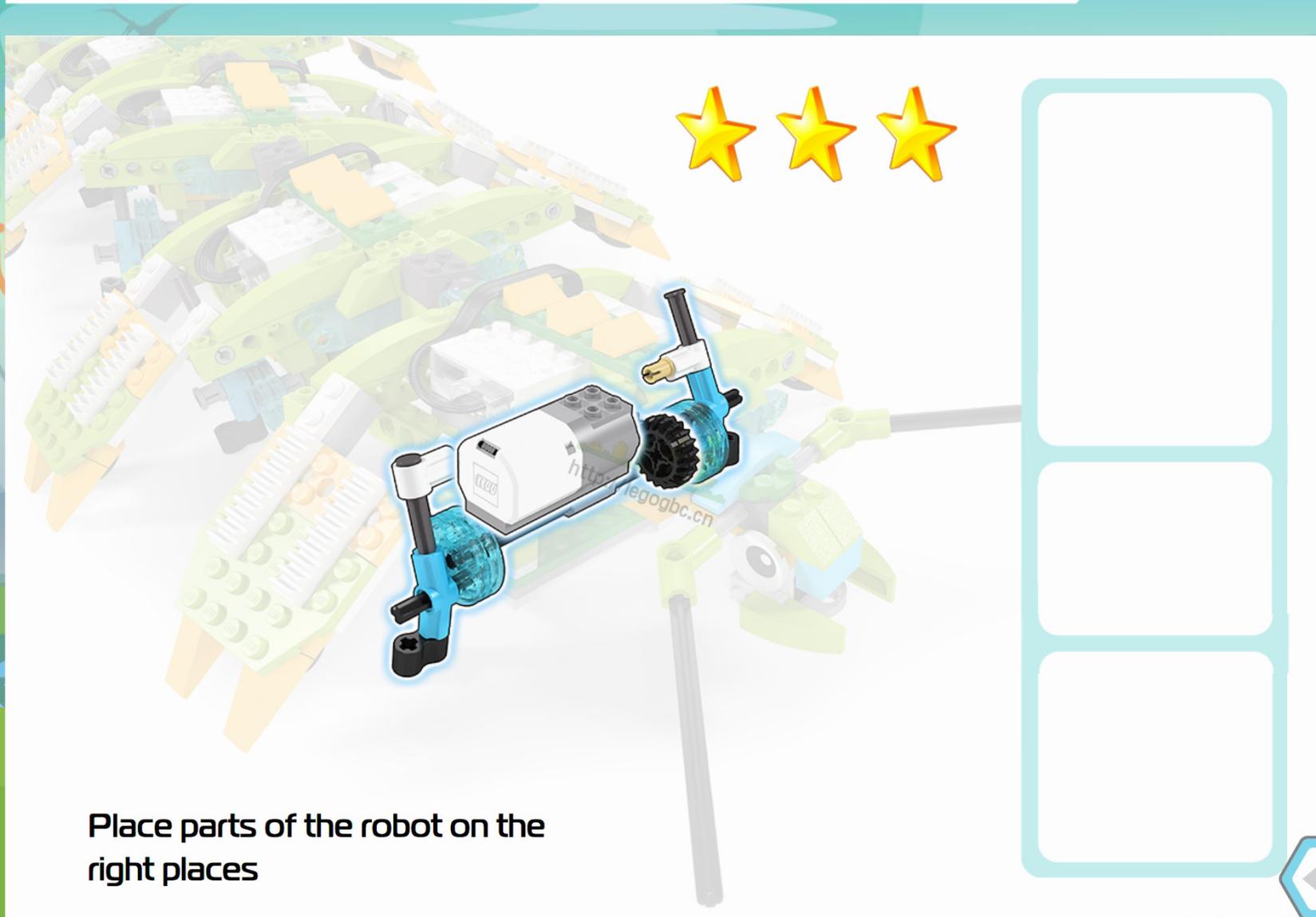




# Let`s remind! Arthropleura.



关注公众号获取更多



Place parts of the robot on the right places





# Let`s remind! Arthropleura.



关注公众号获取更多

What did most likely Arthropleura eat?



Dinosaurs

Fish

Ferns



3



3





# New day at the Robots` factory



关注公众号获取更多



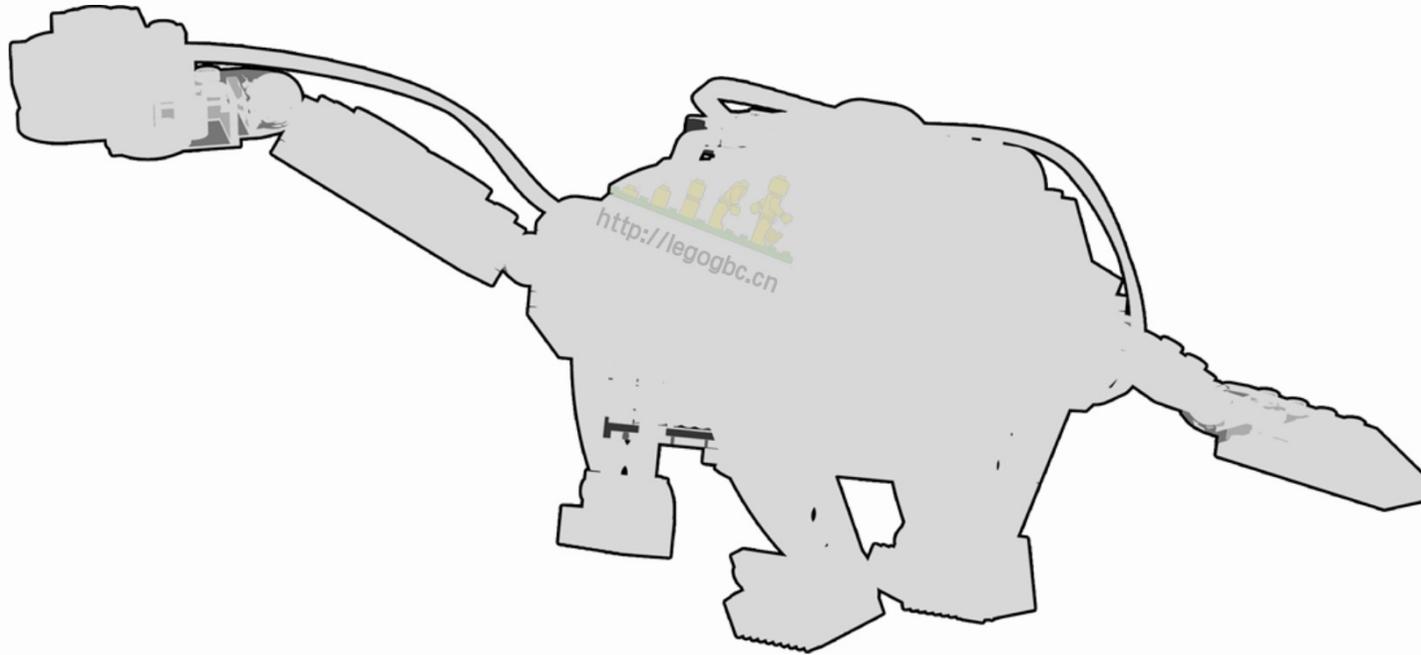


# Dino Park



关注公众号获取更多

Today we continue to create a modern Dino Park. We must develop a robot for the expositions of the Mesozoic era Cretaceous period.





# Dino Park



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At the beginning of Cretaceous period of Mesozoic climate was damp and warm in most regions of Earth. The forests consisted mainly of ferns and gymnosperms, sagovets, conifers, ginkgo trees. The land was dominated by dinosaurs. Among the herbivores of the highest prosperity reached Sauropod.



3



7



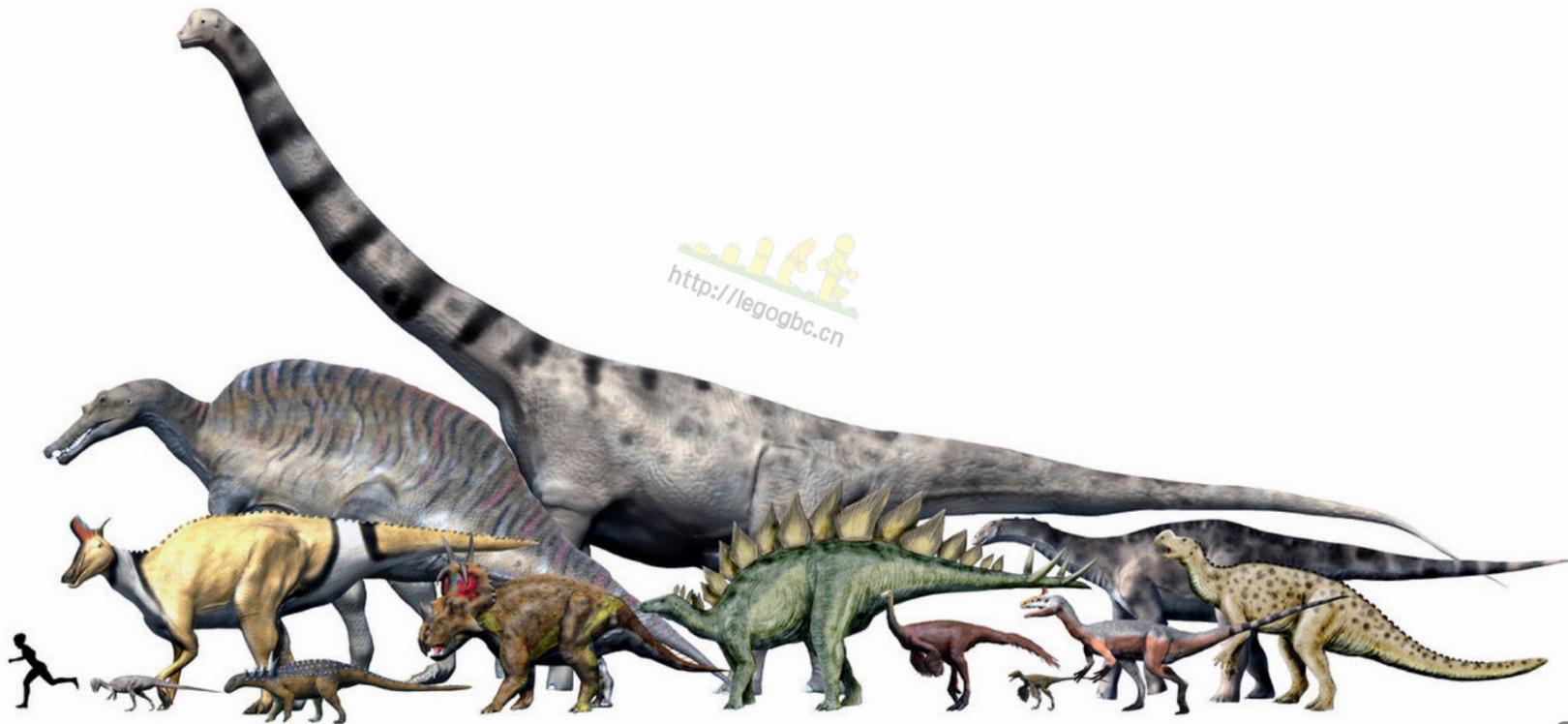


# Dinosaurs



关注公众号获取更多

Those whom we now call "dinosaurs" appeared on Earth about 230 million years ago. There were variety of this group of creatures.



3



8



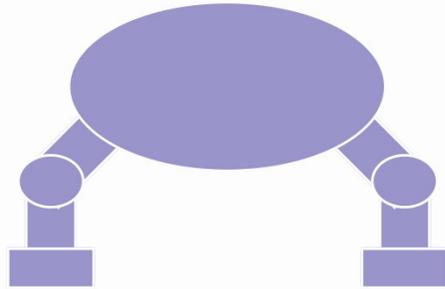


# Dinosaurs

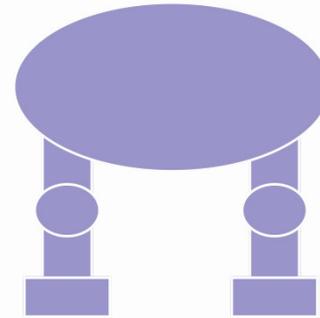


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Not all ancient creatures were dinosaurs. Dinosaurs differ from prehistoric reptiles in the structure of the skeleton:



In the reptile, legs are on the sides of the trunk. Therefore, in order to keep weight, they spend a lot of effort.



And in dinosaurs, legs are under the trunk, so they can long walk and run for, while having a large body mass.



Dimetrodon



Stegosaurus





# Dinosaurs



关注公众号获取更多

Dinosaurs lived on Earth for 150 million years. It was found a lot of fossilized remains of various dinosaurs. Their structure and appearance, like any living creature, depended on the way of life - that the dinosaur ate, how it got food and how it avoided that it would not become food itself.



3



10





# The structure of the dinosaur skeleton



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Scientists have come to the conclusion that most of the found skeletons of the dinosaurs by structure can be attributed to one of five groups:



**THEROPODS**



**SAUROPODS**

DINOSAURS

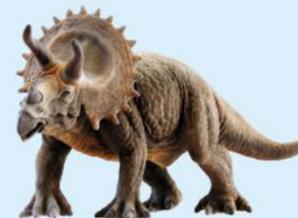
**STEGOSAURUS**



**ORNITHOPODS**



**CERATOPS**





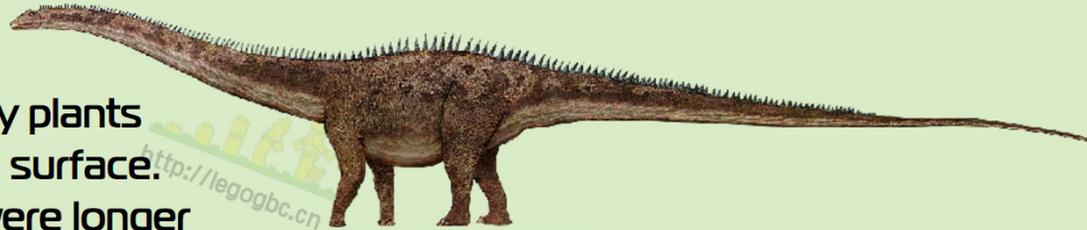
# Sauropods



关注公众号获取更多

Sauropods were the largest animals living on the Earth's surface. They were herbivorous giants that moved on four legs and had long necks and tails. Sauropods are divided into two large groups:

They were fed by plants that grew on the surface. Their rear legs were longer than the front ones.



**DIPLODOCS**

SAUROPODS

They ate leaves from the tops of the trees. Their front legs were longer than the rear.



**BRACHIOSAURUS**



3



12





# Discussion of the task



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<http://legogbc.cn>

**What do you know about the biggest creatures that inhabited the surface of our planet? What can we compare to their size?**



3



13



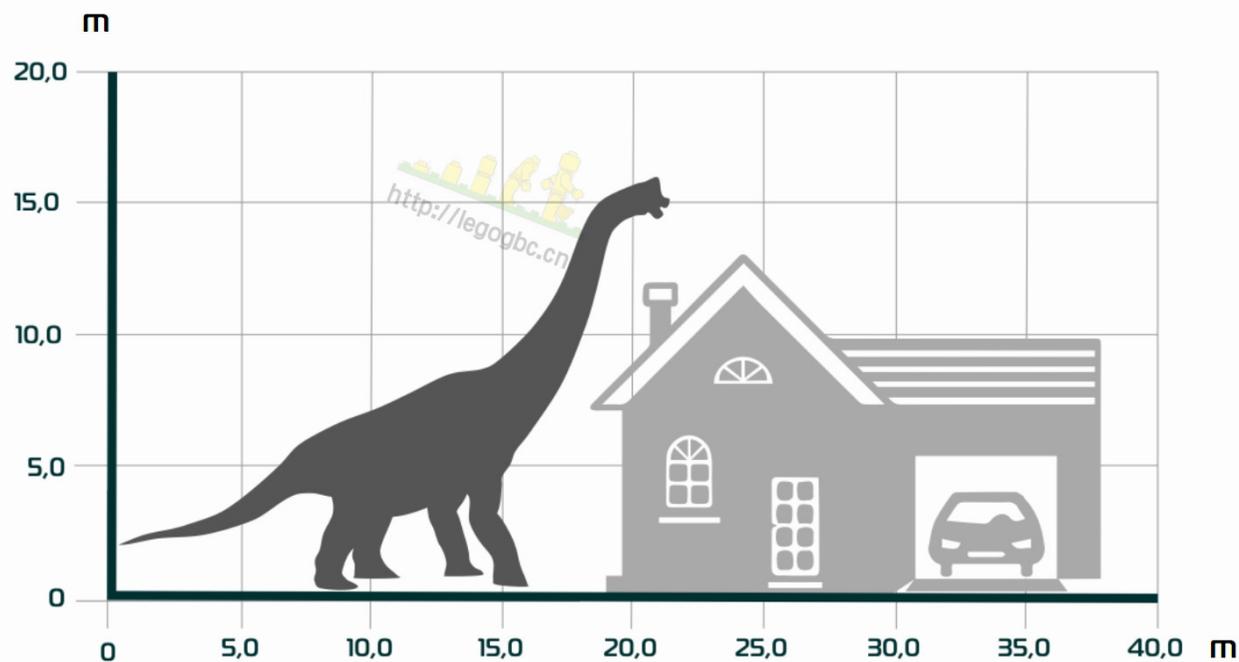


# Sauropods



关注公众号获取更多

To imagine Sauropod size, look at the Brachiosaurus on a background of ordinary house:



3



15





# Sauropods



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Sauropods could not completely chew all the necessary food for life. Therefore, they swallowed stones, which tore the plants in the stomach to a homogeneous state. Further, bacteria worked on digestion.

In addition, the Sauropods had a very developed heart that allowed the blood to flow through the long necks to the brain.



3



16





# Brachiosaurus



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These giants had a weight of 12 African elephants and could eat flowers from the fourth floor balcony. The total length of the Brachiosaurus was 23 meters, and the weight - 89 tons.



3



17



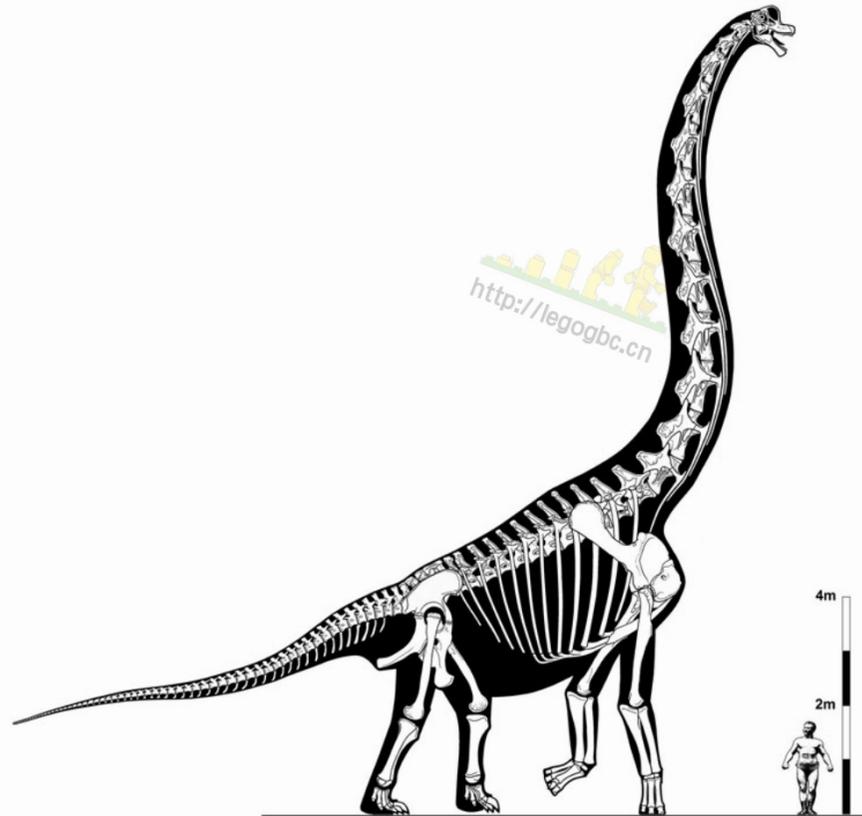


# Brachiosaurus



关注公众号获取更多

The Brachiosaurus had the height of two giraffes stacked on each other. Long legs and shape of cervical vertebrae allowed them to reach the tops of the trees.





# Diplodocs



关注公众号获取更多

Unlike Brachiosaurus, Diplodocs fed on plants that grew on the surface. Their rear legs were longer than the front, and the neck could not lift high.



3



19



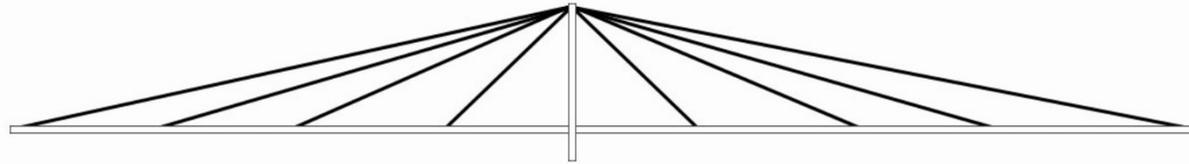
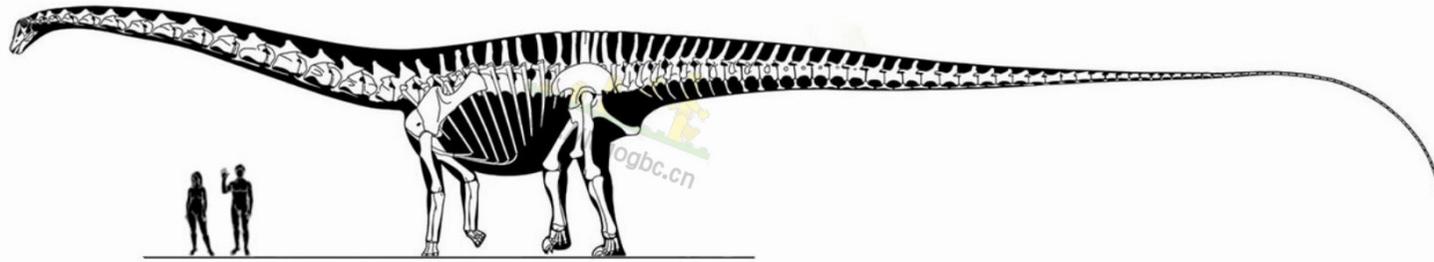


# Diplodocs



关注公众号获取更多

Interestingly, Diplodocs did not hold their necks in the usual sense. The tail was a counterbalance that balanced the neck. It worked as a modern bridge, in which instead of cables - tendons.



3



20





# Diplodocs



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The length of some Diplodocs reached 29 meters with a weight of about 23 tons. Another of their characteristic features is an extremely long neck and tail. Perhaps they could move their heads from side to side to find better food.



3

21

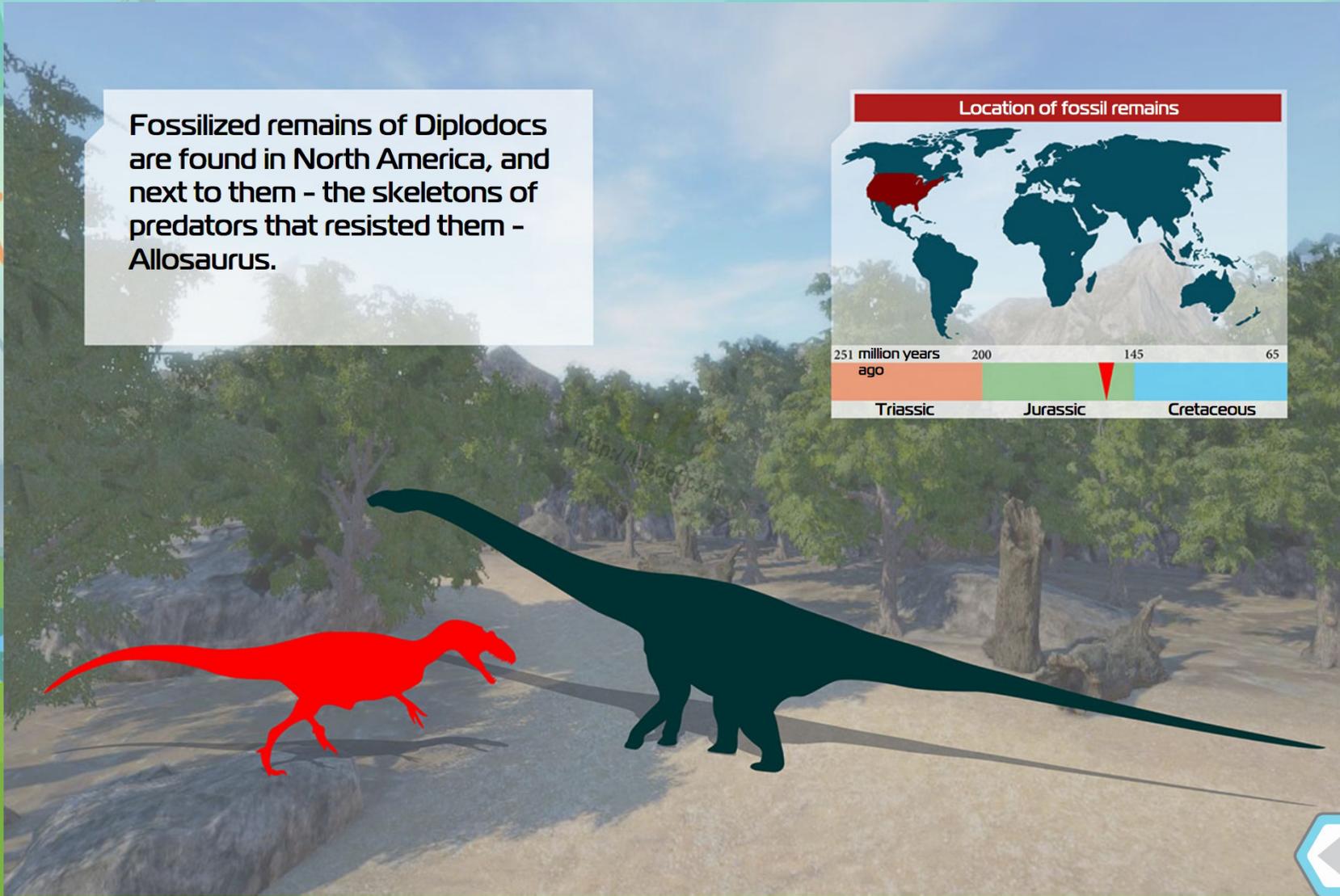
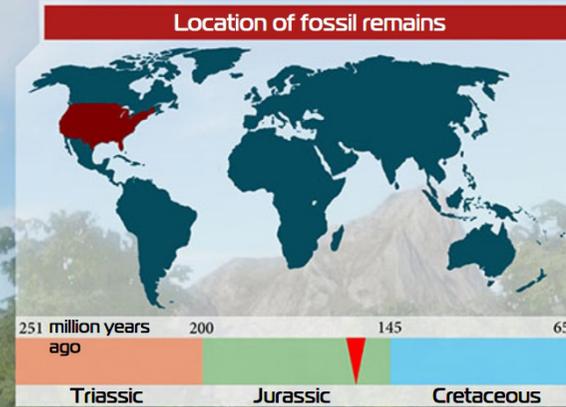


# Diplodocs



关注公众号获取更多

Fossilized remains of Diplodocs are found in North America, and next to them - the skeletons of predators that resisted them - Allosaurus.



3



22





# Discussion



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<http://legogbc.cn>

**What are the main differences between the  
Diplodocs and Brachiosaurus?**



3



23



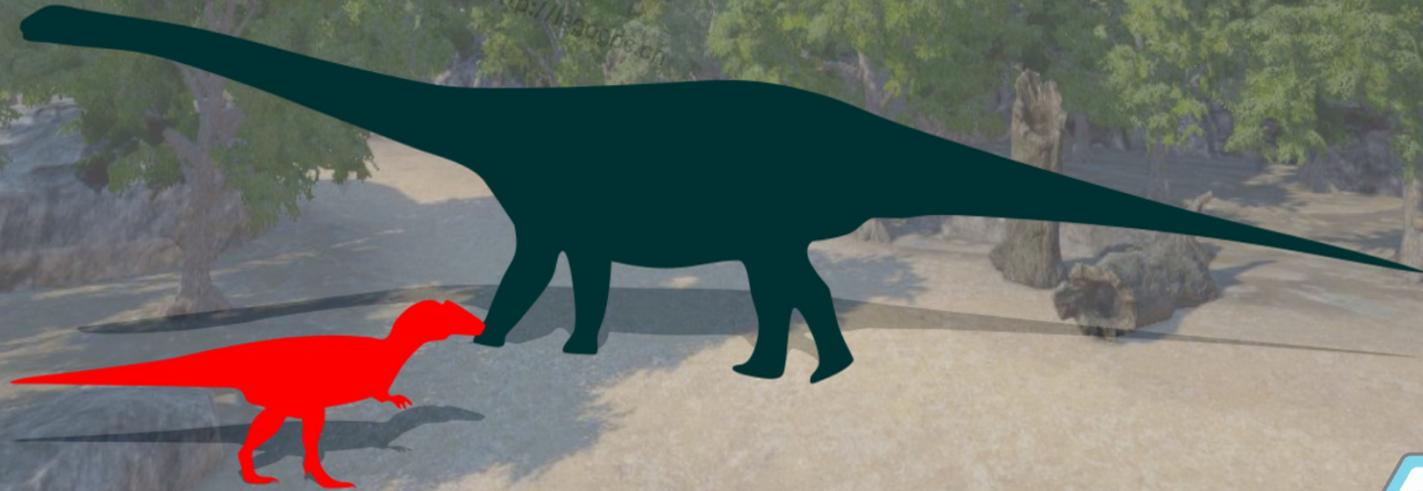
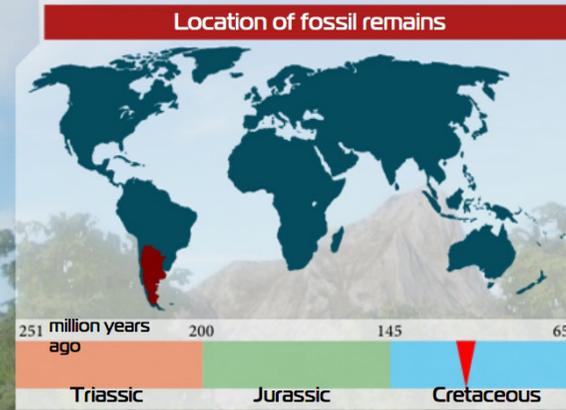


# Argentinosaurus



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Argentinosaurus were one of the largest Sauropods. And even they were threatened by predators. Near the remains found in Argentina, found skeletons Mapusaurus-predatory Theropods.



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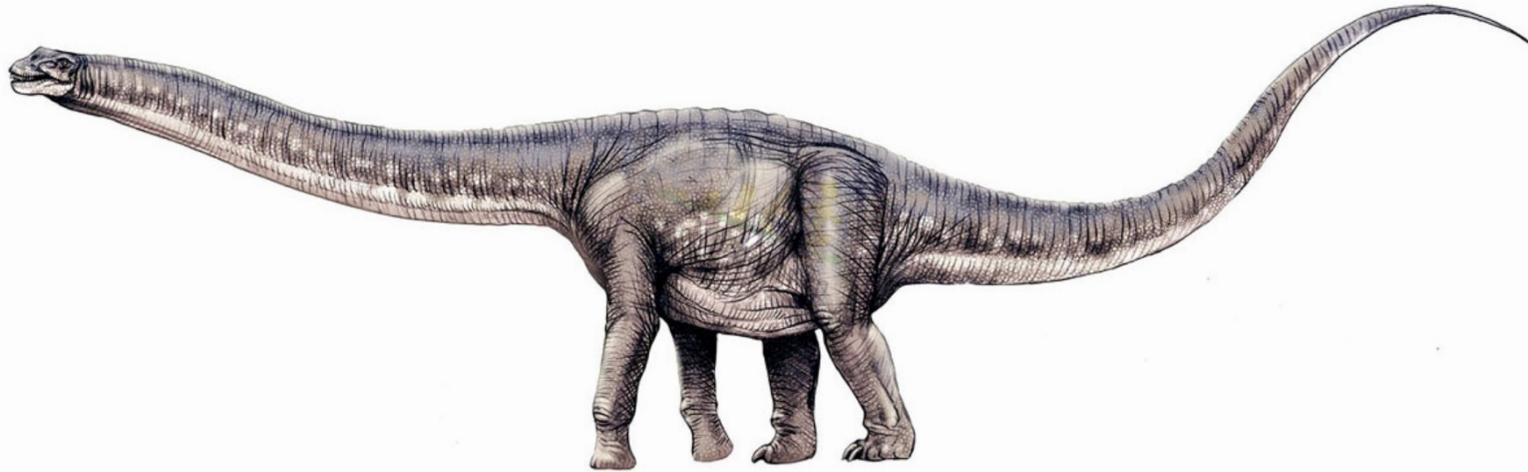


# Dino Park



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In our park must be represented the largest of the most famous dinosaurs - Sauropods. That is why we will build Argentinosaurus today.



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# TASK



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## Task

- create the robot for the expositions of Cretaceous period

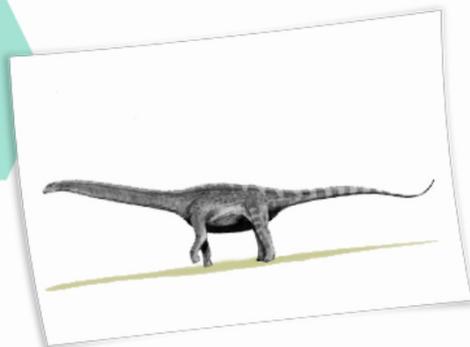


## Requirements

- must be Argentinosaurus
- must react to the predators approaching



## Sauropod's appearance



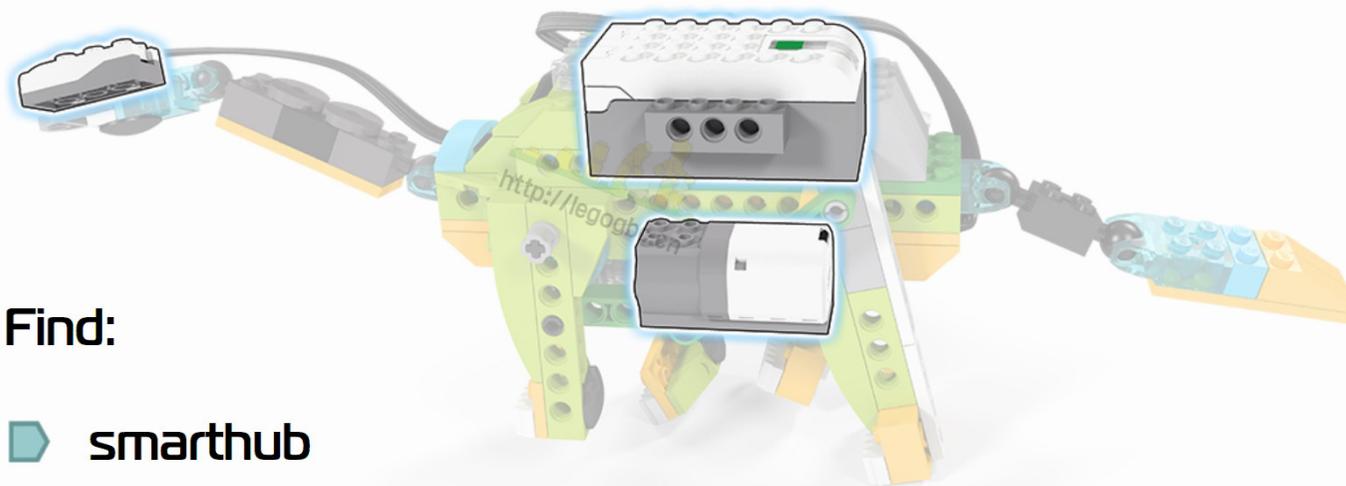


# Design features



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Sauropod uses a motor to drive the four legs. The motion sensor is located on the head, allowing to detect objects in front of the robot



Find:

- ▶ smarthub
- ▶ motor
- ▶ motion sensor

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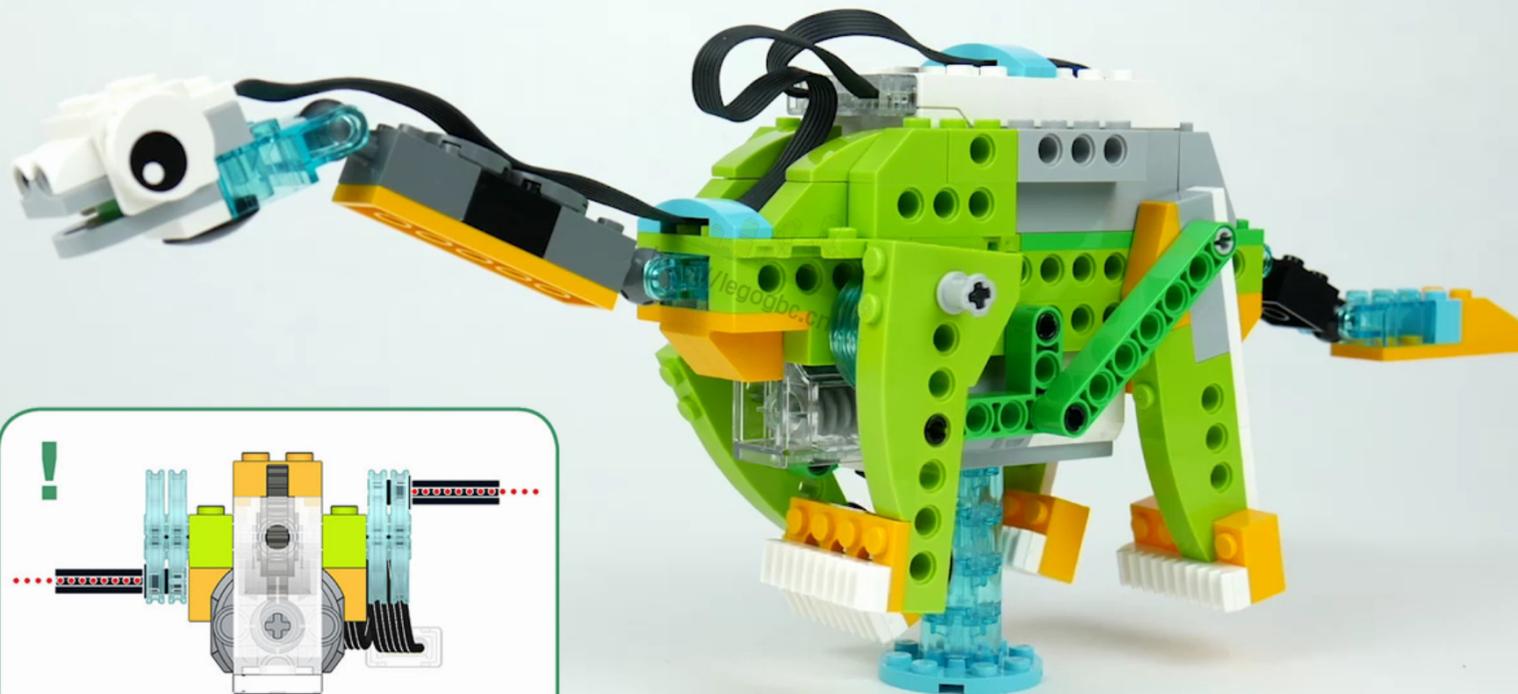


# Design features



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Pay attention! Semiaxis in the cranks stand at opposite points to each other.



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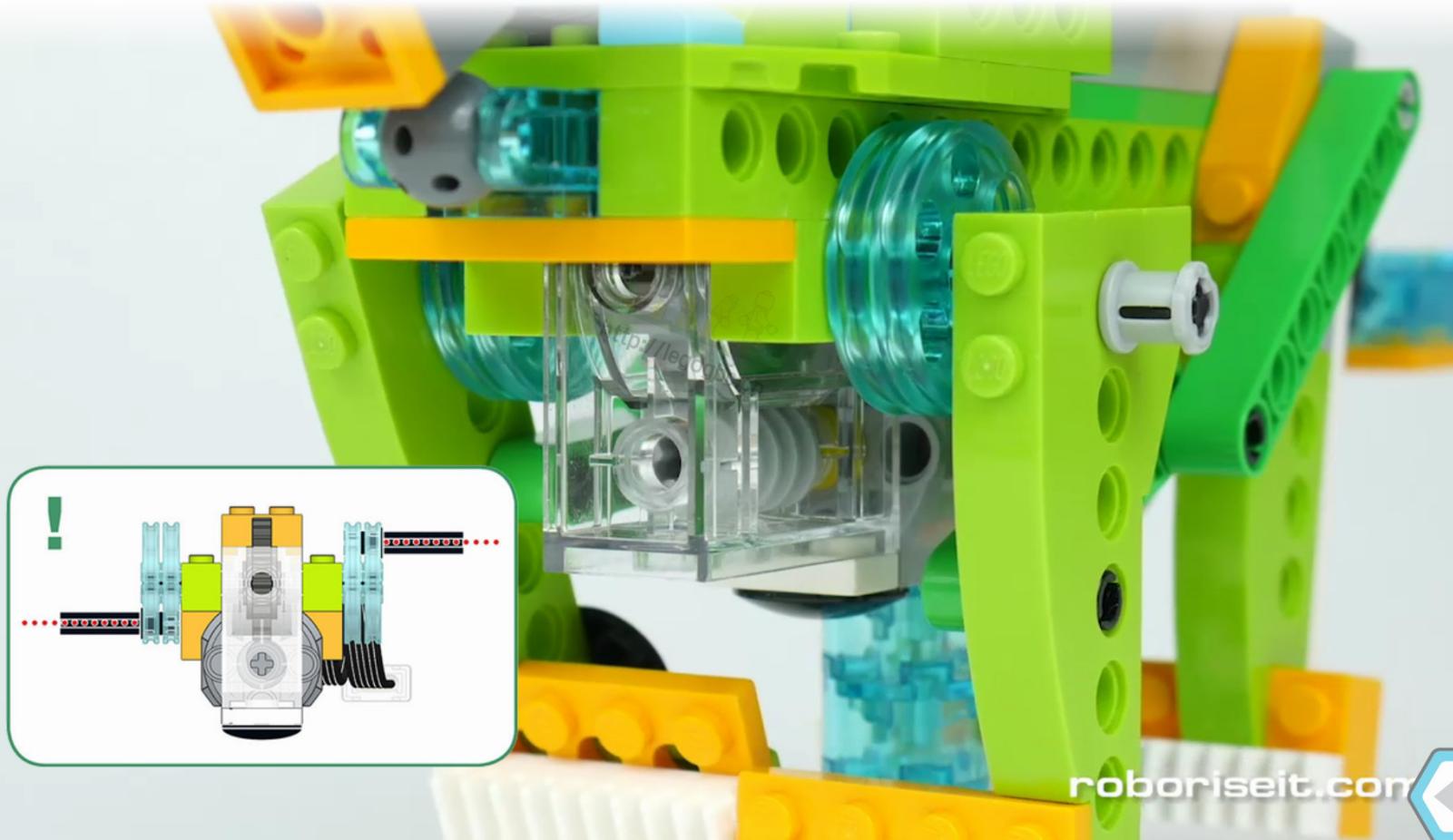


# Design features



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Pay attention! Semiaxis in the cranks stand at opposite points to each other.



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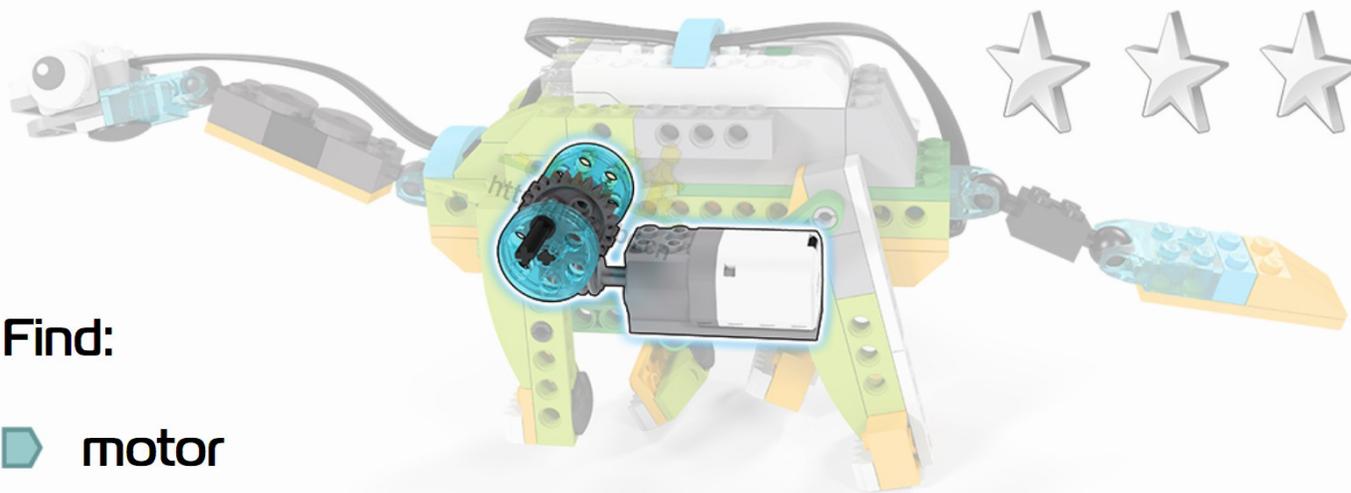


# Design features



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Crankes are used to convert the motor's rotation into the translational motion. The rotation on cranks is transmitted through a worm gear, which reduces the rotational speed and rotates the axis by 90 degrees.



Find:

- motor
- worm gear
- cranks



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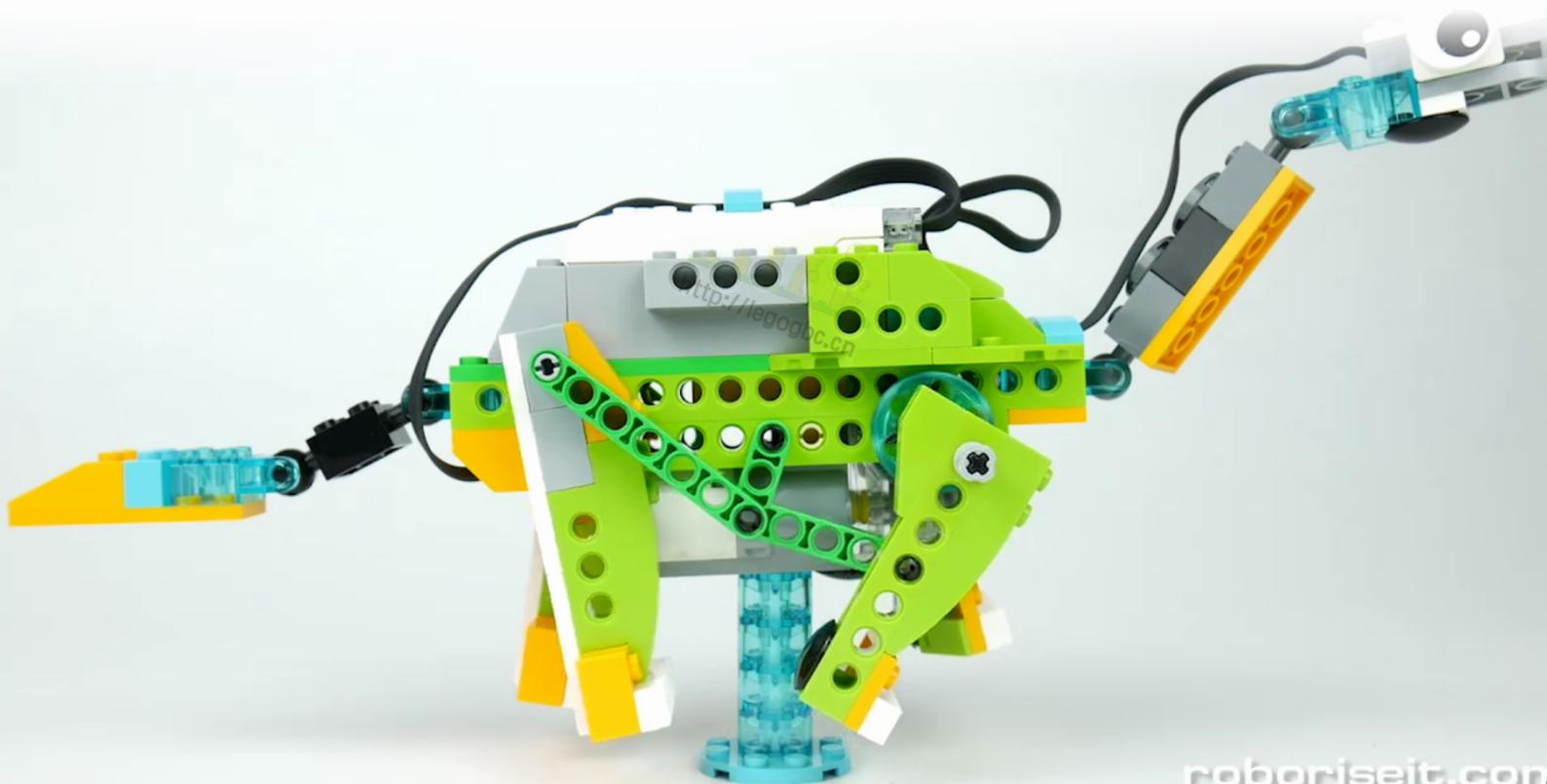


# Design features



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From the motor the movement is transmitted to the front legs of the robot. From them through a moving levers movement is transmitted to the rear legs of the robot.



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# Design features



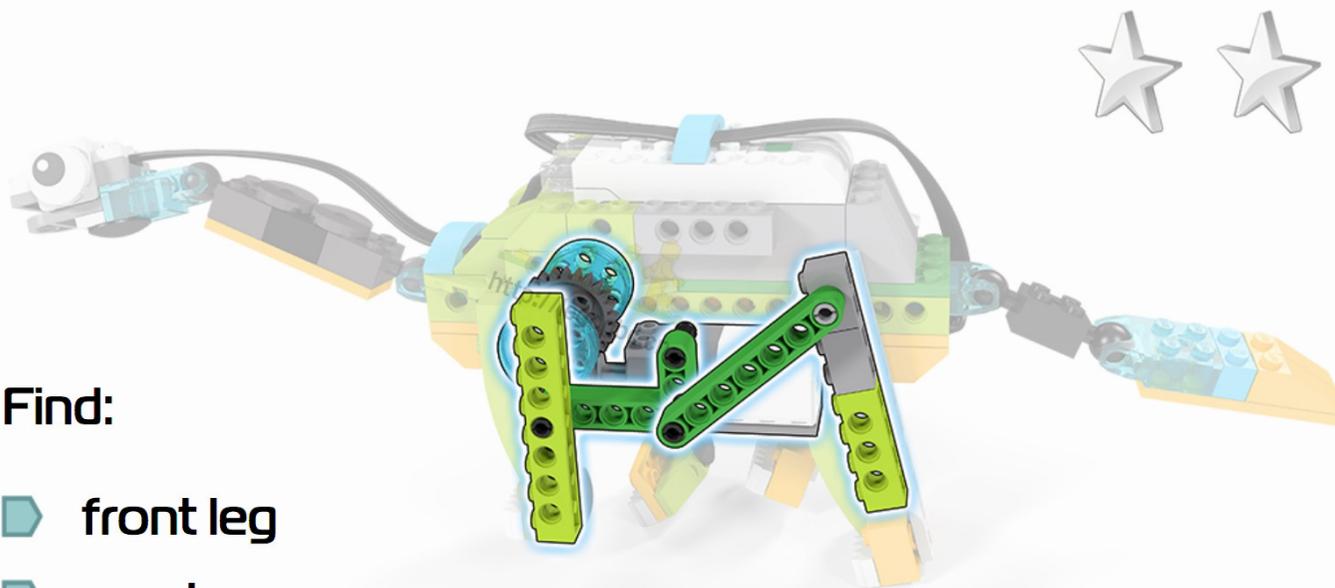
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Pay attention! Worm gear increases the efforts that the motors makes, 24 times. Locking the gear can cause injury!



Find:

- front leg
- rear leg



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# Design features



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Walking, the robot can tear from the surface at the same time two legs. It does not fall due to the fact that the feet are fairly wide and the center of robot's gravity is above them.



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