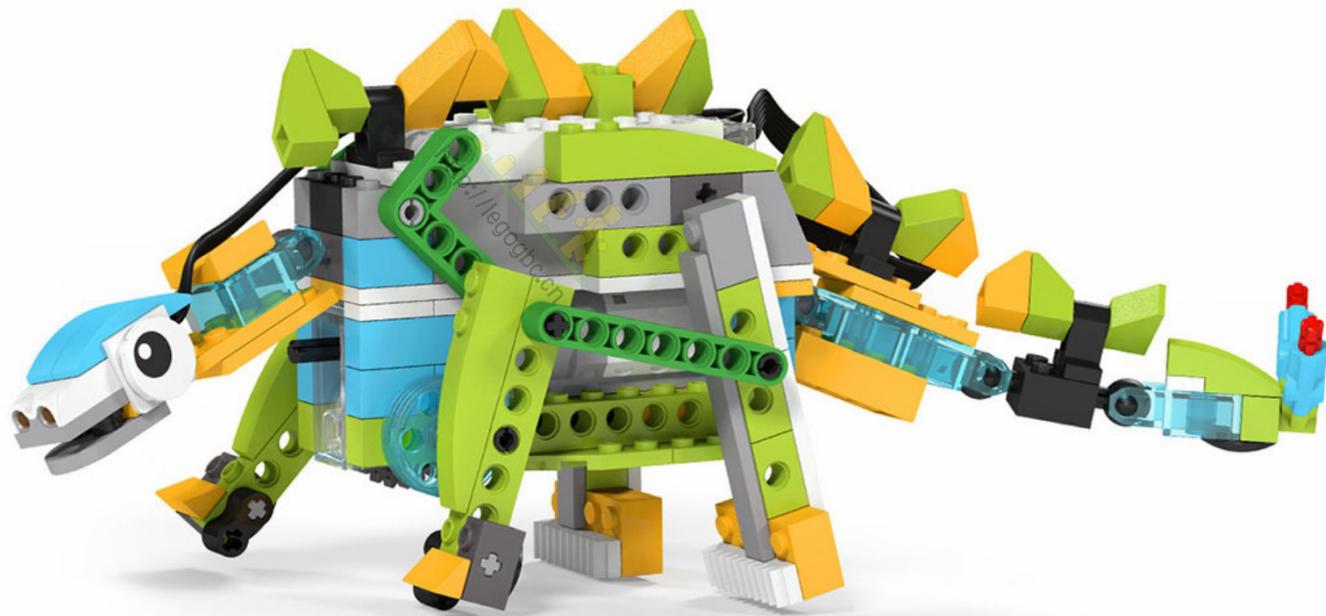




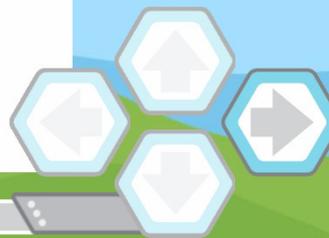
# Stegosaurus



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## Stegosaurus



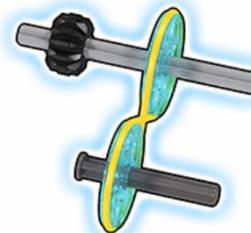
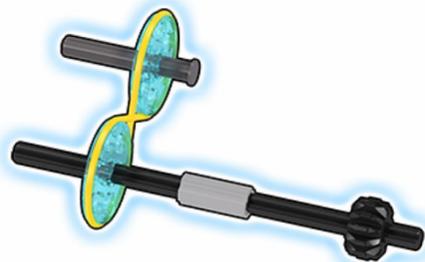
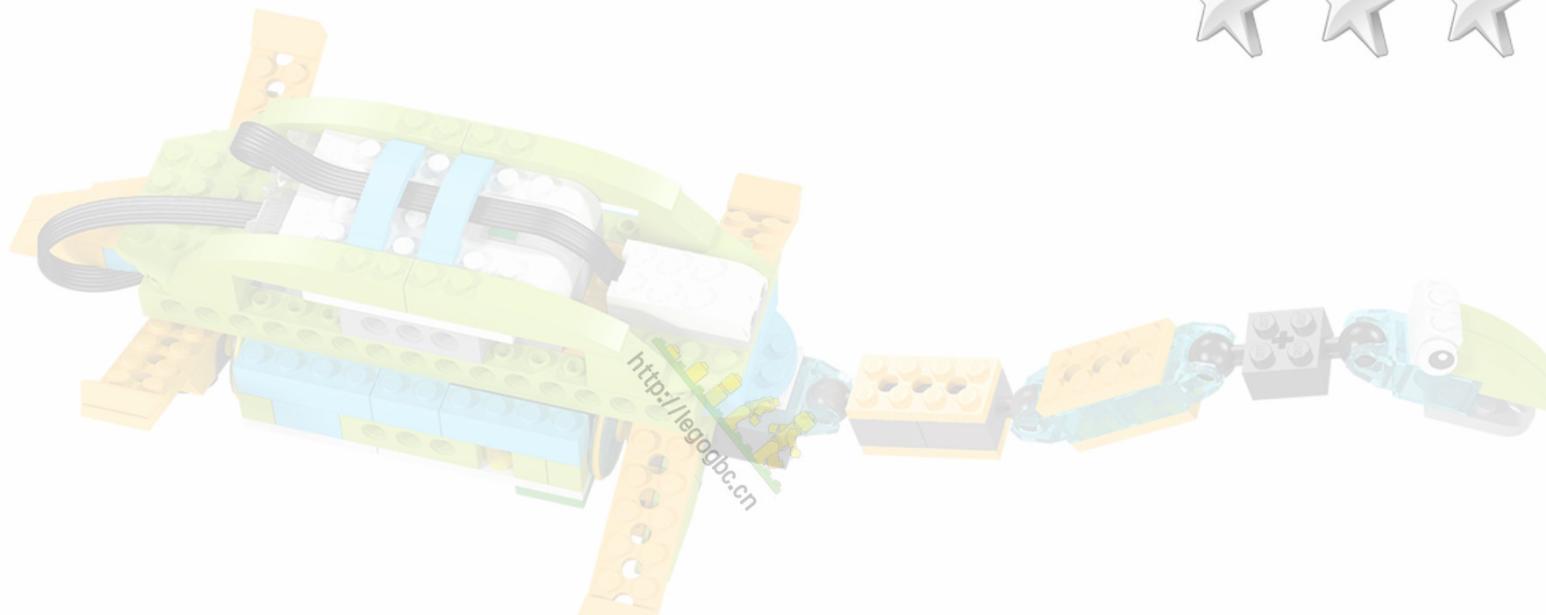


# Let`s remind! Plesiosaurus



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Place parts of the robot on the right places



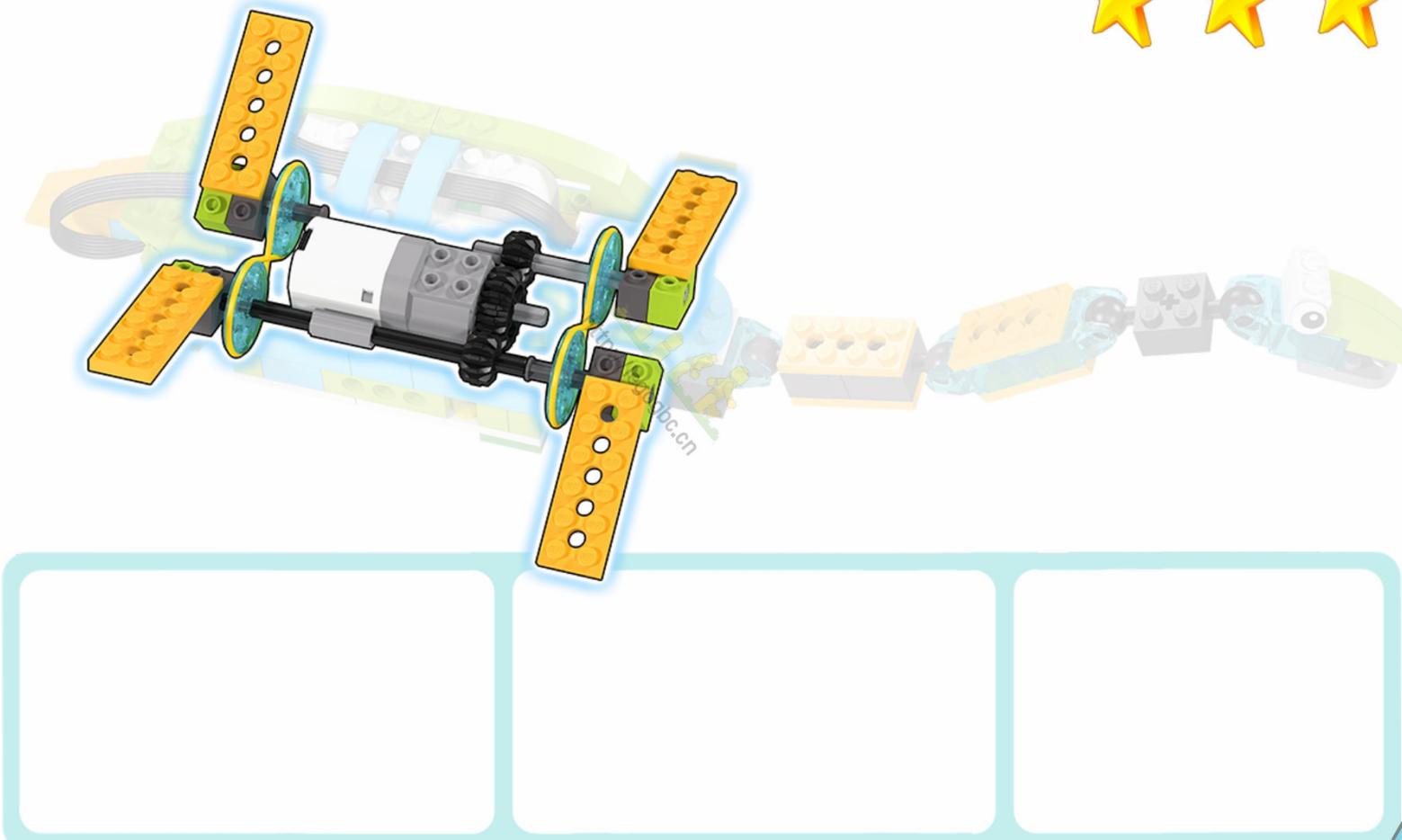


# Let`s remind! Plesiosaurus



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Place parts of the robot on the right places





# Let`s remind! Plesiosaurus



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Are there any sea creatures that swim the same way as Plesiosaurus?



No, there aren't

Yes, there is another species that swims the same way

Yes, such movement is common



3



3



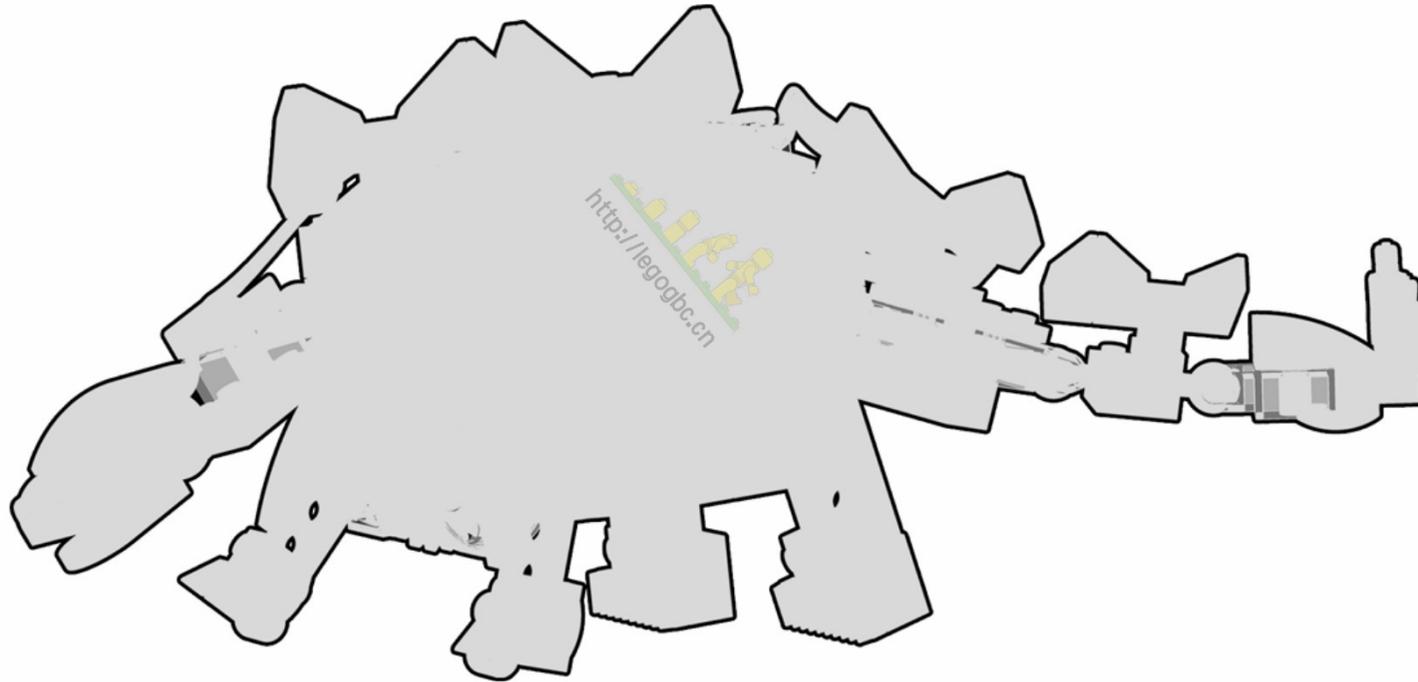


# Dino Park



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Today we continue to create a modern Dino Park. We must develop a robot for the Jurassic exposition of the Mesozoic.



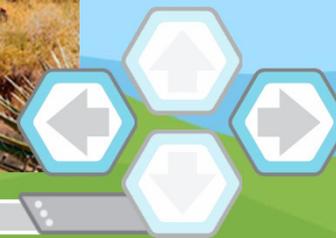


# Dino Park



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The Jurassic period is the time of the flowering of the diversity of dinosaurs. The climate was damp and warm, at the equator, even dry. The Pangea Supercontinent began to disintegrate, which led to the emergence of shallow seas between the new continents.





# Let`s remind



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<http://legogbc.cn>

**What is the difference between the structure of a skeleton of dinosaurs and reptiles?**





# Task



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What structure of a skeleton fit to the following creatures? Draw the schematic drawings to the pictures of the animals that they are responsible for.



5



9





# 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

Dinosaur from which group have you already built?



THEROPODS



SAUROPODS

DINOSAURUS

STEGOSAURUS



ORNITHOPODS



CERATOPS



5



10



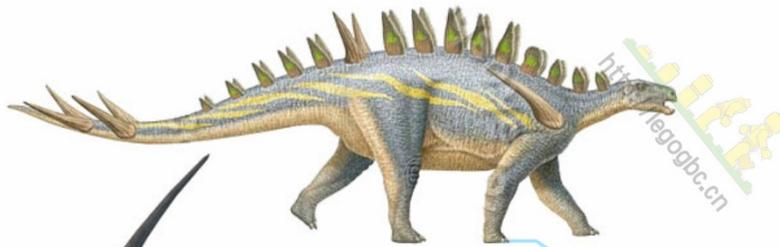


# Stegosaurus

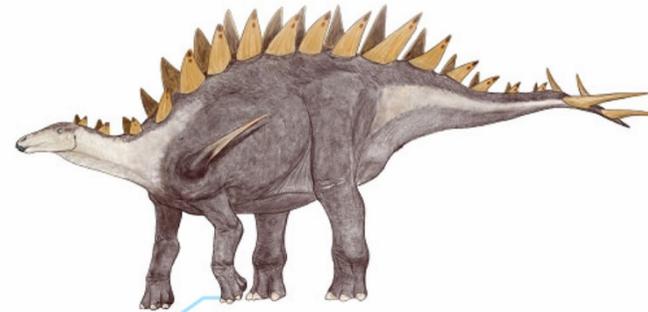


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The main feature of this group of dinosaurs is the bone plates that were along the back. At the tail, they had several pairs of spikes, which helped them protect themselves from predators. Stegosaur moved on four legs.



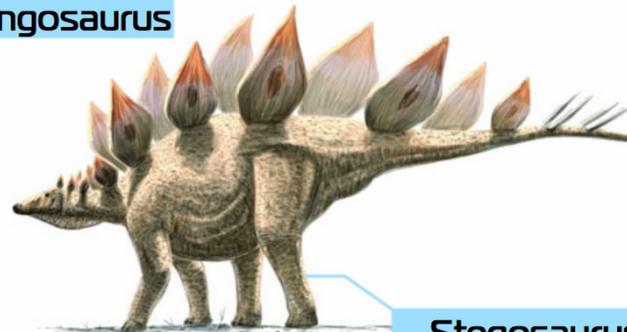
Huayangosaurus



Tuojiangosaurus



Kentrosaurus



Stegosaurus



5



11



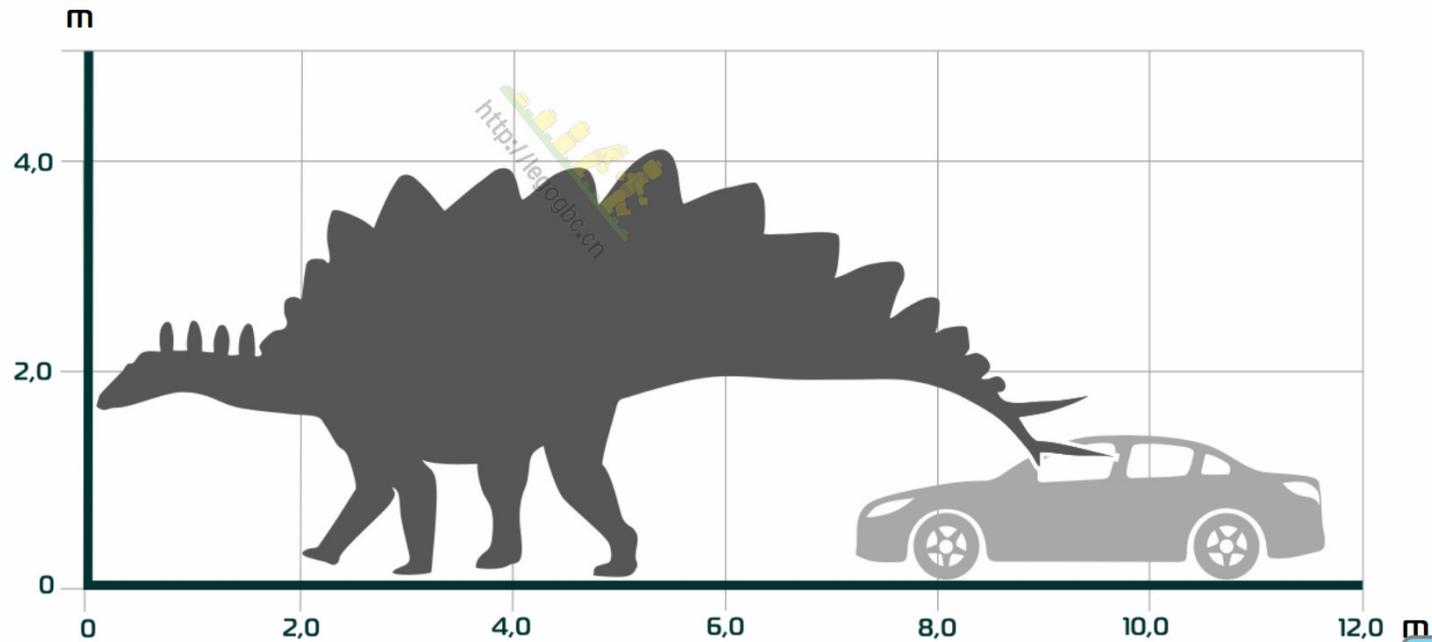


# Stegosaurus



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These massive animals were twice higher as adults and weighed 7 to 9 tons, slightly larger than the modern largest elephants.





# Stegosaurus



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In addition to bone plates, the feature of the Stegosaurus skeleton is long legs. They were twice as long as the front ones. For walking, all four legs were used.



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# Stegosaurus



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The bone plates on the back could not serve as reliable armor from predators. Therefore, most likely, they simply helped the dinosaur make better impressions and look bigger.



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15





# Stegosaurus



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These herbivorous dinosaurs had a toothless beak. Teeth were located in the back of the mouth, where they helped to chew the leaves.



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16



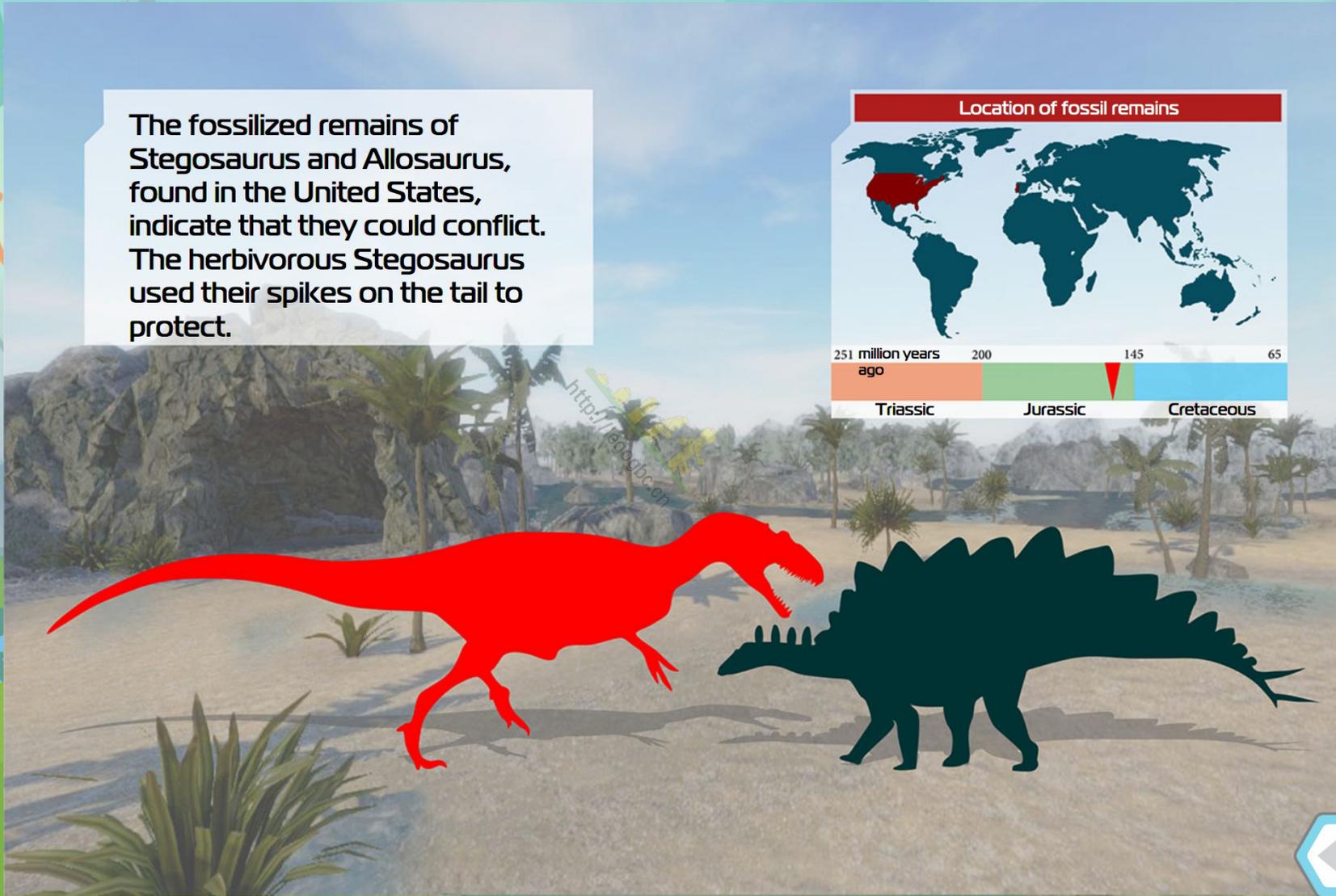
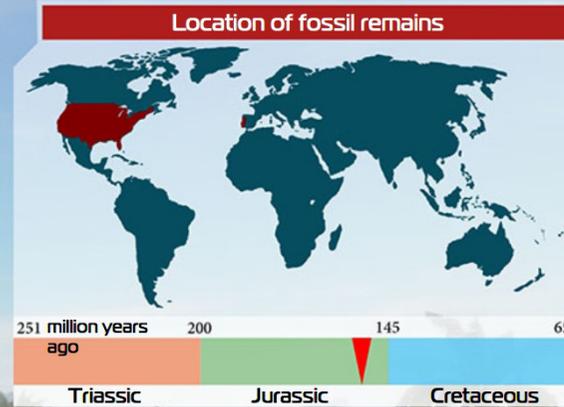


# Stegosaurus



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The fossilized remains of Stegosaurus and Allosaurus, found in the United States, indicate that they could conflict. The herbivorous Stegosaurus used their spikes on the tail to protect.



5



17





# Dino Park



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The next inhabitant of our park will be Stegosaurus. It can be identify on the bone plates on the back and spikes on the tail.



What do you think, for what served bone plates on the back of Stegosaurus?





# TASK



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## Task

- create a robot for the Jurassic exposition

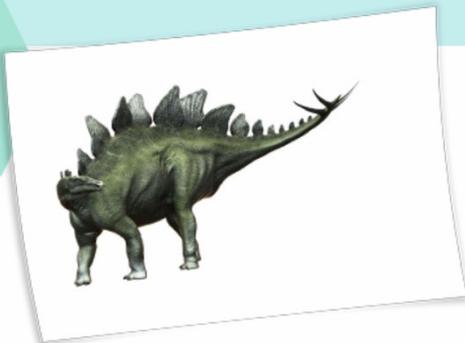


## Requirements

- should be Stegosaurus
- must move on four legs and have distinctive plates on the back and spikes on the tail



## Stegosaurus's appearance



5



20





# Design features



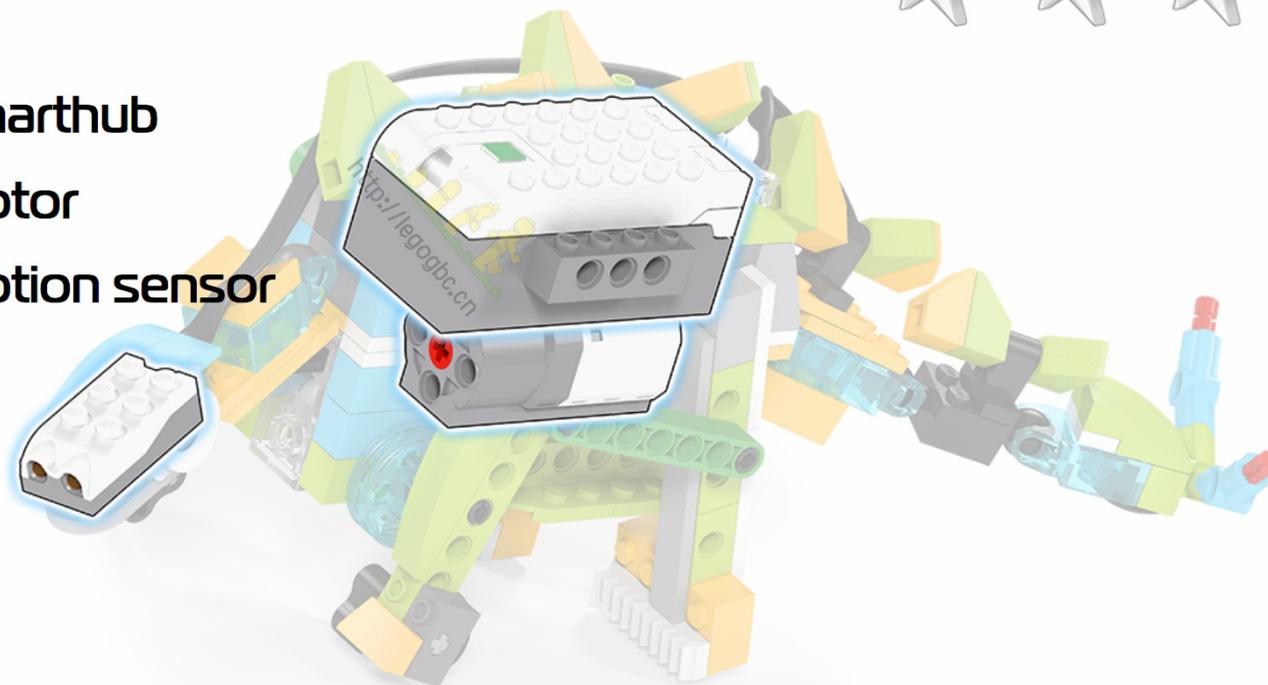
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Stegosaurus uses the motor to drive the legs. The motion sensor is placed on the head of a robot, allowing to detect objects in front of the robot.



Find:

- smarthub
- motor
- motion sensor



5



21



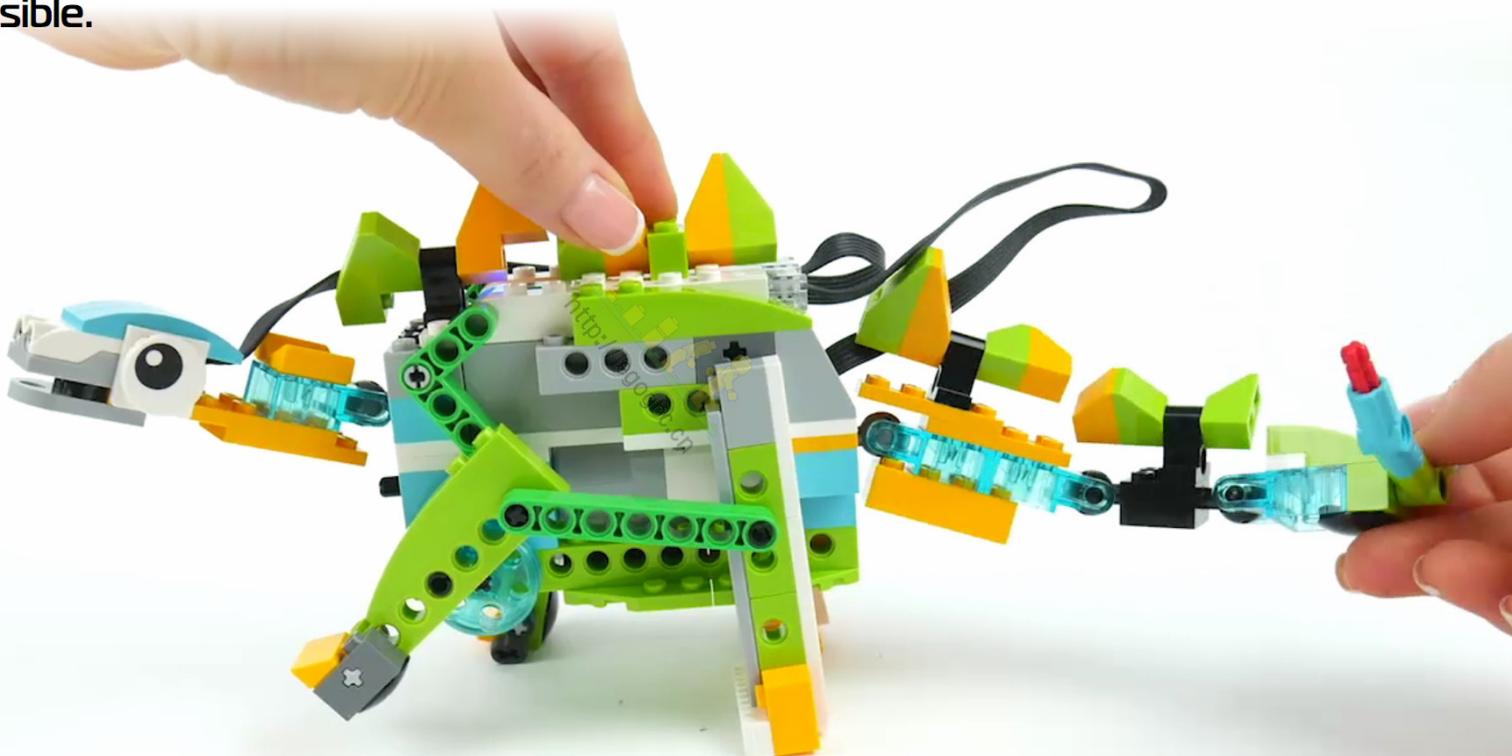


# Design features



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Moving head allows you to choose the convenient position of the motion sensor, and thanks to moving segments of the tail and spikes the robot looks more plausible.



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5



22





# Design features



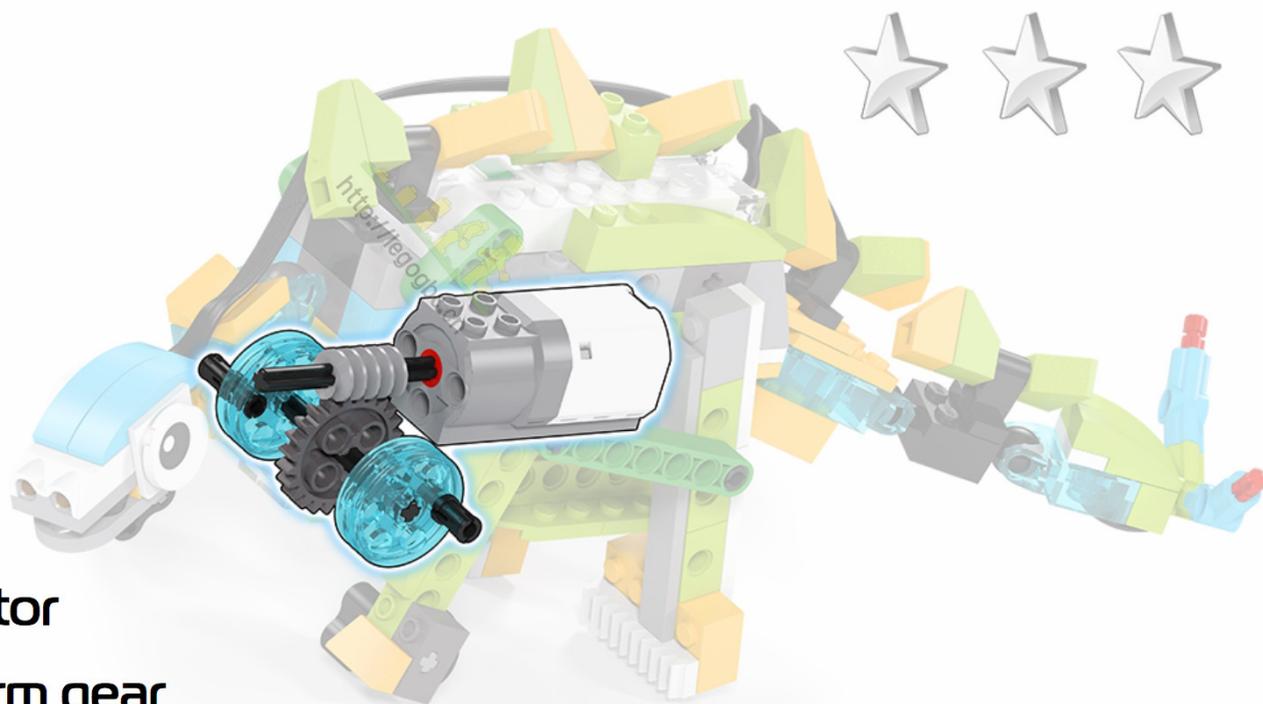
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A worm gear is used to transfer the rotation from the motor to the cranks. It reduces the speed of rotation by 24 times and increases the force in as many times.



Find:

- motor
- worm gear
- cranks



5



23



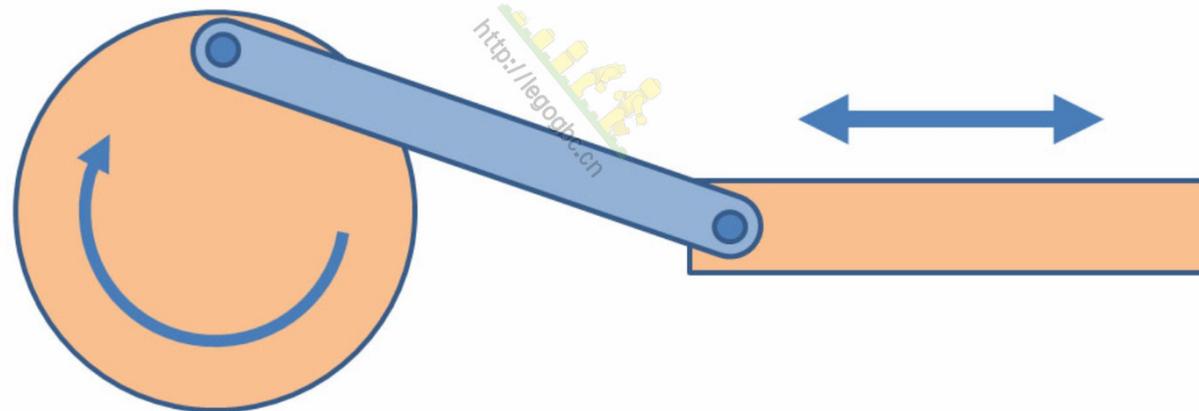


# Crank



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**The crank** is a simple mechanism that has the form of a handle, attached at right angles to the axis. Used to convert the rotational motion into the translational and vice versa.



5



24



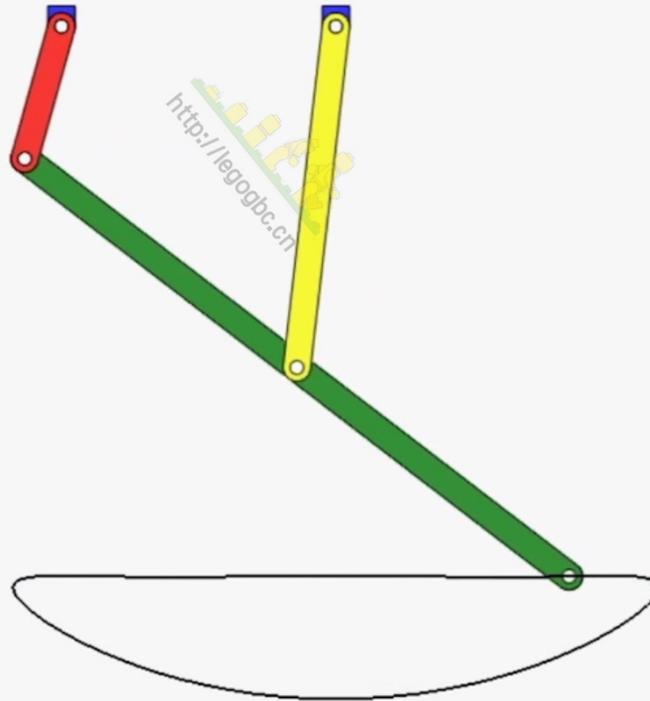


# Walking



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To make step, the touch point to the surface has a long time to move horizontally, and then make a rapid push forward. To do this, you can use a lever system:



5



25



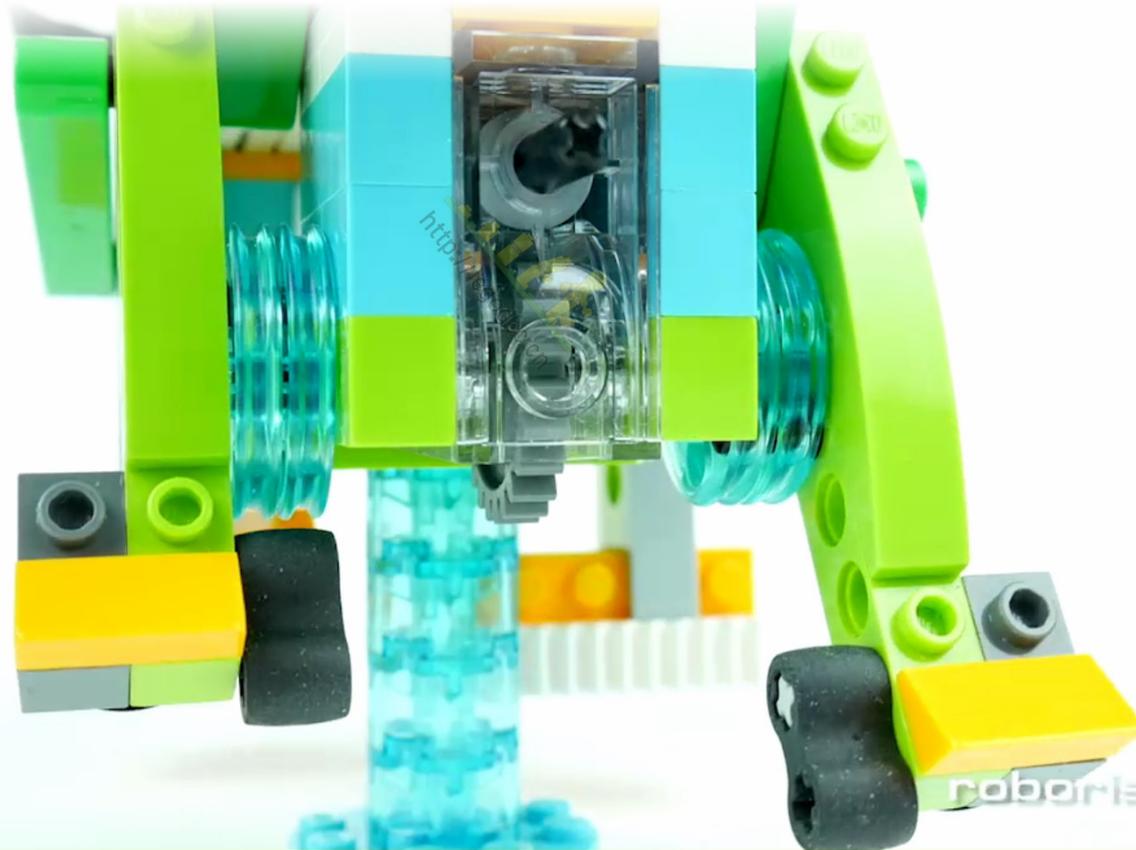


# Design features



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The crank transfers the rotary motion from the motor to the translational one.  
Thanks to this, a step is taking place.



5



26





# Design features



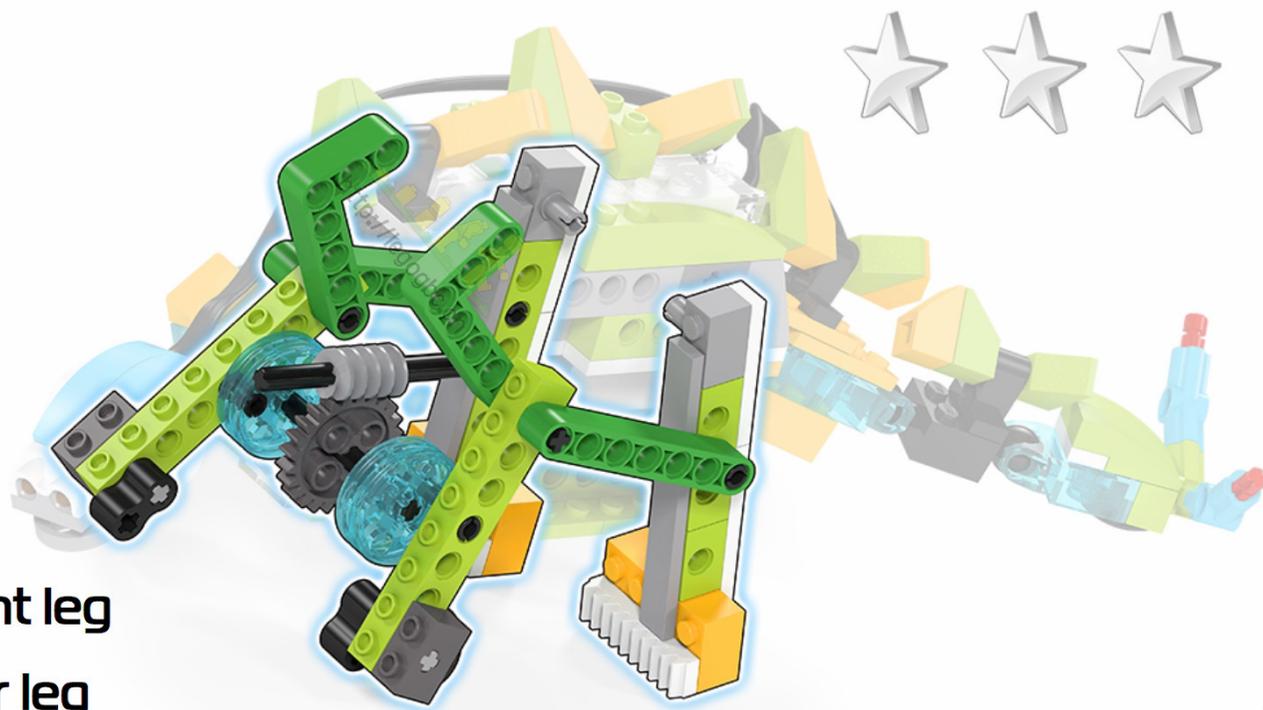
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The drive is given to the robot front legs . For better adhesion to the surface, they have rubber parts. Further through the moving beam the movement is transmitted to the robot rear legs.



Find:

- front leg
- rear leg
- spikes on the tail



5



27



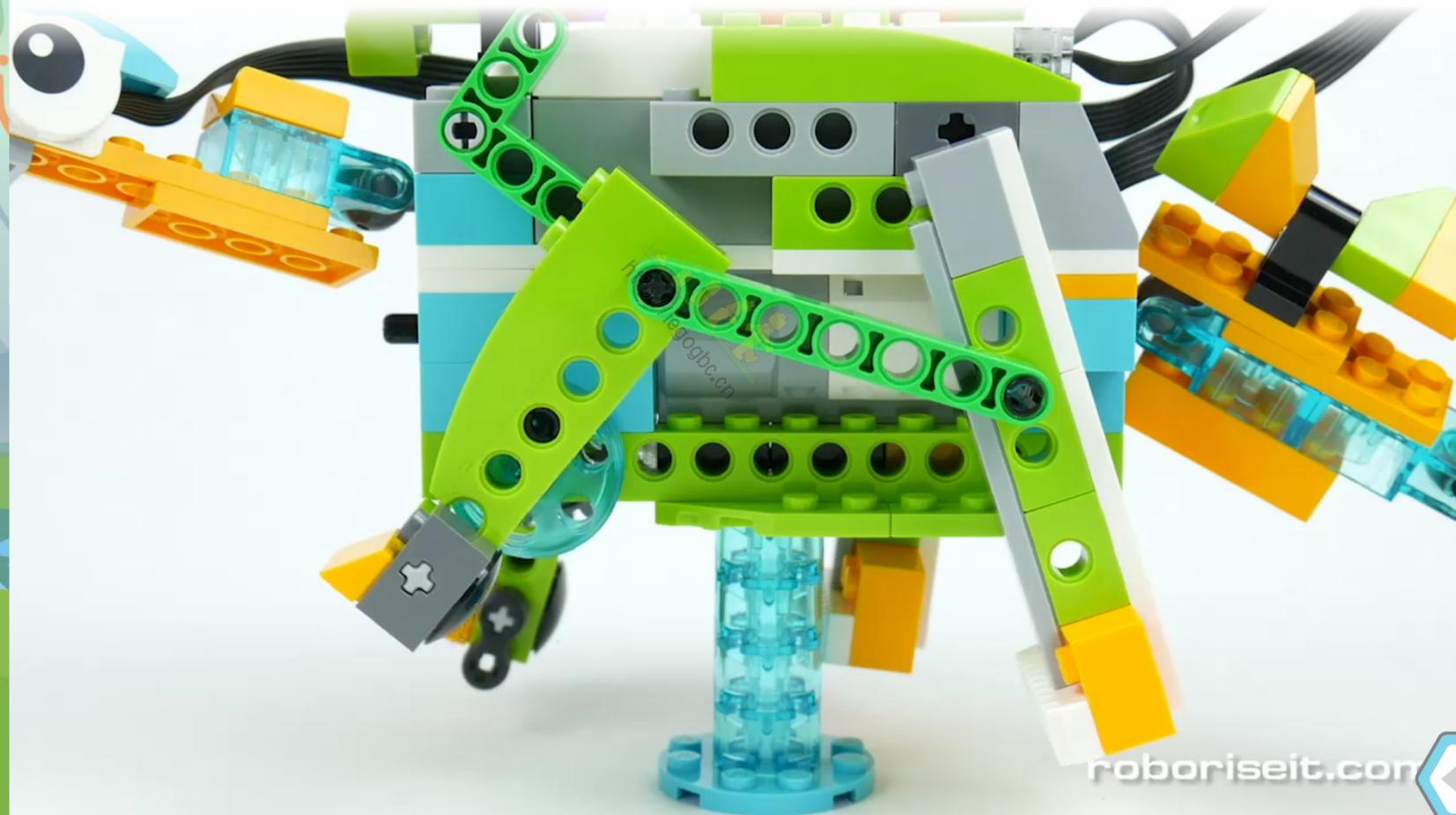


# Design features



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Pay attention to the trajectory of movement of the front and rear legs. The front leg holds on two moving points. And at the rear leg one of the points is still.



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5



28



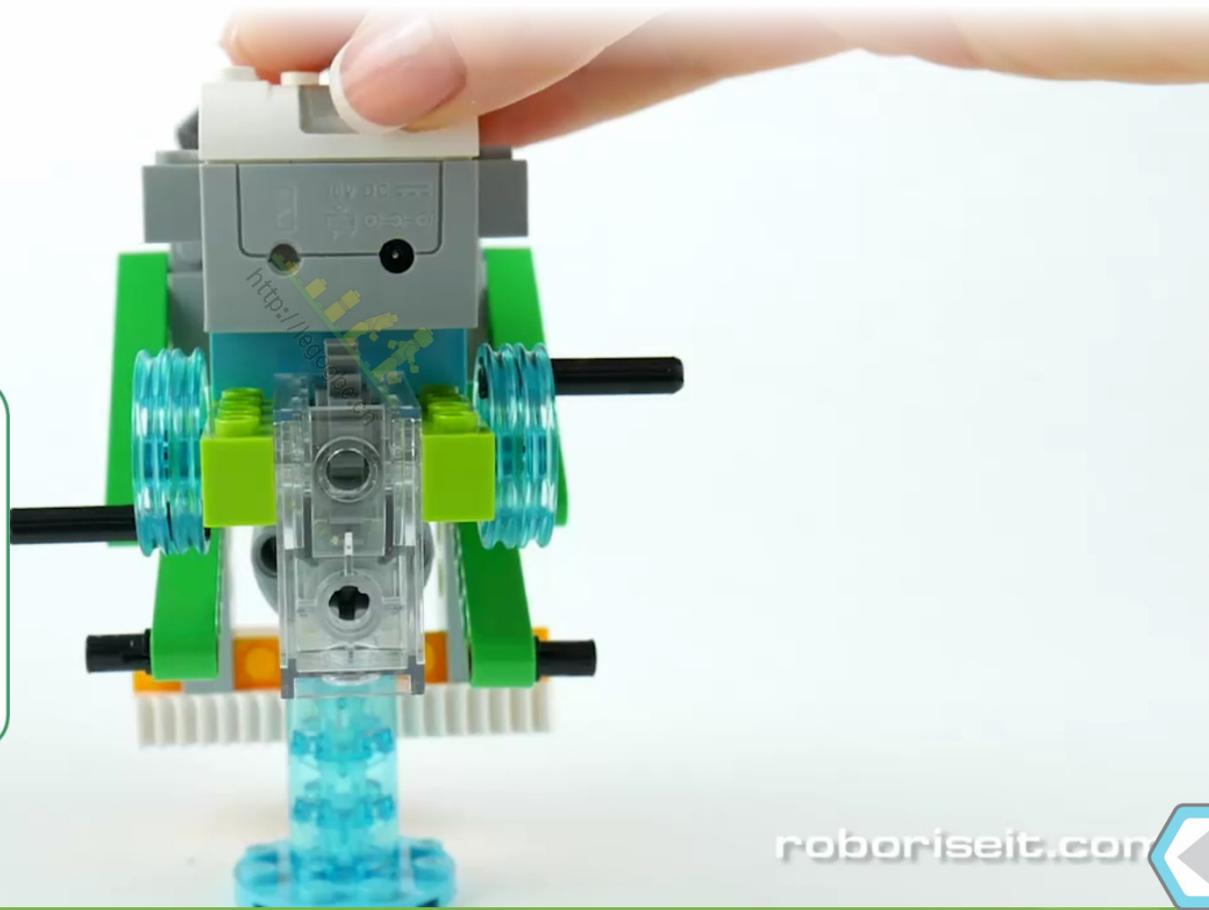
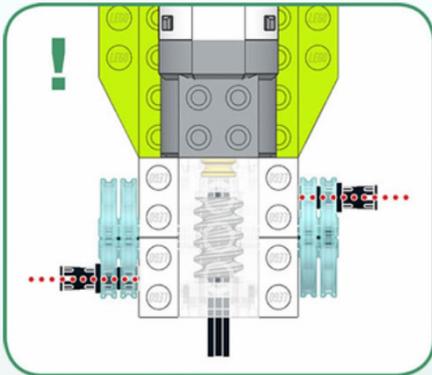


# Pay attention!



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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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5

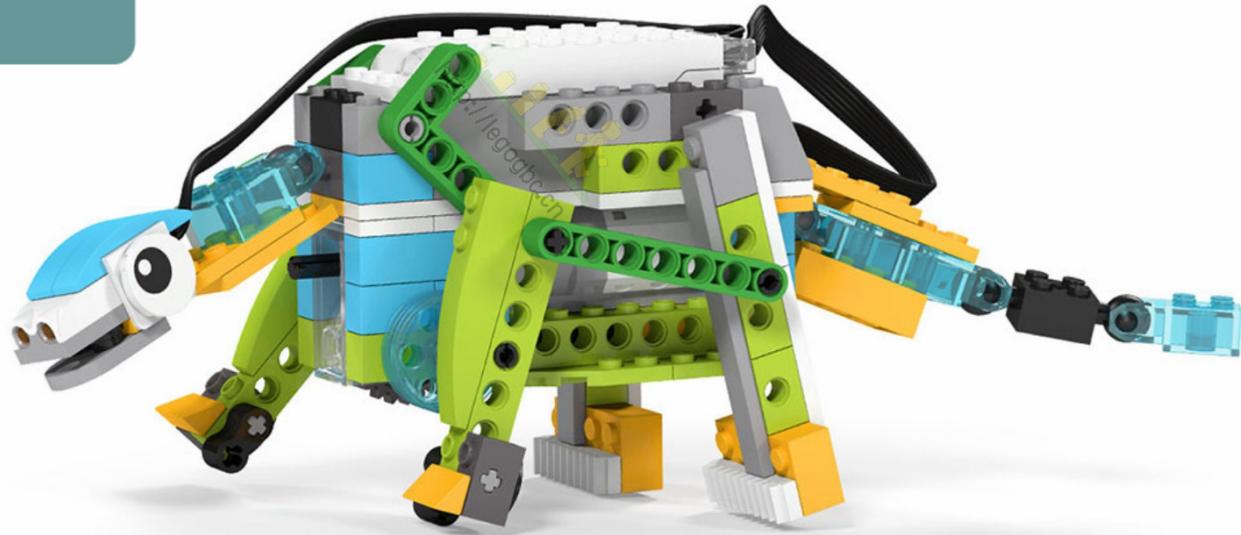
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# Build the robot!



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## Stegosaurus



5

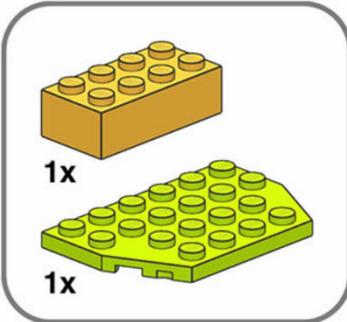


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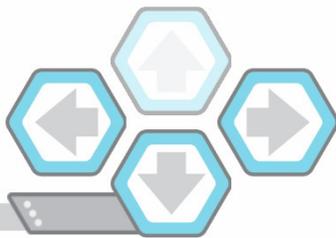
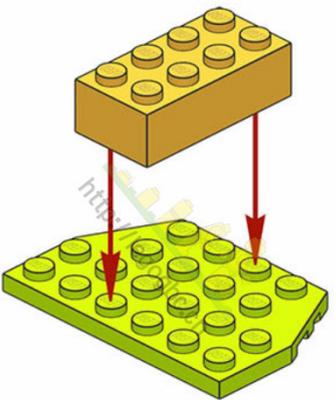




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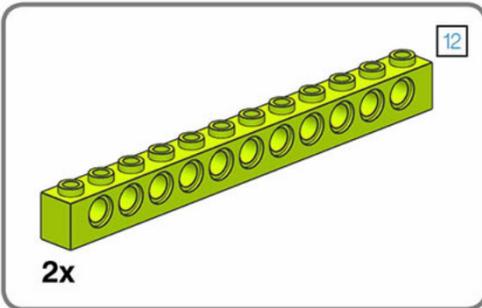


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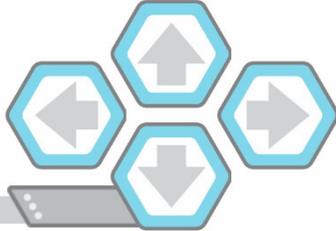
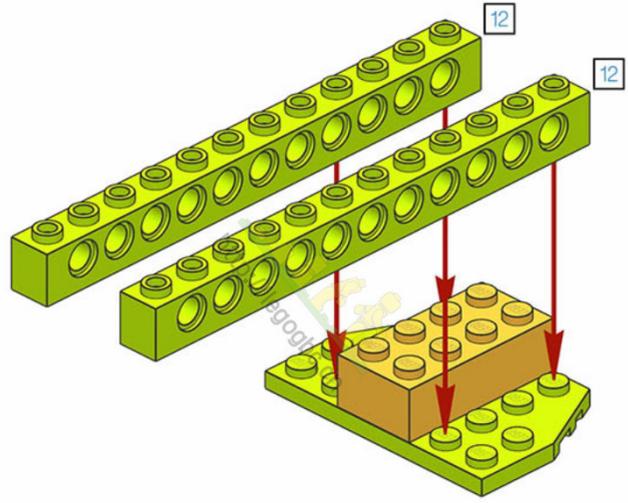




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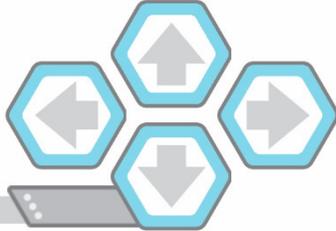
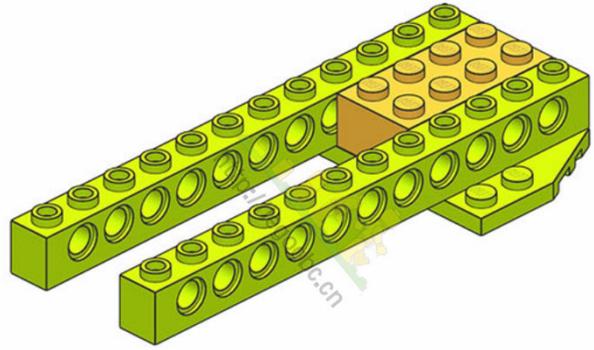
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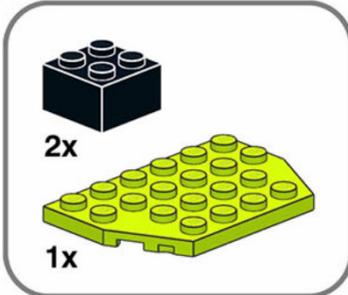
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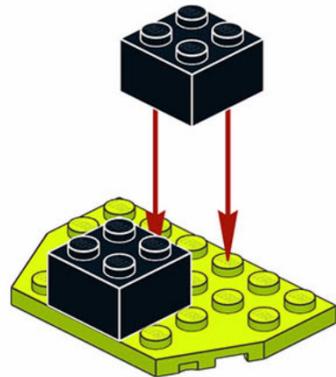




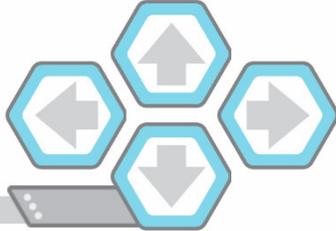
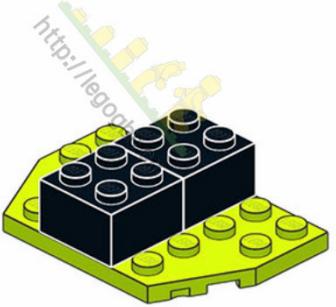
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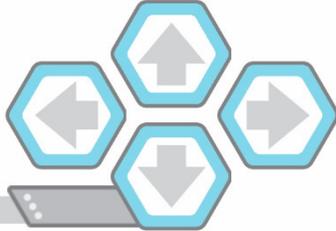
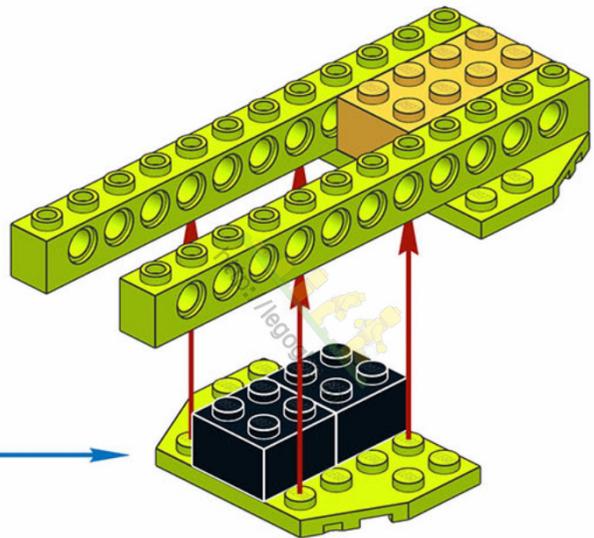
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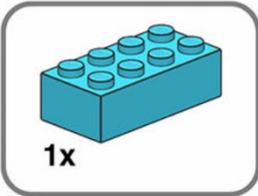
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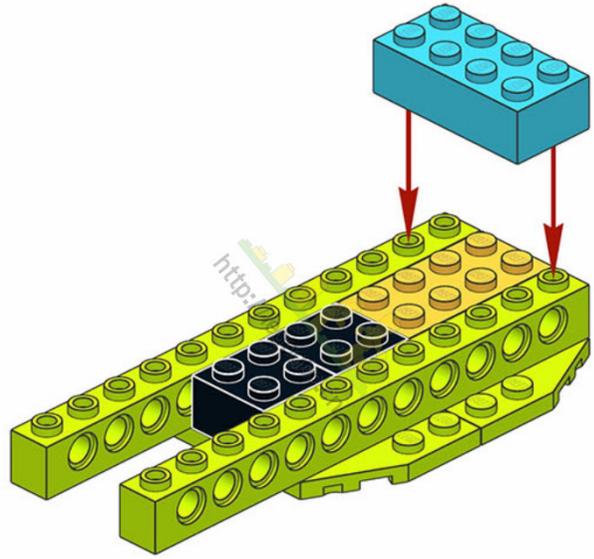


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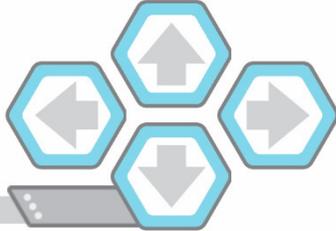
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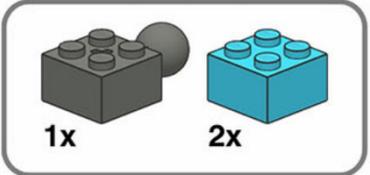


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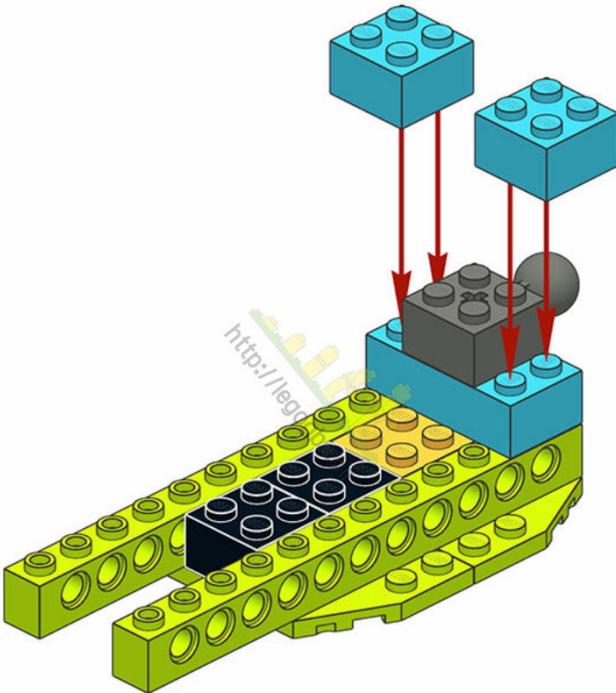




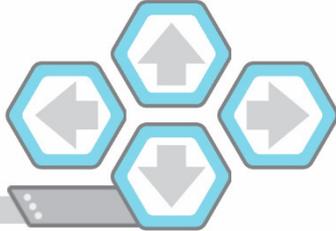
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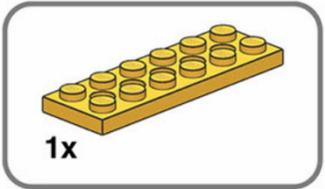


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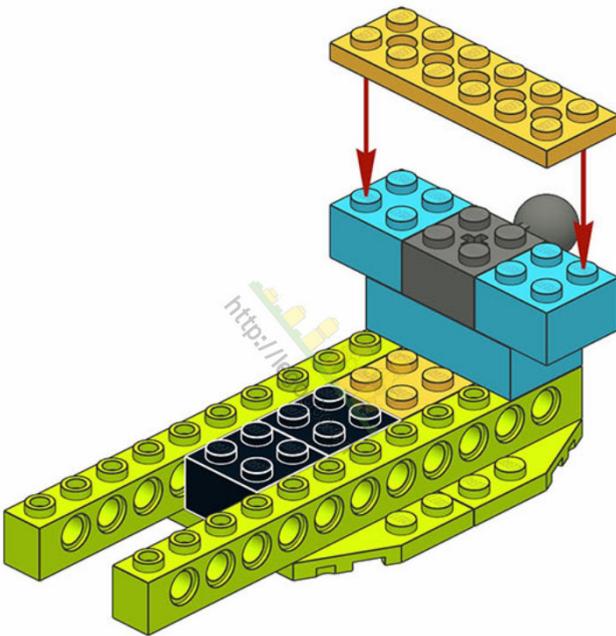


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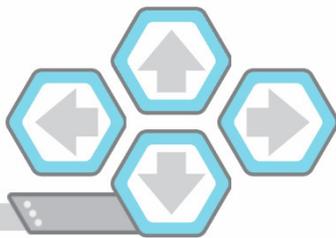
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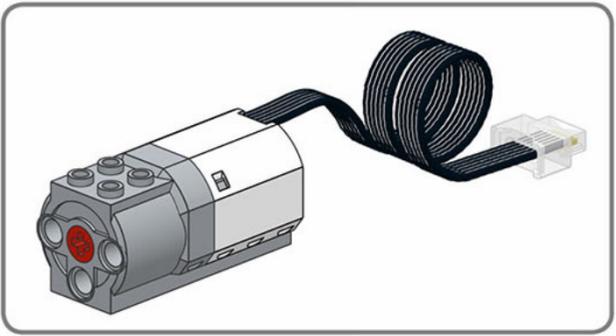


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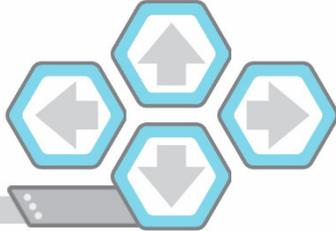
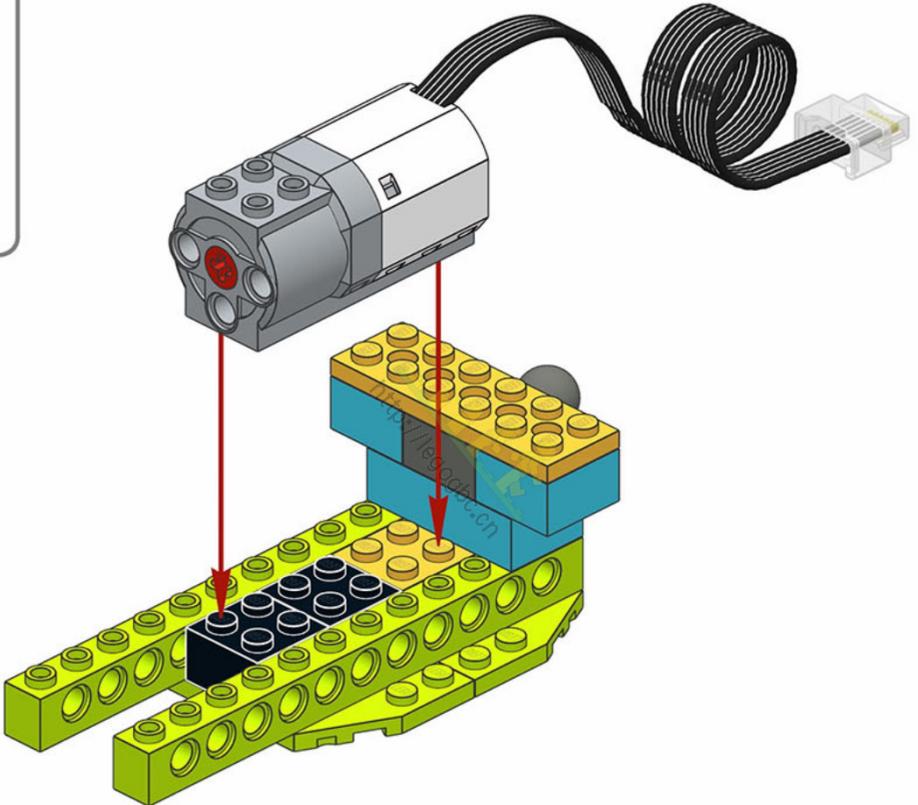




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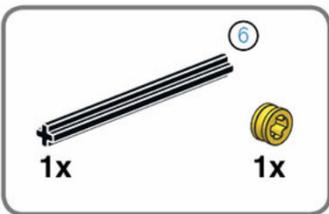


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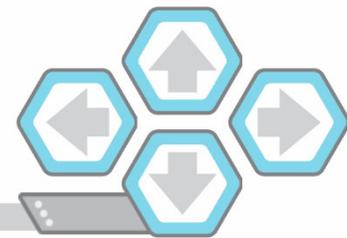
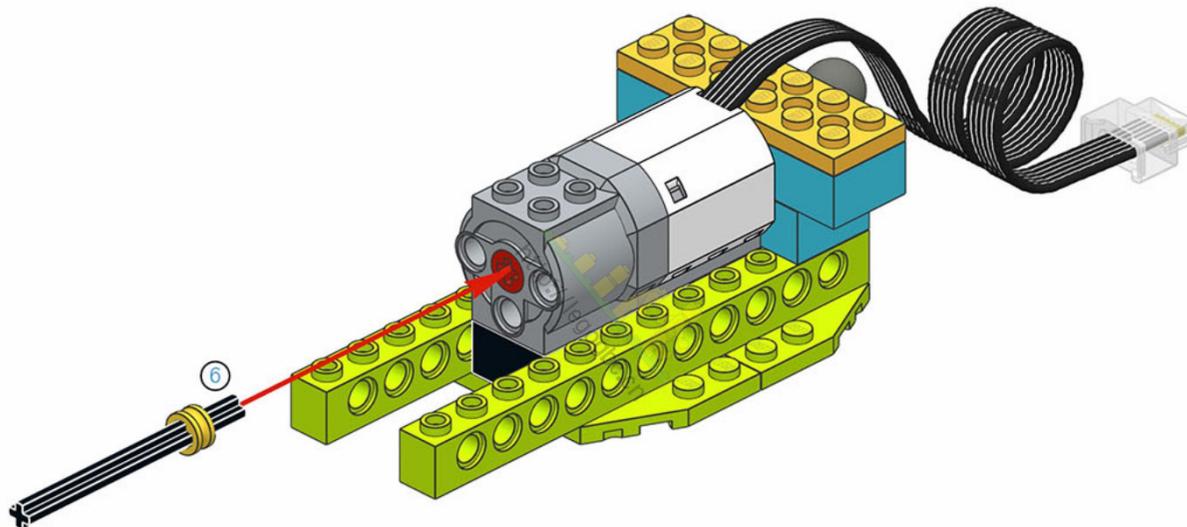




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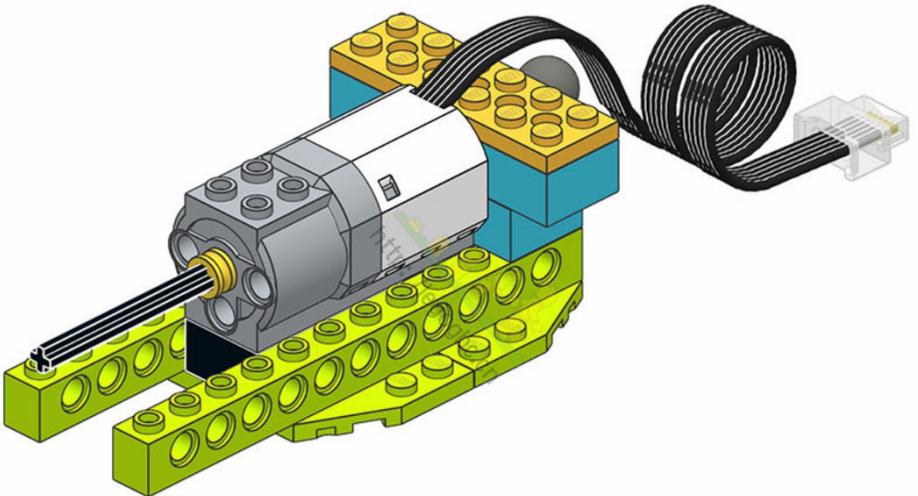
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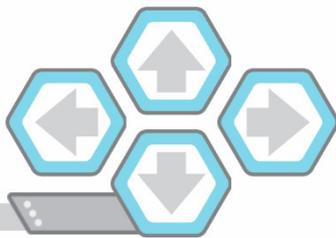
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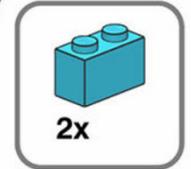
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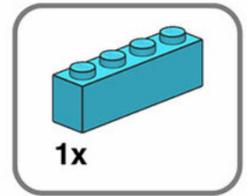
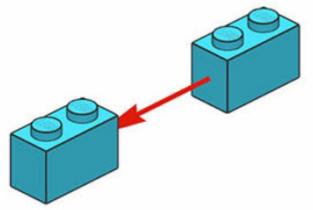




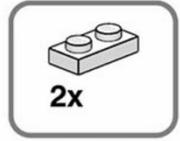
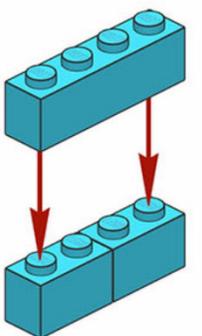
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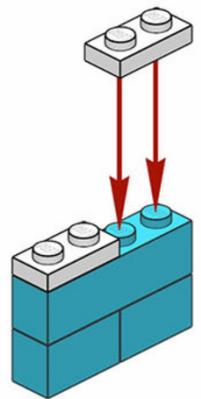
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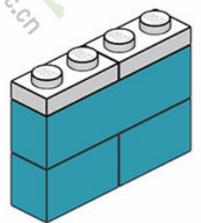


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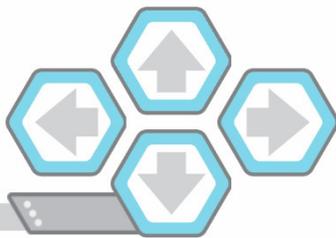


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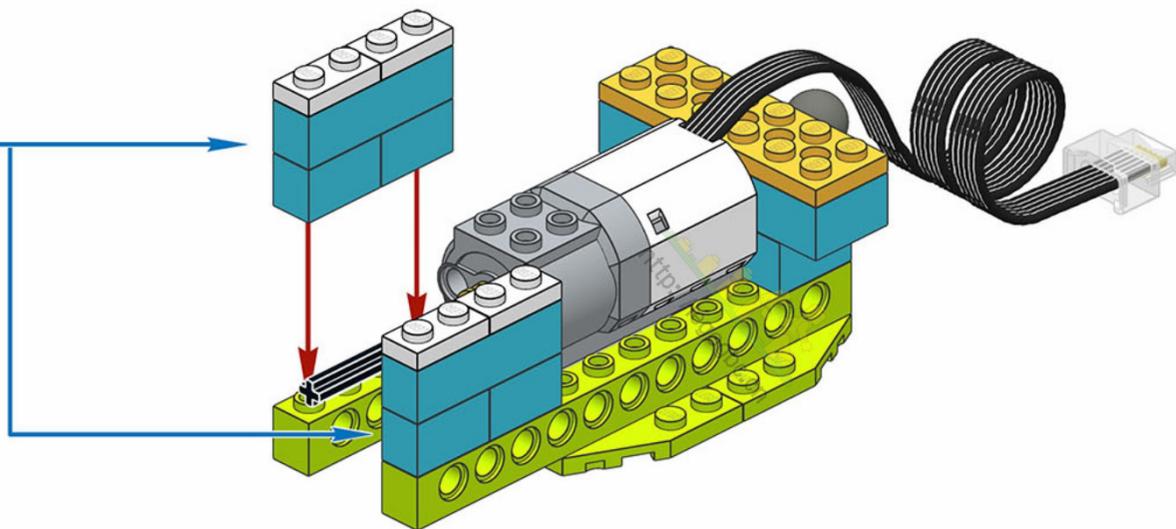
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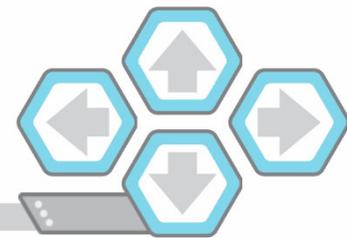
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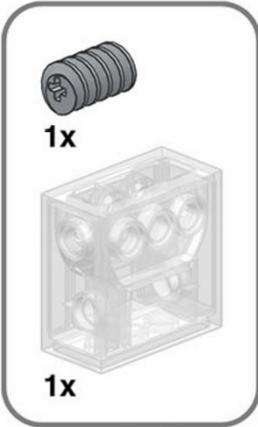
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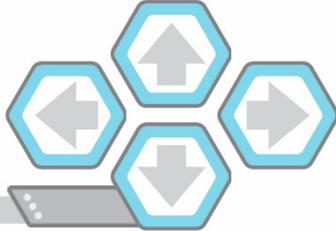
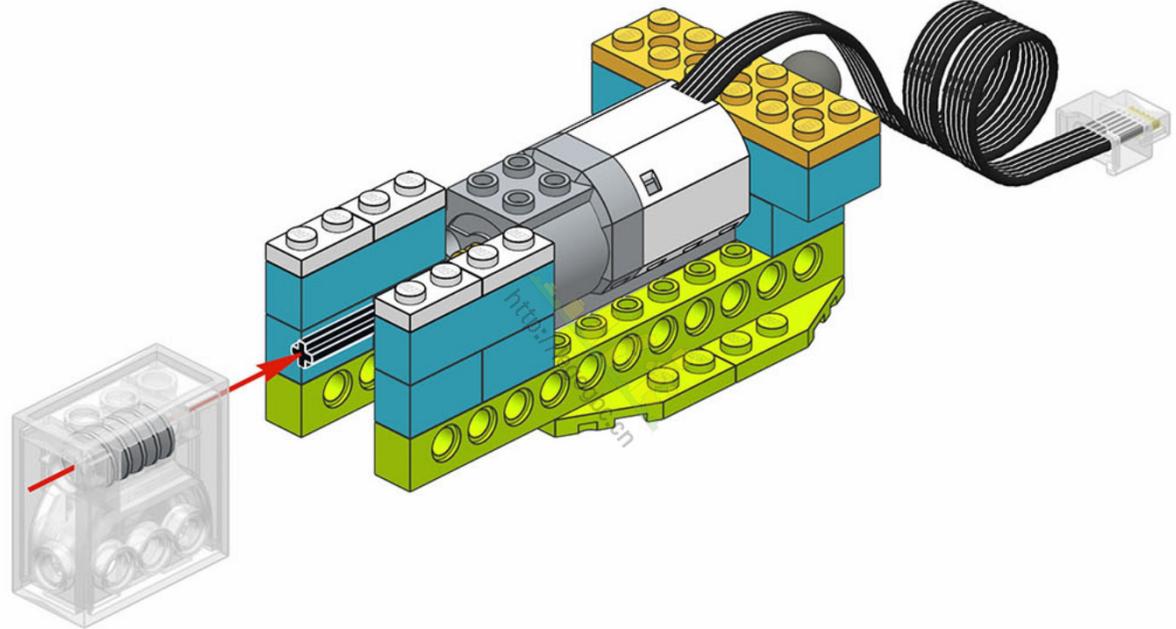




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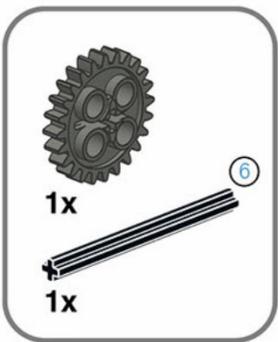


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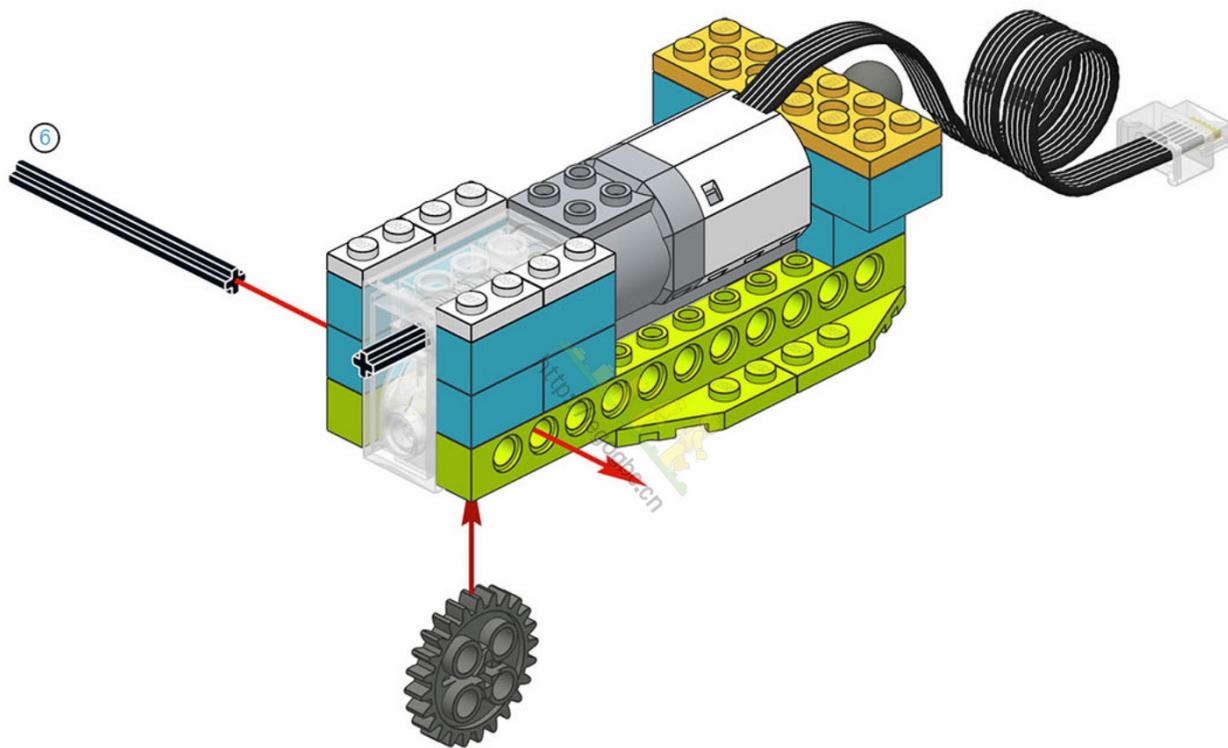




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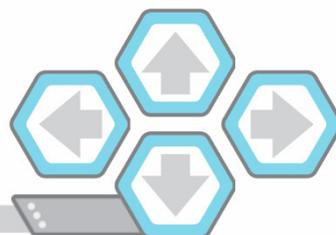
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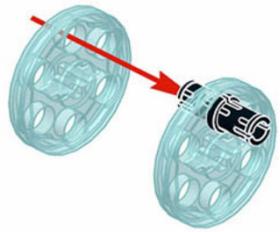
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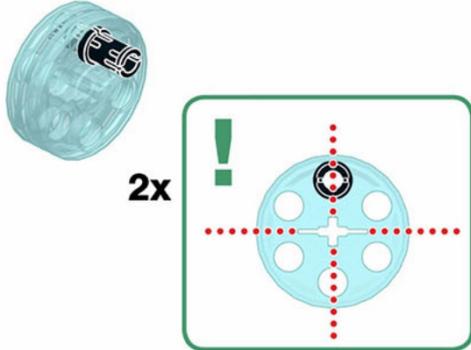


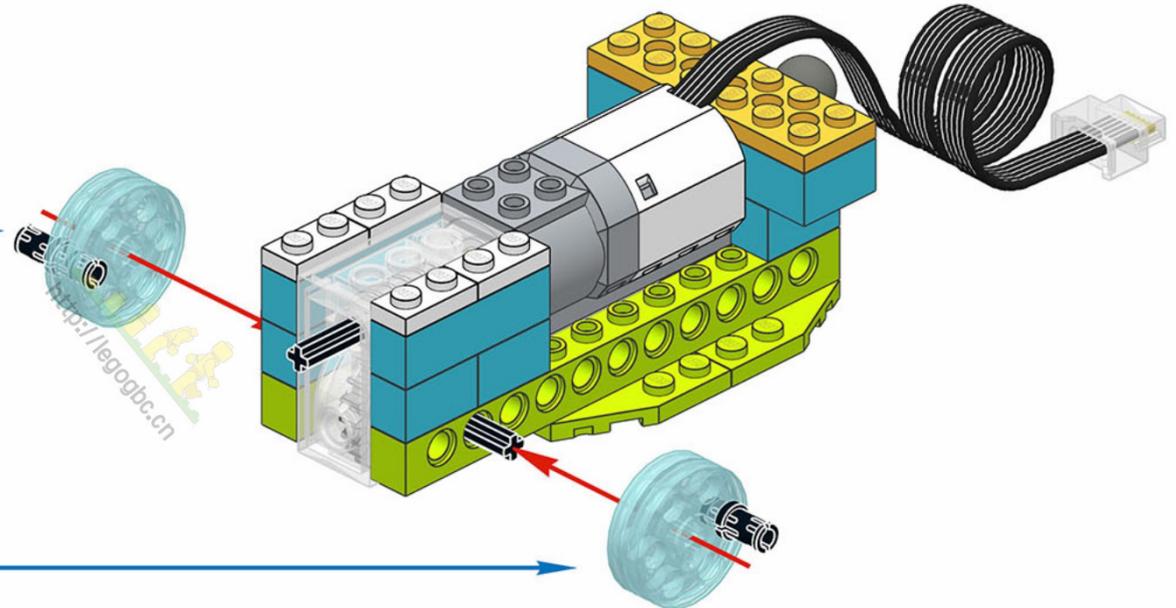


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**2x**  **1x** 

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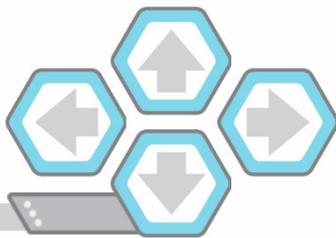
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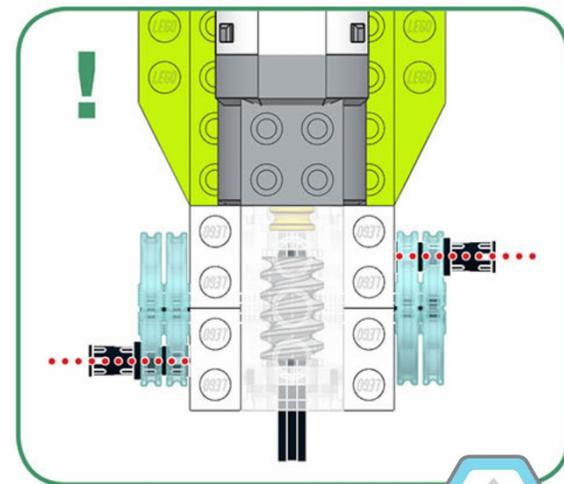
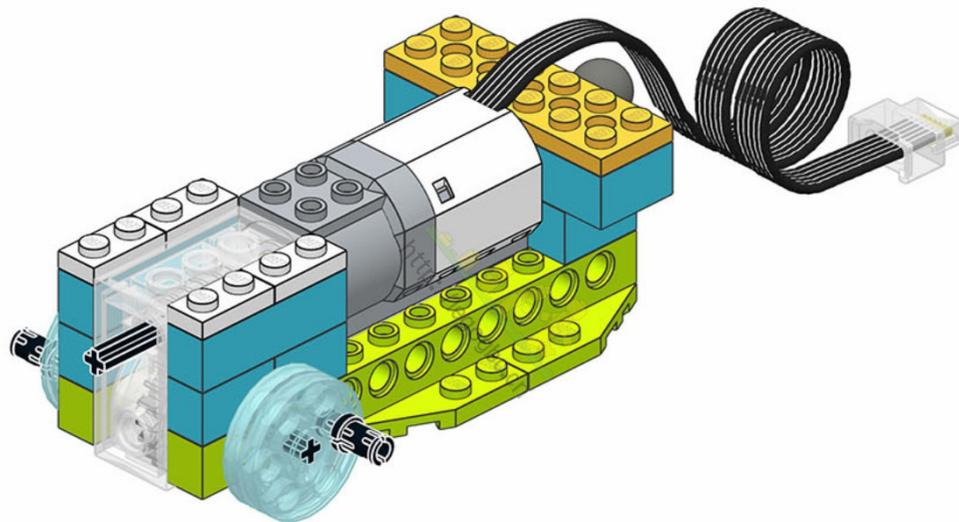
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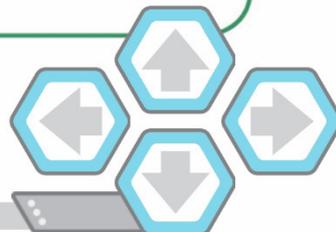
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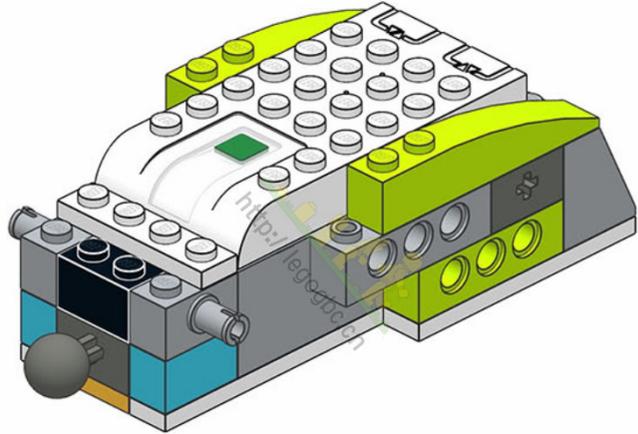
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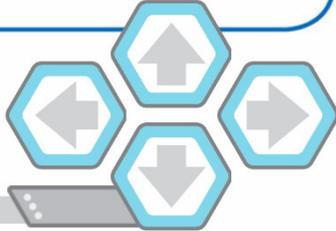
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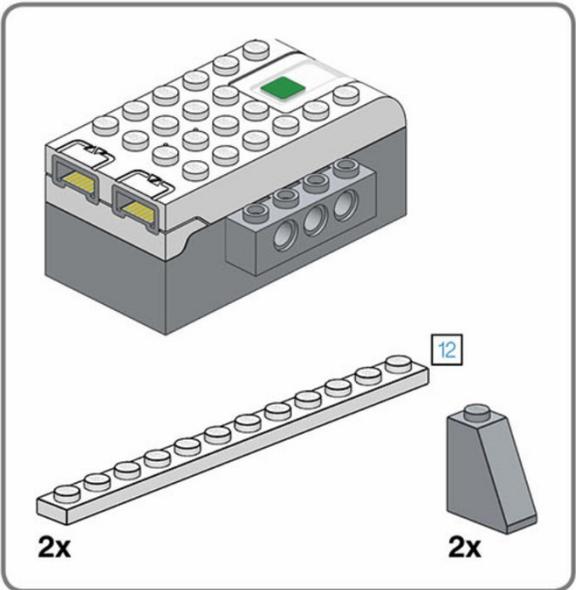
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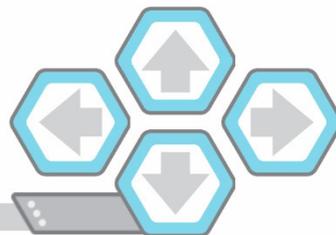
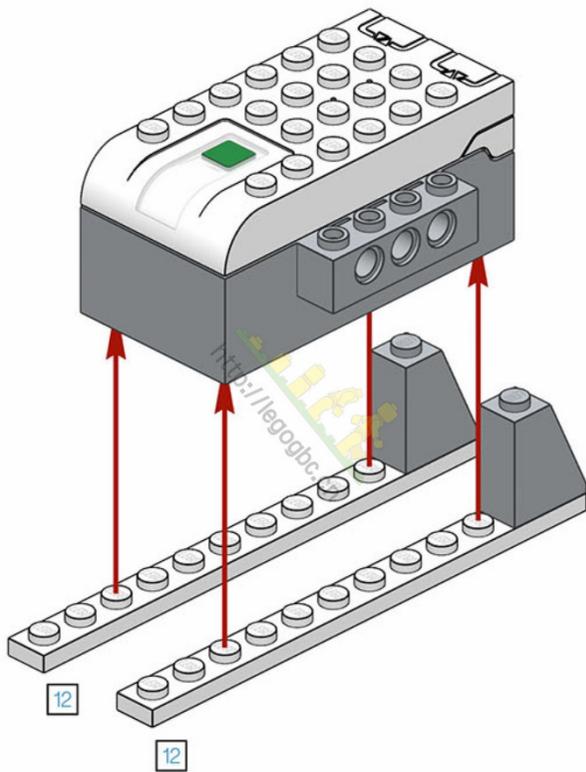




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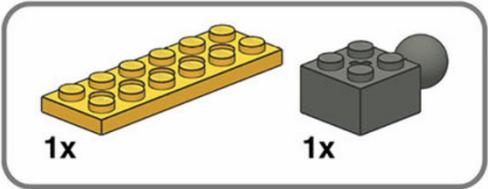


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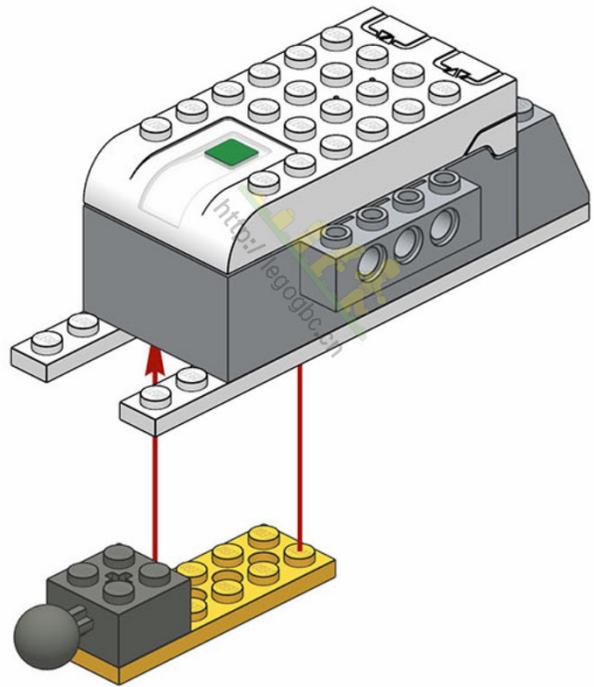




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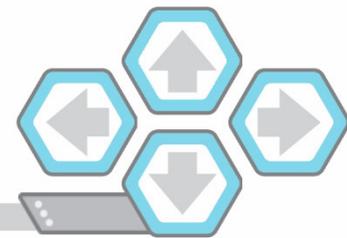
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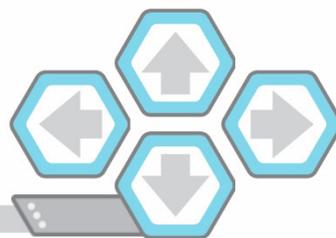
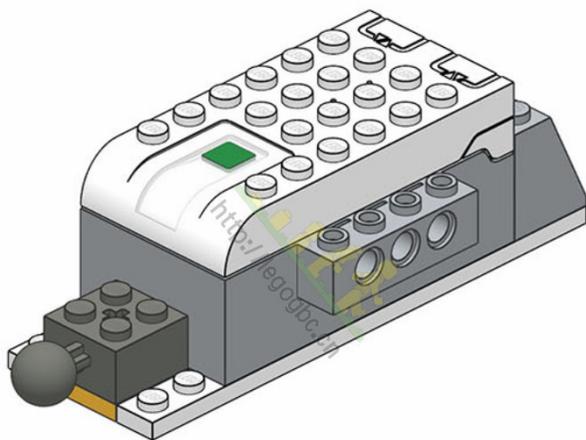
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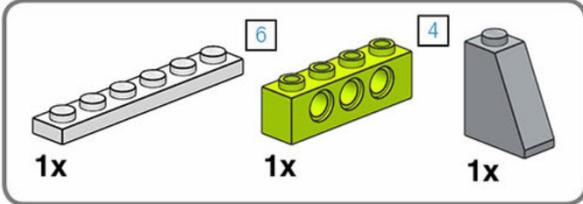
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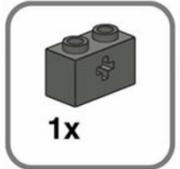
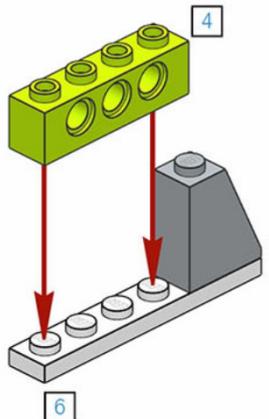




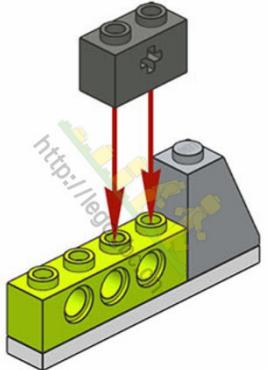
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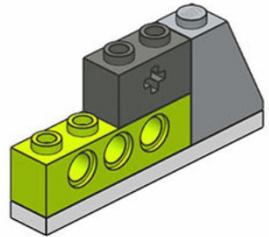
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2



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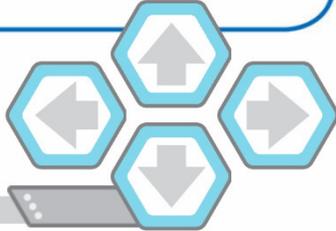


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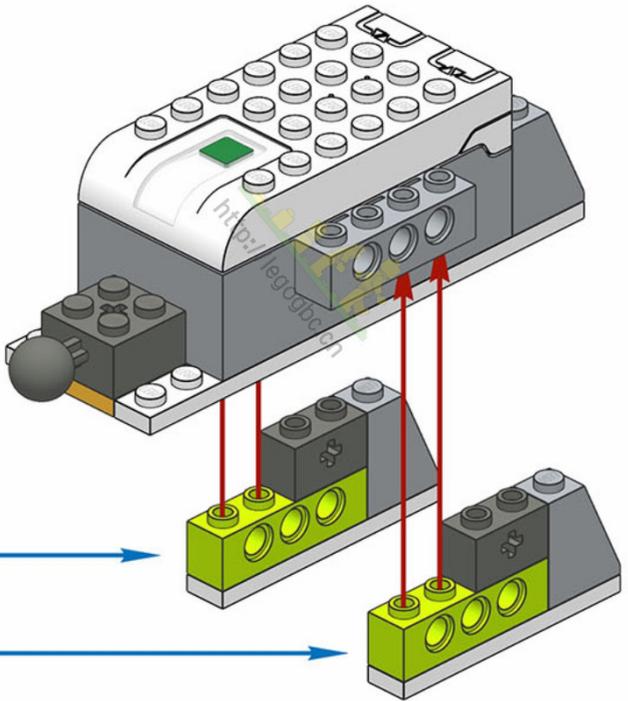
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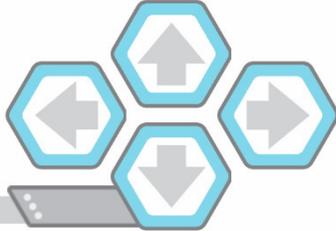
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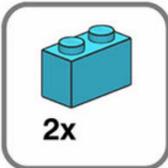
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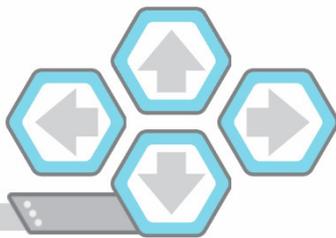
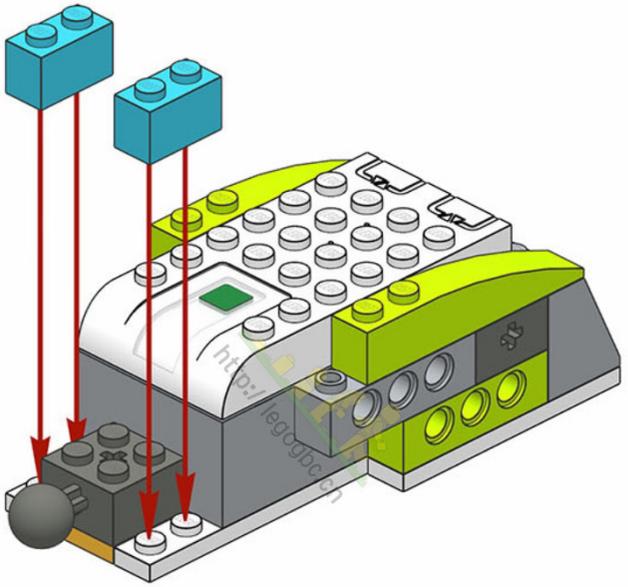




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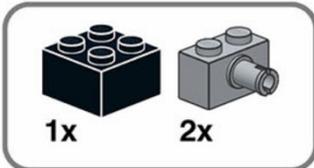


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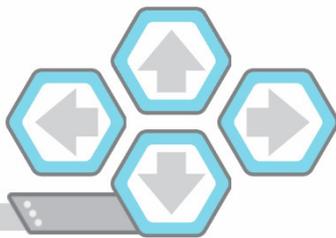
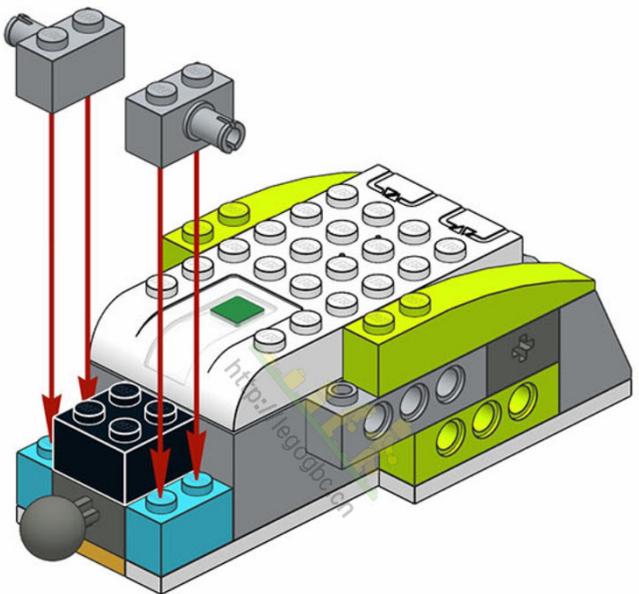




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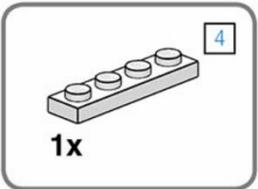


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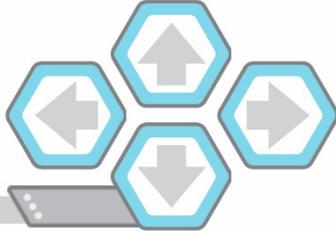
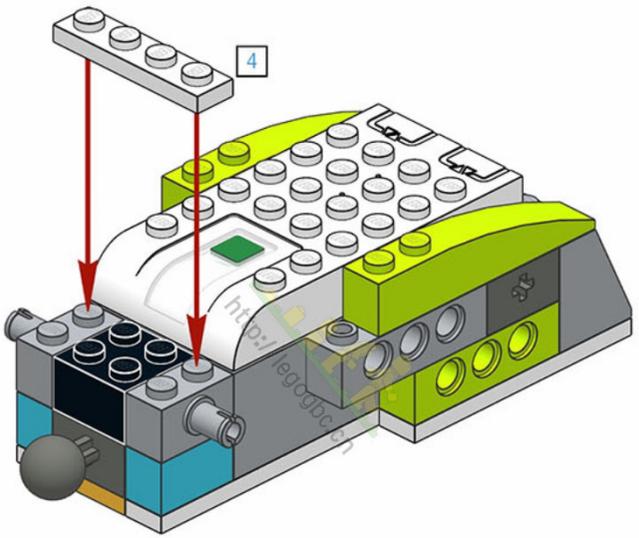




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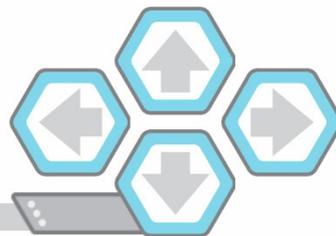
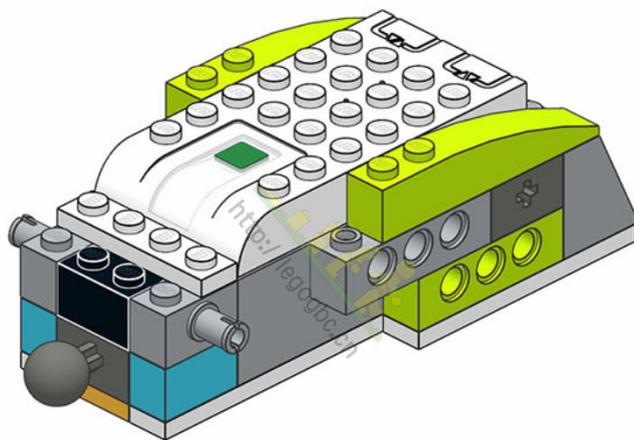
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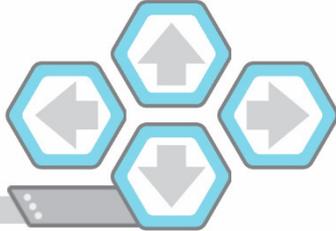
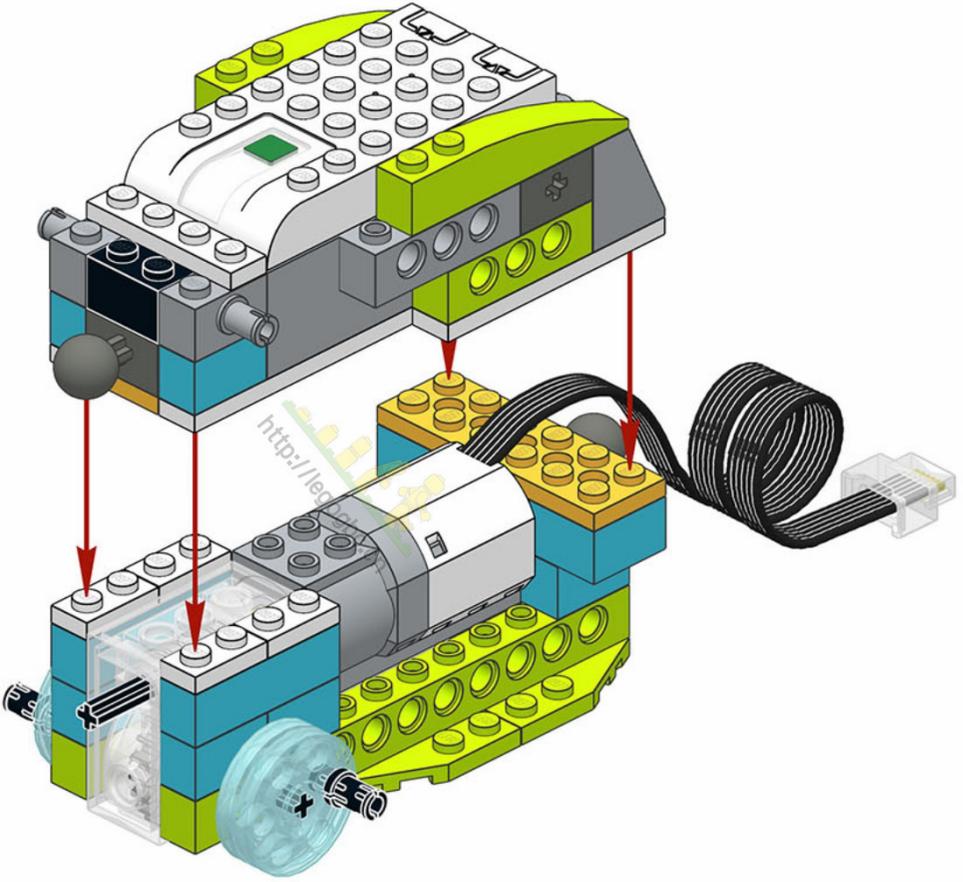
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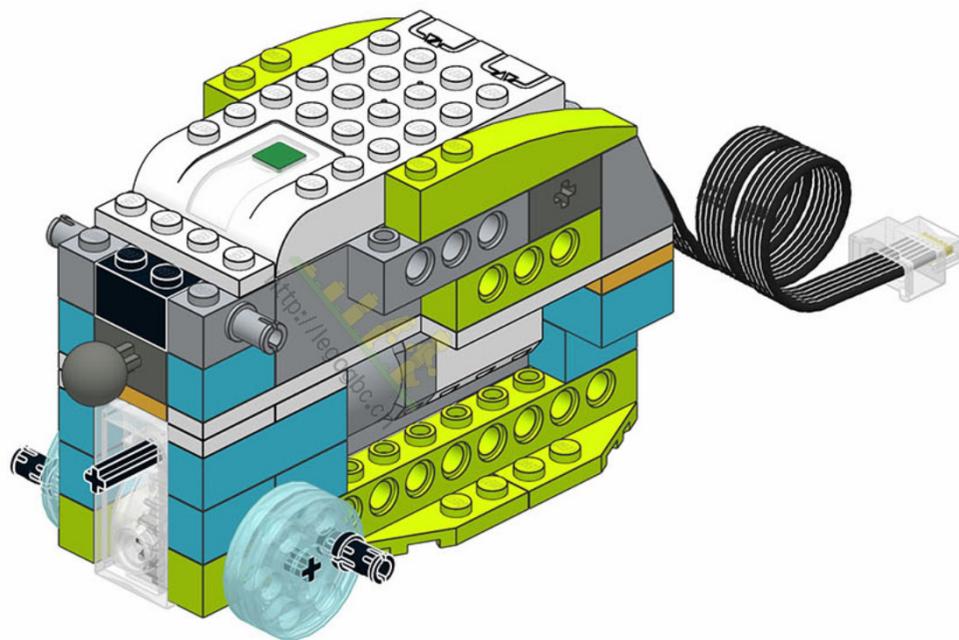
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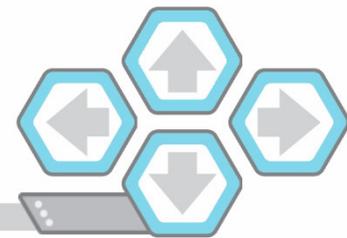
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5

60

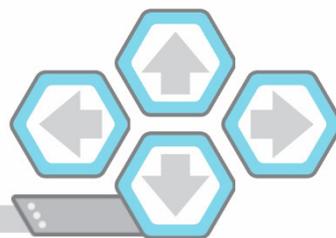
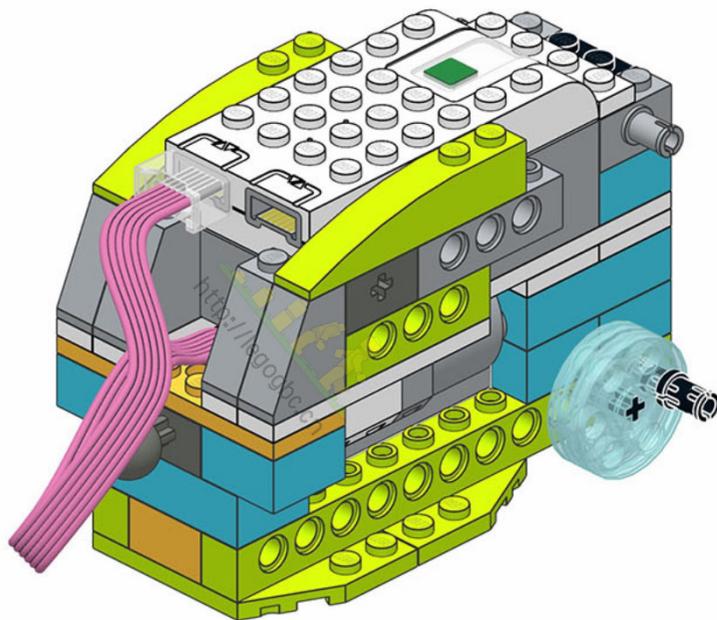




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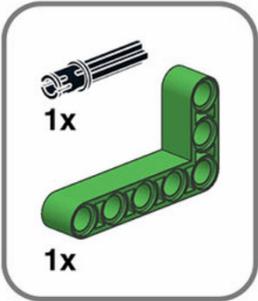


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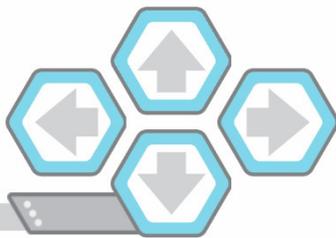
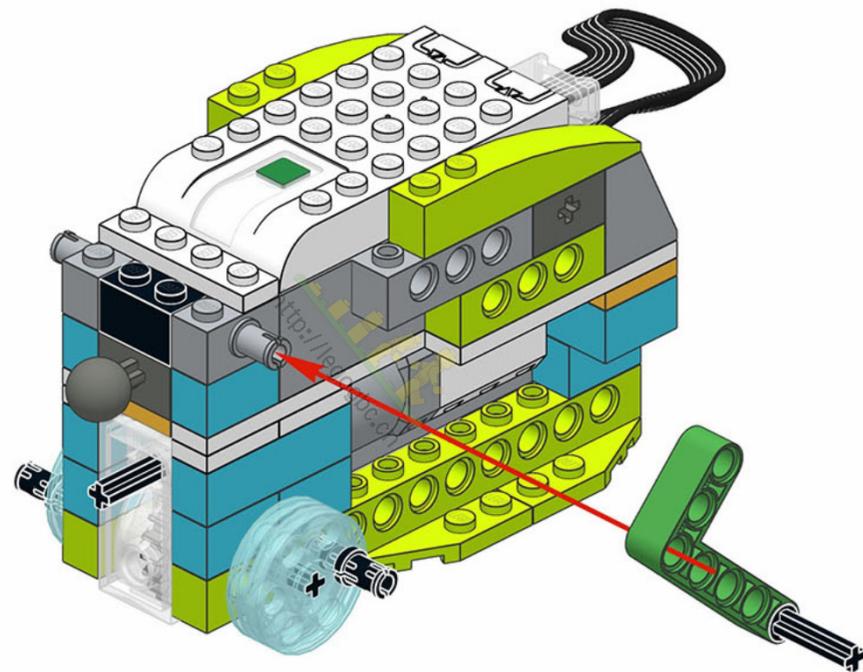




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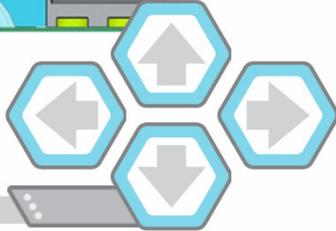
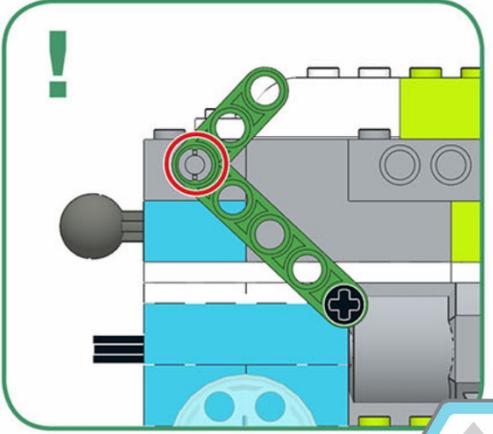
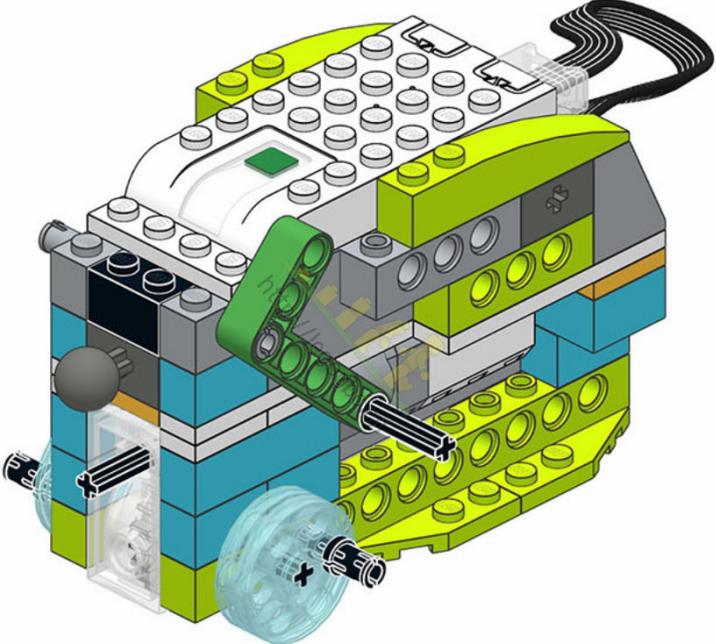
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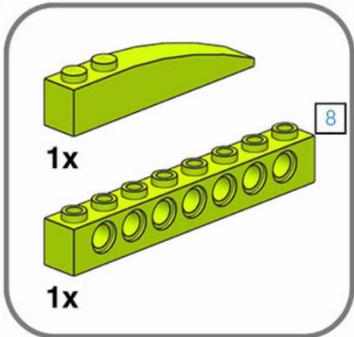
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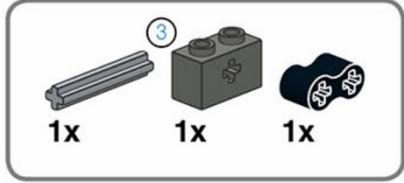
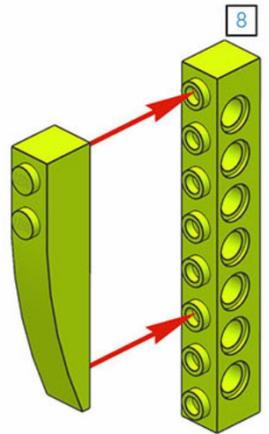




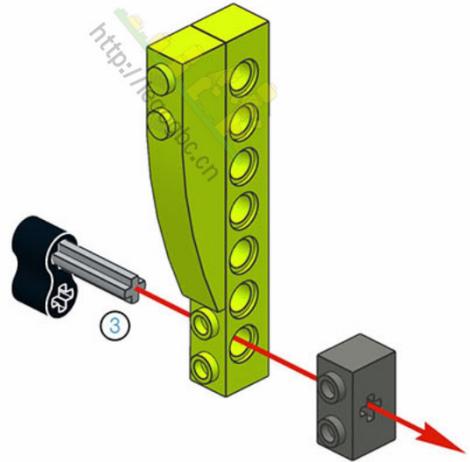
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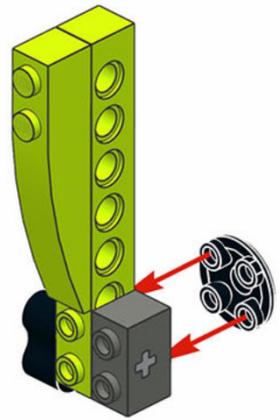
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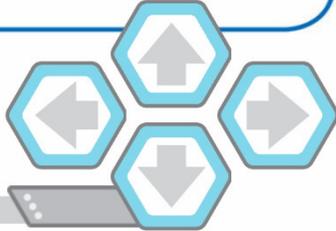
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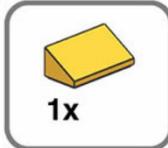
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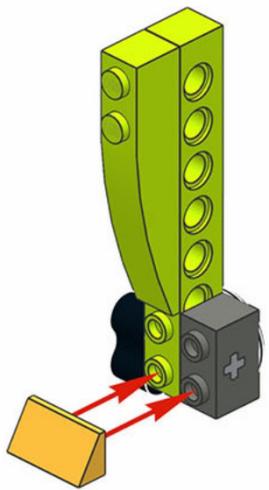




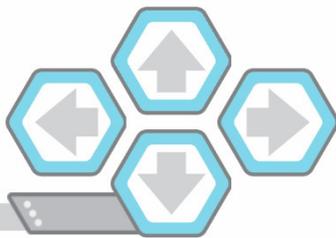
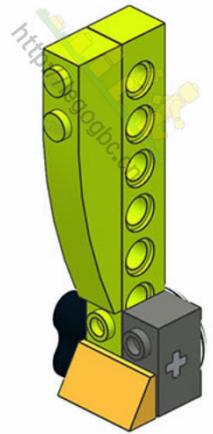
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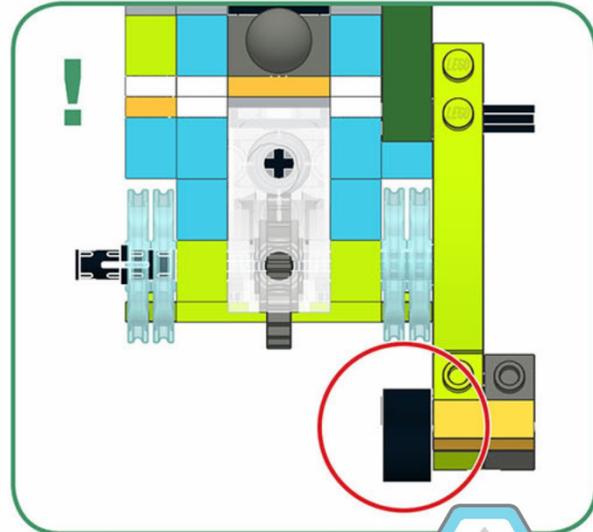
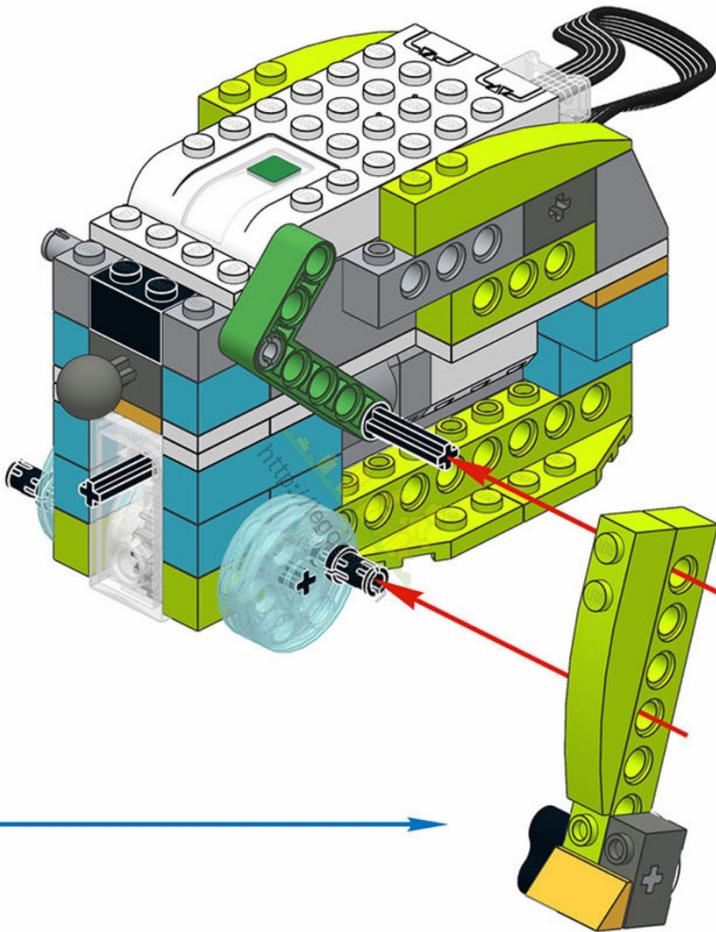
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关注公众号获取更多

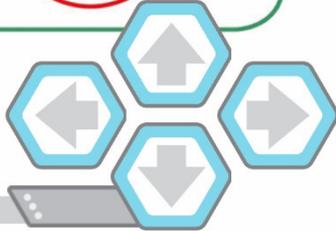
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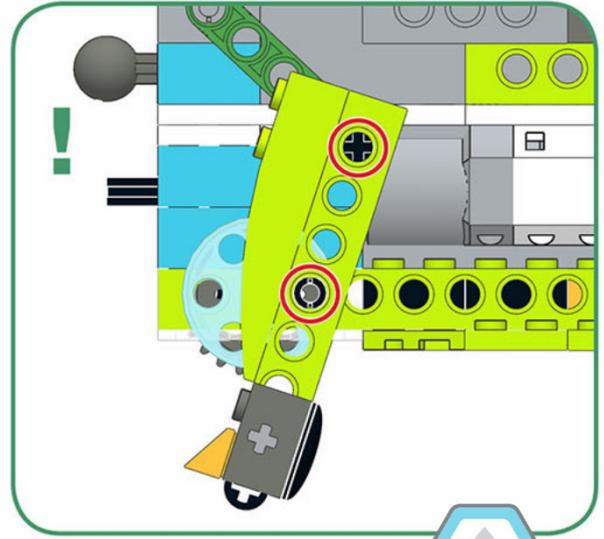
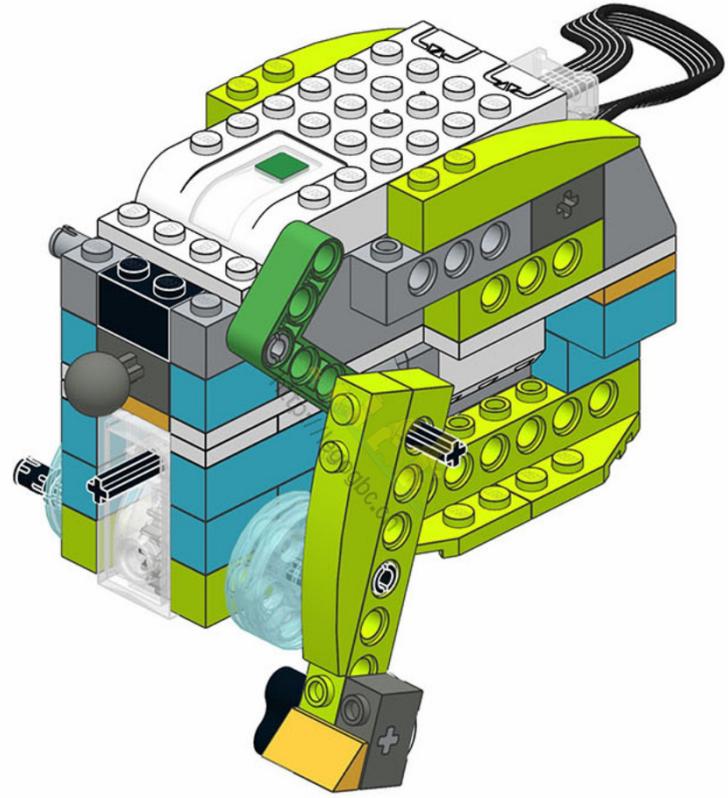
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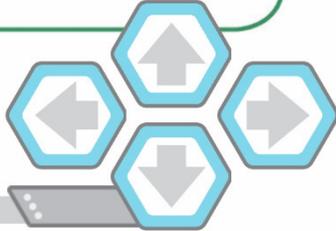
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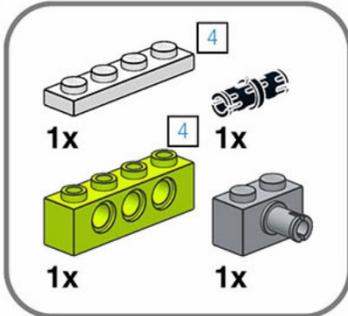
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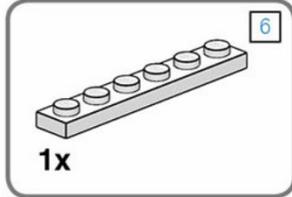
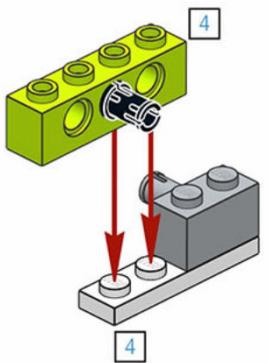




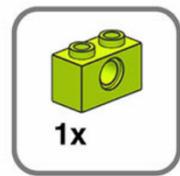
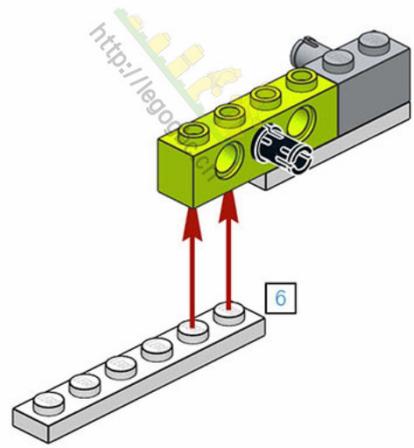
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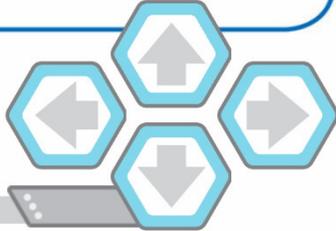
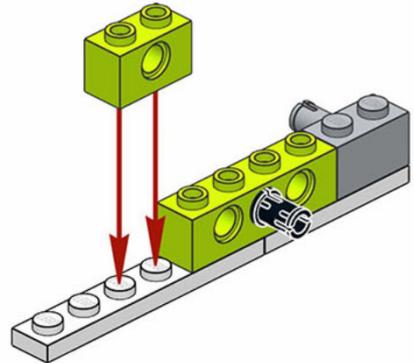
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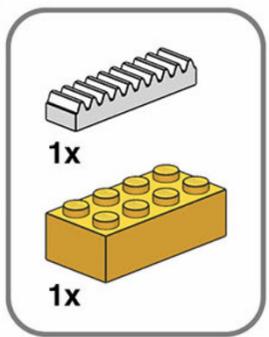


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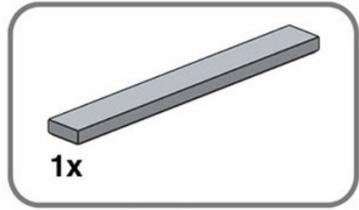
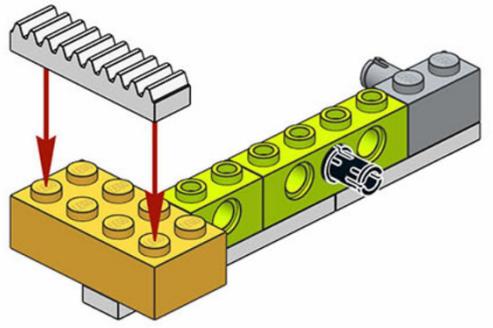




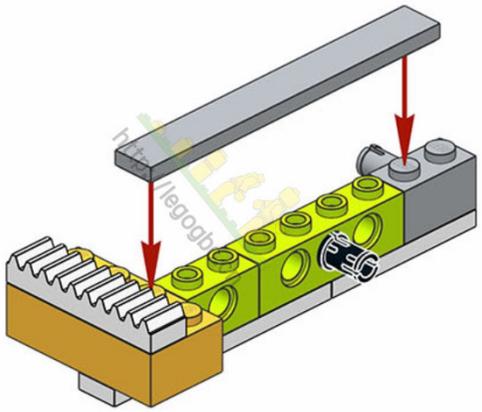
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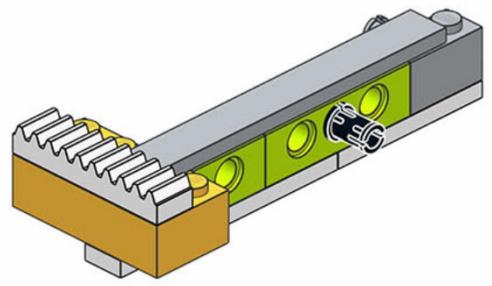
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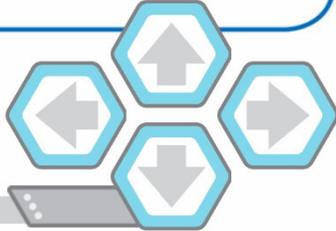
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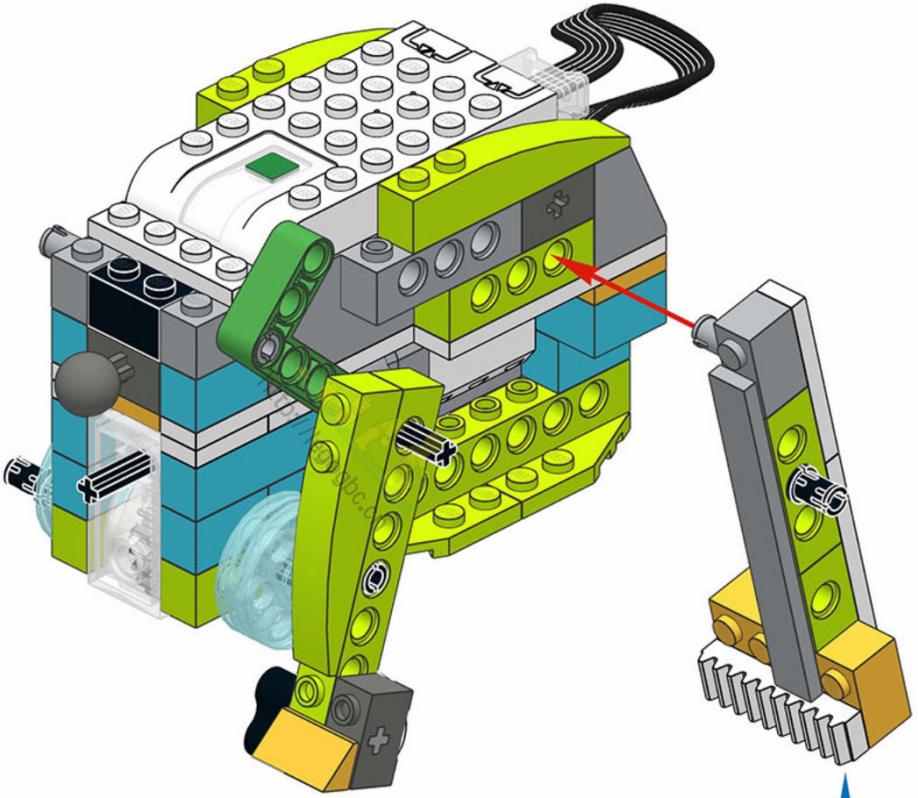
69





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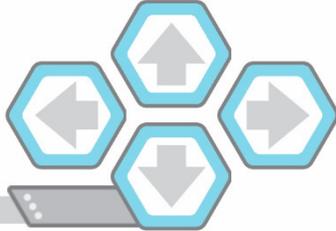
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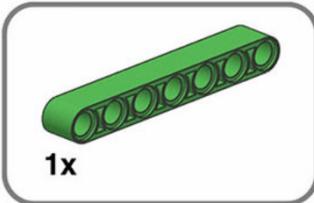
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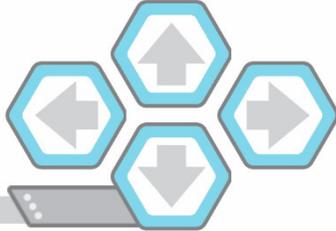
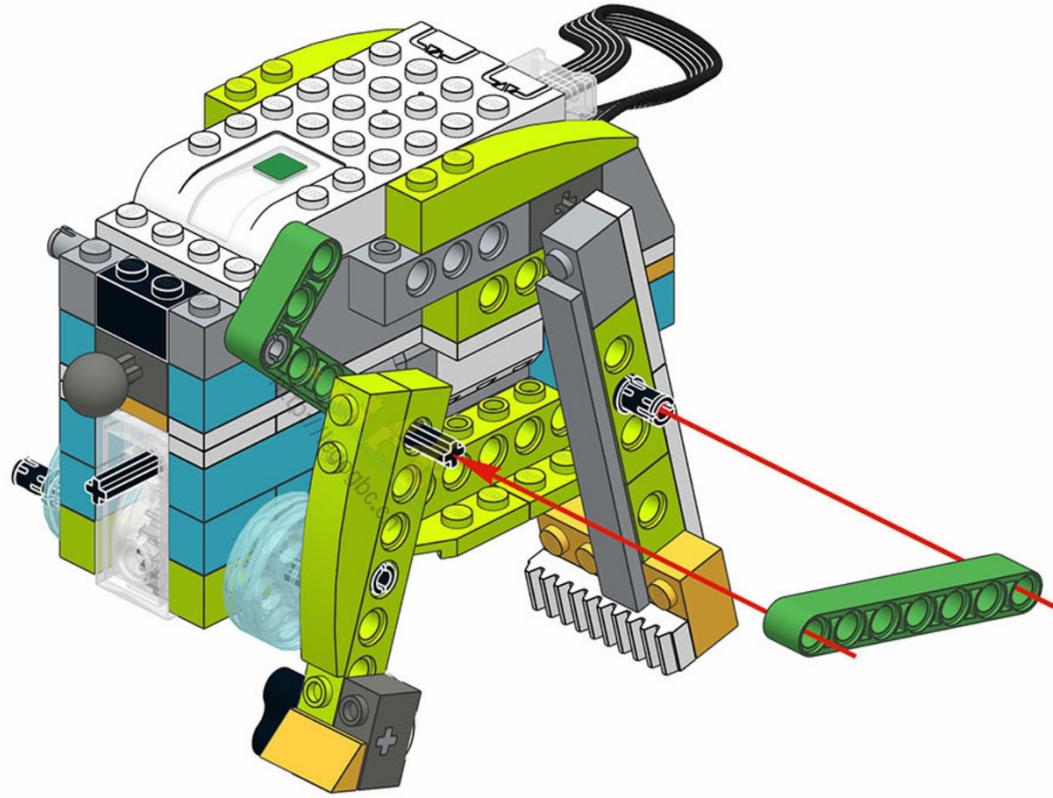


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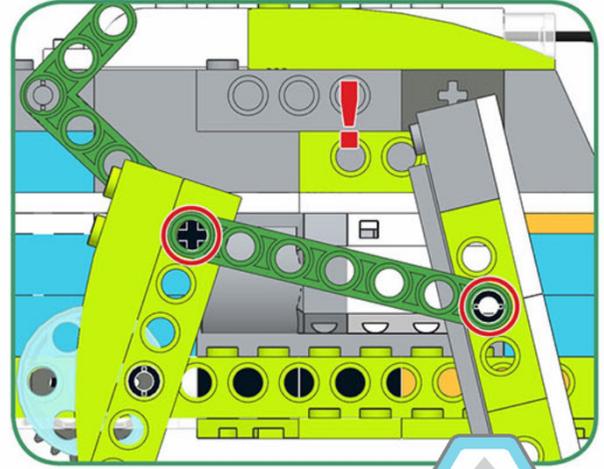
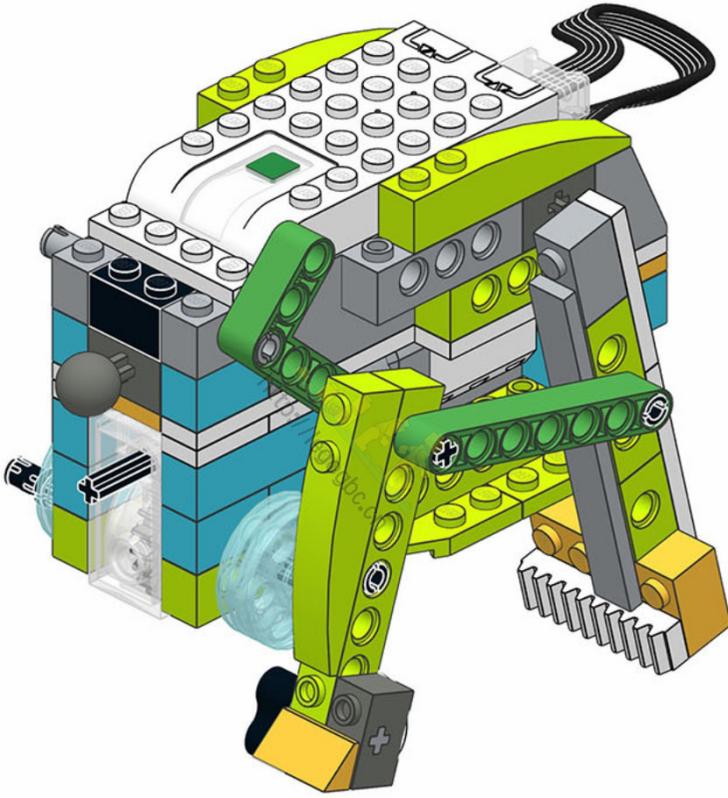
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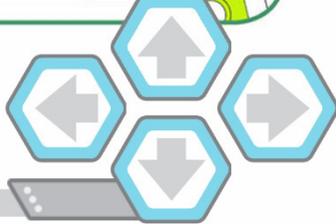
42



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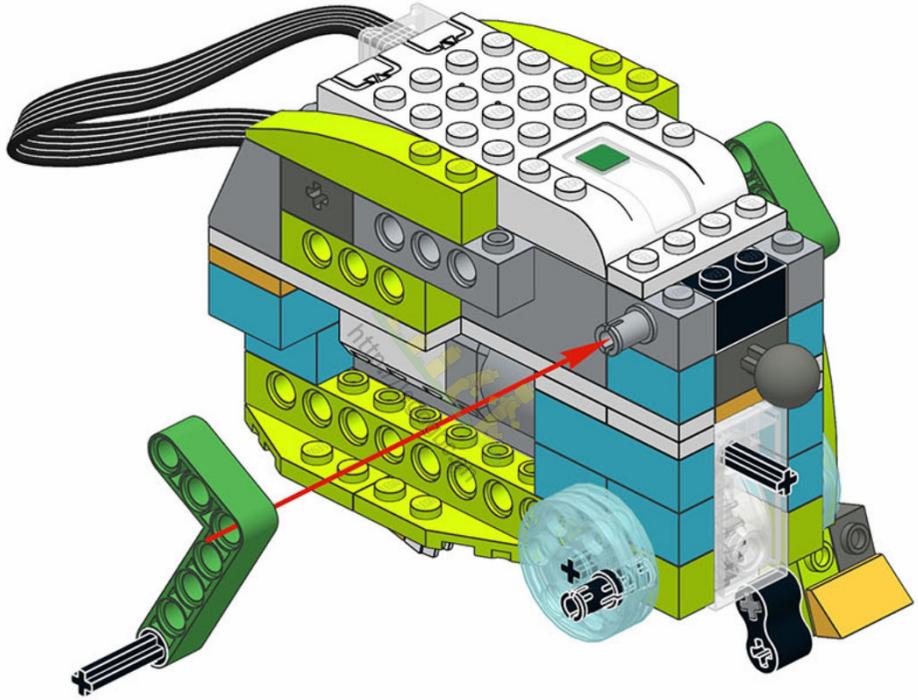
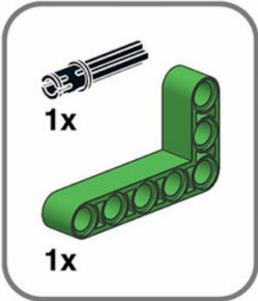
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72





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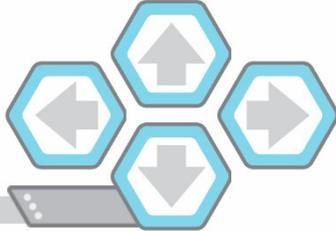


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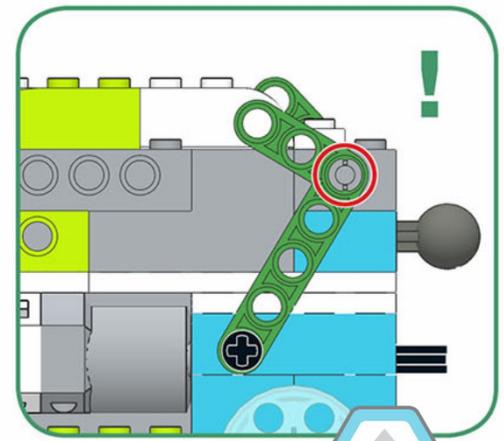
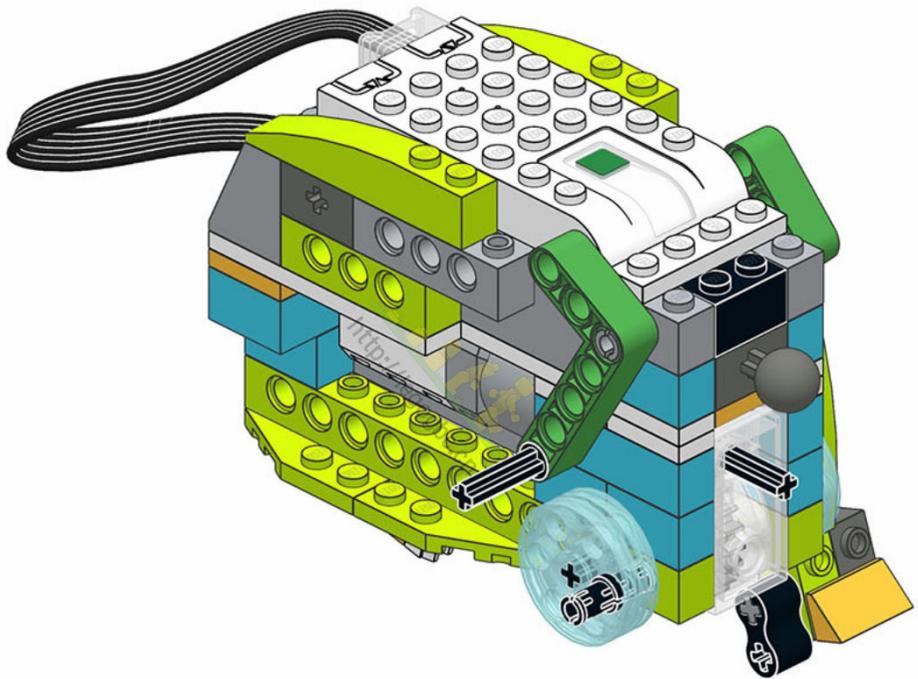
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73





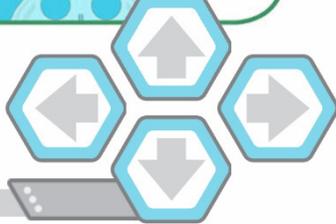
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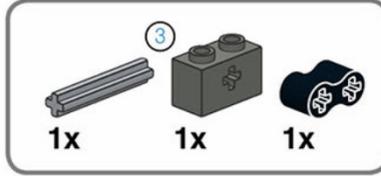
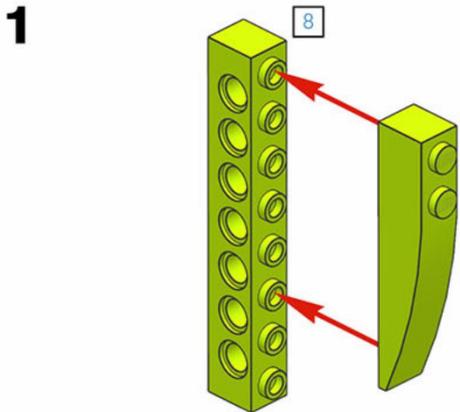
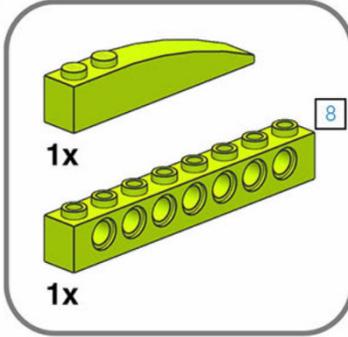
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74

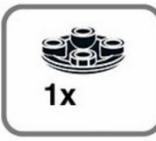
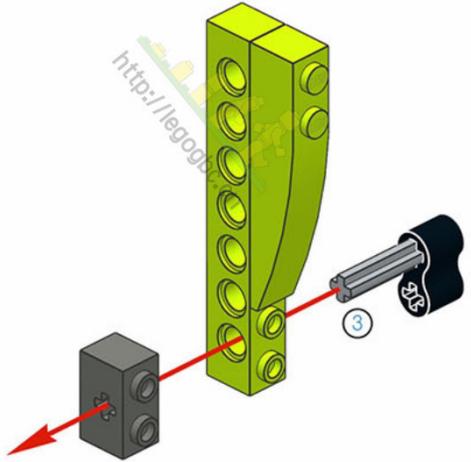




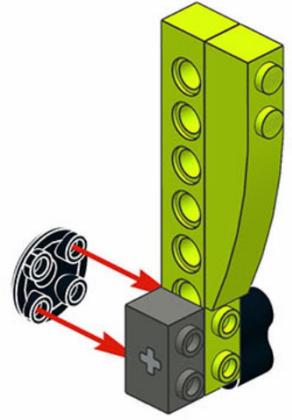
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**2**



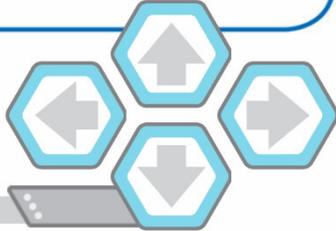
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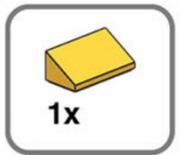
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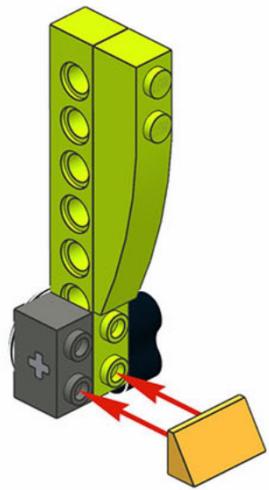




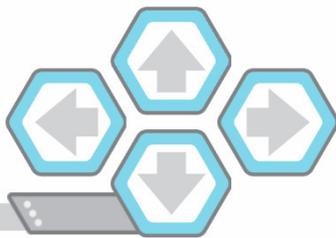
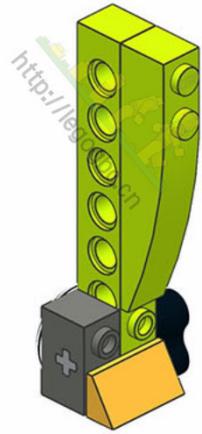
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4



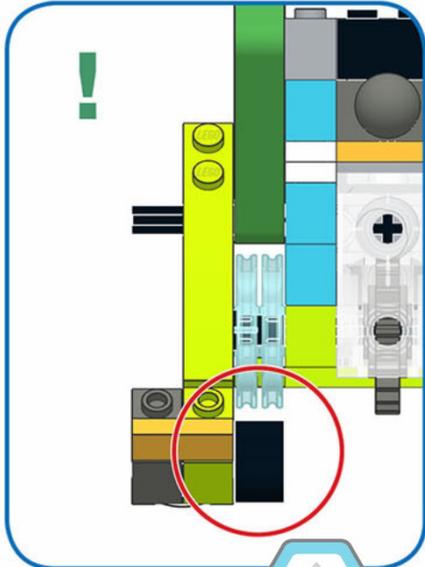
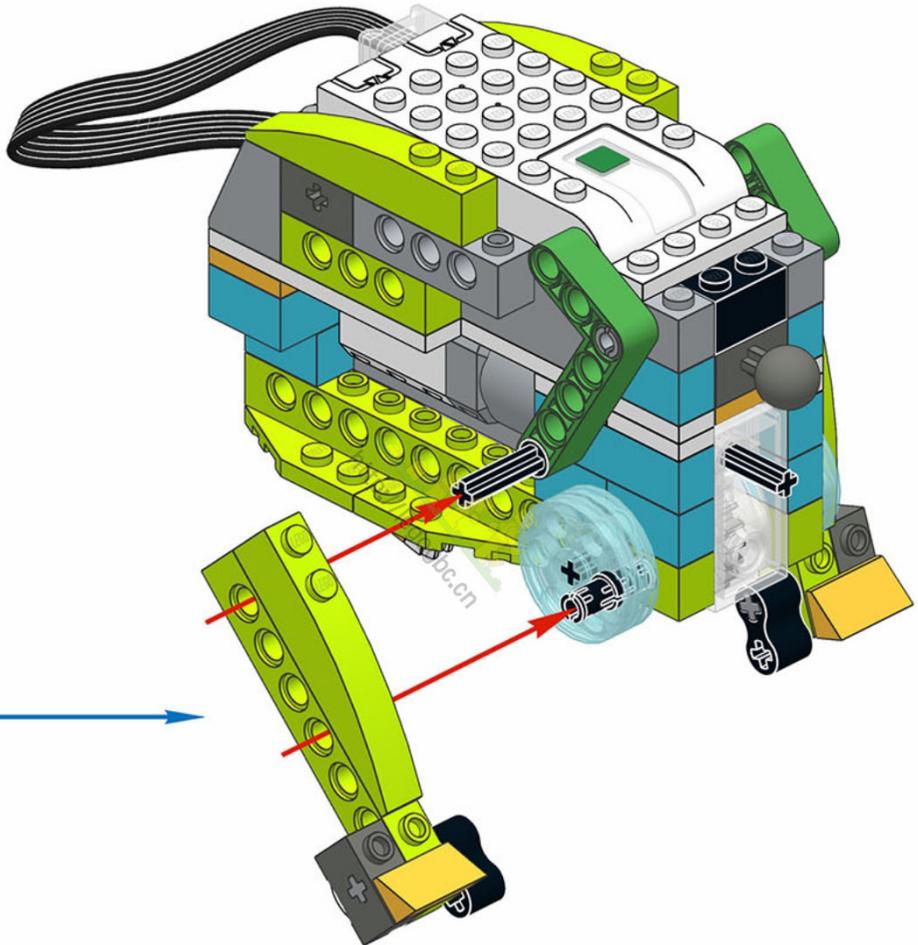
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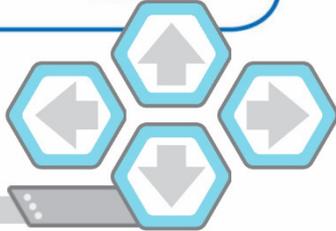
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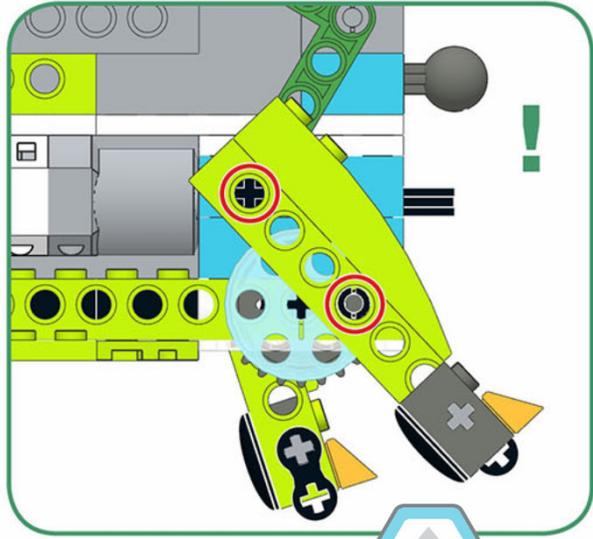
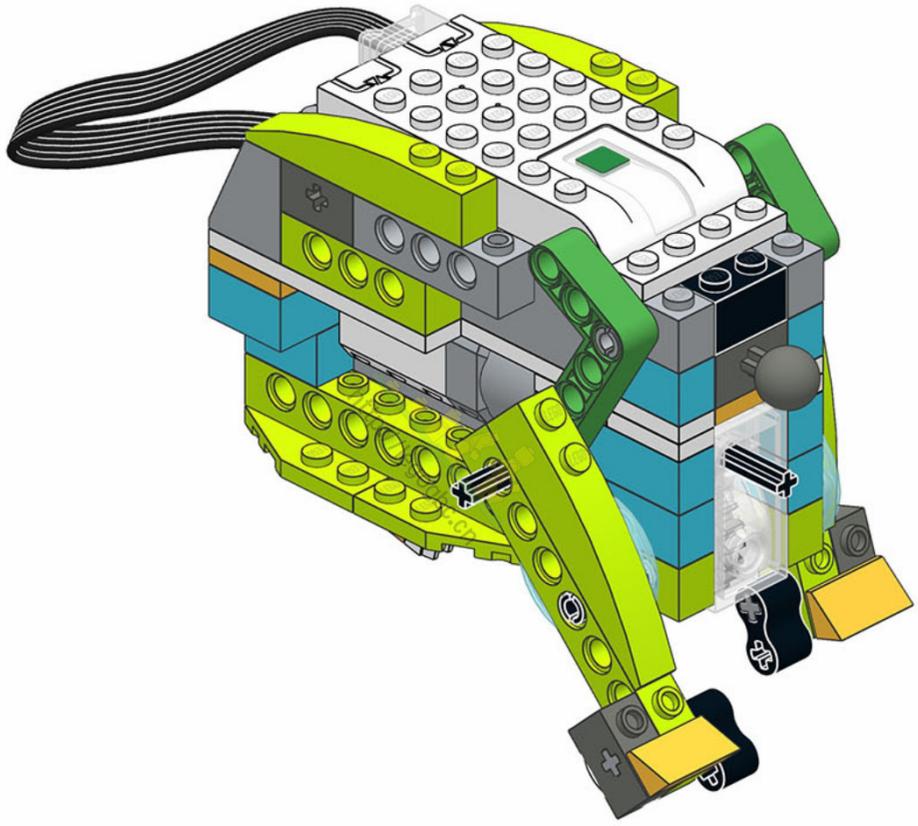
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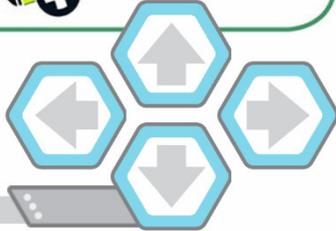
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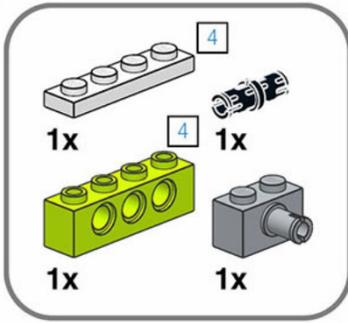
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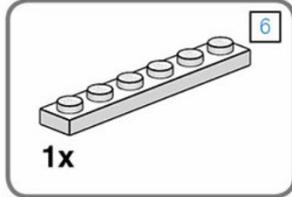
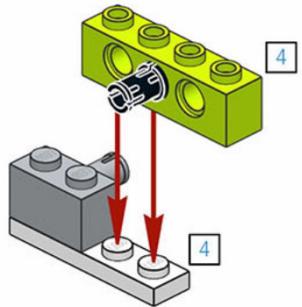




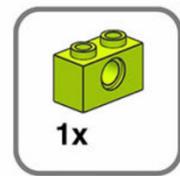
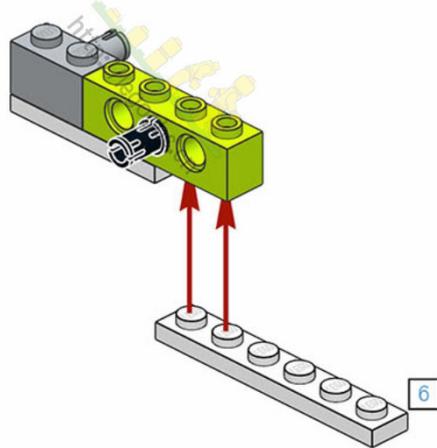
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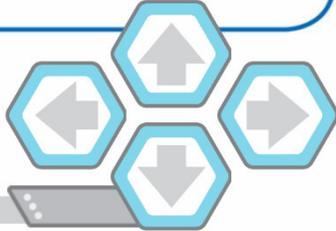
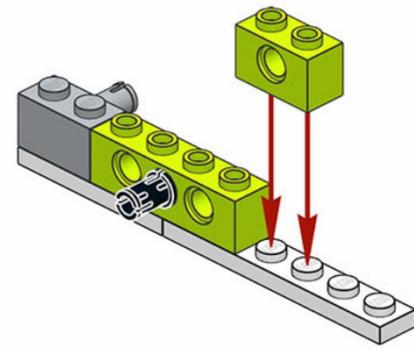
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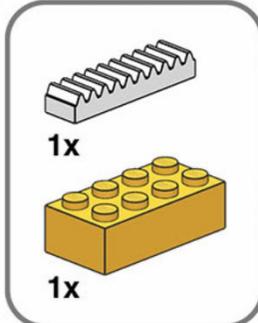


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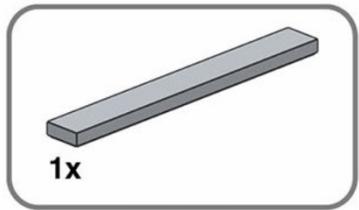
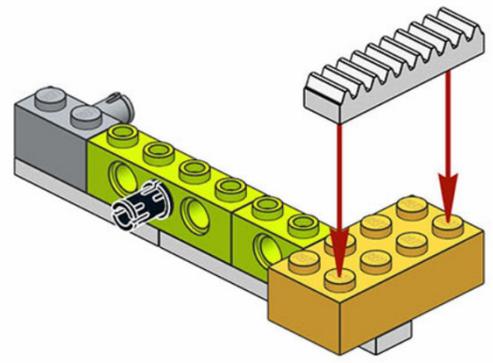




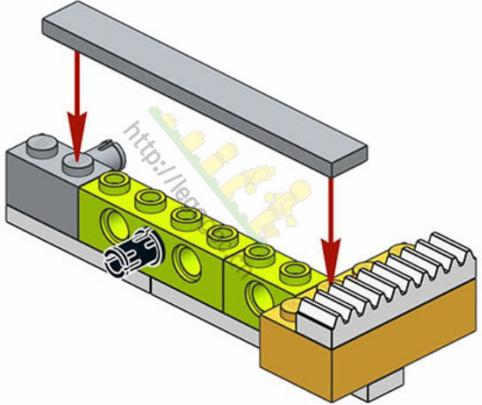
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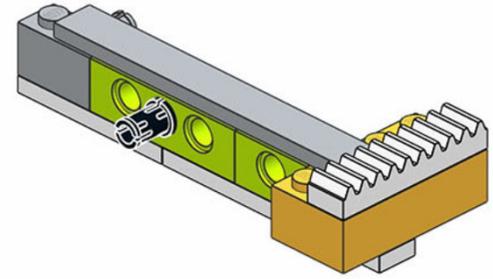
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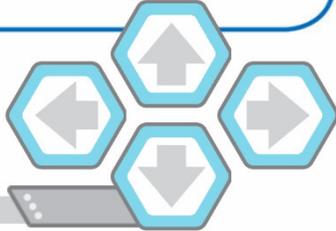
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5

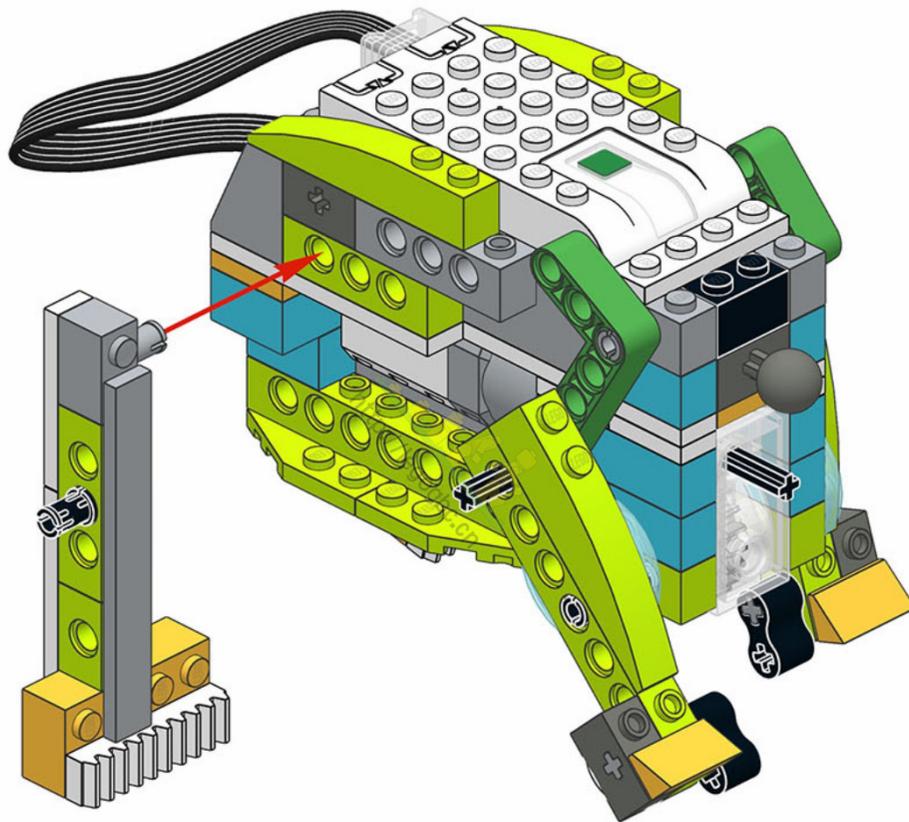
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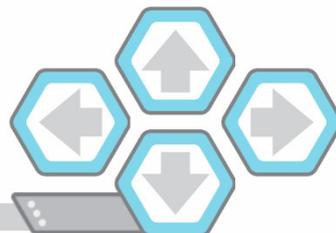
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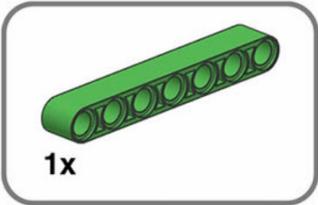
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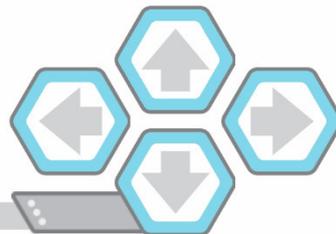
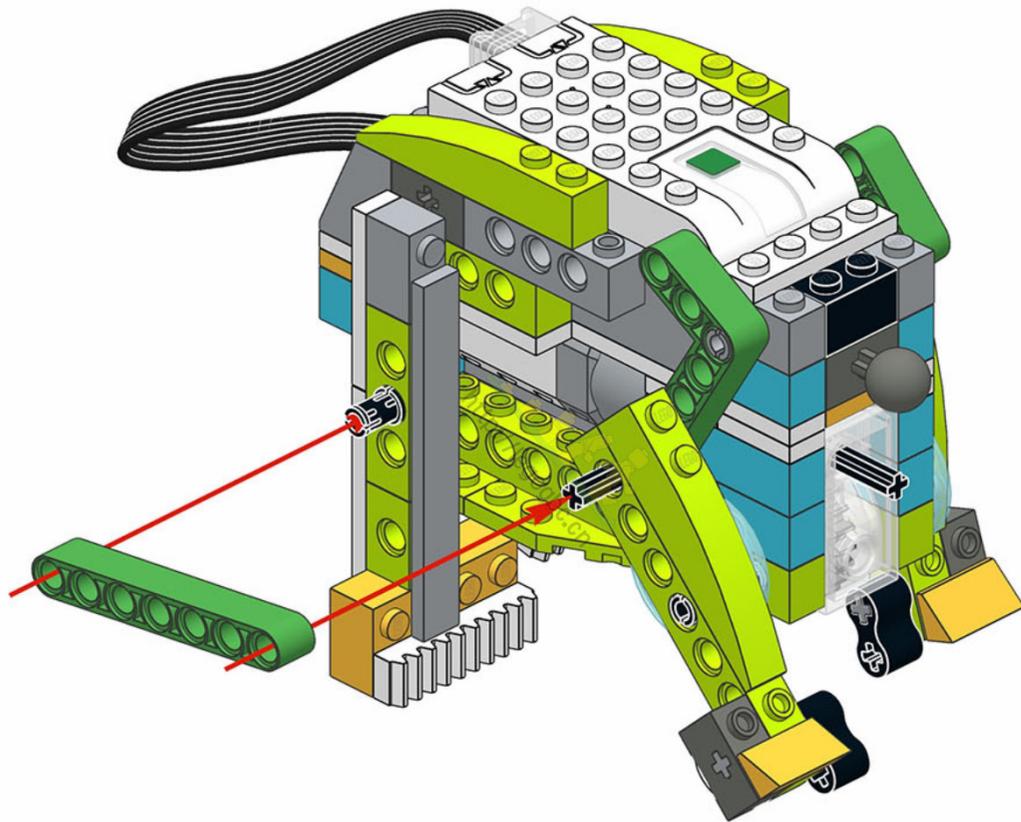


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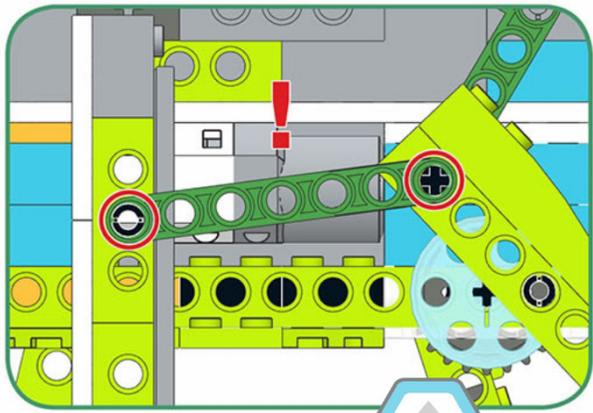
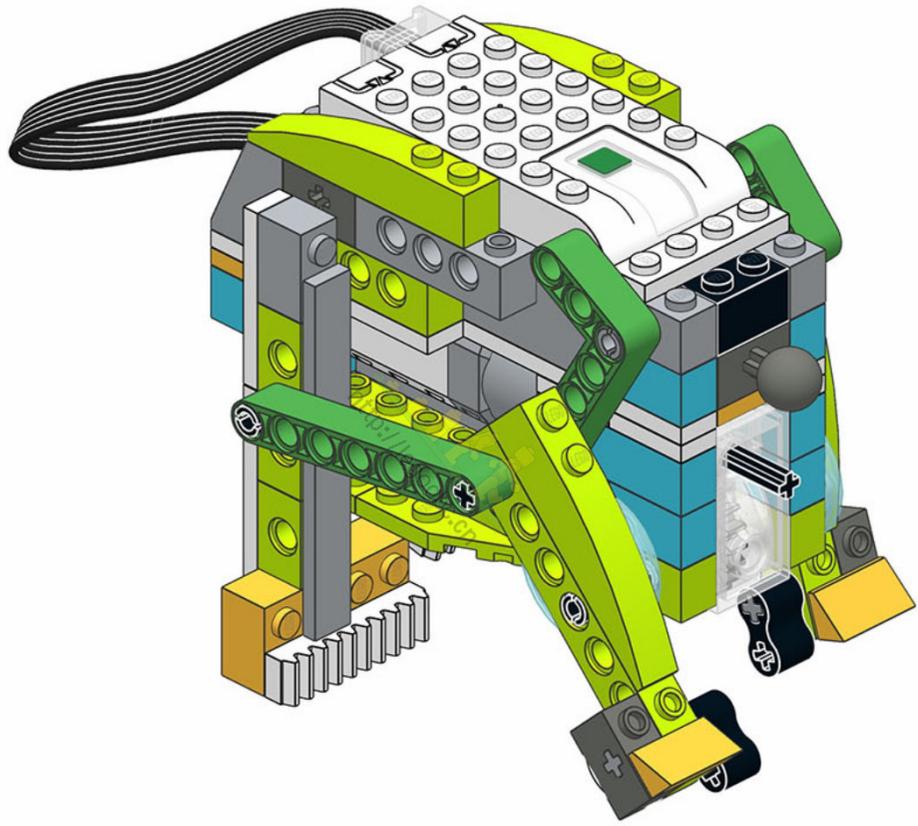
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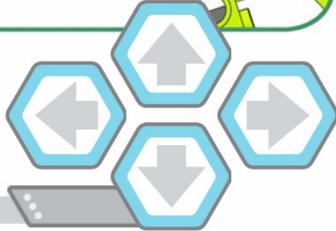
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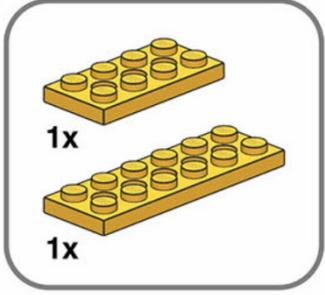
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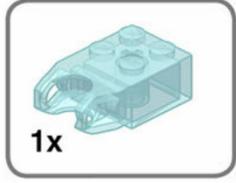
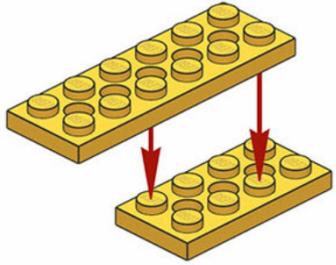




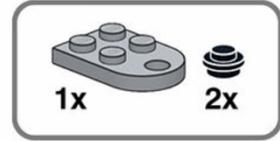
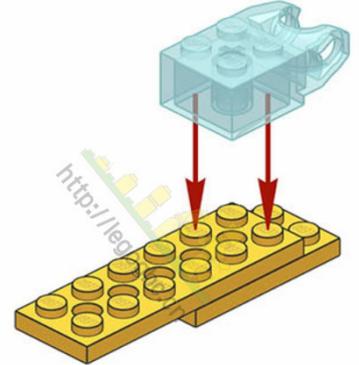
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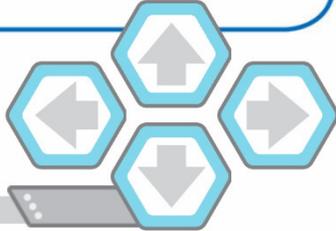
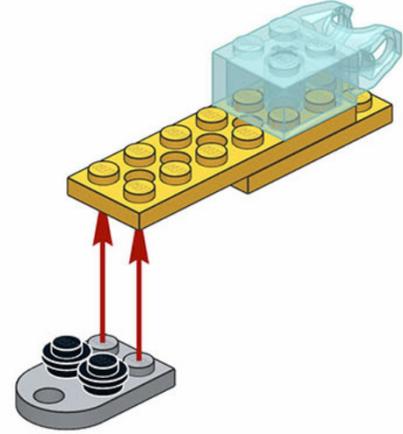
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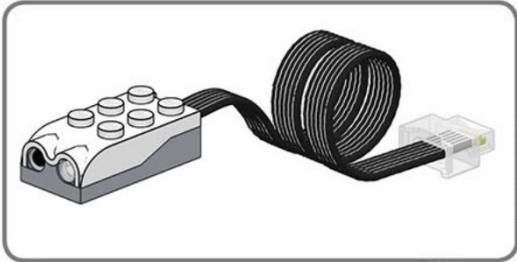


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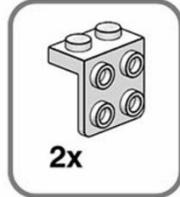
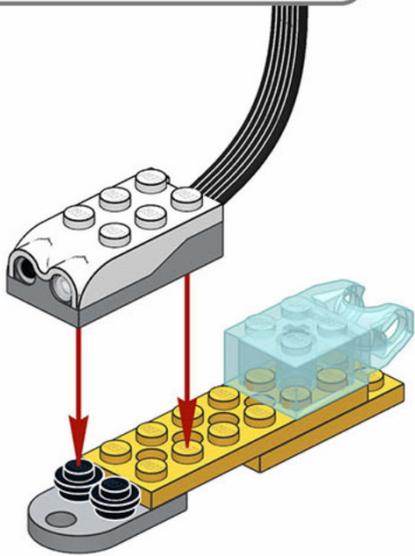




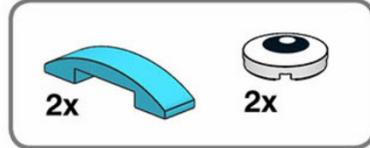
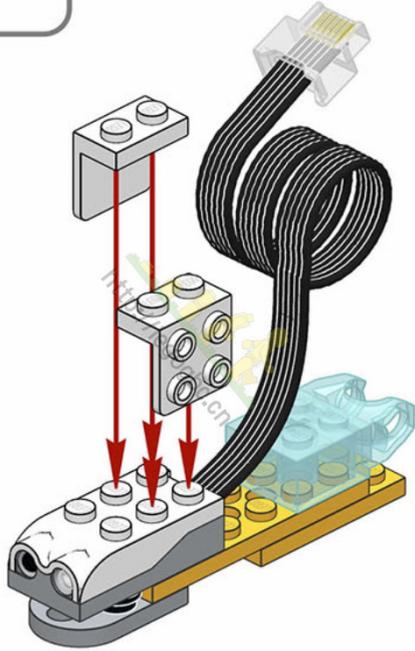
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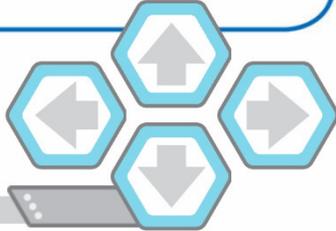
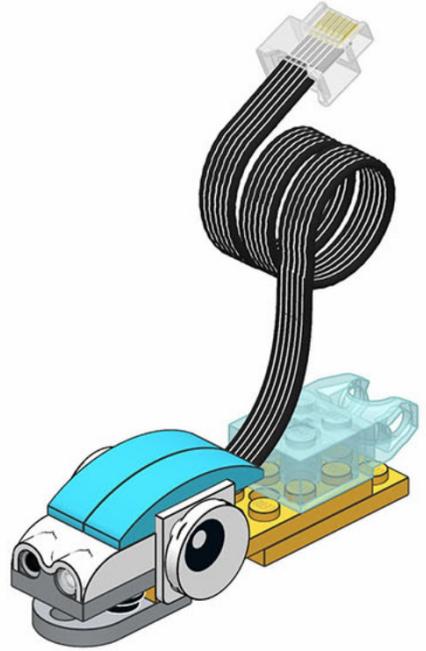
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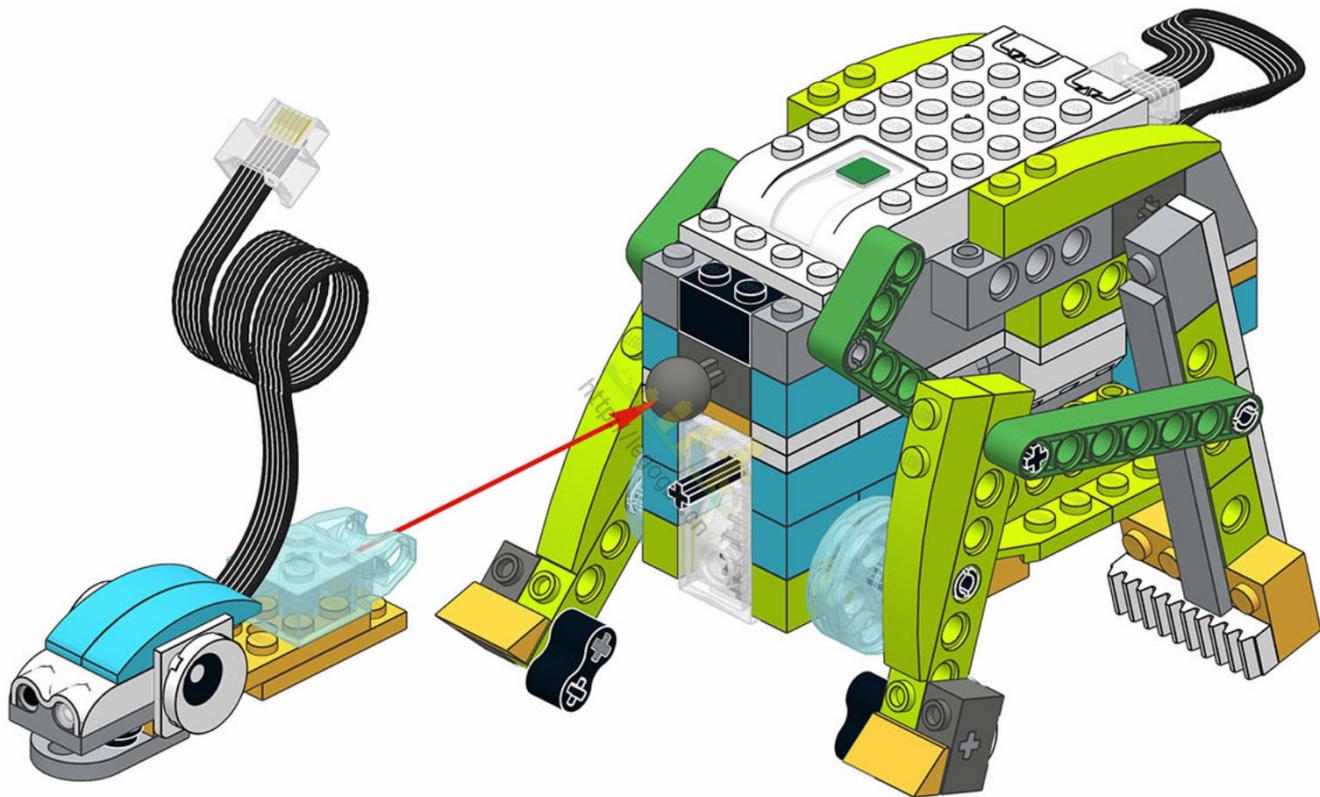
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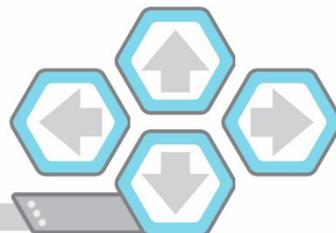
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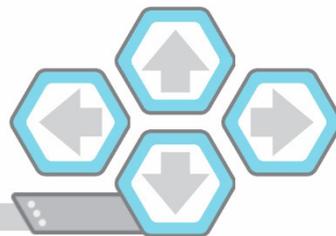
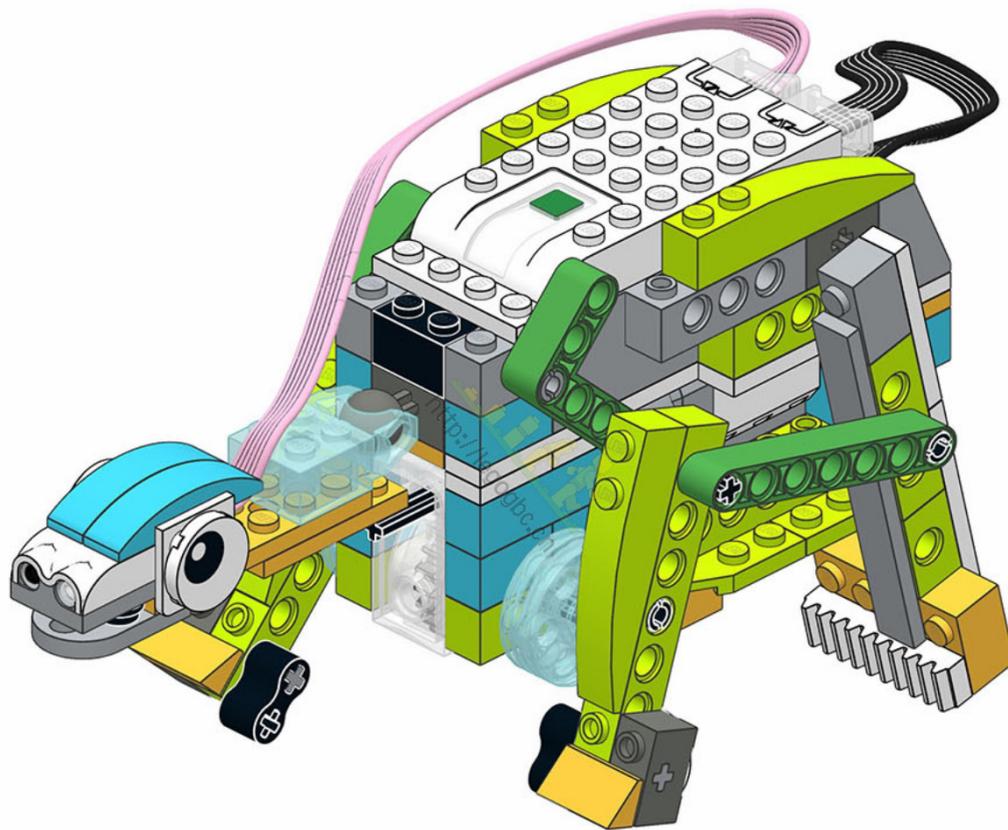
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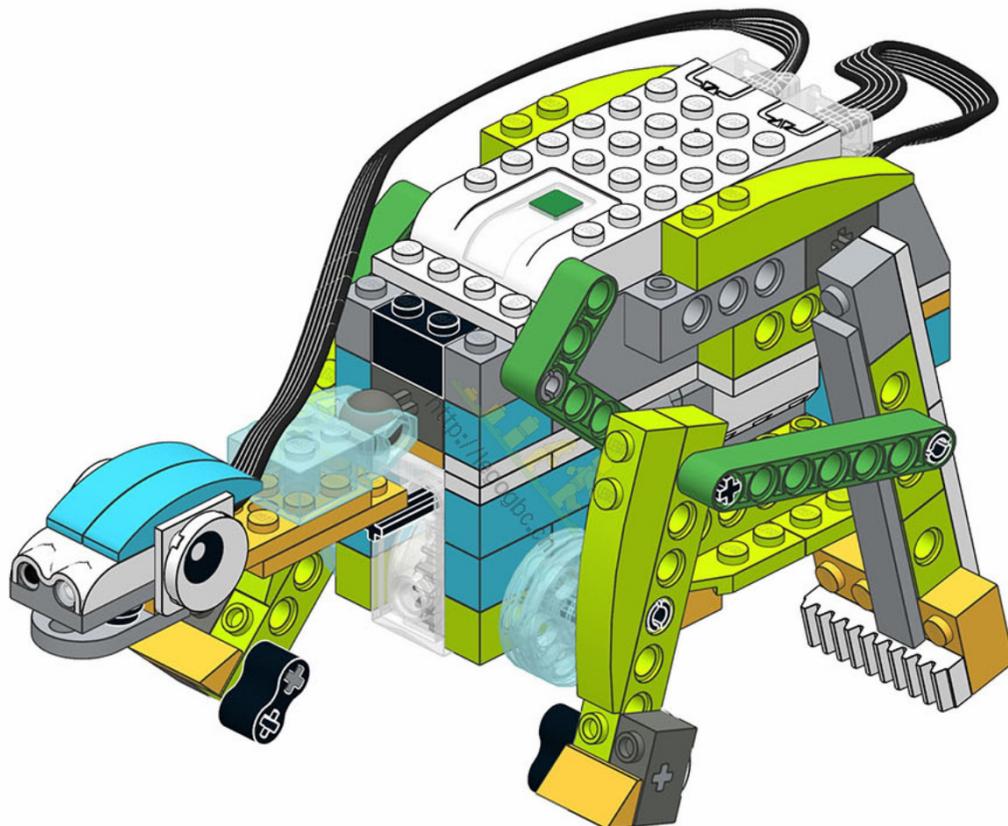
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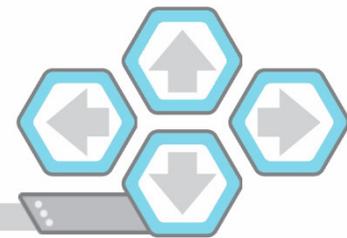
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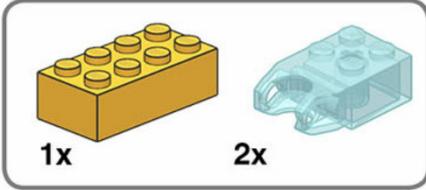
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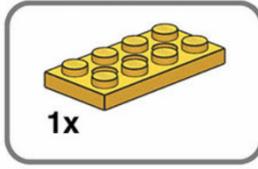
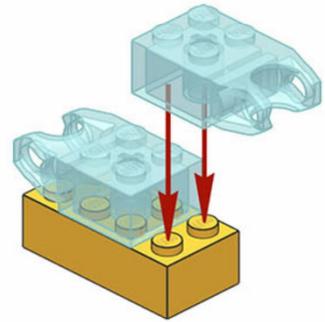




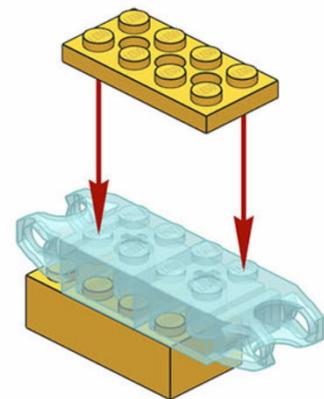
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2

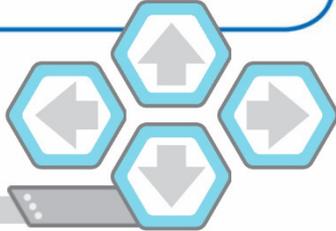


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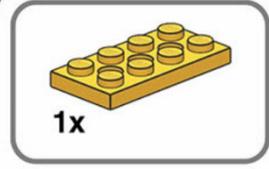
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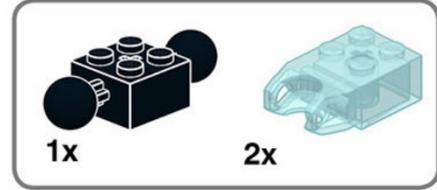
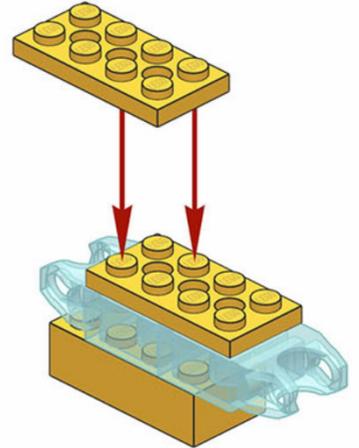




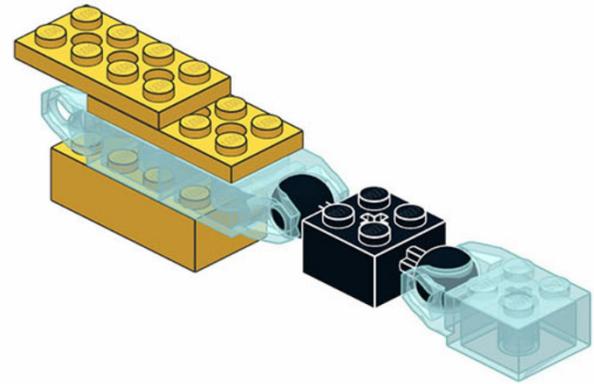
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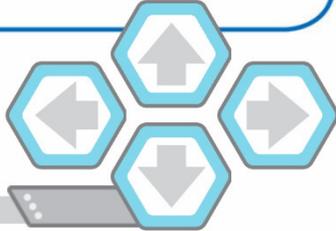
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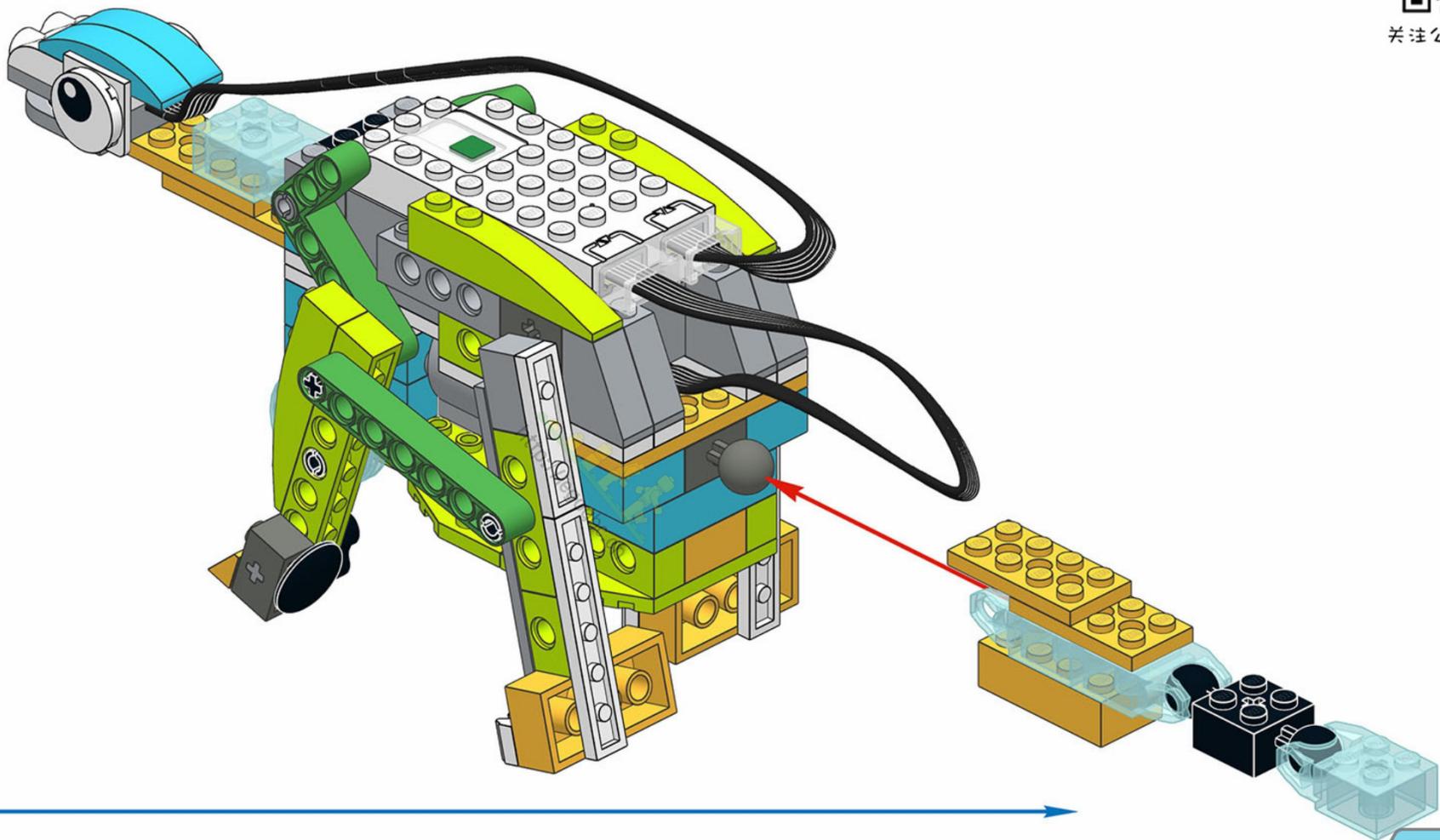
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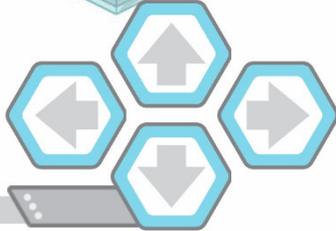
61



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5

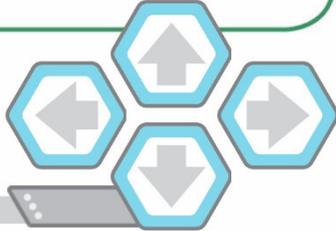
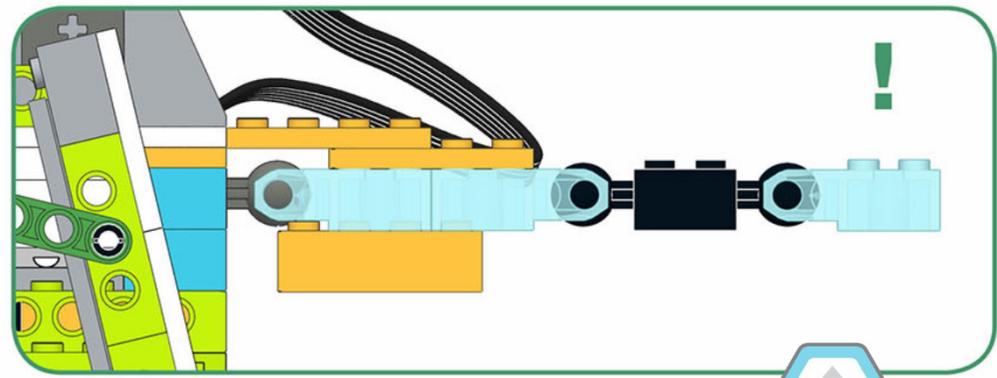
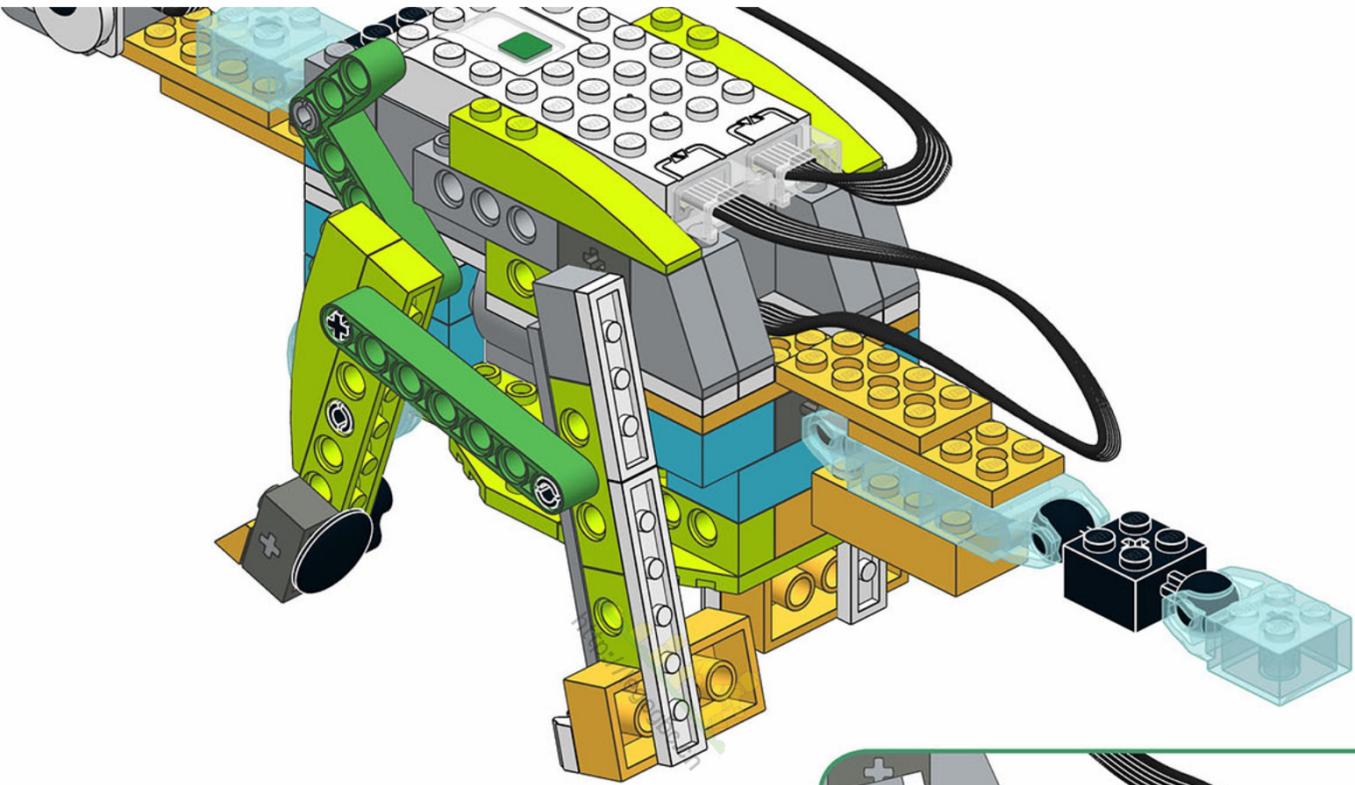
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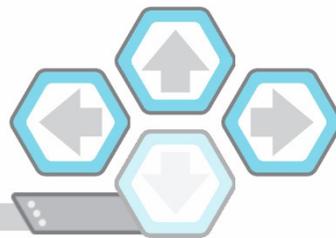
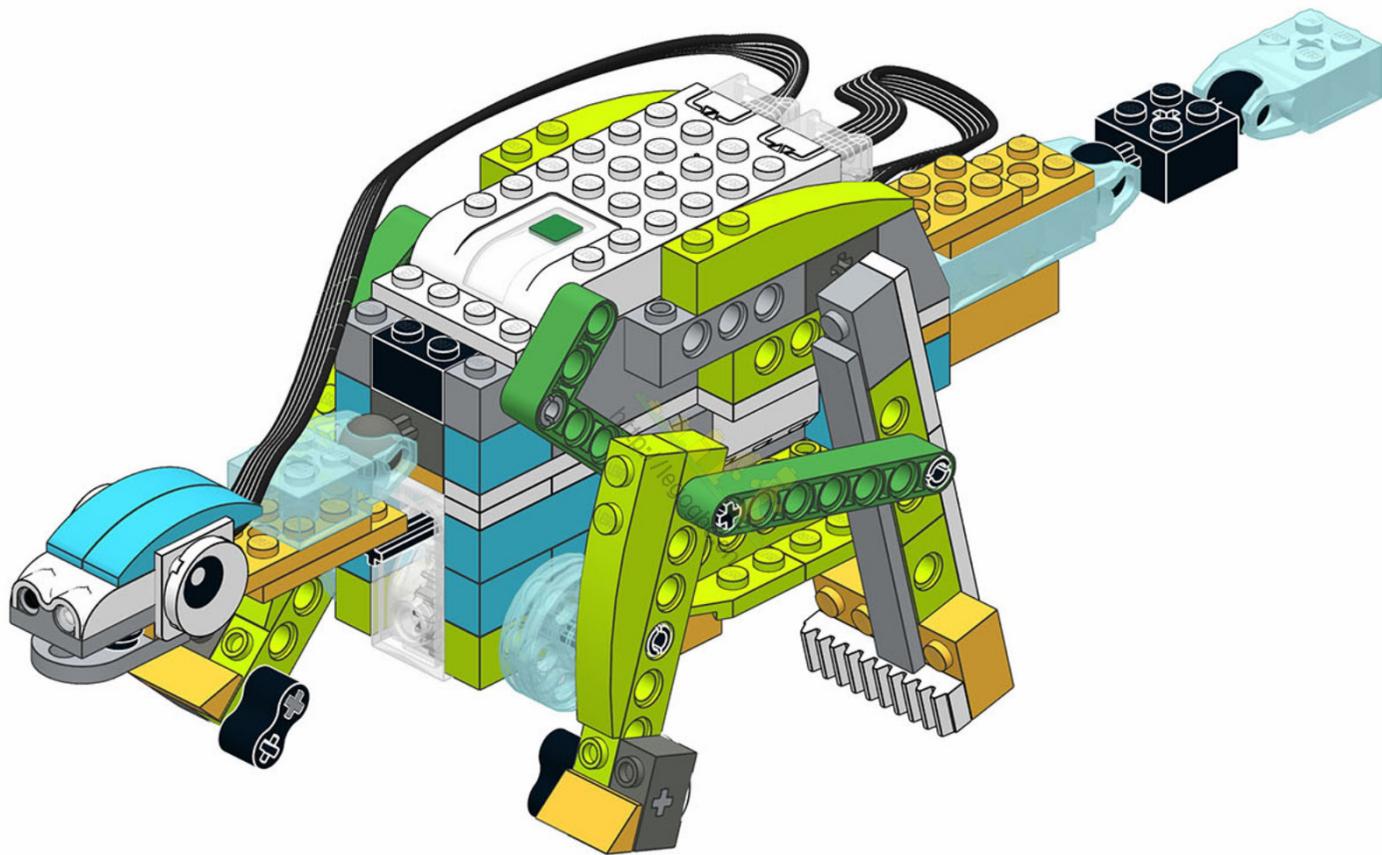
62





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63



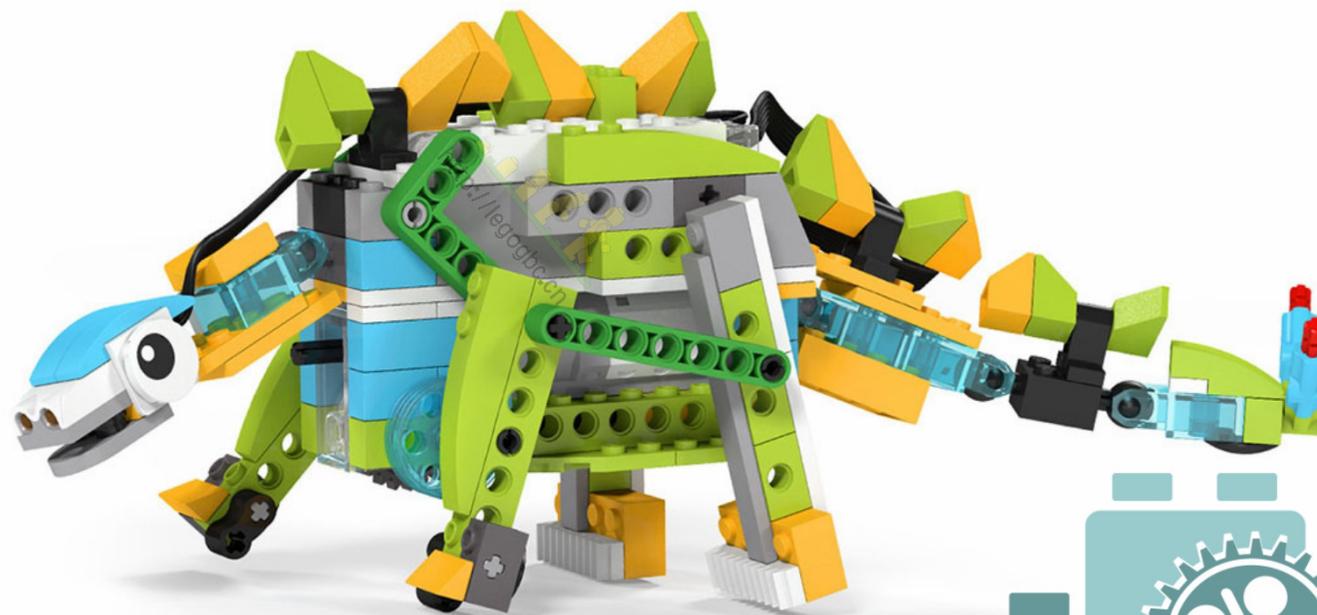


# Enhanced version

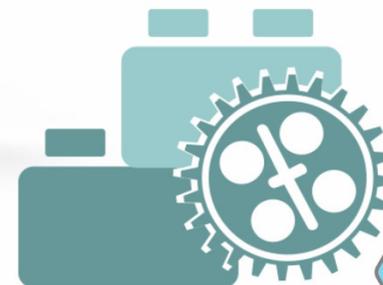


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Add bone plates along the back of the robot and spikes on the tail.



## Stegosaurus



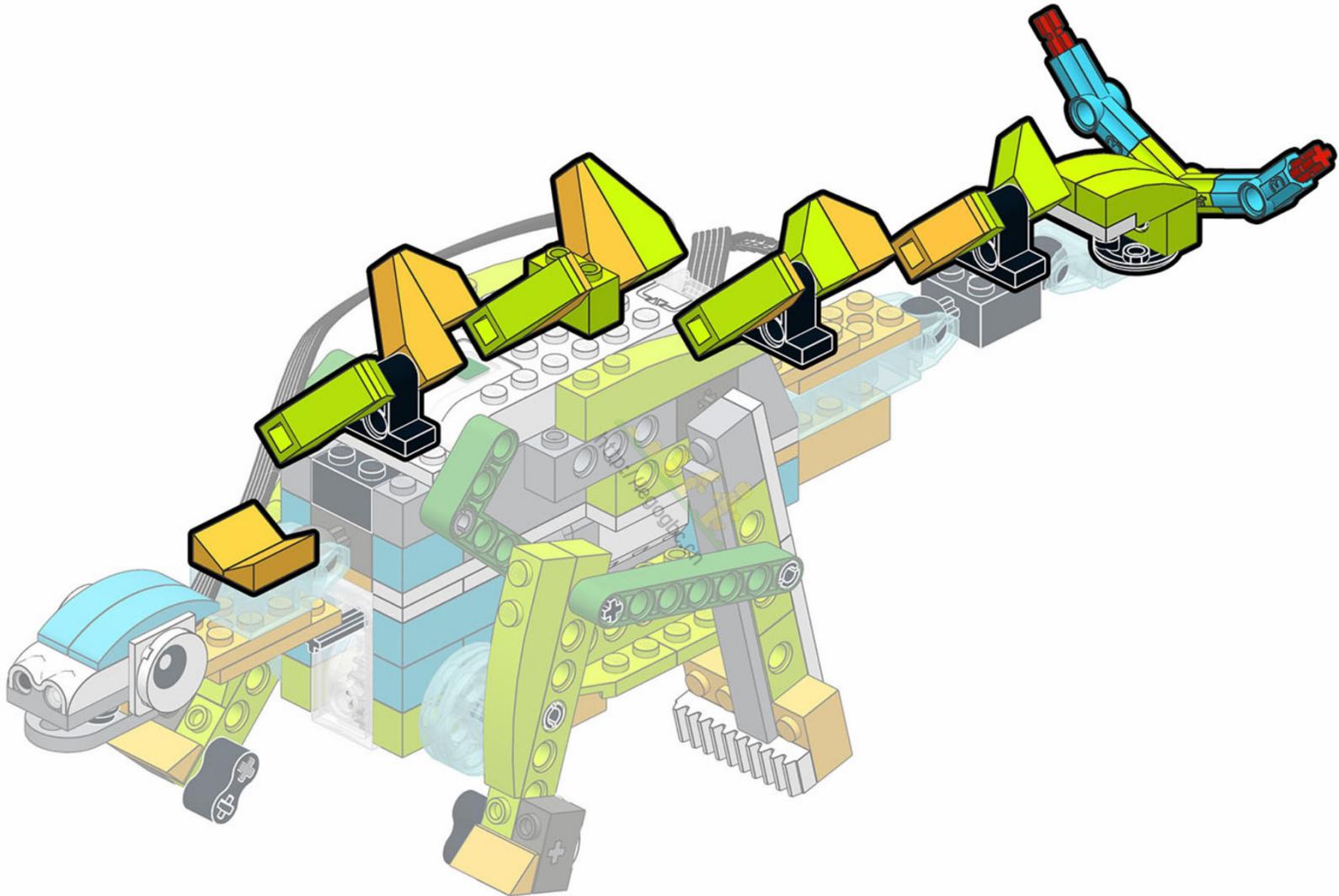
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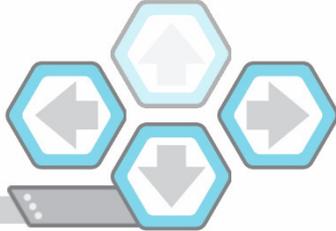
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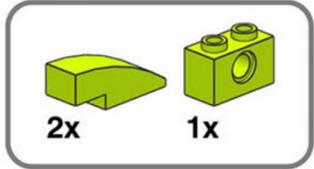
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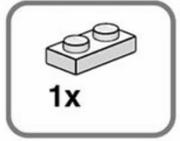
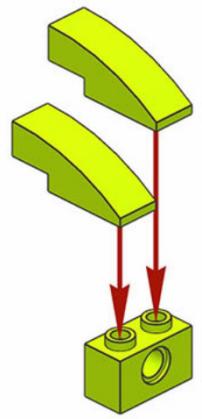




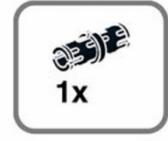
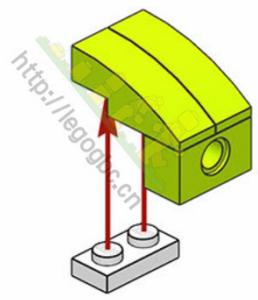
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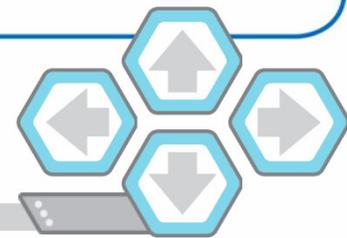
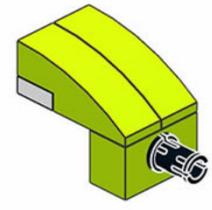
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2



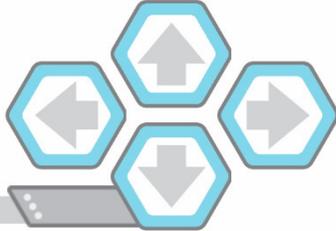
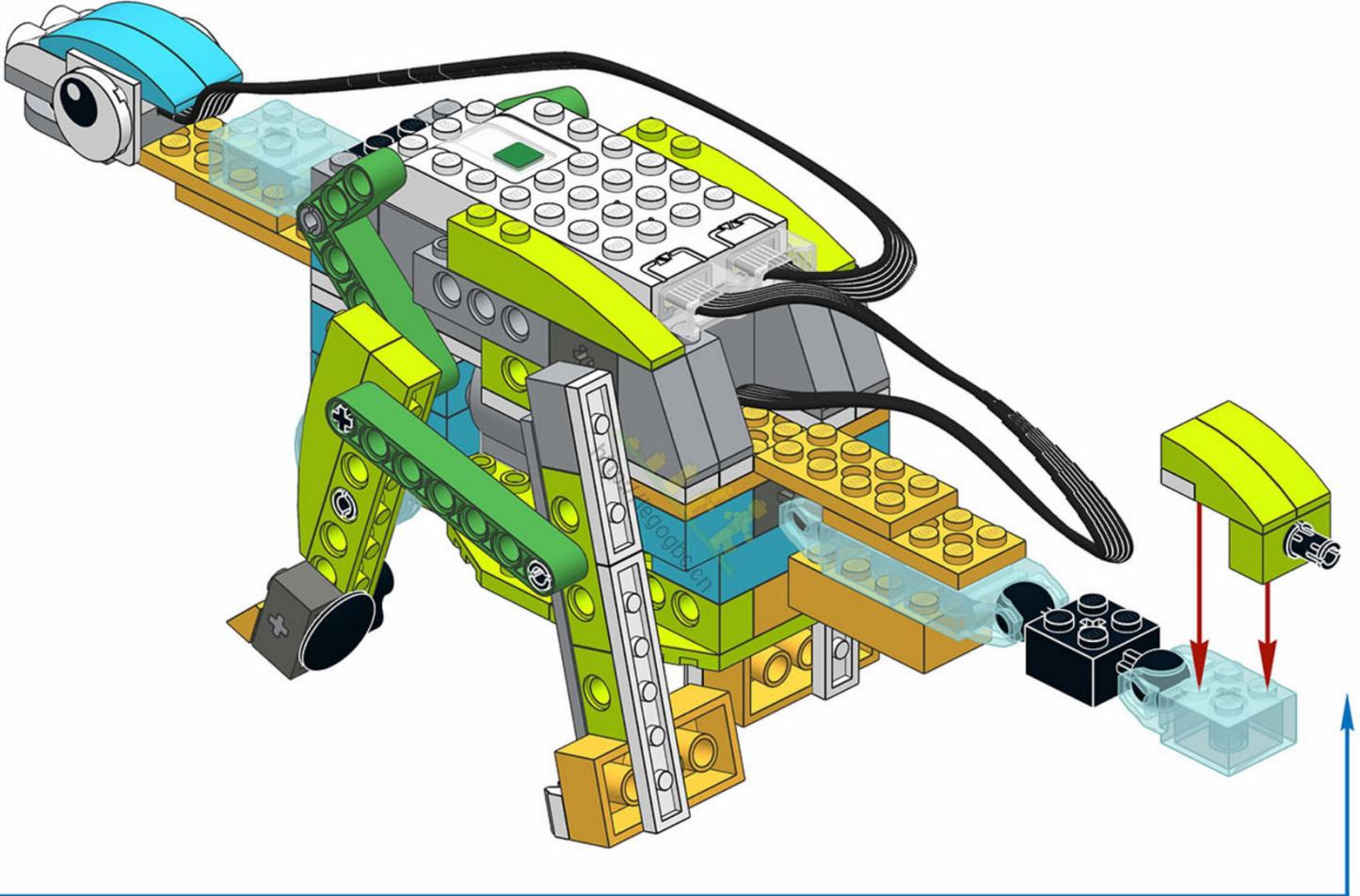
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65

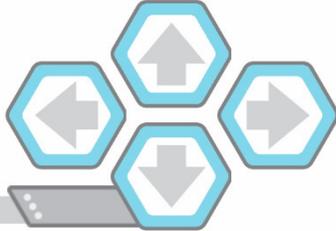
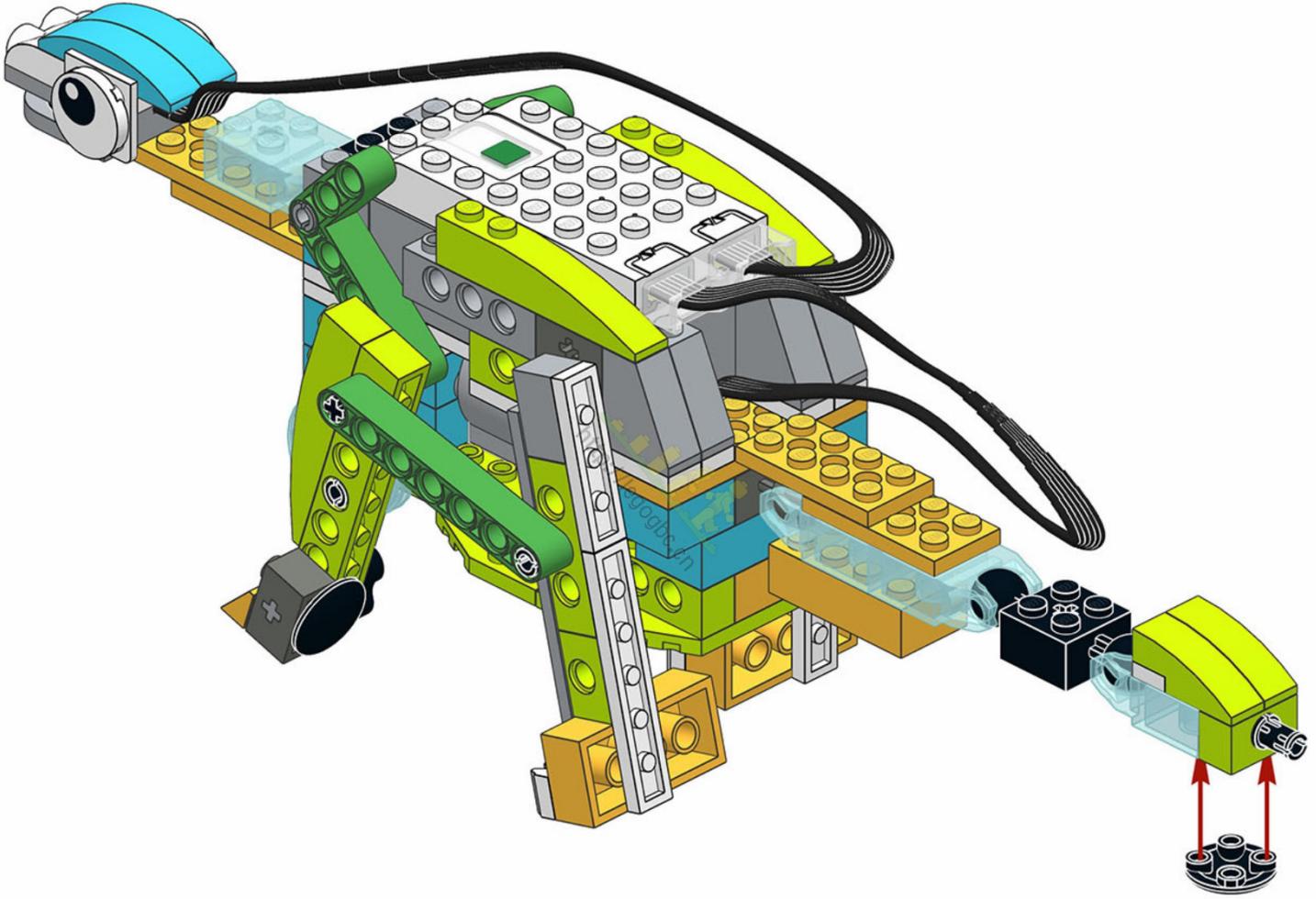




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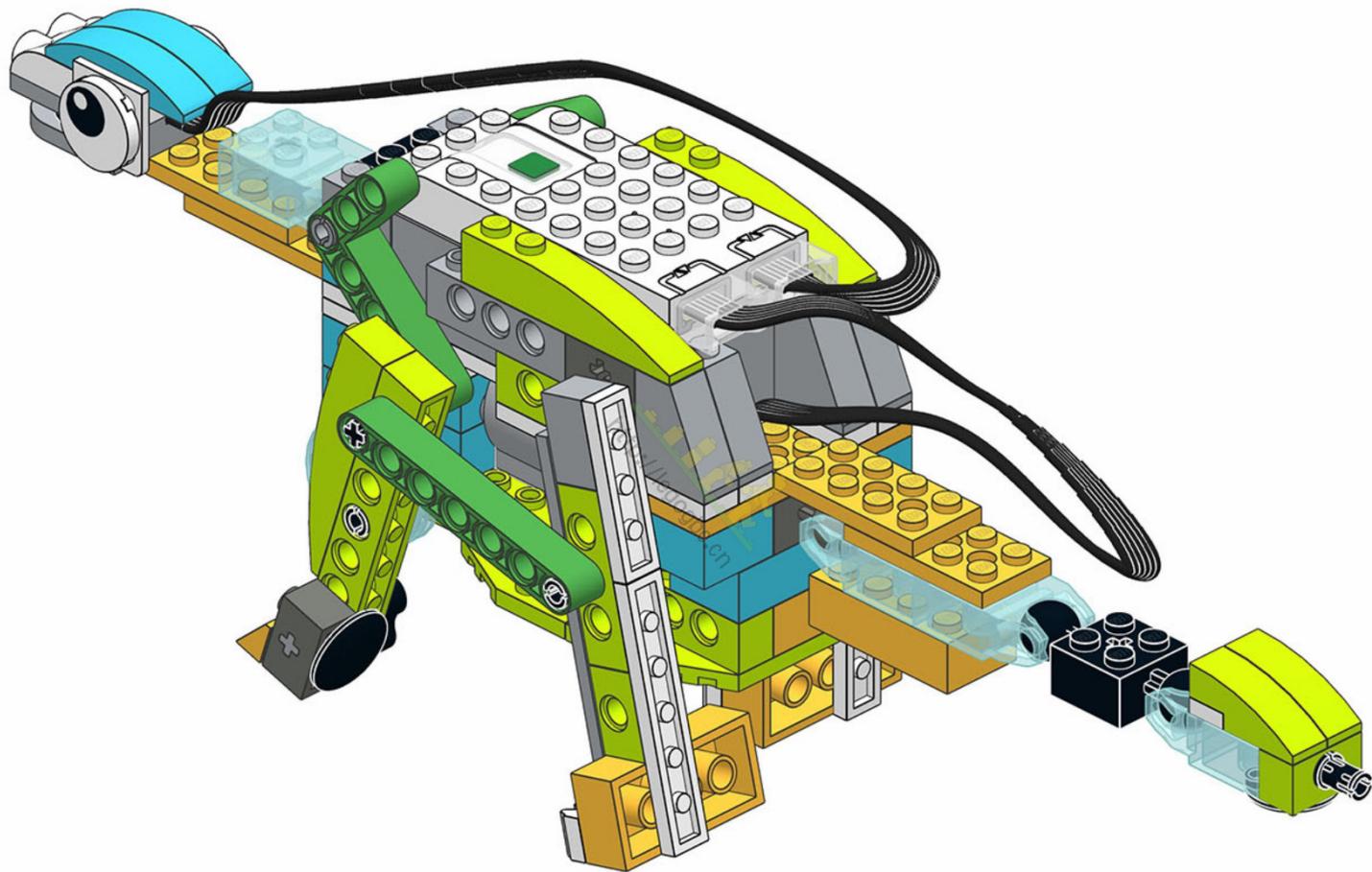
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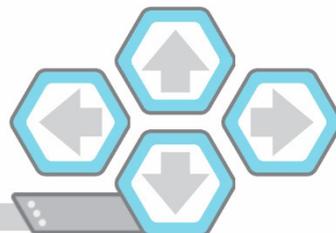
67



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5

99

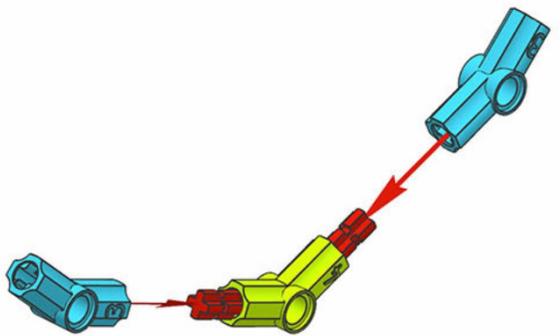




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- 2x
- 1x
- 2x

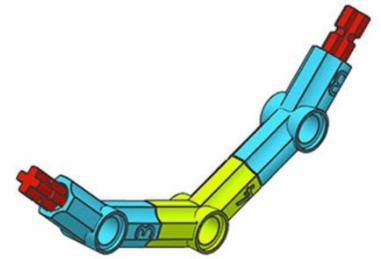
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- 2x

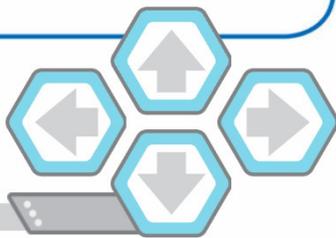
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5

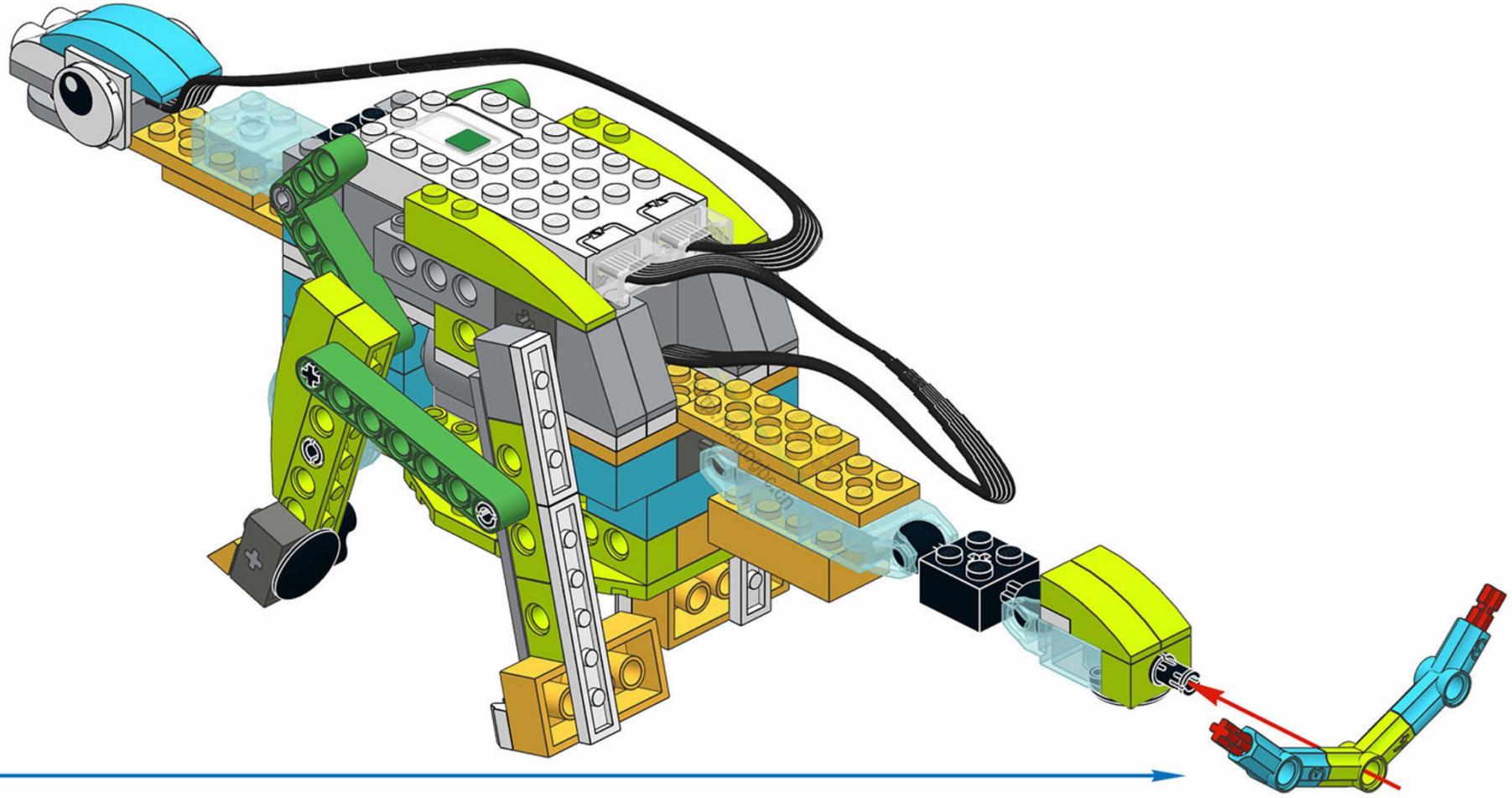
100





关注公众号获取更多

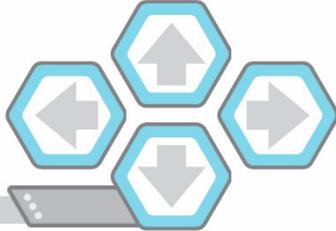
68



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5

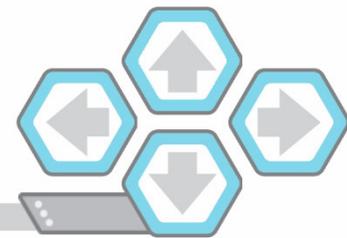
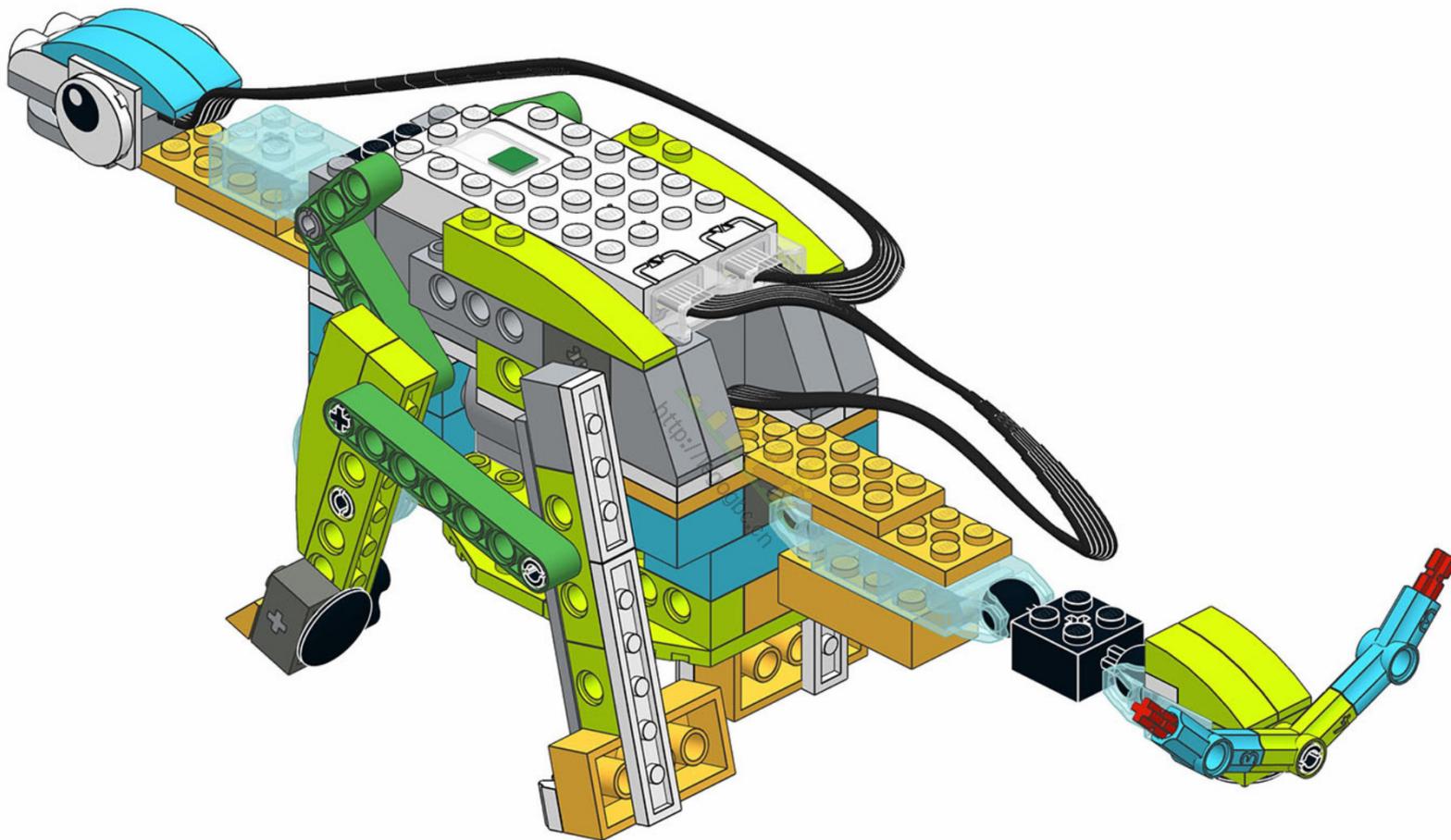
101





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69





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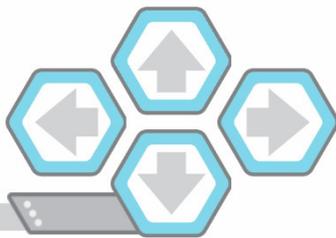
1x  
1x

**2**

2x

1x

<http://hgogbc.cn>

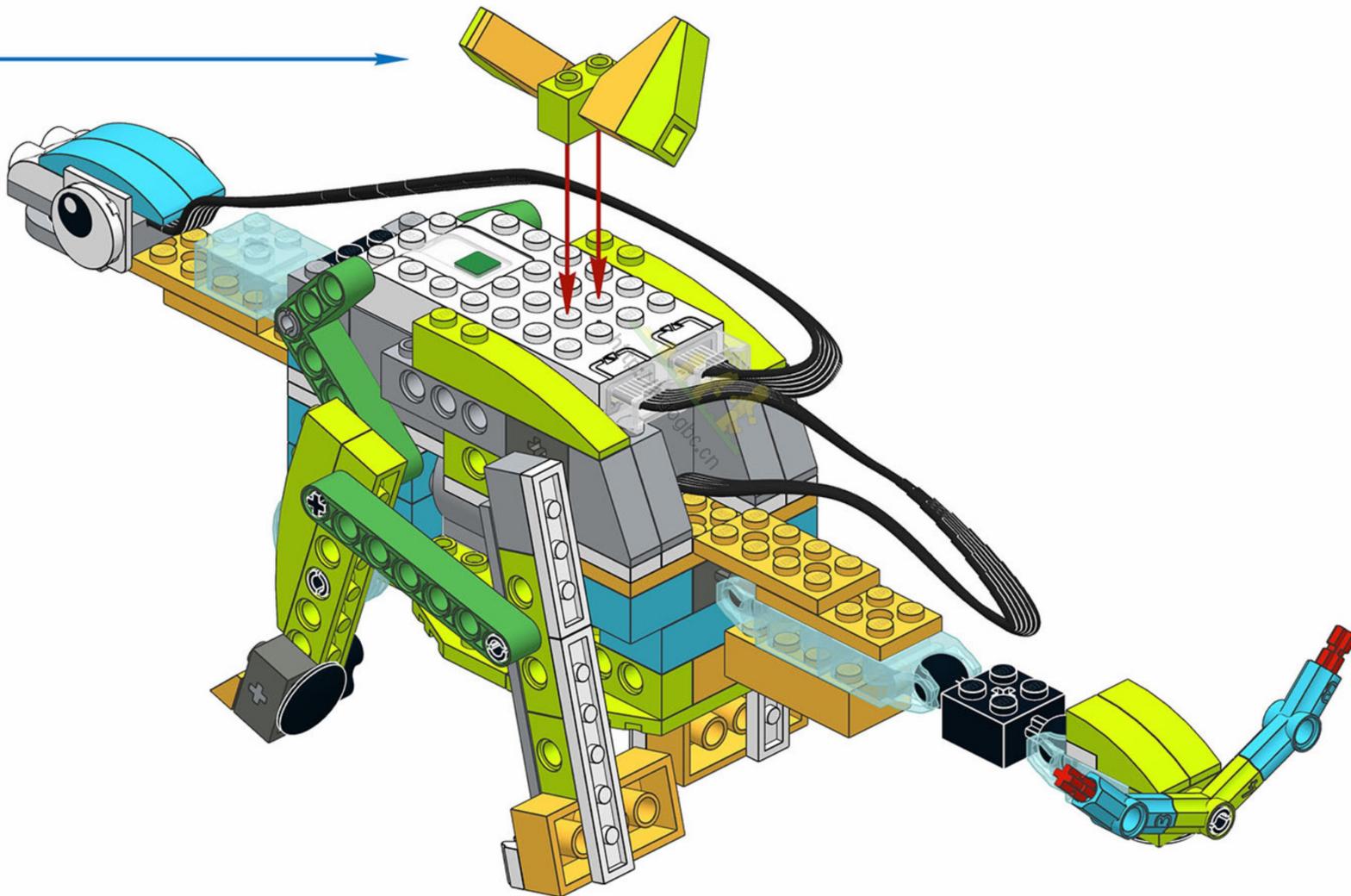






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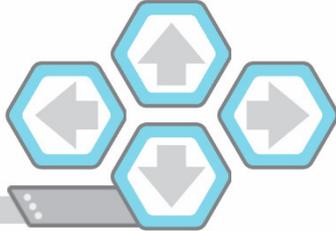
73



11/24

5

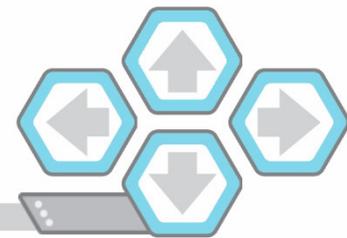
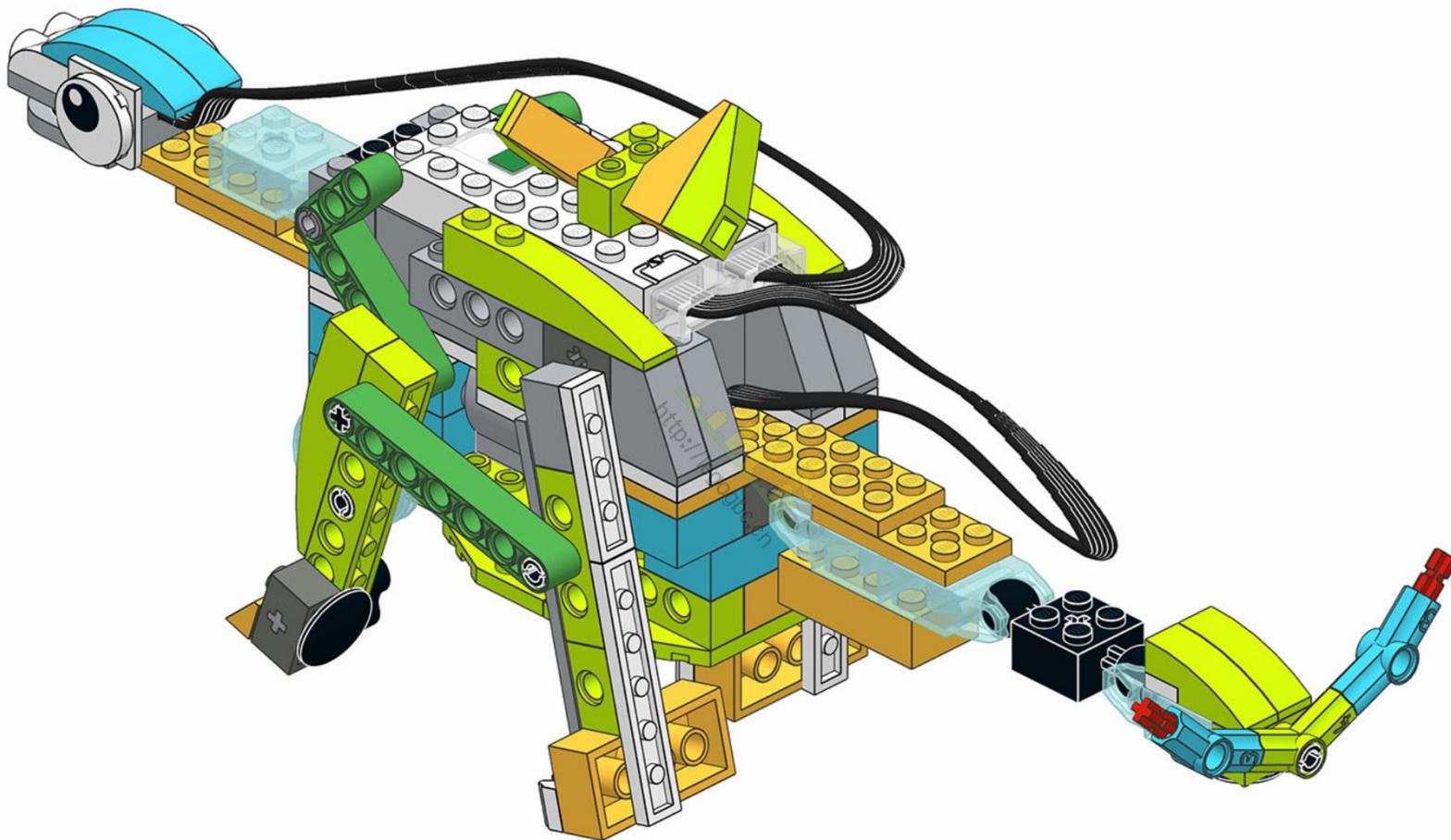
105





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74





关注公众号获取更多

**1**

1x  
1x

**2**

1x

<http://legoipcc.cn>

**1**

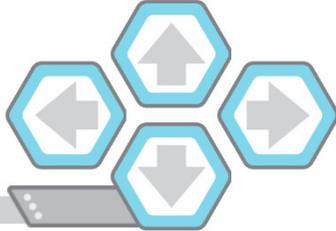
1x 1x

**2**

13/24

5

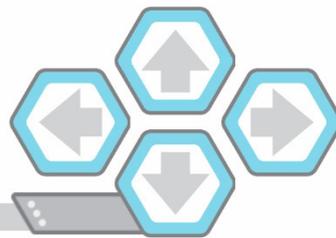
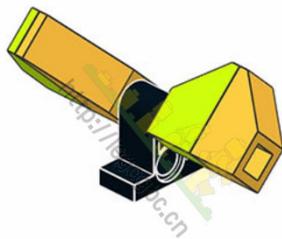
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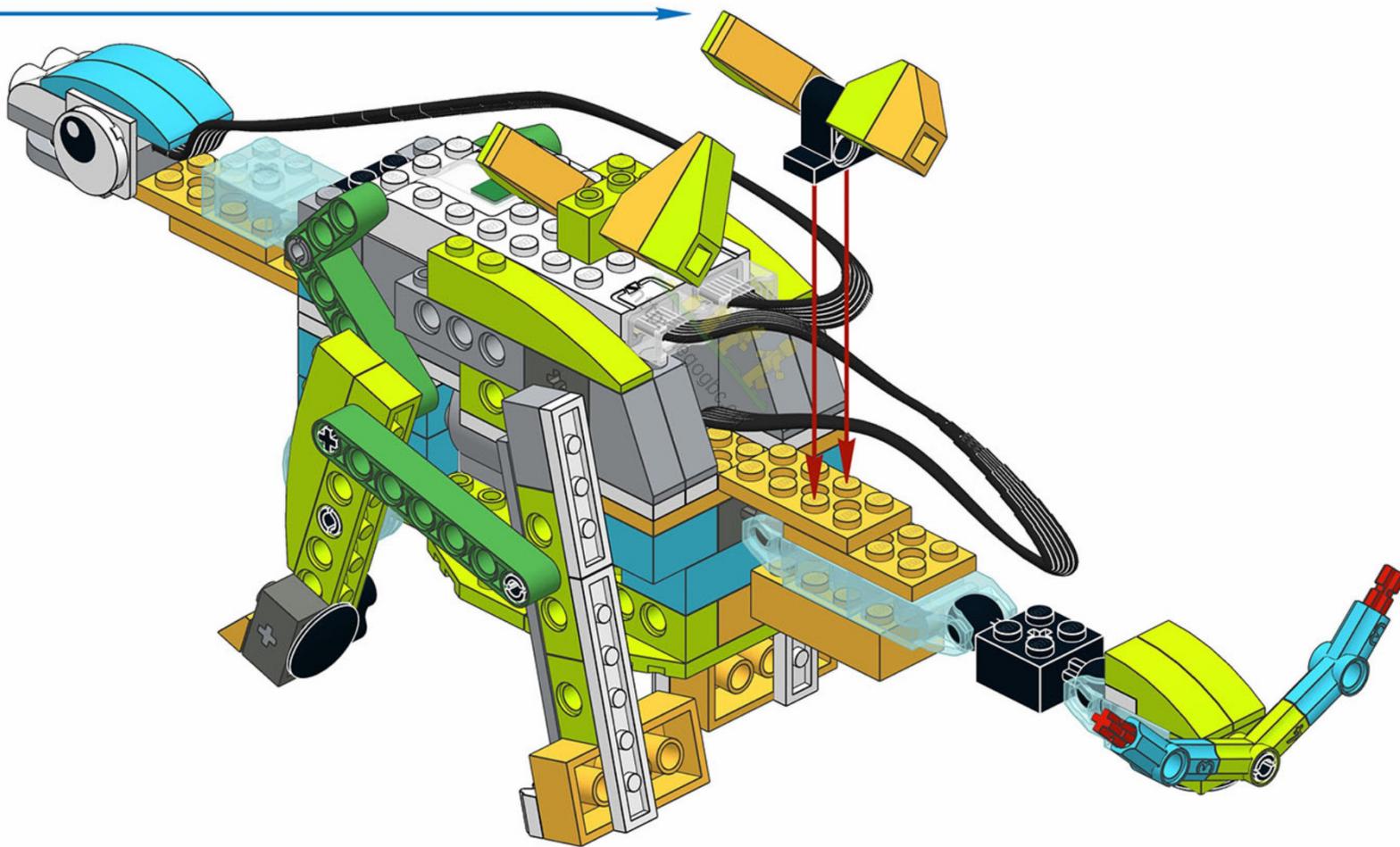
76





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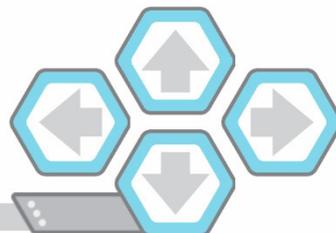
77



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5

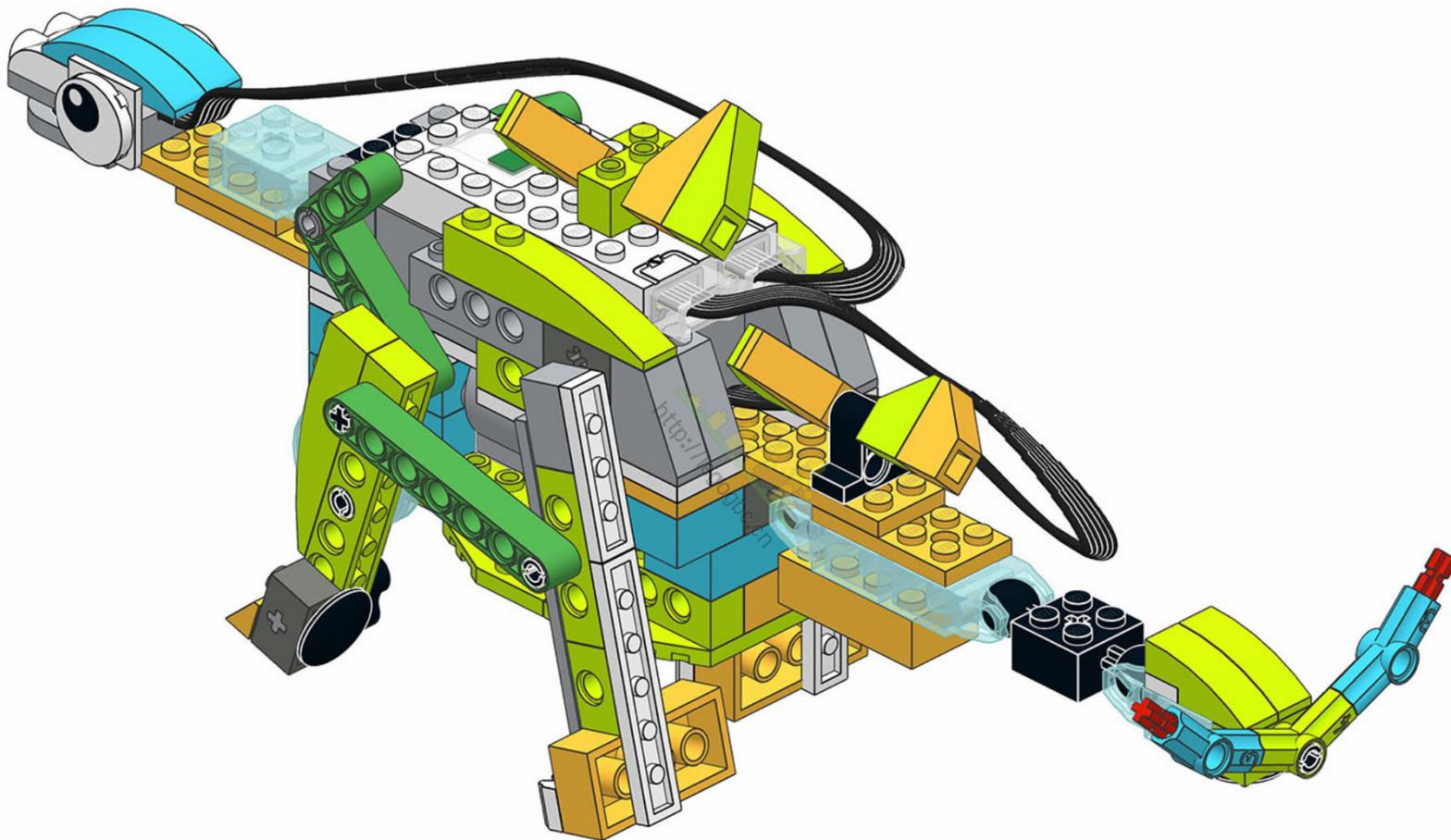
109





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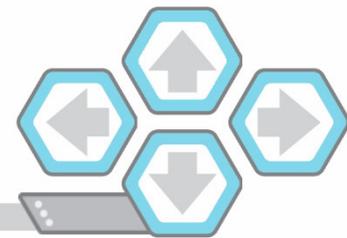
78



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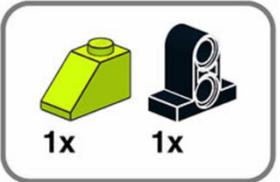
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110

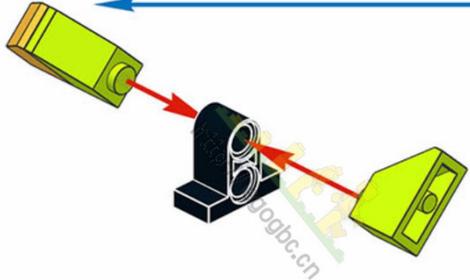




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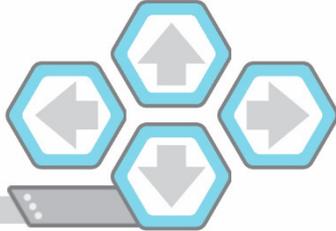
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1x 1x

**1**

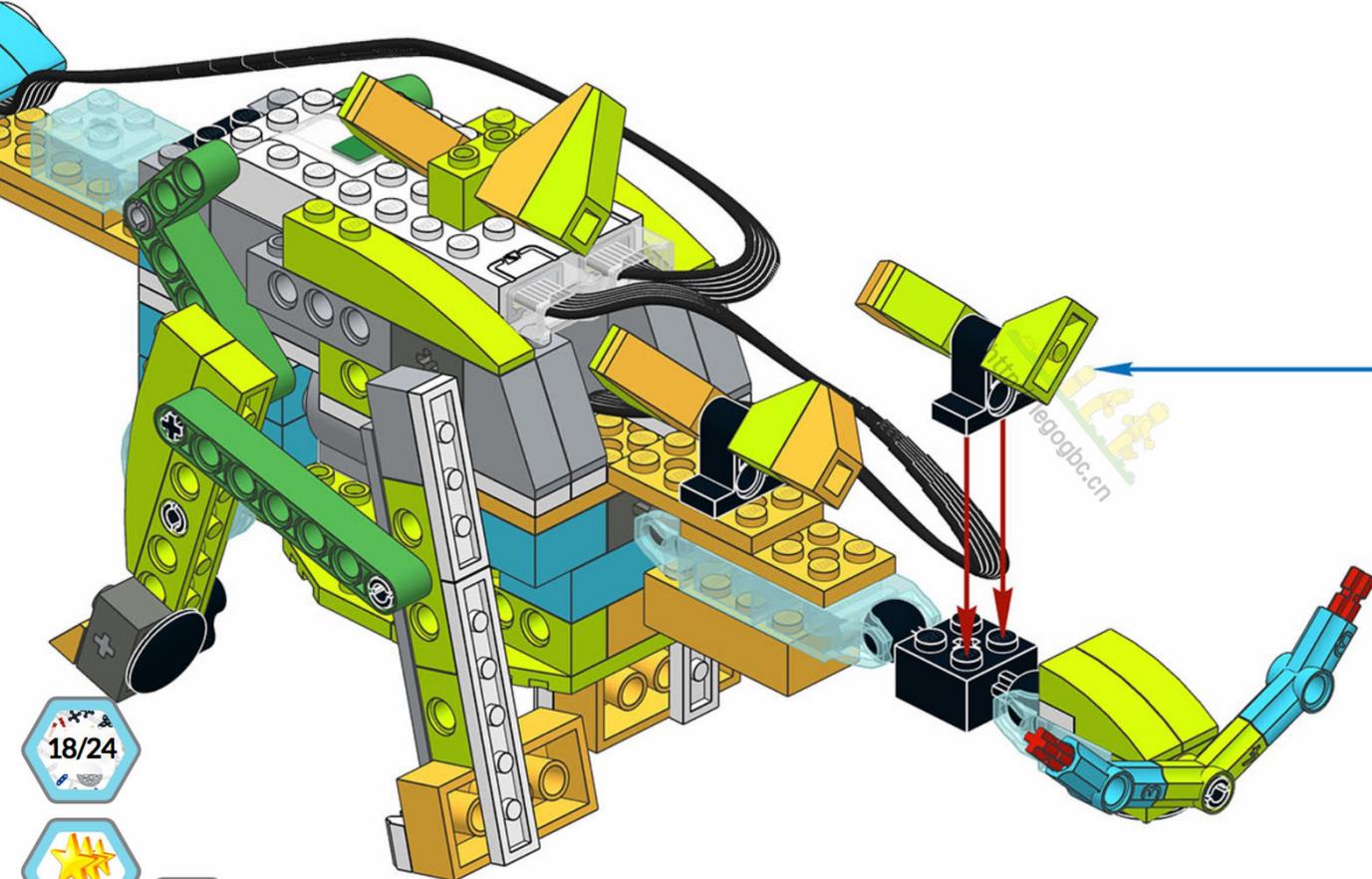
**2**





关注公众号获取更多

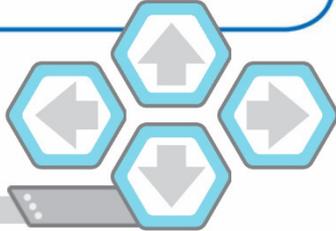
80



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5

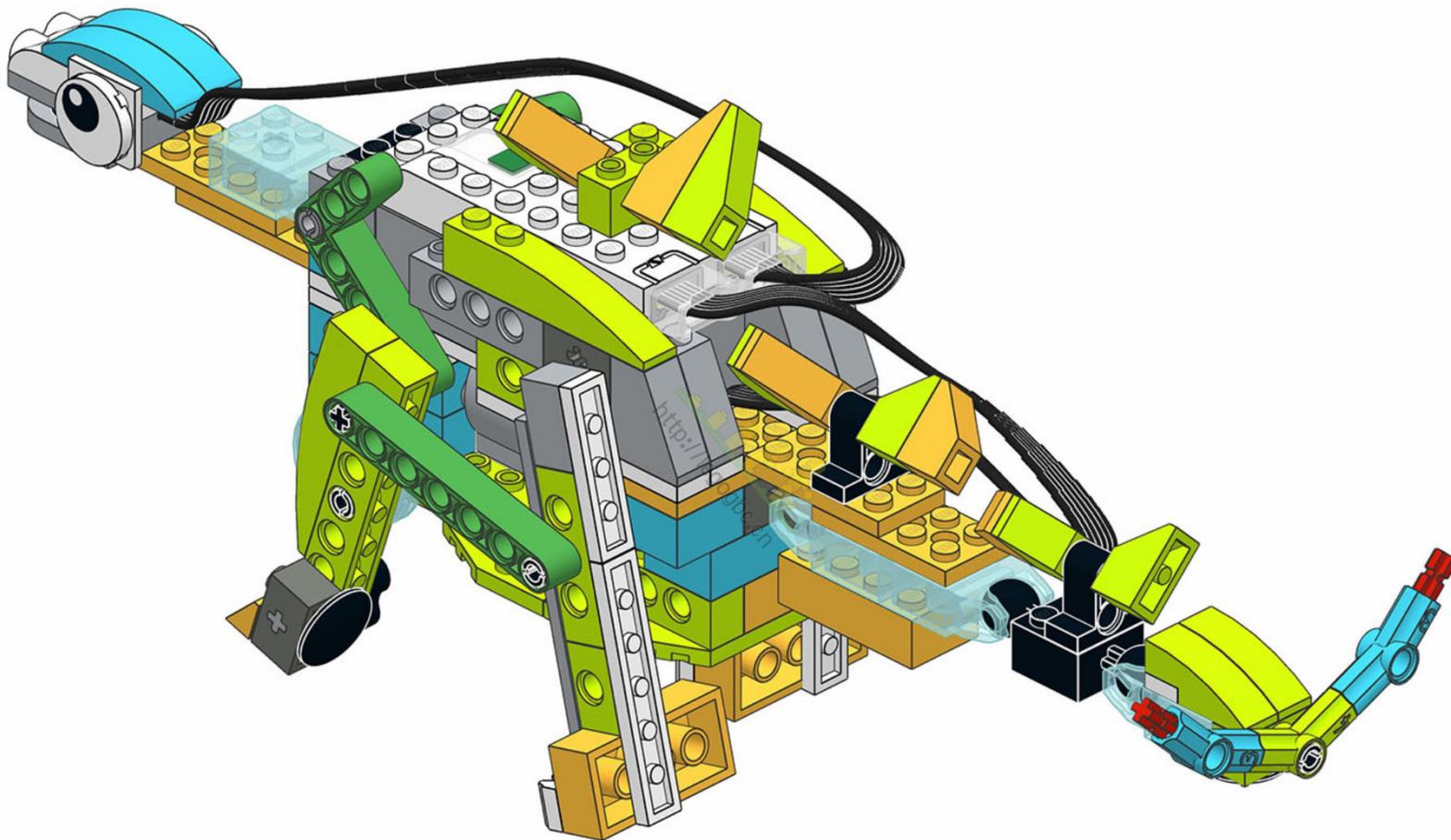
112





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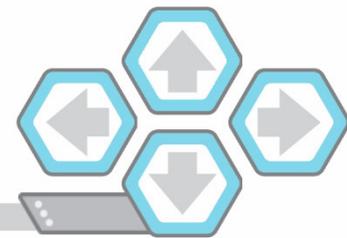
81



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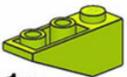
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113

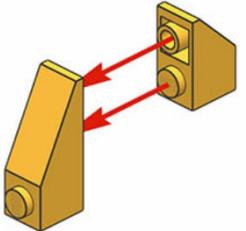




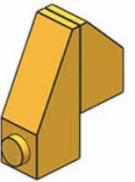
关注公众号获取更多

1x  1x 

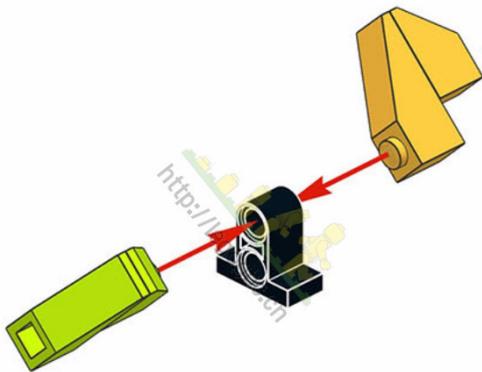
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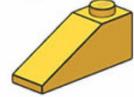


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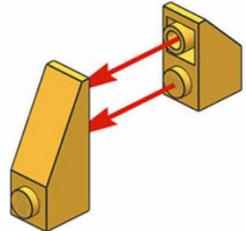


1x 

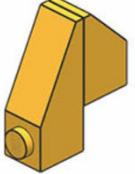


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**1**



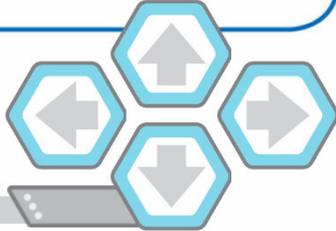
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20/24

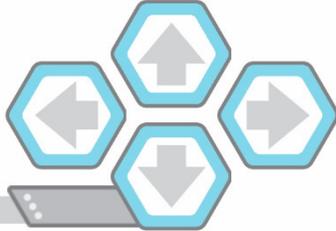
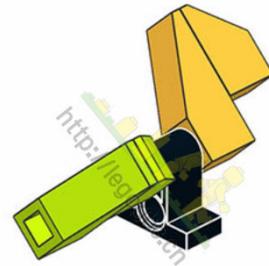
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114





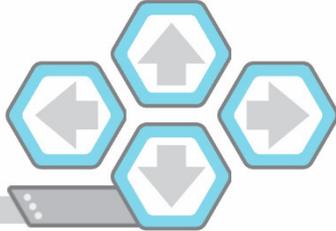
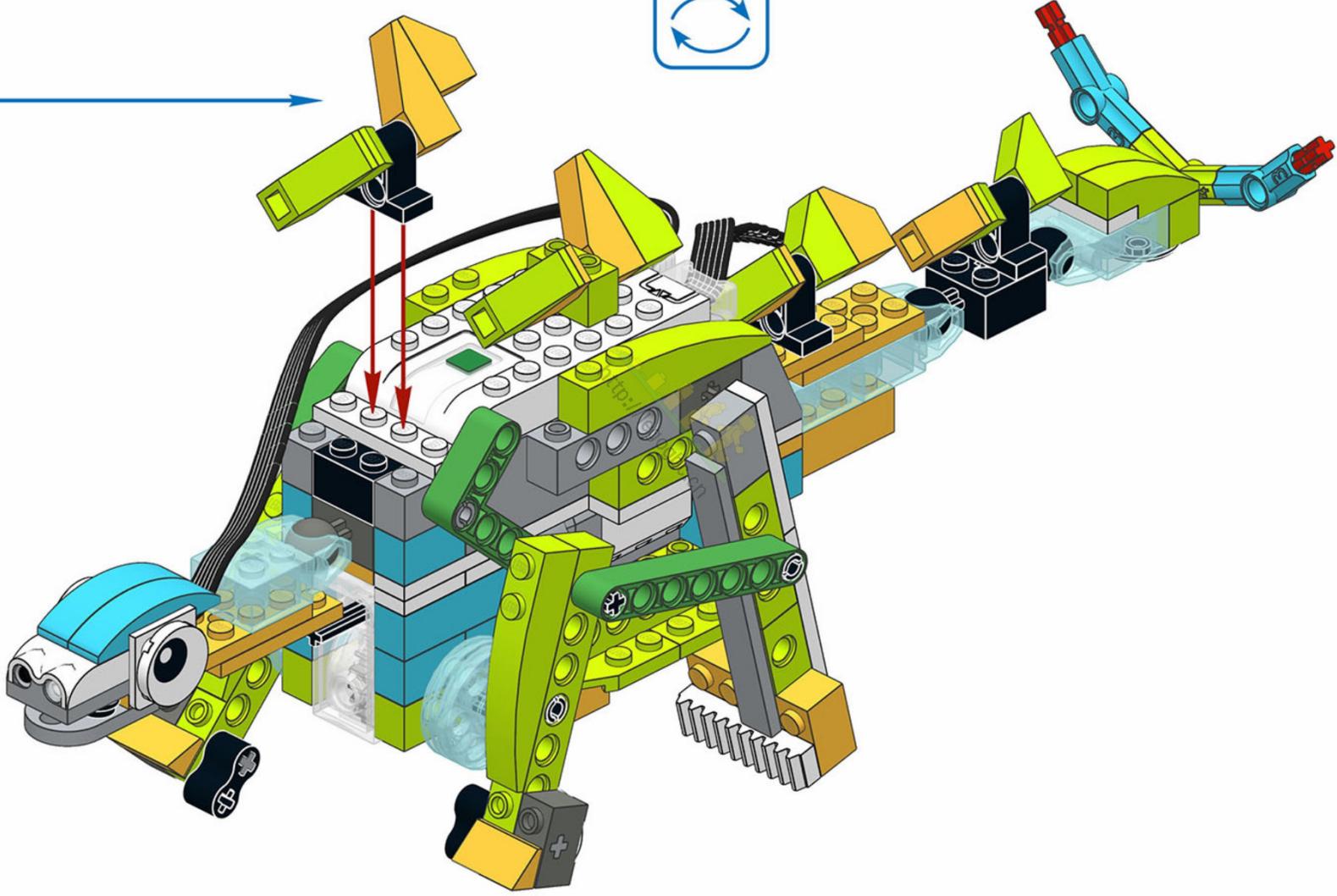
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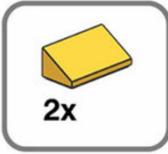
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84

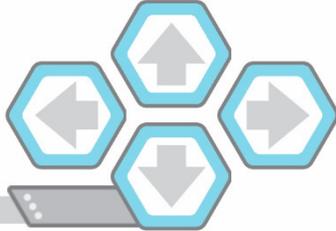
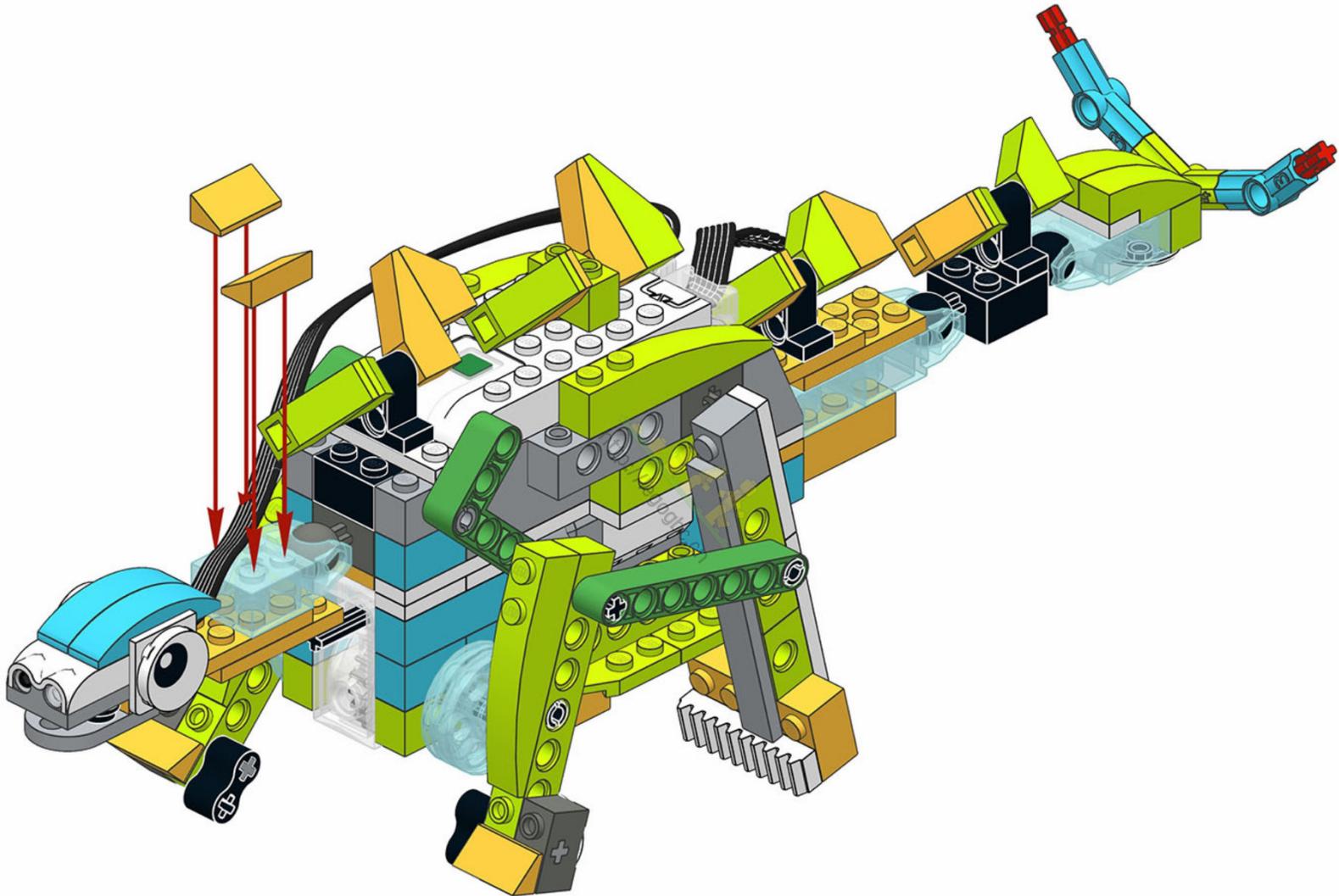




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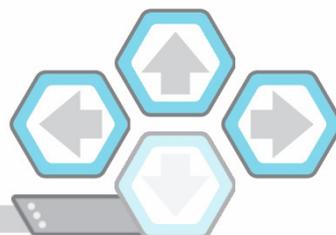
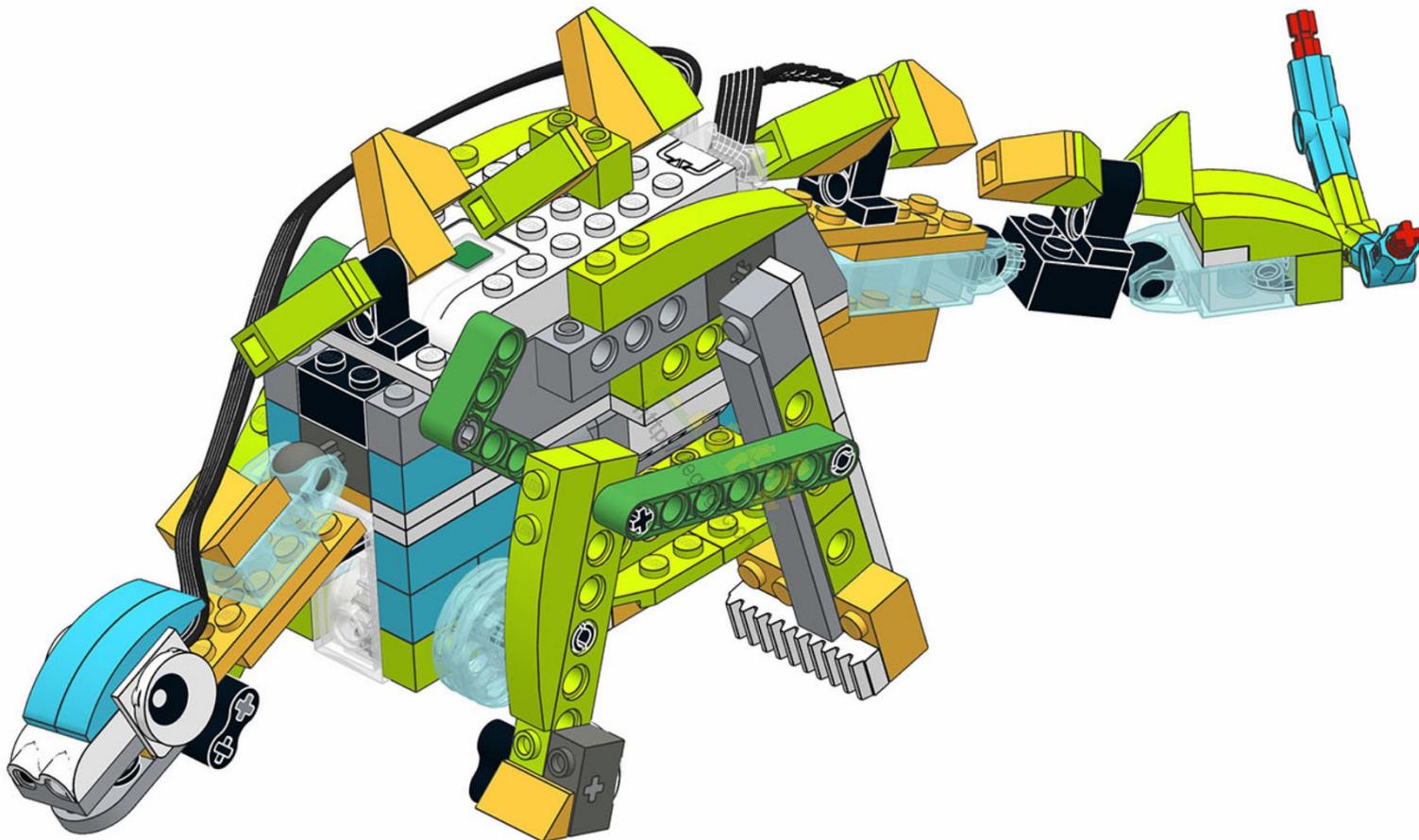
85





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86





# Check it out!



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Avoid any friction  
between the cables  
while robot is moving.



5



119



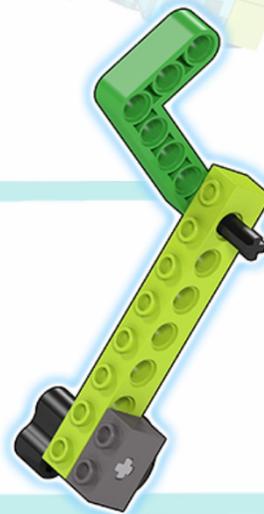
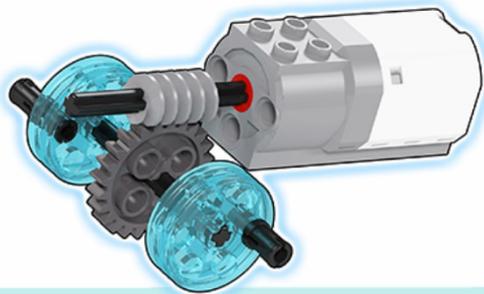
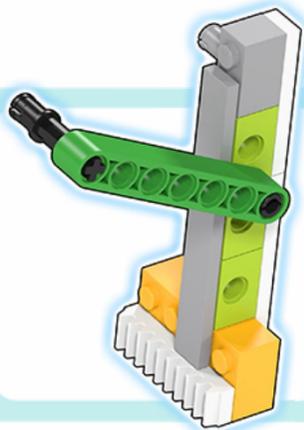


# Task



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Place parts of the robot on the right places



5



120



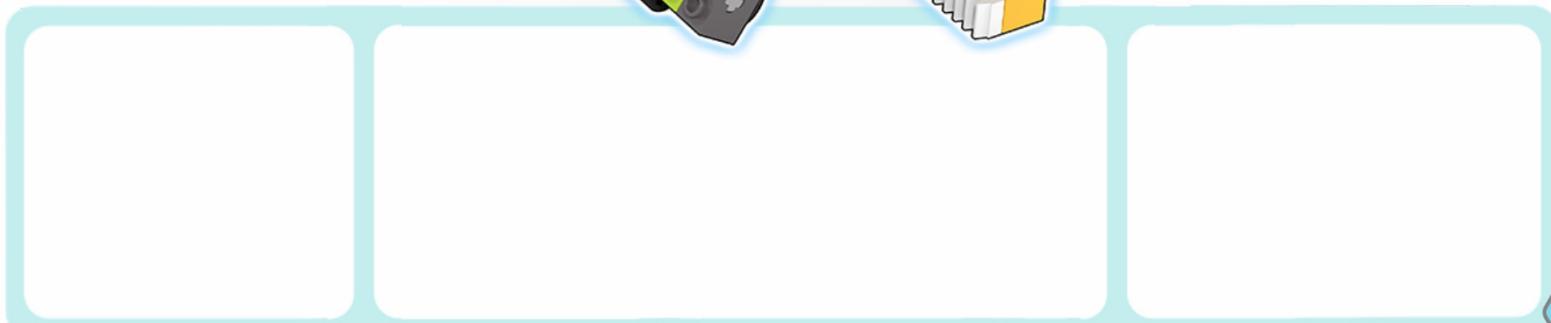
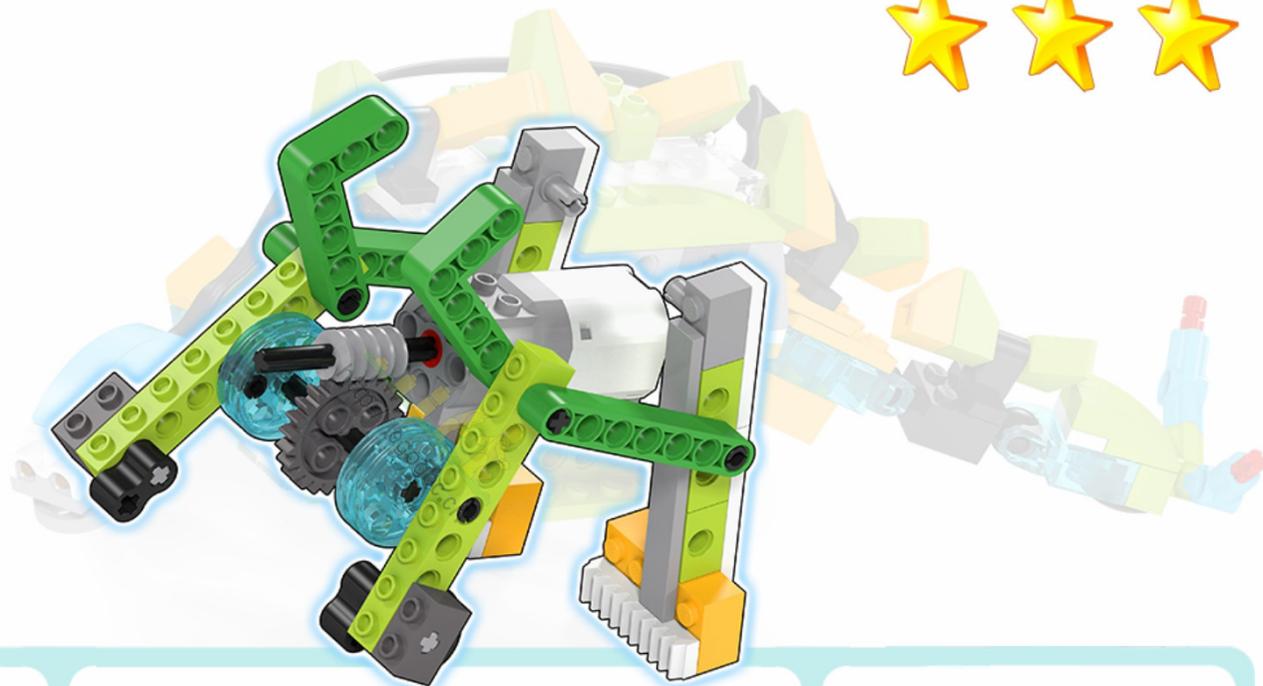


# Task



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Place parts of the robot on the right places



8



120





# Task 1



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Program the robot for 10 seconds to make sure that the mechanism works correctly.



robotiseit.com



8



121





## Task 2



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Program the robot movement for food. It should come to the proposed feed, if it is distanced:



robotiseit.com



8



122



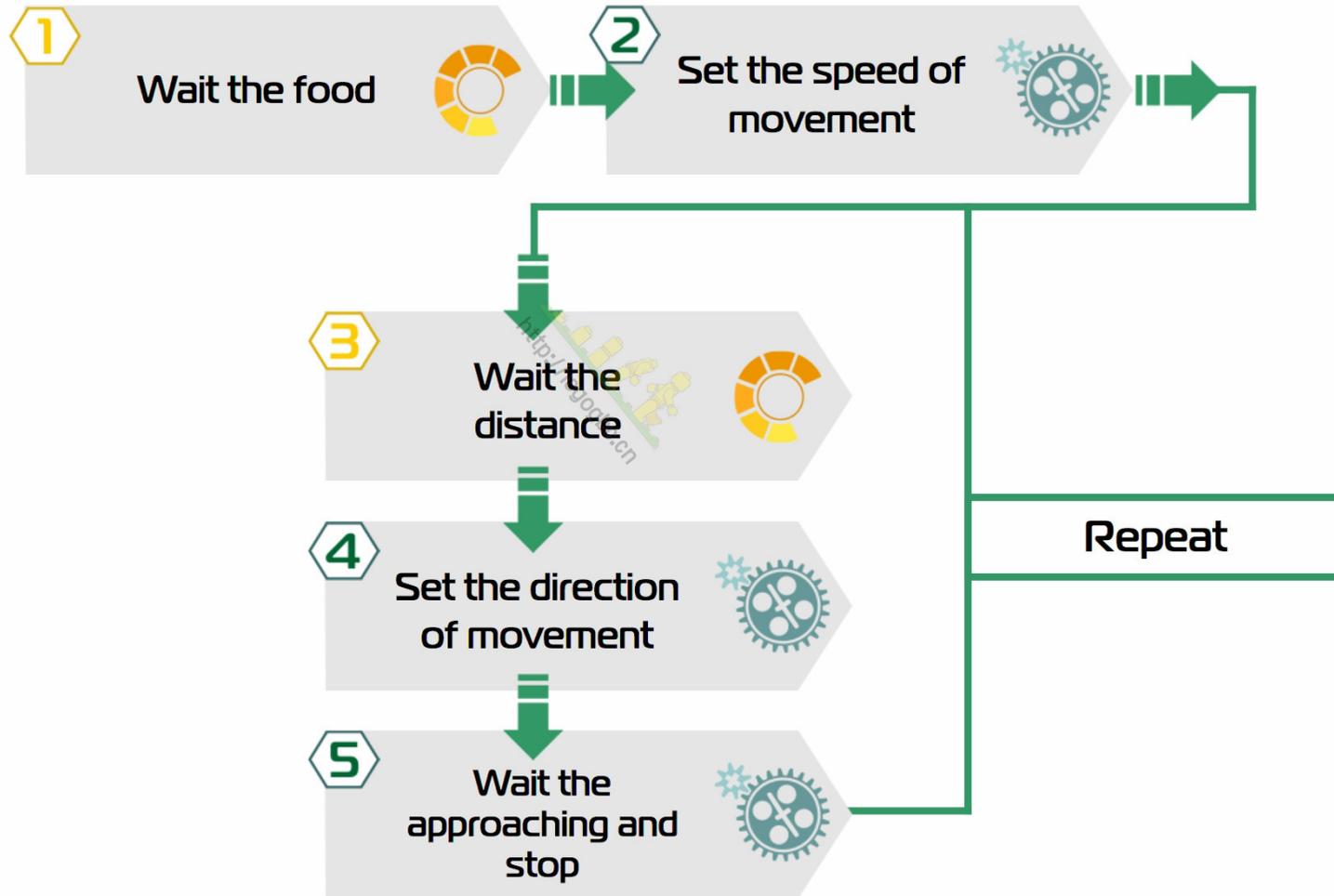


# Task 2. Algorithm



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The program is run by the following algorithm:





# Task 2. Program



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1

Wait the food



<http://legogbc.cn>

Step:



8



124





# Task 2. Program



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1

Wait the

2

Set the speed of  
movement



Step:

1

2

3

4

5



8



124





# Task 2. Program



关注公众号获取更多

1

Wait the

2

Set the speed  
motor

3

Wait the  
distance



Step:



8



124





# Task 2. Program



关注公众号获取更多

- 1 Wait the
- 2 Set the speed  
movement
- 3 Wait  
distance
- 4 Set the direction  
of movement 



Step:



8

124



# Task 2. Program



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- 1 Wait the
- 2 Set the sp  
mover
- 3
- 4 Wait distar
- 5 Set the dir  
of mover
- Wait the  
approaching and  
stop



Step:



8



124





# Task 3 \*



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Program the display of the distance that the robot "sees" the food through the color of the Smarthub:



robotiseit.com



8



125



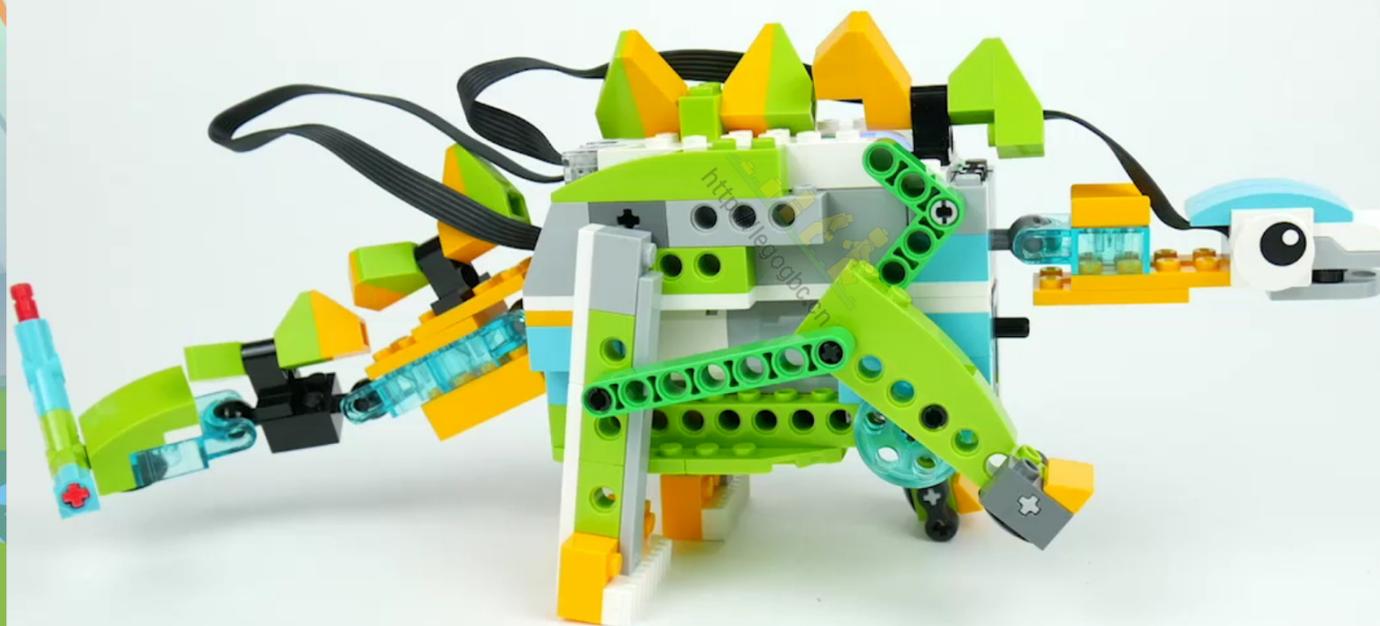


# Task 4



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Small Stegosaurus could be vulnerable to predators, so they had to react to their approach. Program the robot to escape from a predator:



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8



126





# Task 4. Algorithm



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The program is run by the following algorithm:



8



127





# Task 4. Program



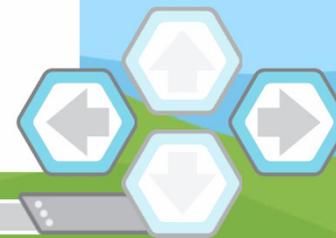
关注公众号获取更多

1

Wait a loud sound



Step:





# Task 4. Program



关注公众号获取更多

1

Wait a lou

2

Run the motor



Step:



8



128



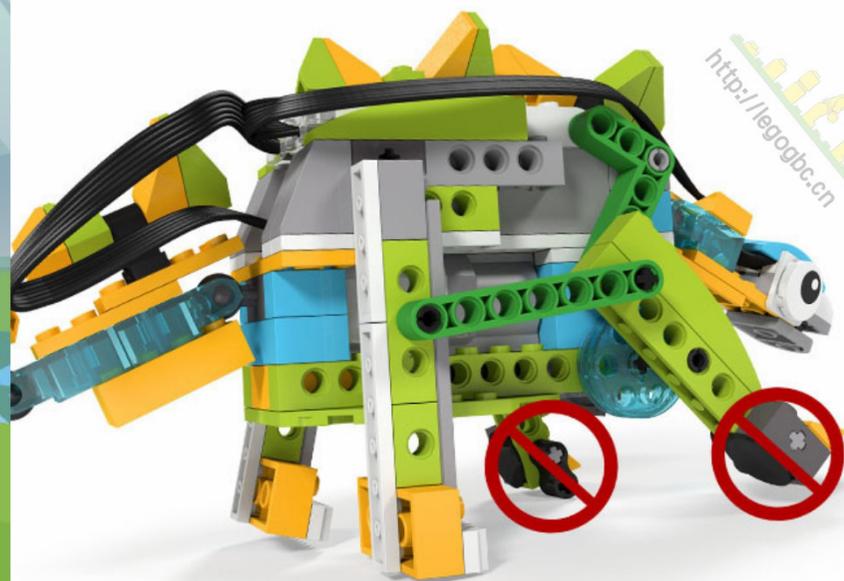


# Task 5



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Test the impact of the rubber parts on the robot adhesion with the surface. To do this, take two robots and remove rubber parts in one of them. After that, check who can push better.



8



129





# Discuss!



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**Why a robot, equipped with rubber parts, was able to push an opponent without rubber parts?**

8

130





# Question



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How could Stegososaurs use their spikes?



To hunt for prey

To protect against predators

For digging the soil

9

131





# Discuss!



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- ▶ What features does the Stegosaurus skeleton have?
- ▶ What did Stegosaurus eat?
- ▶ Why were the rubber details on the legs used in the robot?
- ▶ What is a crank and why is it needed?



9



132

