



Parasaurolophus



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Parasaurolophus



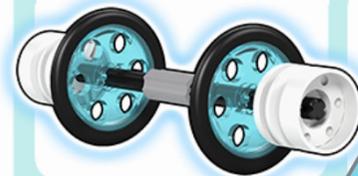
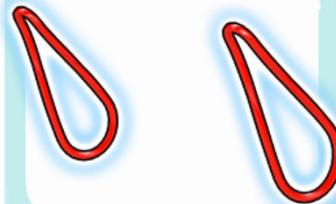
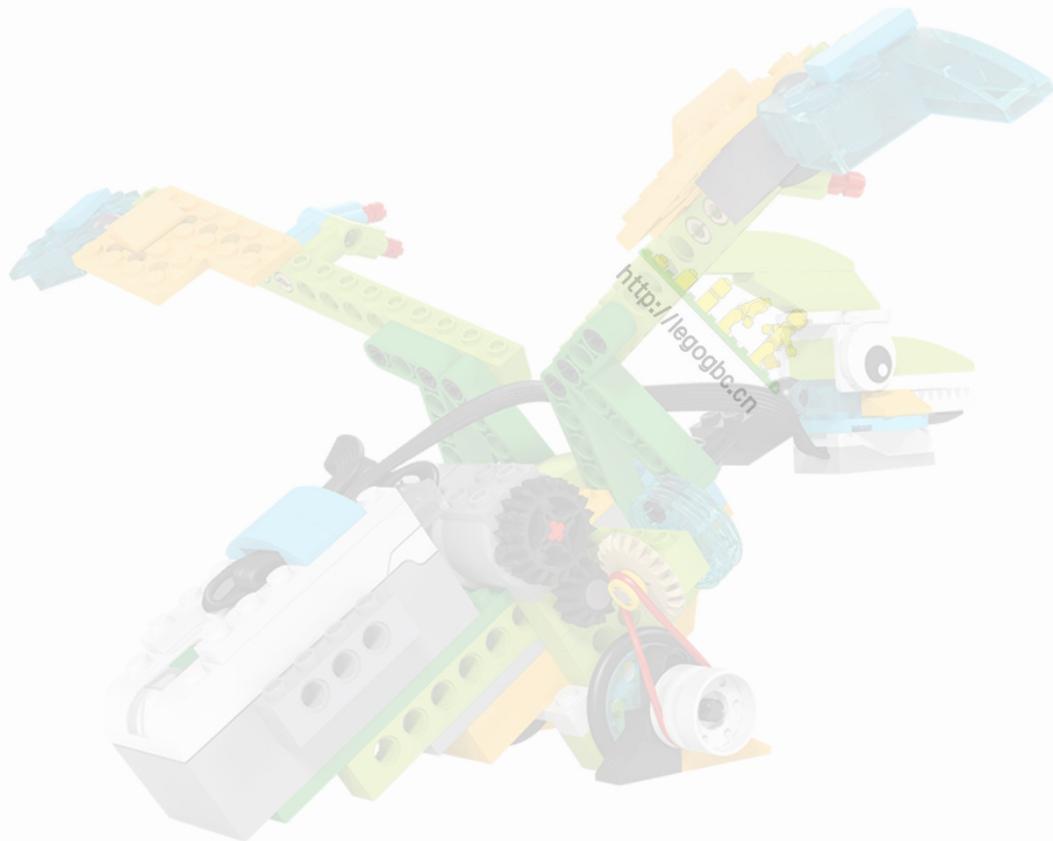


Let`s remind. Pteranodon



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Place parts of the robot on the right places



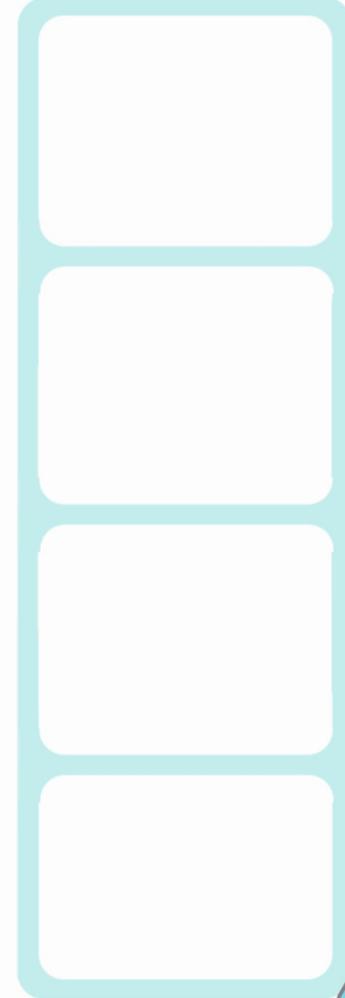
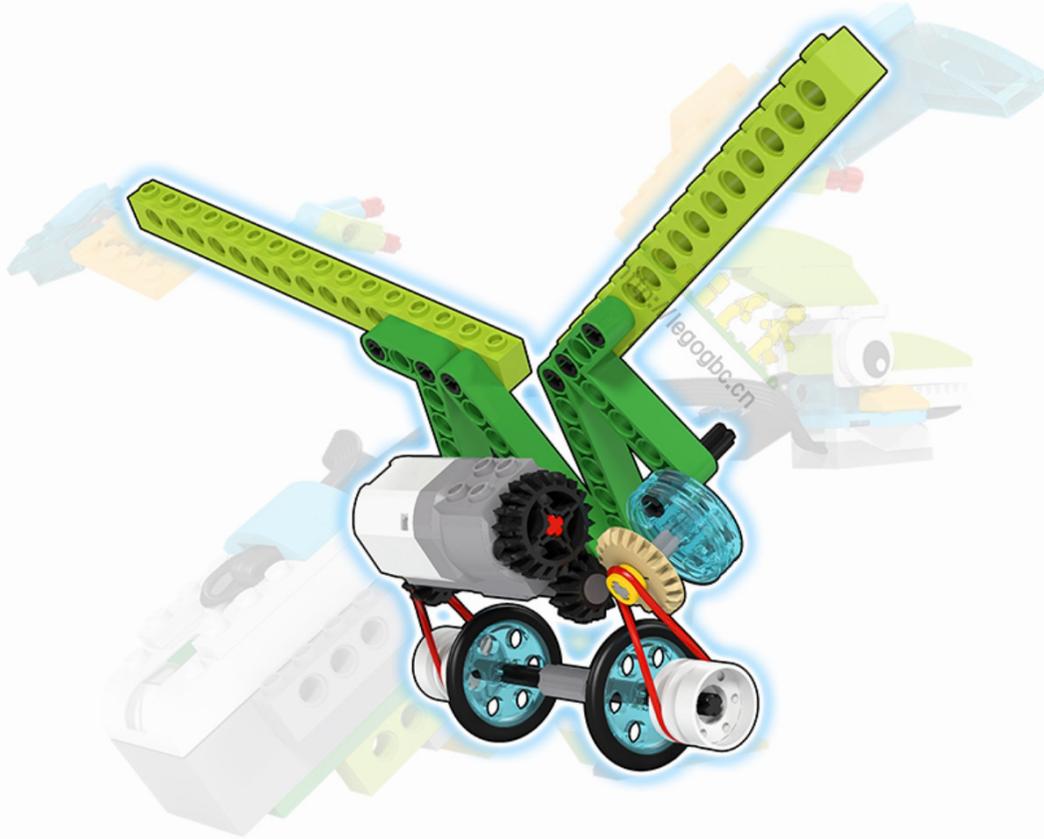


Let`s remind. Pteranodon



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Place parts of the robot on the right places



4



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Let`s remind. Pteranodon



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Who became the descendant of Pterosaurs?



Birds

Insects

None of the
modern creatures

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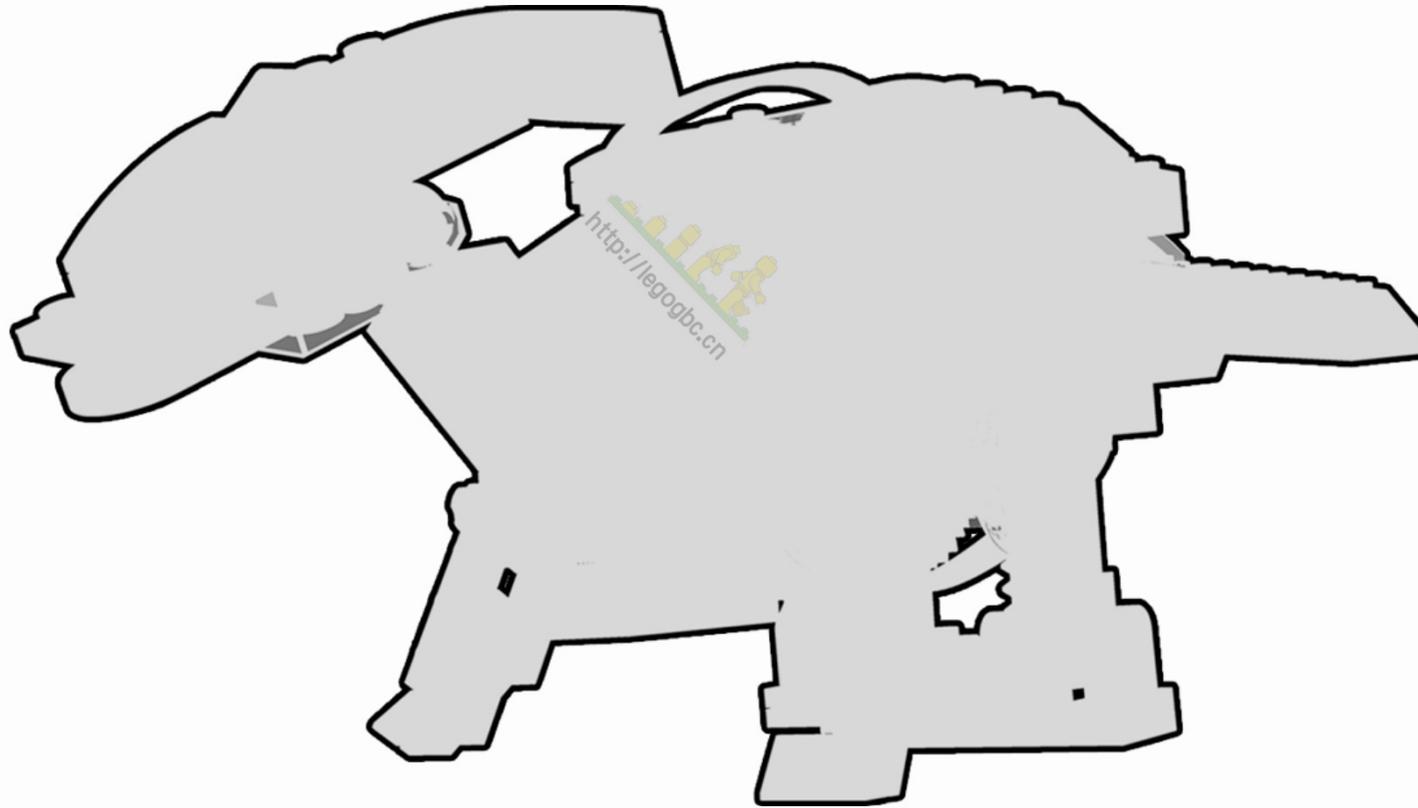


Dino Park



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





Dino Park



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In the Mesozoic Cretaceous period were flowering plants and insects that pollinated them. Plants with more succulent leaves gave the opportunity to develop large groups of herbivorous dinosaurs and predators that hunted them.



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Let`s remind



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<http://teggobc.cn>

Which five groups do dinosaurs divide into the structure of the skeleton?

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8





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

DINOSAURS

STEGOSAURUS



ORNITHOPODS



CERATOPS





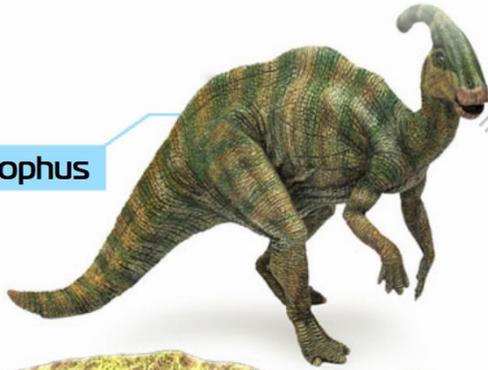
Parasaurolophus



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Parasaurolophus belongs to the Hadrosaurus, or duck-like dinosaurs. These are representatives of the Ornithopods, one of the main consumers of vegetable food. Recent findings in the nests of these dinosaurs say that they not only lived in large colonies, but also worried about offspring.

Parasaurolophus



<http://legogbc.cn>

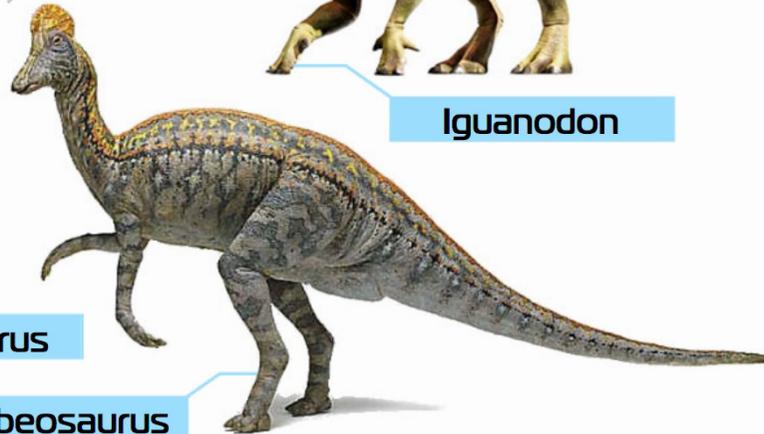
Iguanodon



Hadrosaurus



Lambeosaurus



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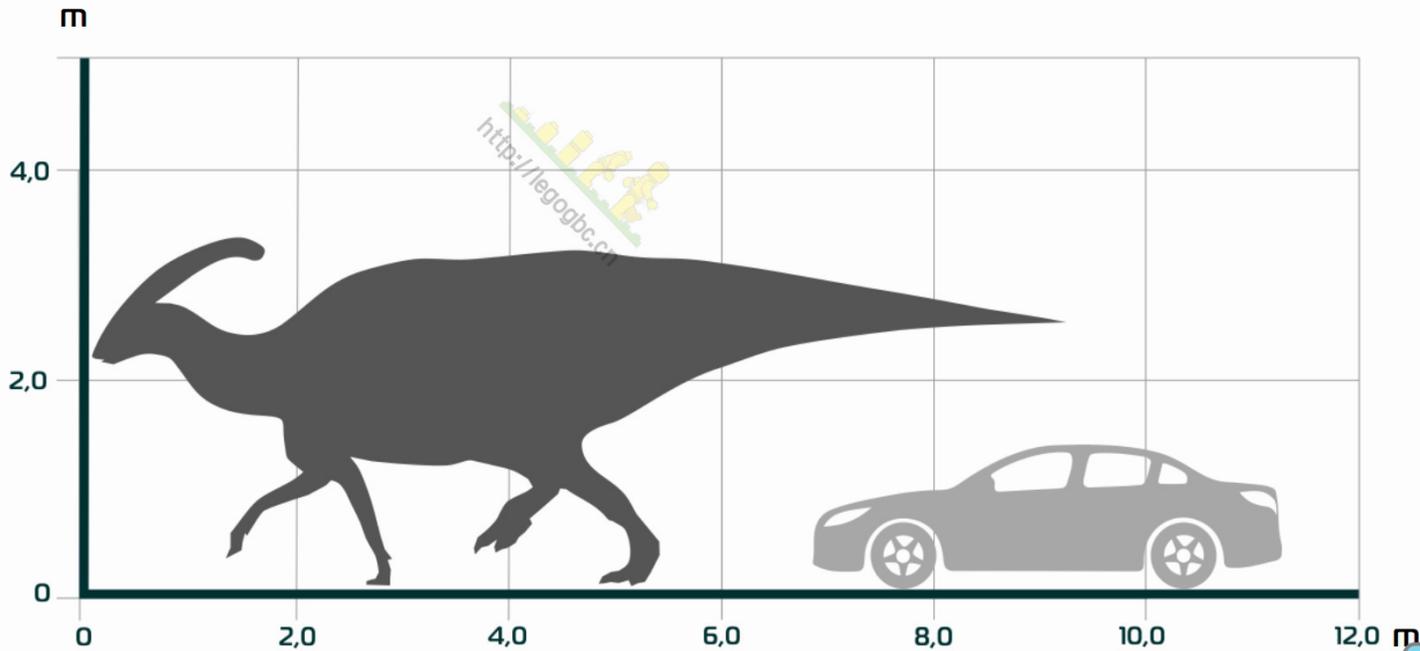


Parasaurolophus



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These were massive animals up to 9 meters long. Most likely, they moved on four legs, but could stand only on the rear legs.



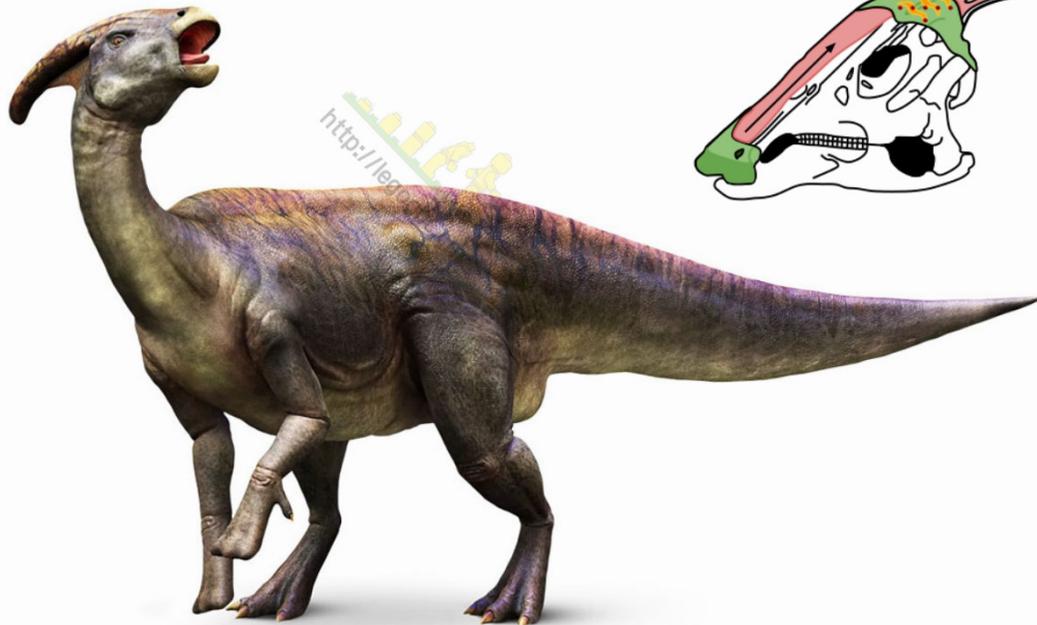


Parasaurolophus



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This representative of the Ornithopods had a long crest on its head. It is believed that with its help, the dinosaur could create vowels to communicate with other dinosaurs.



<http://lego.com>



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Parasaurolophus



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Carnivorous Parasaurolophus had to take care that both they and their youth would not become predators' food. The life in large colonies helped them to survive and care about dinosaur that had just hatched.



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Parasaurolophus



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For chewing the plant food, these duck-like dinosaurs had in the back of the jaw many teeth. And in order to look for food was more convenient, the rear legs were twice longer than the front ones.



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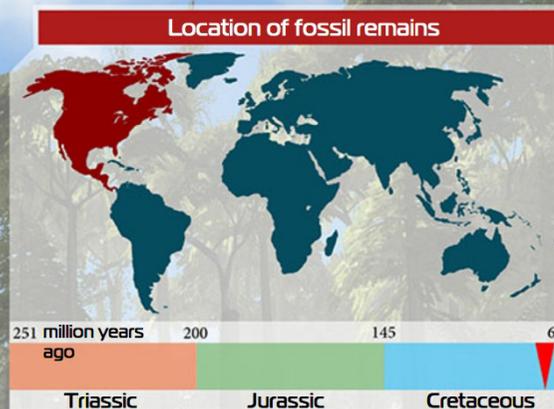


Parasaurolophus



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Excavations in North America show that the herd life of these herbivores, and the care about the offspring, helped to confront the Allosaurus, the remains of which are found nearby



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Dino Park



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Next, who we will create for Dinopark, will be *Parasaurolophus*. Scientists believe that the crest on its head was the first trombone in history.



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TASK



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Task

- create a robot for the exposition of the Cretaceous period by the Mesozoic



Requirements

- should be *Parasaurolophus*, walk on four legs and have a characteristic shape of the head
- must present the Ornithopods



Parasaurolophus appearance



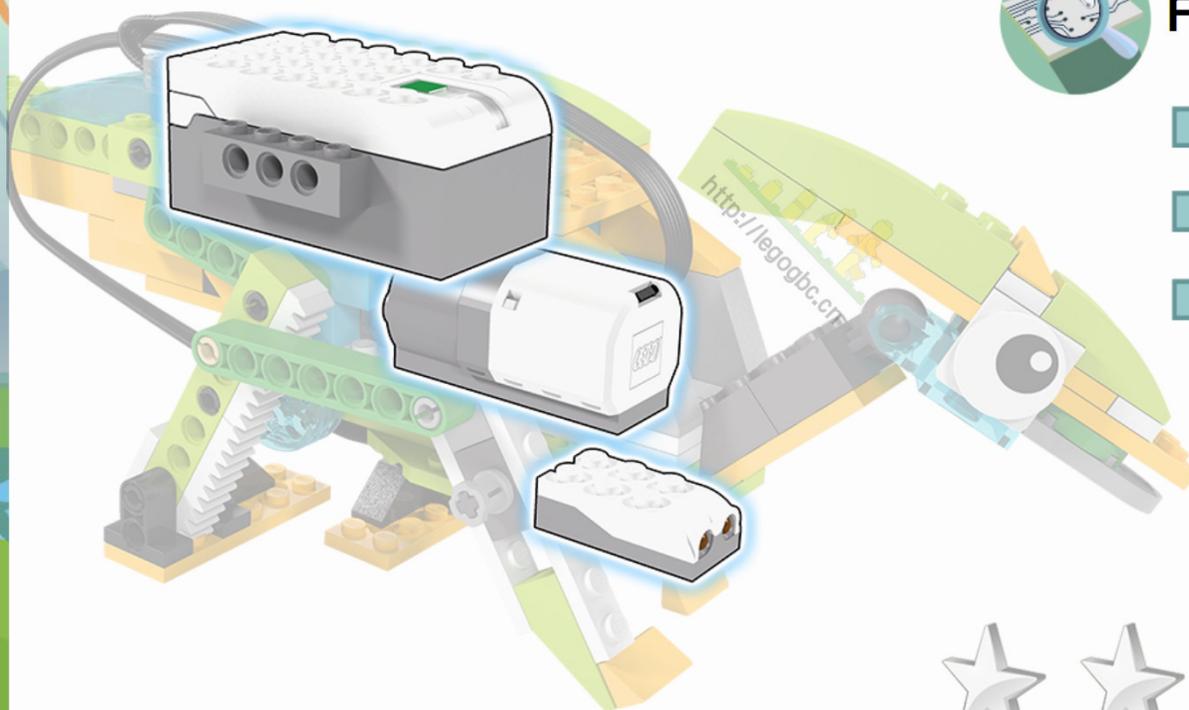


Design features



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Parasaurolophus feature that movement from the motor transmit to the rear leg of the robot, and than from them - on the front. The motion sensor is motionless placed to the robot trunk.



Find:

- ▶ smarthub
- ▶ motor
- ▶ motion sensor



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Design features



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Like the real dinosaurs of this species, the rear legs of the robot play a major role in stepping. Compare the movement of the front and rear legs of the robot.



robotiseit.com



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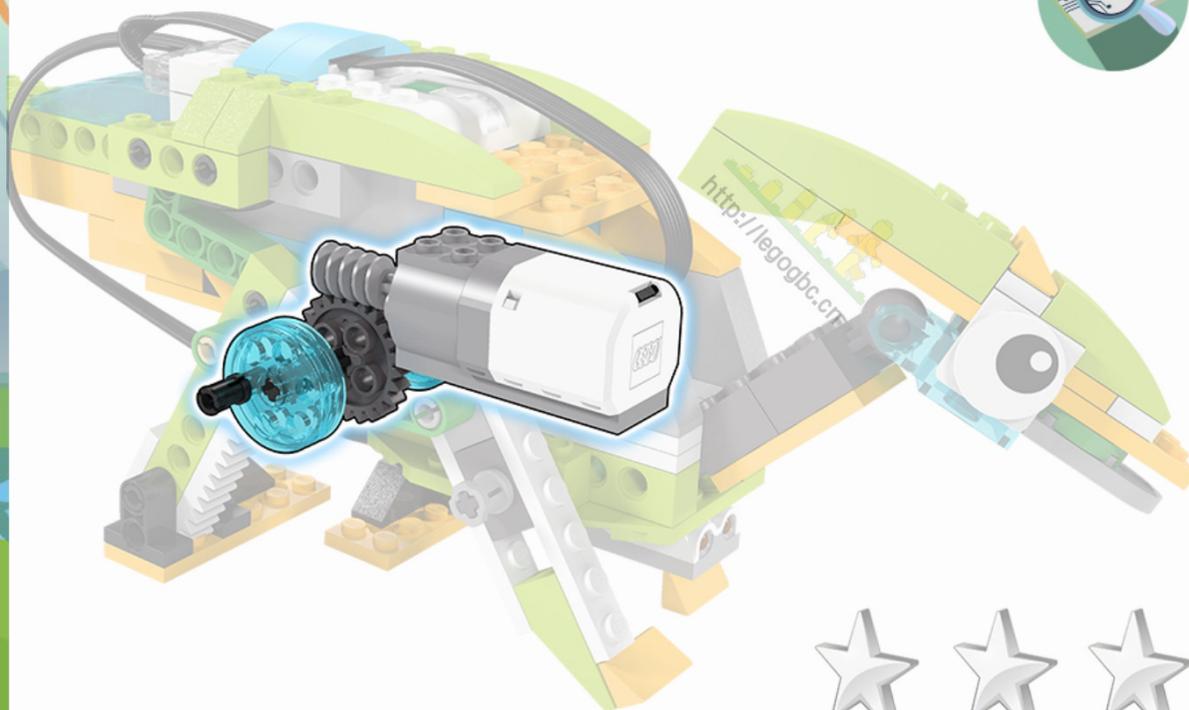


Design features



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The rotation from the motor to the cranks is transmitted through a worm gear, so keep your robot very carefully!



Find:

- ▶ motor
- ▶ worm gear
- ▶ cranks



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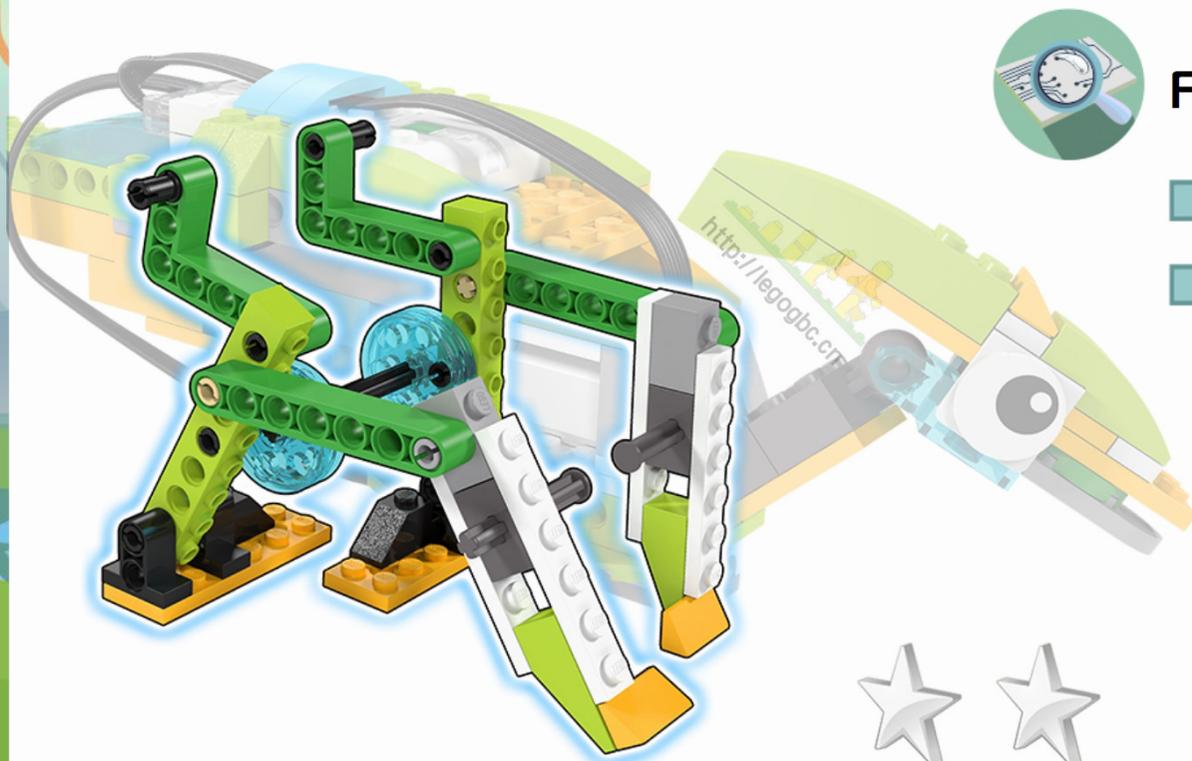


Design features



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The rear legs of the robot have very wide feet. Due to this, the robot can stand on its rear legs and even begin to move from this position.



Find:

-  rear leg
-  front leg



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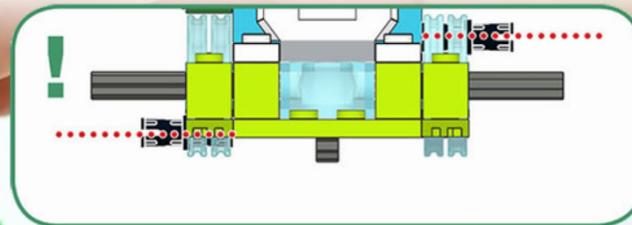
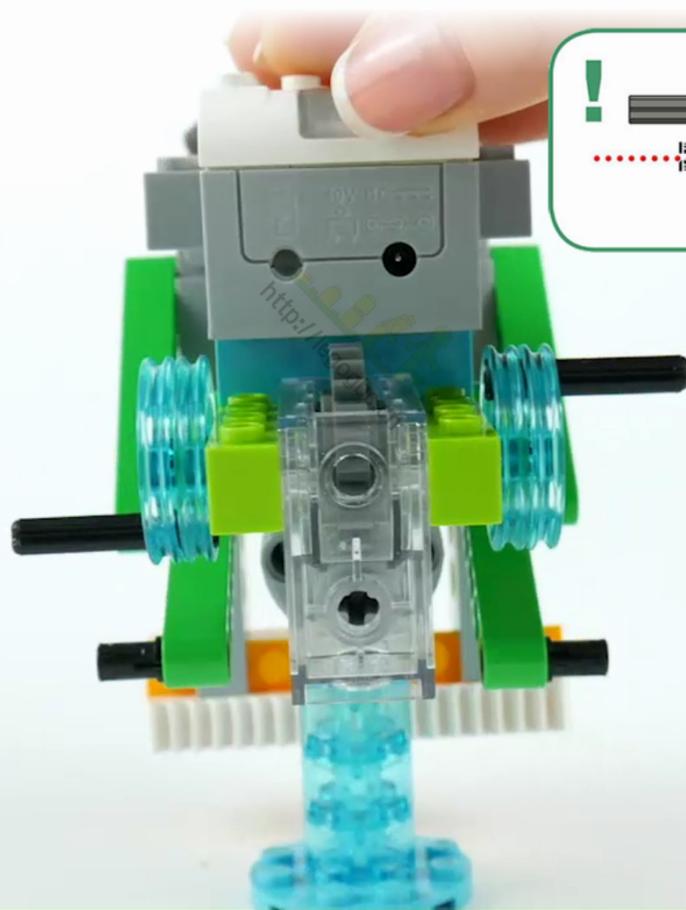


Pay attention!



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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:



robobits.com



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Build the robot!



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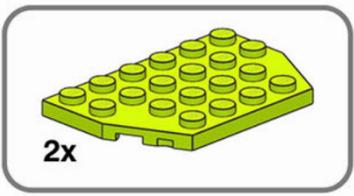


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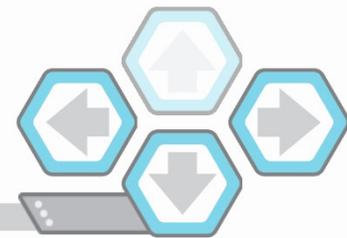
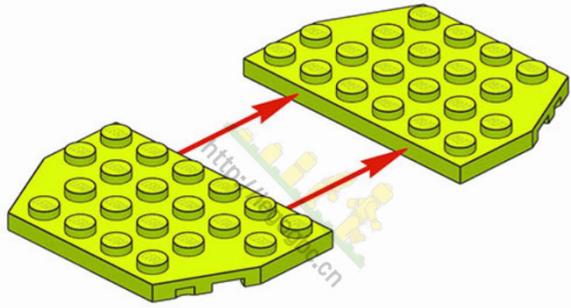




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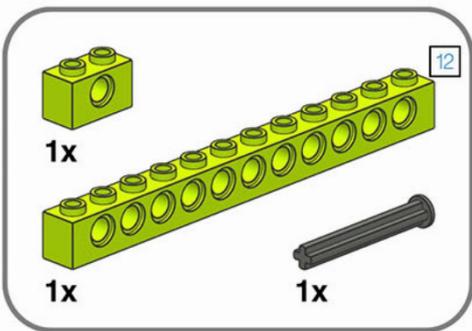


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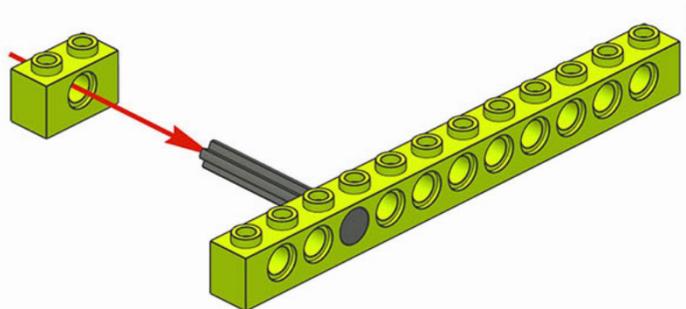




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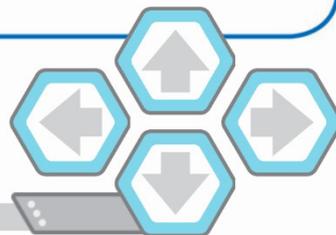
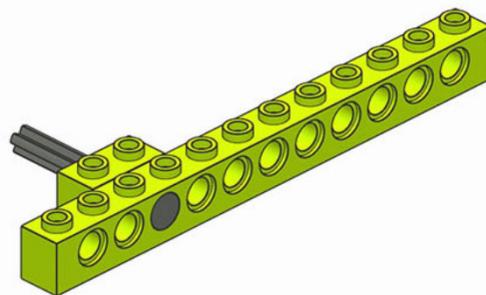


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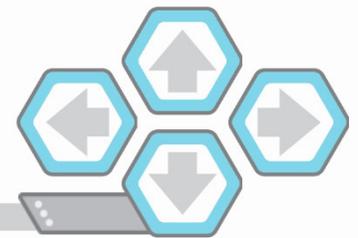
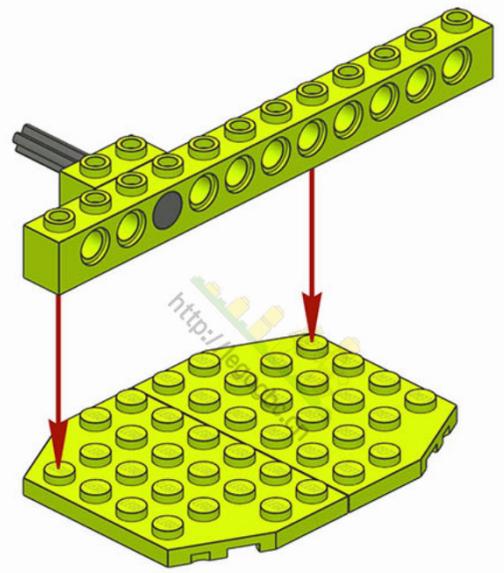
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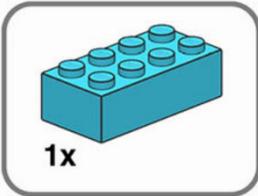
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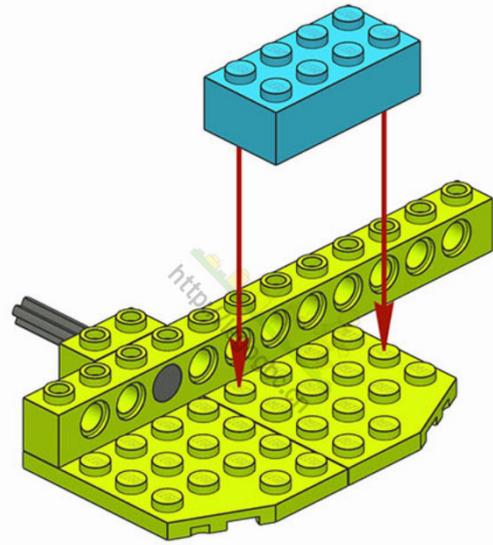


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1x

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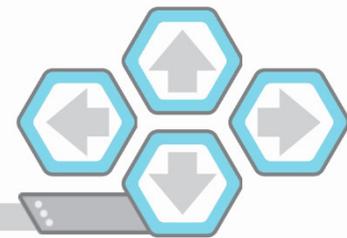
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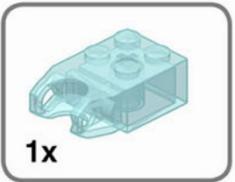


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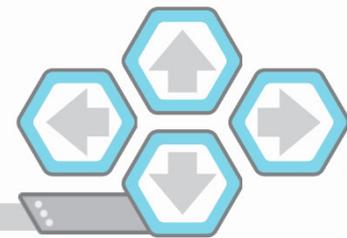
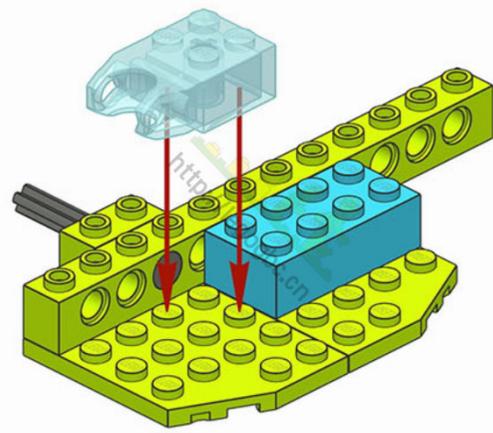




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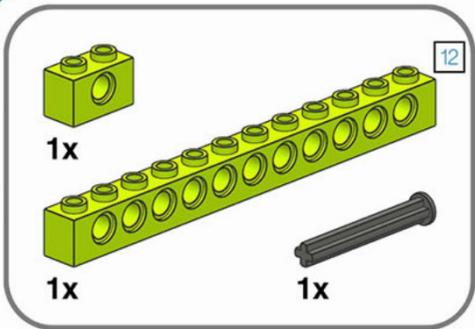


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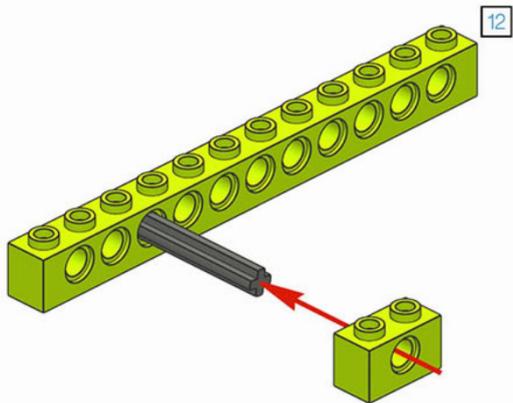




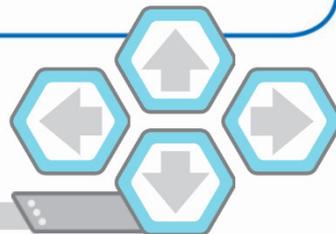
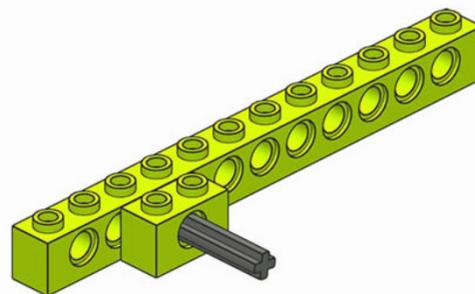
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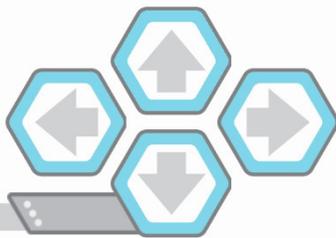
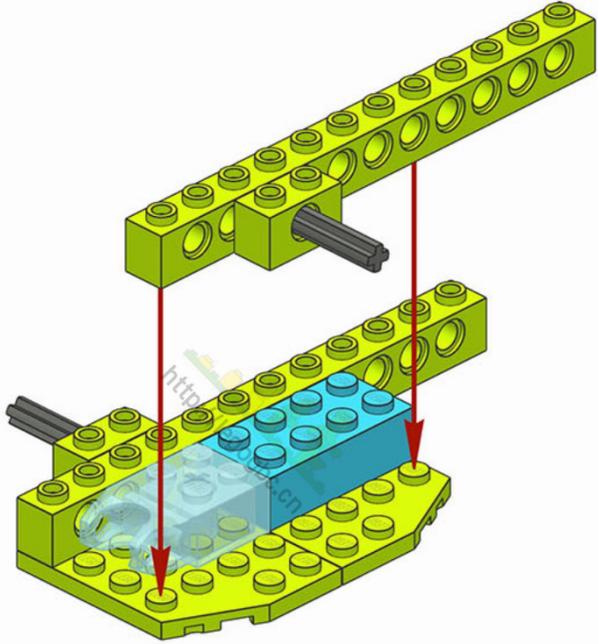
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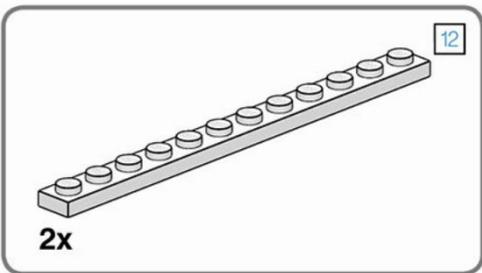
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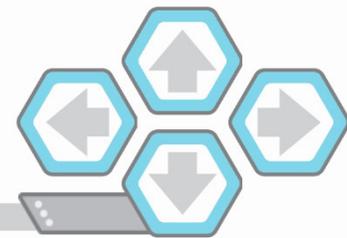
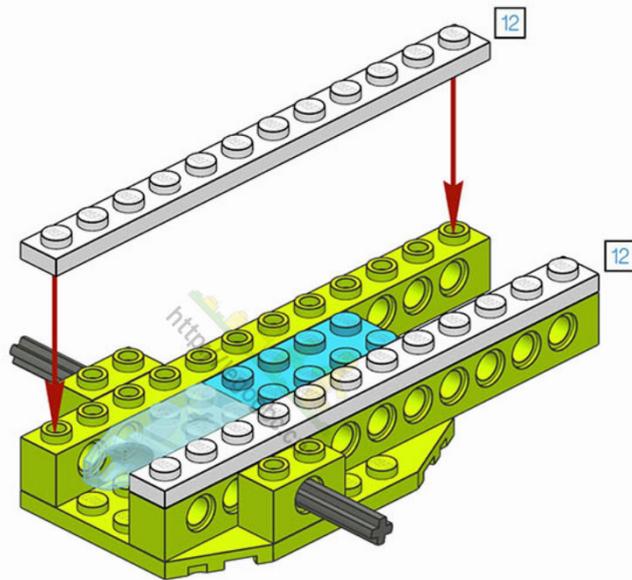




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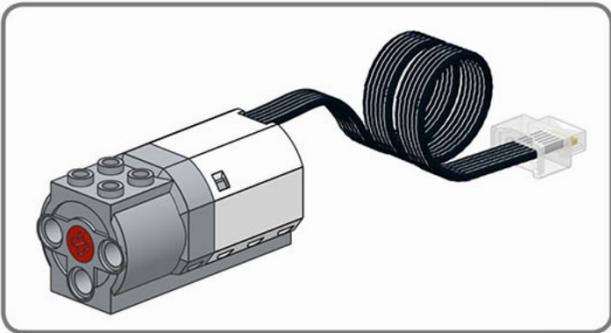


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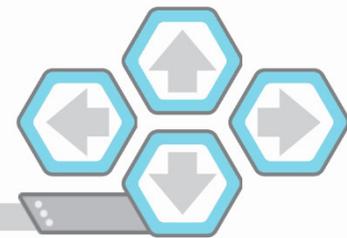
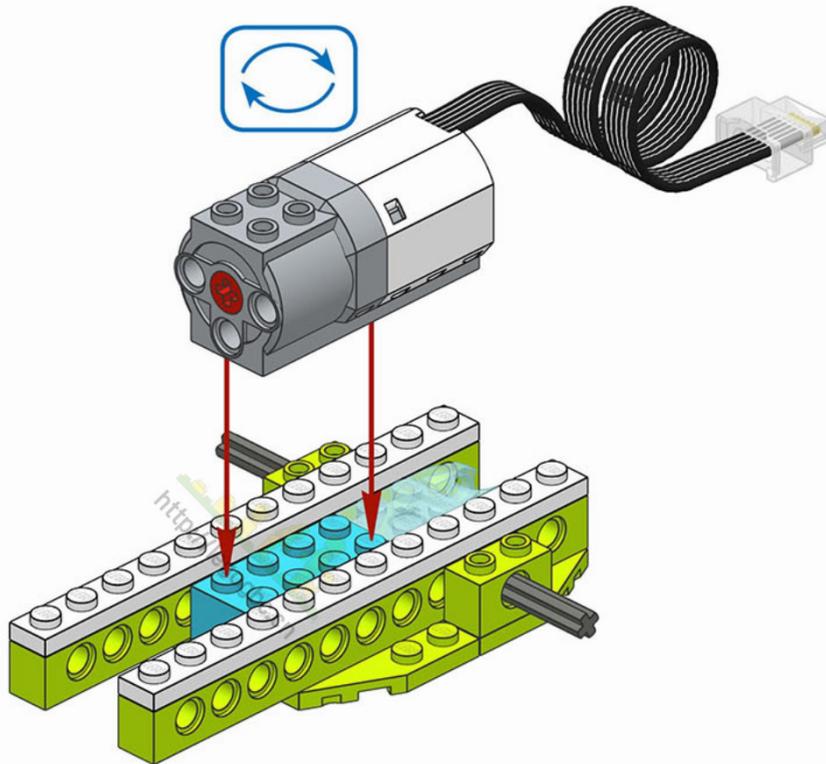




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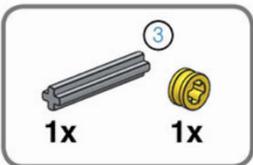


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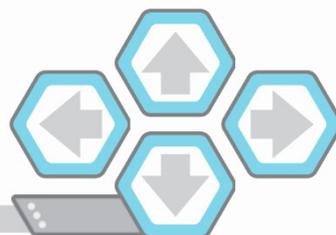
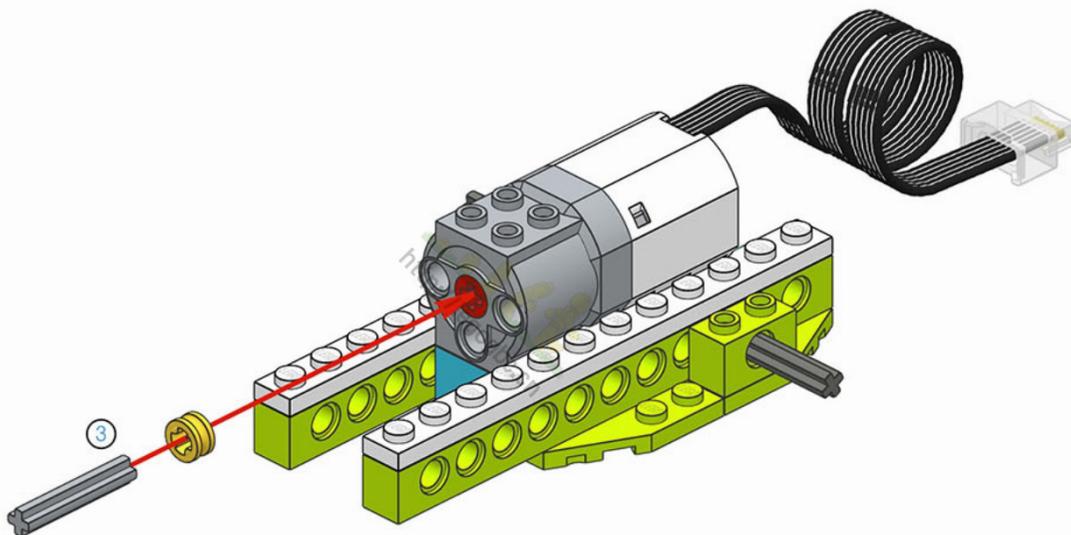




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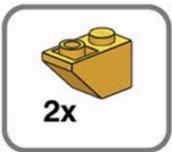


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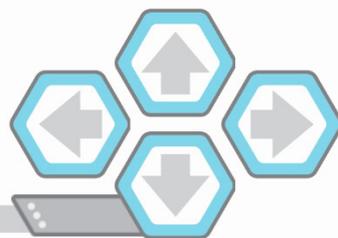
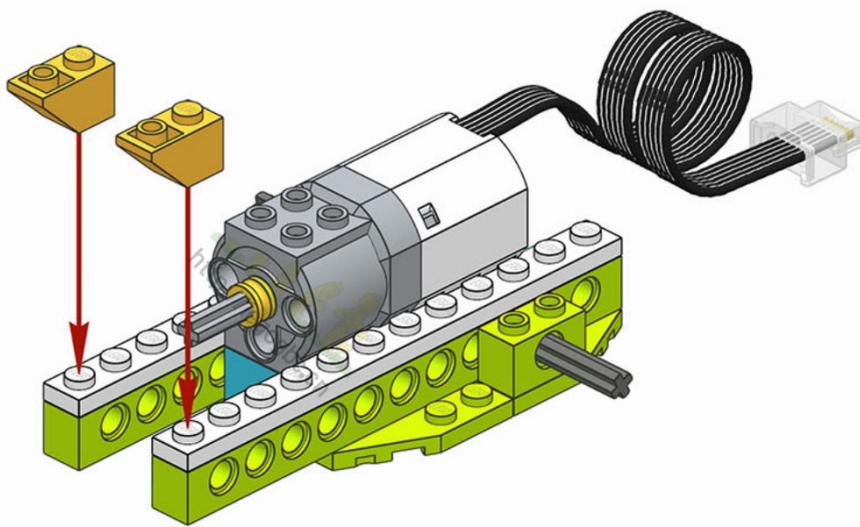


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2x

11



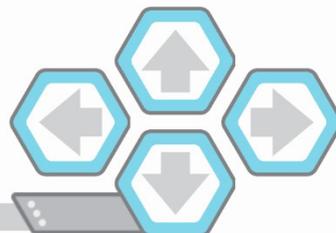
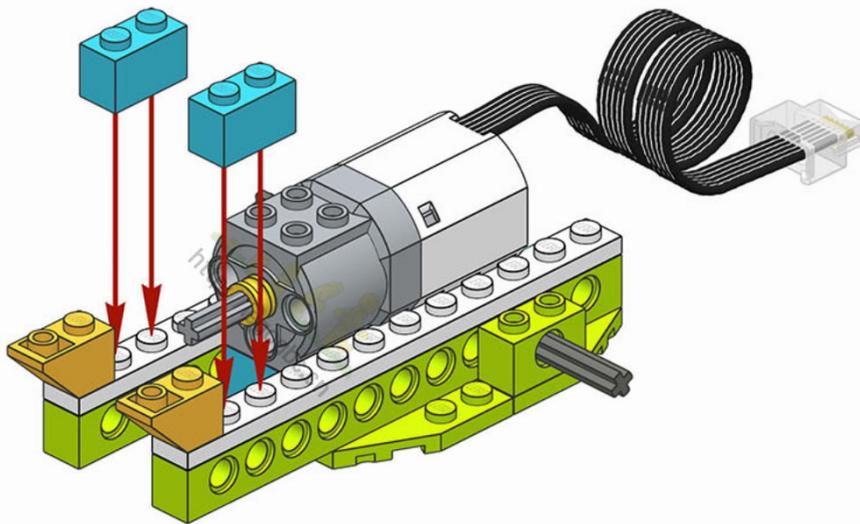


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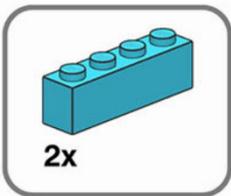
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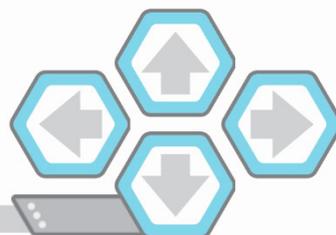
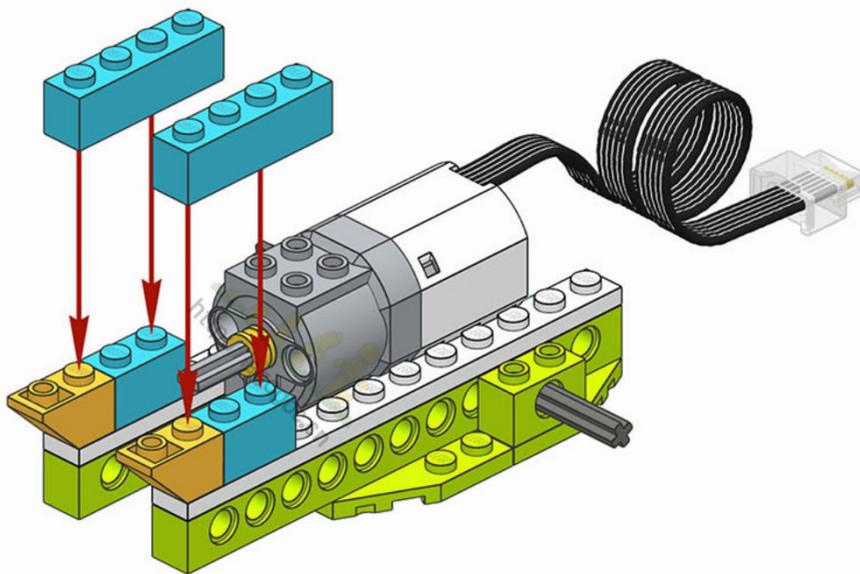




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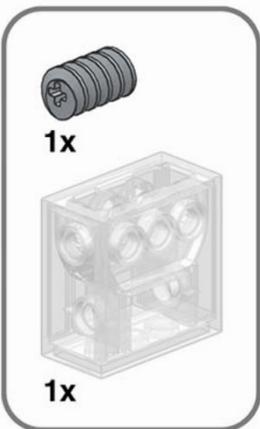


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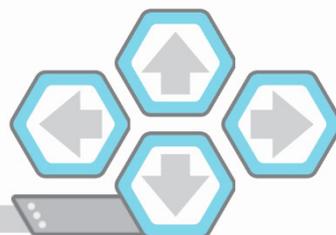
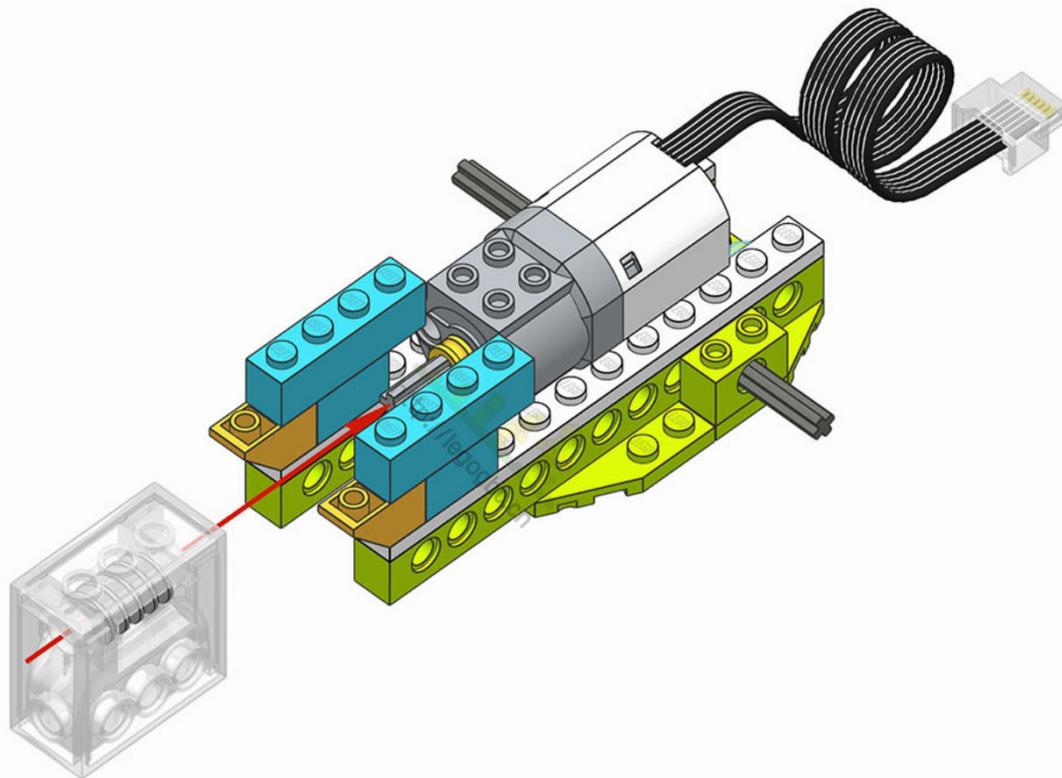




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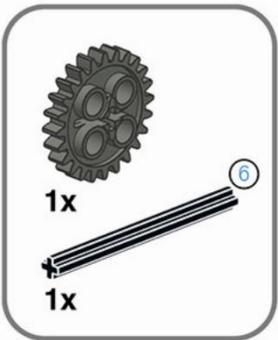


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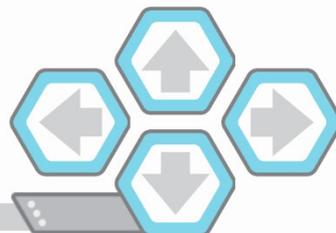
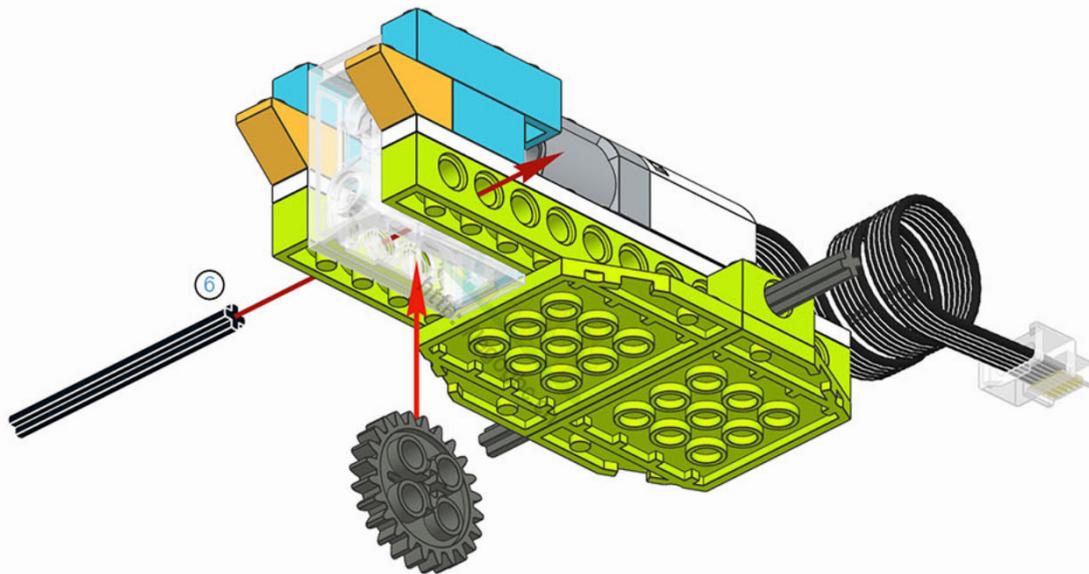




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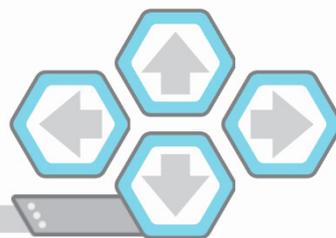
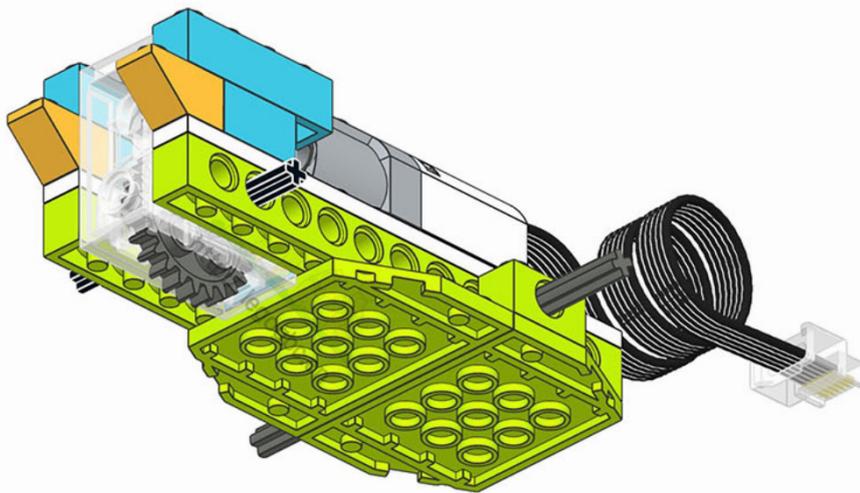
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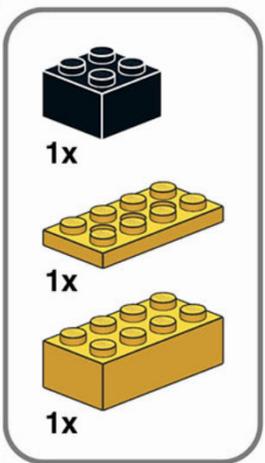
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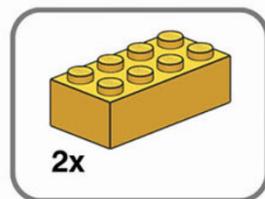
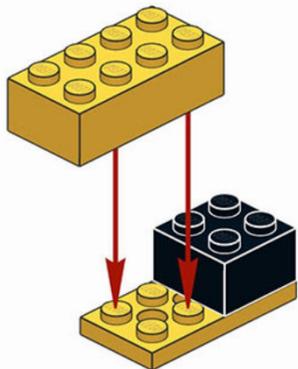




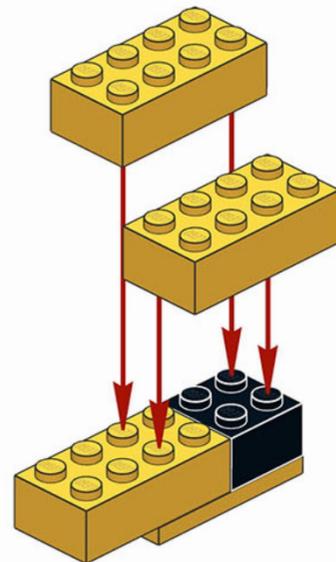
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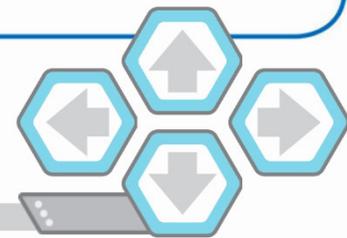
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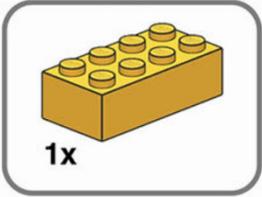


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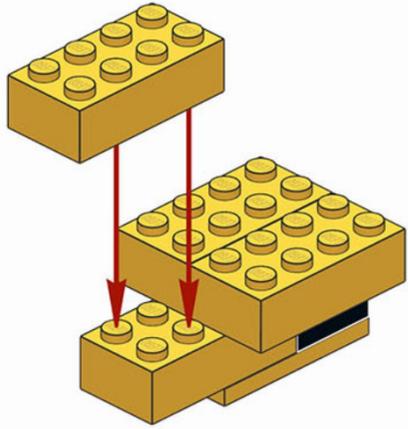




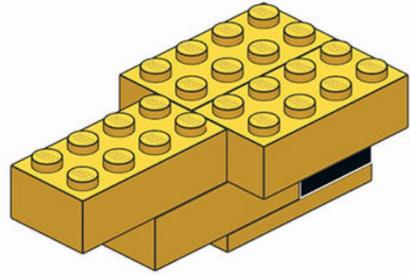
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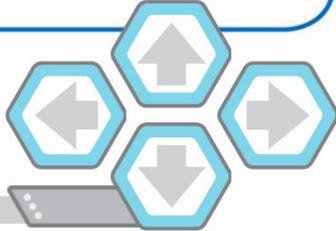


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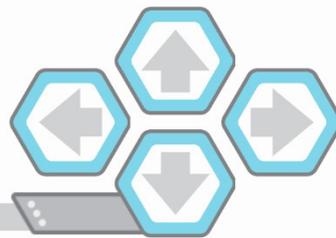
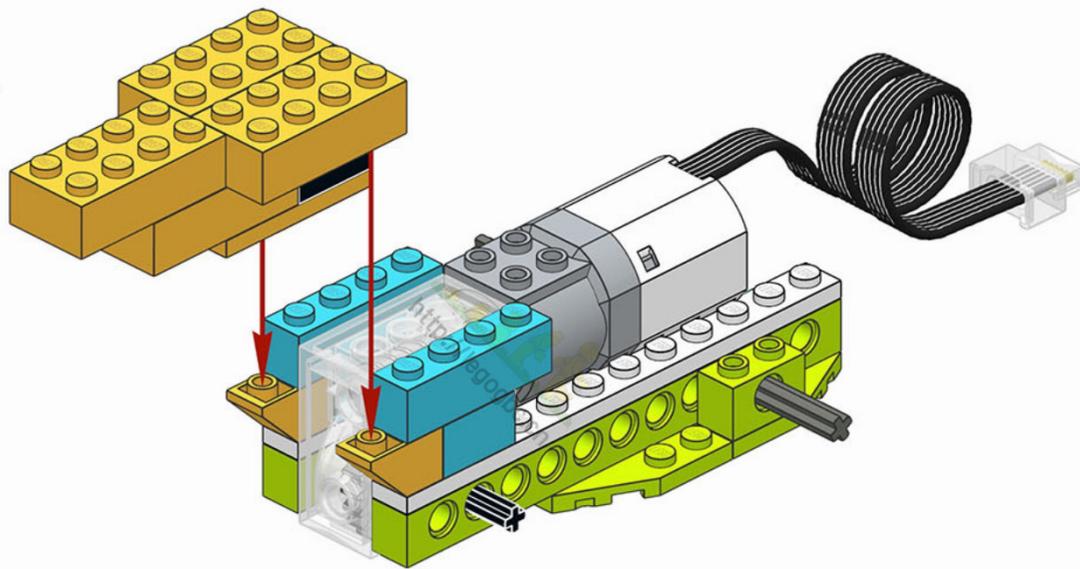
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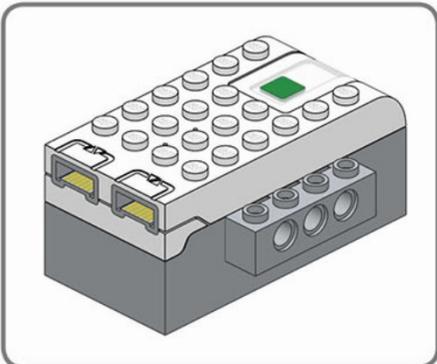
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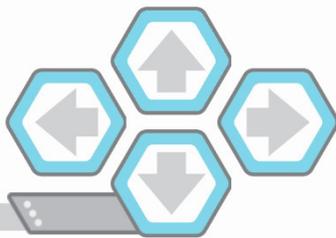
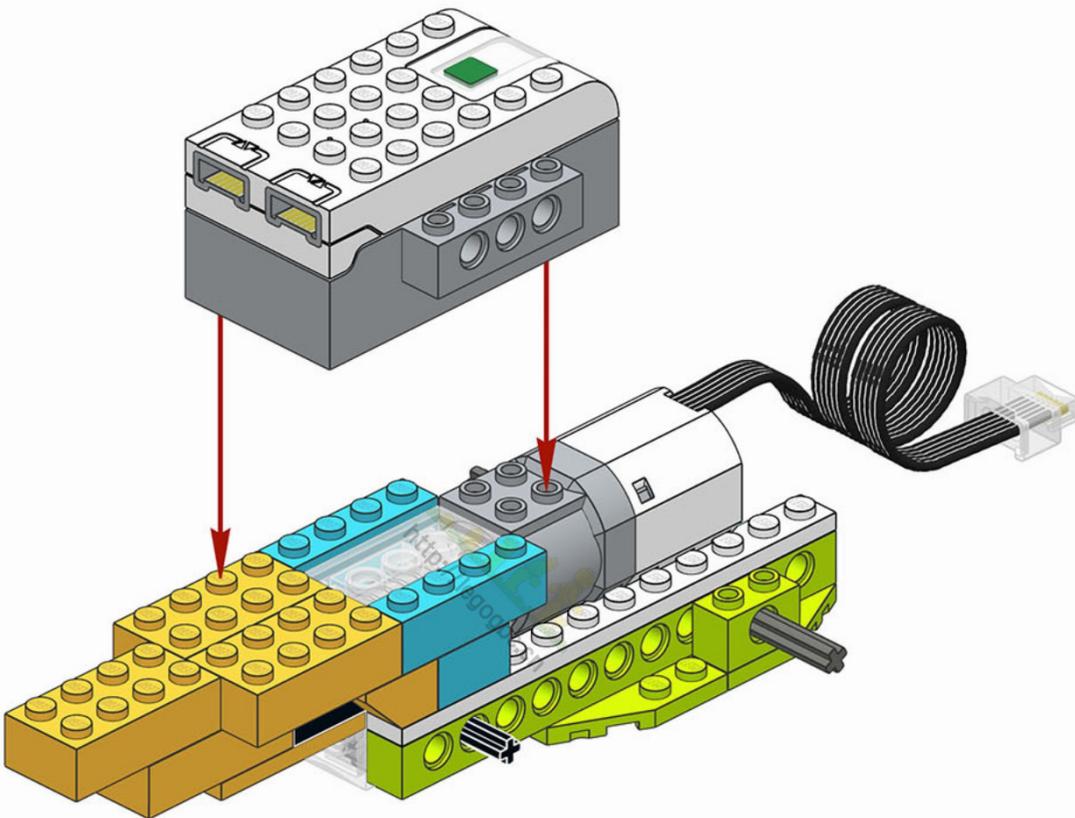




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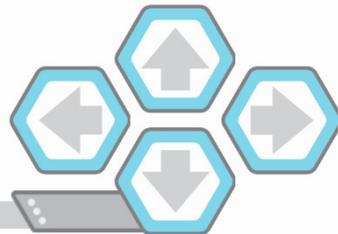
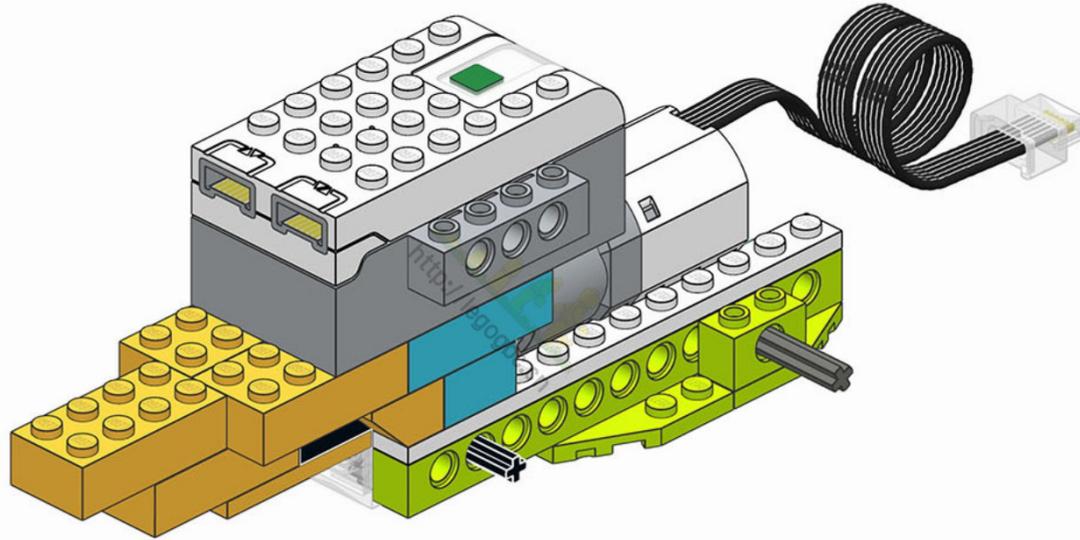
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21





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1

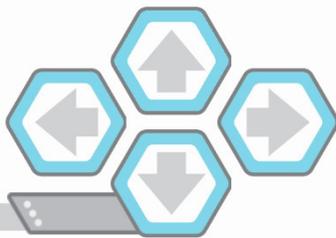
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<http://legogbc.cn>

22/74

5

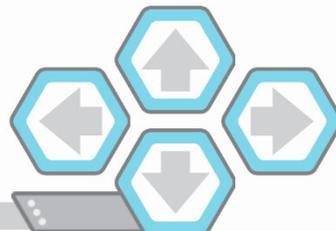
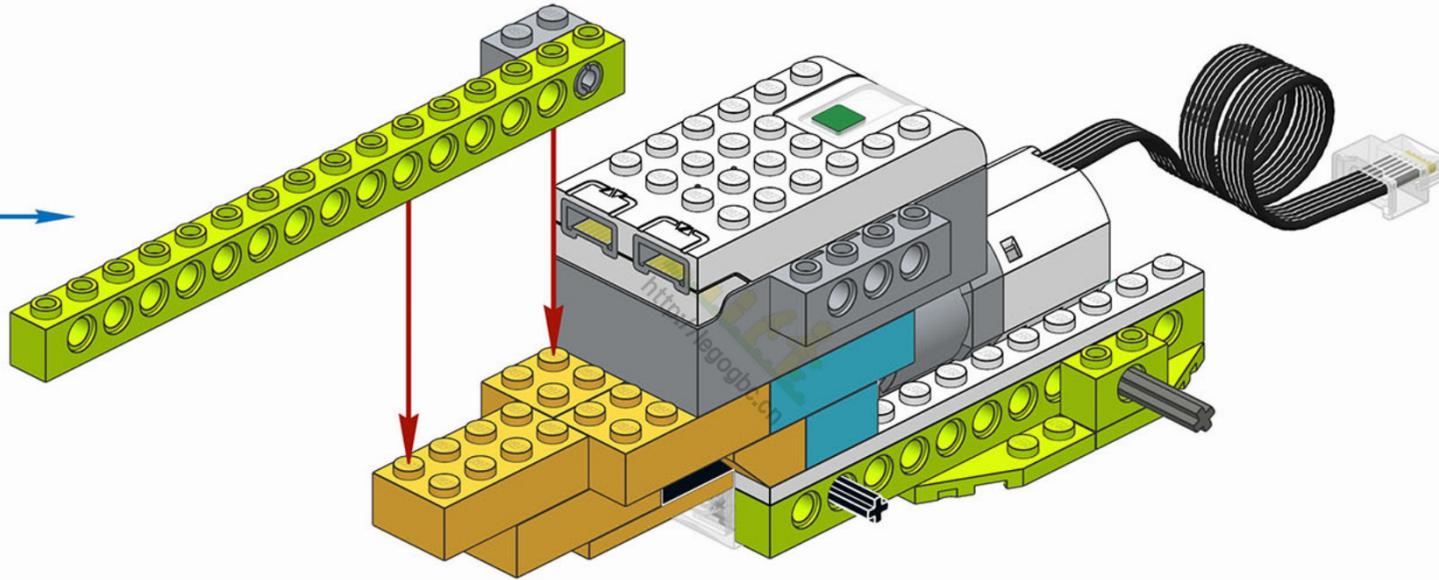
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23



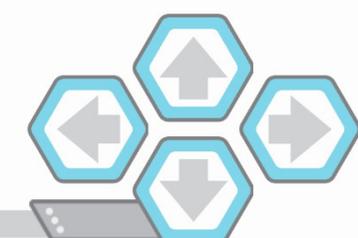


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1

2

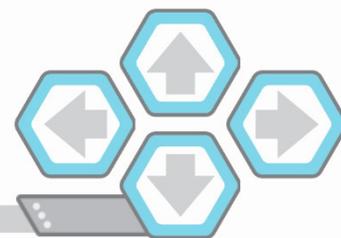
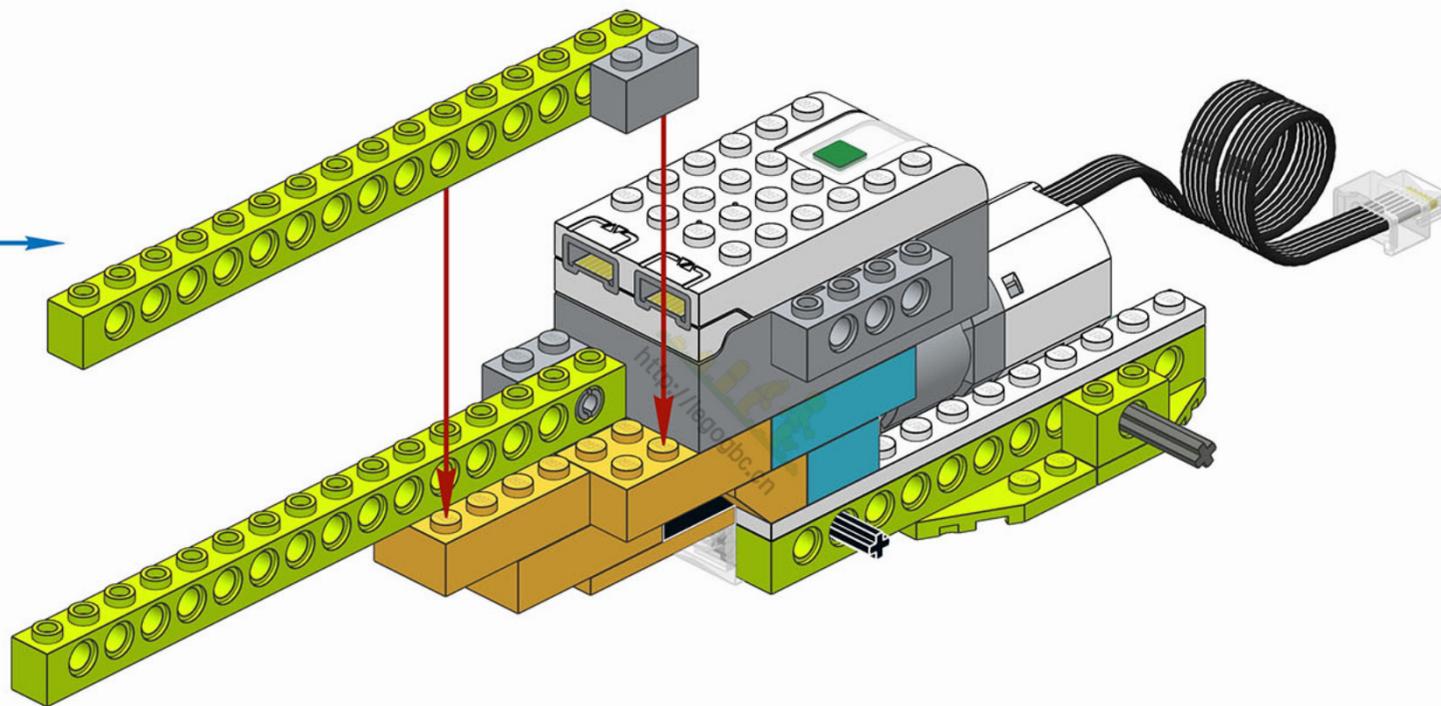
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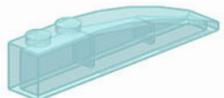
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25



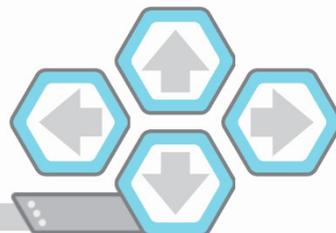
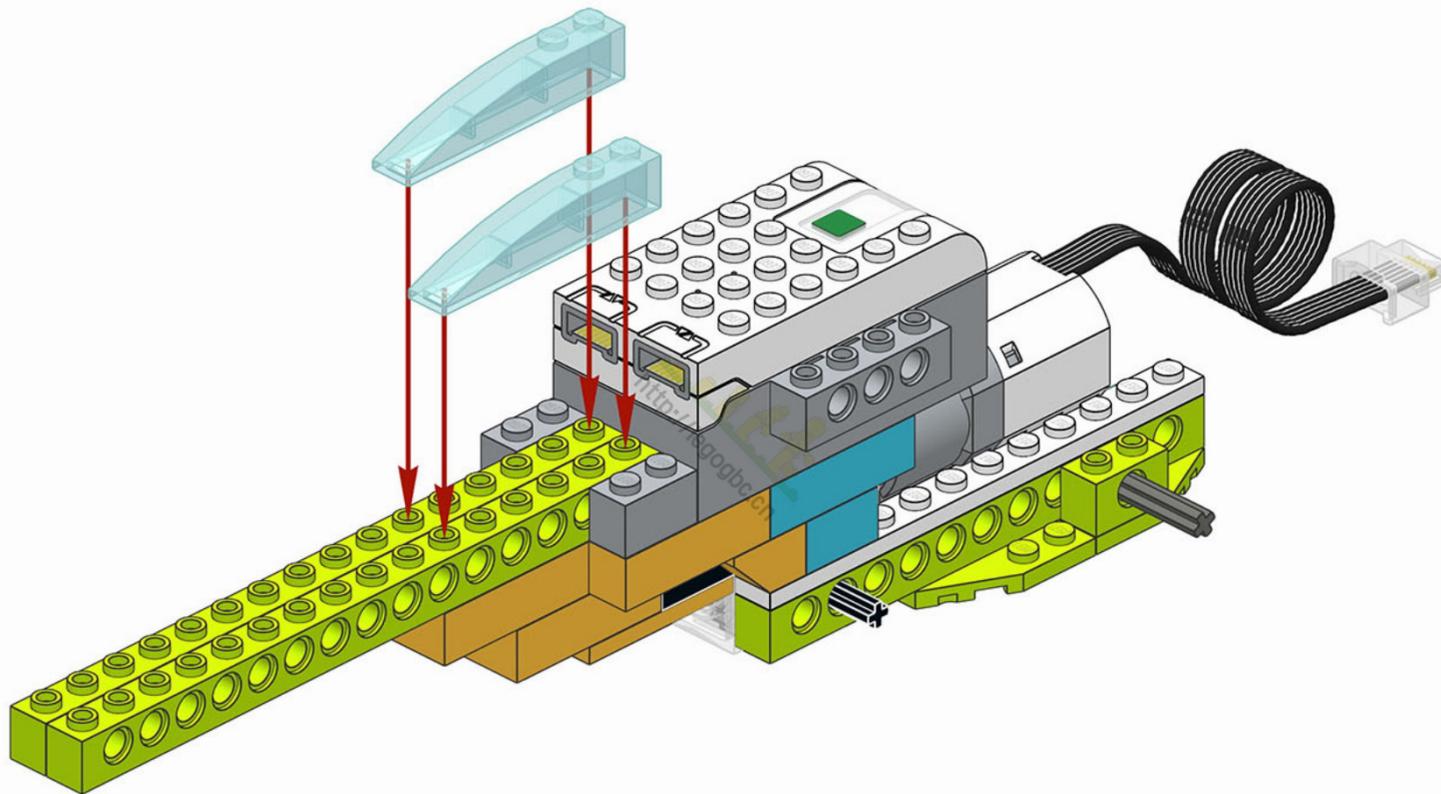


关注公众号获取更多



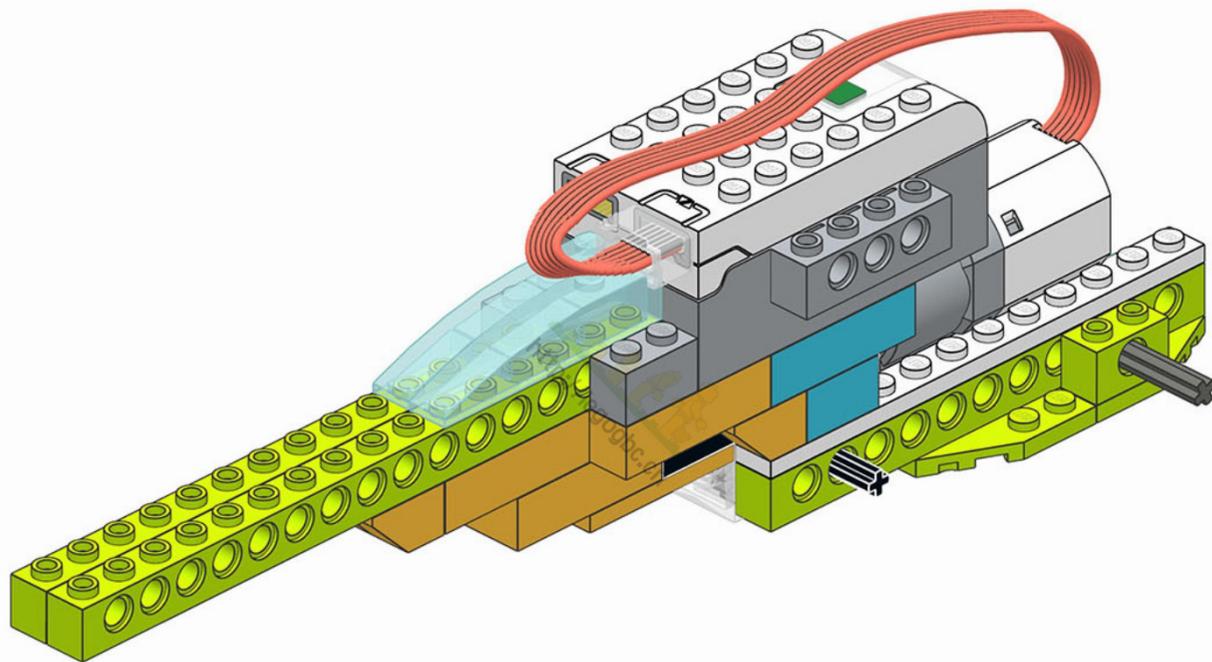
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26

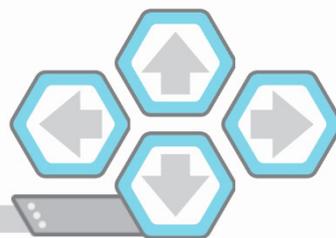




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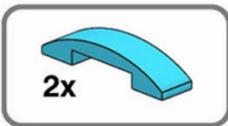


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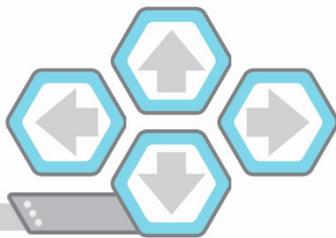
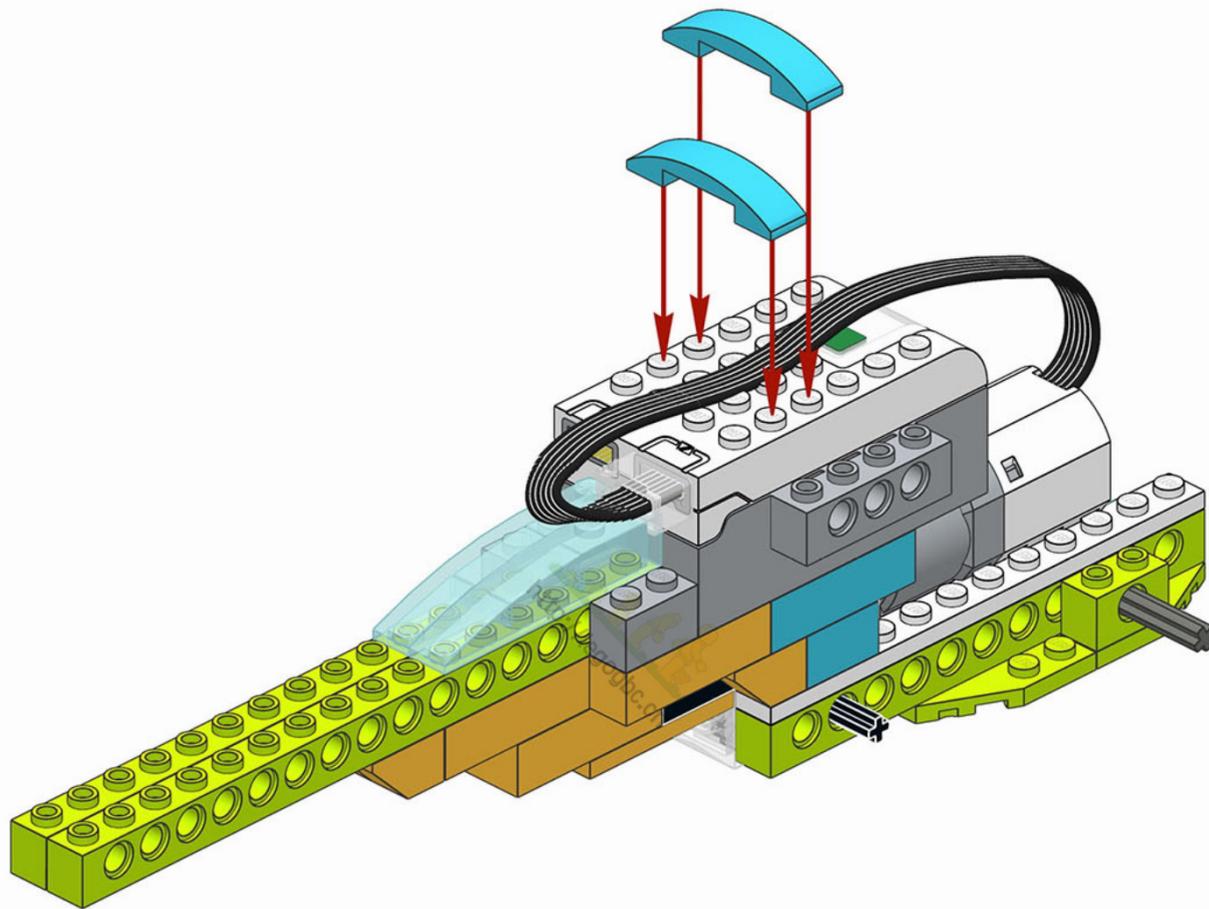




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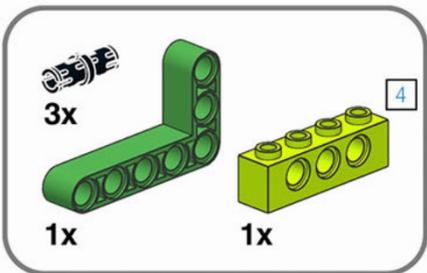


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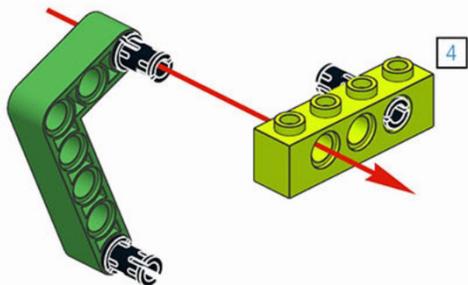




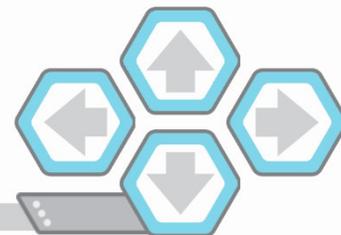
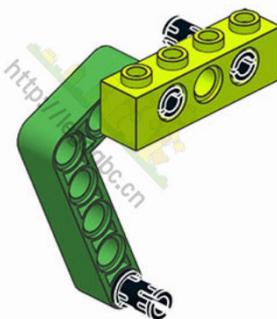
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1



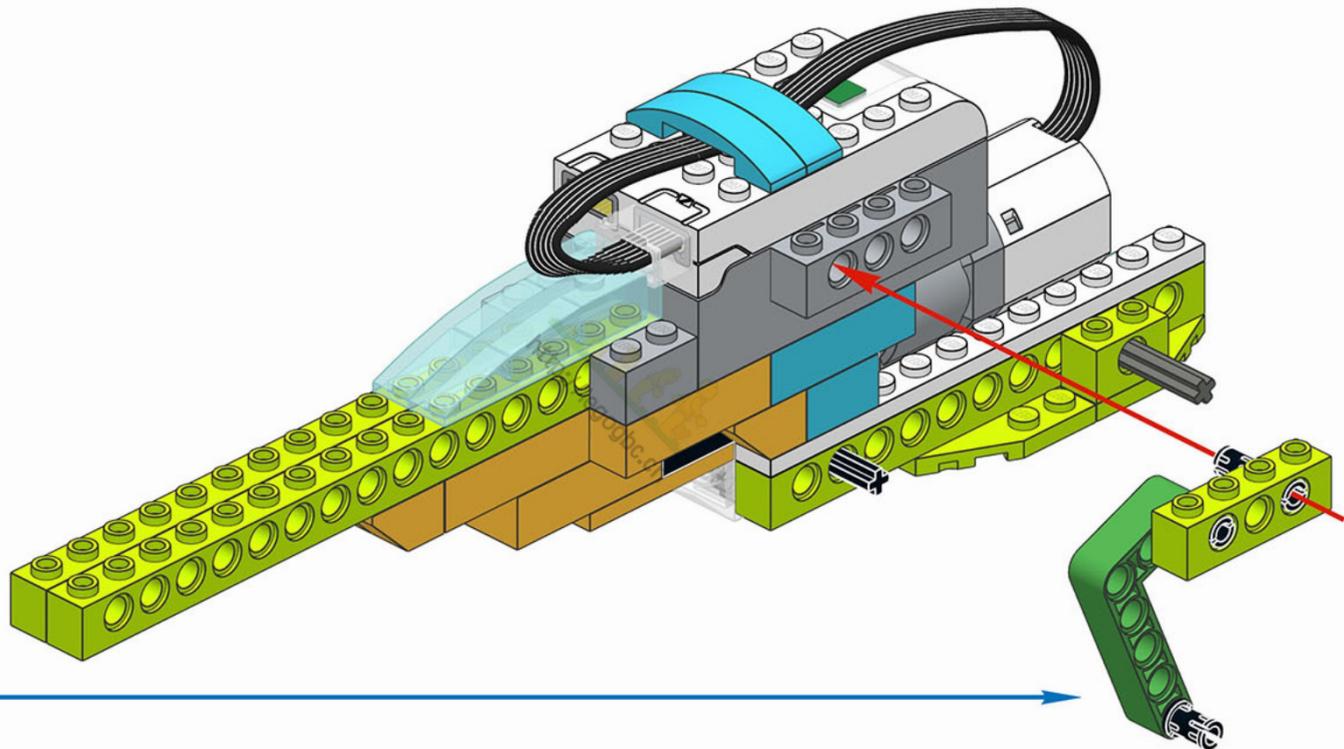
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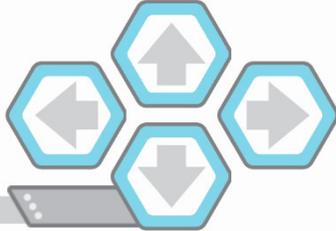
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5

55



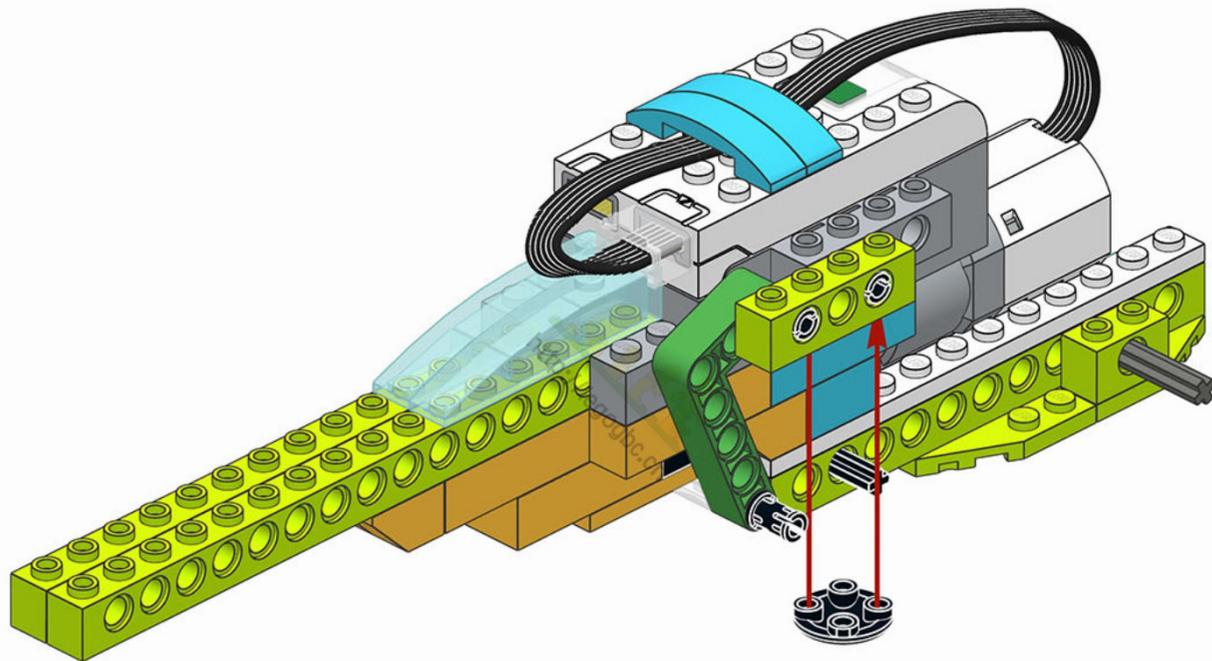


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1x

31



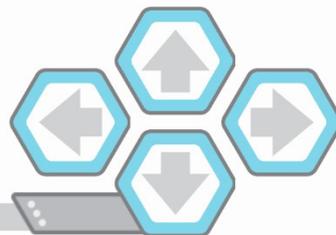
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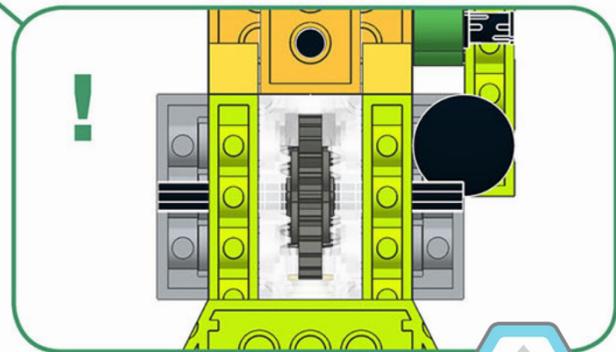
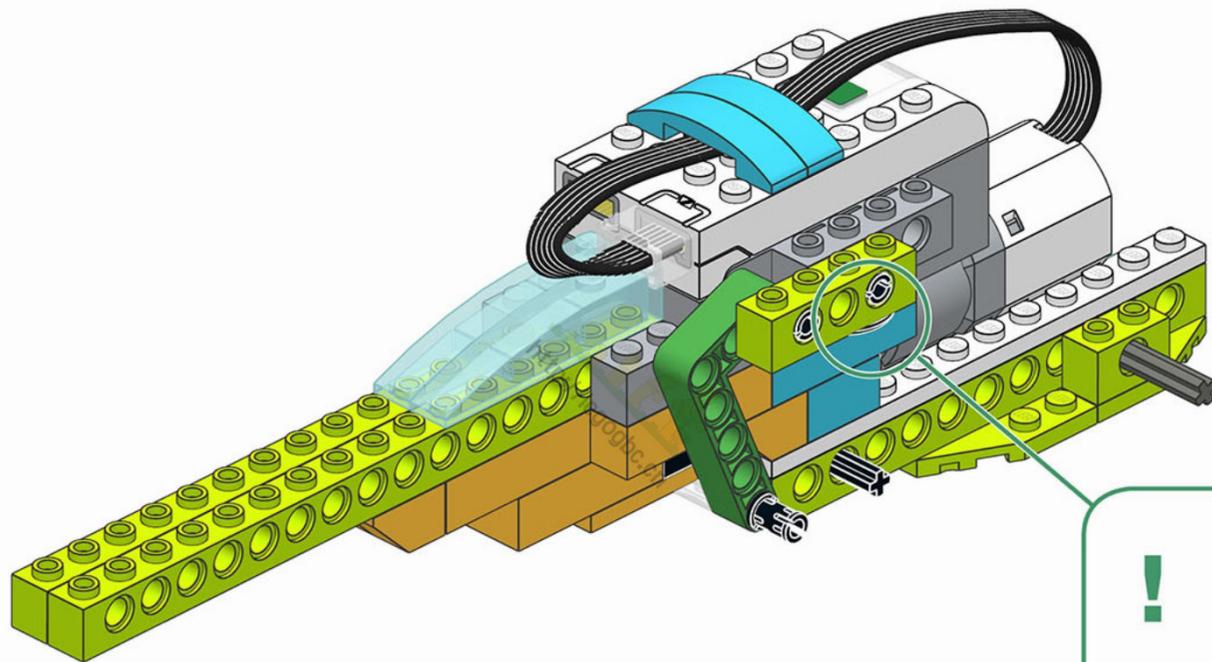
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32



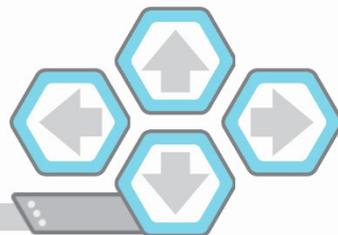
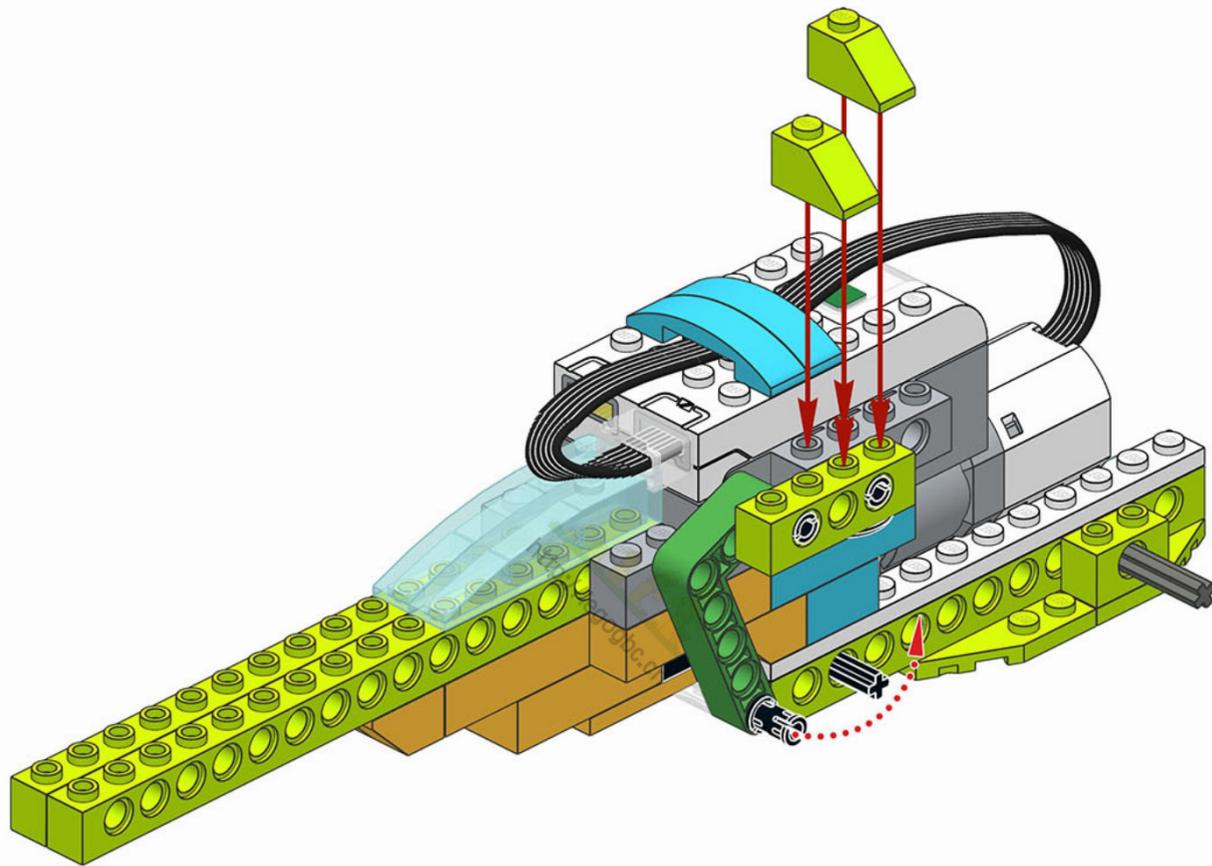


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2x

33





关注公众号获取更多

2x 1x

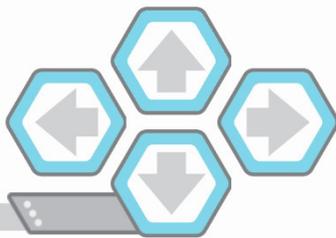
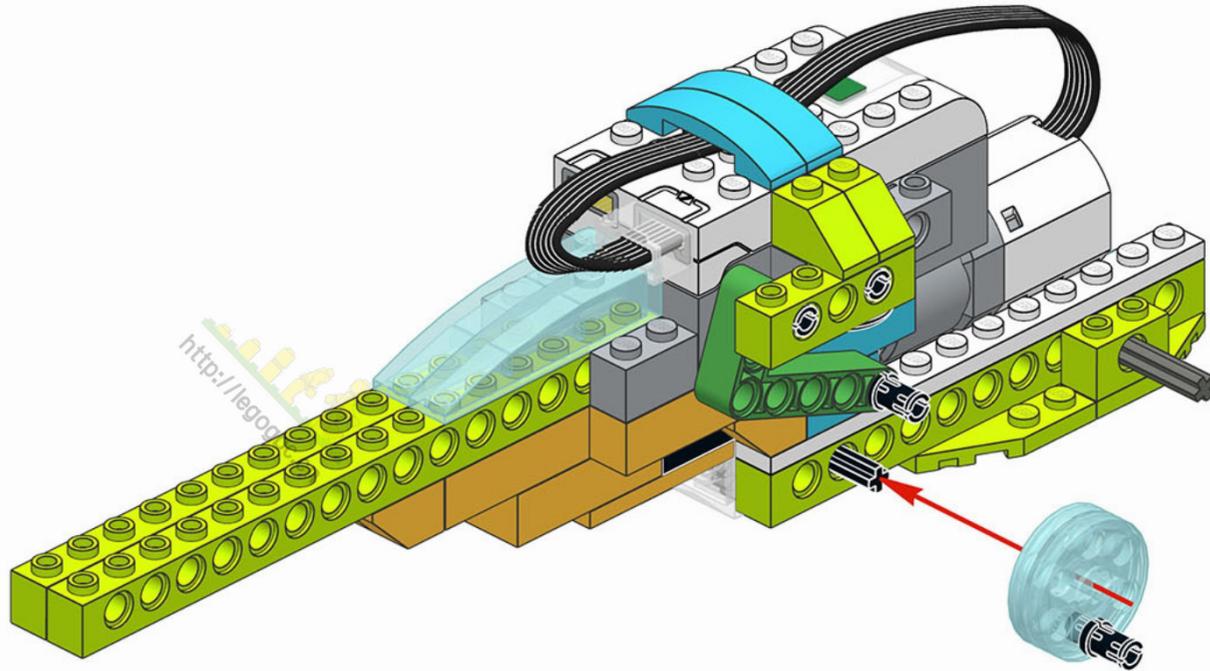
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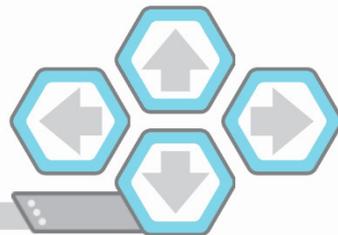
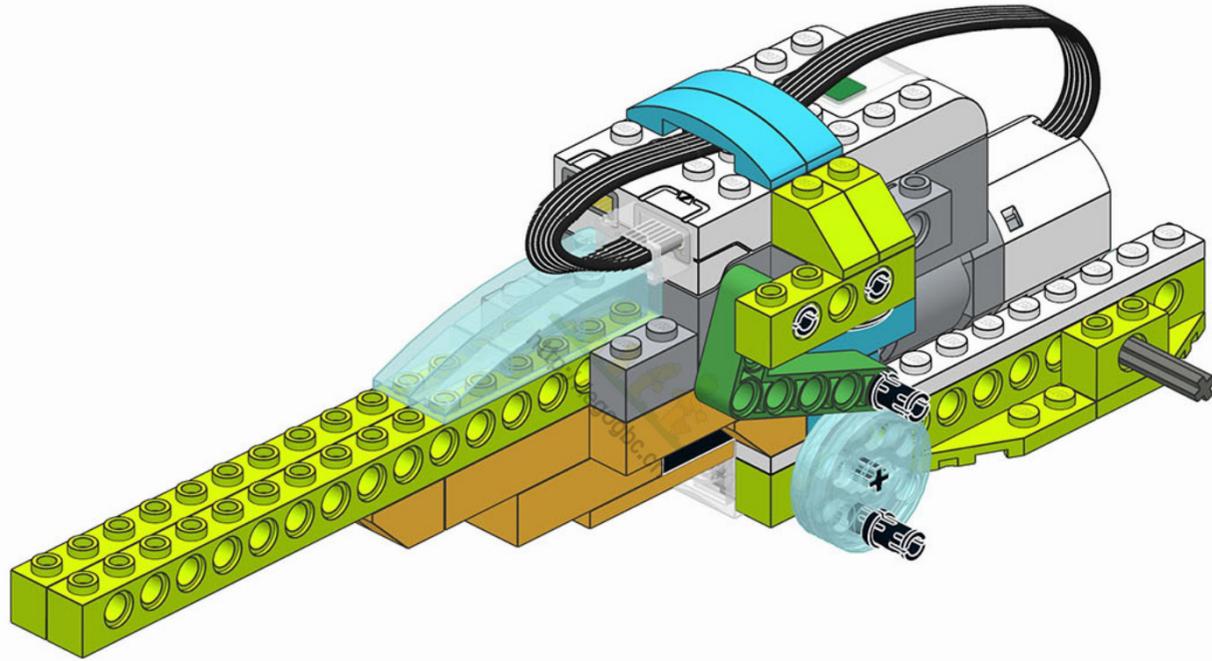
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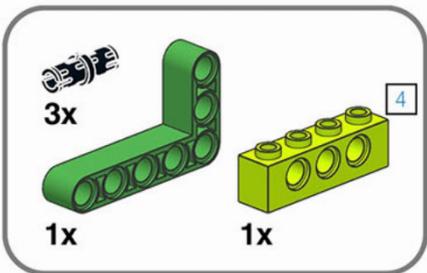
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35

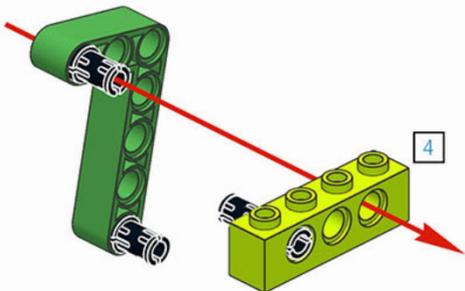




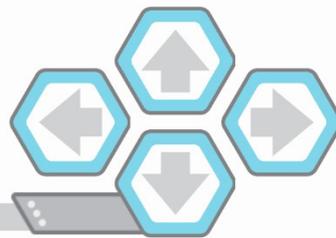
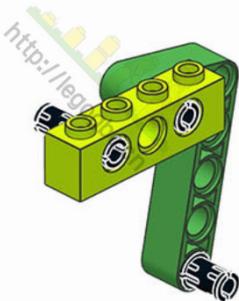
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1

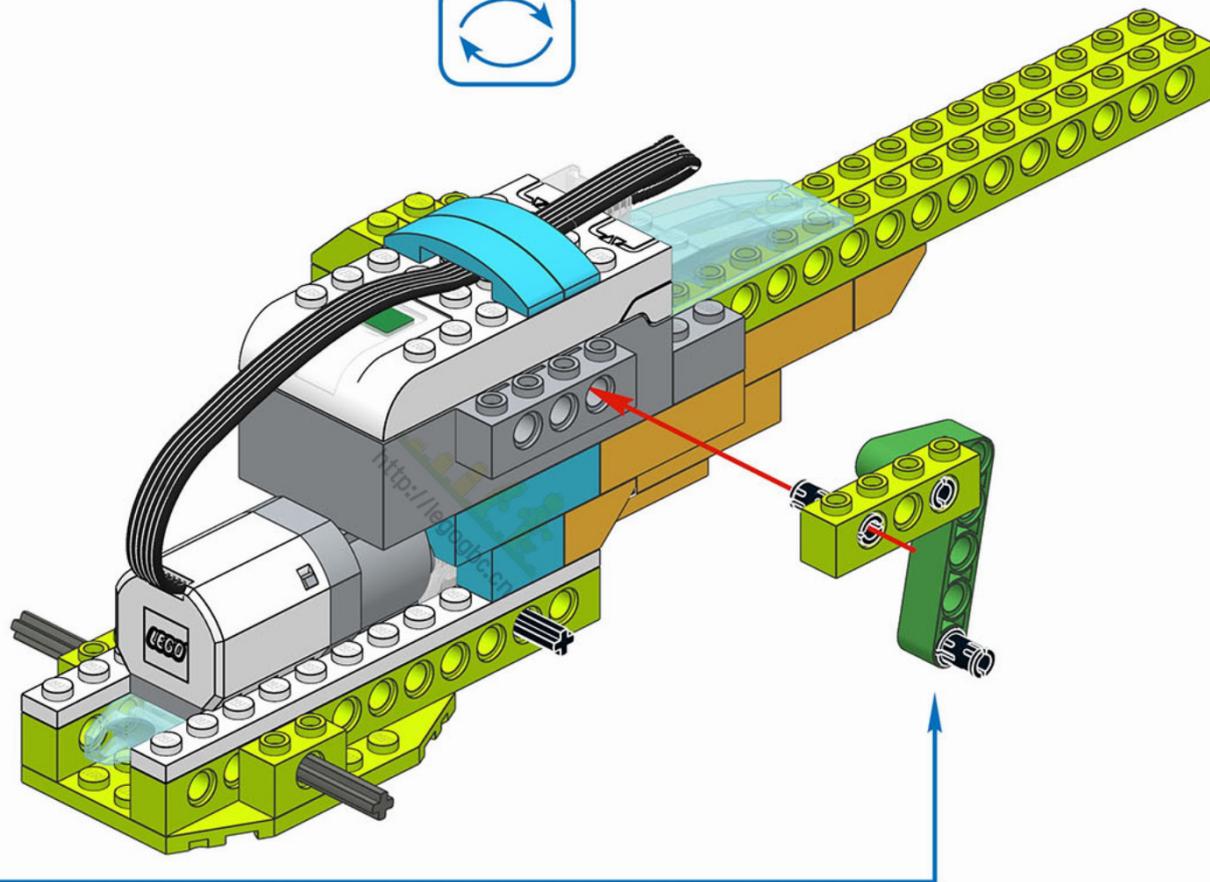


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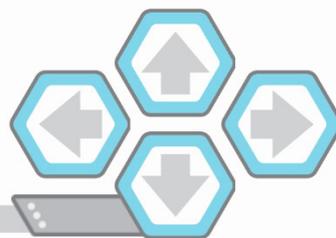




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37



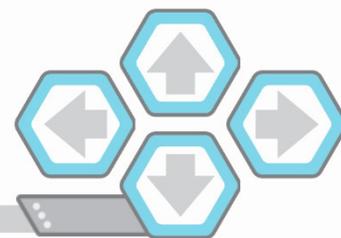
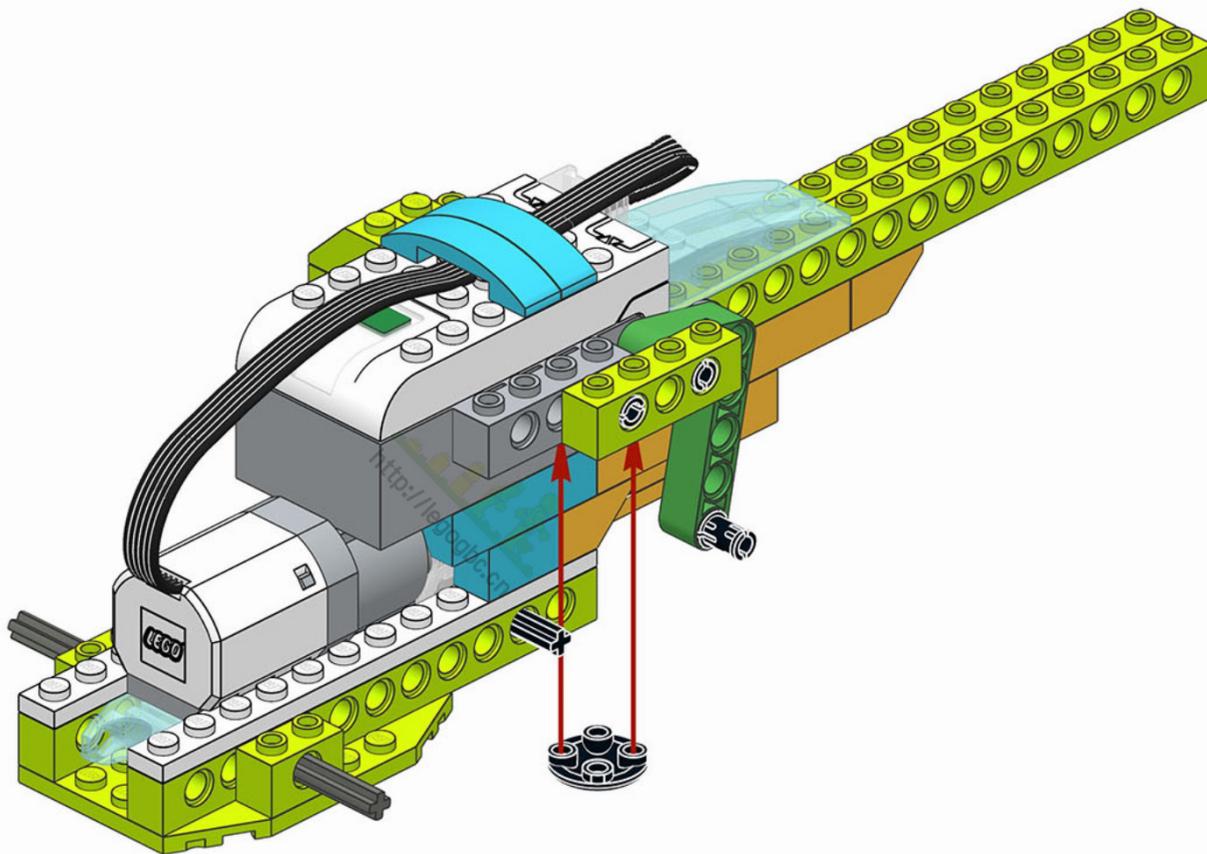


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1x

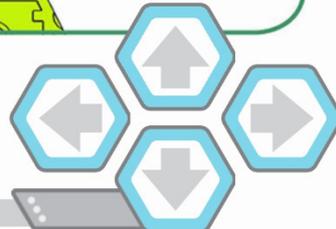
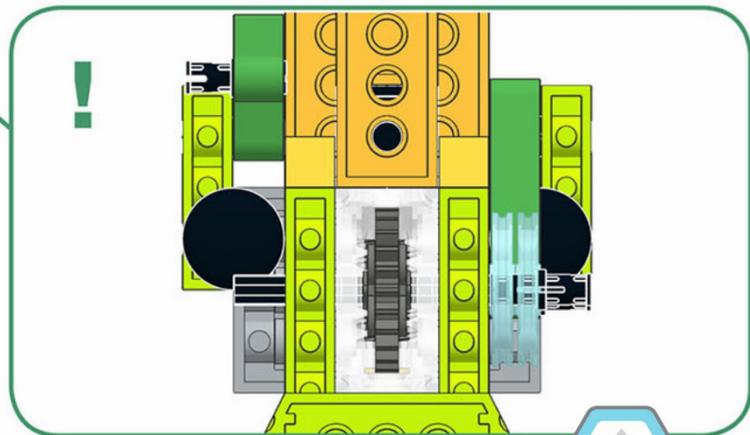
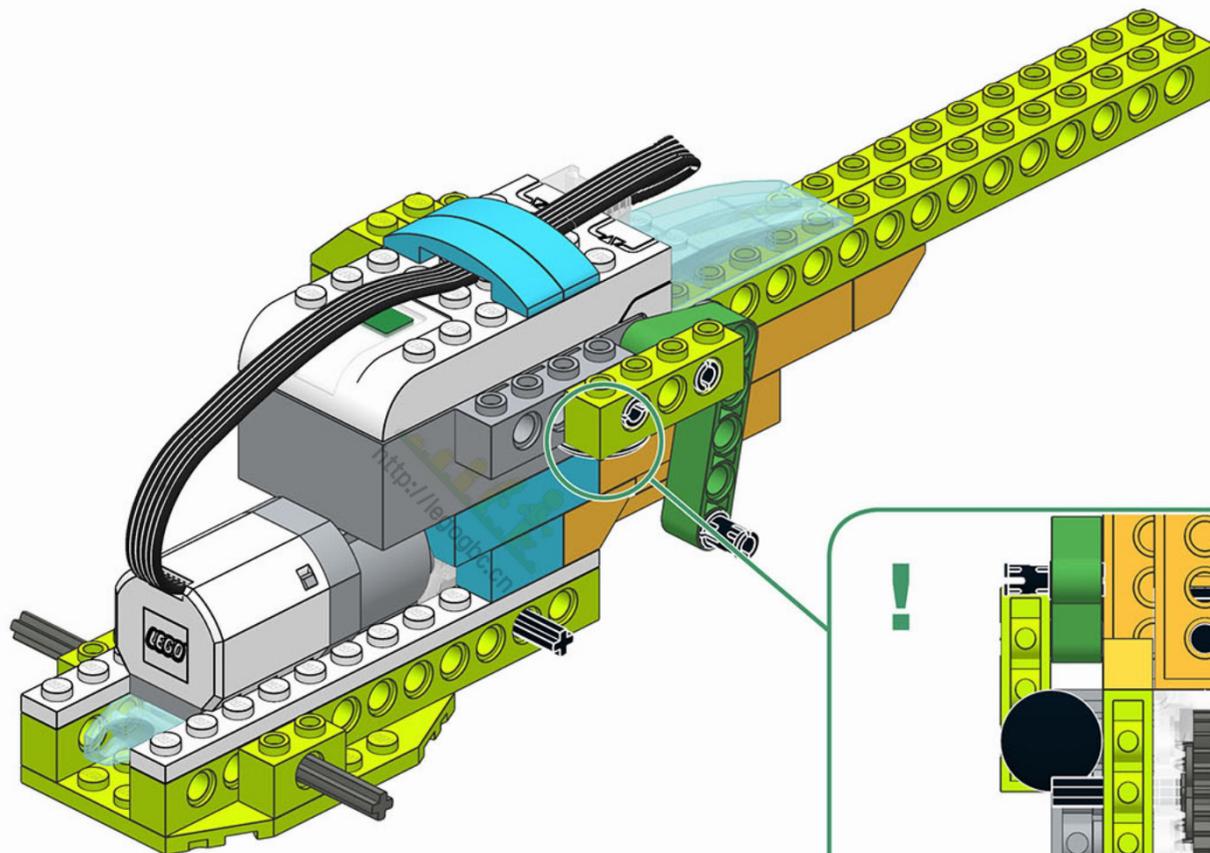
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39



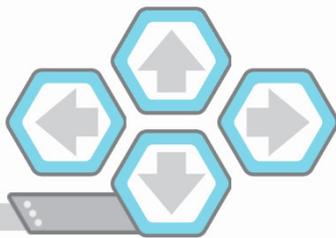
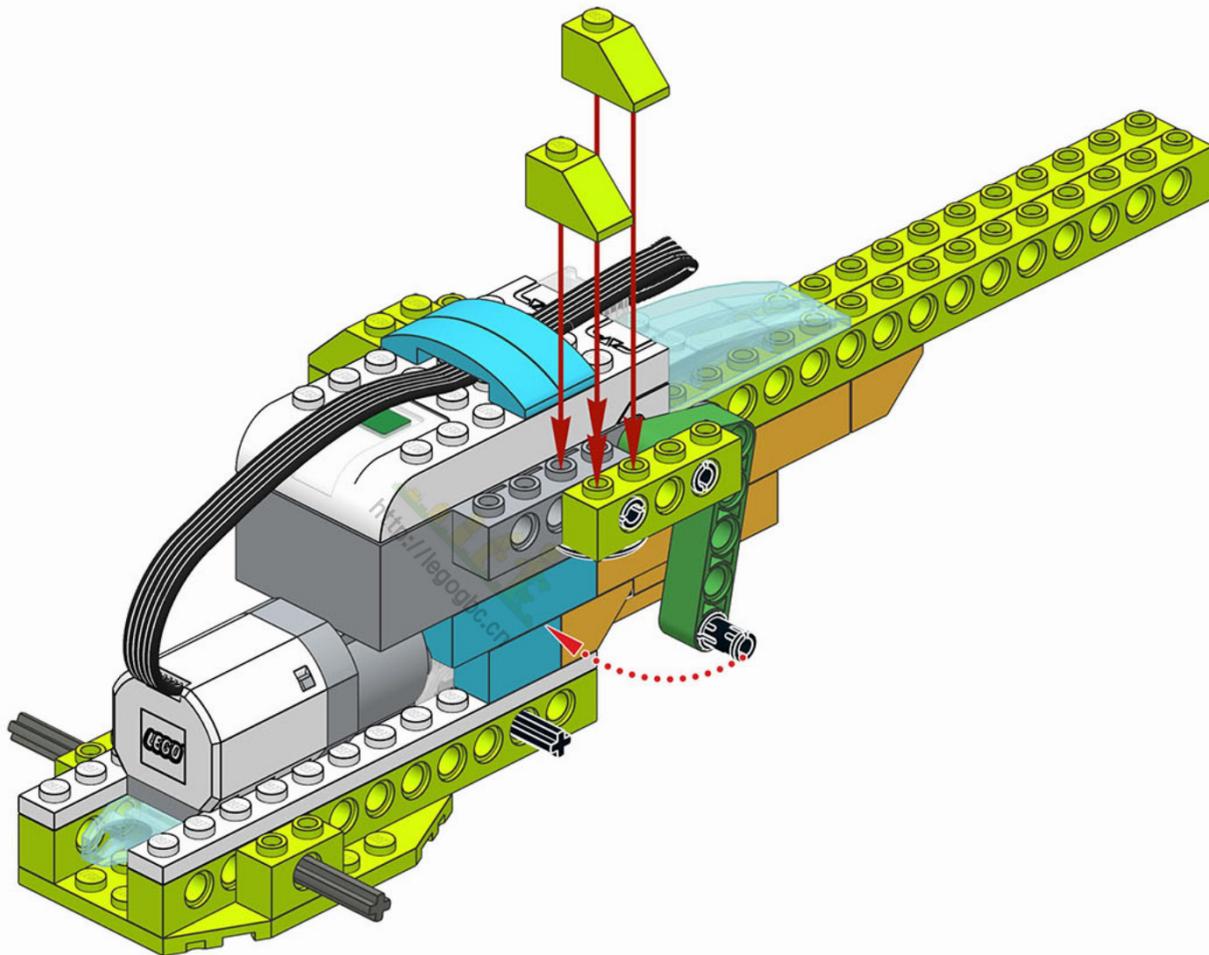


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2x

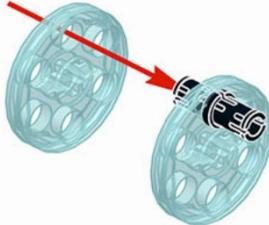
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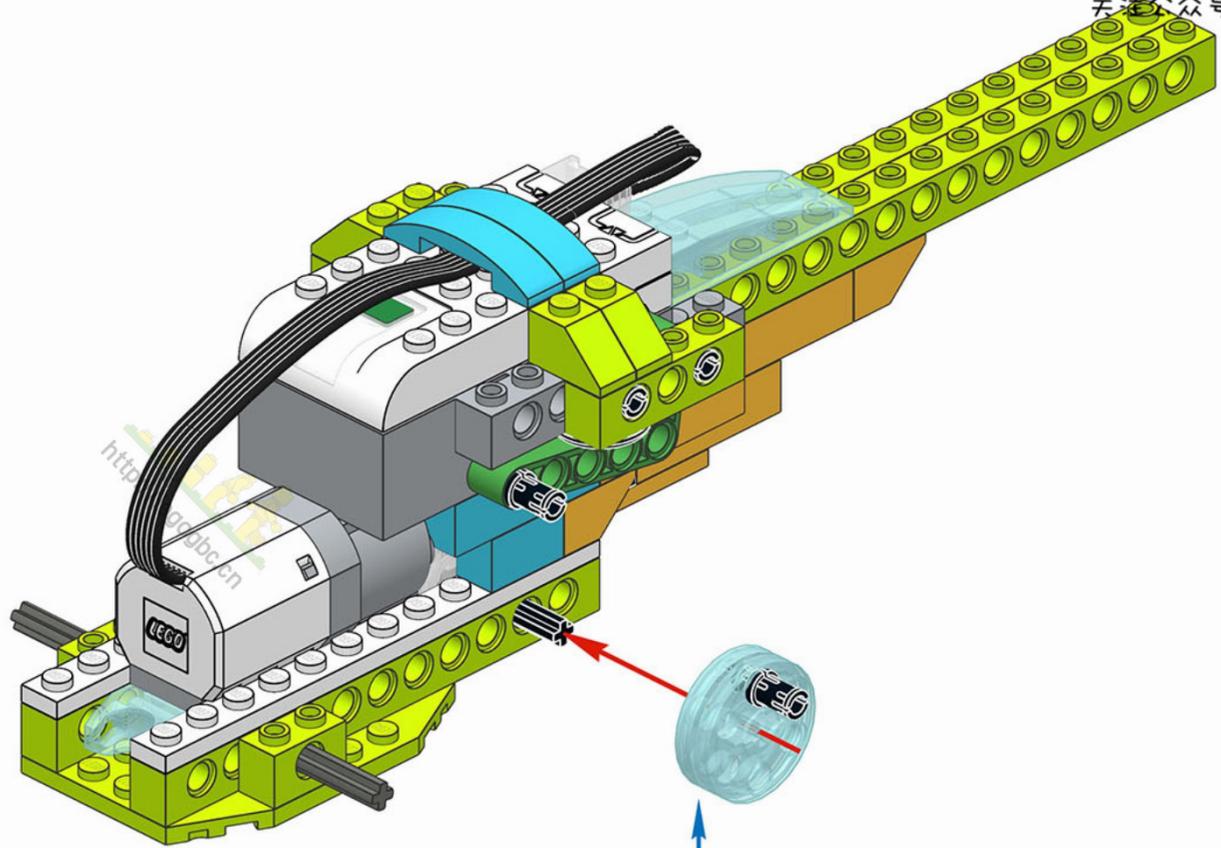
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2x  **1x** 

1 

2 

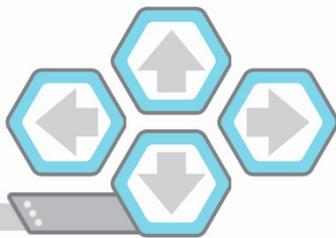
 



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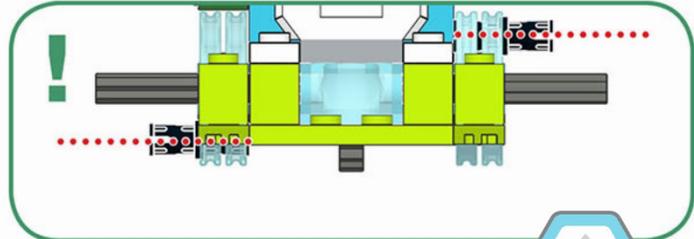
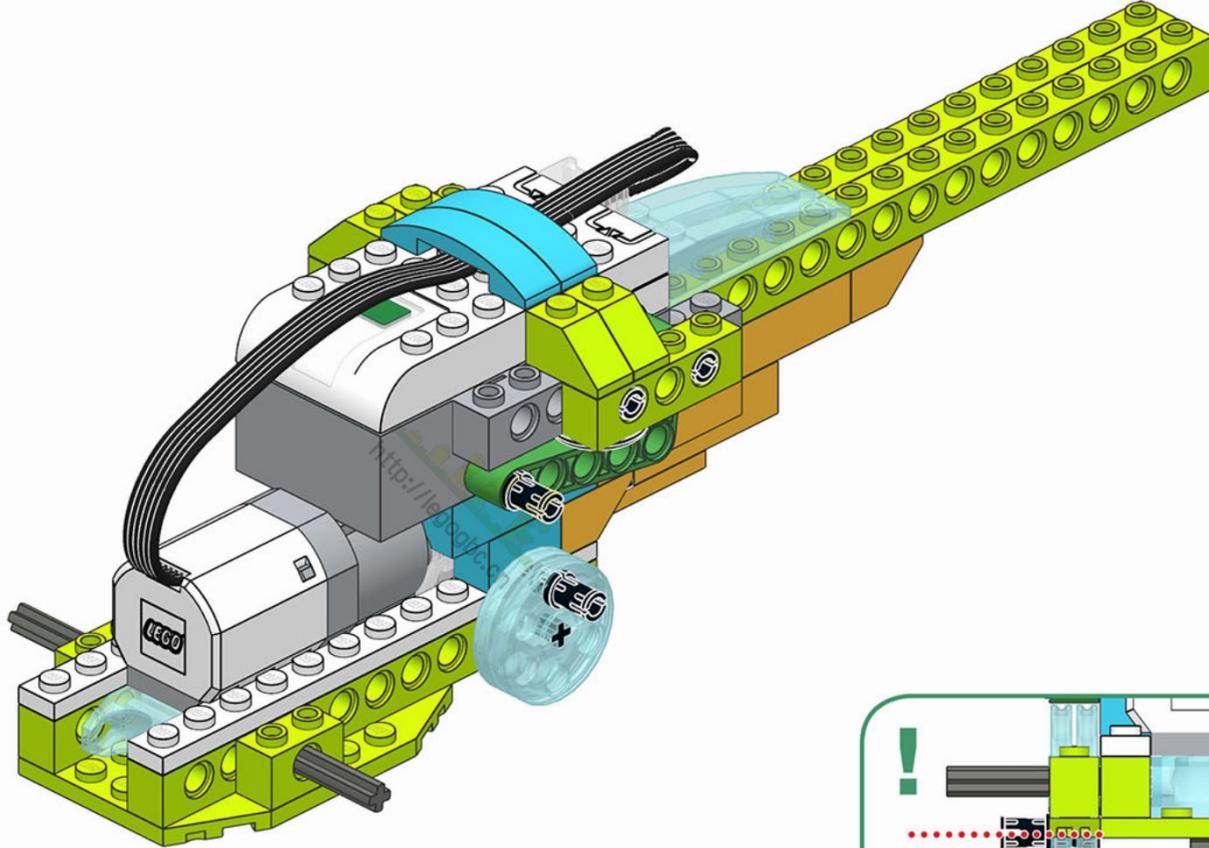
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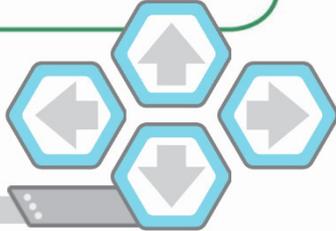
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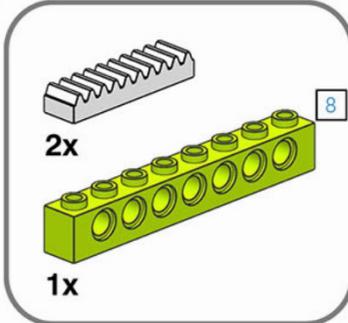
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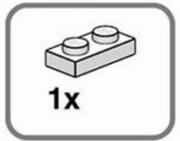
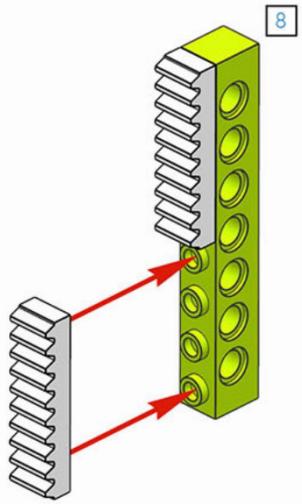




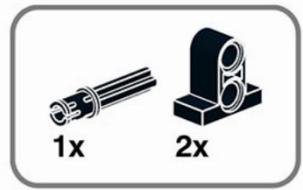
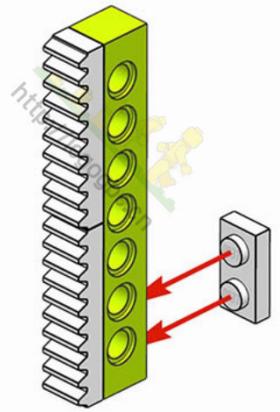
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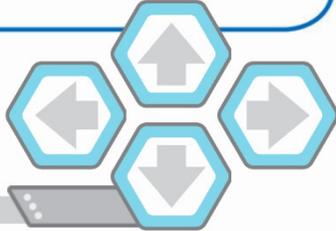
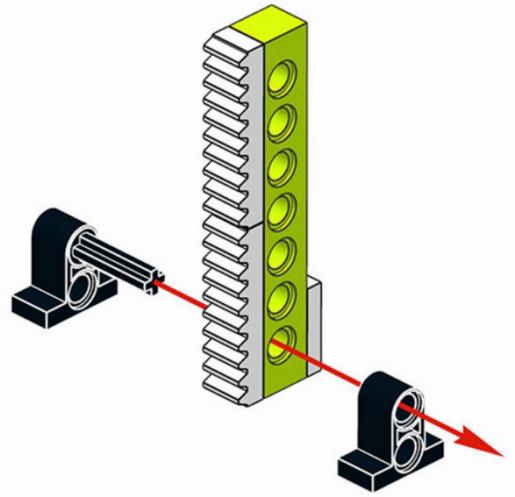
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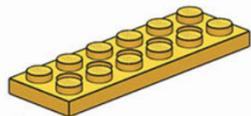


3





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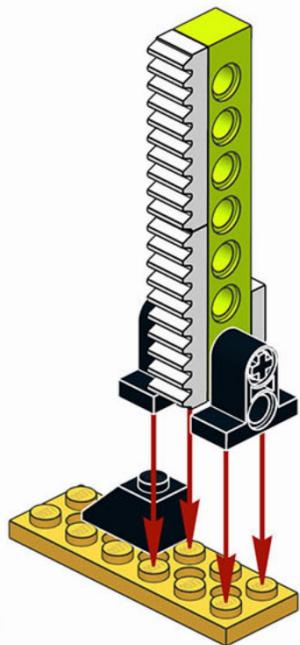


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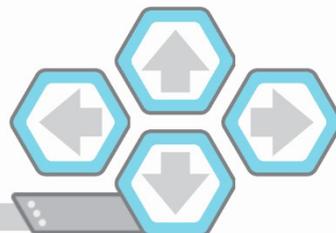
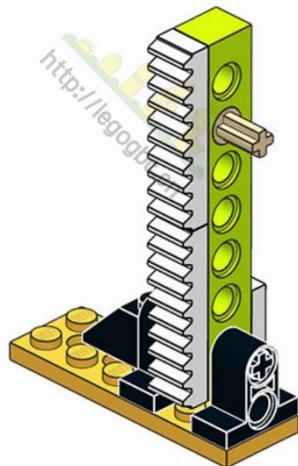
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4



1x

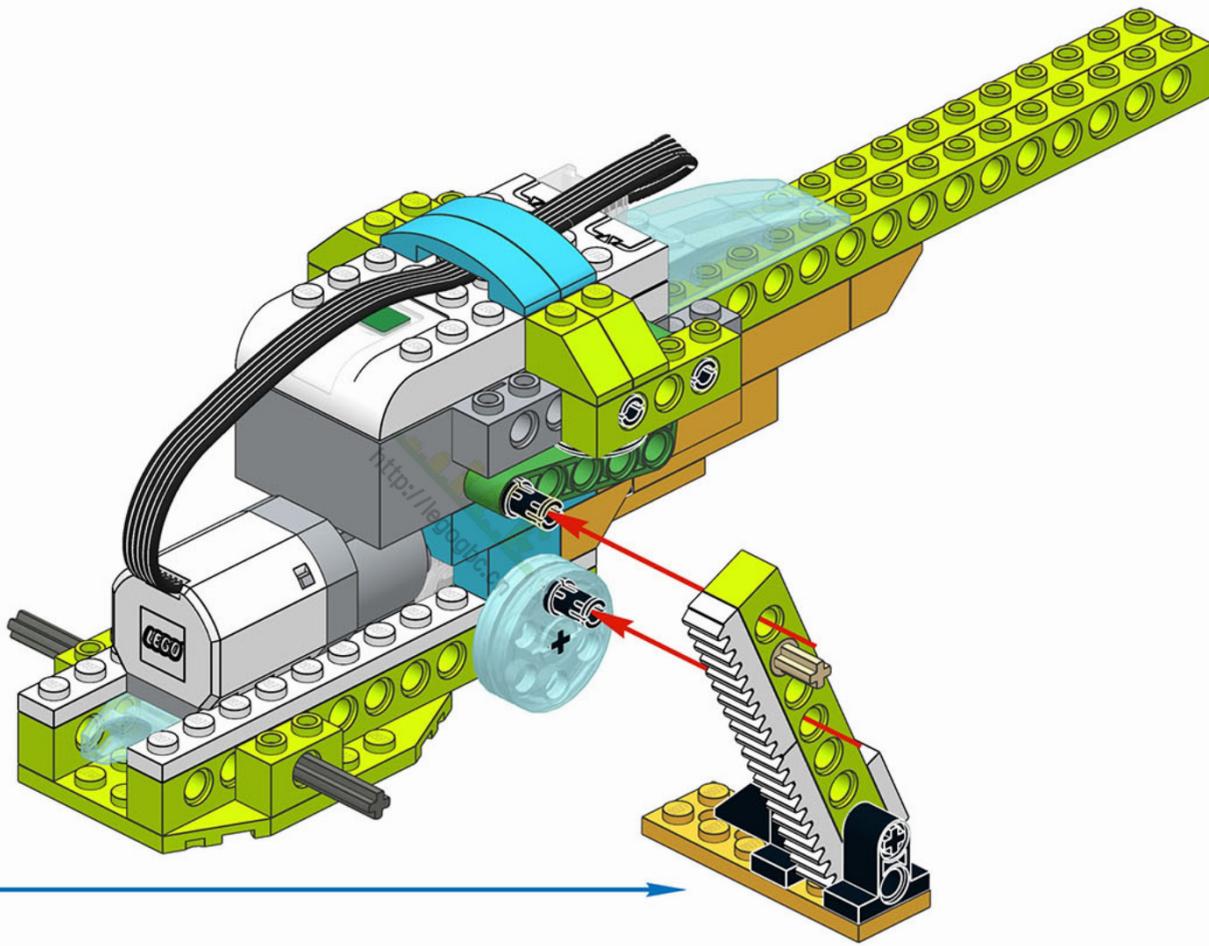
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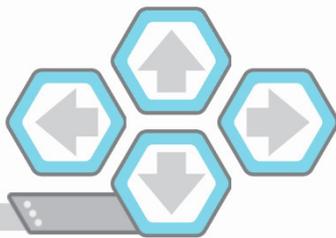
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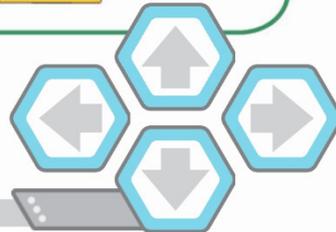
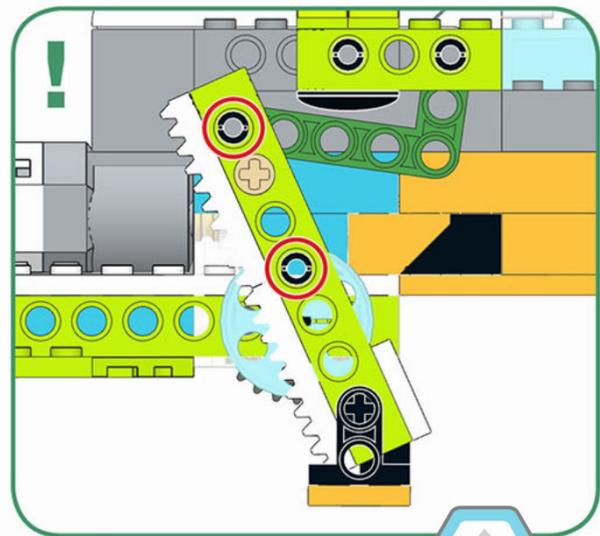
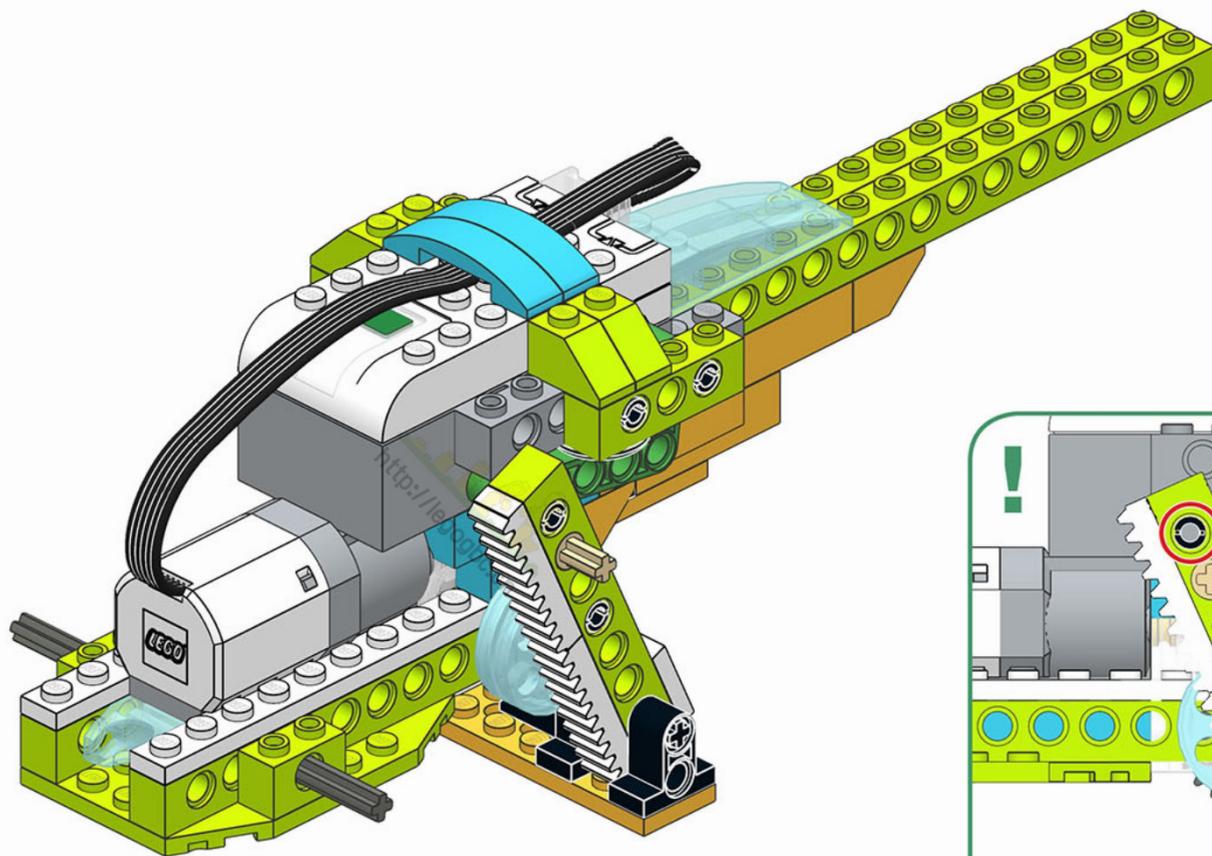
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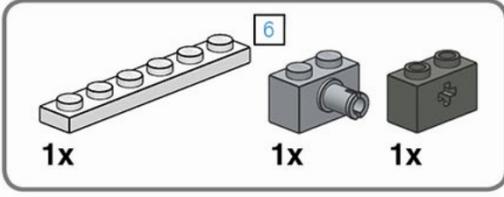
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46

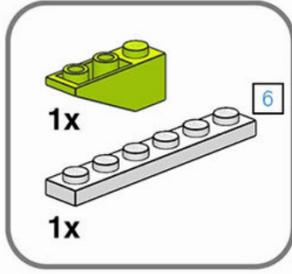
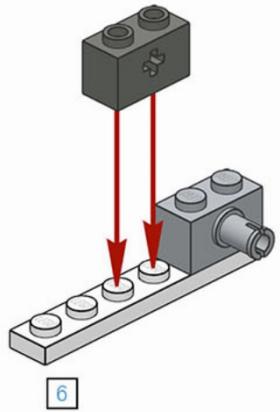




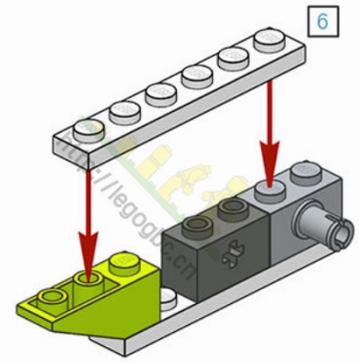
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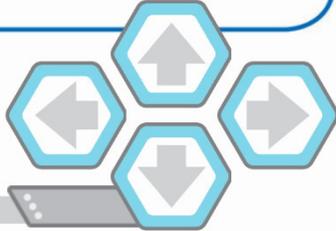
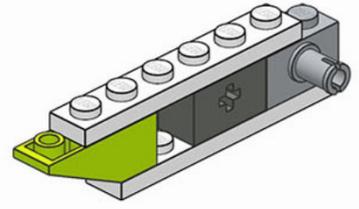
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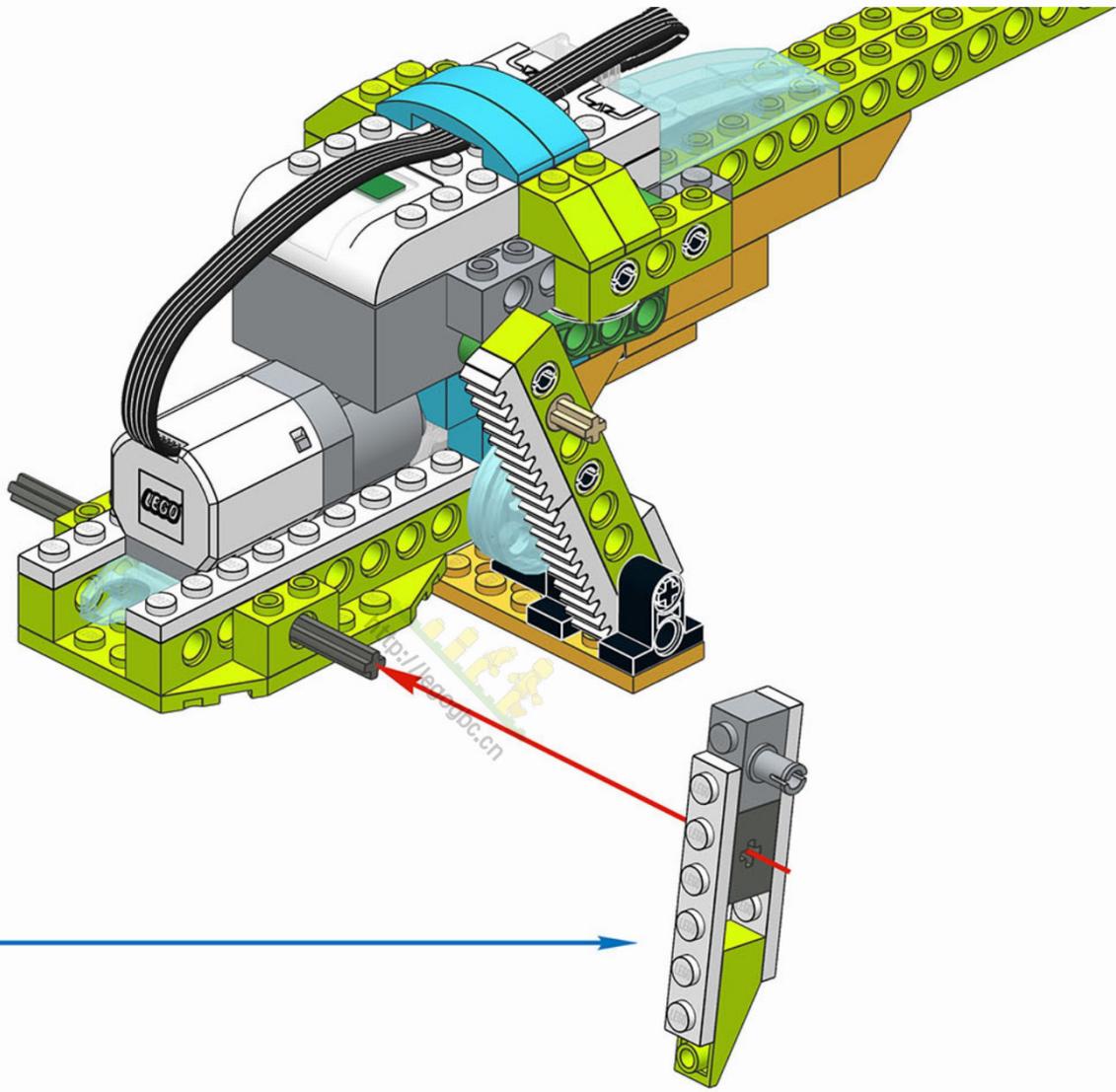
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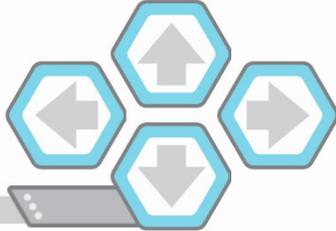
48



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5

73



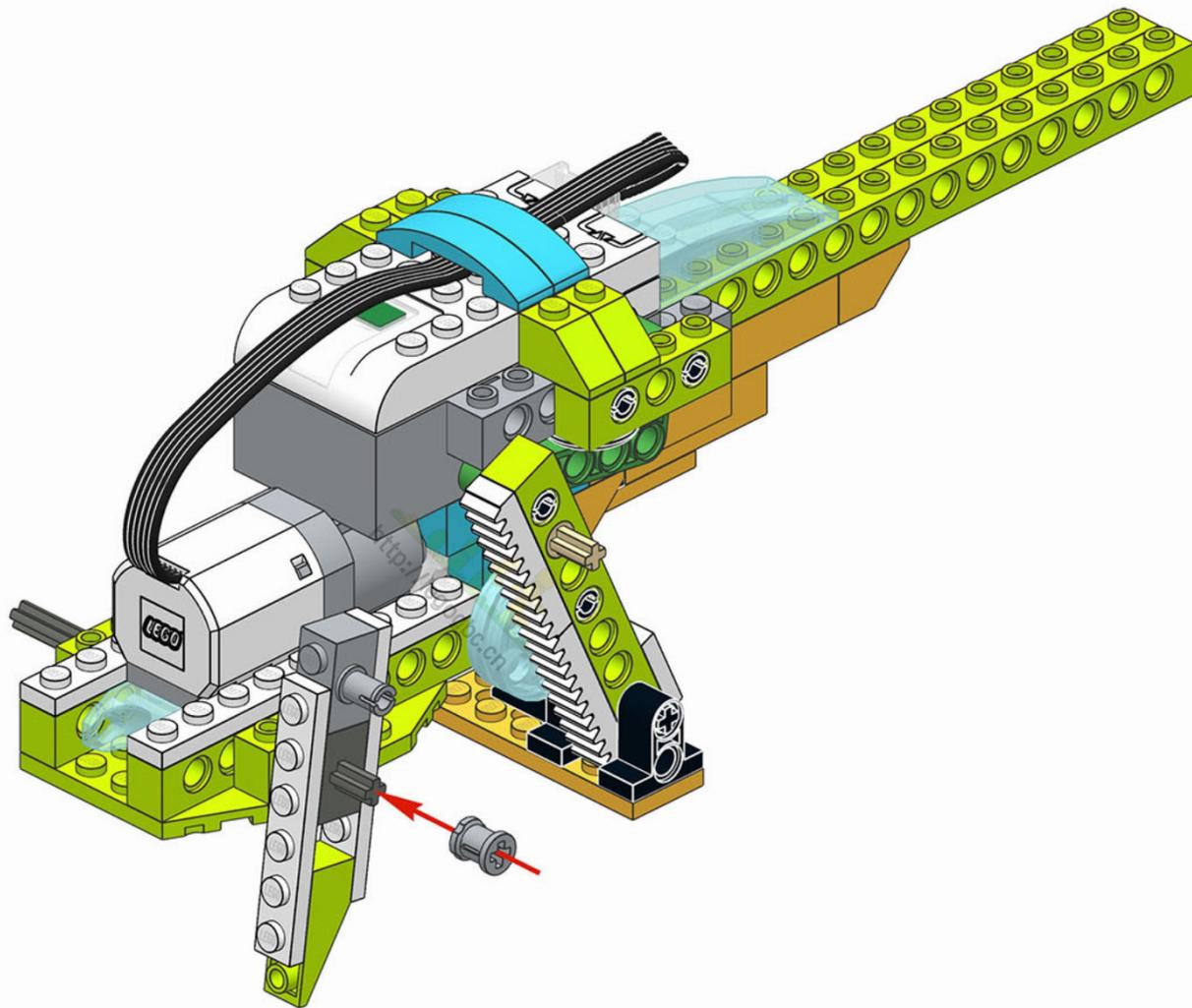


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1x

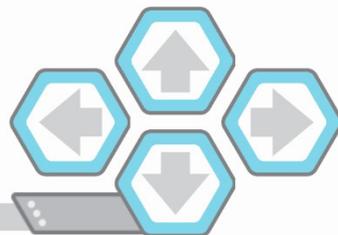
49



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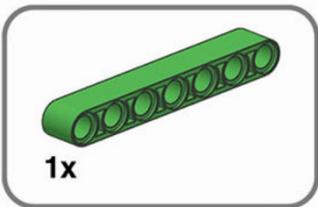
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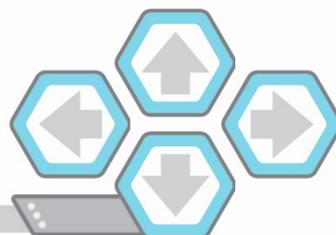
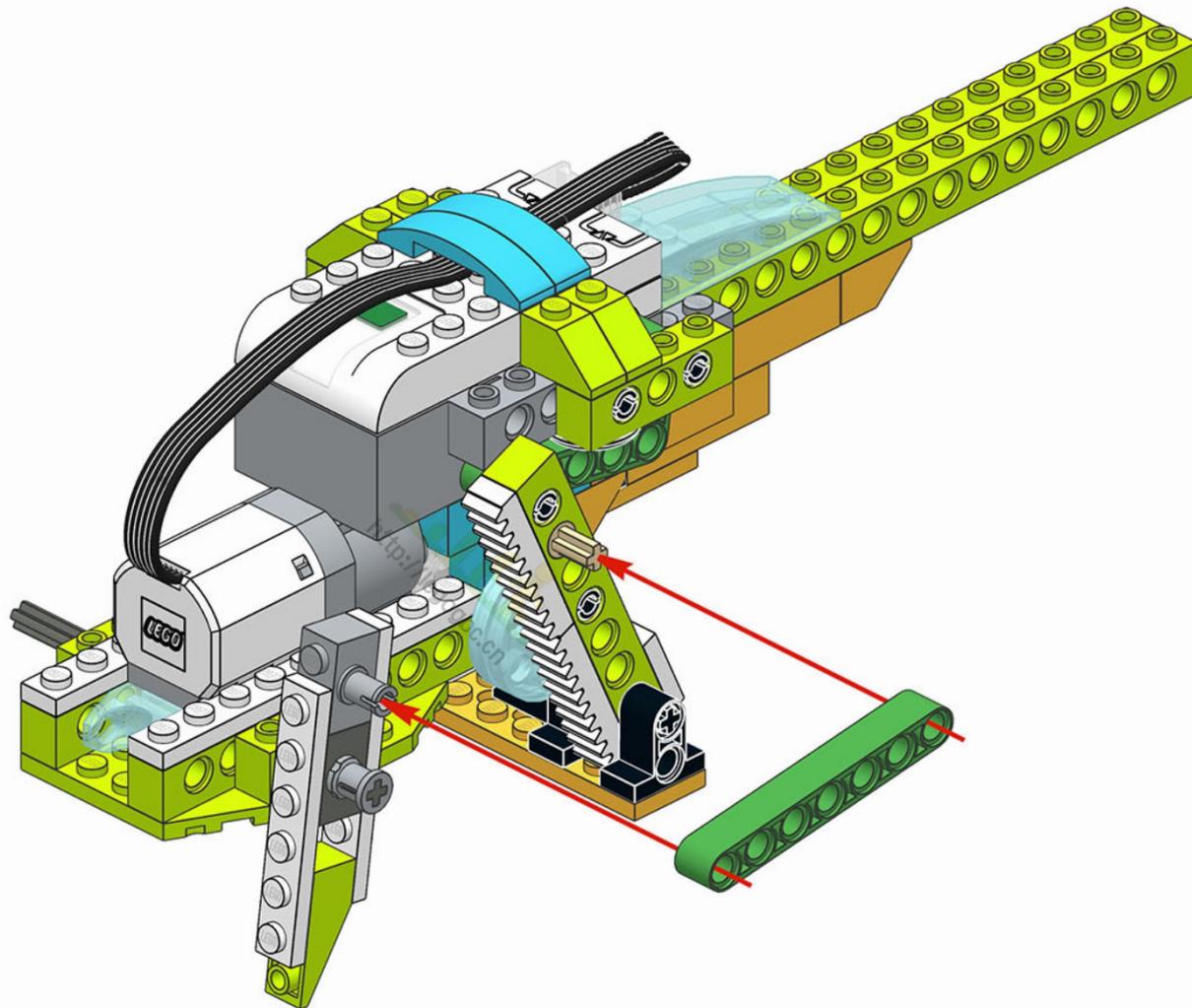


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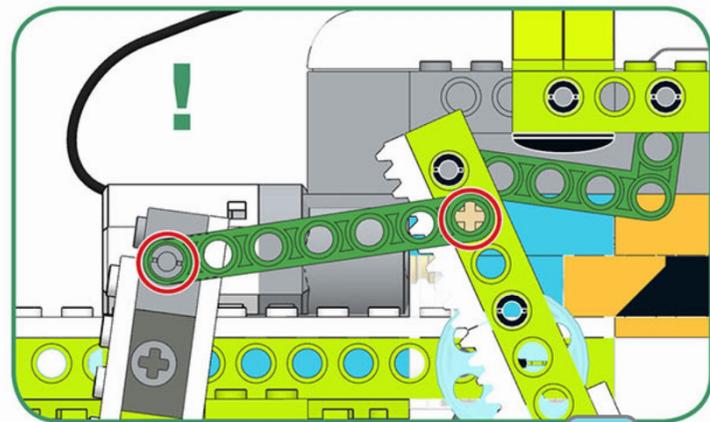
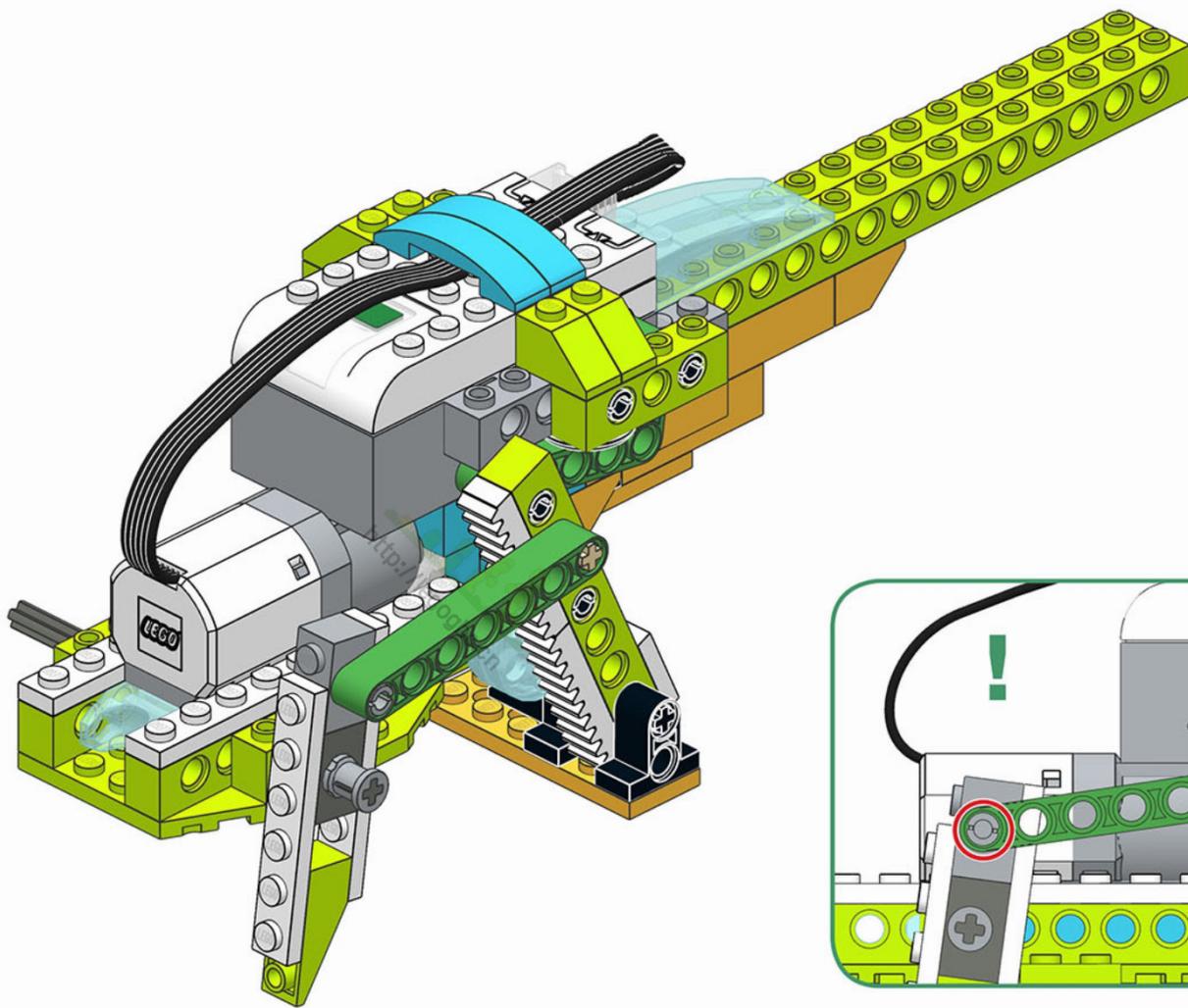
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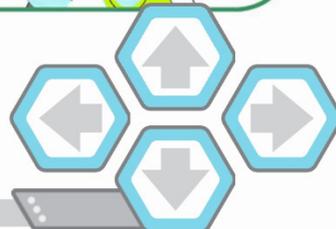
51



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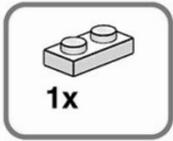
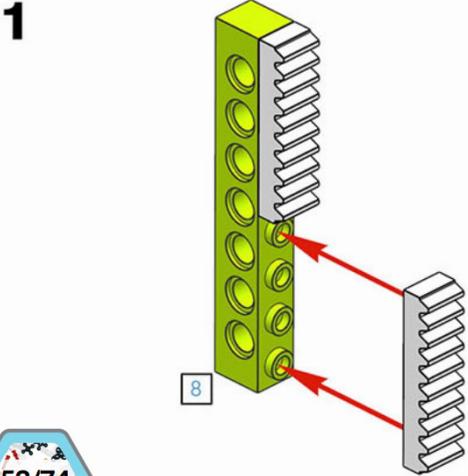
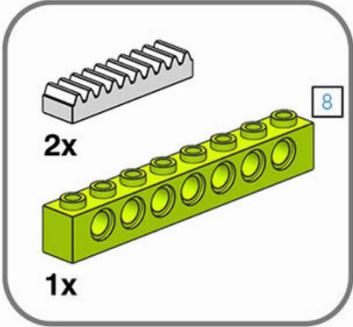
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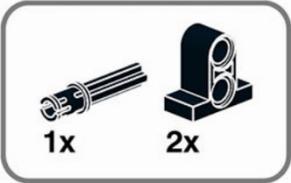
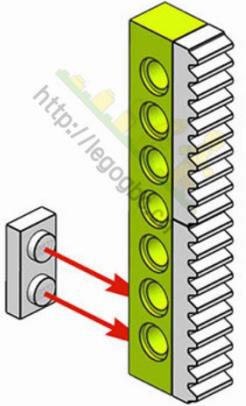




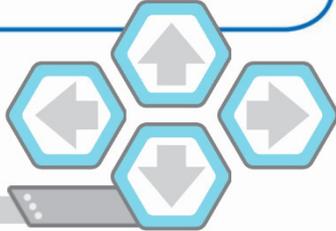
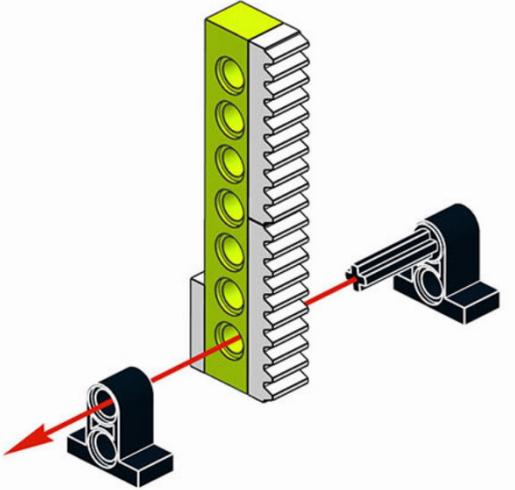
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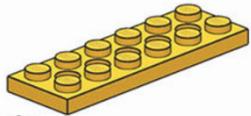


3





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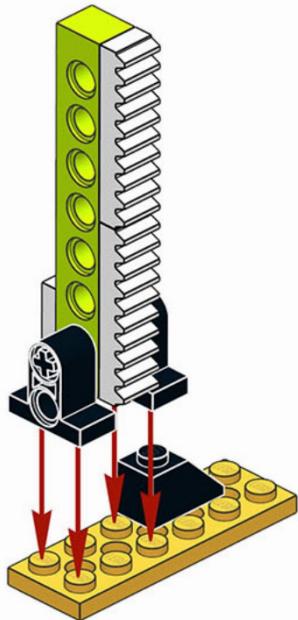


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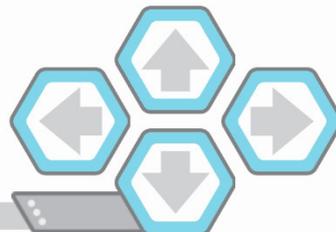
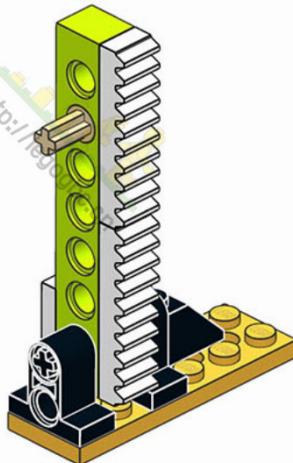
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4



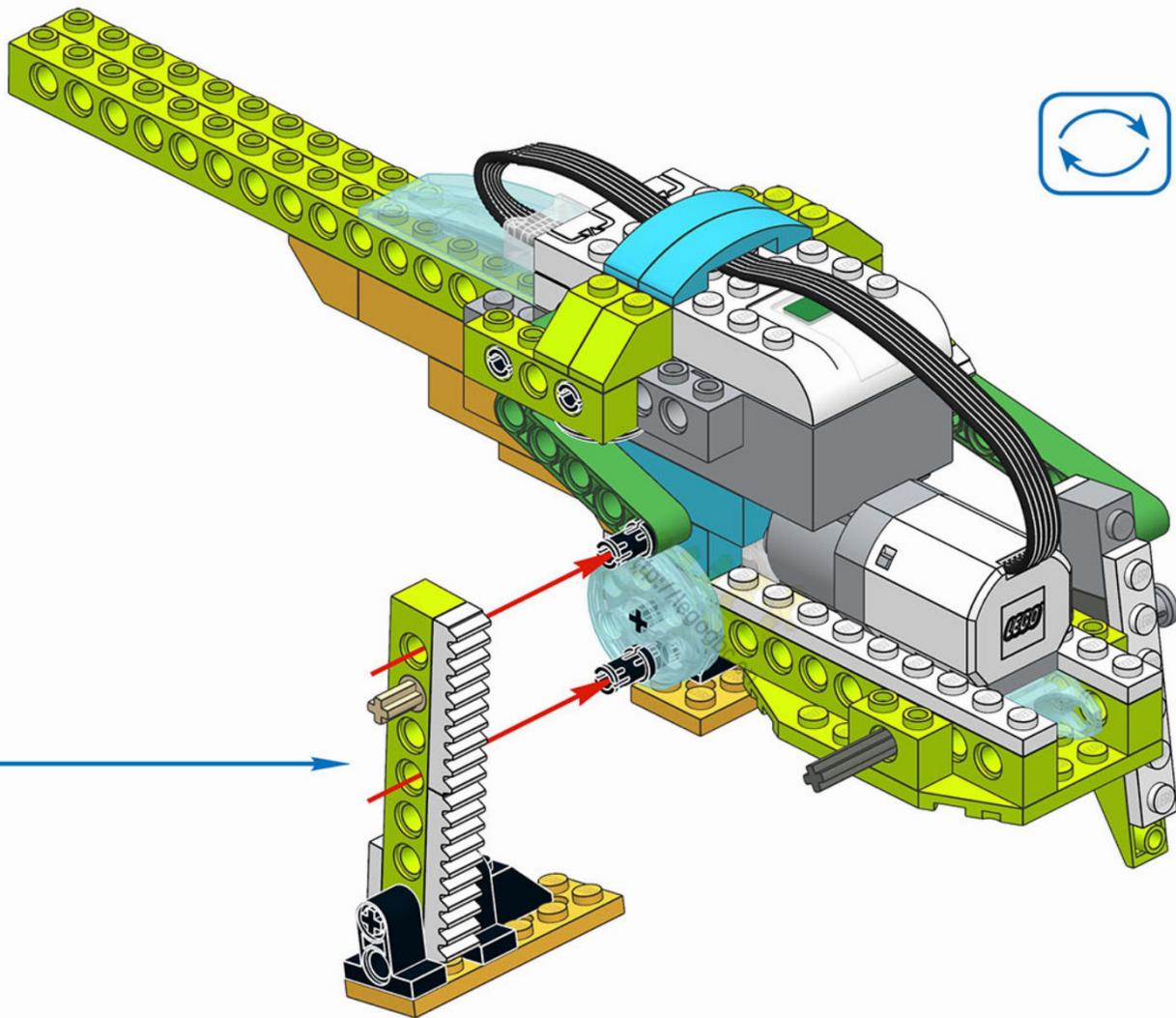
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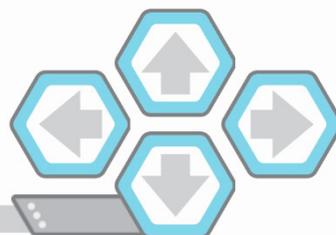




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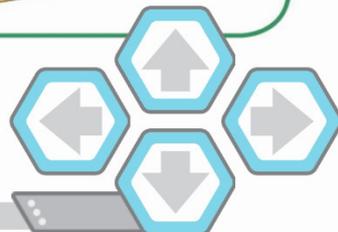
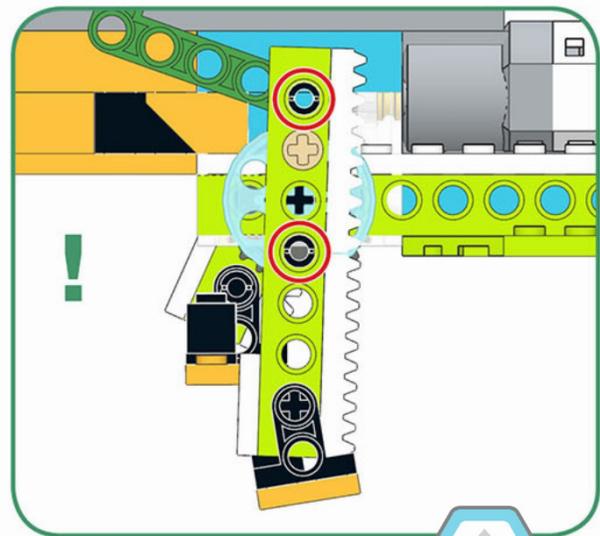
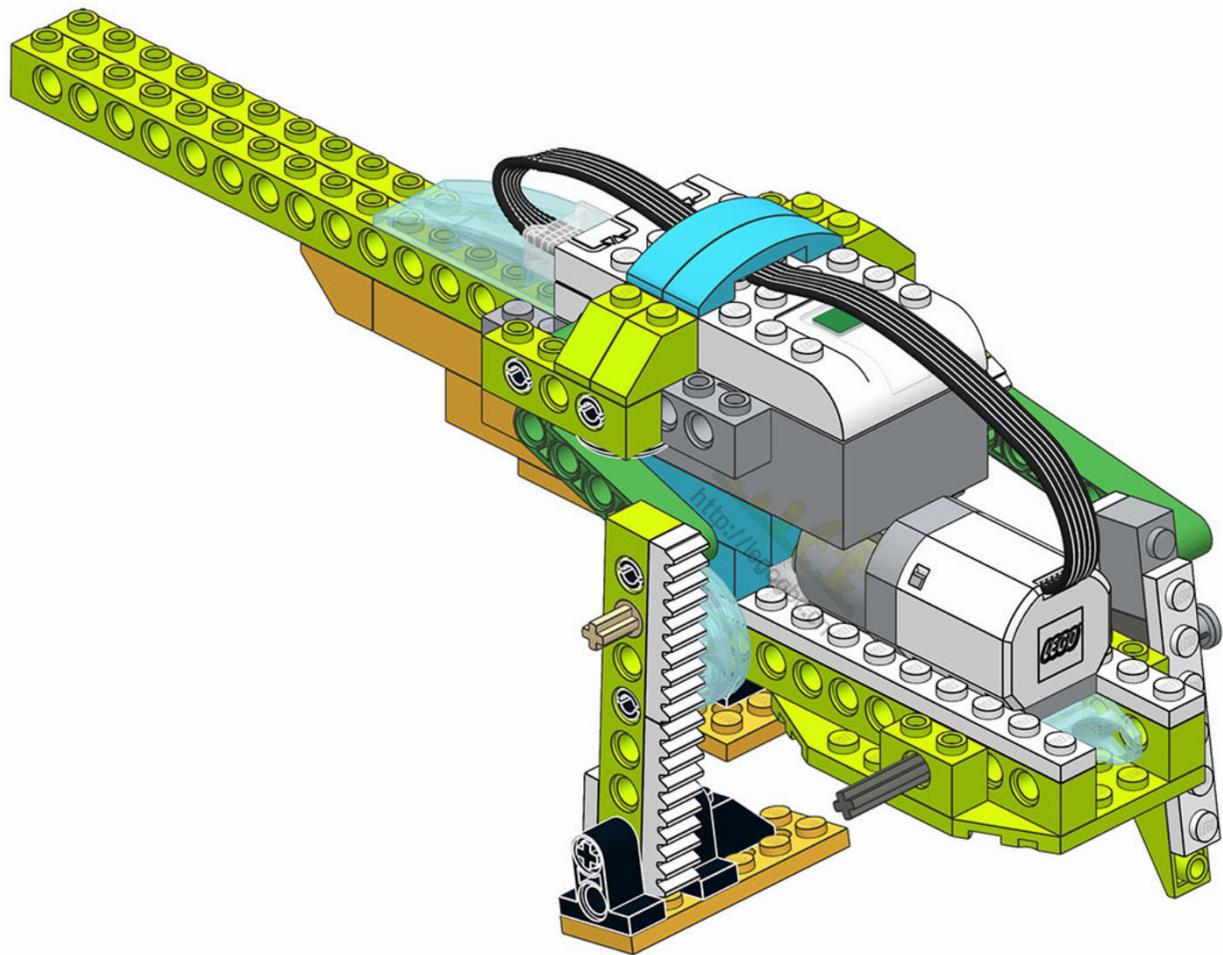
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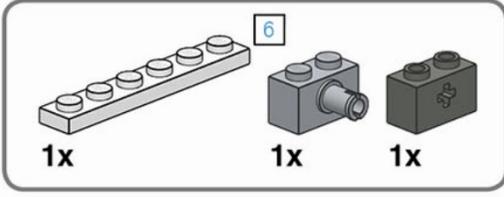
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55

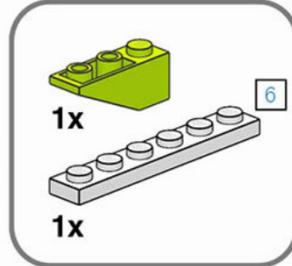
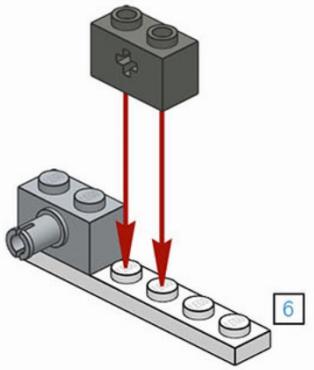




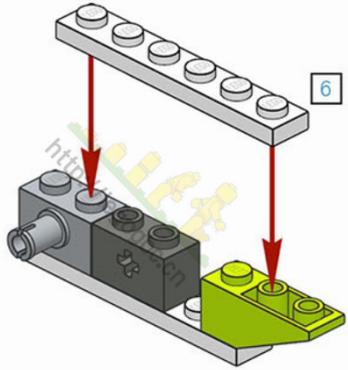
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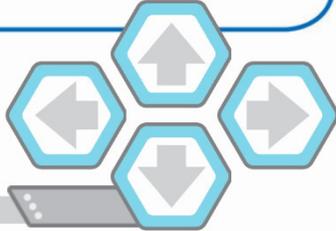
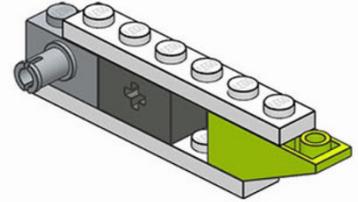
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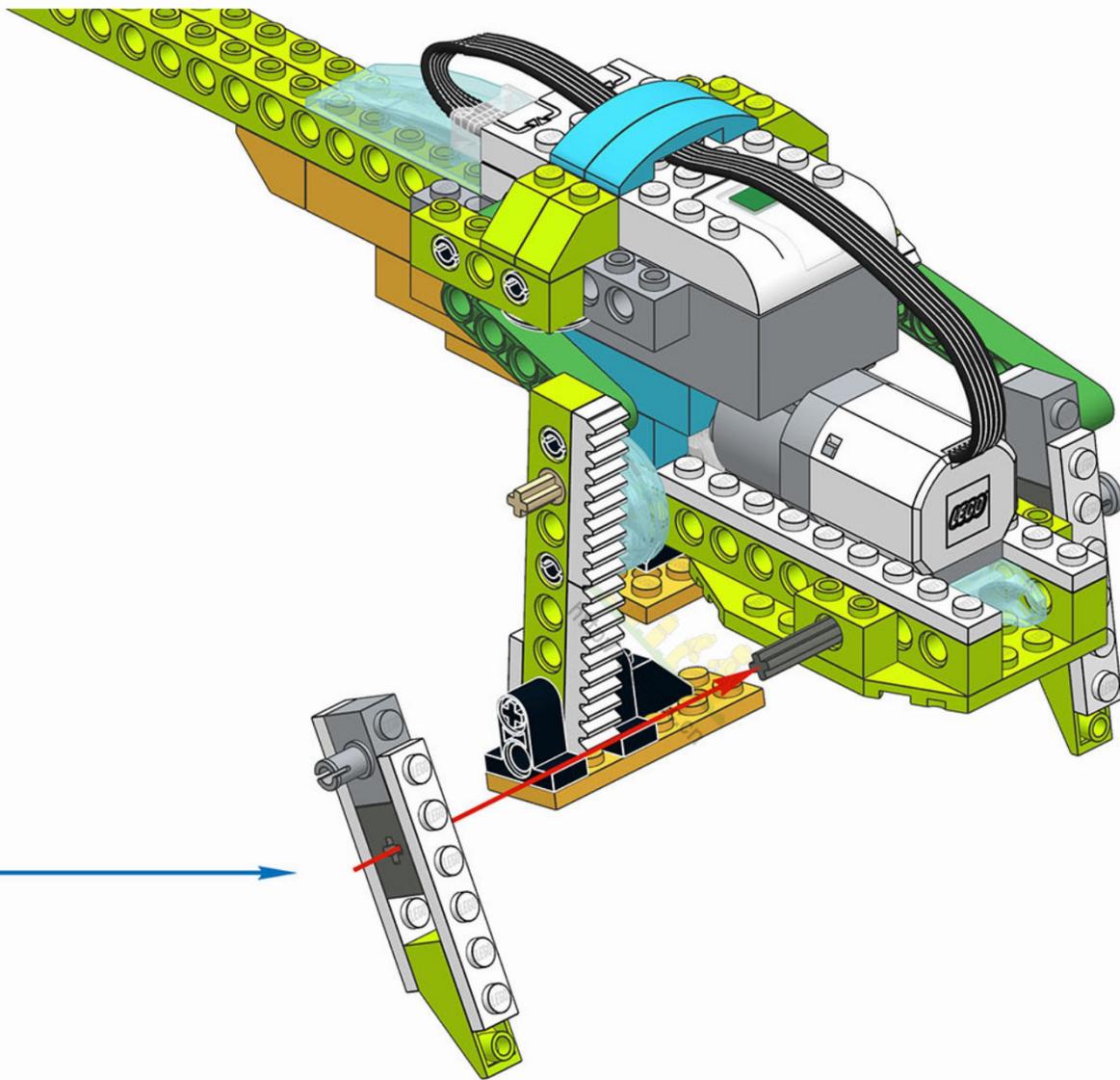


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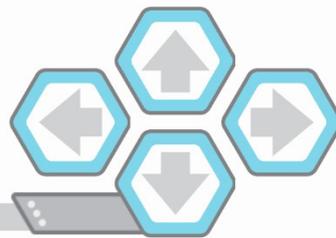




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57



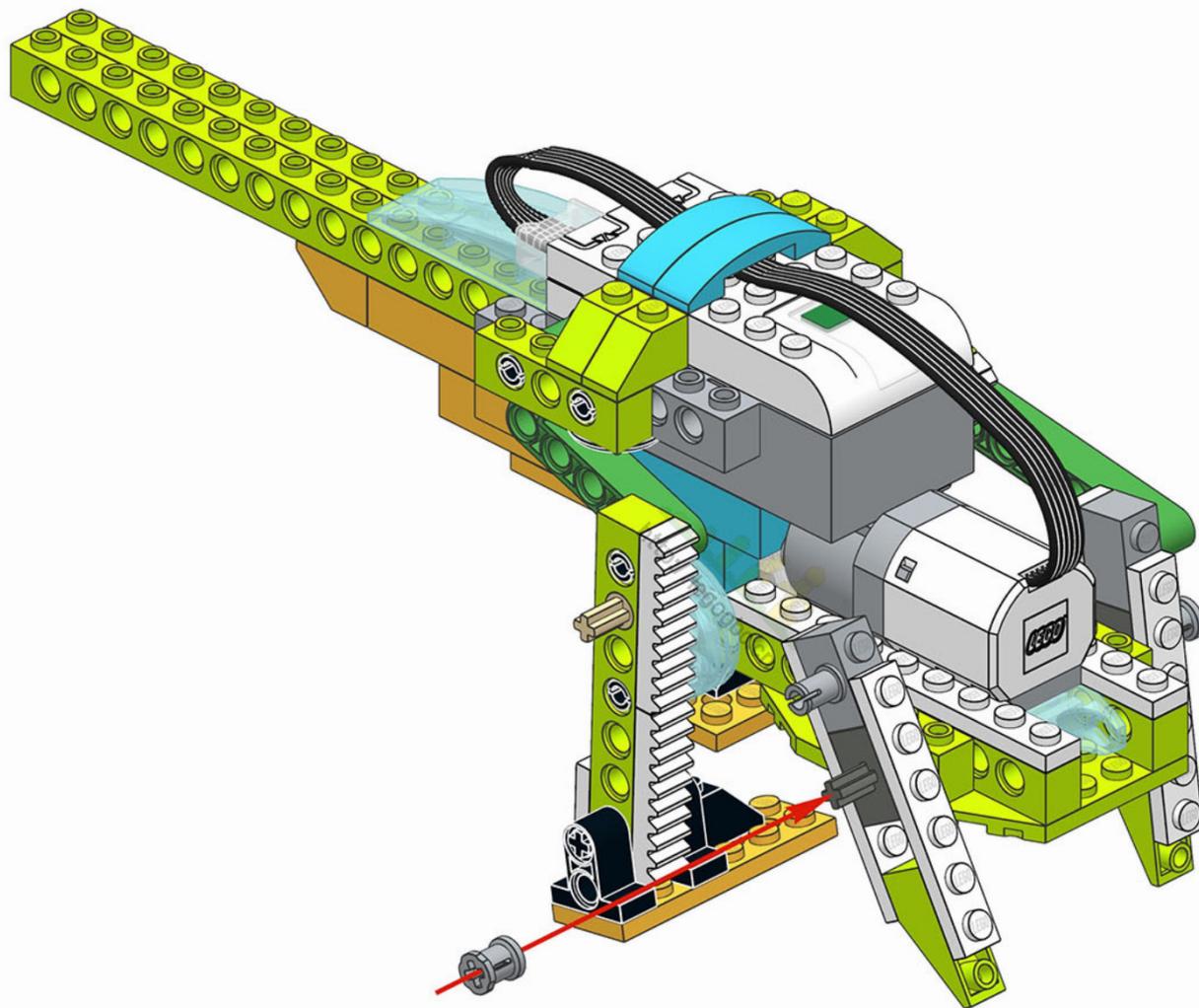


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1x

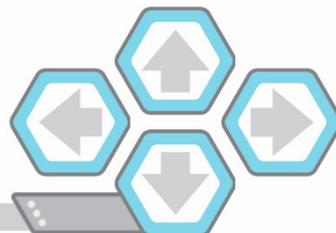
58



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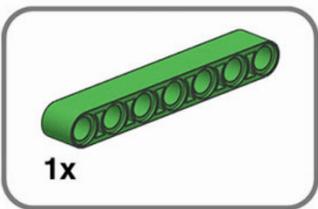
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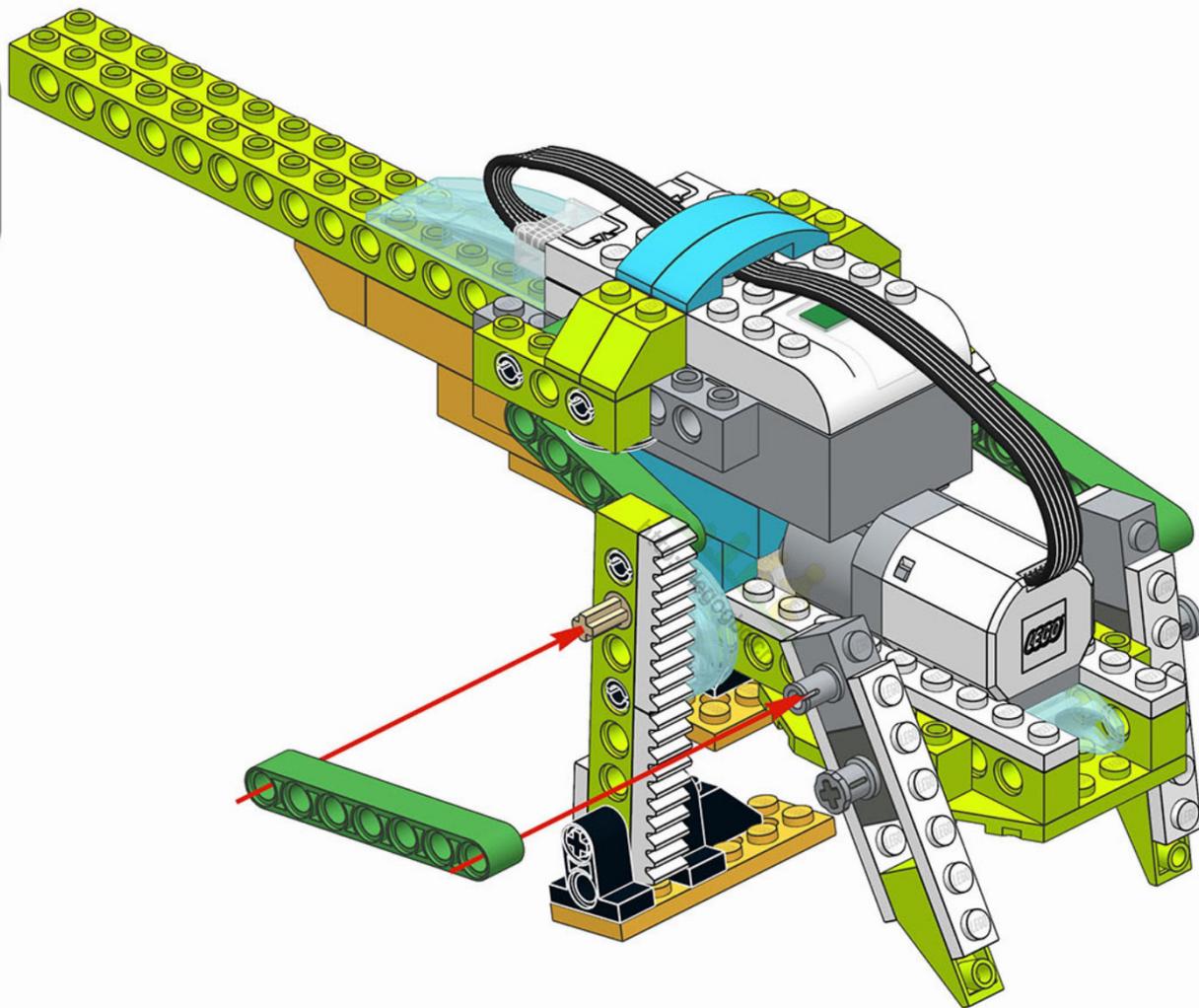




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1x



59



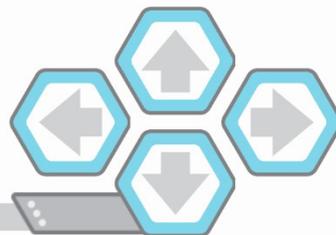
59/74



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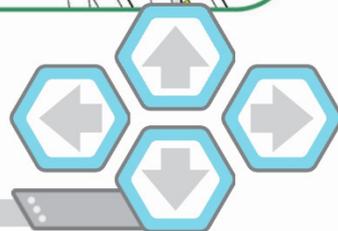
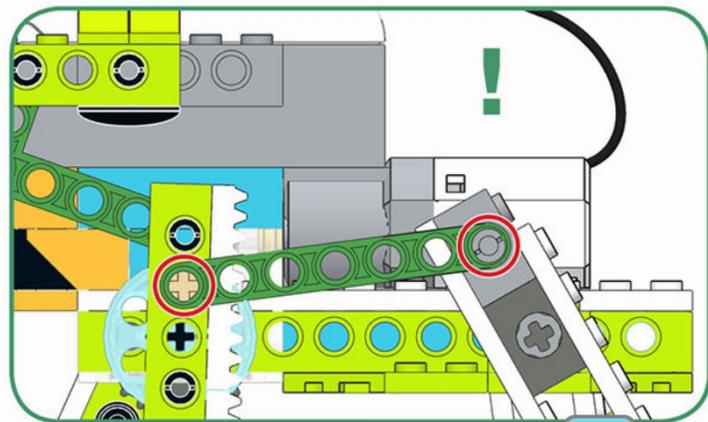
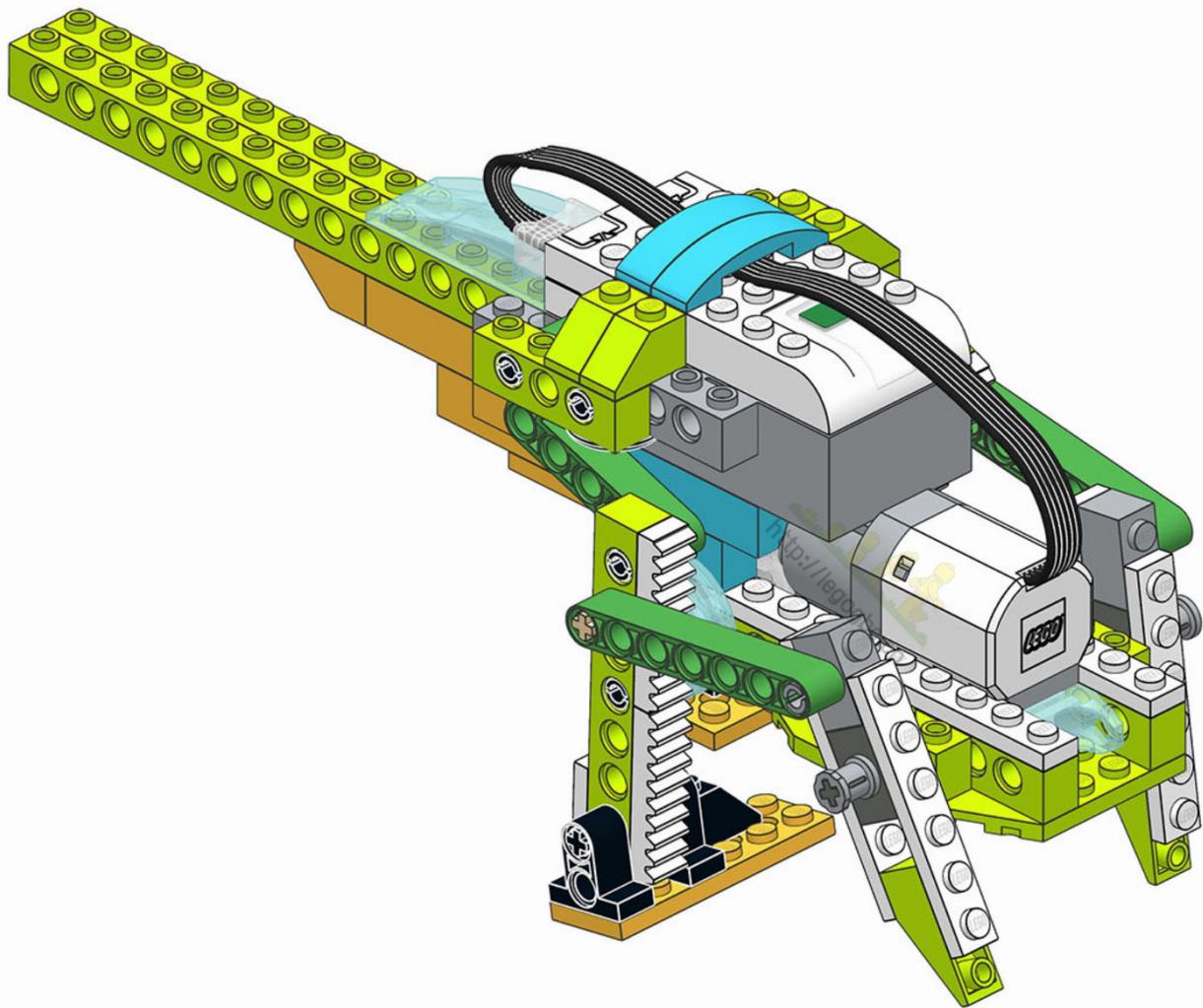
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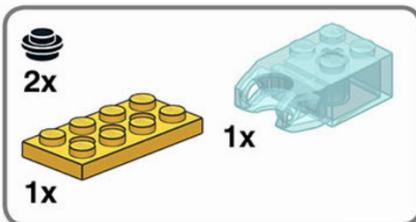
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60

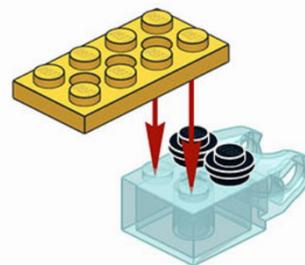




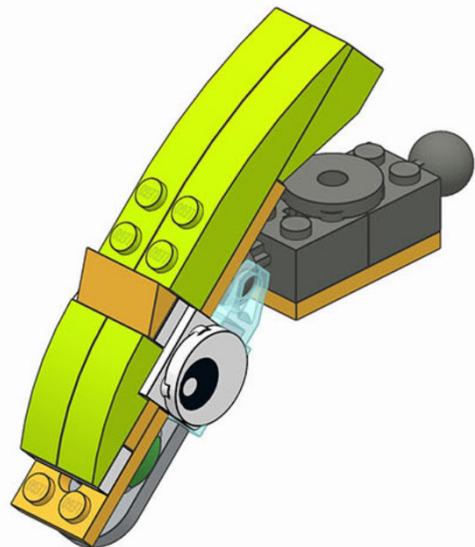
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61



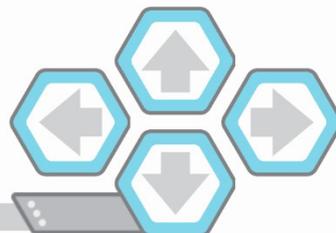
<http://legogbc.cn>



61/74

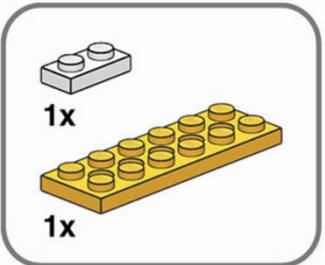
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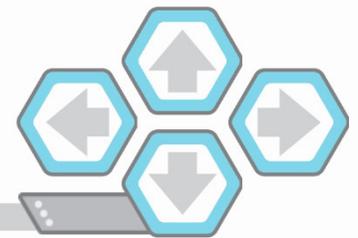
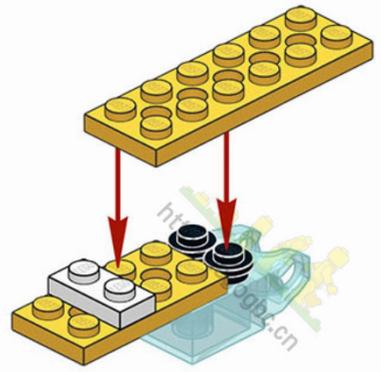




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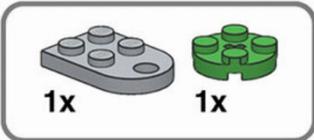


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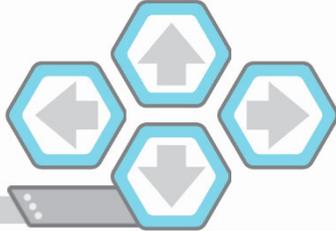
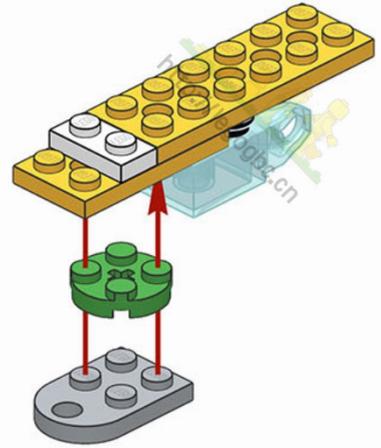




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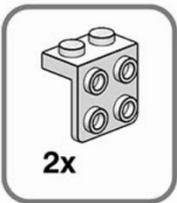


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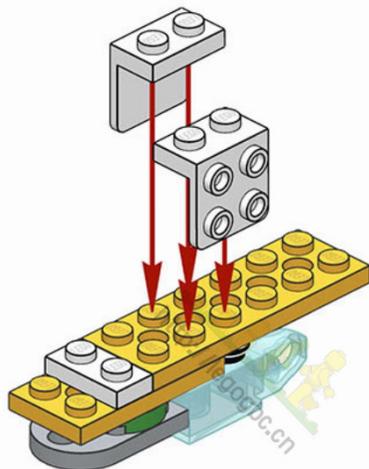


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2x

64



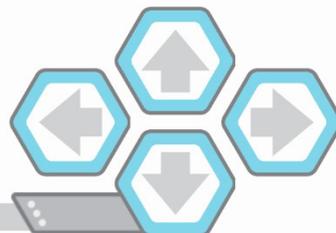
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5

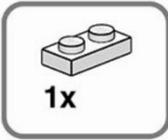


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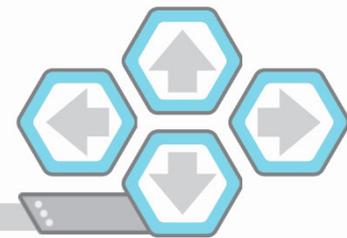
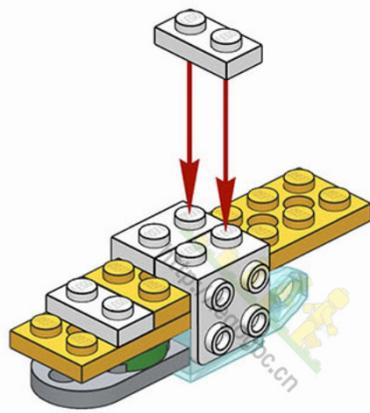




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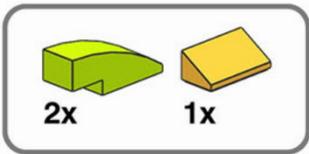


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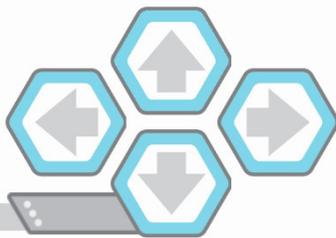
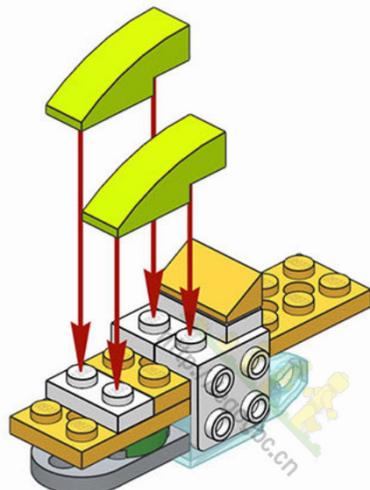




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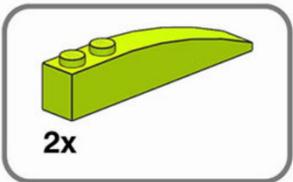


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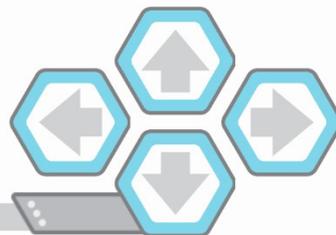
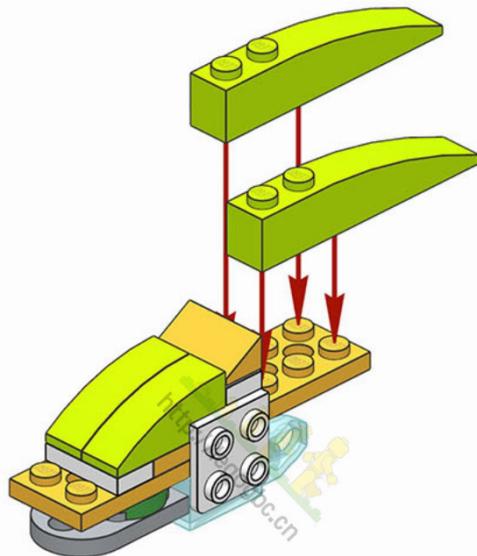


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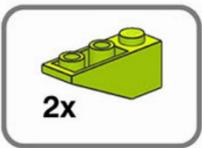
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67



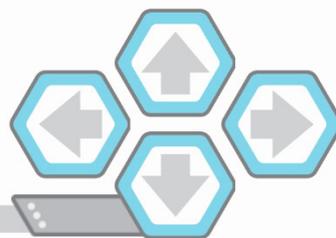
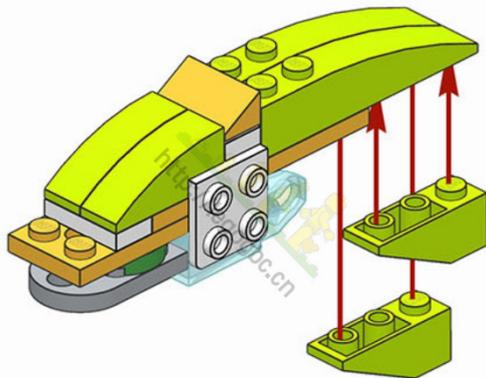


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2x

68



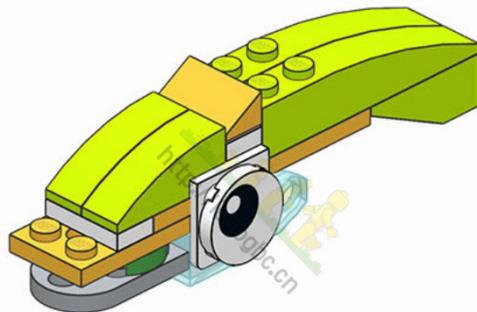


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2x

69



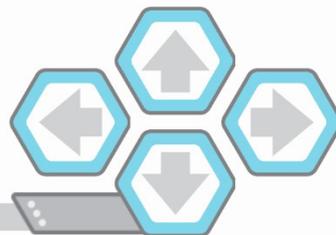
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5

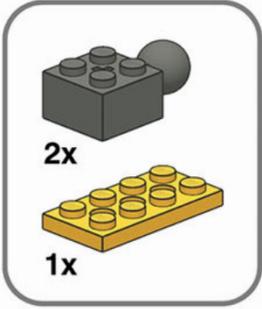


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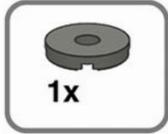
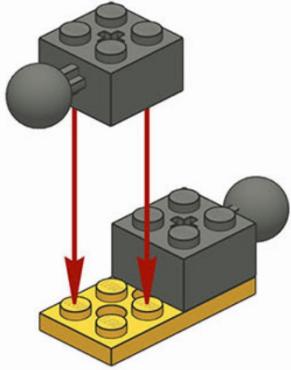




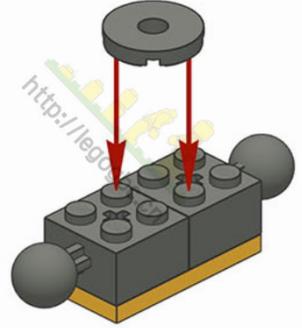
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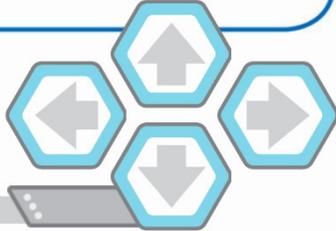
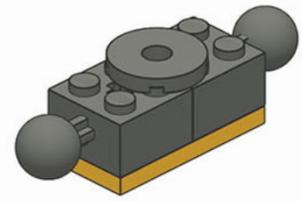
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2



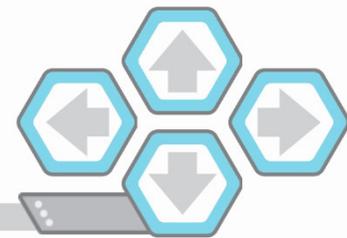
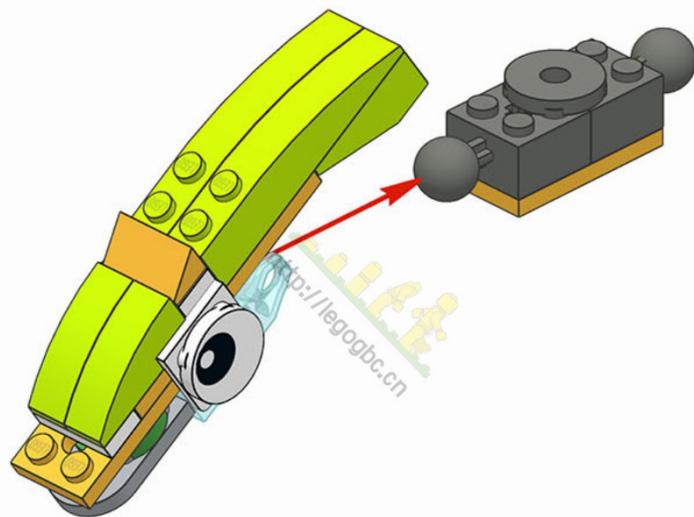
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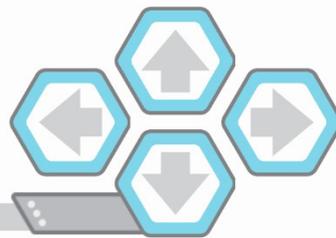
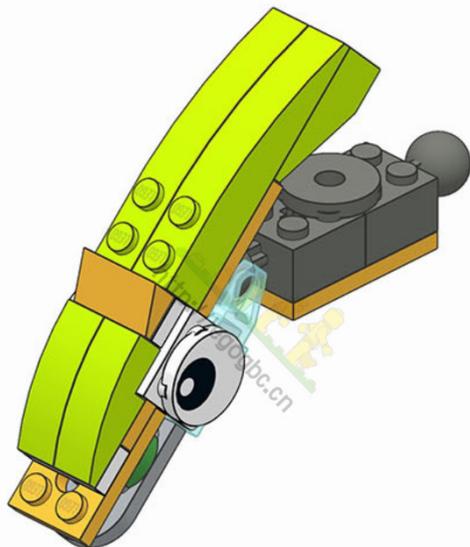
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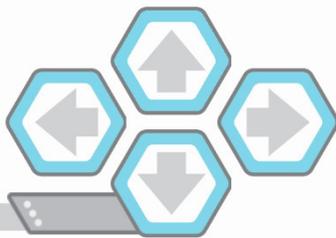
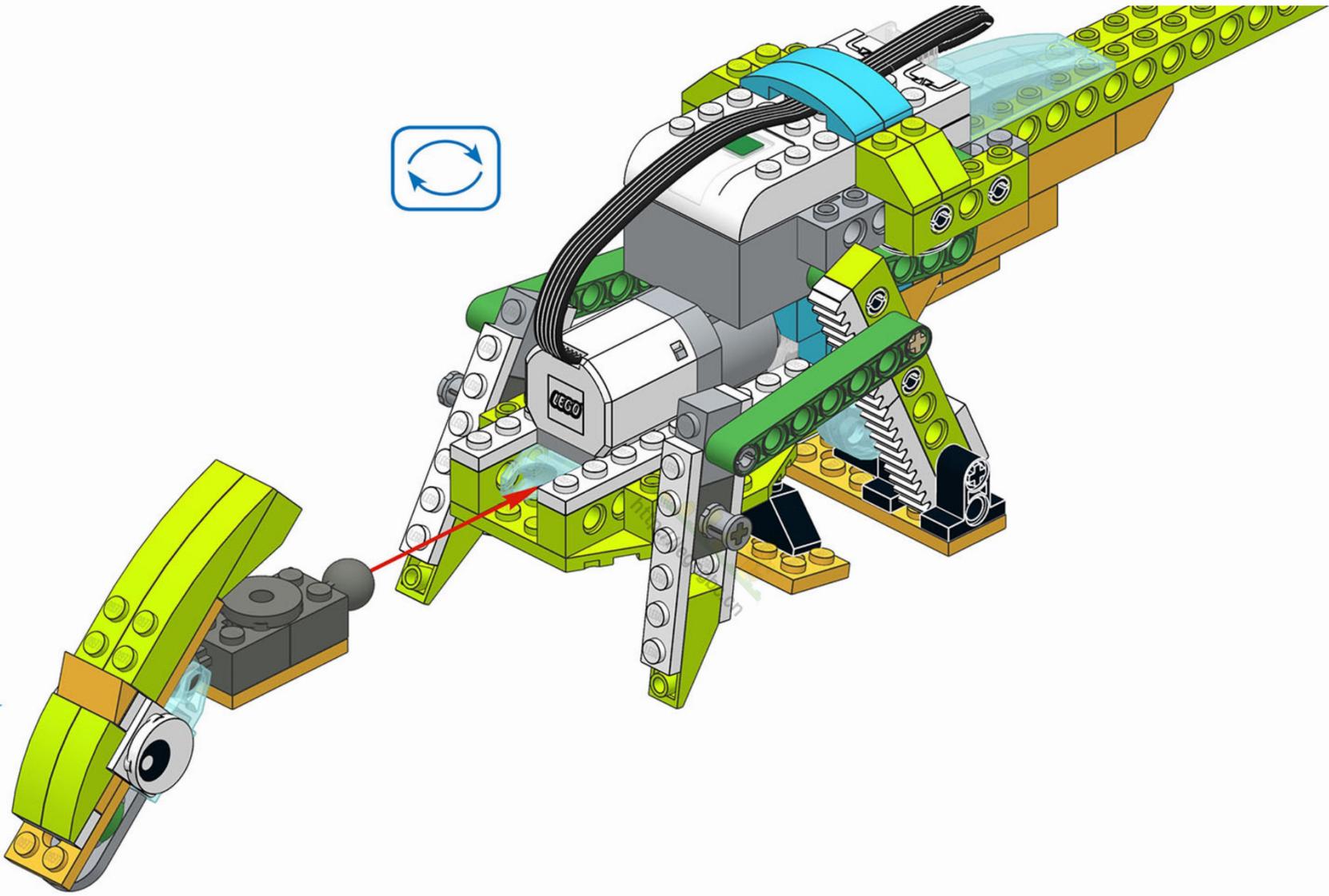
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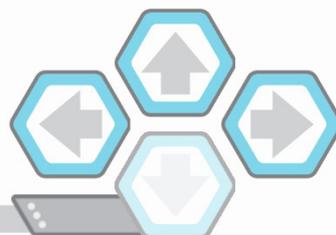
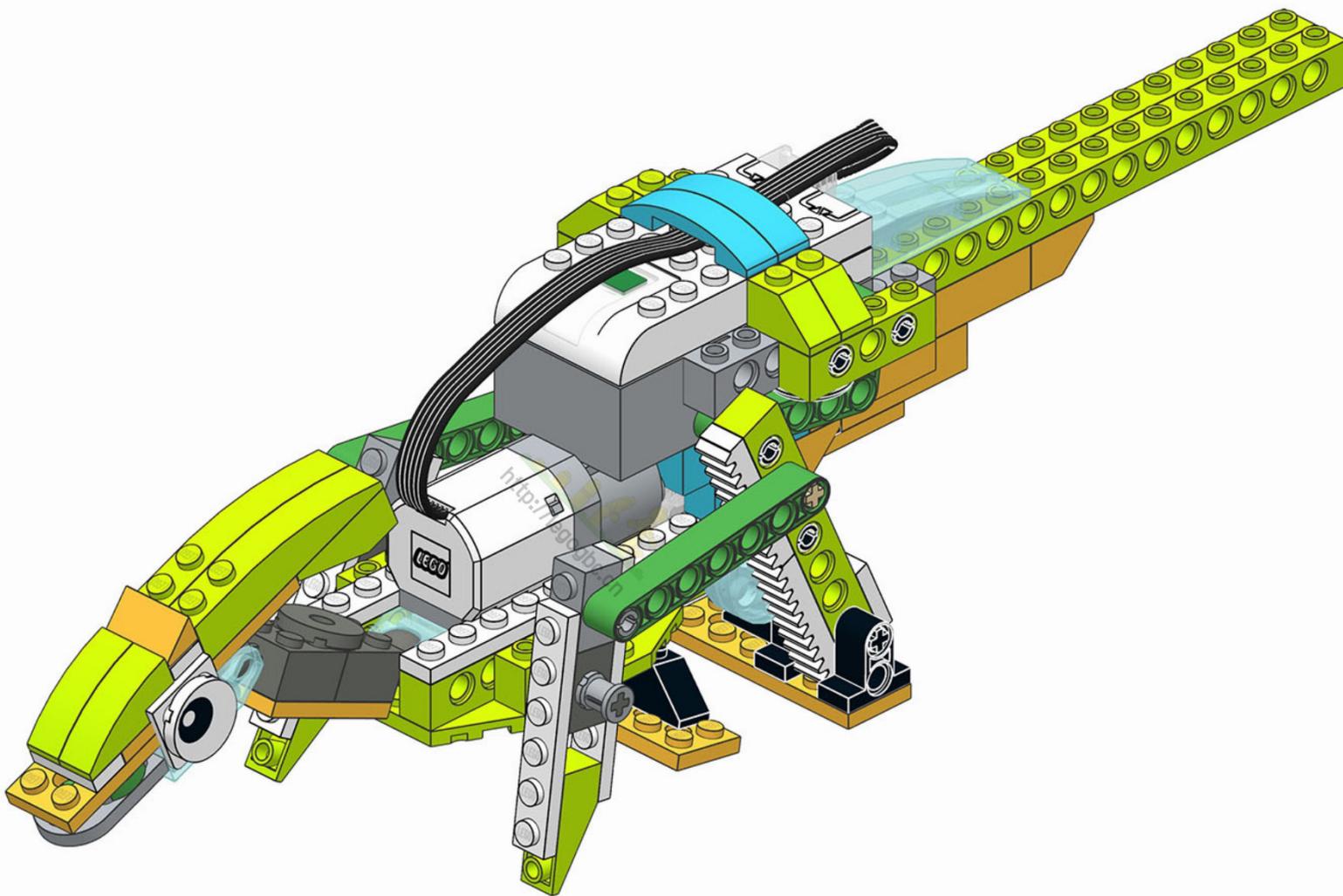
73





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74



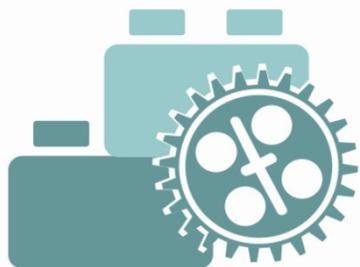


Enhanced version



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Add the decorative elements of the trunk and tail of the robot.



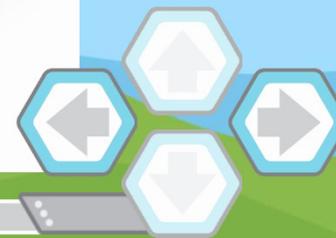
Parasaurolophus



5

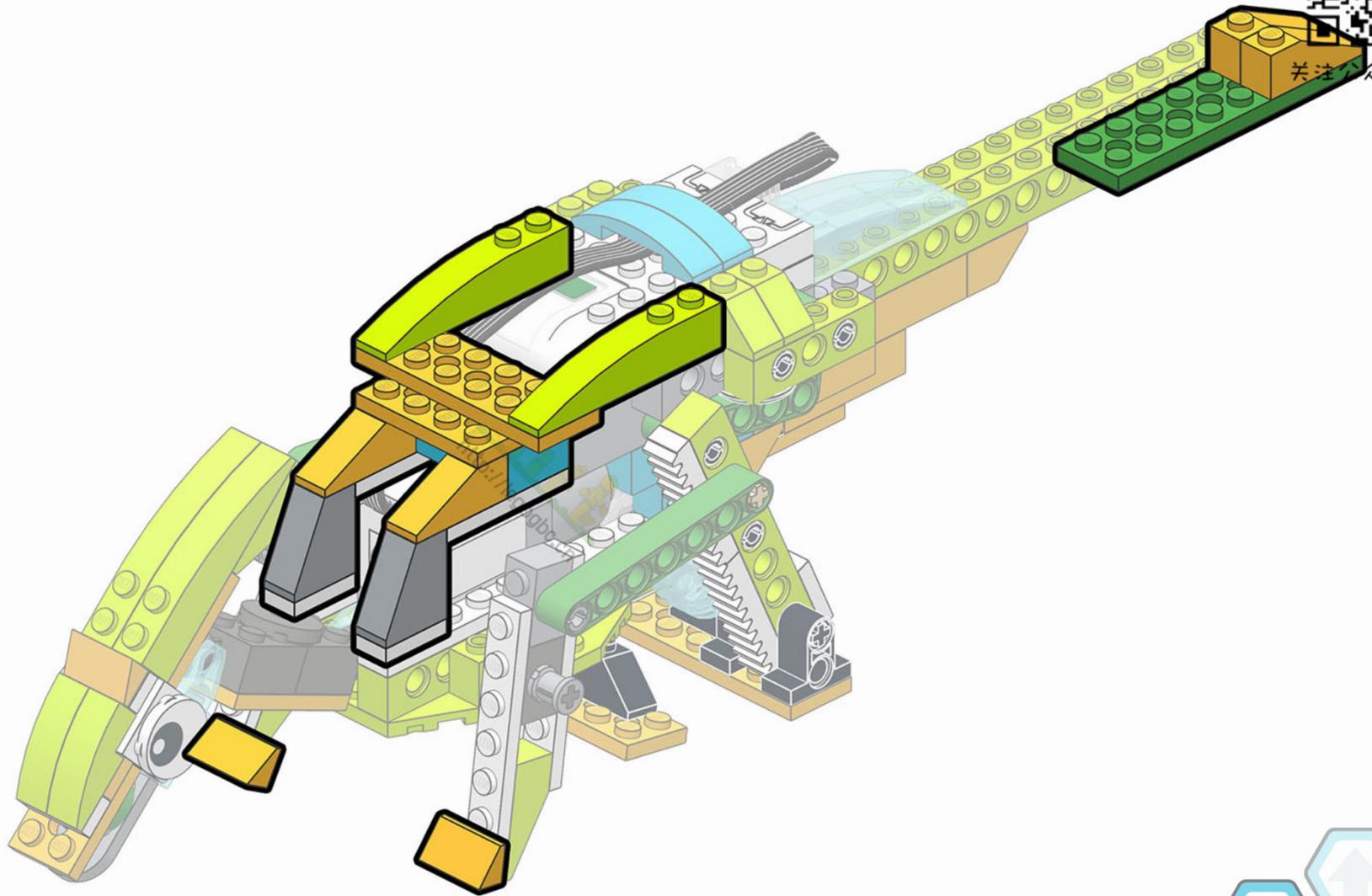


100





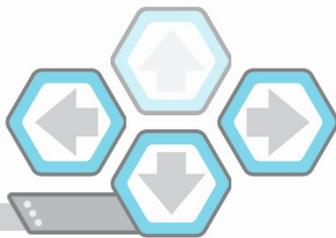
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1/10

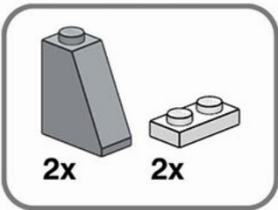
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101

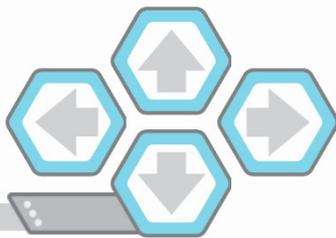
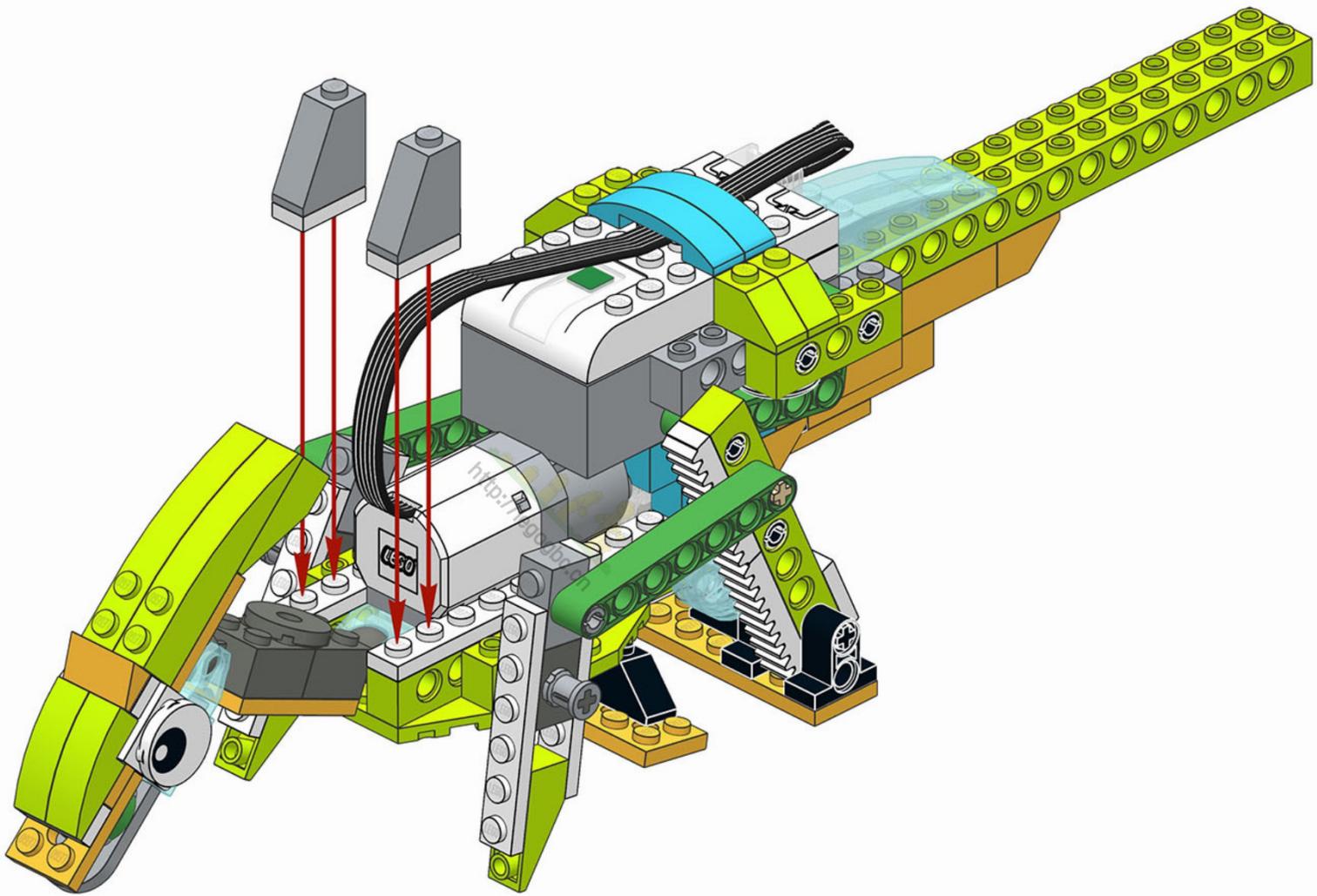




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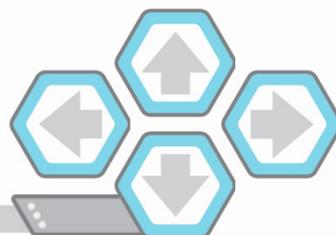
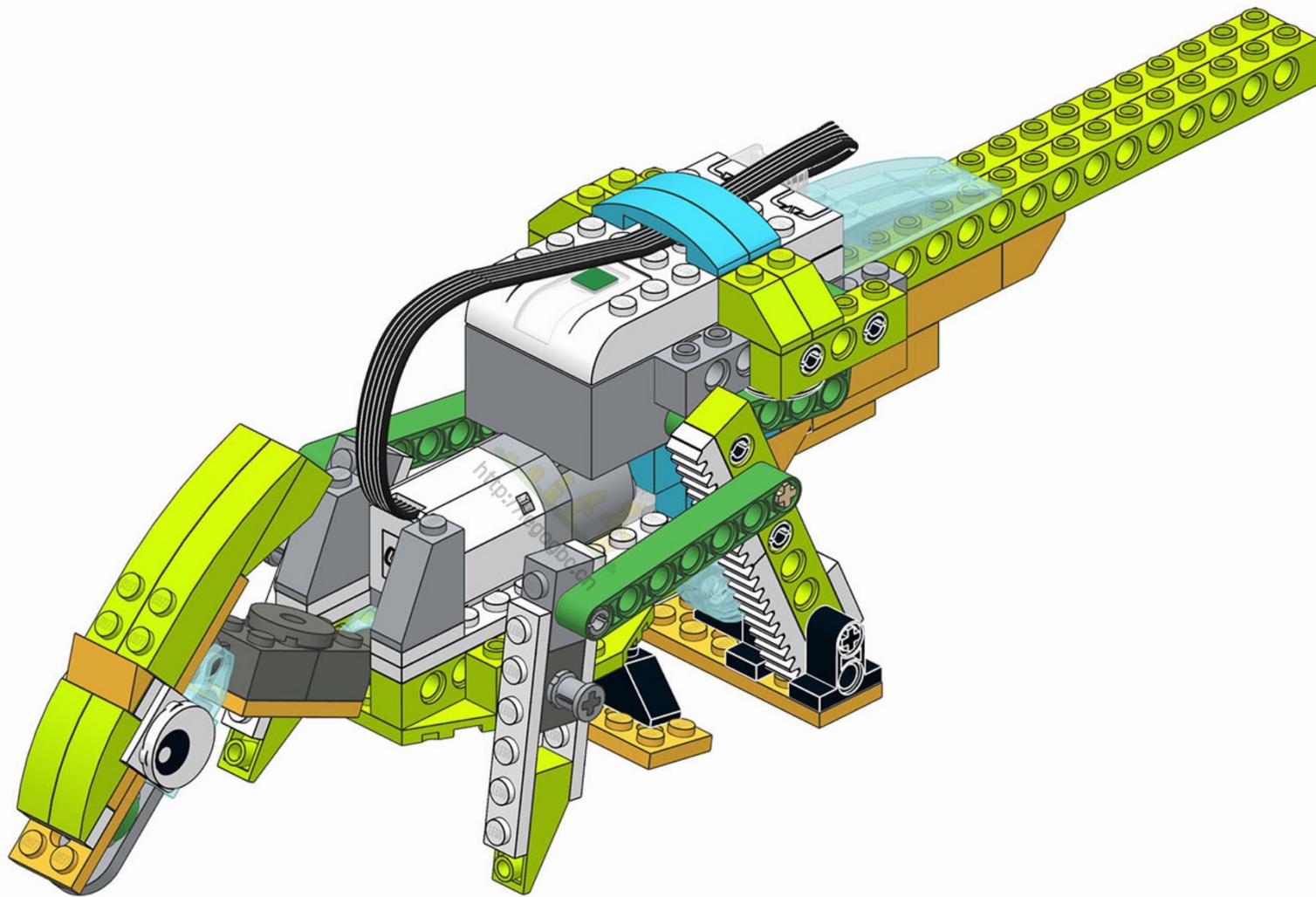
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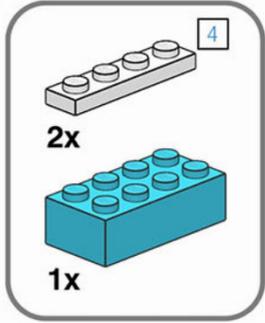
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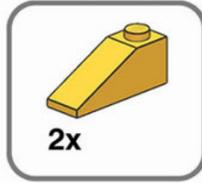
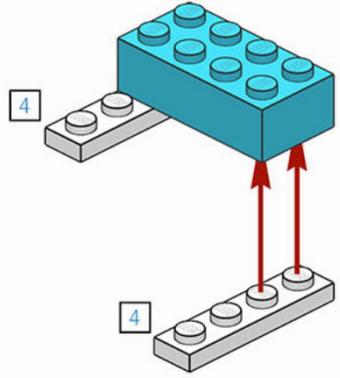




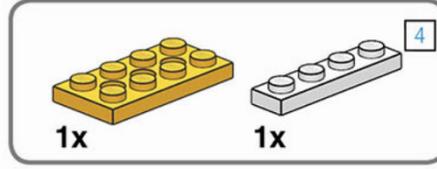
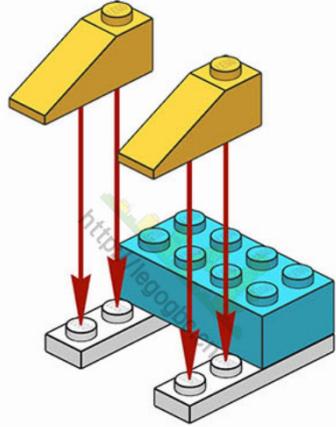
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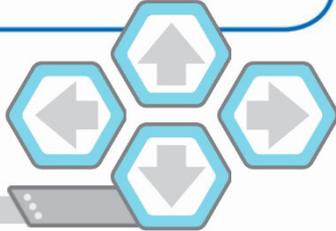
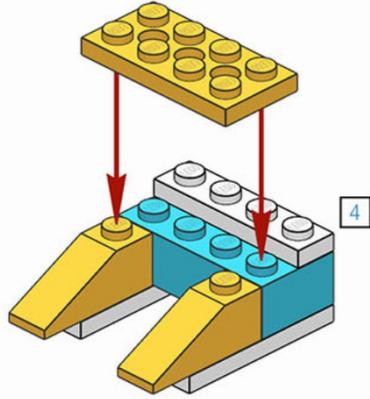
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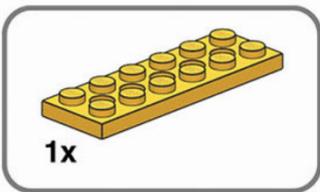


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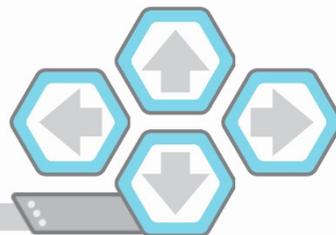
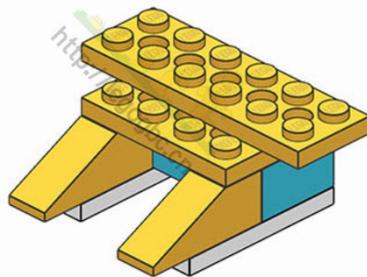
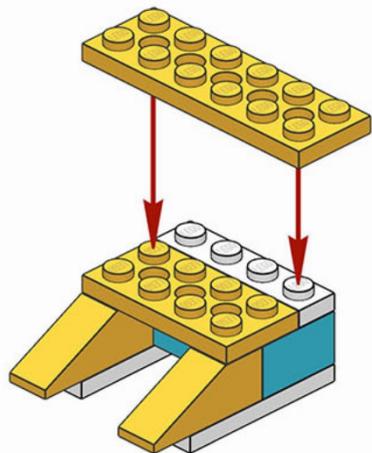


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5

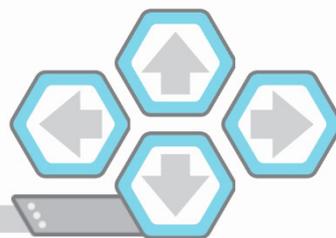
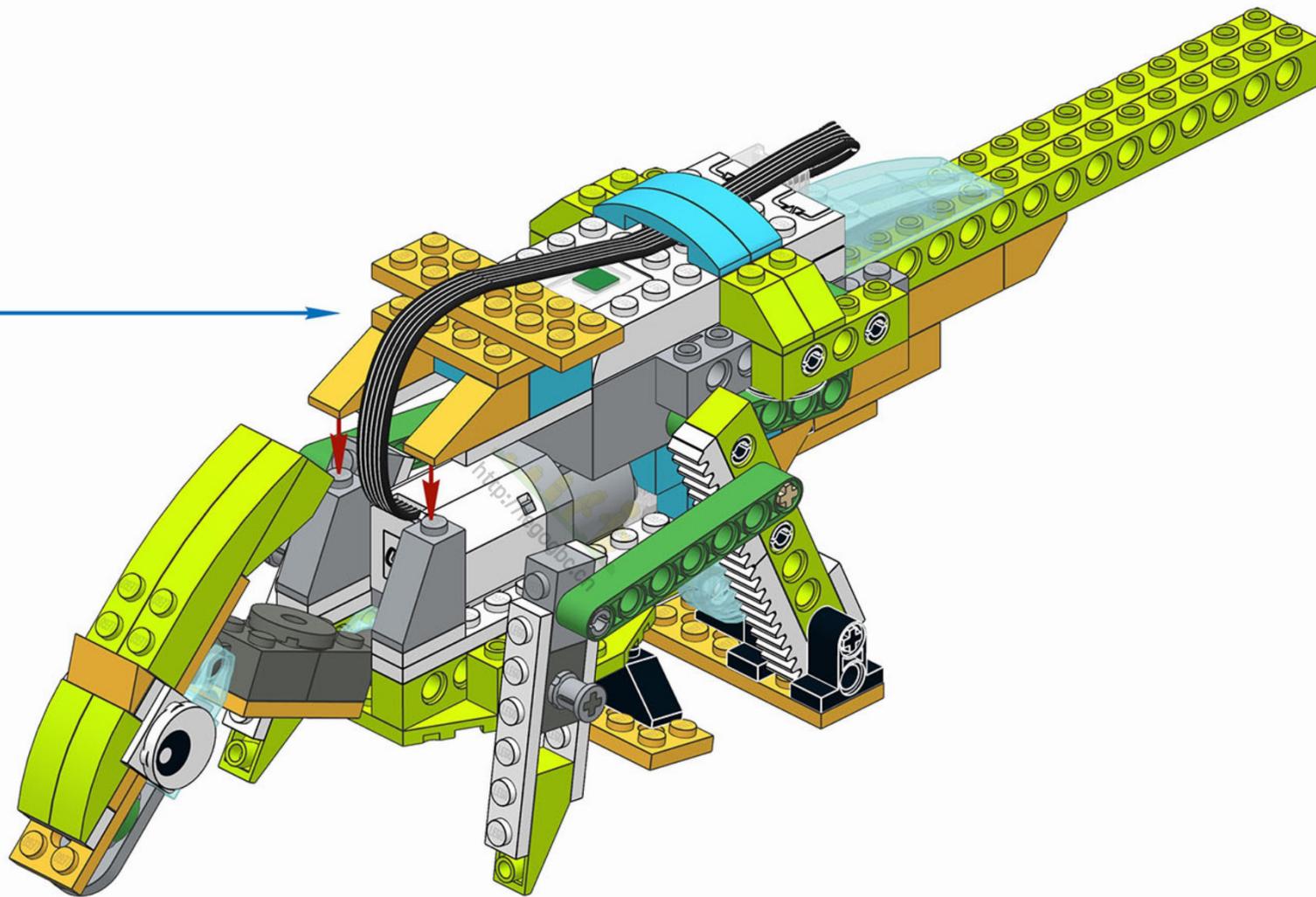
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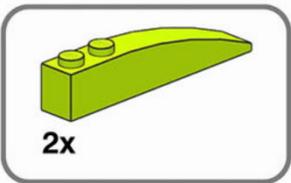
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79



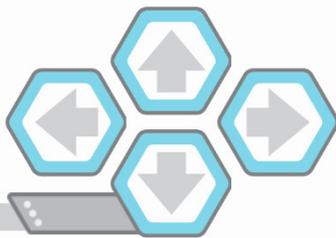
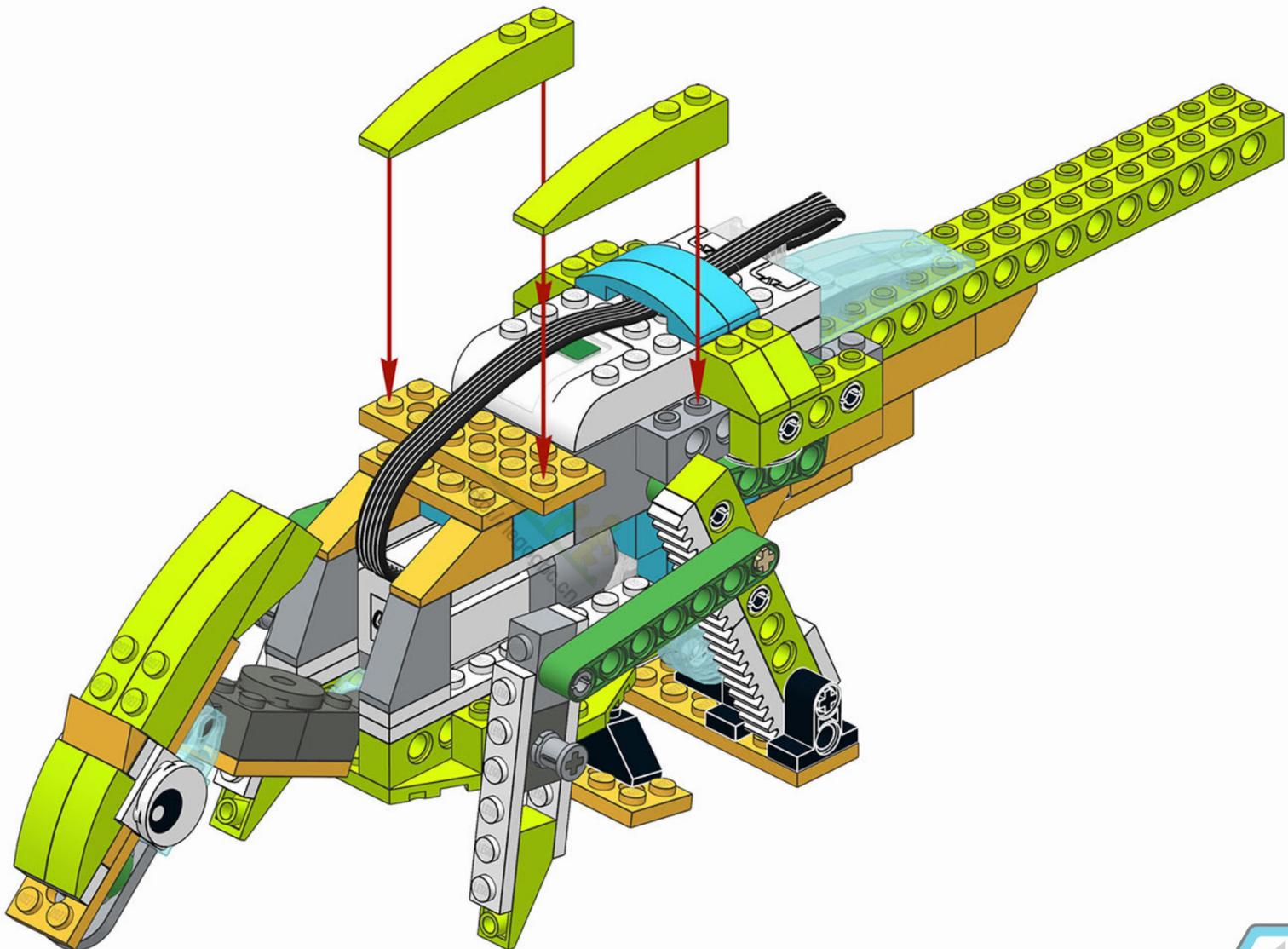


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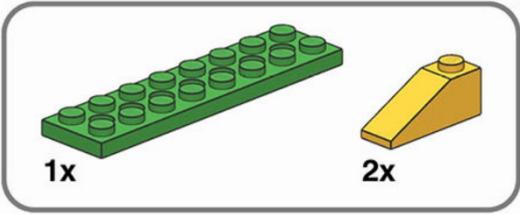
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80





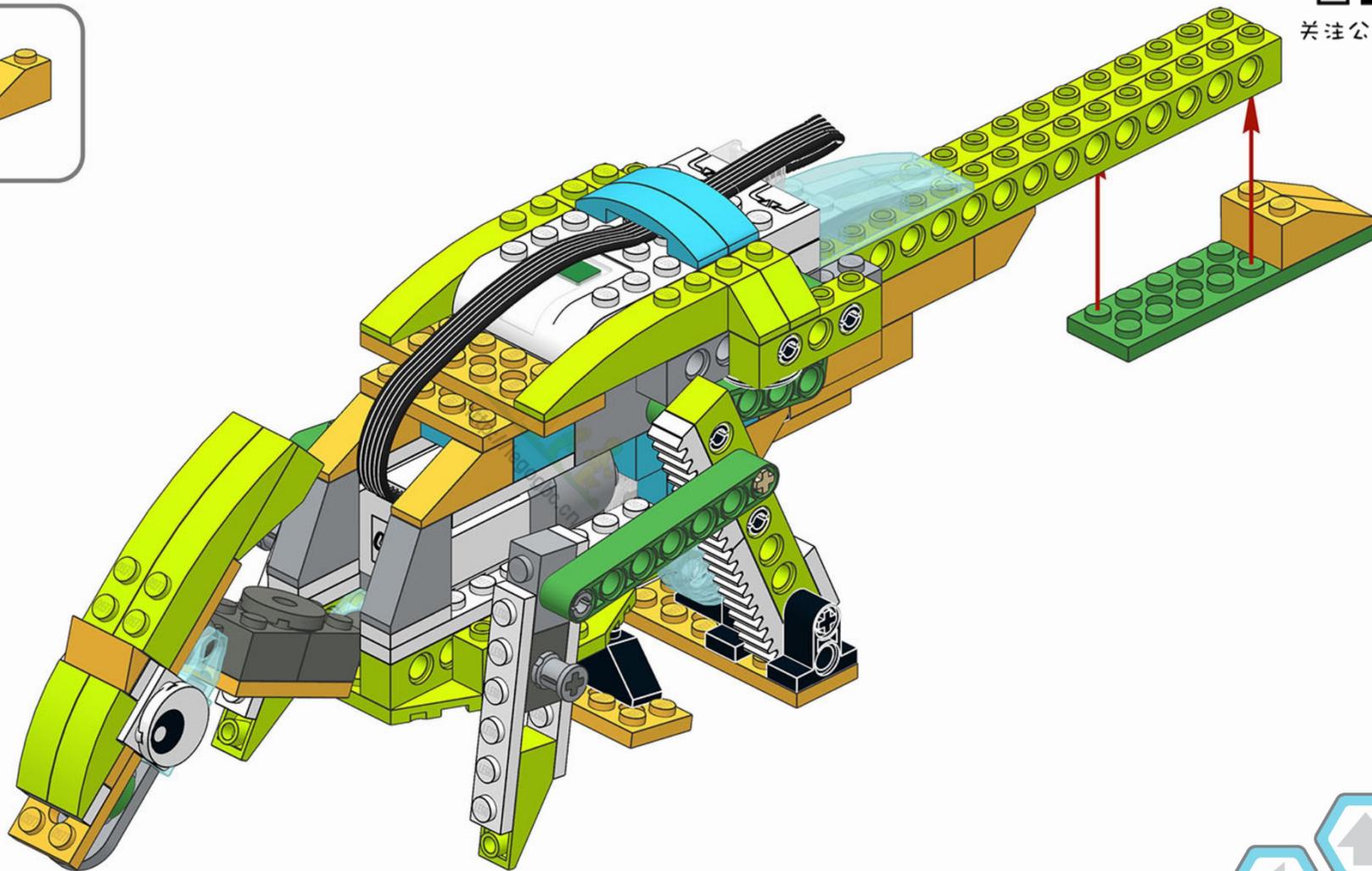
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1x

2x

81



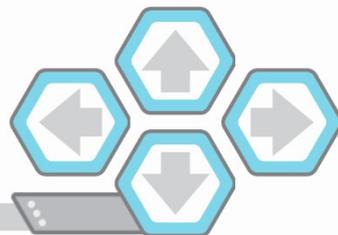
8/10



5

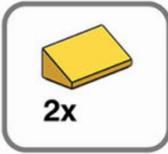


108

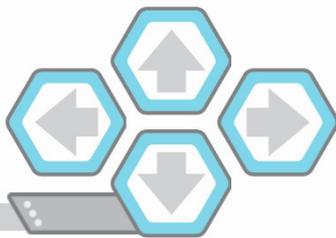
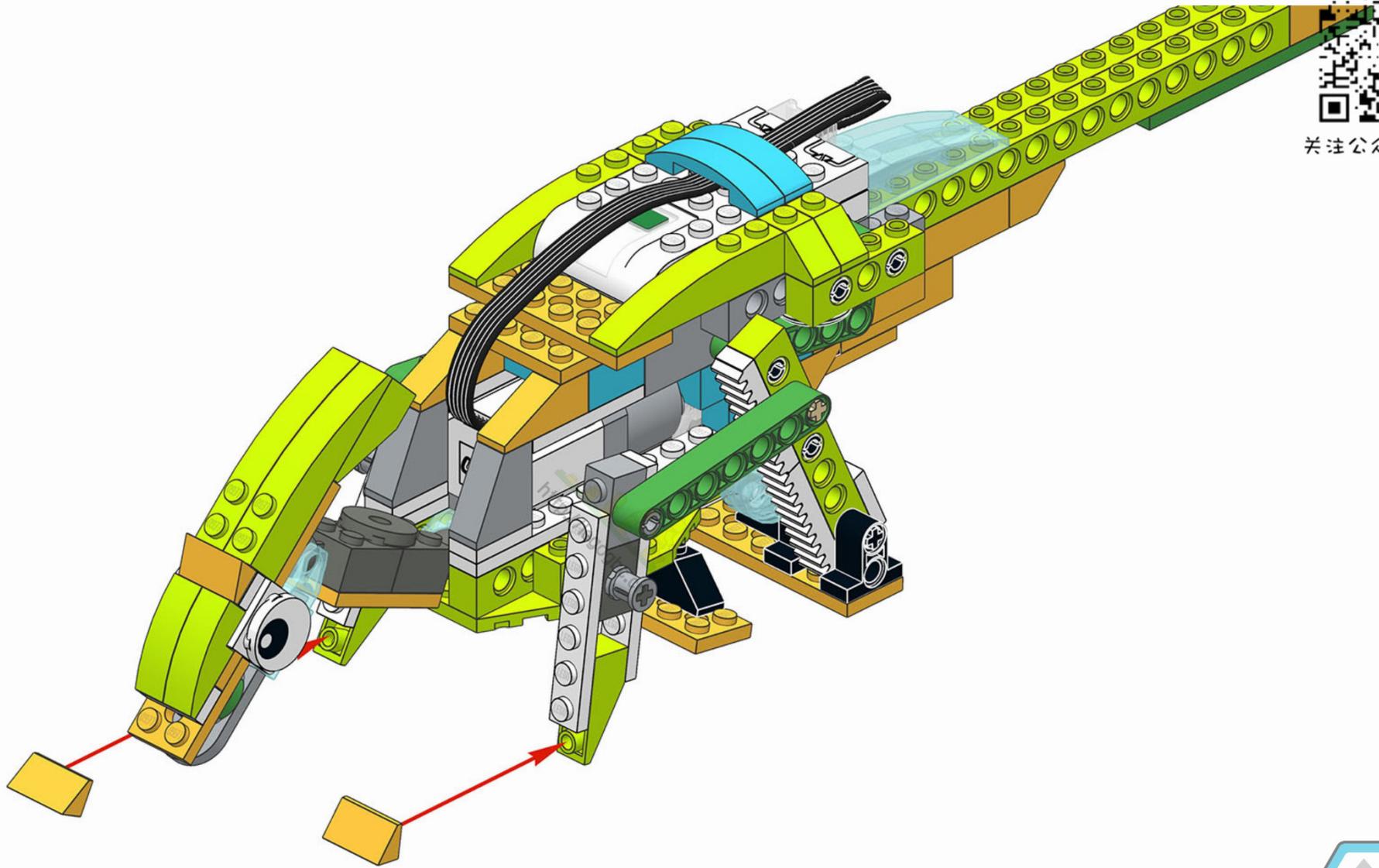




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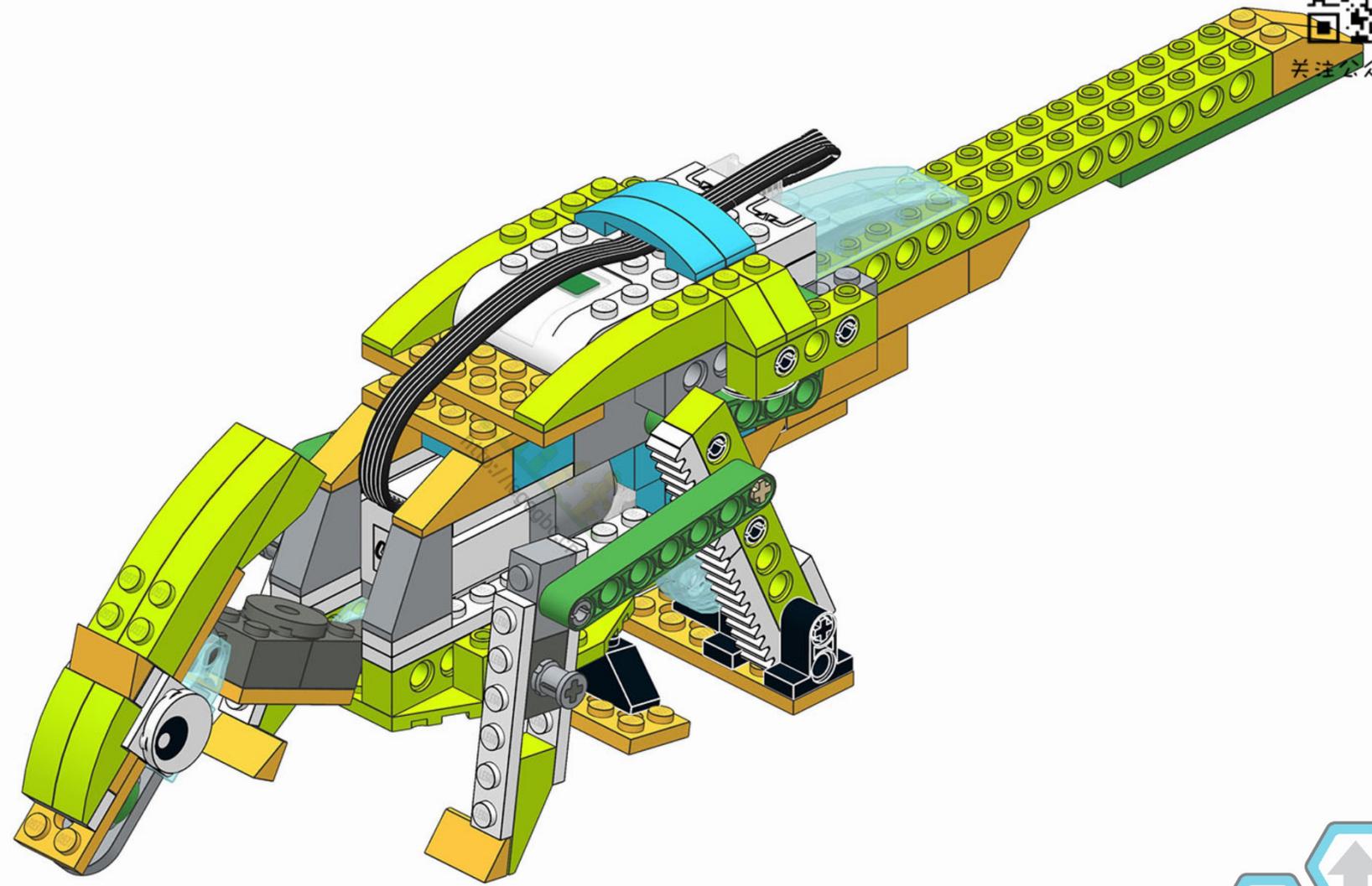
82





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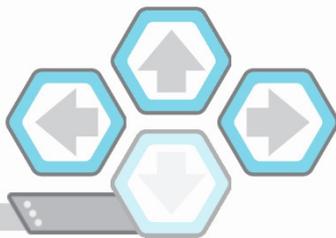
83



10/10

5

110



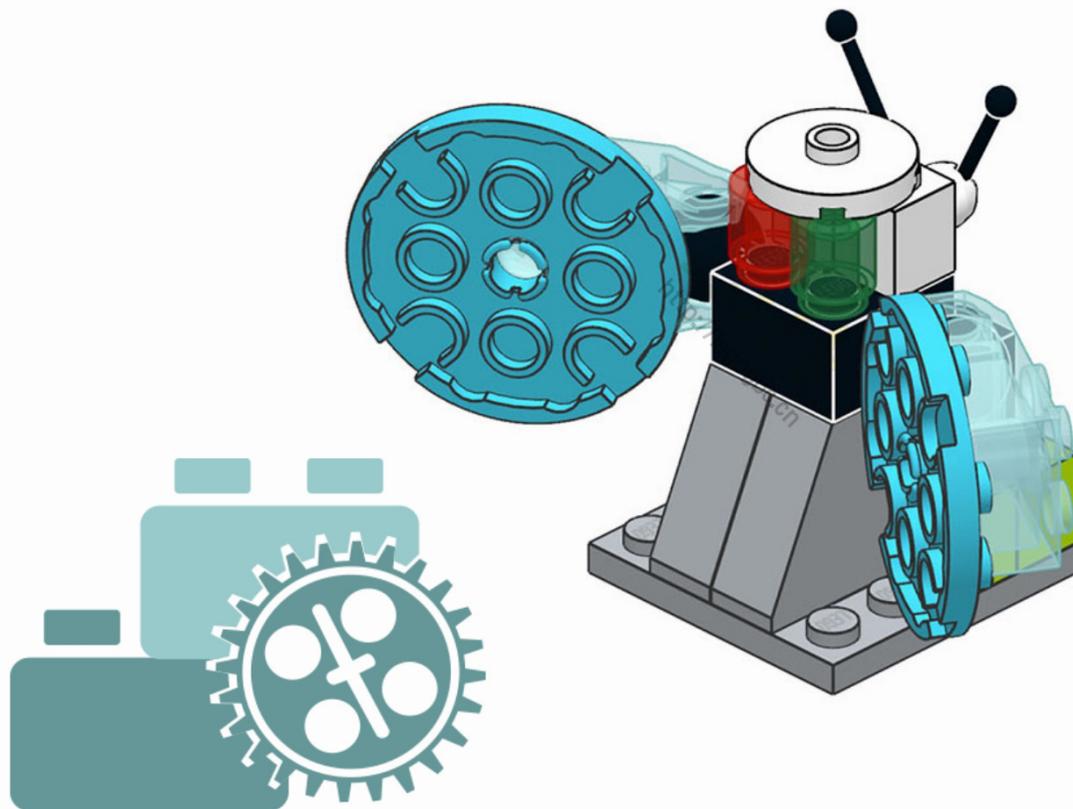


Charging station



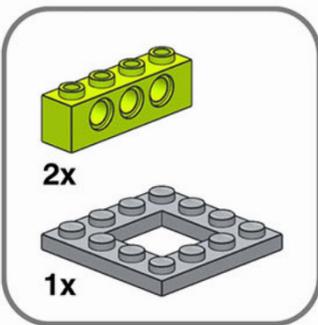
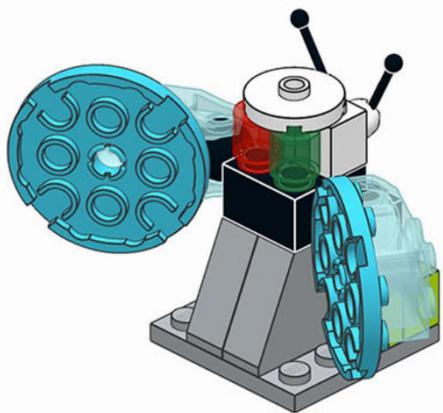
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Build the charging station for the robot.



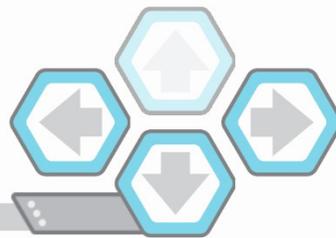
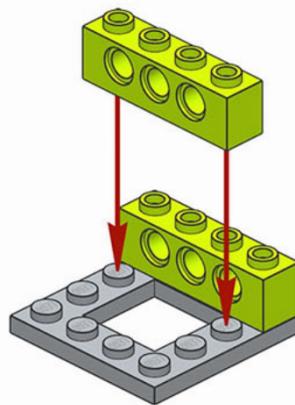


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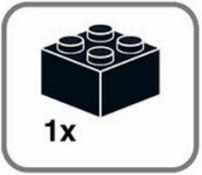
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<http://legogbc.cn>

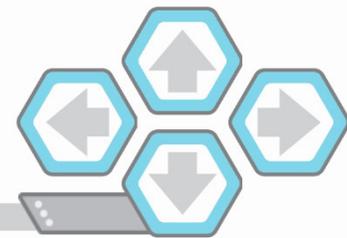
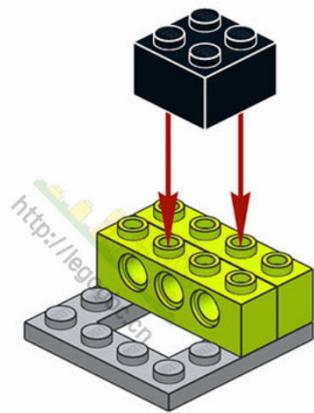




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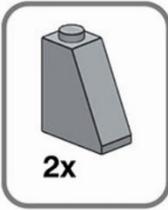


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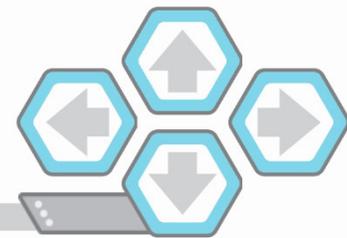
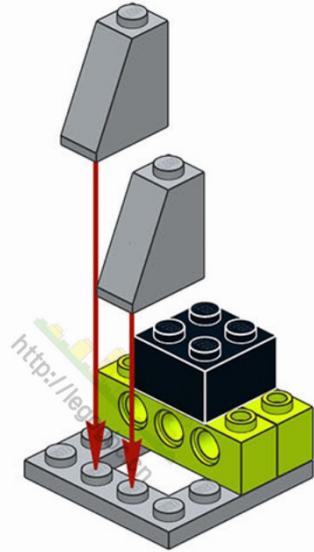




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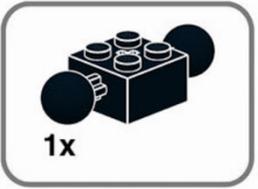


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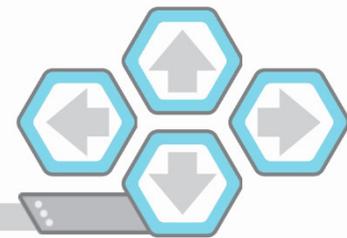
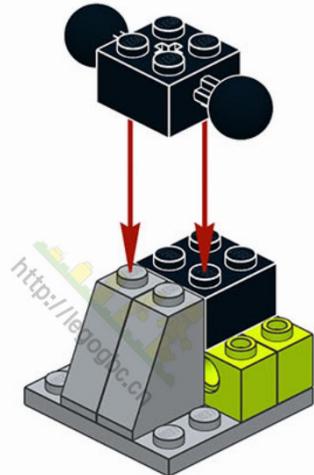




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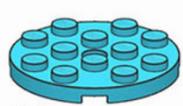


4





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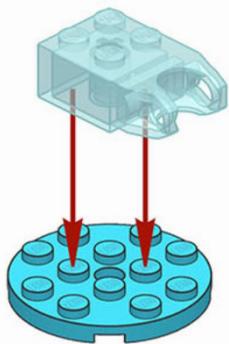


1x

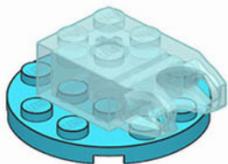


1x

1

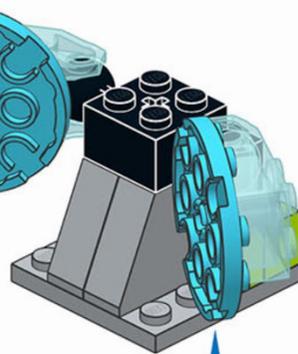


2



2x

<http://legogbc.cn>



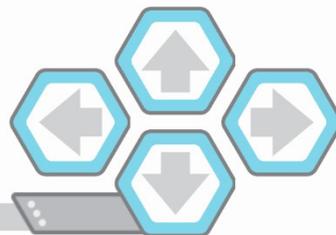
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5

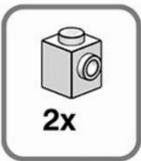


116



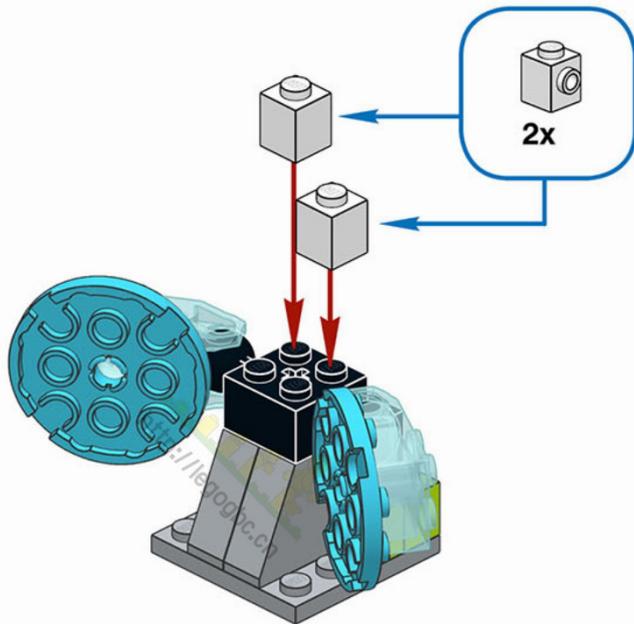


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2x

6



2x



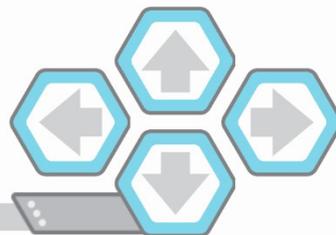
6/9



5



117



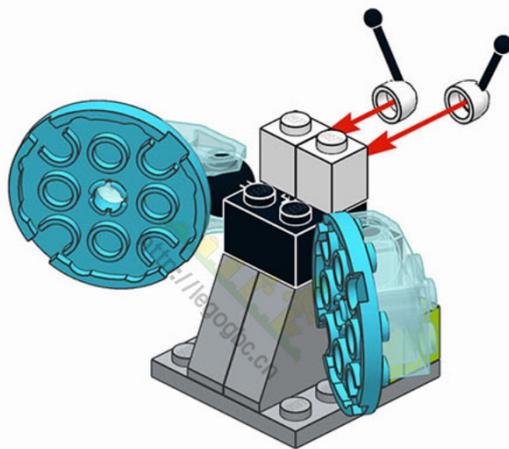


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2x

7



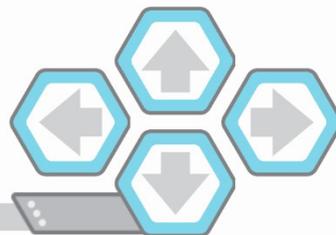
7/9



5

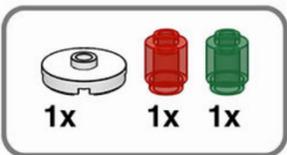


118

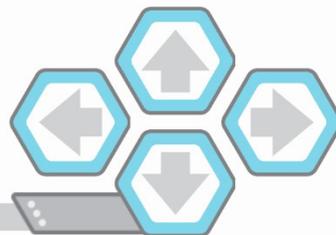
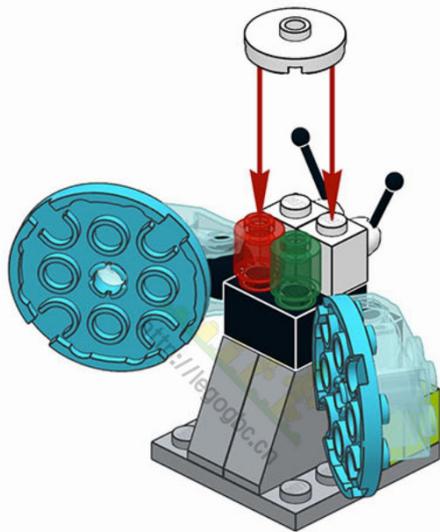




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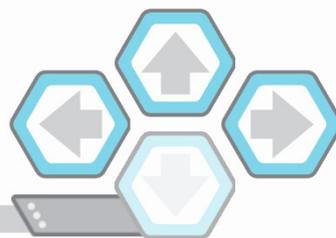
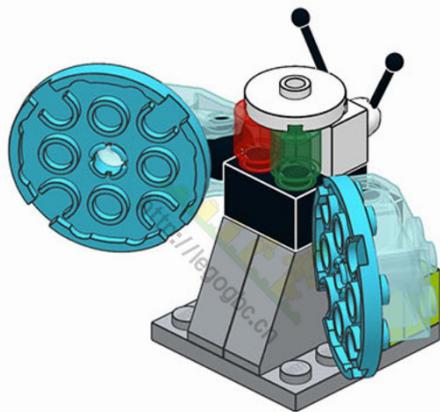
8





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9





Check it out!



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Avoid any friction
between the cables
while robot is moving.



5



121



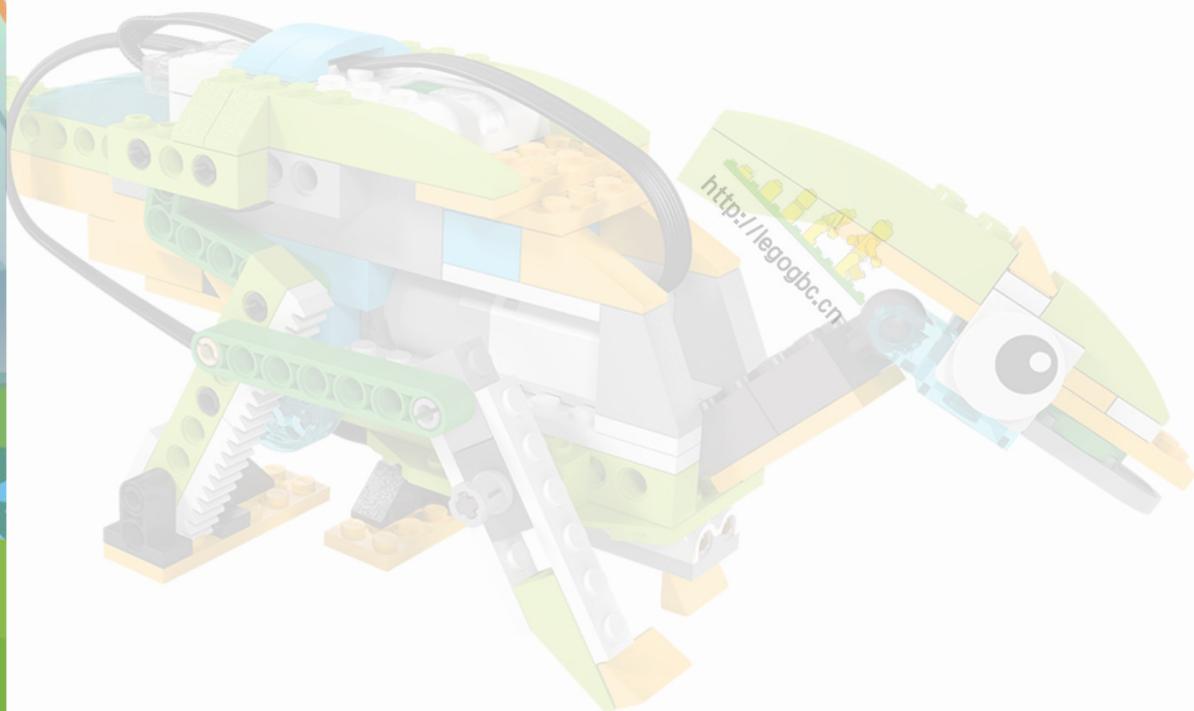


Task



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Place parts of the robot on the right places



5



122

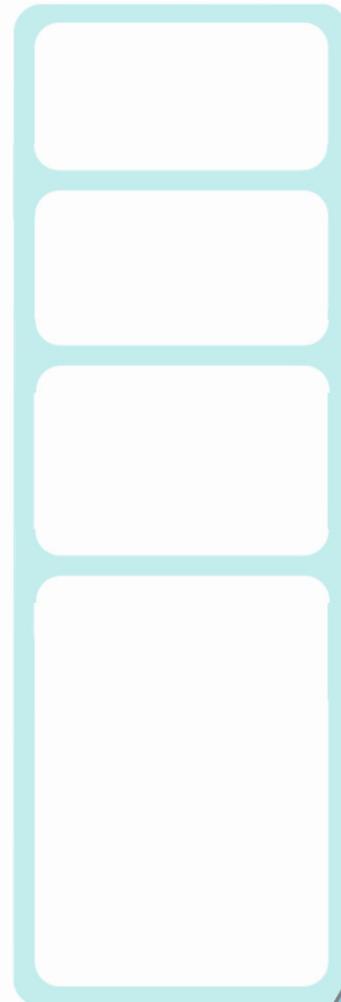
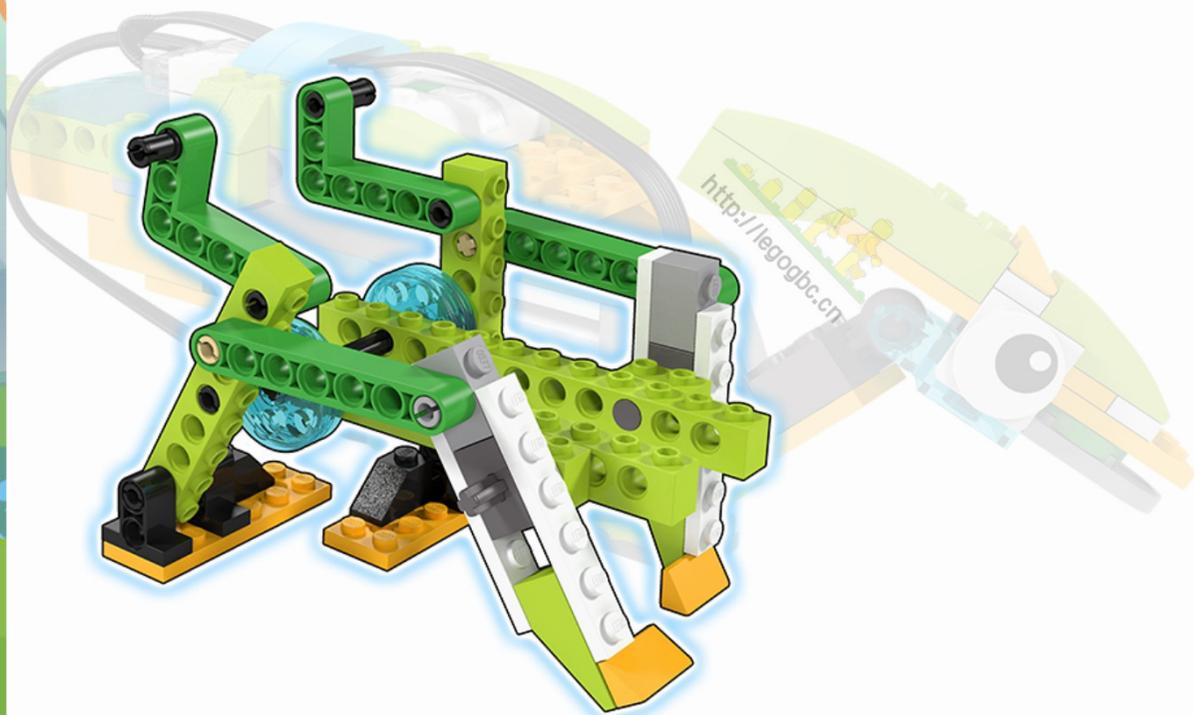


Task



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Place parts of the robot on the right places



9



122





Task 1



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Check the work of the mechanism. Program the robot moving forward for 10 seconds. Experiment with the position of the robot at the beginning of the movement.



robotiseit.com



9



123



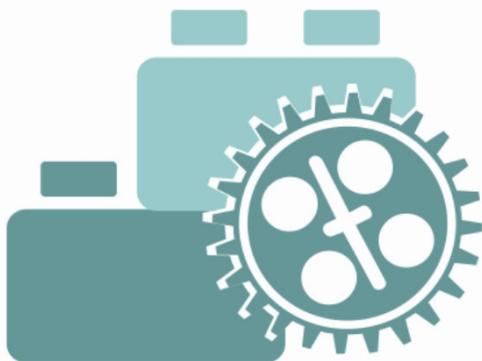


Additional sensors



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Fix the motion sensor at the robot



9

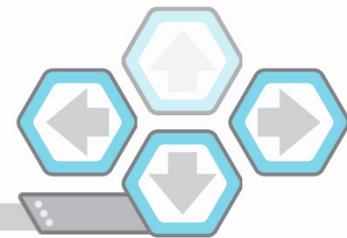
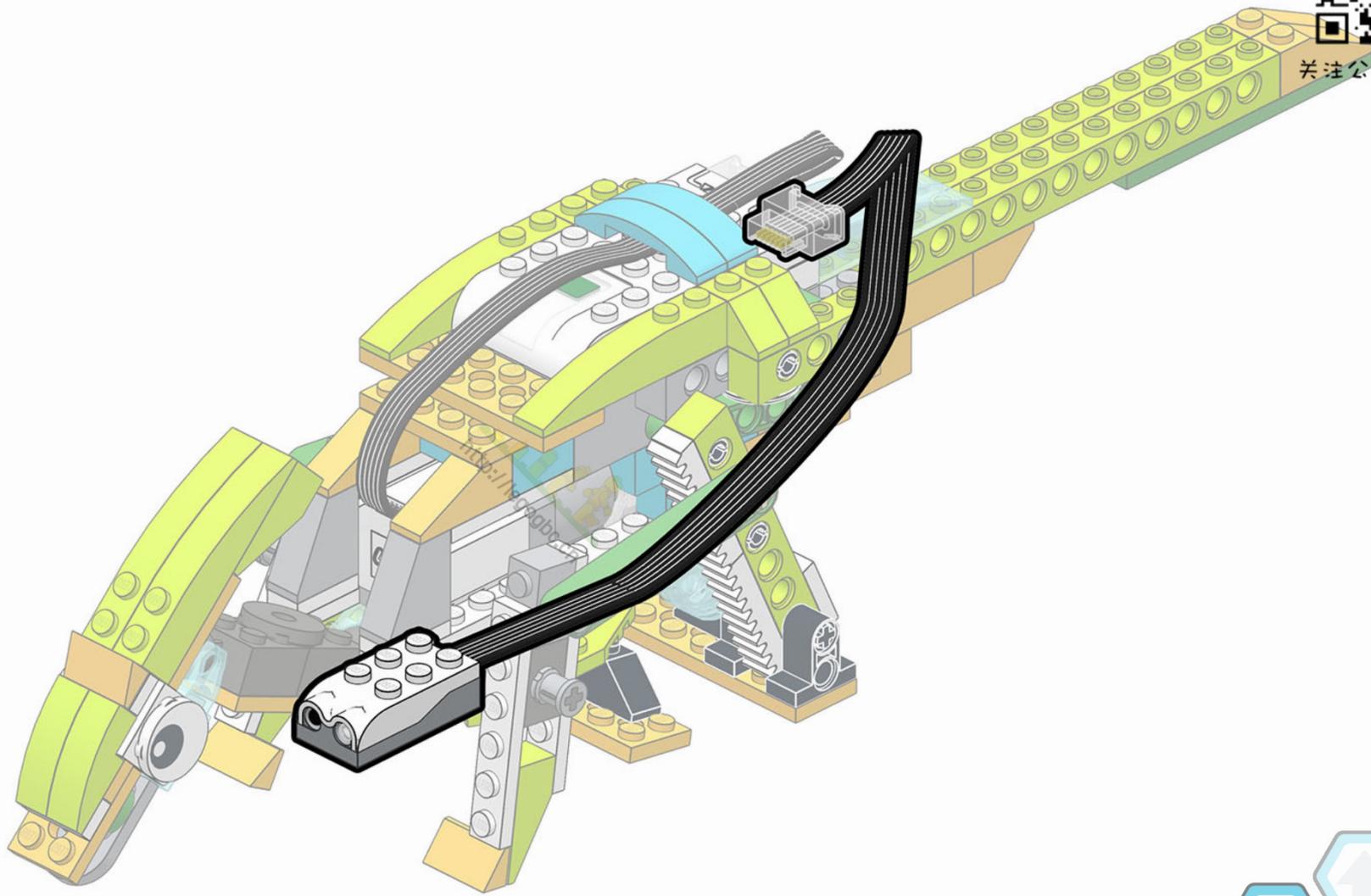


124



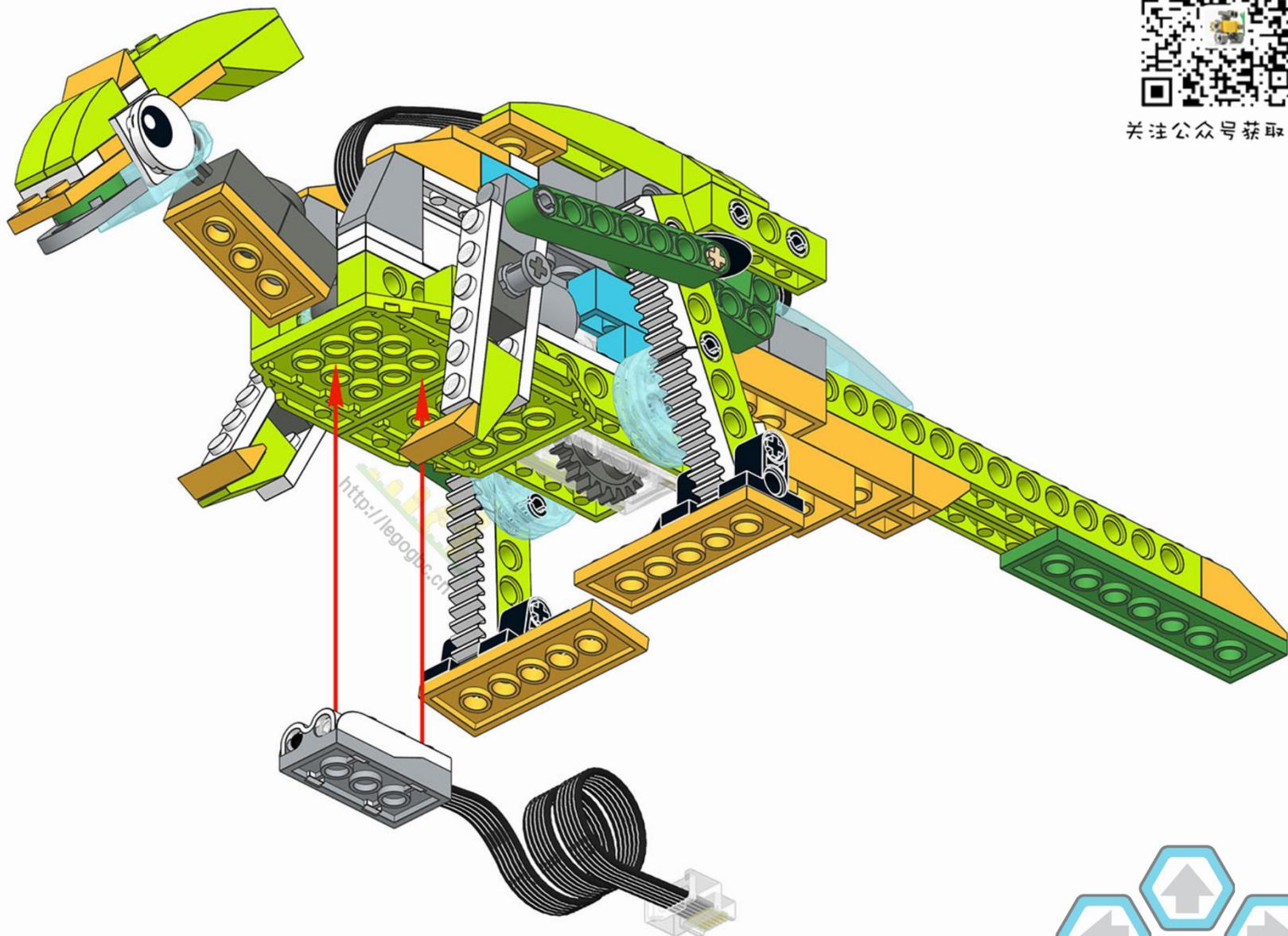
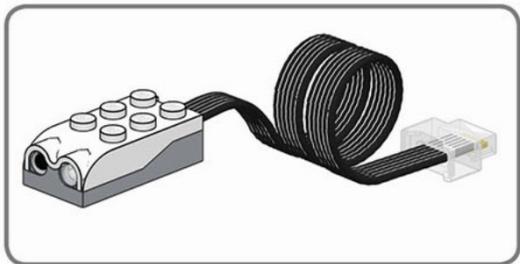


关注公众号获取更多

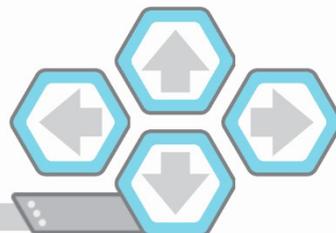




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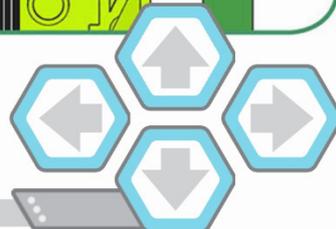
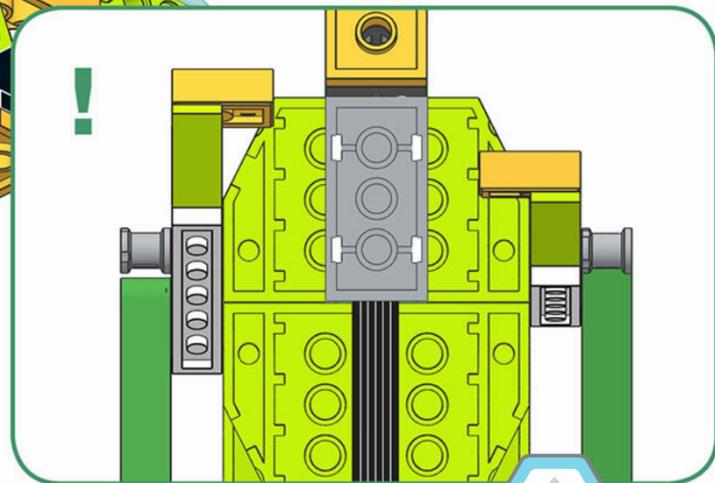
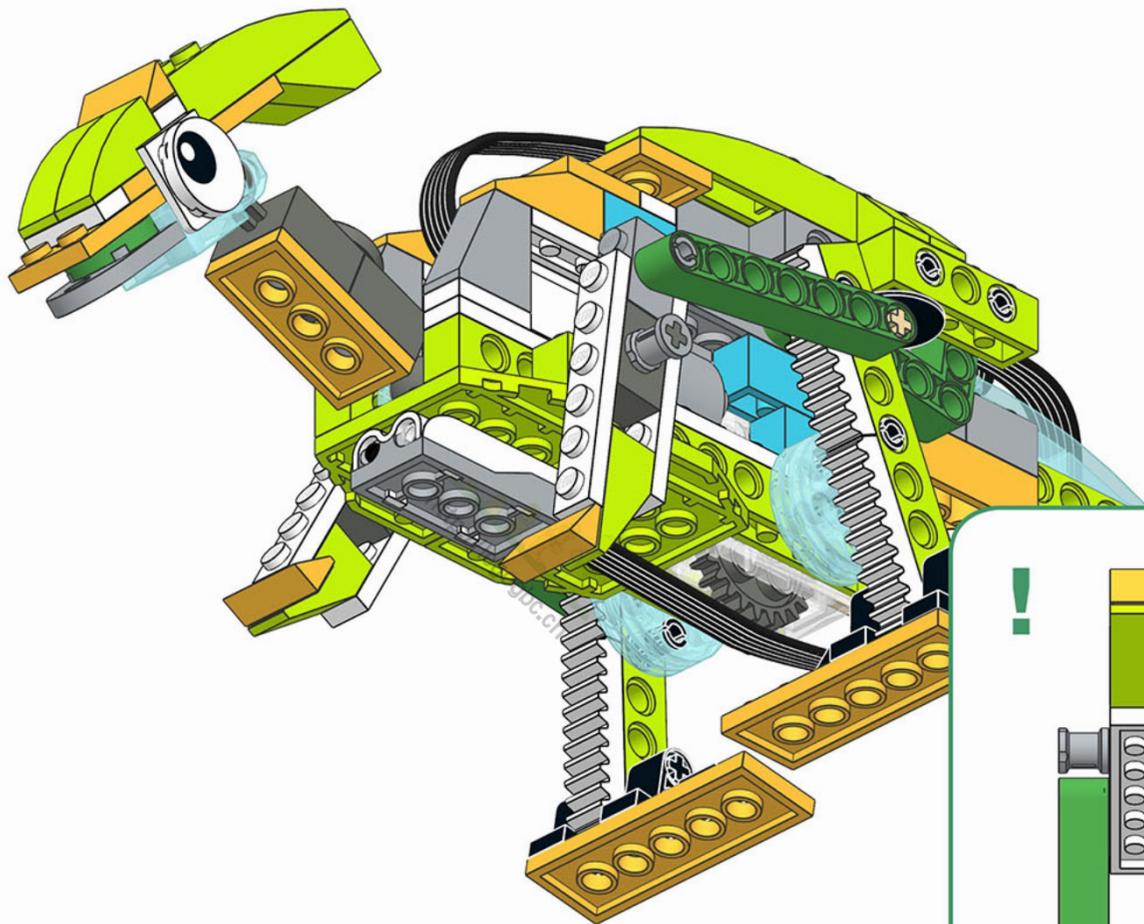
84





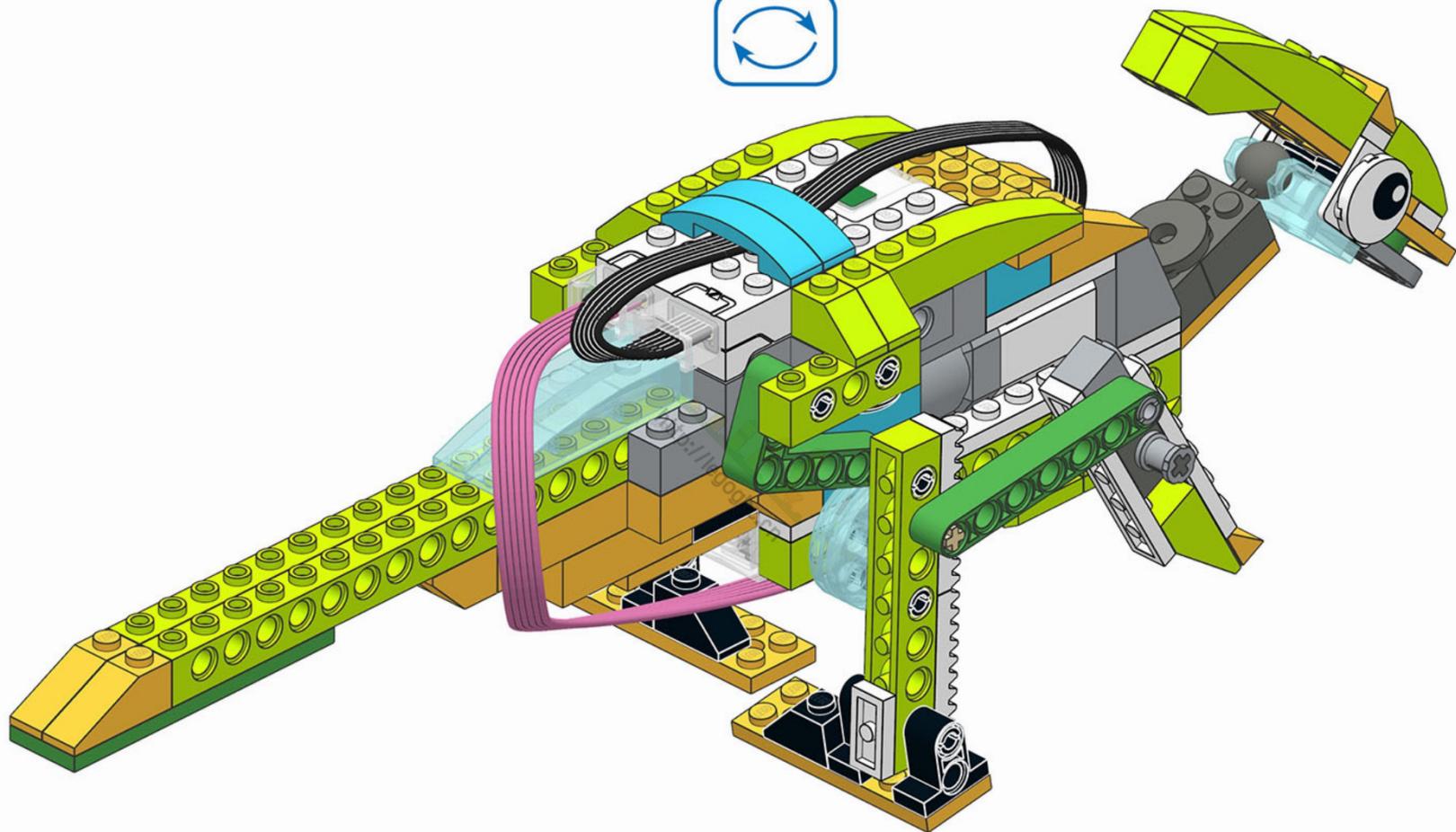
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85

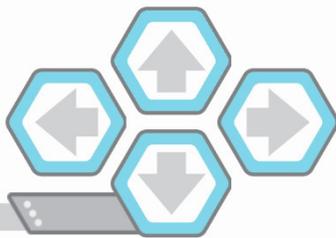




关注公众号获取更多

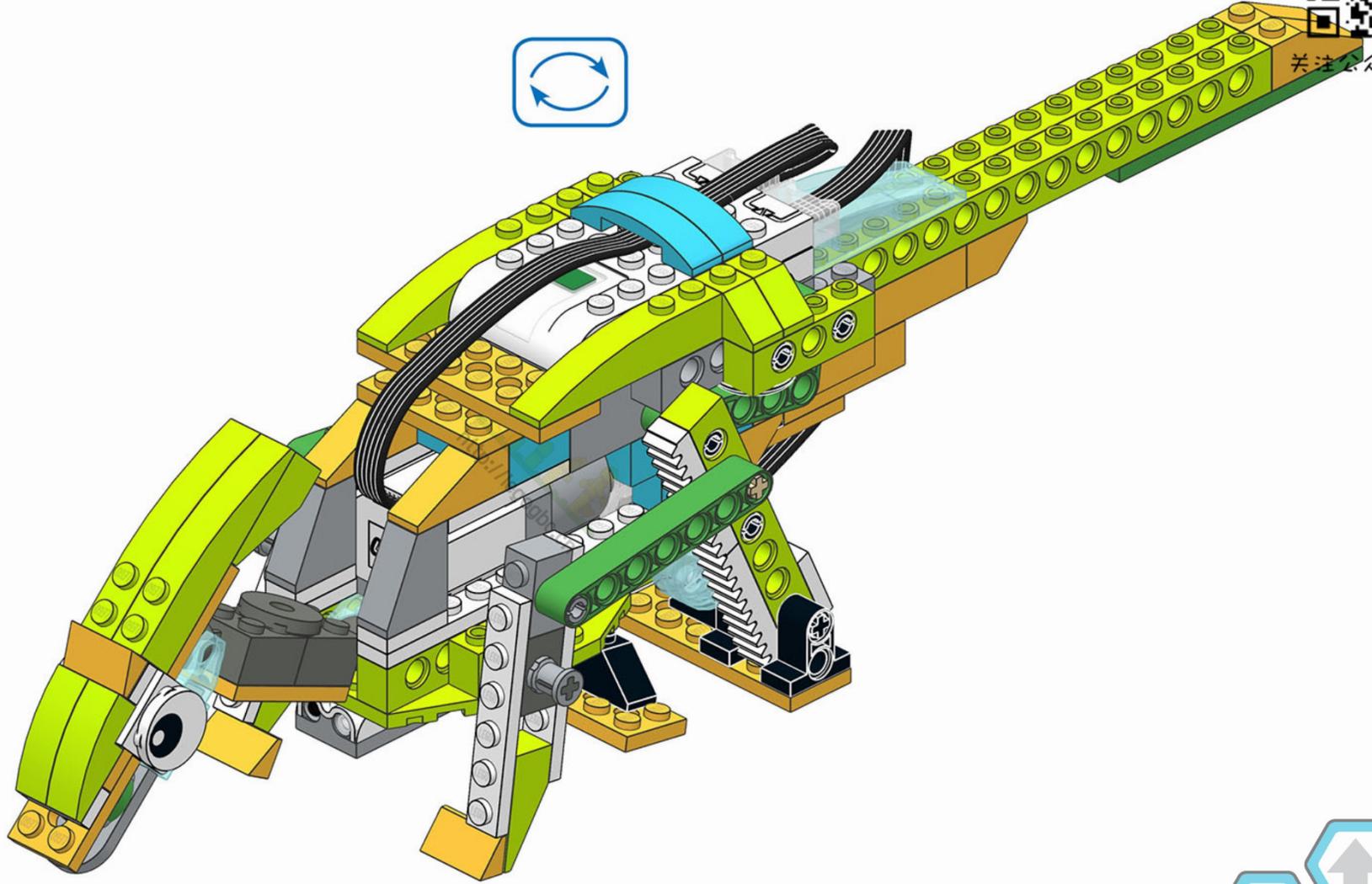


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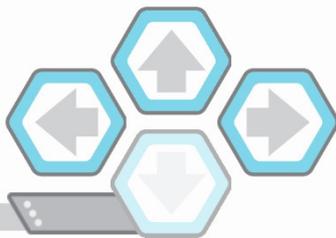




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Task 2



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Robots of the dinopark should react to visitors. Program the robot movement forward after greeting. The motion sensor will detect a consistent approach and distance of the object in front of it:



robotiseit.com



9



130



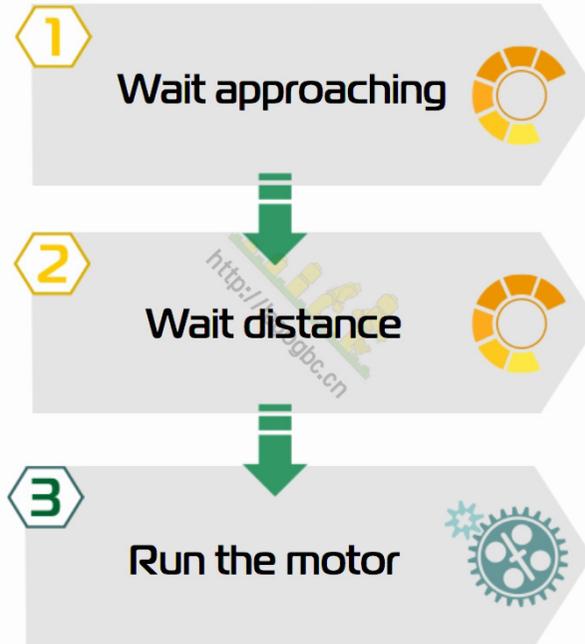


Task 2. Algorithm



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The program is run by the following algorithm:



9

131



Task 2. Program



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1

Wait approaching



<http://legogbc.cn>

Step:



9



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Task 2. Program



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1 Wait approx 2 Wait distance 



Step:





Task 2. Program



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Step:



9



132





Task 3



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In the evening, after closing the park for visitors, robot must recharge their batteries, as they do, for example, robot-vacuum cleaners. Each robot has its own charge station. Program the robot stop at the station:



robotiseit.com



9



133



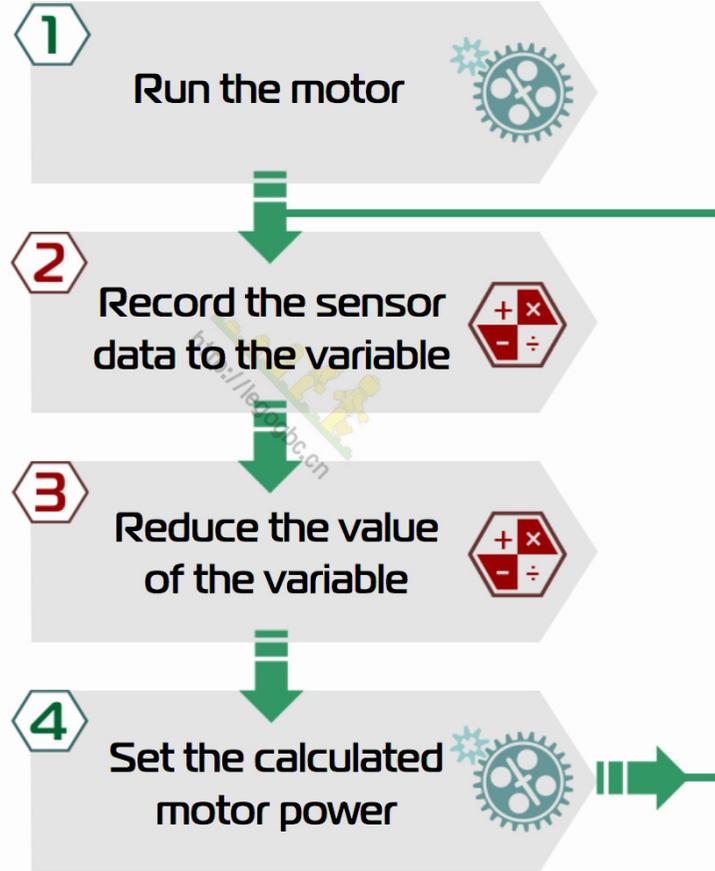


Task 3. Algorithm



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The program is run by the following algorithm:



9

134



Task 3. Program



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1

Run the motor



Step:



9



135





Task 3. Program



关注公众号获取更多

1

Run the

2

Record the sensor data to the variable



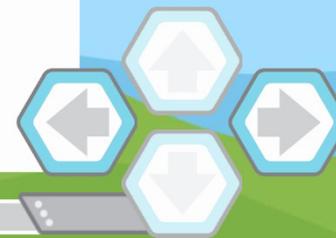
Step:



9



135





Task 3. Program



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- 1 Run the
- 2 Record the data to the
- 3 Reduce the value of the variable



Step:





Task 3. Program



关注公众号获取更多

- 1 Run the
- 2 Record the data to the
- 3 Reduce the of the v
- 4 Set the calculated motor power 



Step:



9

135



Task 3. Questions



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What program blocks are used to work with a variable?





Question



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How could *Parasaurolophus* use its bone crest on the head?



To get food

To protect against predators

To create loud sound

9

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Question



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Were Parasaurolophus predators or herbivorous dinosaurs?



<http://legogbc.cn>

Herbivorous

Predators

They were omnivorous



9



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Discuss!



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- ▶ How the caring for the offspring help the species to thrive?
- ▶ Why is it important for animals living in large groups to communicate?
- ▶ What are the advantages of the wide feet of the robot rear legs?



10



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