



Dimetrodon



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Dimetrodon





New day at the Robots` factory

Our factory received a large order for the creation of a modern Dino Park. We must develop robots that look and behave as closely as possible to the creatures that inhabited the planet millions years ago.

Dino Park



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Discussion

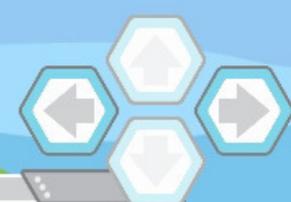


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How did people know that in ancient times Earth was inhabited by creatures, which were then called dinosaurs?

<http://www.les90c.com>



Dino Park

The fact that dinosaurs inhabited Earth, people have learned through fossils. They are found during archaeological excavations. These are skeletons or separate bones, parts of a shell of eggs or shells.



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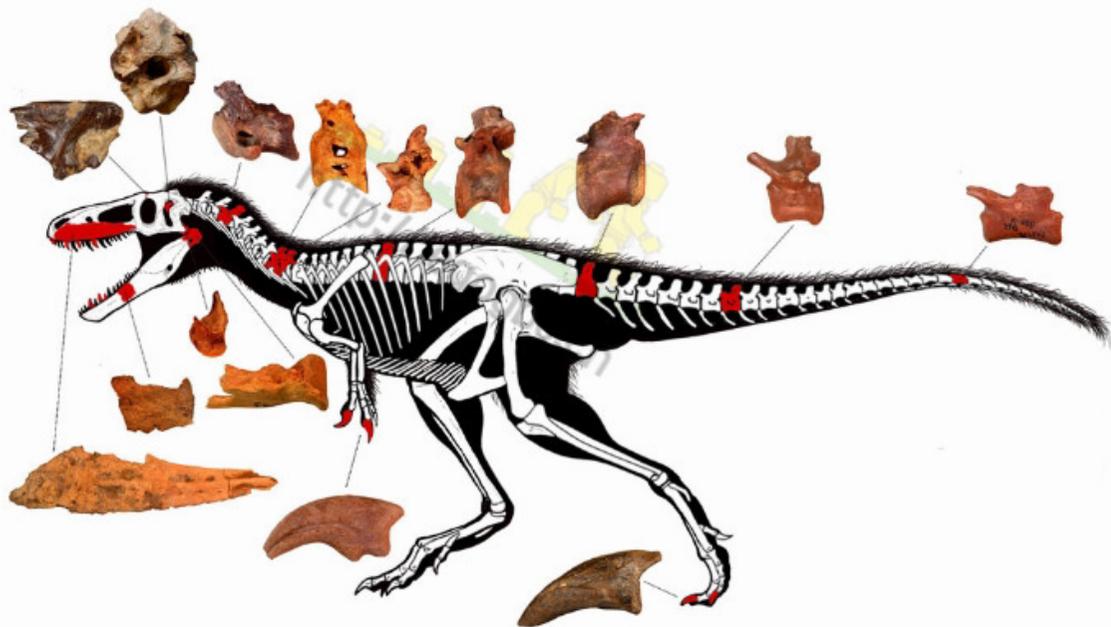
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Dino Park

Found fossils of dinosaurs by archaeologists - a kind of puzzle, which do not always have all the parts. Scientists finish building skeletons using the known parts of other skeletons. The fully assembled skeleton can recreate the look of a dinosaur:



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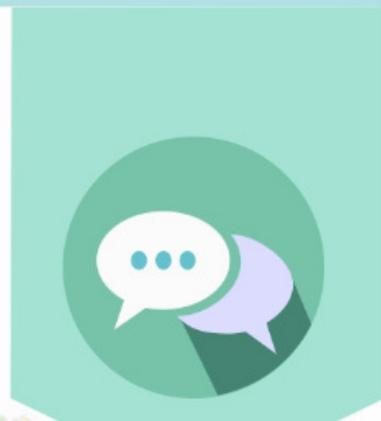




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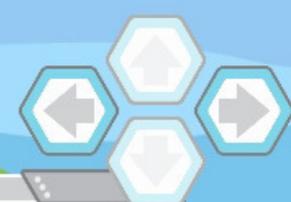


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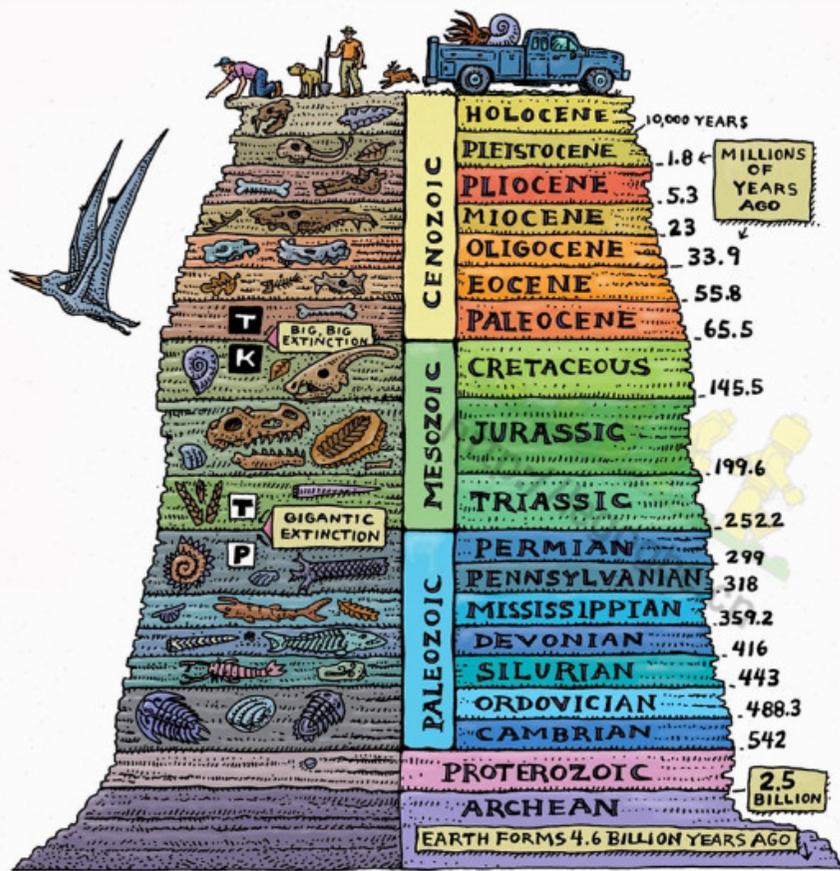
How do you think to determine the age of a found skeleton?

<http://www.learn360.com>





Dino Park



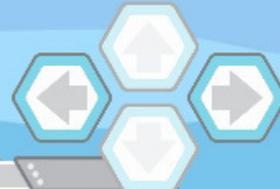
As a rule, as deeper the remains of the dinosaur were found, than longer ago it lived. The found nearby remains of other organisms or traces help to better imagine how dinosaurs lived.



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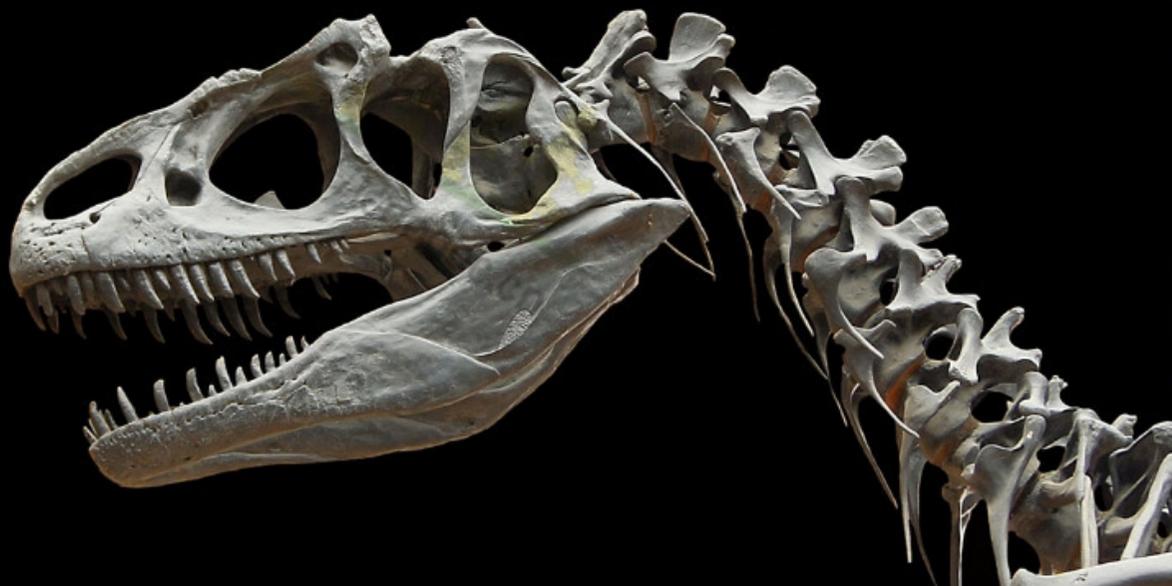
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Dino Park

Visitors of the park should receive the most complete and at the moment reliable information about animals. Therefore, before creating a robot, we will learn everything that is known about the animal that we will reproduce.



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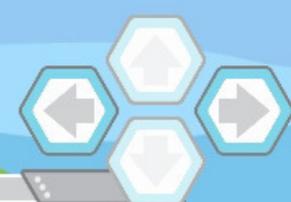
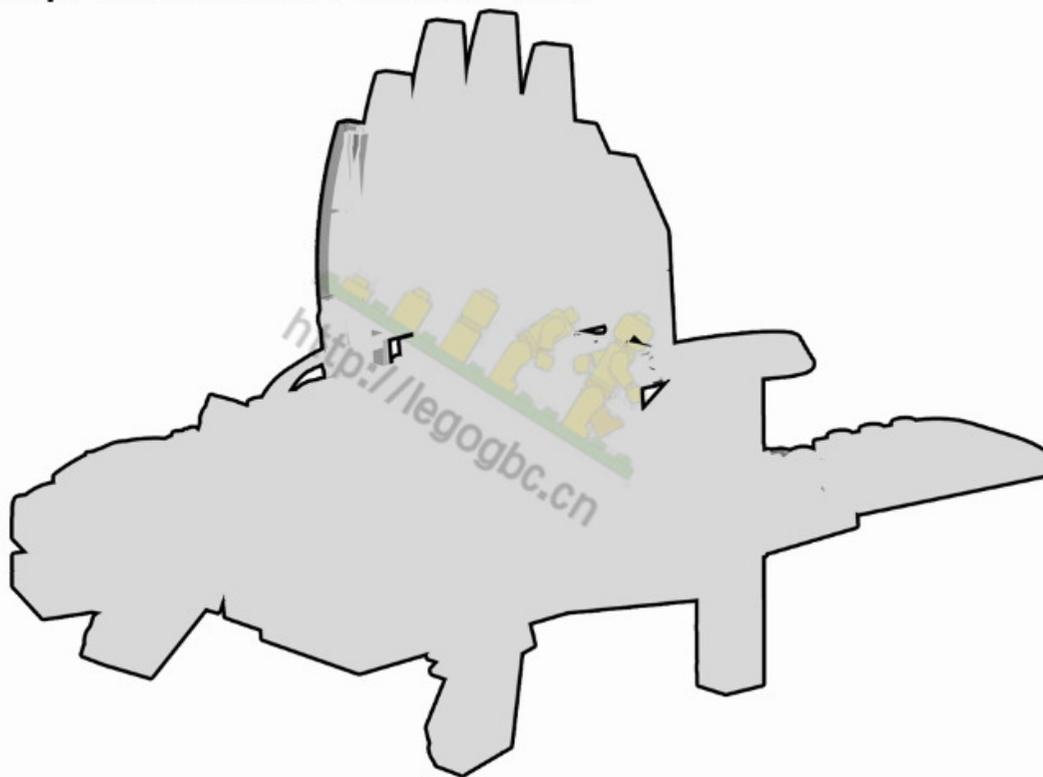


Dino Park



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To create the Dino Park we will start with the exposition of the Permian period of the Paleozoic era.





Dino Park

In the Permian period, land except insects actively populate the reptiles and ancestors of mammals - cynognathus. In plain forests, seed ferns and gymnosperms displaced tree-like planino-like plants of the Carboniferous period.



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Ancestors of mammals



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Pelicosaur were the dominant predators of the Perm period. They lived more than 300 million years ago. Jaw muscles, that pass through the holes in the skull, unite them with mammals.

Ophiacodon



Edaphosaurus



Dimetrodon



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Dimetrodon

Dimetrodon is the ancestor of the Ophiacodon, which completely went out on the dry land. It had teeth of varying lengths and was the greatest predator of its time.



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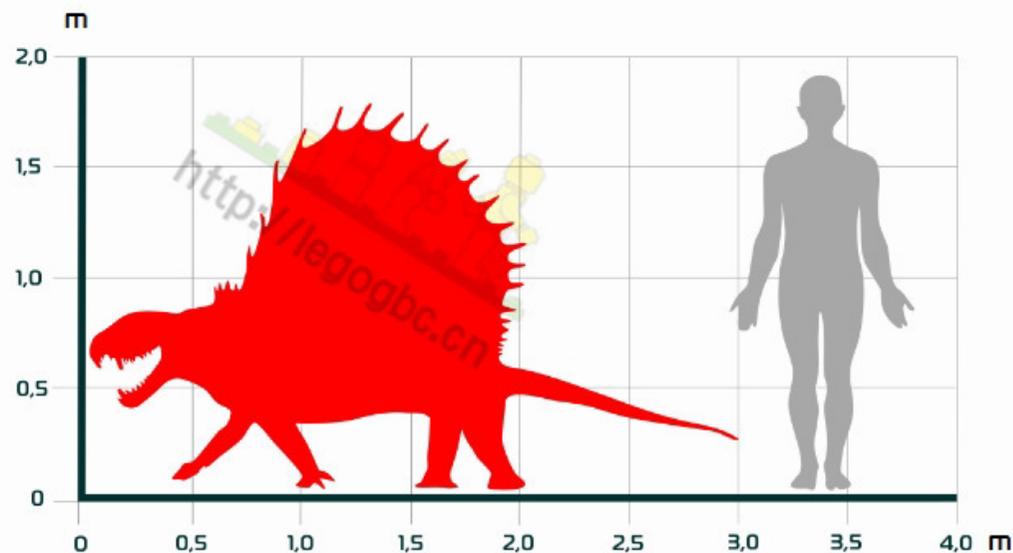


Dimetrodon



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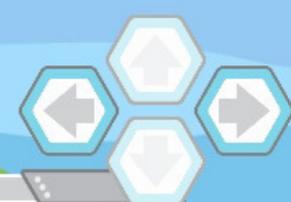
Together with the "sail", these animals had the height of an adult and the length of a modern crocodile.



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Dimetrodon

It is believed that Dimetrodon was cold-blooded, and used the "sail" in order to effectively warm up in the sun.



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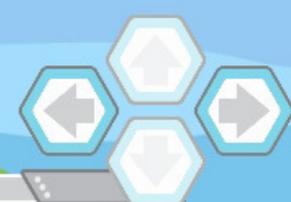
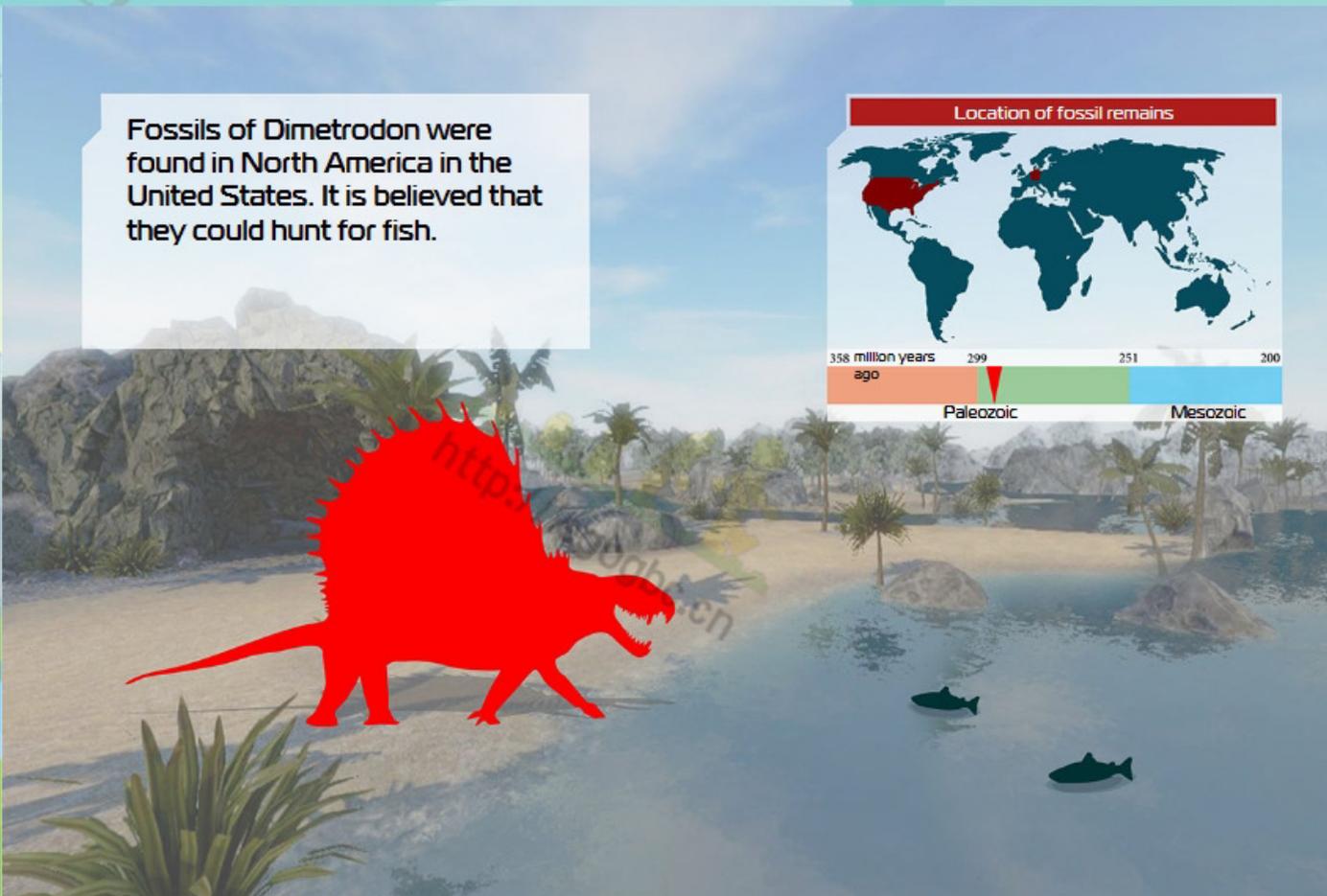
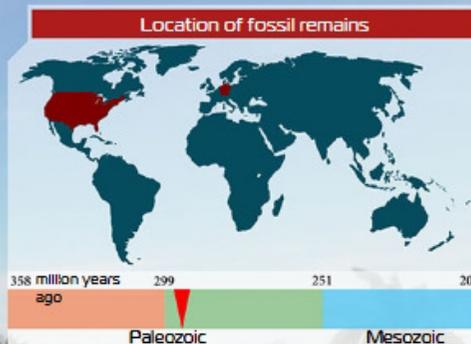


Dimetrodon



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Fossils of Dimetrodon were found in North America in the United States. It is believed that they could hunt for fish.





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TASK



Task

- to create a robot for the exposition of the Permian period

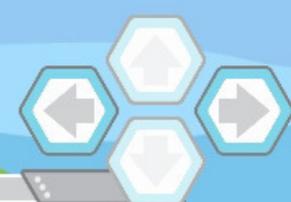
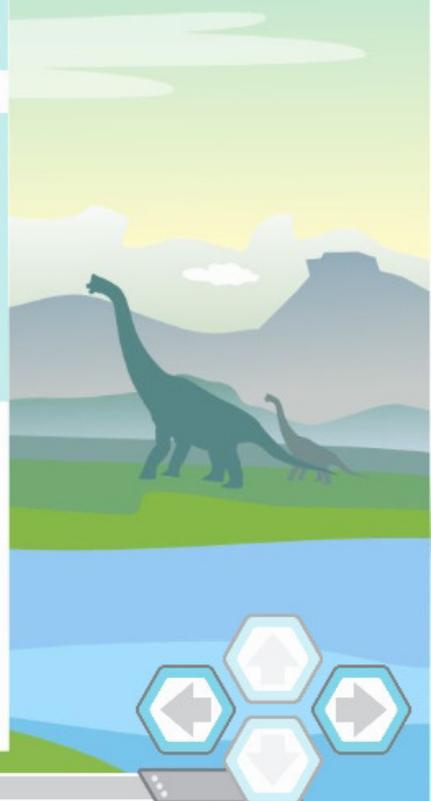


Requirements

- should be similar to Dimetrodon or Ophiacodon
- should react to objects around and walk



Dimetrodon's appearance





Dino Park

To learn as much as possible about extinct animals, people create their computer models. This helps to test the guesses about how these creatures lived and also to imagine their appearance.



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Dino Park

The company Creature Technology Co. is engaged in the creation of huge robot-dinosaurs. Their works are impressive. The show in which they take part is very spectacular and realistic.



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Creating robot dinosaurs



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Dino Park

Today we will build Dimetrodon, a prehistoric creature that lived about 295-272 million years ago and was the ancestor of mammals.



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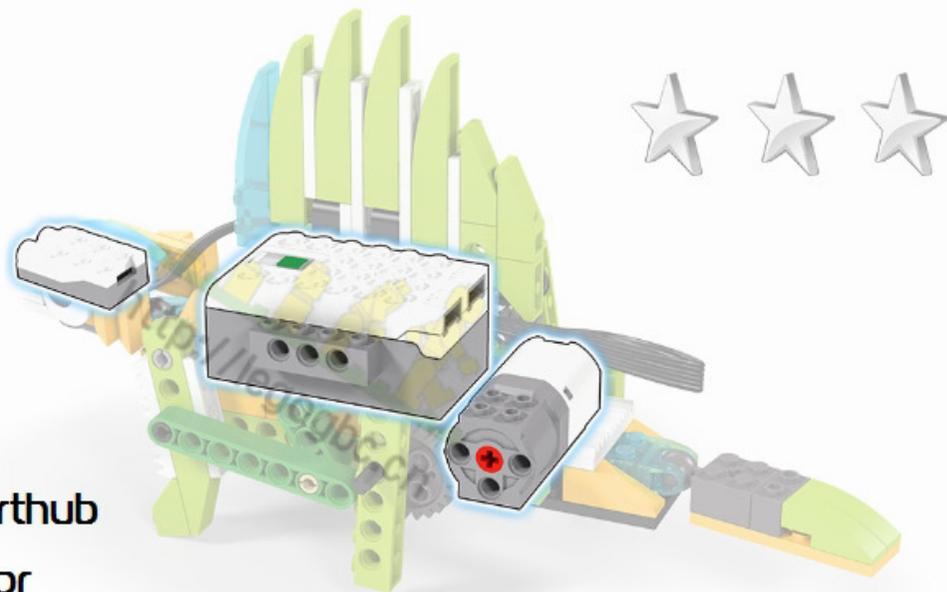
Design features

Dimetrodon uses the motor to drive all four legs. The motion sensor for the convenience of detecting is located in the robot's head.



Find:

- smarthub
- motor
- sensor



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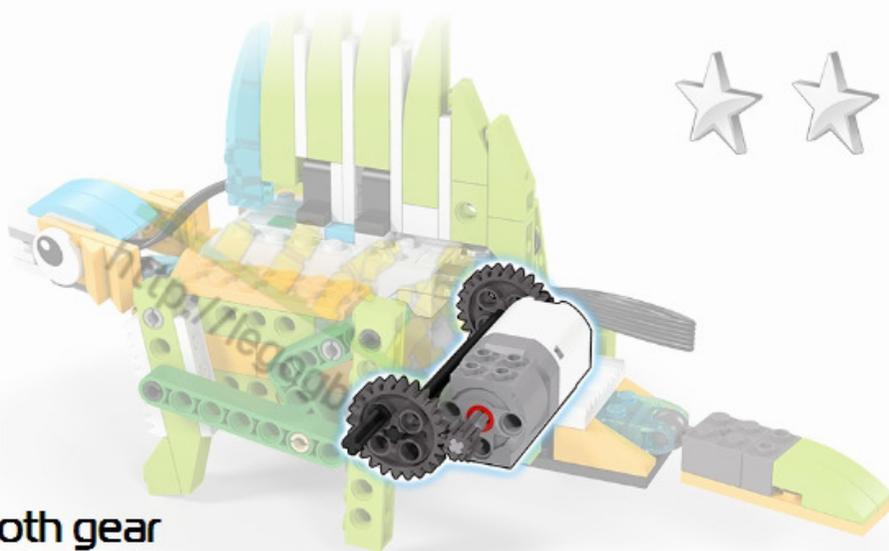
Design features

The rotation from the motor is transmitted through the gearing up to 24-tooth gear. These gears work as cranks that turn the rotational motion into a translational one.



Find:

- 8-tooth gear
- 24-tooth gear
- motor



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Design features

24-tooth gear is convenient to use as a crank, because the semiaxis can be easily attached to it.



robobits.com



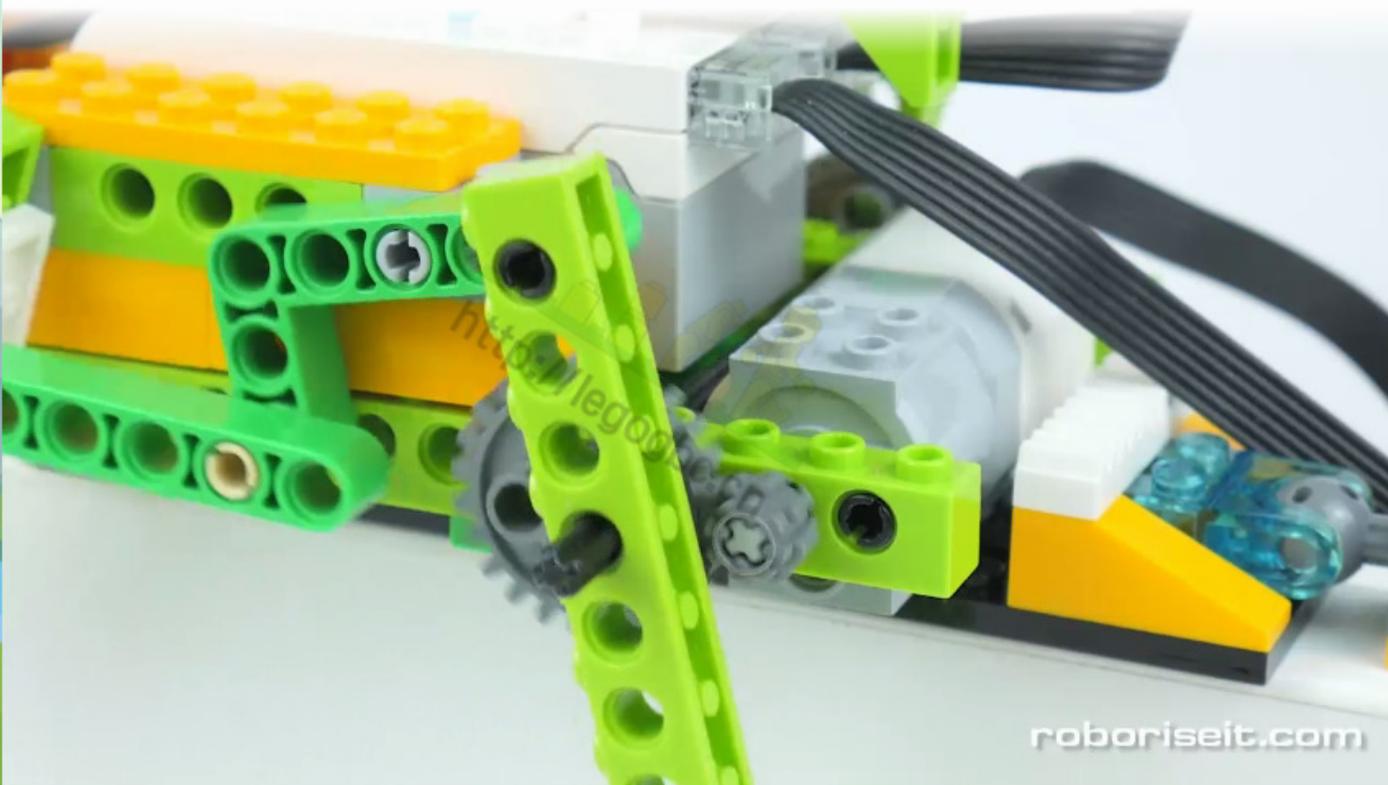
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Design features

24-tooth gear is convenient to use as a crank, because the semiaxis can be easily attached to it.



roboriseit.com



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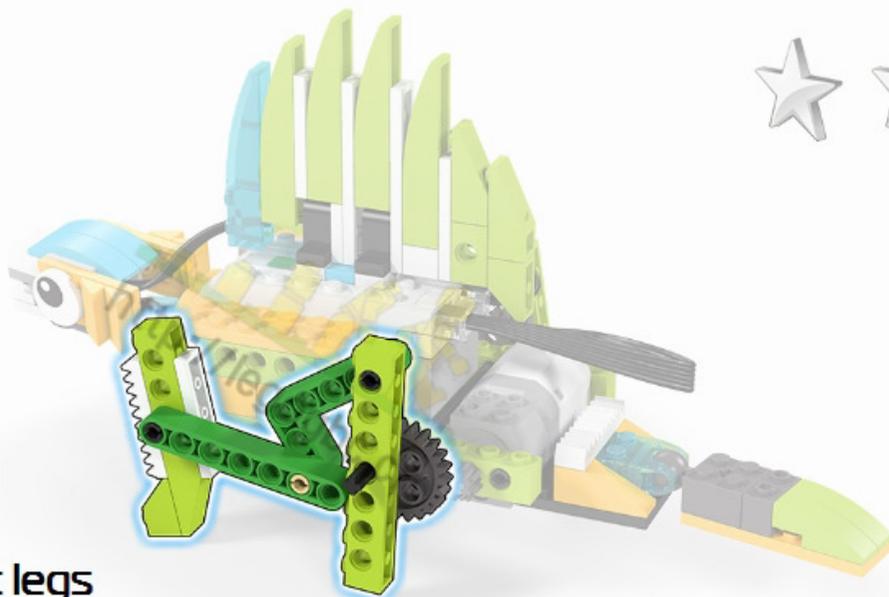
Design features

From the gear-crank movement is transferred to the rear legs of the robot, and from them - to the front legs.



Find:

-  front legs
-  rear legs



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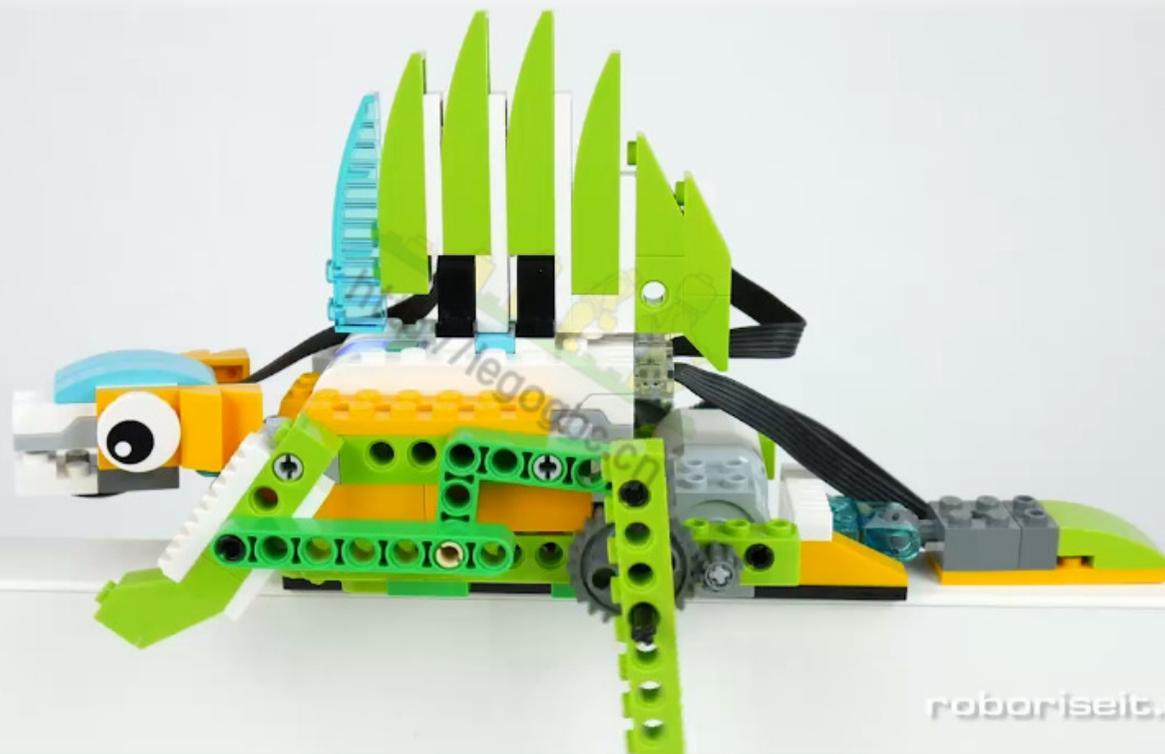
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Design features

The front legs of the robot are driven through moving levers.



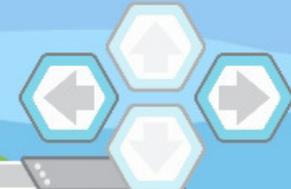
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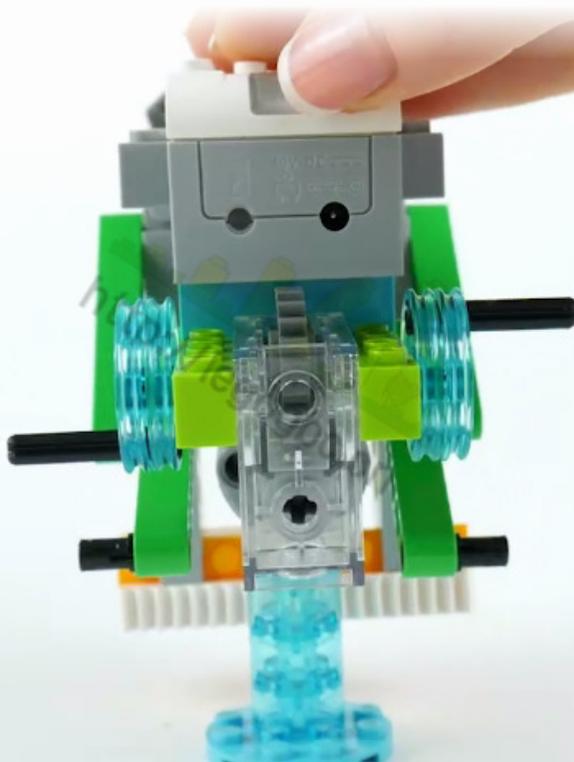


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Pay attention!

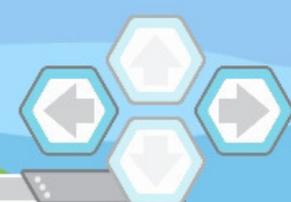
When building the robot correctly fix the crank mechanism. If on the left it is at the top point, on the right it should be in the bottom, and vice versa:



robotiseit.com

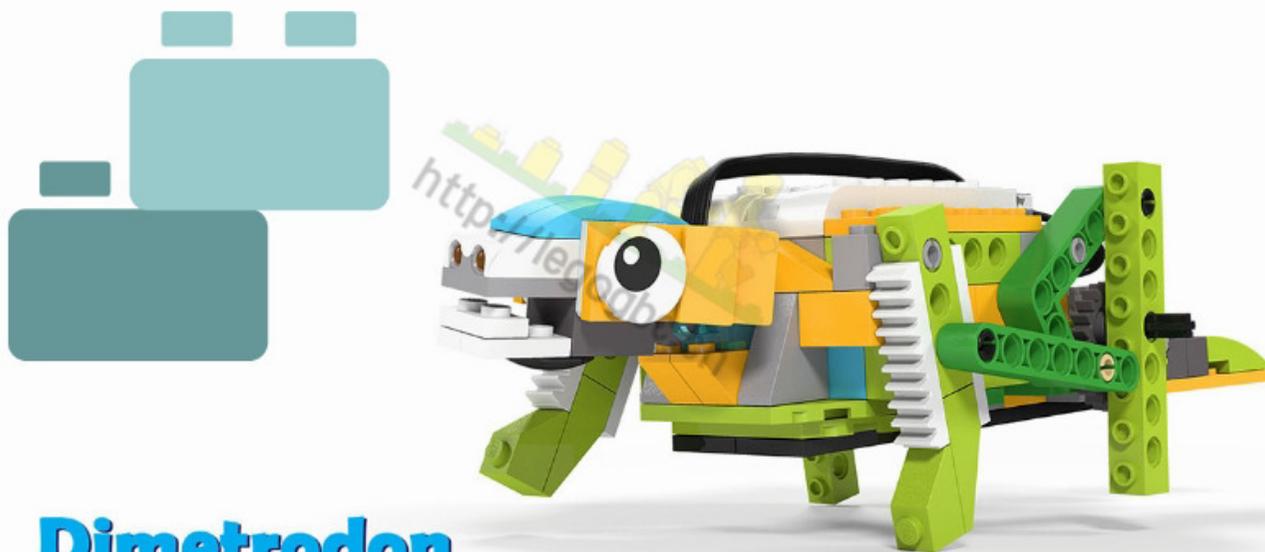


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Build the robot!

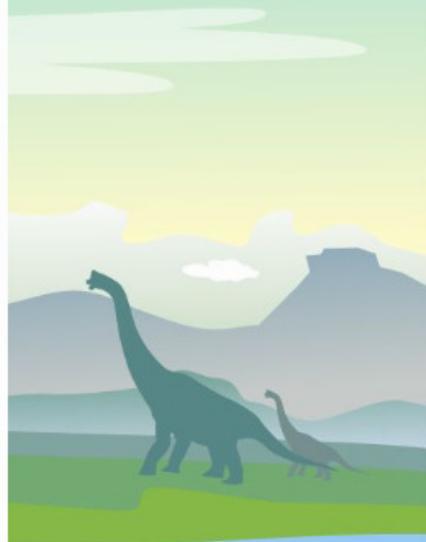
In the basic version, the robot is similar to Ophiacodon - it has no "sail".



Dimetrodon

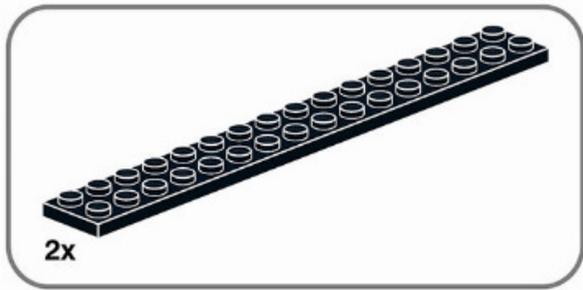


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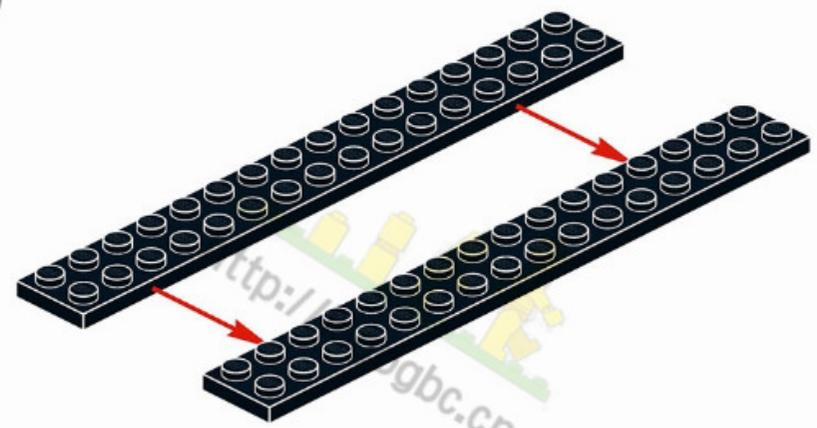




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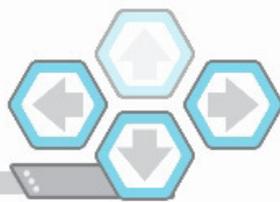
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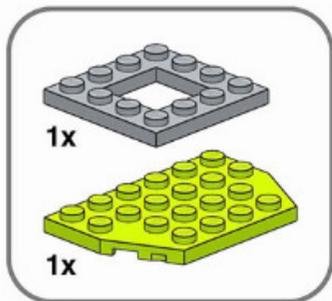
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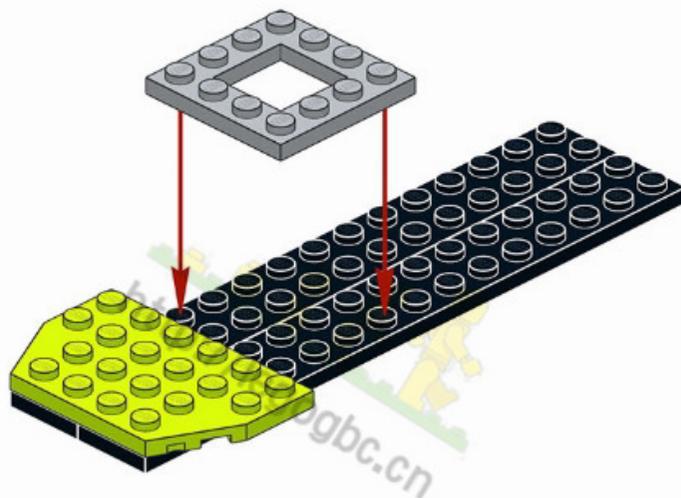
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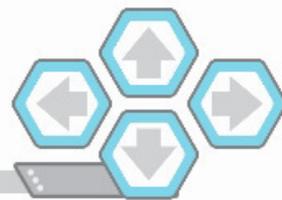
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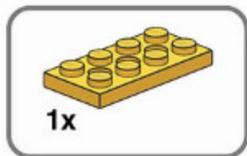


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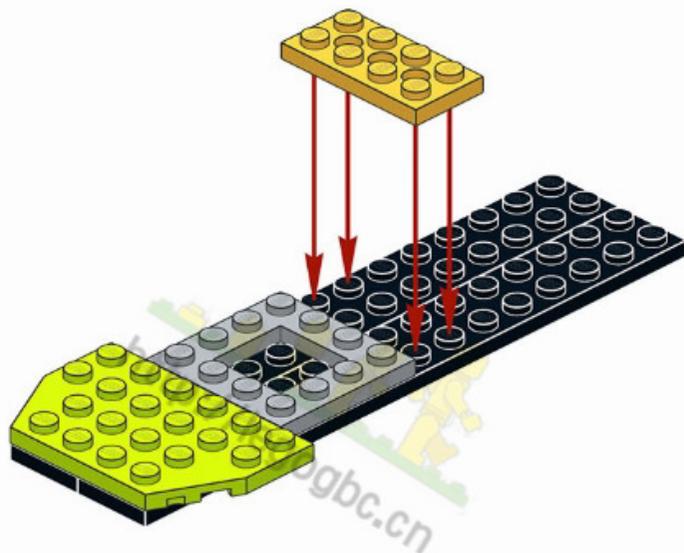




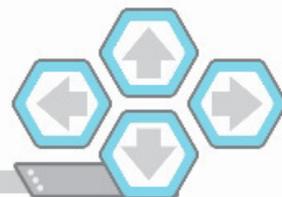
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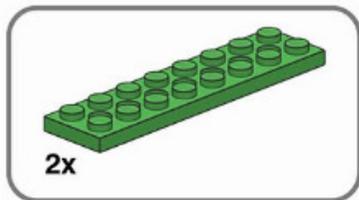


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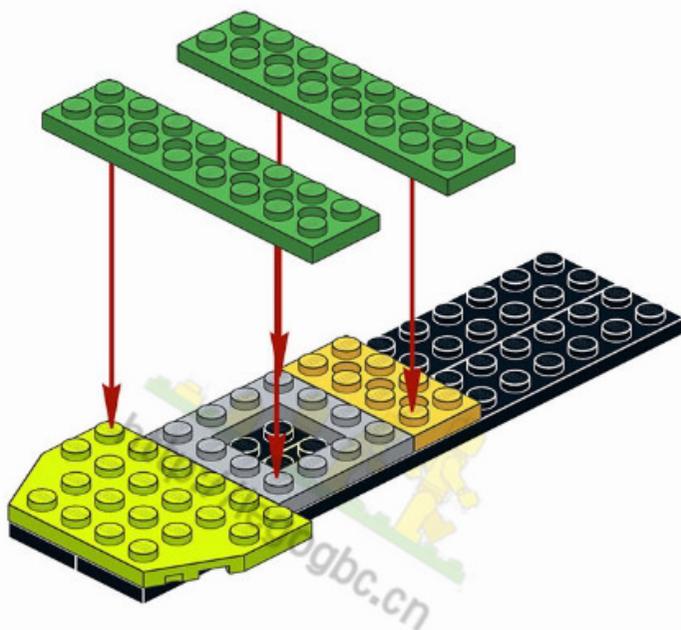


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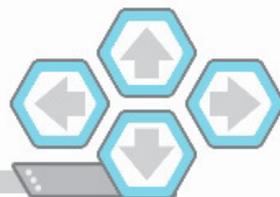
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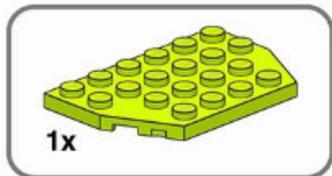


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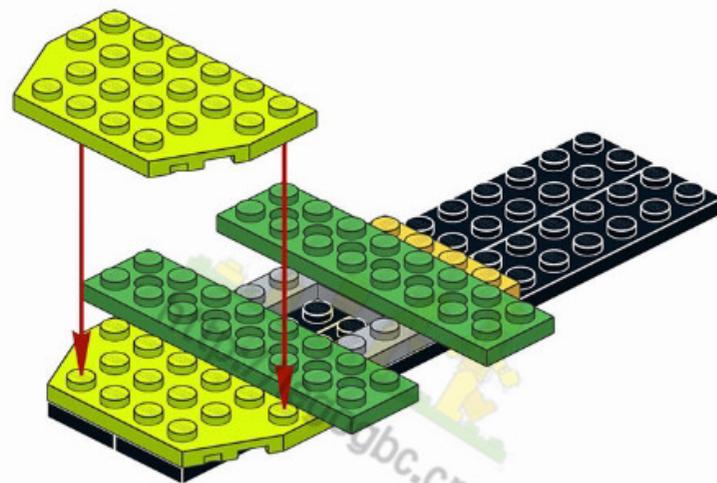


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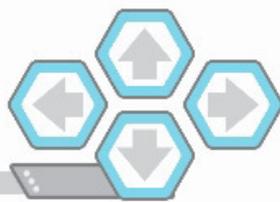


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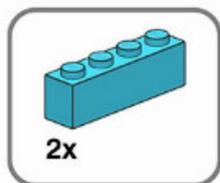


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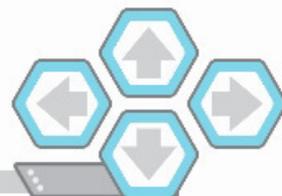
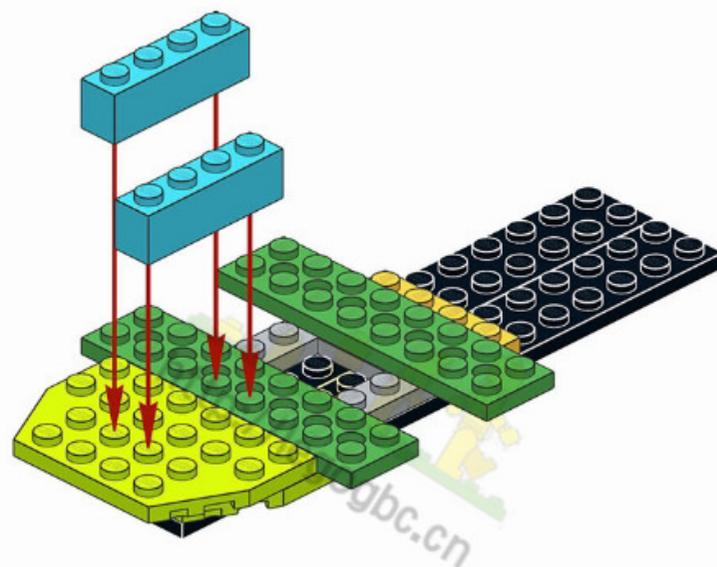




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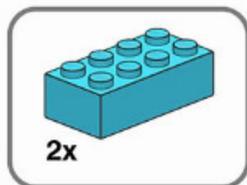


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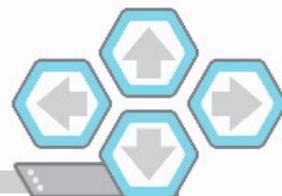
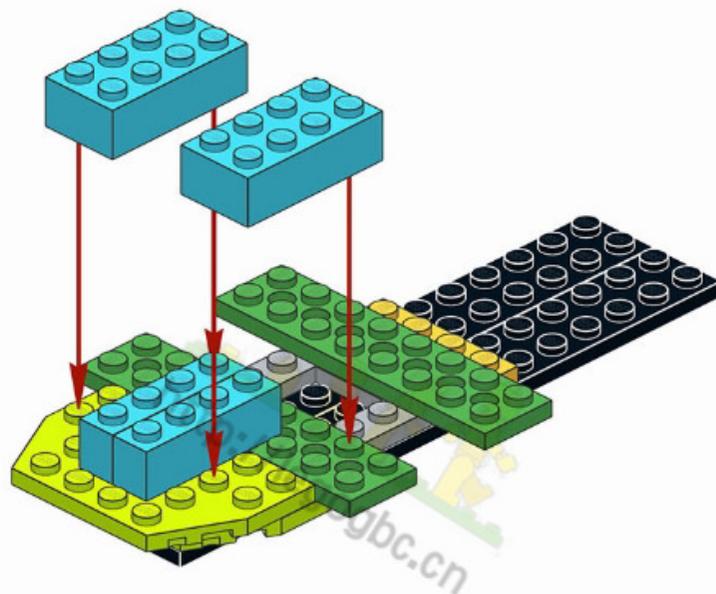




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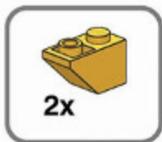


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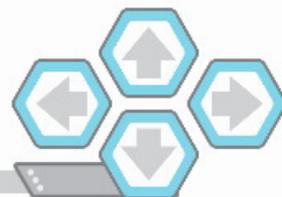
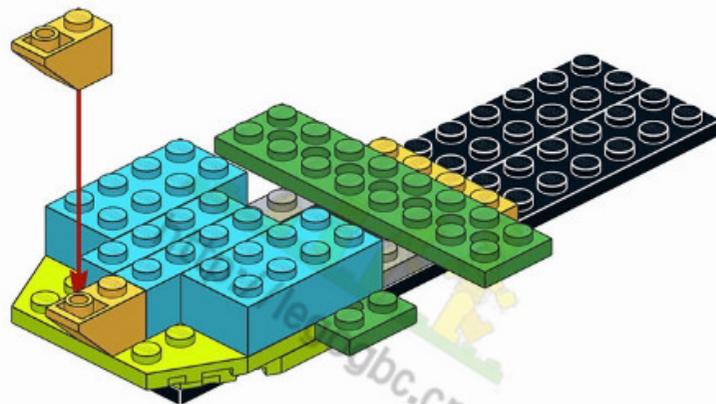




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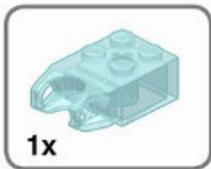


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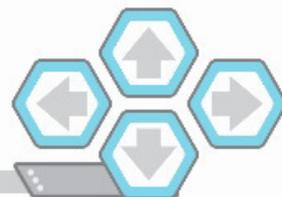
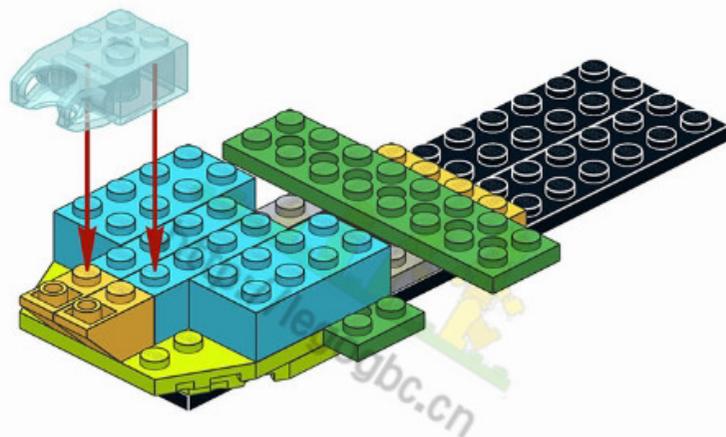




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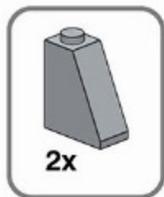


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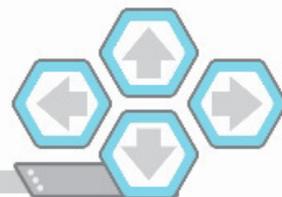
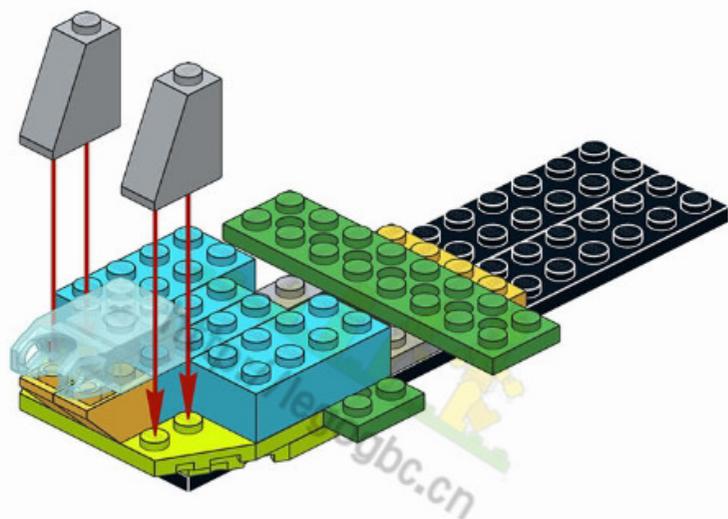




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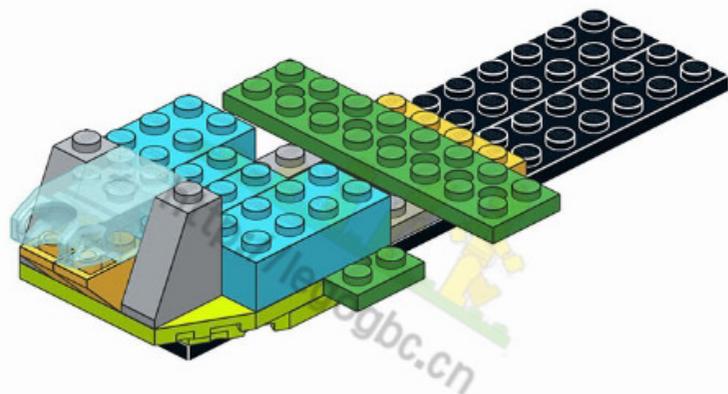
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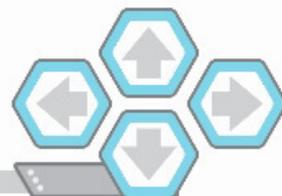
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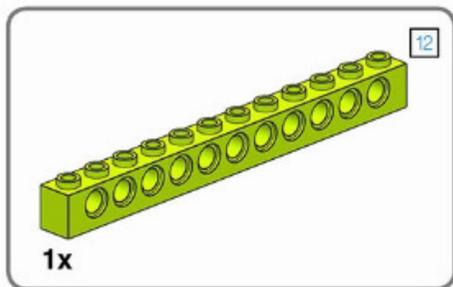


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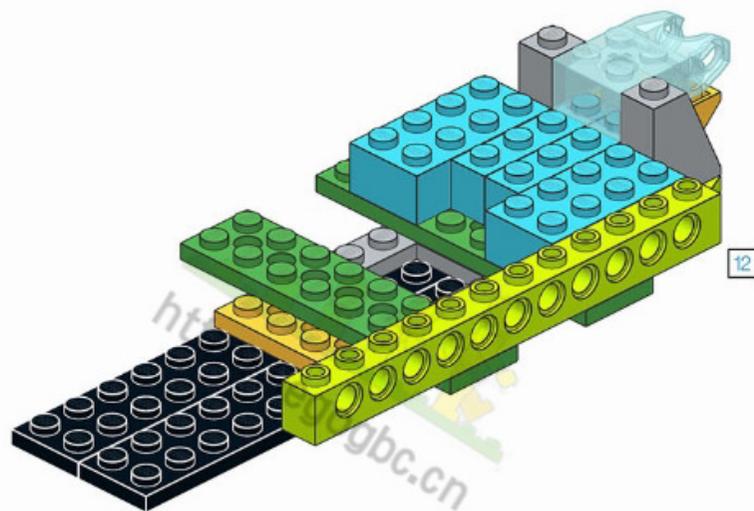




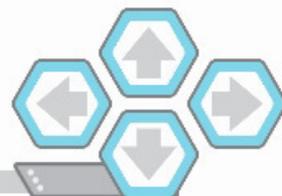
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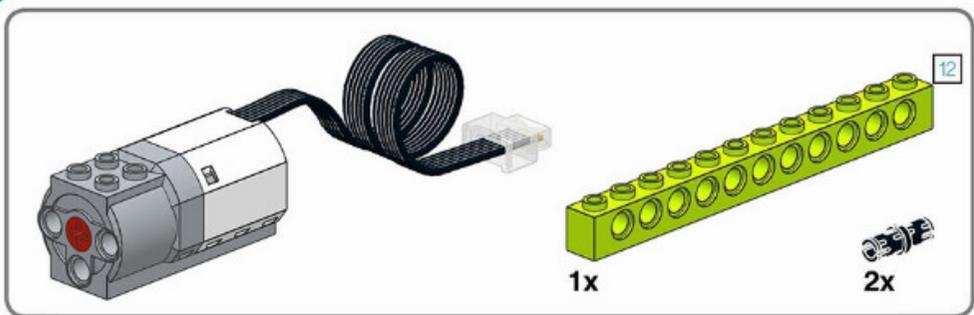


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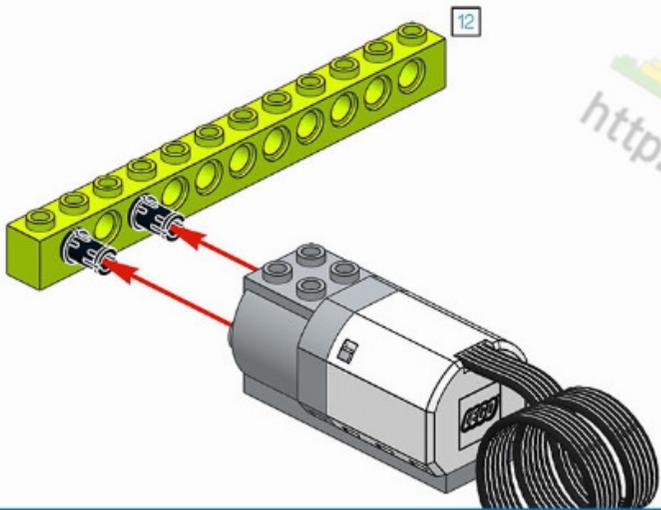




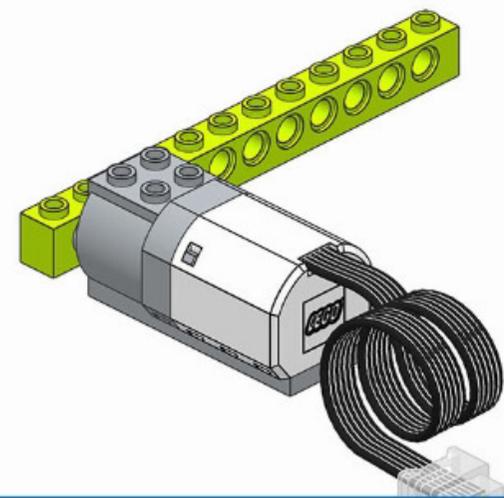
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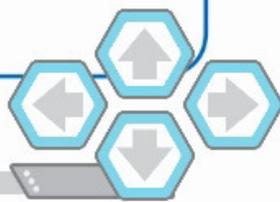
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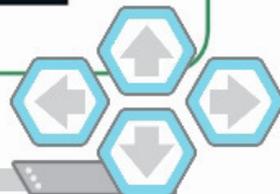
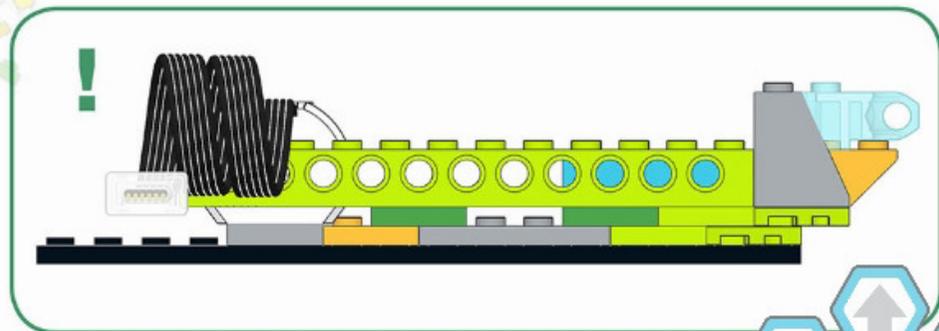
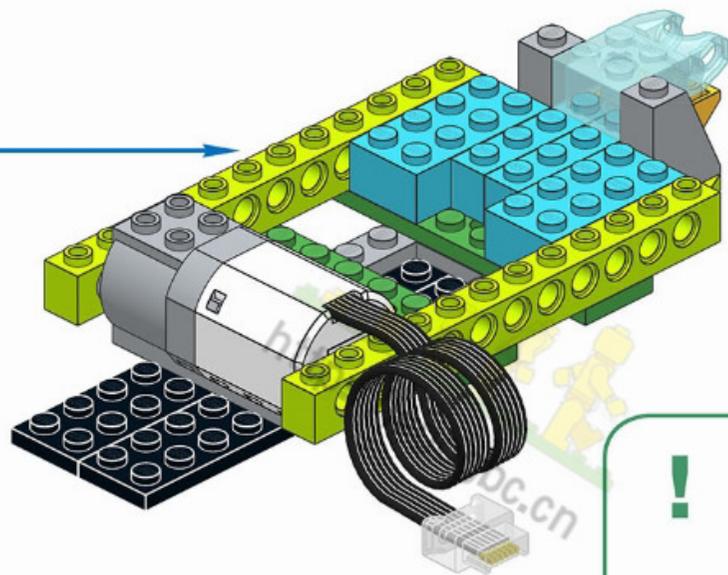


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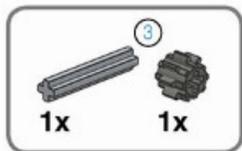
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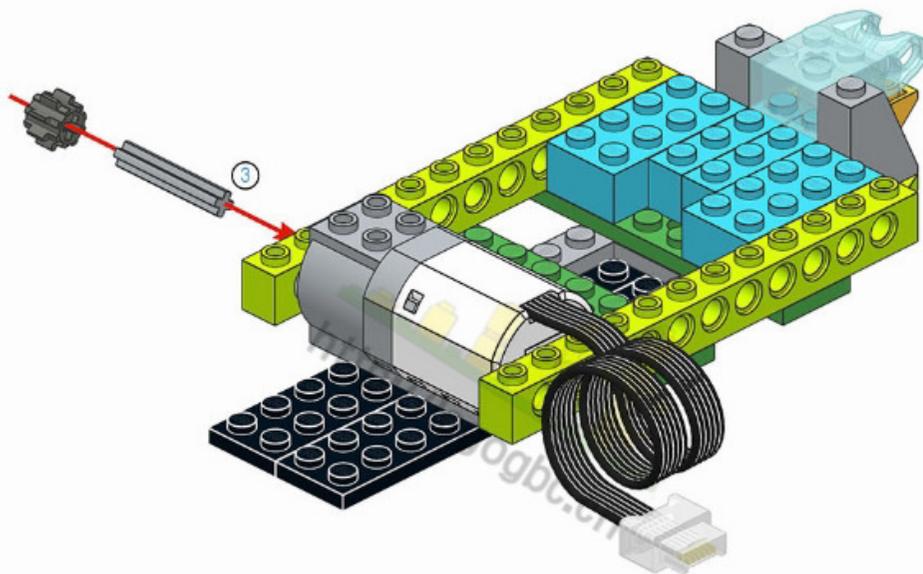
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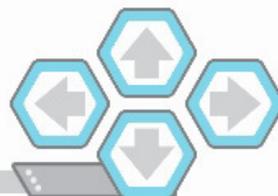
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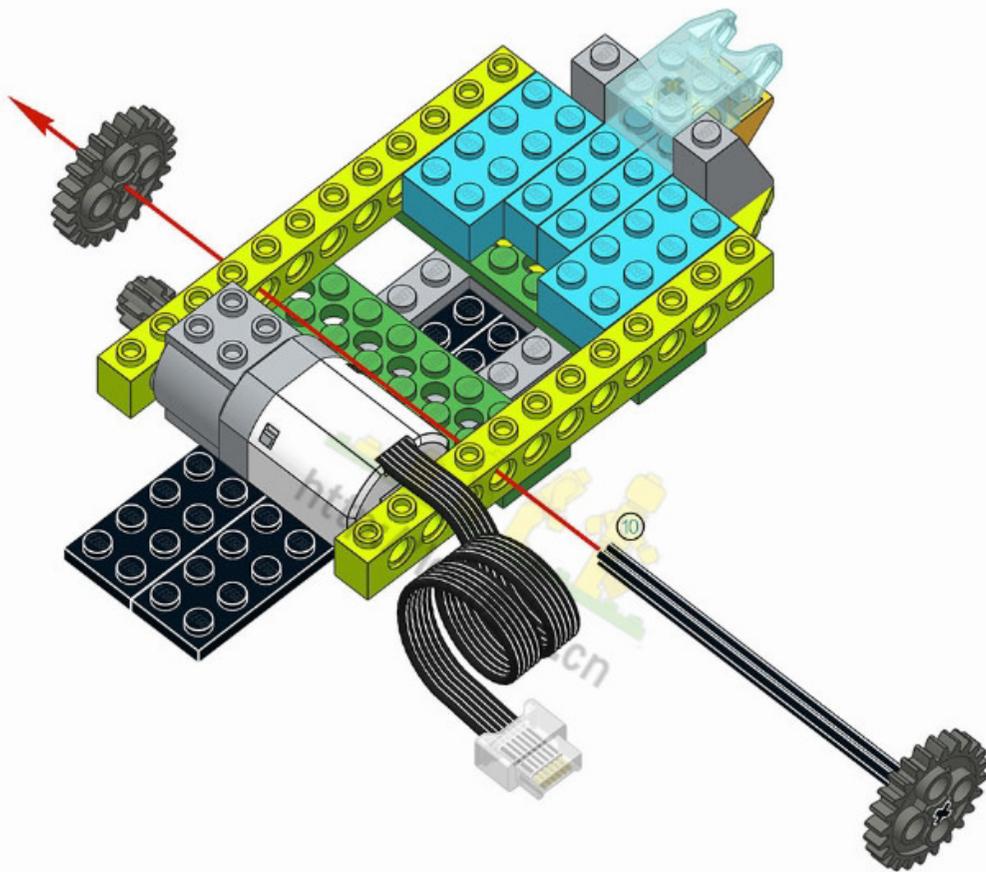




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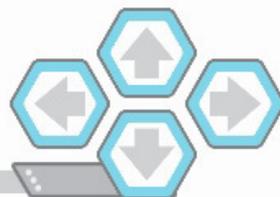
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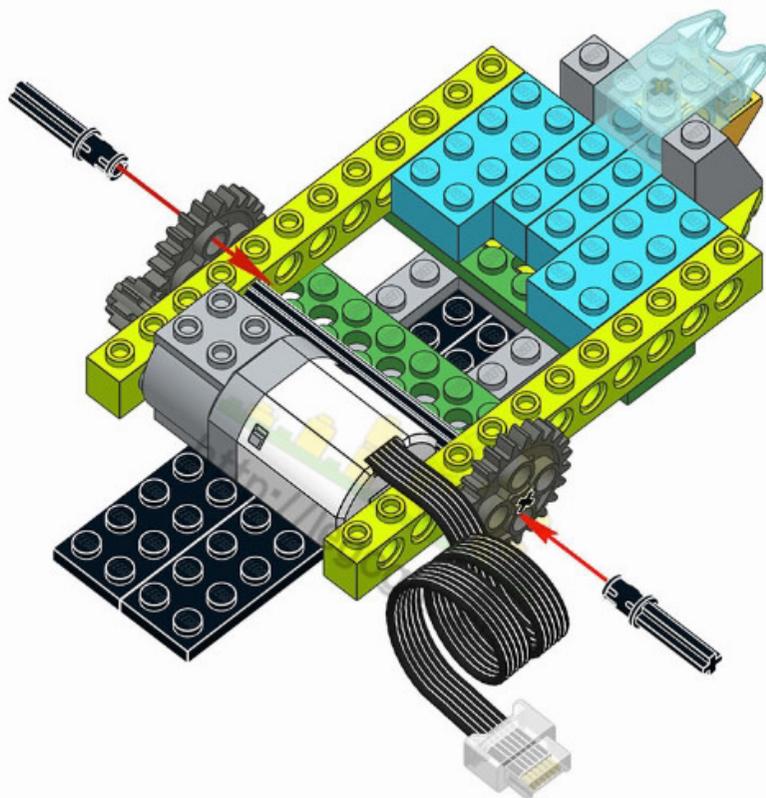




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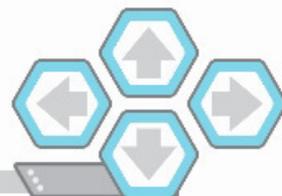
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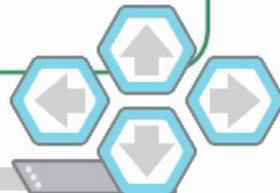
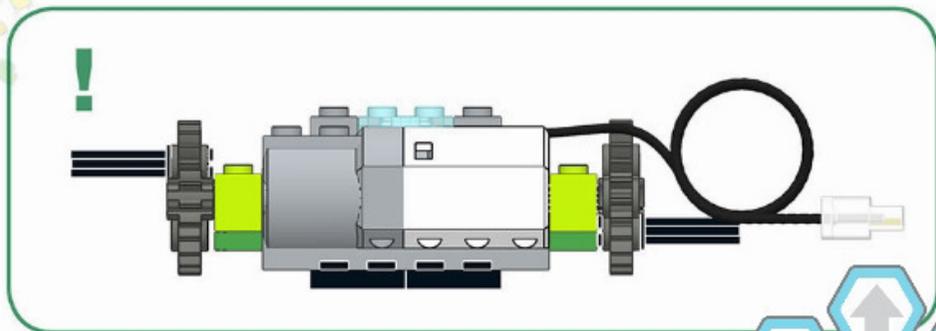
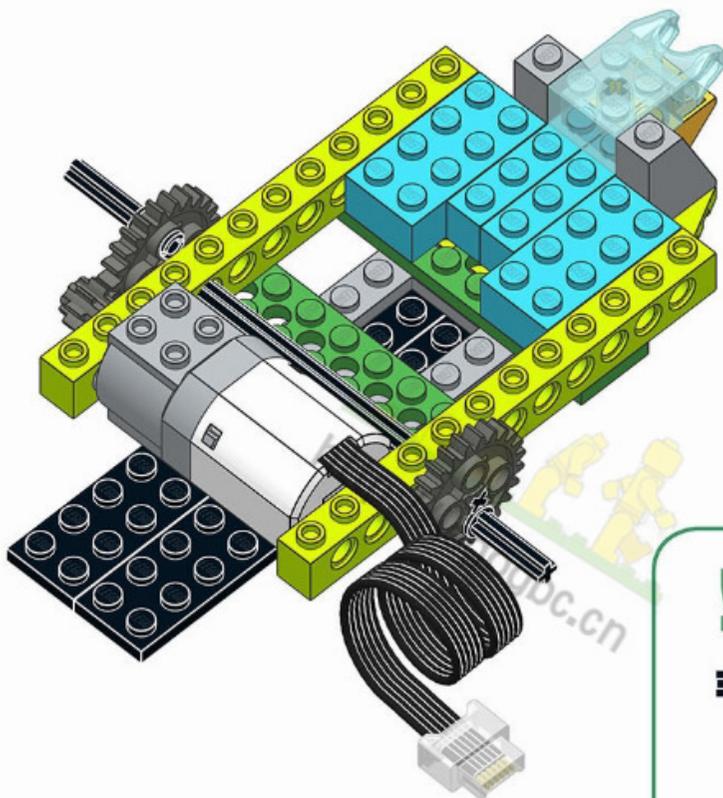
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18



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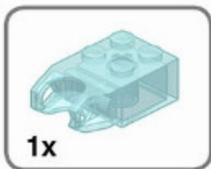
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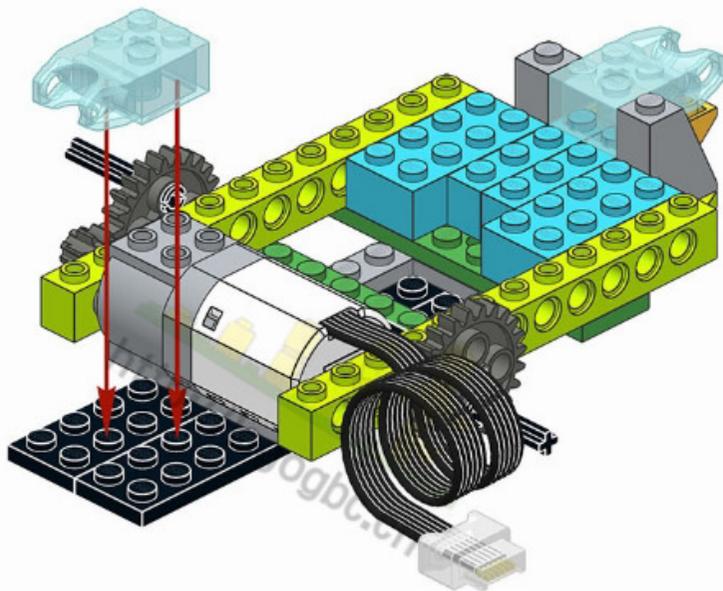
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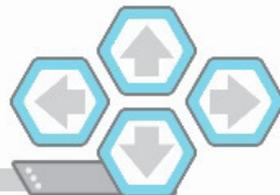
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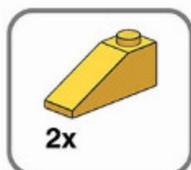


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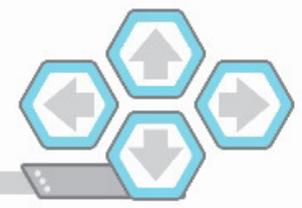
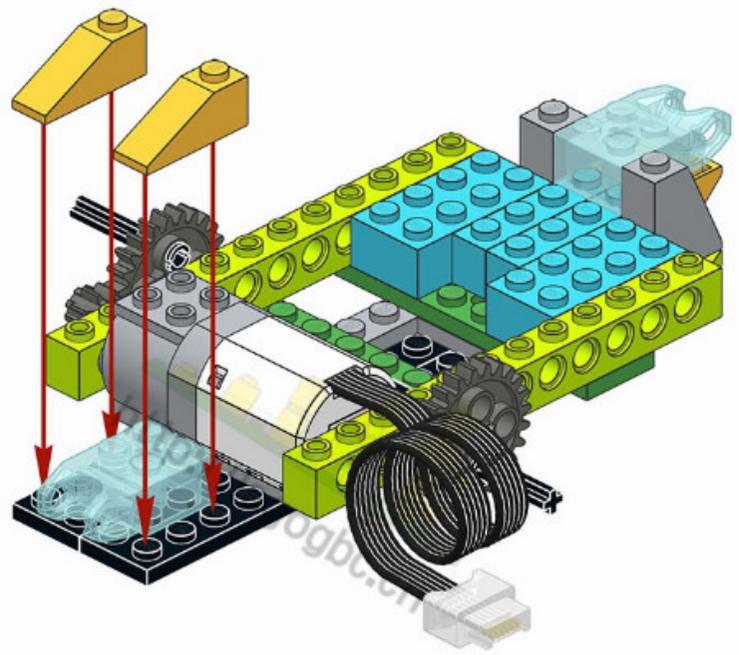


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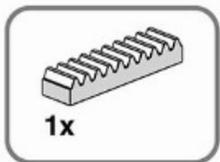
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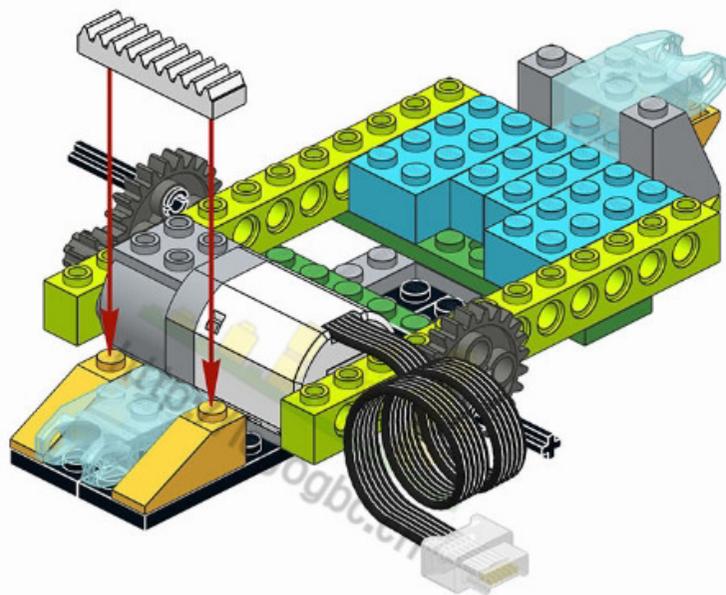




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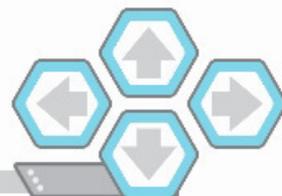
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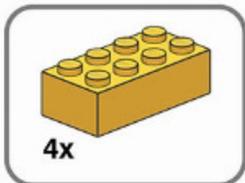


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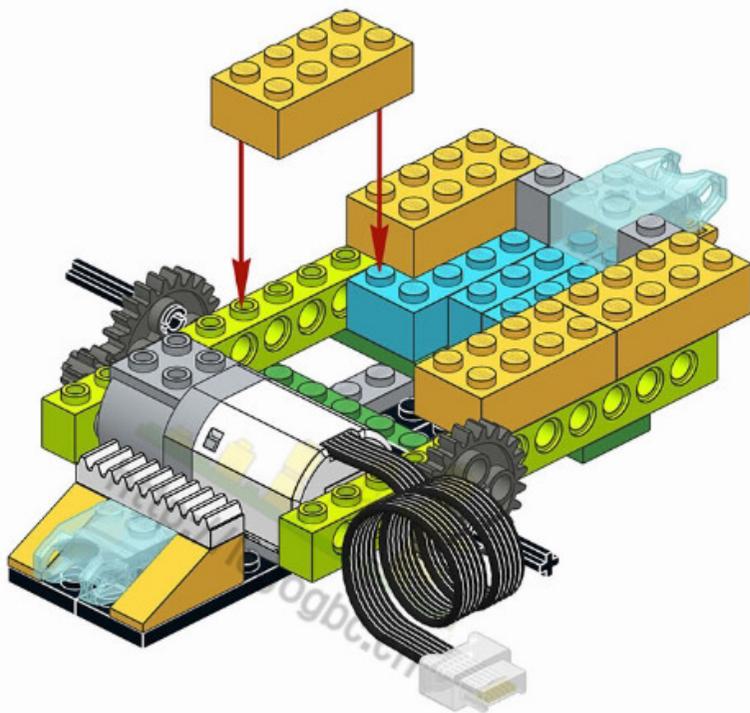


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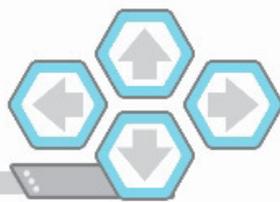


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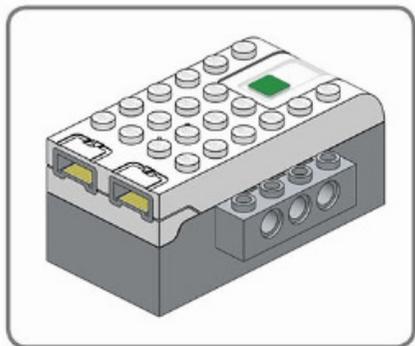
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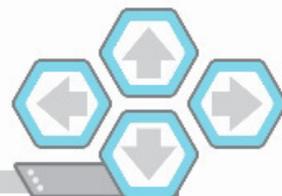
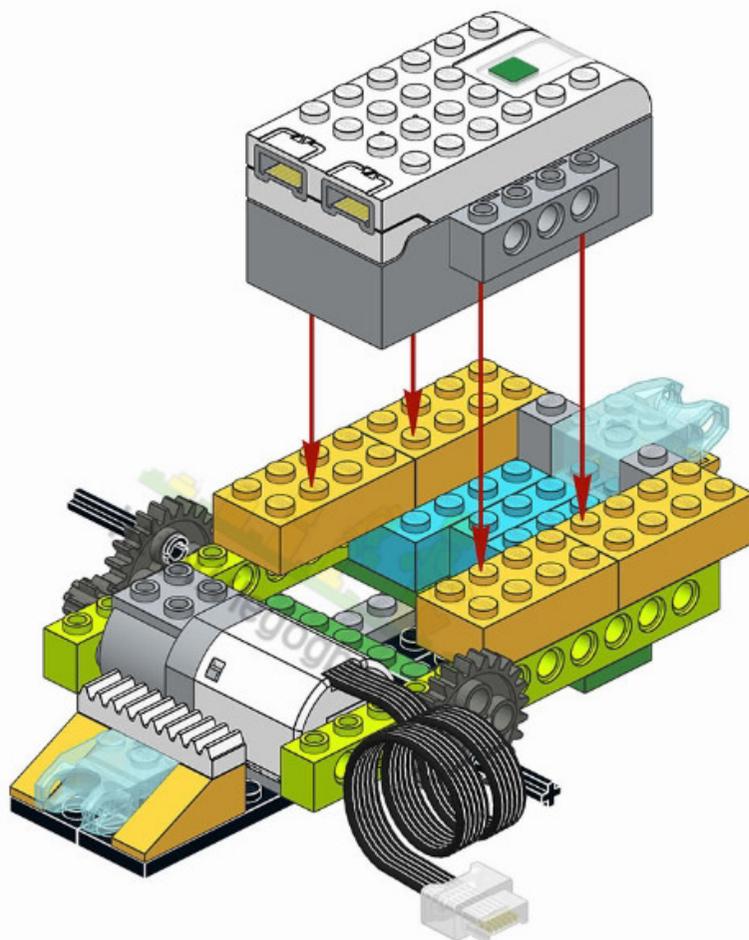




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23



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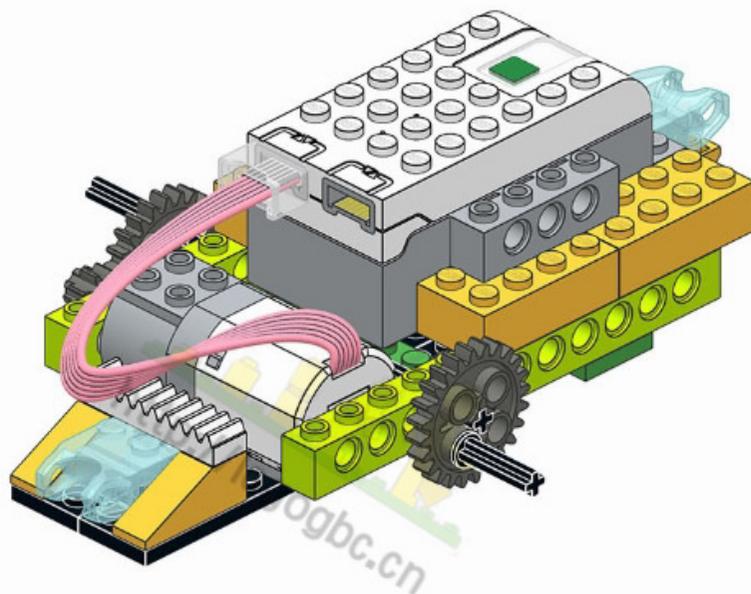
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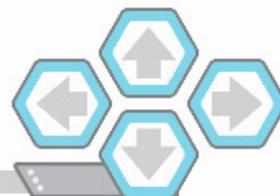
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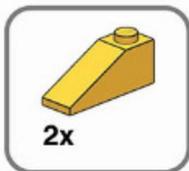
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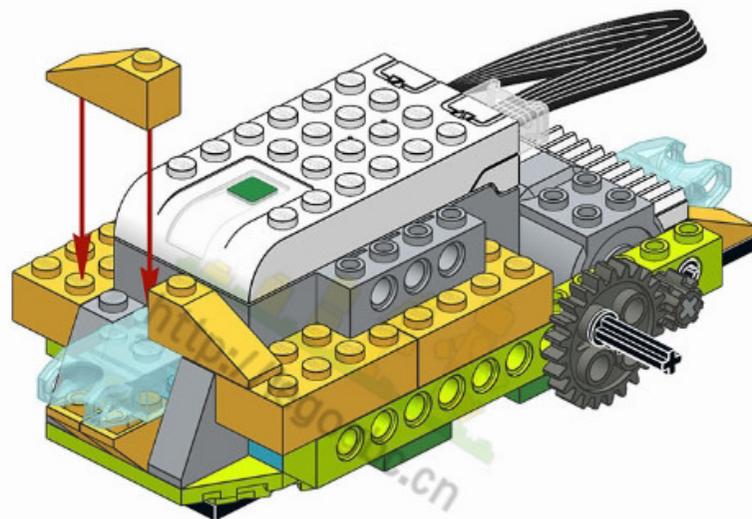
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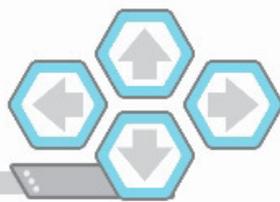
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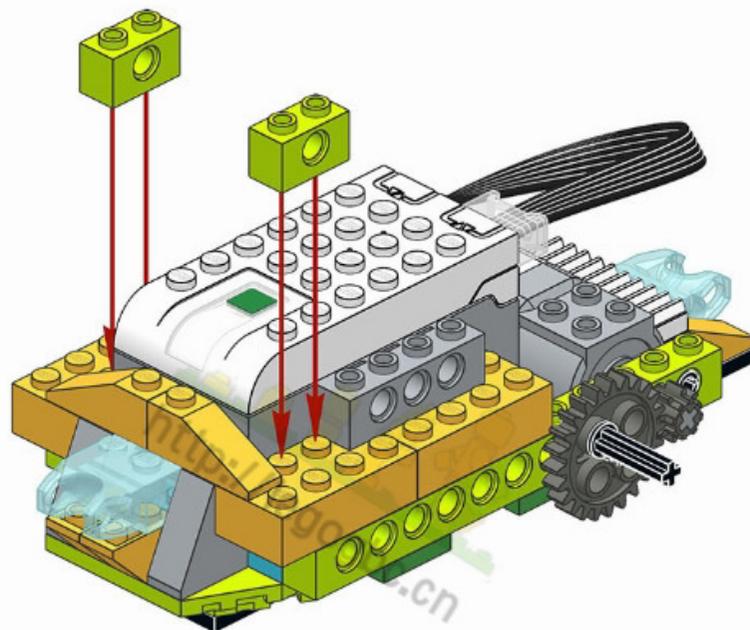




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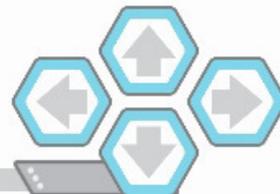
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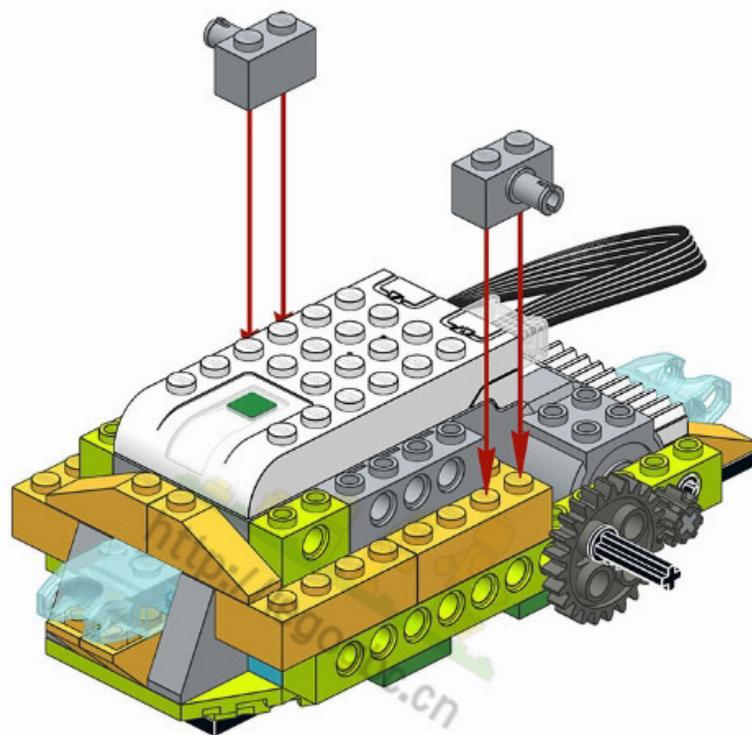




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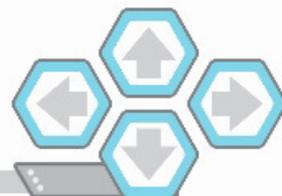
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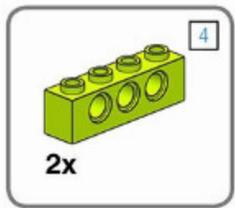


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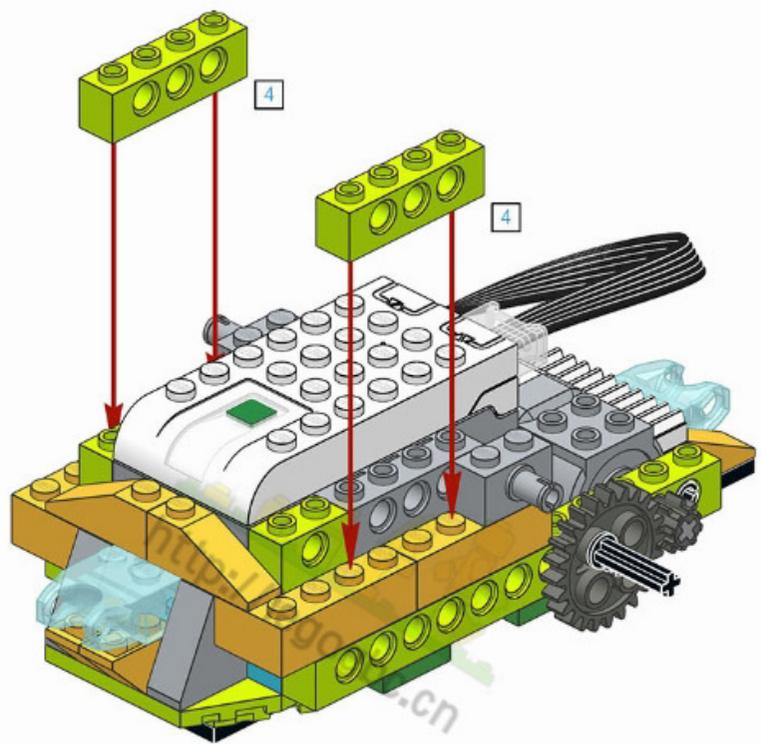




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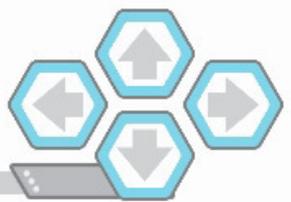
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59

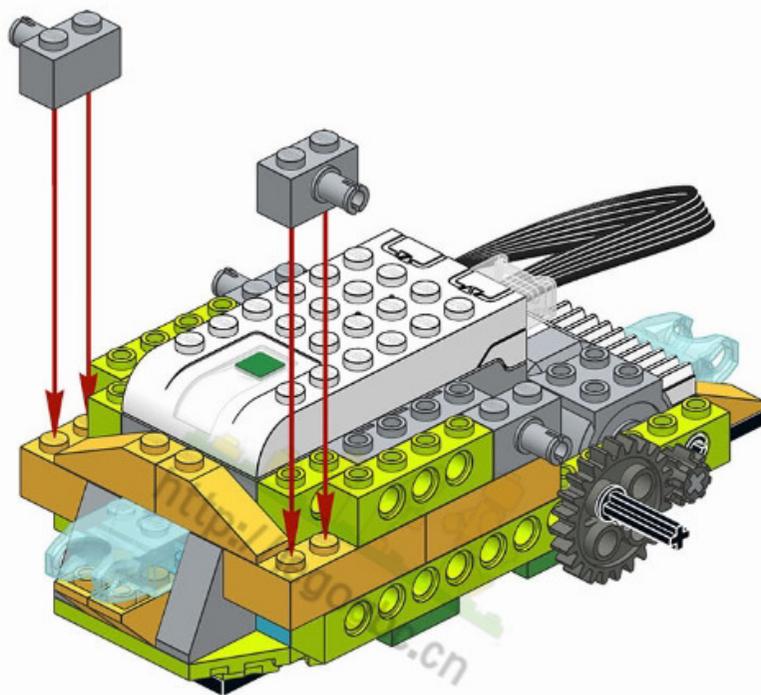




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29



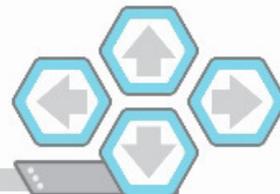
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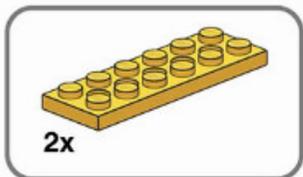


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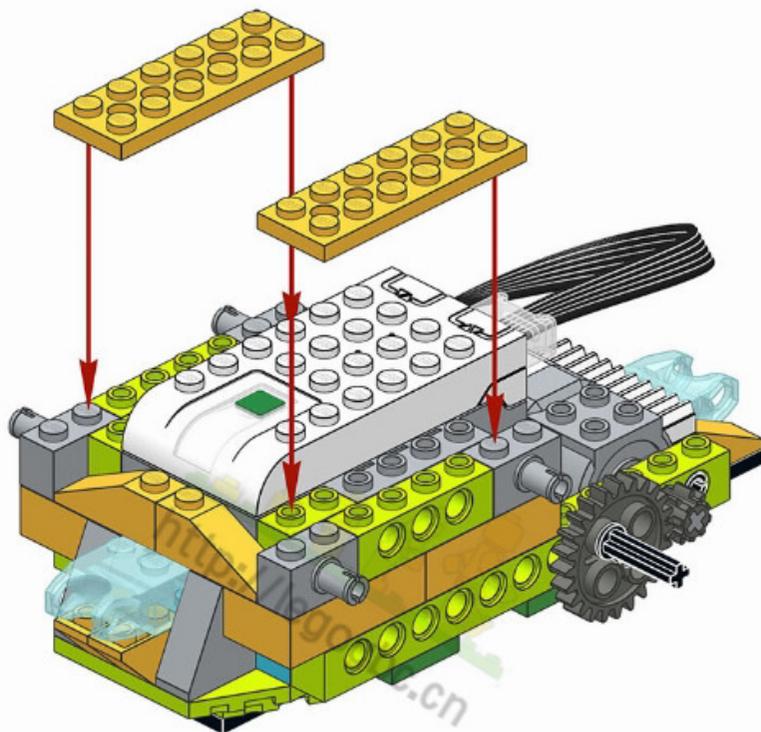




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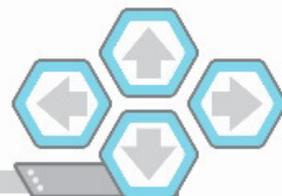
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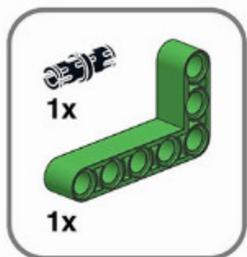


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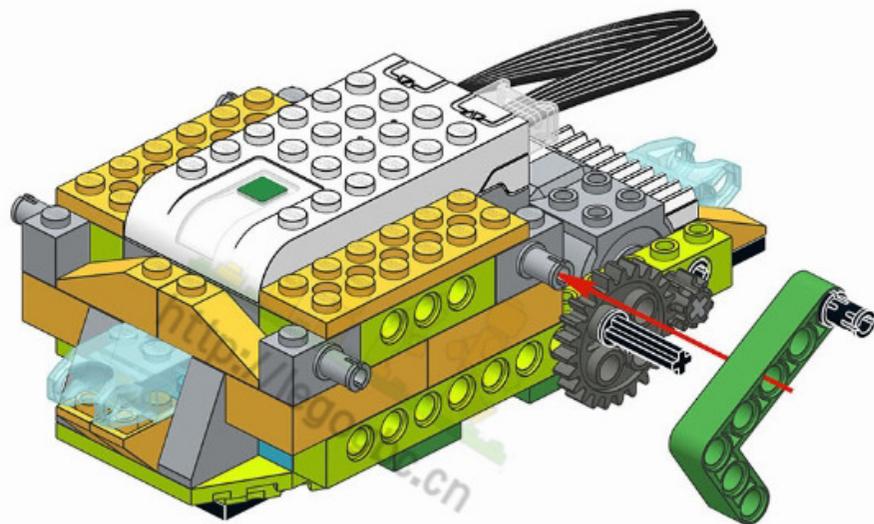




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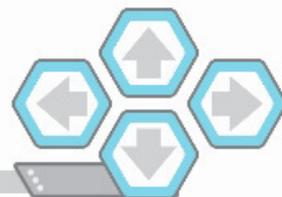
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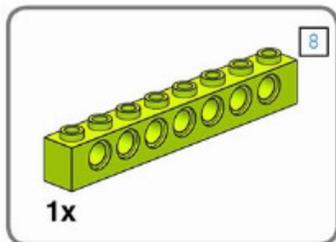


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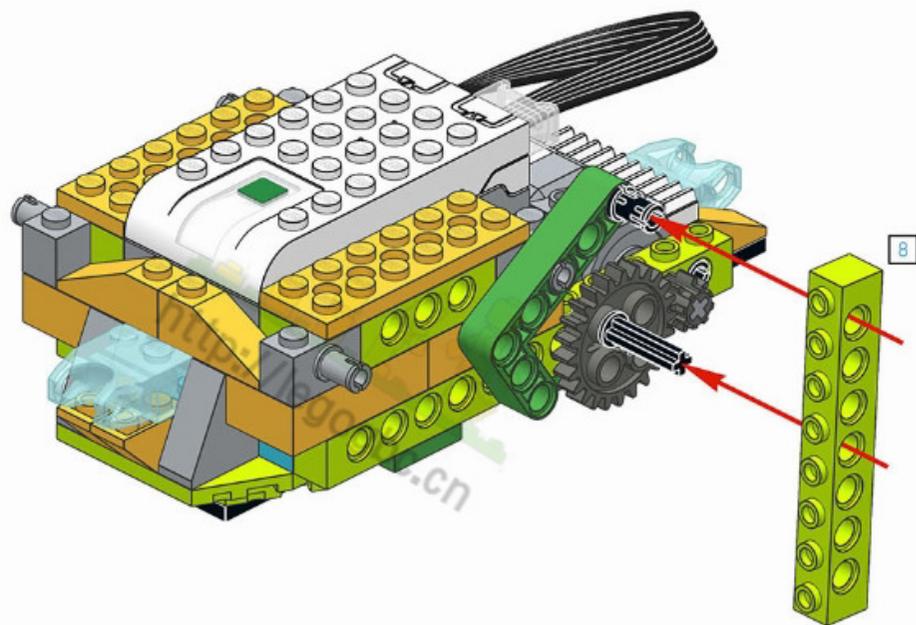


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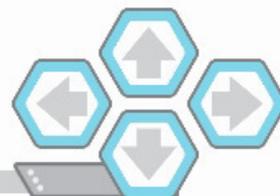
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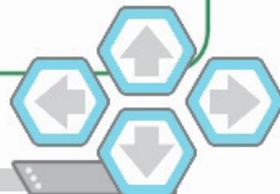
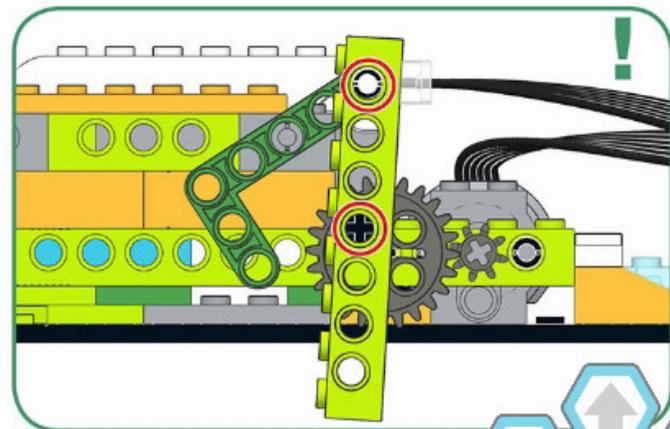
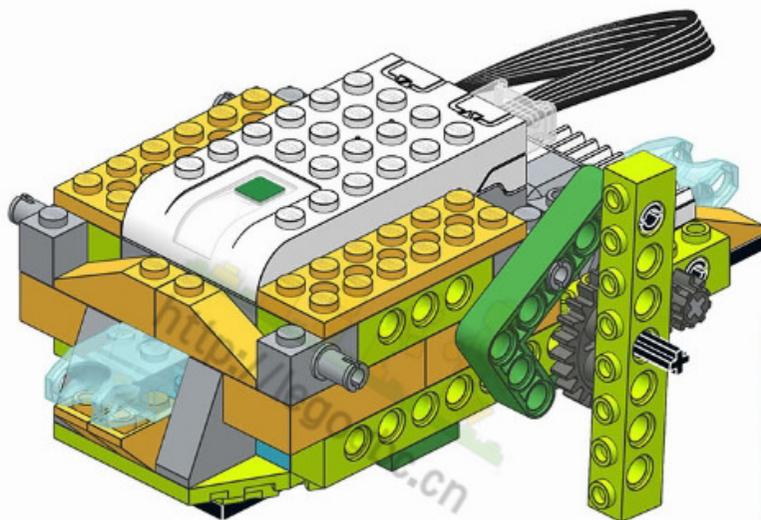
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33



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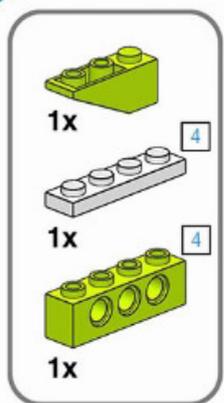


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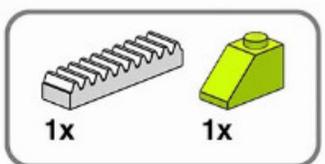
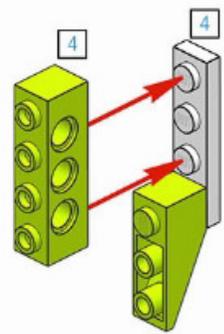




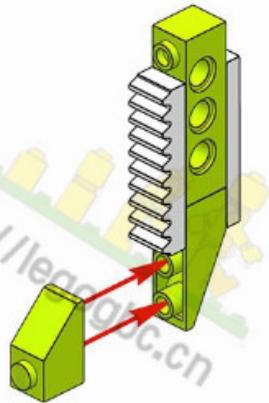
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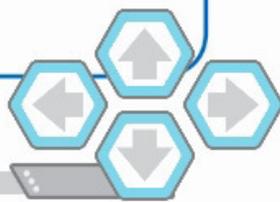
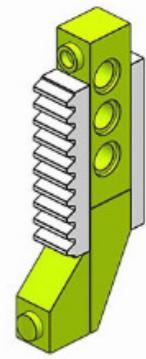
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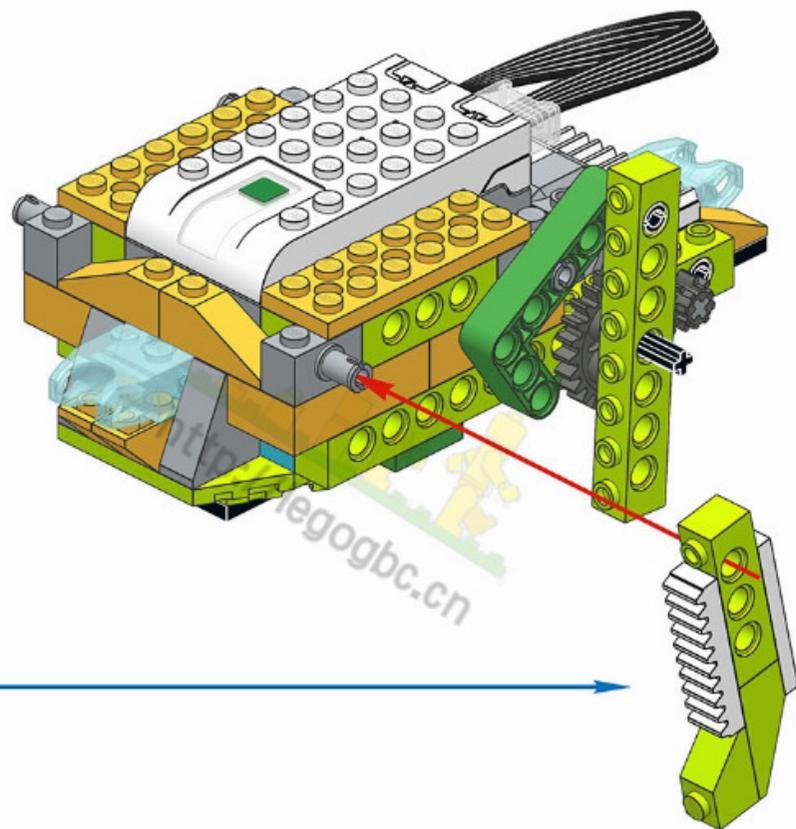
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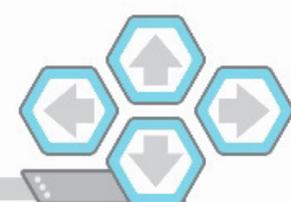
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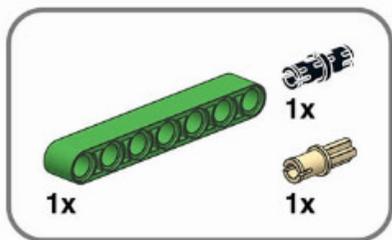
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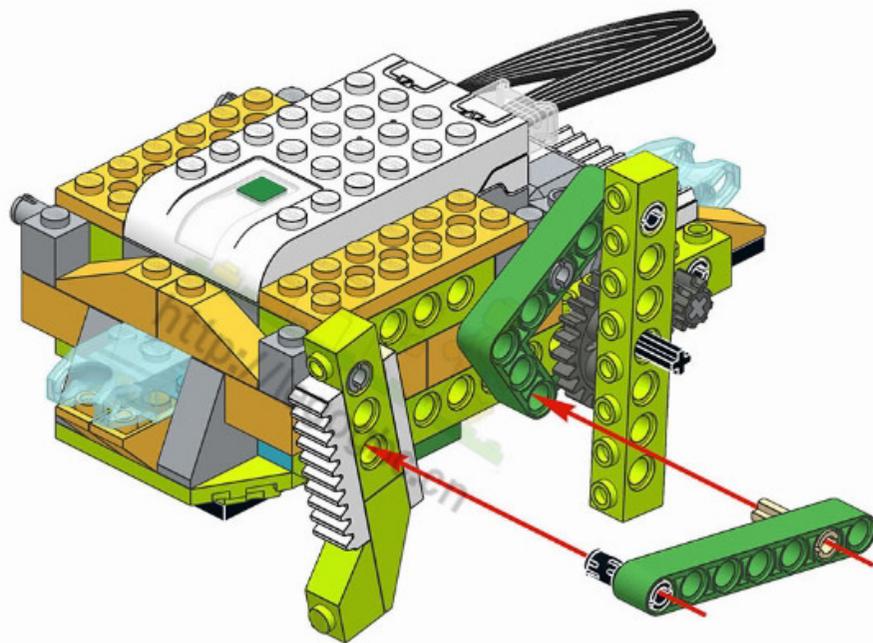




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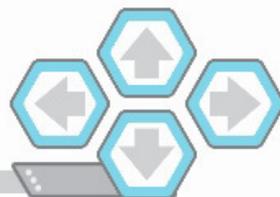
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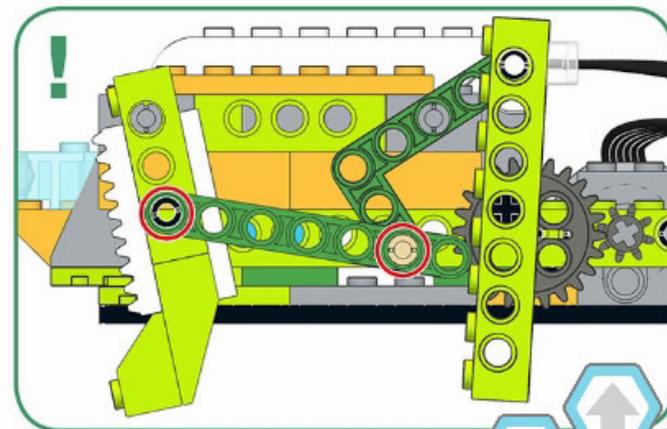
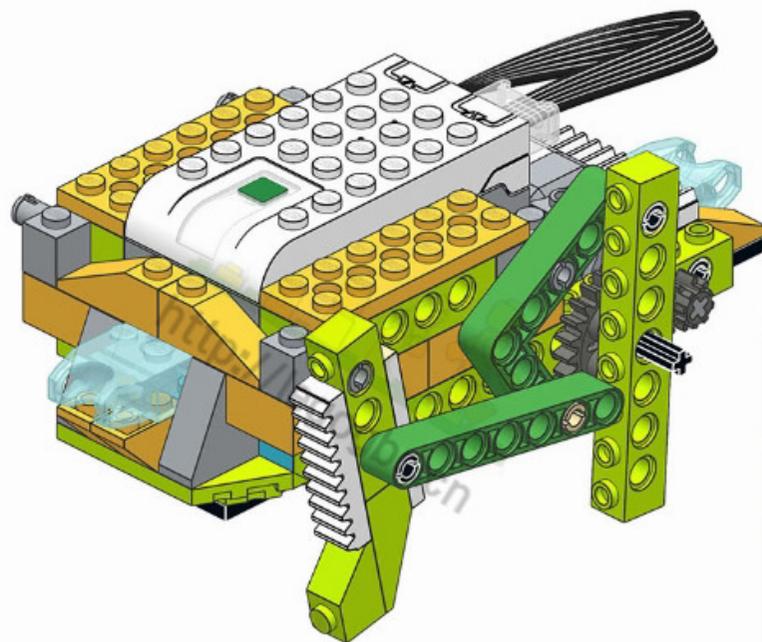
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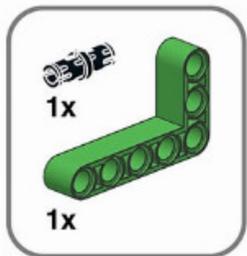
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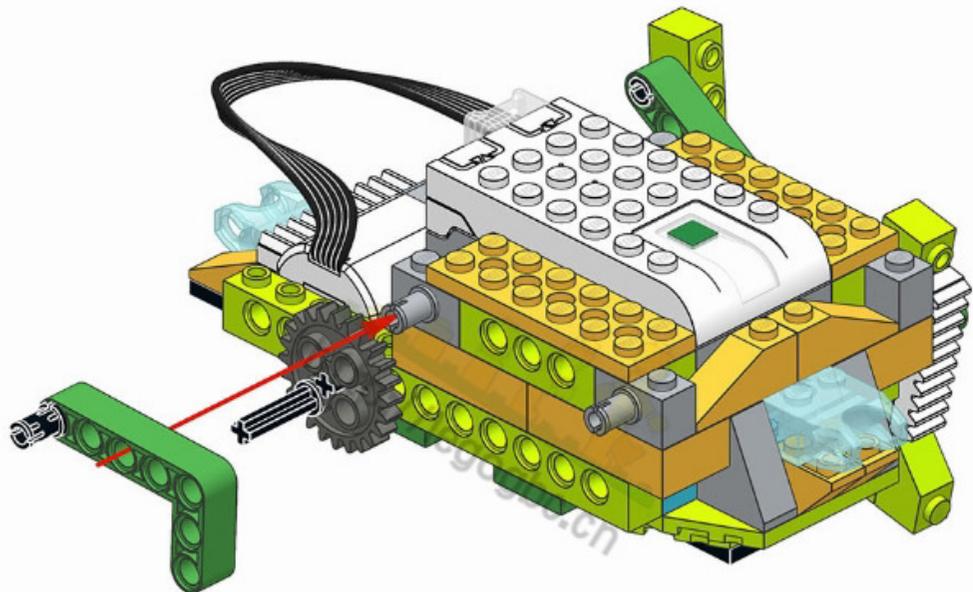




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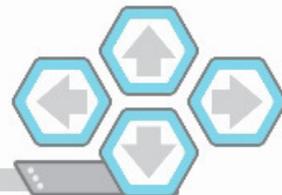
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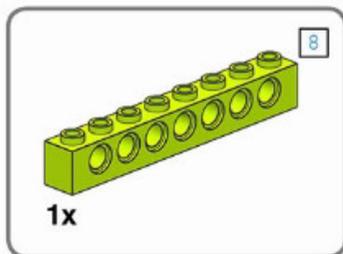
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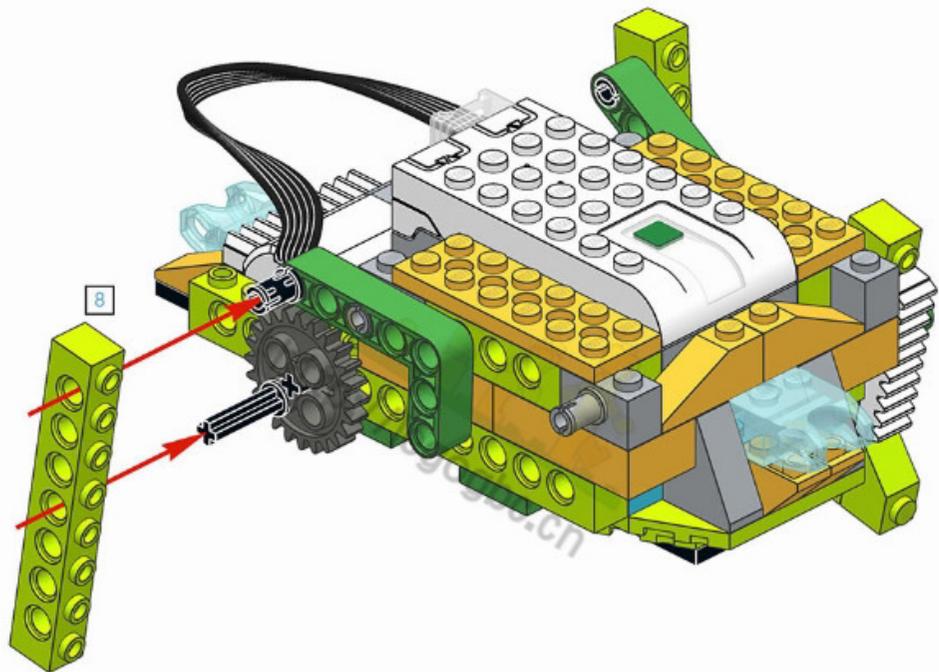




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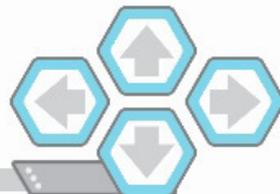
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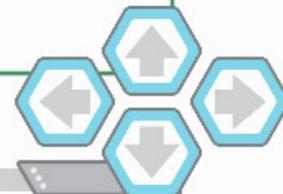
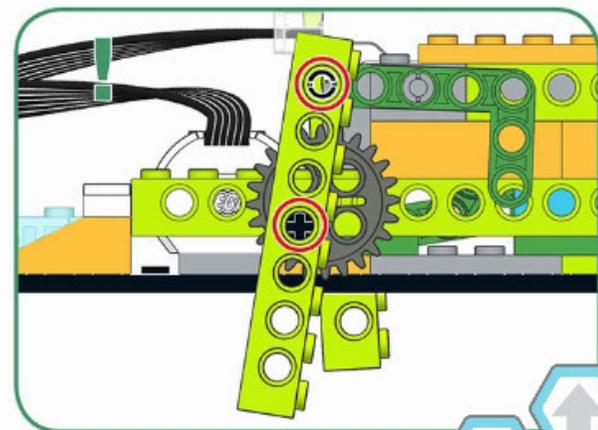
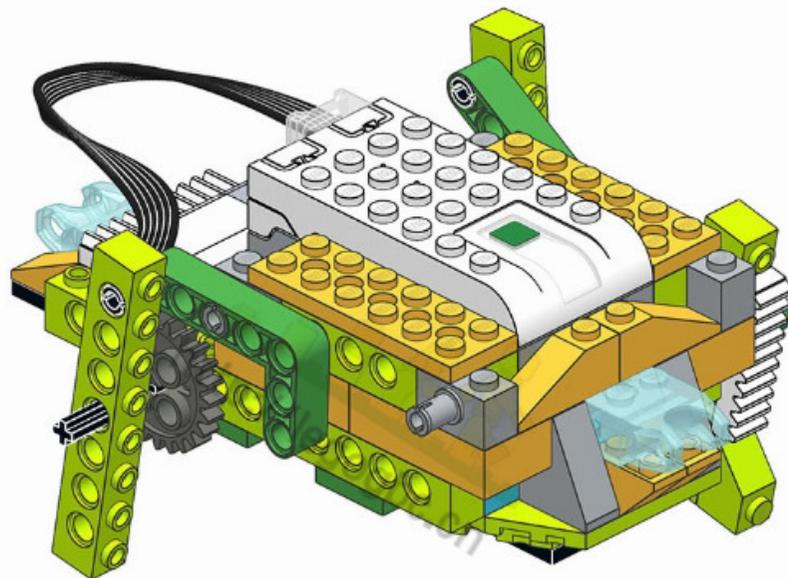
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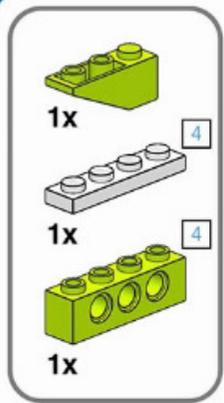
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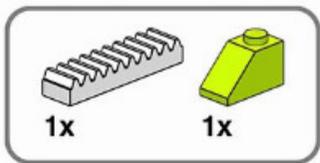
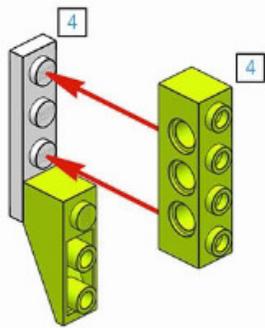




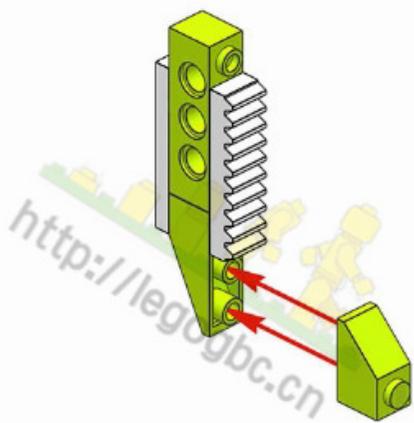
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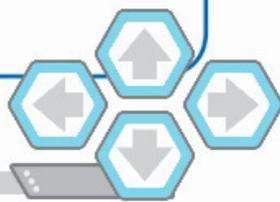
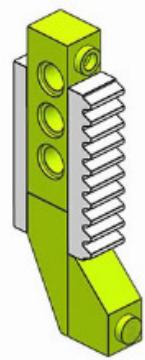
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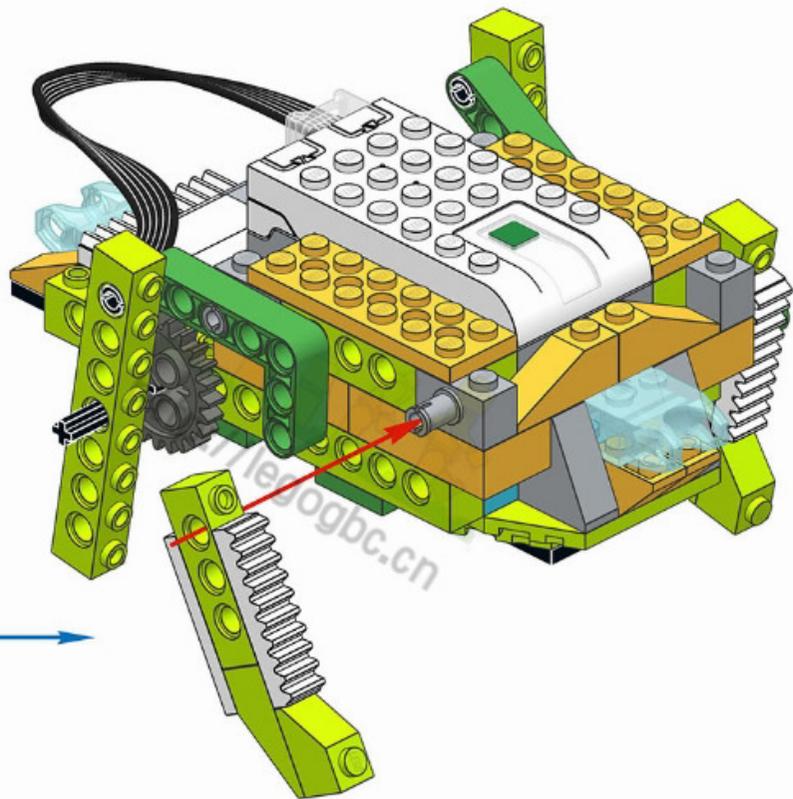
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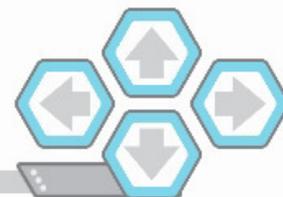
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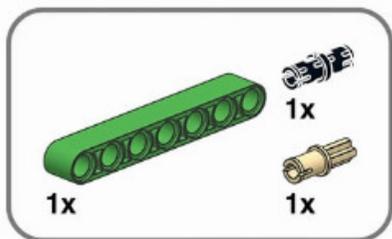
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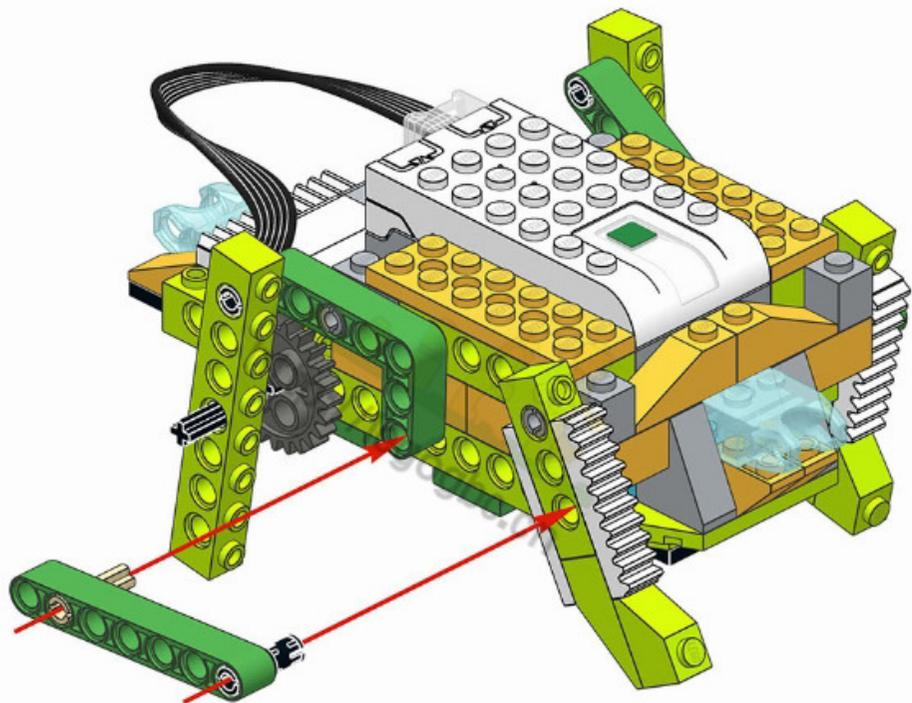




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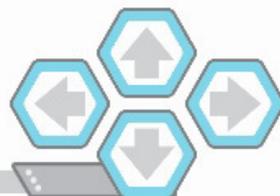
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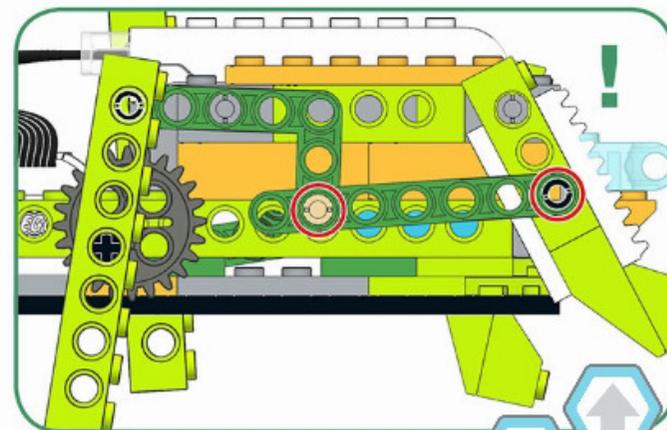
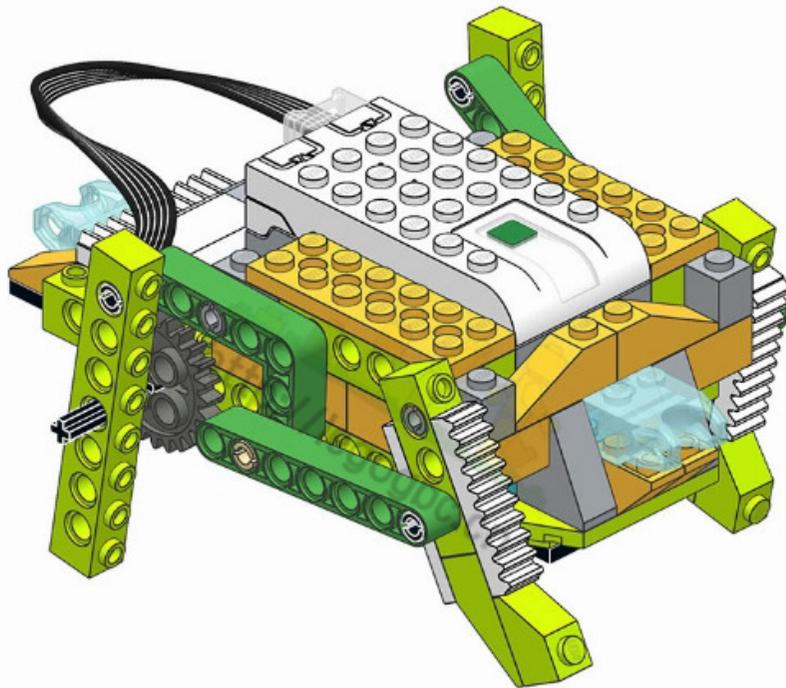


74





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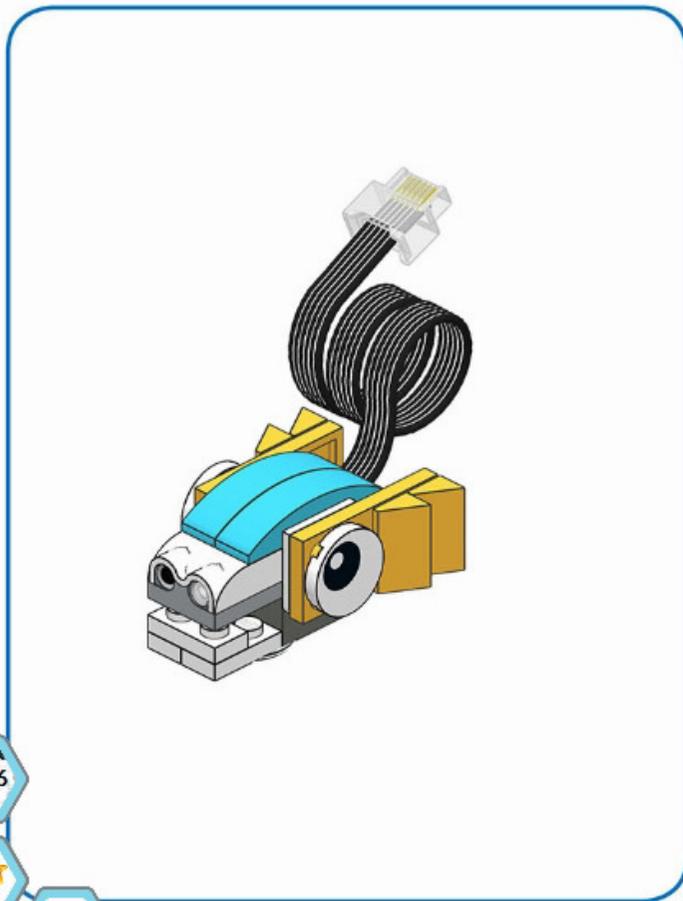
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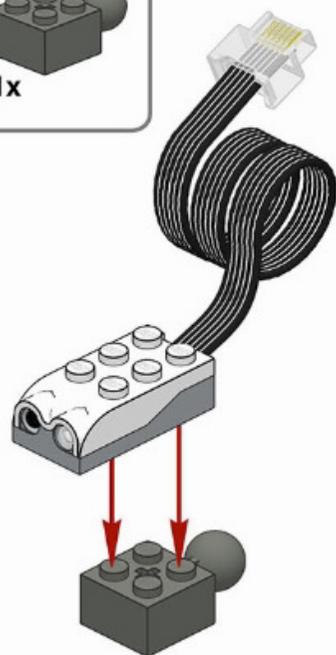


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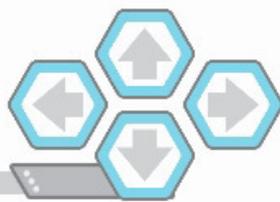
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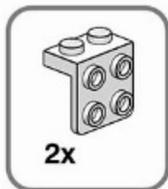
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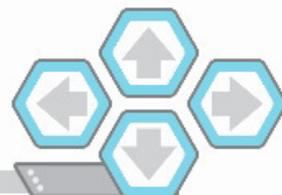
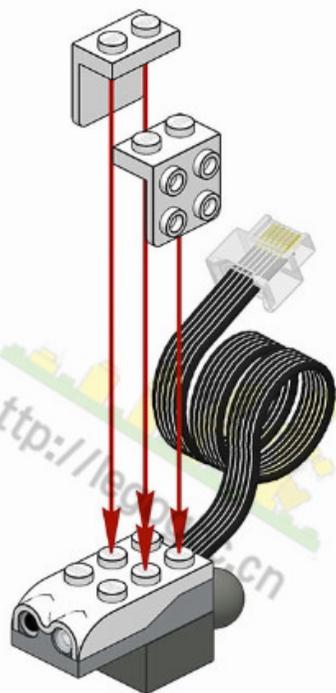




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1x 2x

1

2

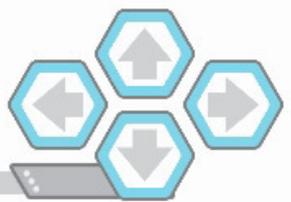
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<http://legogbc.cn>

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78

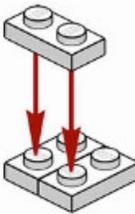




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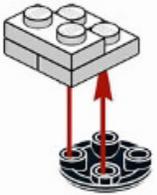
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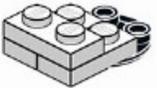


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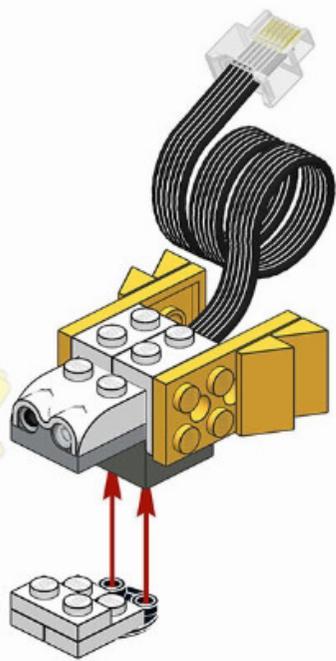
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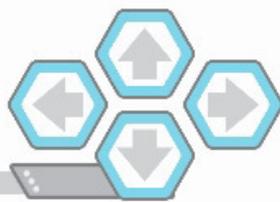
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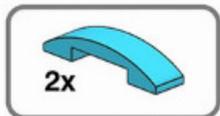
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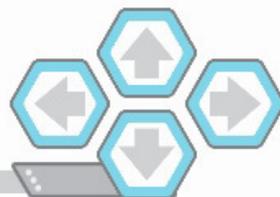




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49



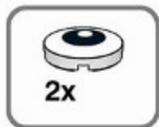
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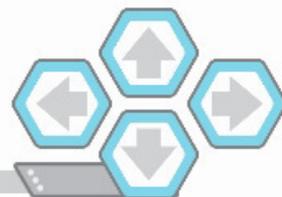
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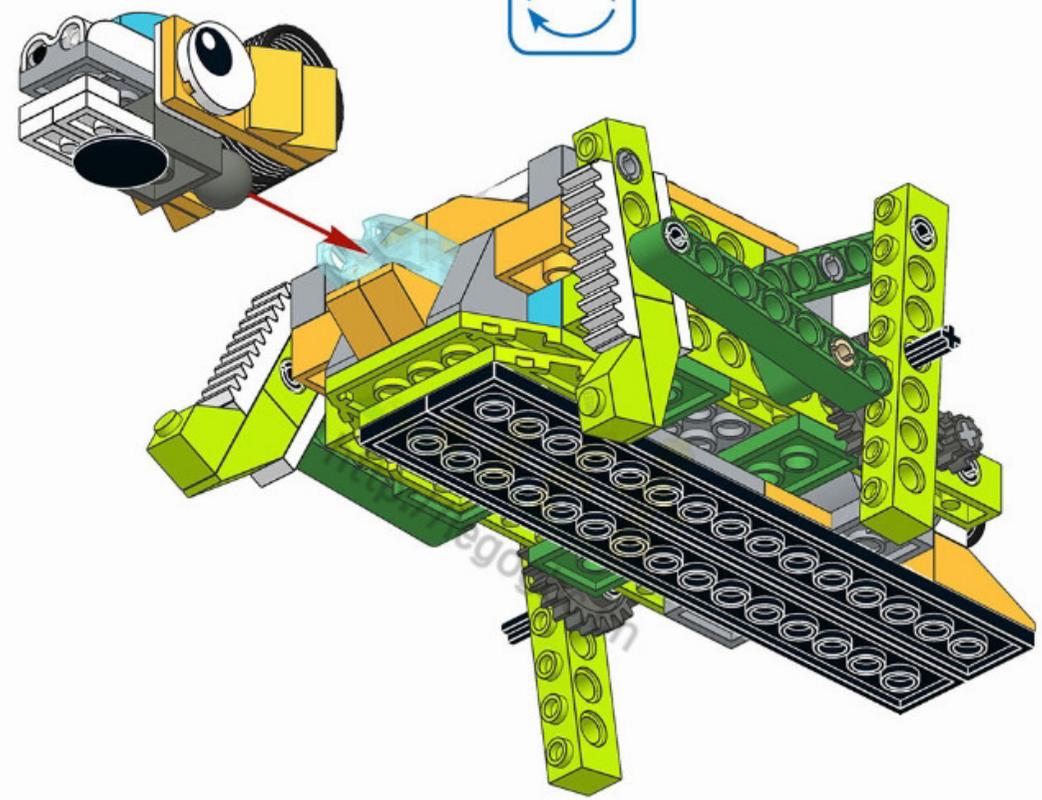
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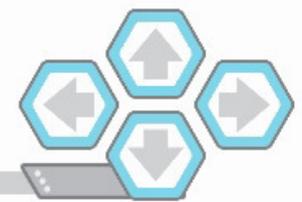
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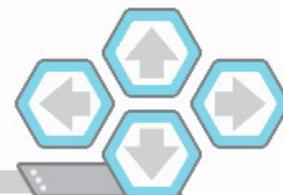
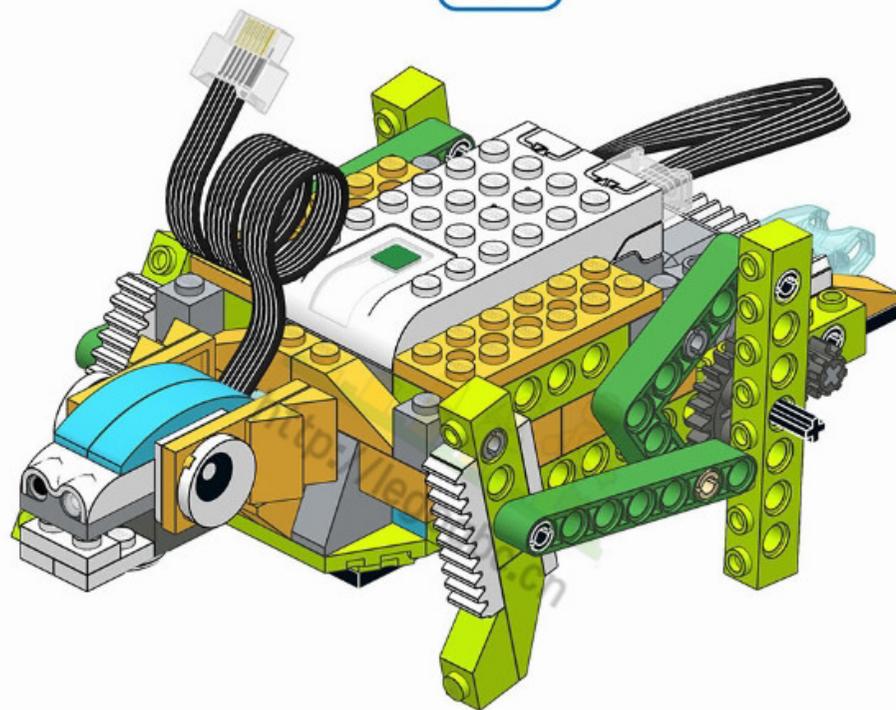
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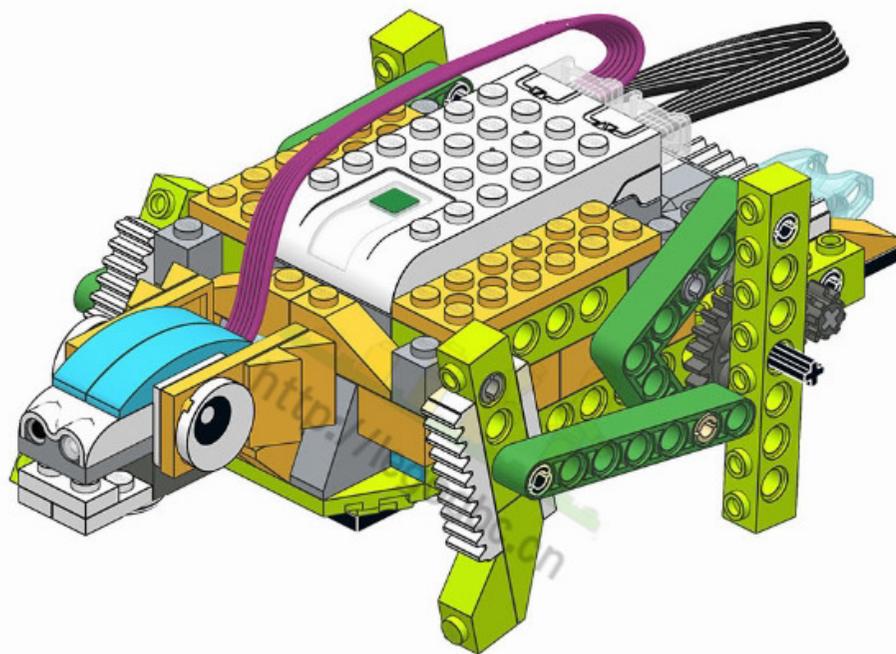
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53



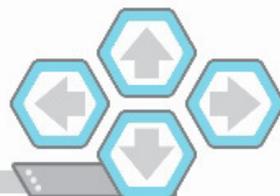
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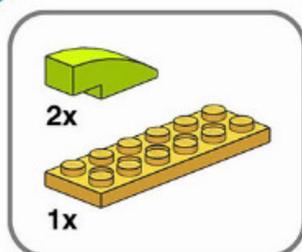


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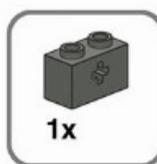
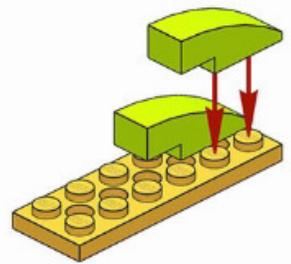




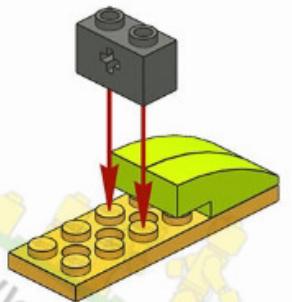
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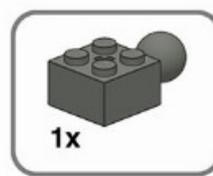
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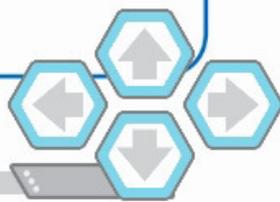
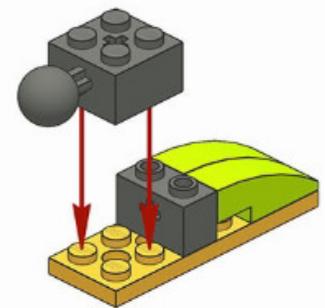
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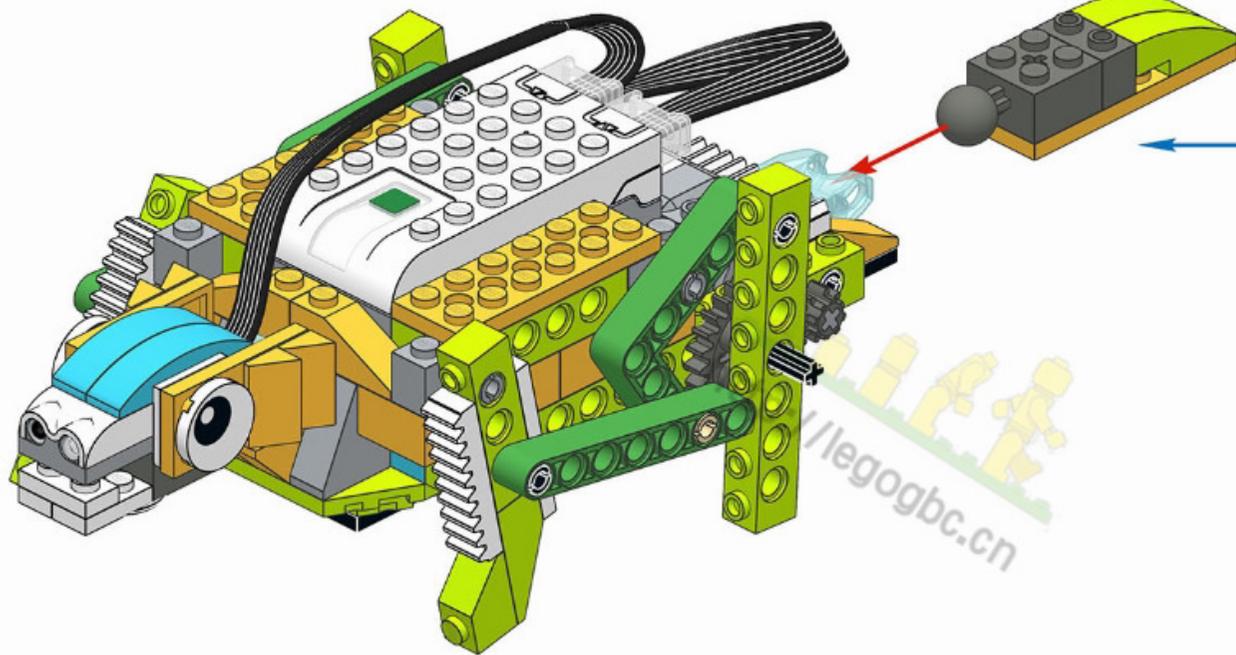
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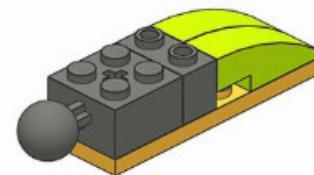
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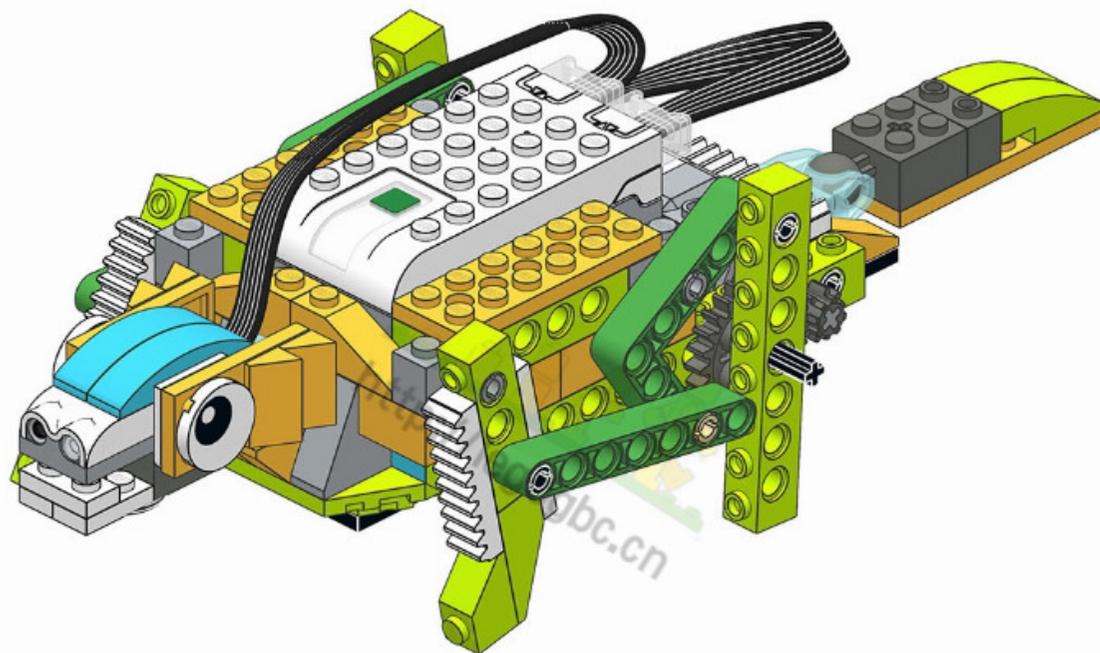
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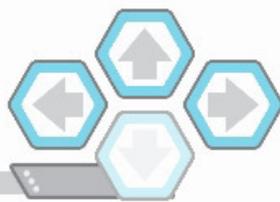


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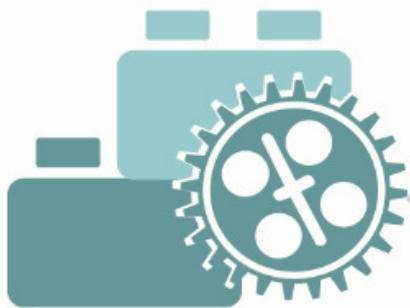
87





Enhanced version

Add the "sail". So you transform Ophiacodon into Dimetrodon.



Dimetrodon



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0

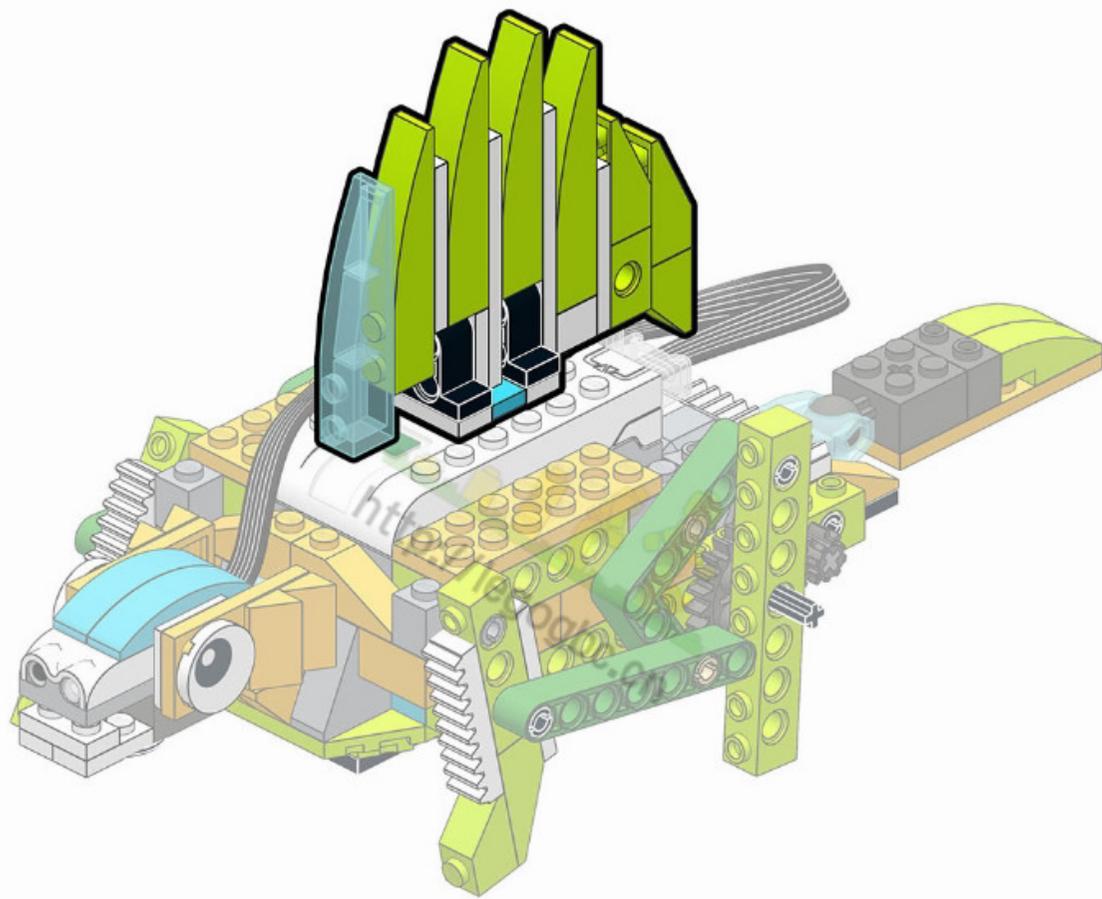


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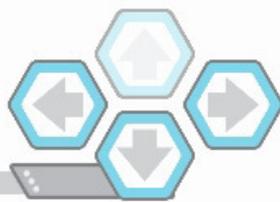
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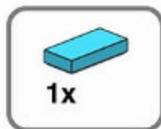
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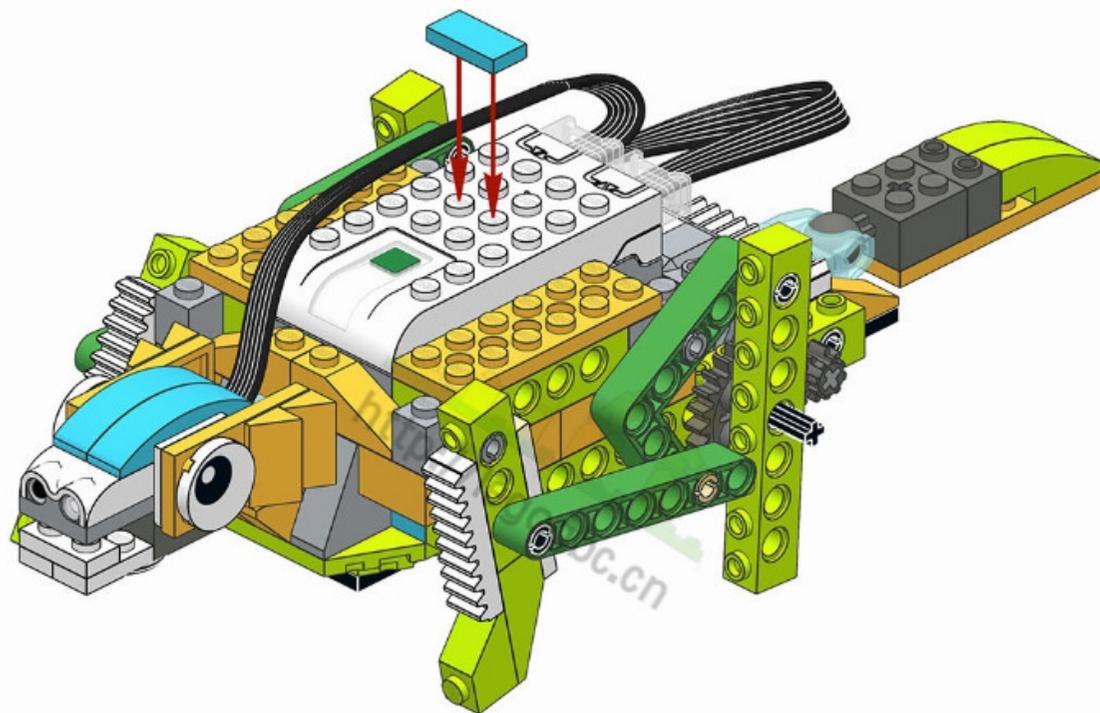




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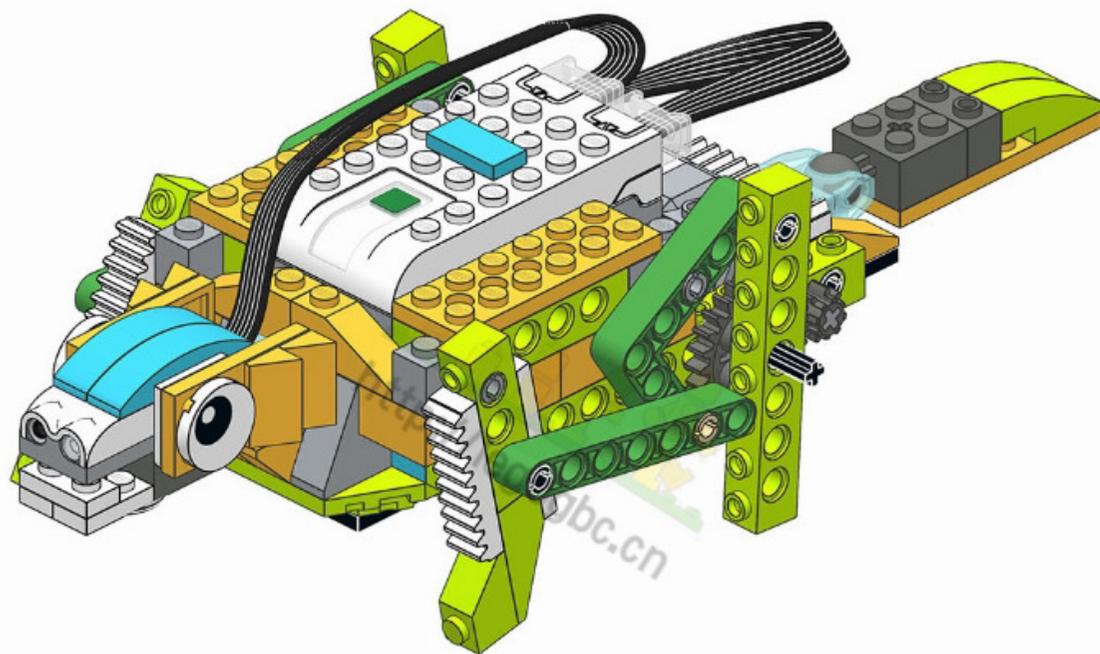
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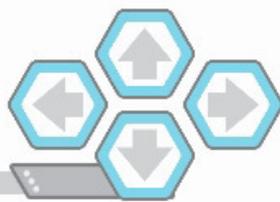


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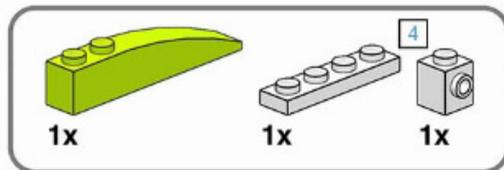
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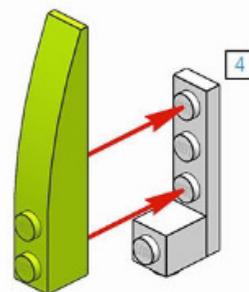
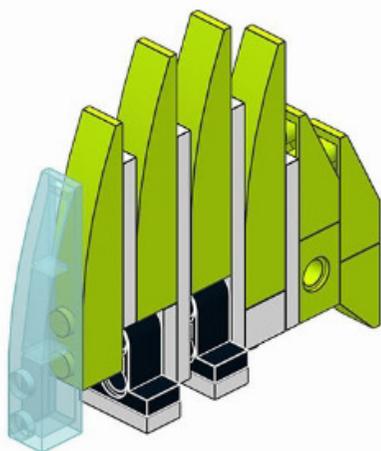




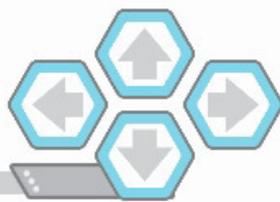
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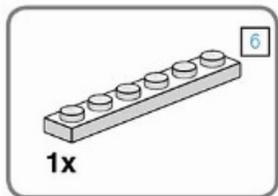


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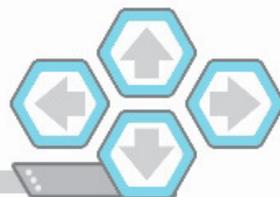
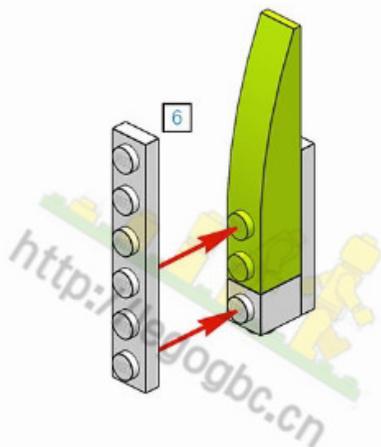




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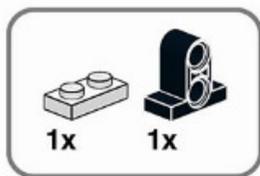


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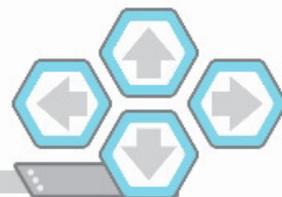
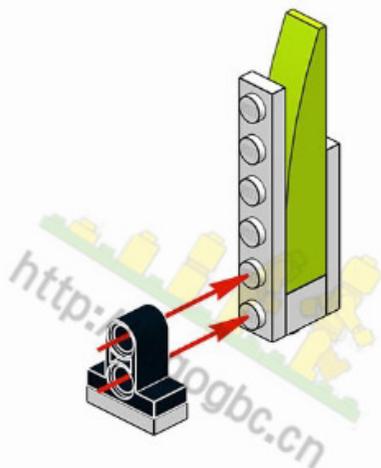




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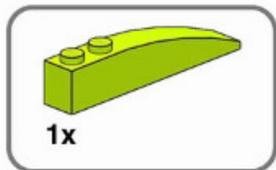


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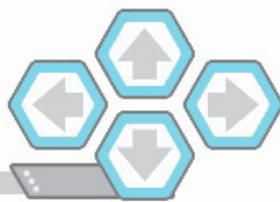
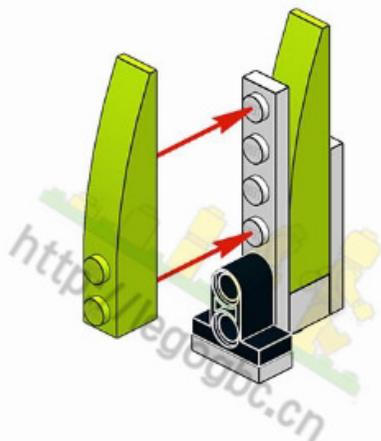




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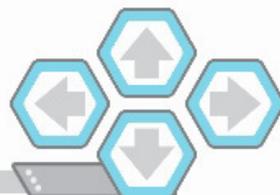
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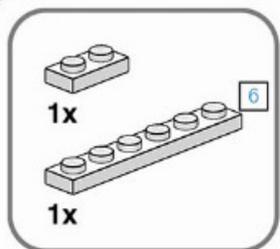


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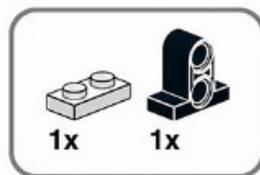
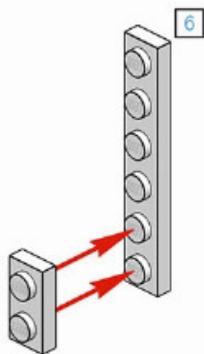




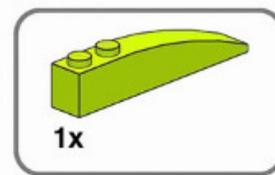
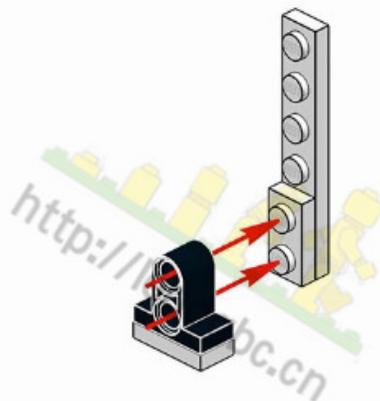
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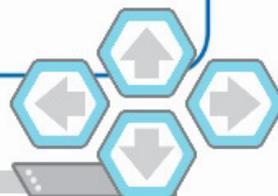
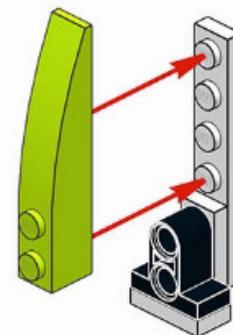
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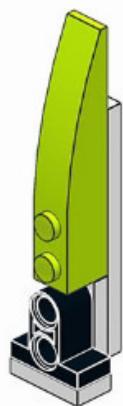
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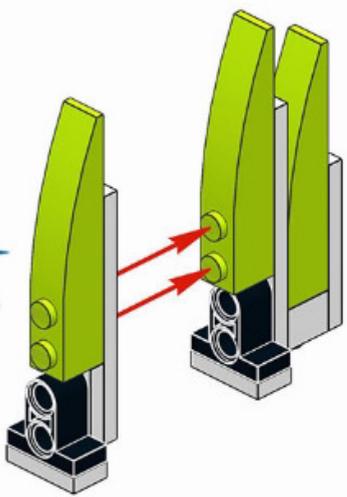


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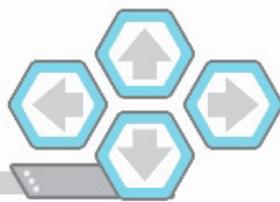
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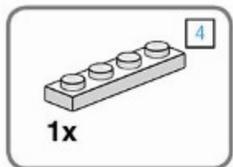
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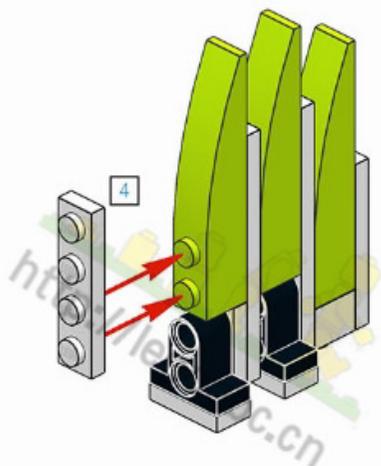




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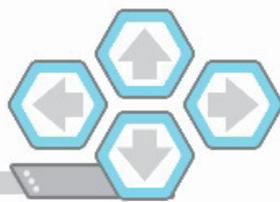
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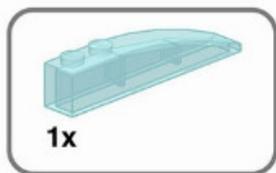
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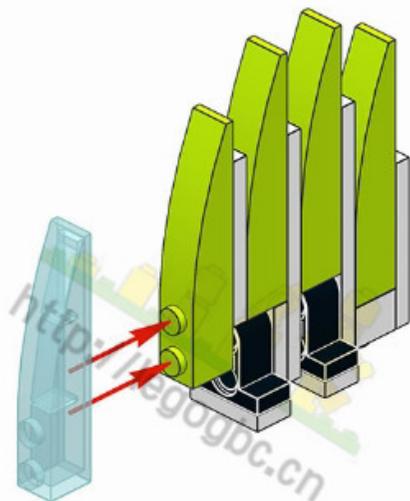


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1x

68



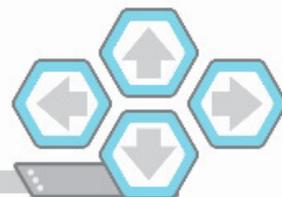
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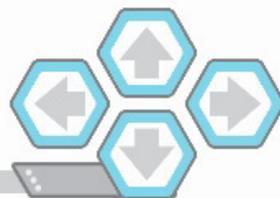
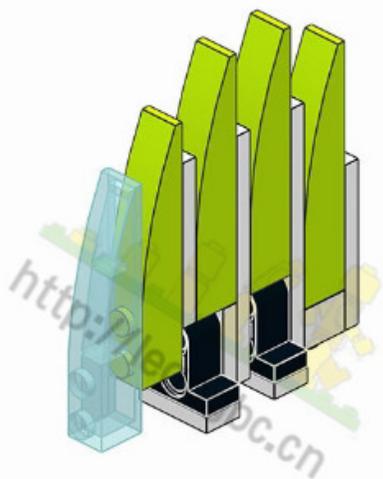


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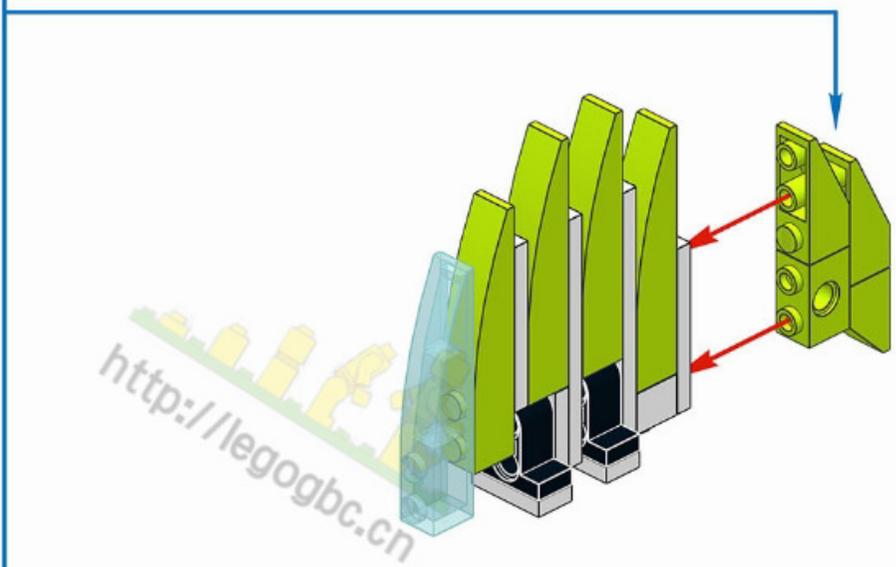


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2x 1x 1x

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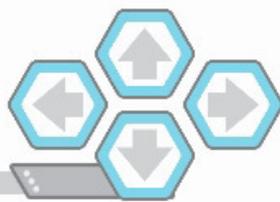
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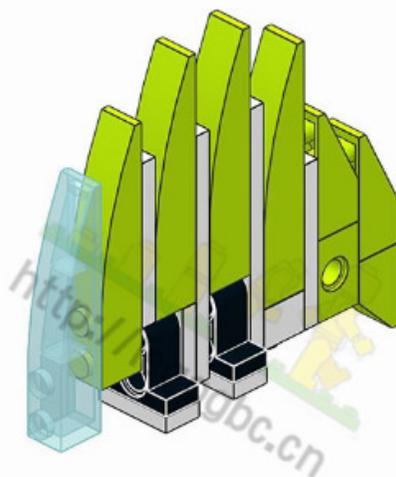
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71



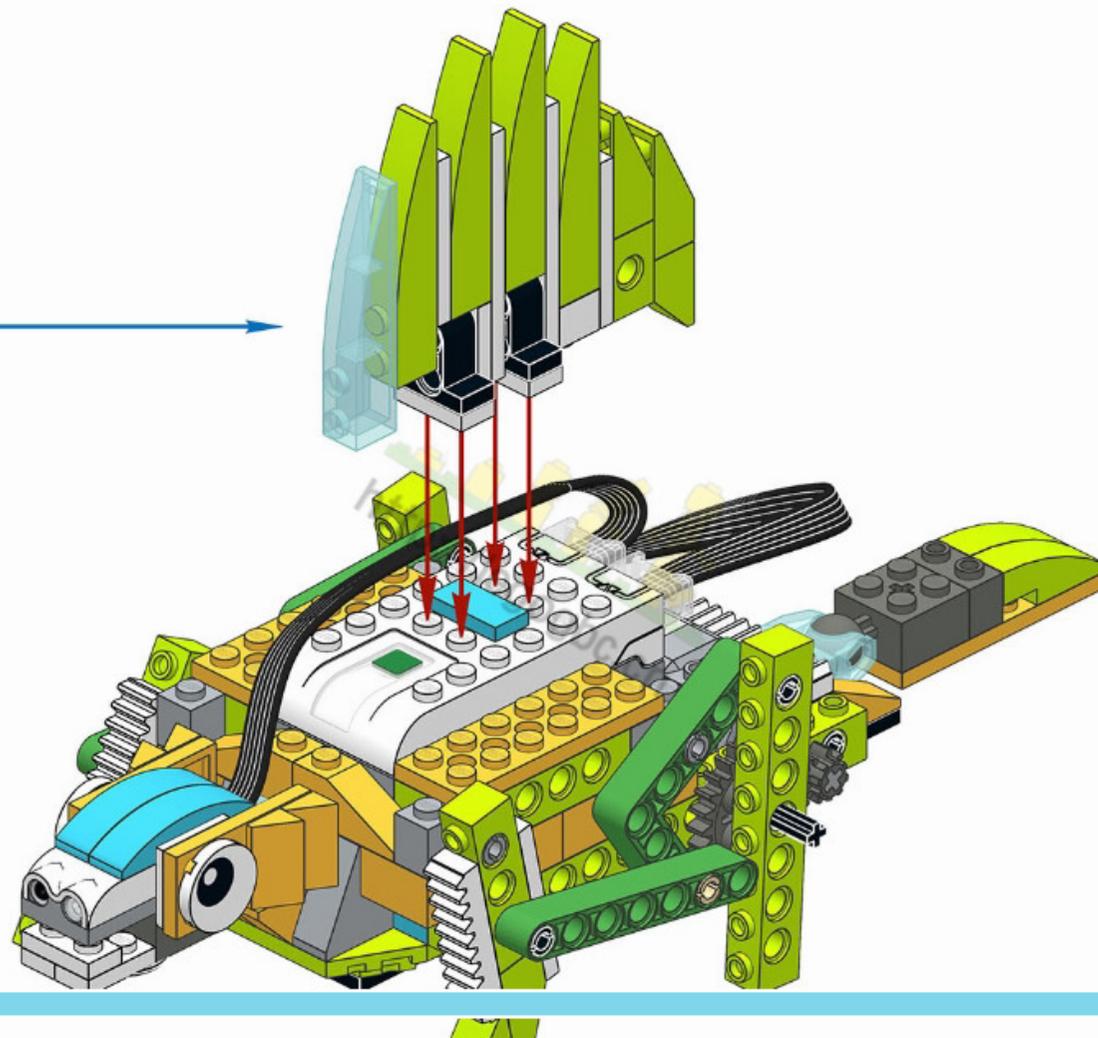
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72



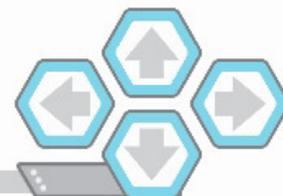
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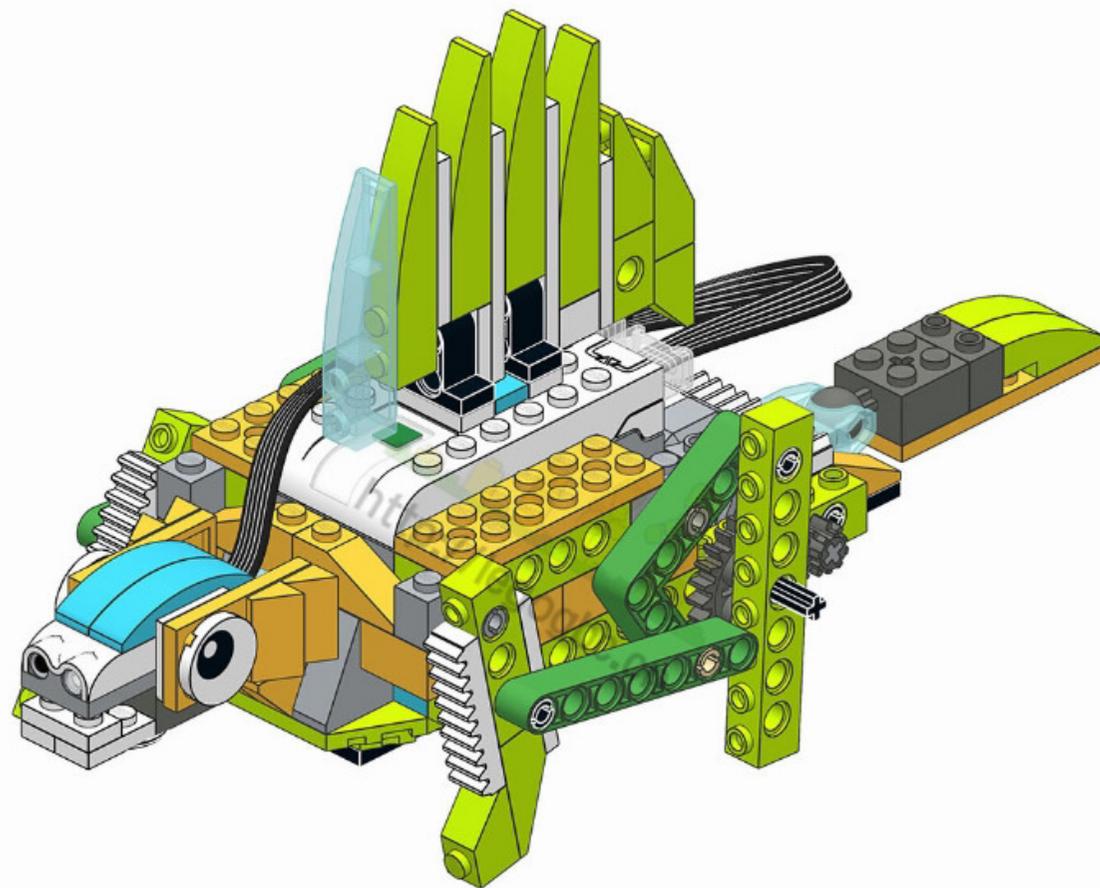
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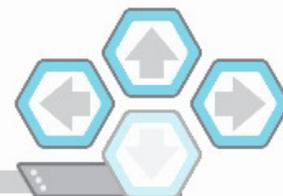
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Check it out!

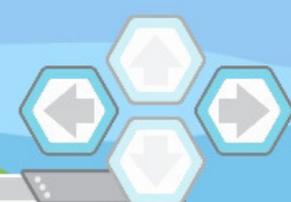
Avoid any friction
between the cables
while robot is moving.



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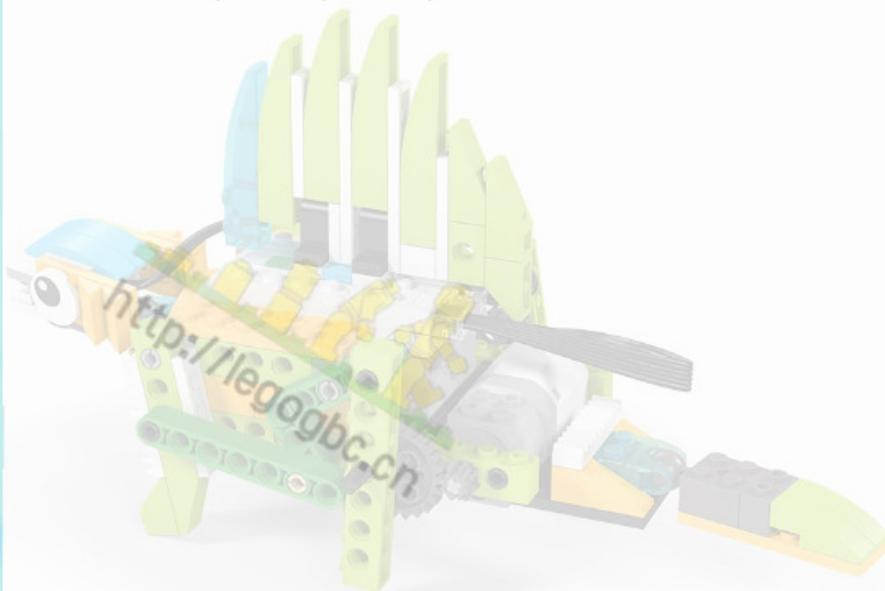
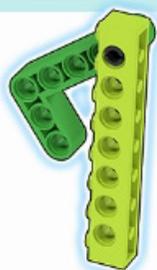




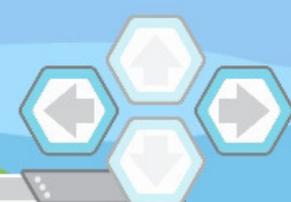
Task



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Place parts of the robot on the right places

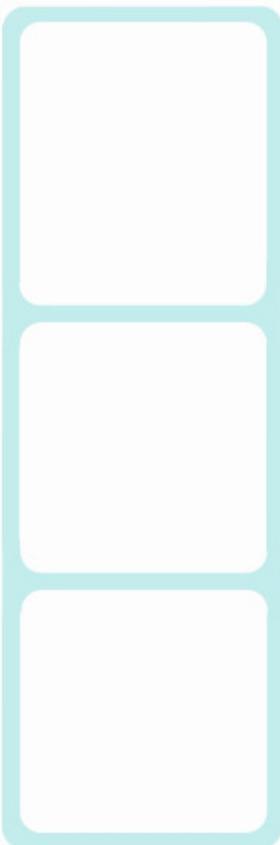
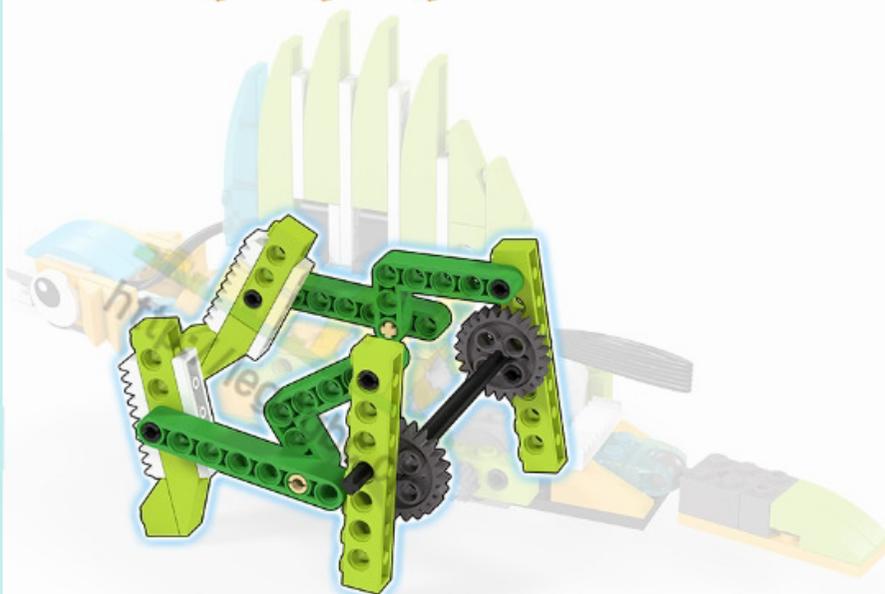




Task



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Place parts of the robot on the right places



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Task 1

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



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Task 2

Program the displaying of motion sensor data on the screen. Experiment. What distance does the robot "see" from the sensor to your hand?



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Task 3

Program the robot's stop after finding food. The robot must move forward until the sensor detects the object in front of it.



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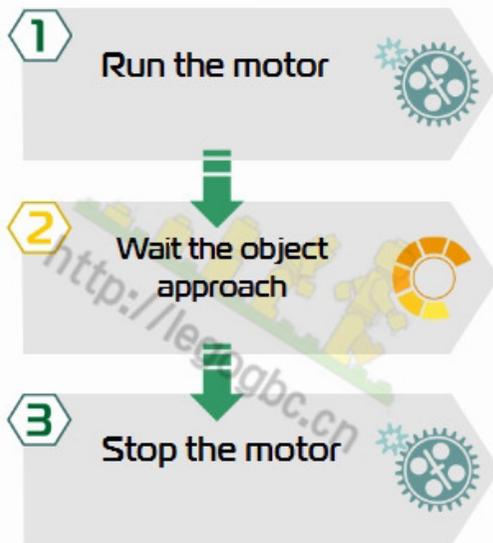


Task 3. Algorithm



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The program is run by the following algorithm:



Task 3. Program



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1 Run the motor 



Step:  —  — 



Task 3. Program



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1 Run the program

2 Wait the object approach



Step:





Task 3. Program



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Step:



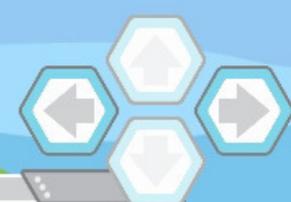


Task 3. Questions

Setting of what program block need to change in order for the robot waits the distance to the object not approach?



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Task 4 *

Sound the robot. Add to the program block "Play Sound"



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Task 5 *

Perhaps Dimetrodon used its "sail" to demonstrate its strength and attractiveness. Program a change color of the backlight of the Smarthub. Thanks to the transparent details, the "sail" will look very beautiful!



Dimetrodon



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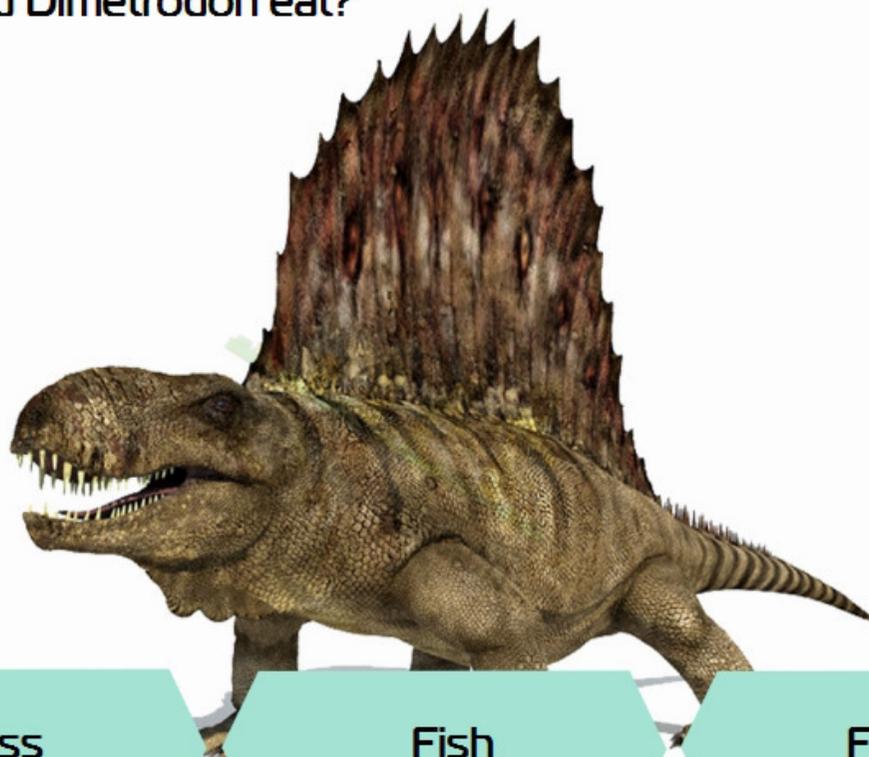


Question



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What could Dimetrodon eat?



Grass

Fish

Ferns



3



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Question



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Was Dimetrodon dinosaur?



No, it was not

Yes, it was a dinosaur

It was an ancestor of dinosaurs



3



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Discuss!

- Why do scientists believe that Dimetrodon is an ancestor of mammals, and not dinosaurs?
- What did Dimetrodons eat?
- What features had the skull of these prehistoric lizards?
- What is the difference between Dimetrodon teeth and dinosaur teeth?
- How did Dimetrodon use its "sail"?



Dimetrodon



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