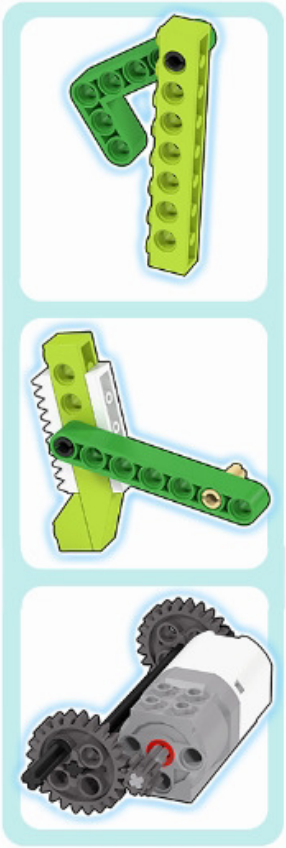
Arthropleura

Arthropleura

Let`s remind! Dimetrodon.



Place parts of the robot on the right places

File Lesson Window Language

Let`s remind! Dimetrodon.

Place parts of the robot on the right places

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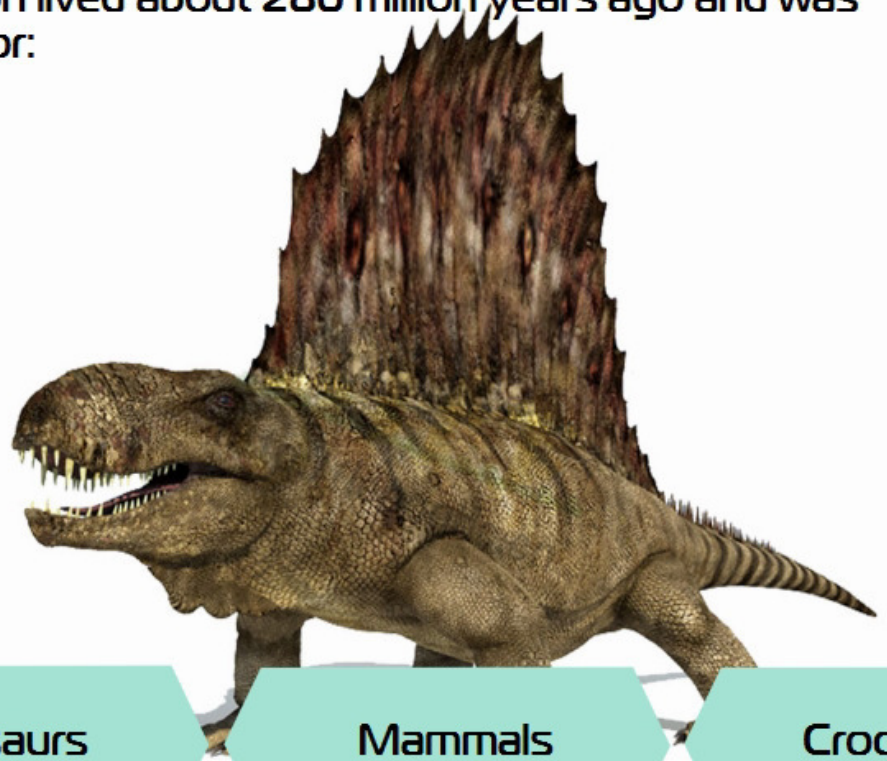
Let`s remind! Dimetrodon.

Dimetrodon lived about 280 million years ago and was an ancestor:



Dinosaurs

Mammals

Crocodiles

Let`s remind. Date

Place the eras of life on Earth in the right order. On the left should be the oldest era, to the right - the closest to our time.

PROTEROZOIC

CENOZOIC

MESOZOIC

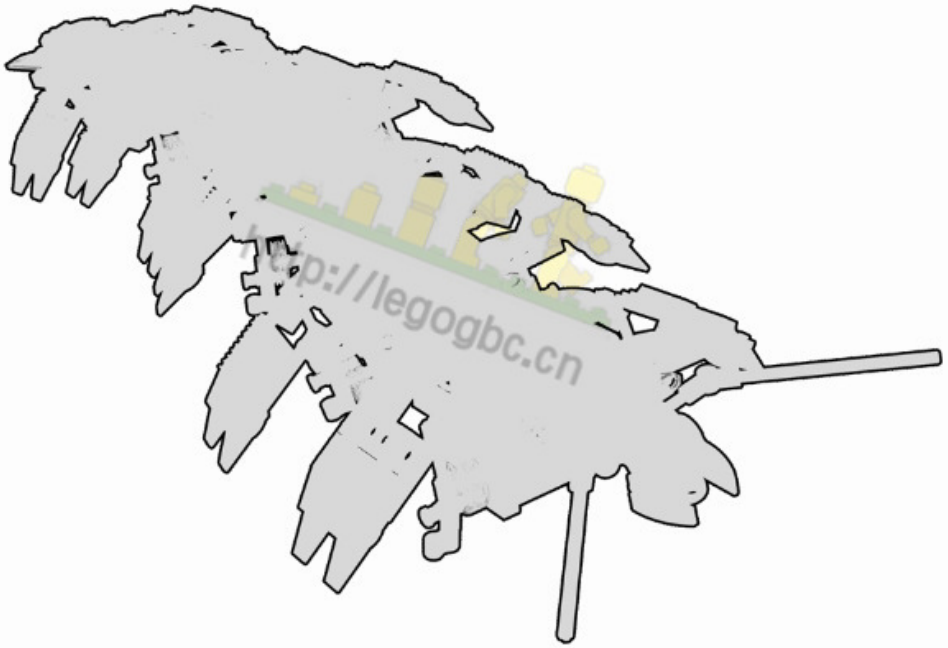
PALEOZOIC

1	2	3	4

PREHISTORIC LIFE

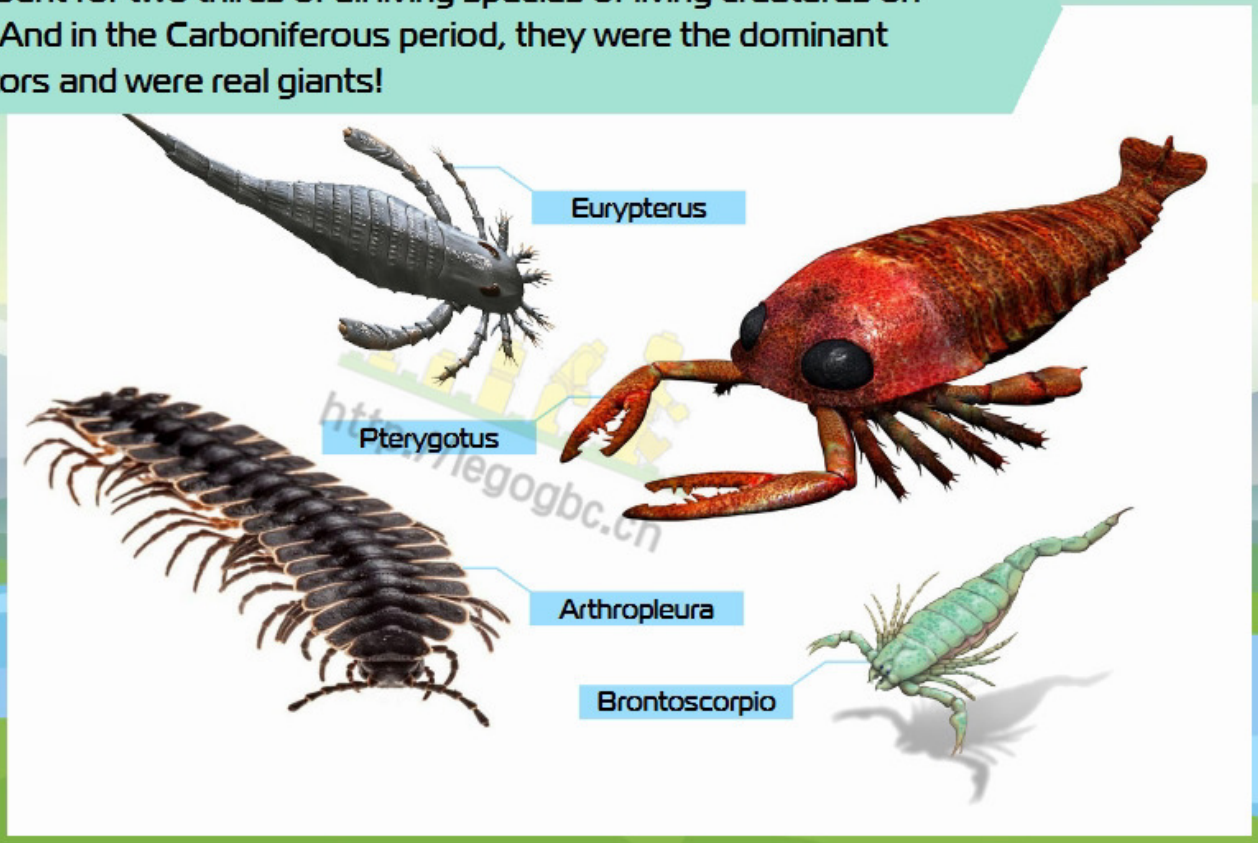
Dino Park

Today we continue to create a modern Dino Park. We have to create a robot for exposition of the Paleozoic era Carboniferous period.



Arthropods

Arthropods include insects, crustaceans, spider and millipedes. Today they count for two thirds of all living species of living creatures on Earth. And in the Carboniferous period, they were the dominant predators and were real giants!



Giant millipedes

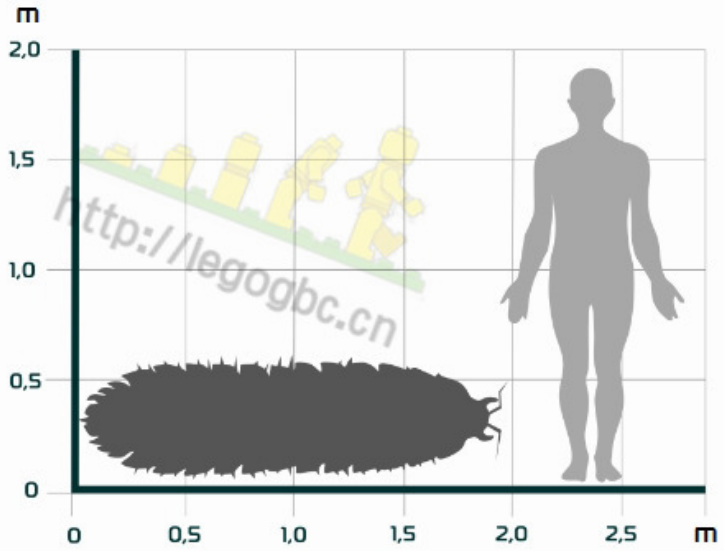
These were one of the first creatures that began to go out from water to land for eating mosses and lycopodiums almost 430 million years ago. In 100 million years, the first simple plants turned into trees, and millipedes grew with them.

Giant size

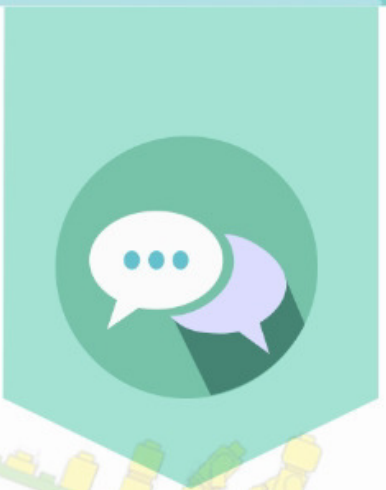
Arthropleuras had a length of up to 2 meters. Modern invertebrates can not be so large, because the atmosphere has much less oxygen needed for their breathing.

Arthropleura

The size of this creature are impressive. Probably walking, you would not like to meet a millipede of your own size.



Discussion of the task



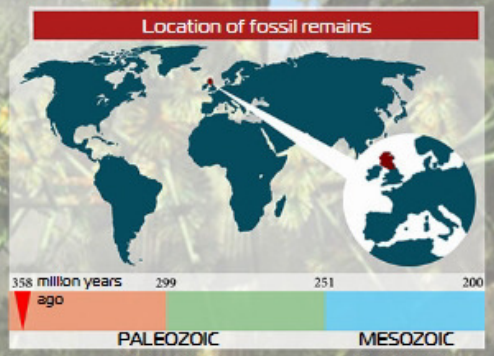
What do you think, what features of the body structure did the first animals allow to move in the thickets on the land?

Arthropleura

The millipede`s body consisted of 30 segments, each of which had a pair of legs. Due to this, it could skillfully overcome obstacles.

Arthropleura

Some of the fossilized remains of Arthropleura were found in Scotland. They were found in Europe and North-East of North America.



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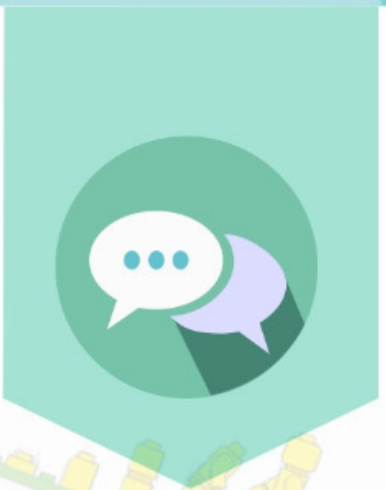


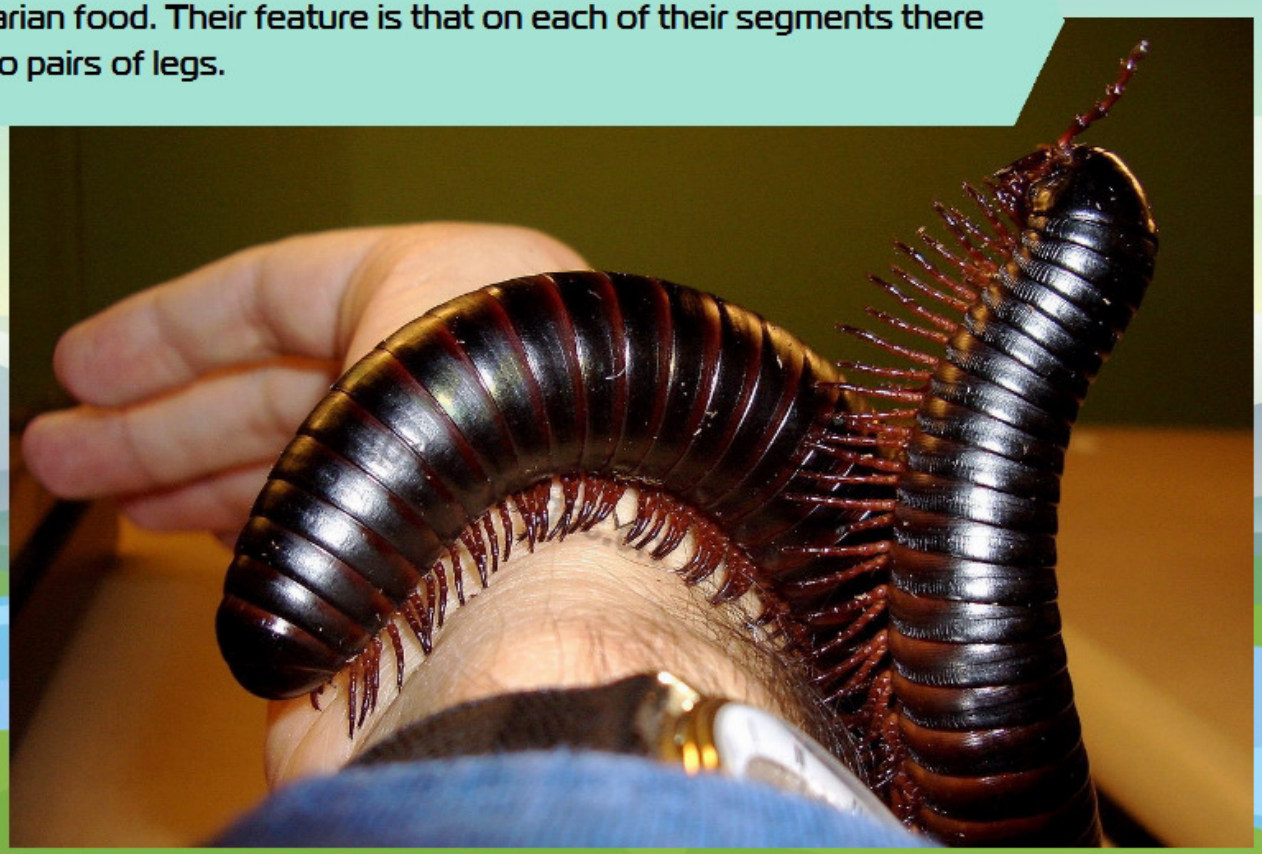
What do you know about modern millipedes?
How do they move, what do they eat?

Modern millipedes

The largest of modern millipede, Giant scolopendra, has a length of 35 cm. It is a predator and can even poison its prey.

Millipedes

Unlike the predators of Scolopenda, two-pair legs millipedes feed on vegetarian food. Their feature is that on each of their segments there are two pairs of legs.



TASK

Task

- create a robot for exposition of the Carboniferous period

Requirements

- must present the giant millipedes of the early Carboniferous period
- should consist of segments with a lots number of legs

Millipede`s appearance

Dino Park

For the Dino Park, we will develop a robot-millipede Arthropleura. Scientists have found fossilized remains of such millipedes of gigantic size! Due to the large number of feet, they easily moved by ancient forests of ferns and ivy. Flexible body allowed to avoid obstacles on the way.

Do you think dinosaurs and arthropleuras were neighbors?

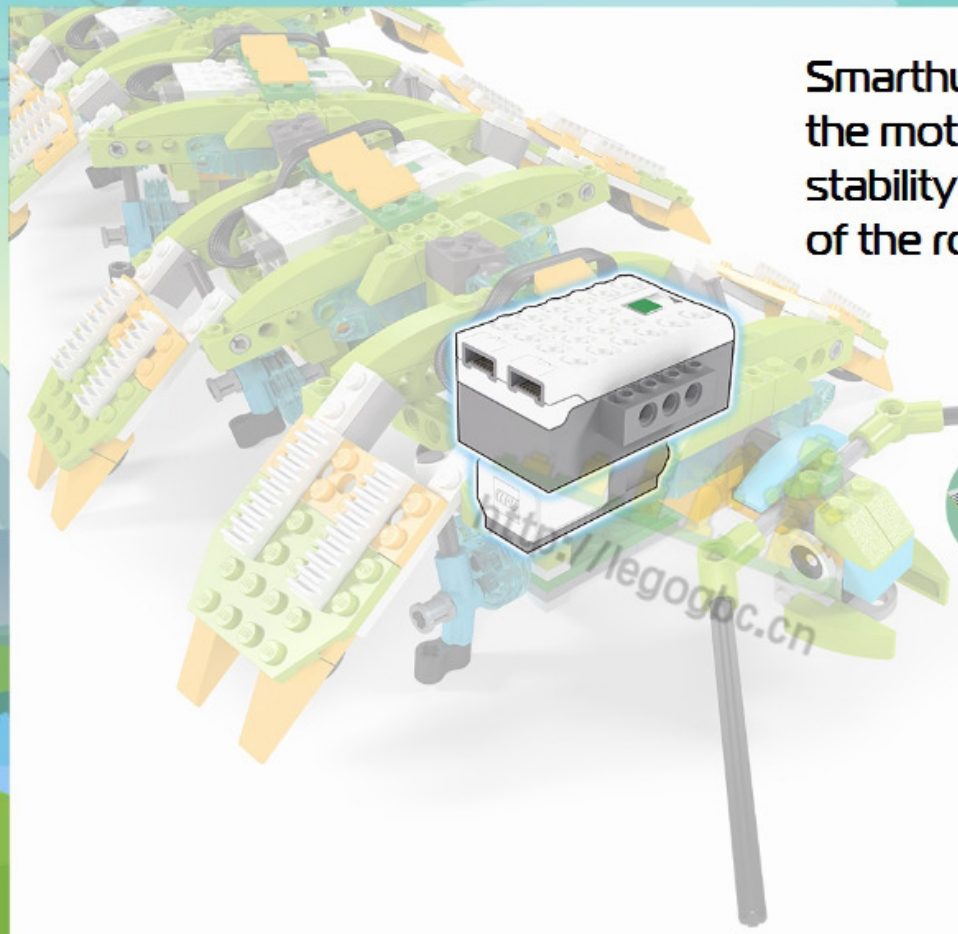
Discussion of the task

How do you think we can build a robot that looks like a gigantic millipede?

Segments of the robot

To build a big robot, we will use many similar segments. Each team will build a part of a giant millipede!

Design features



Smarthub is placed above the motor for maximum stability and compactness of the robot.

Find:

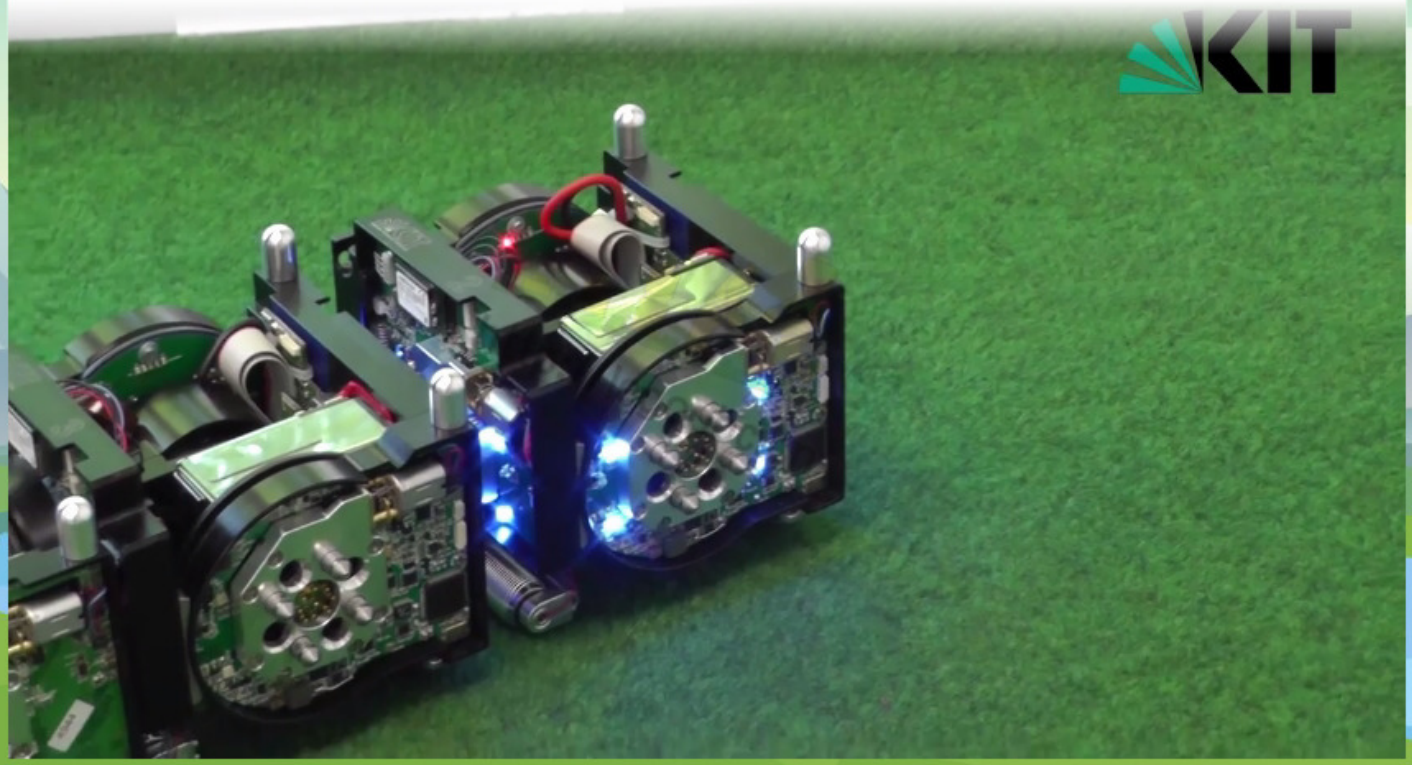
- smarthub
- motor

Design features

The robot is built from the individual segments. The head is additionally attached to the first segment, and the tail - to the last one. The segments can bend against each other.

Module robots

One large robot can consist of a large number of individual identical autonomous robots. This allows you to quickly replace damaged modules and reassemble them in a large number of different configurations.



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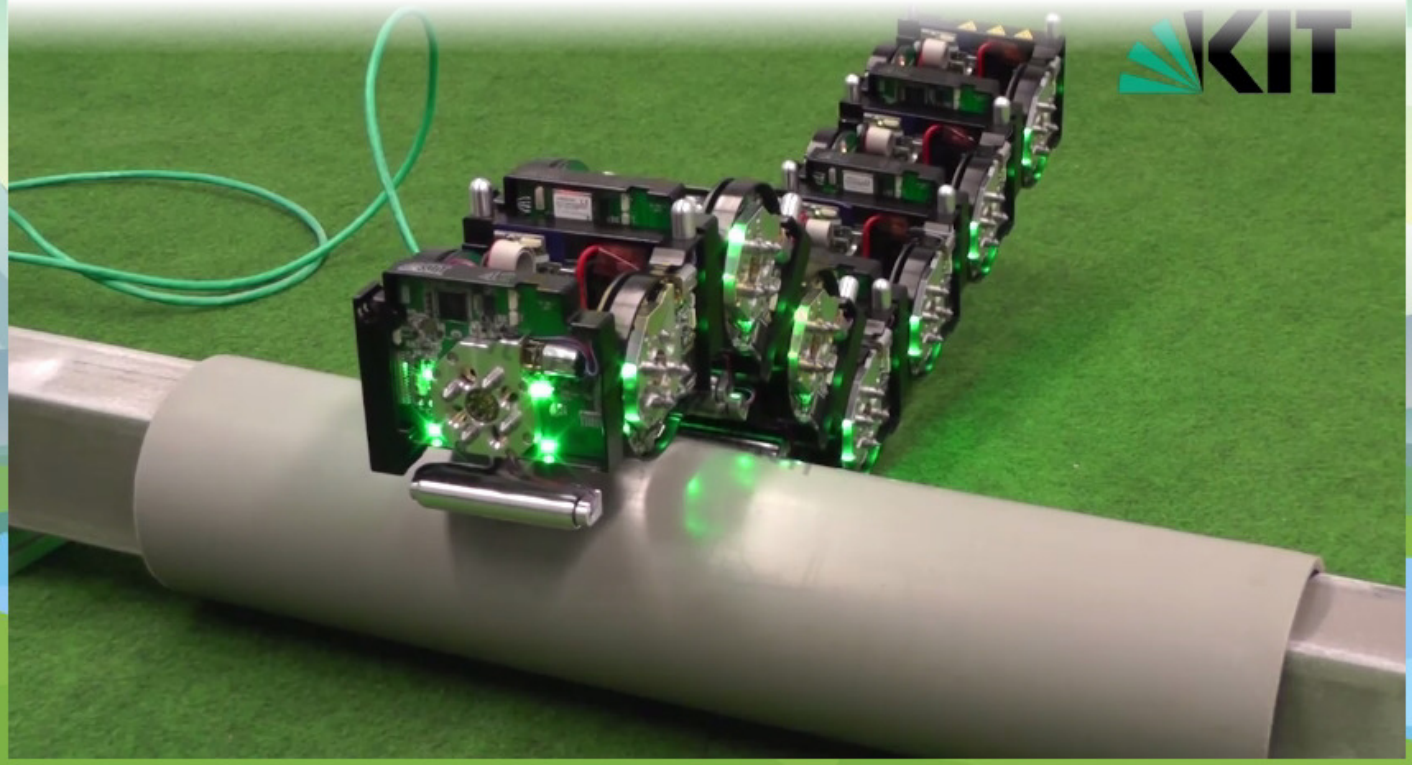

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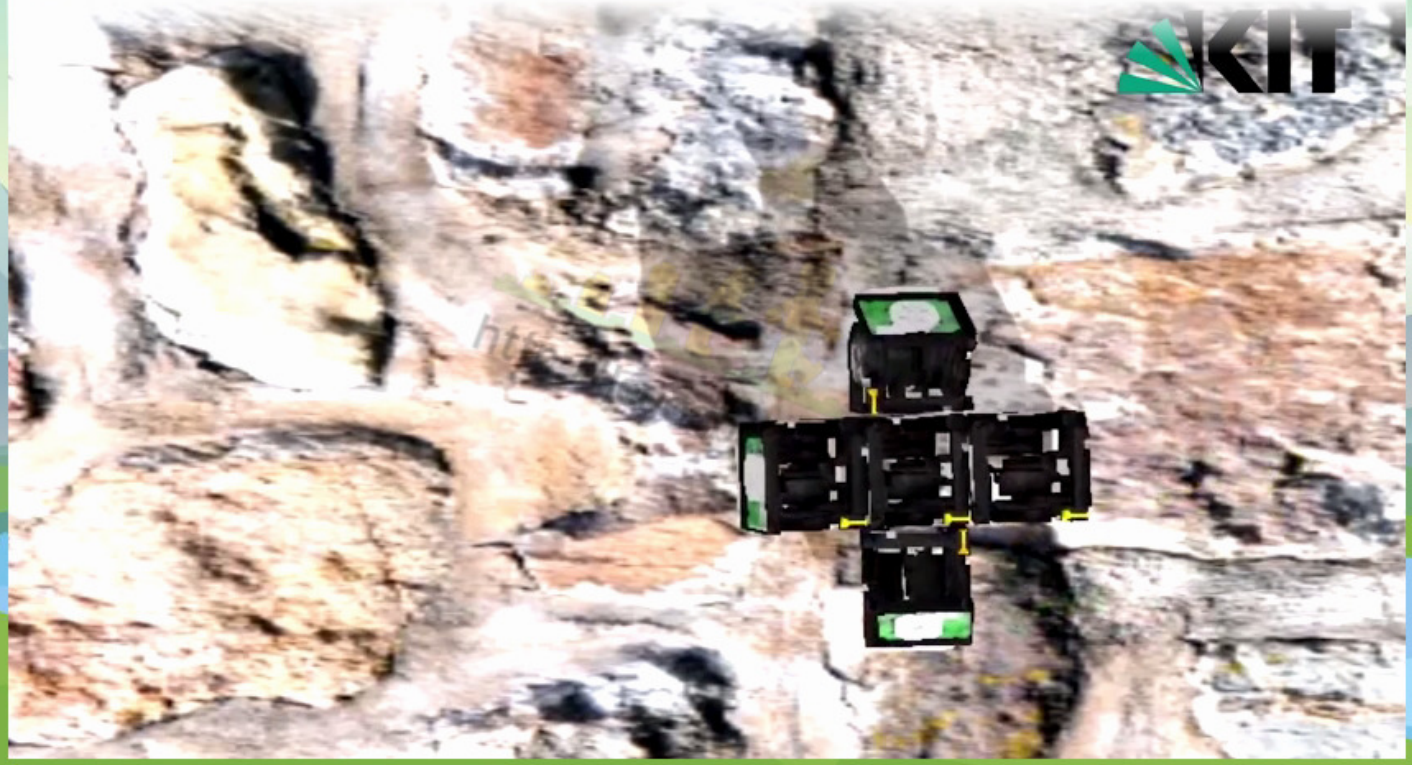

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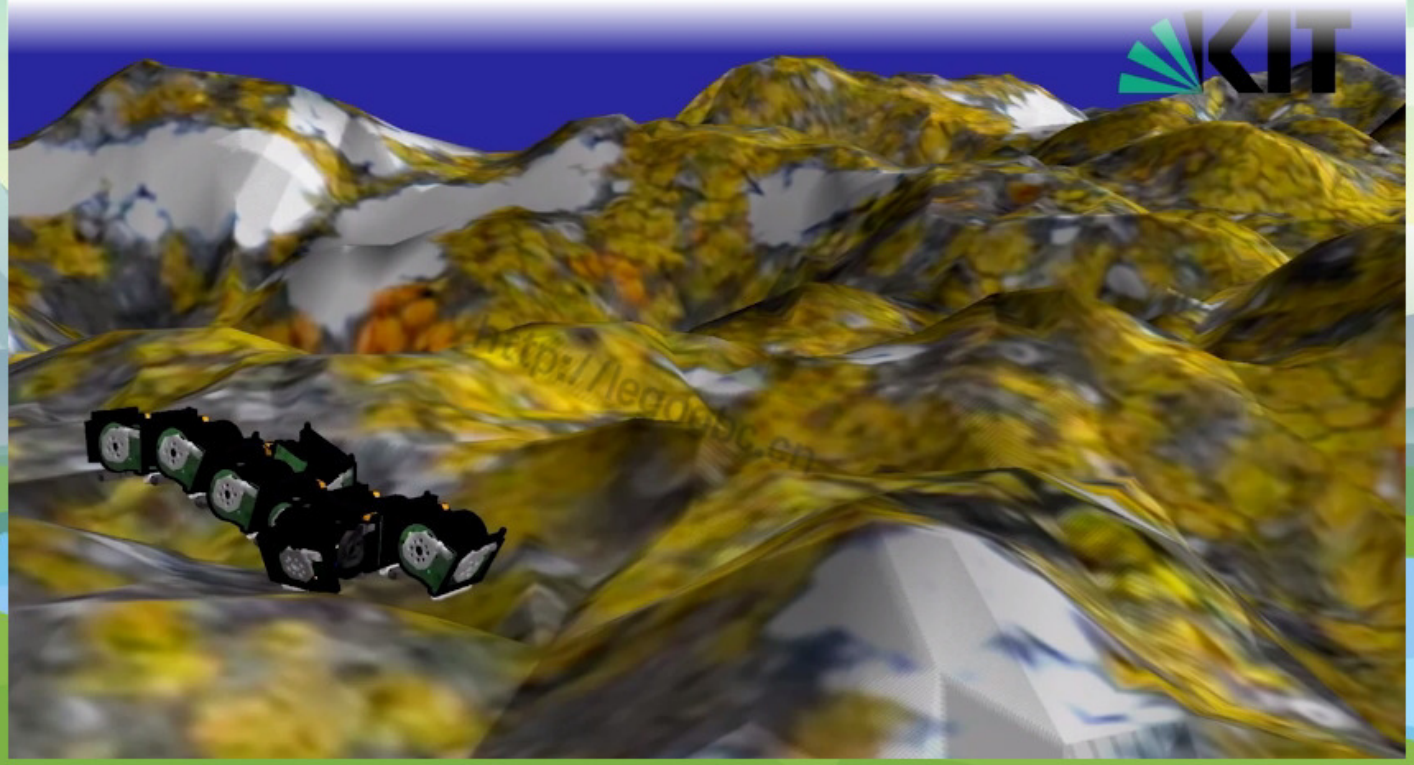
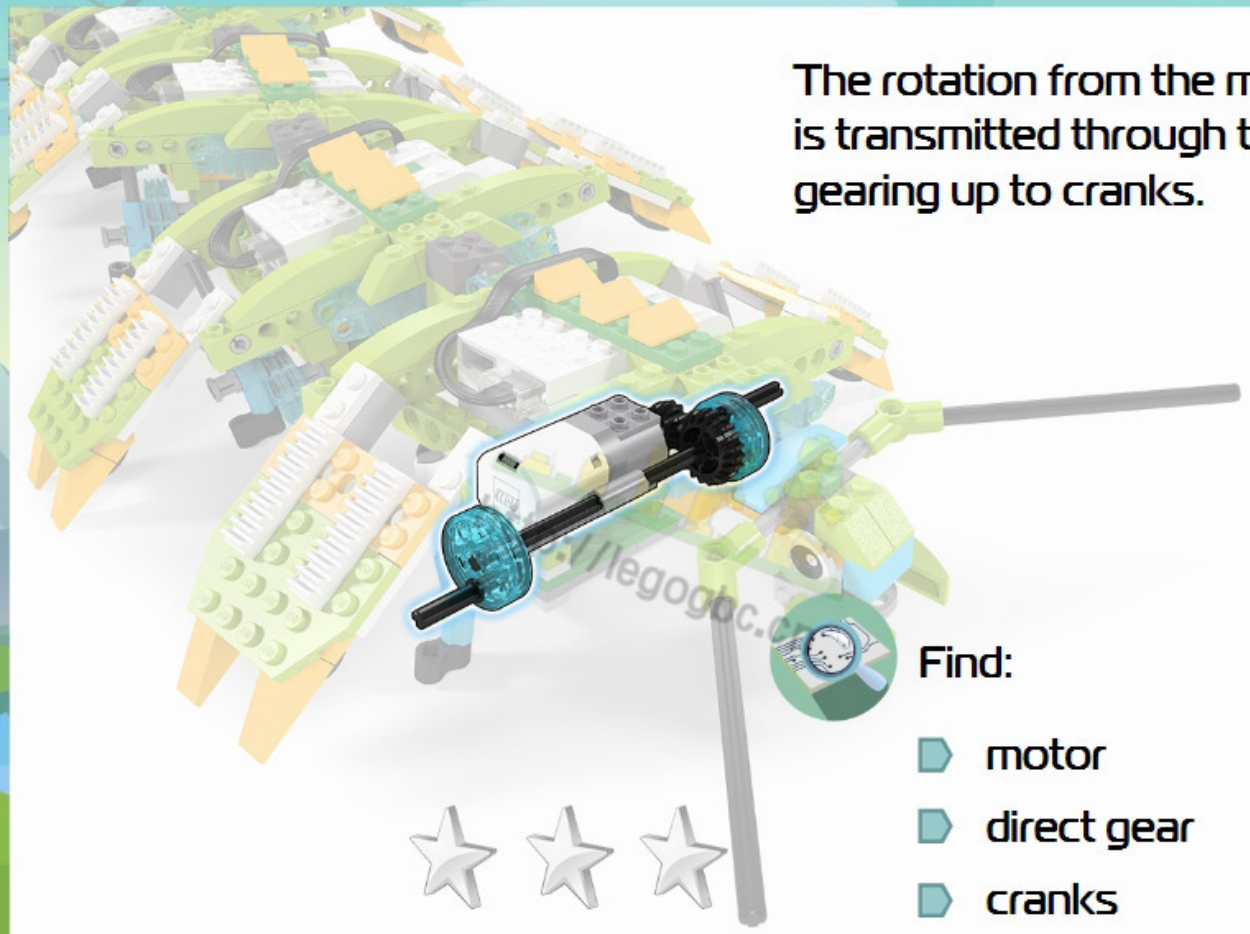


Design features



The rotation from the motor is transmitted through the gearing up to cranks.

Find:

- motor
- direct gear
- cranks

Design features

The feet of the robot have rubber parts. Because of this, they do not slip. In order for the leg correctly make step, the axes are moving in white special guiding parts.

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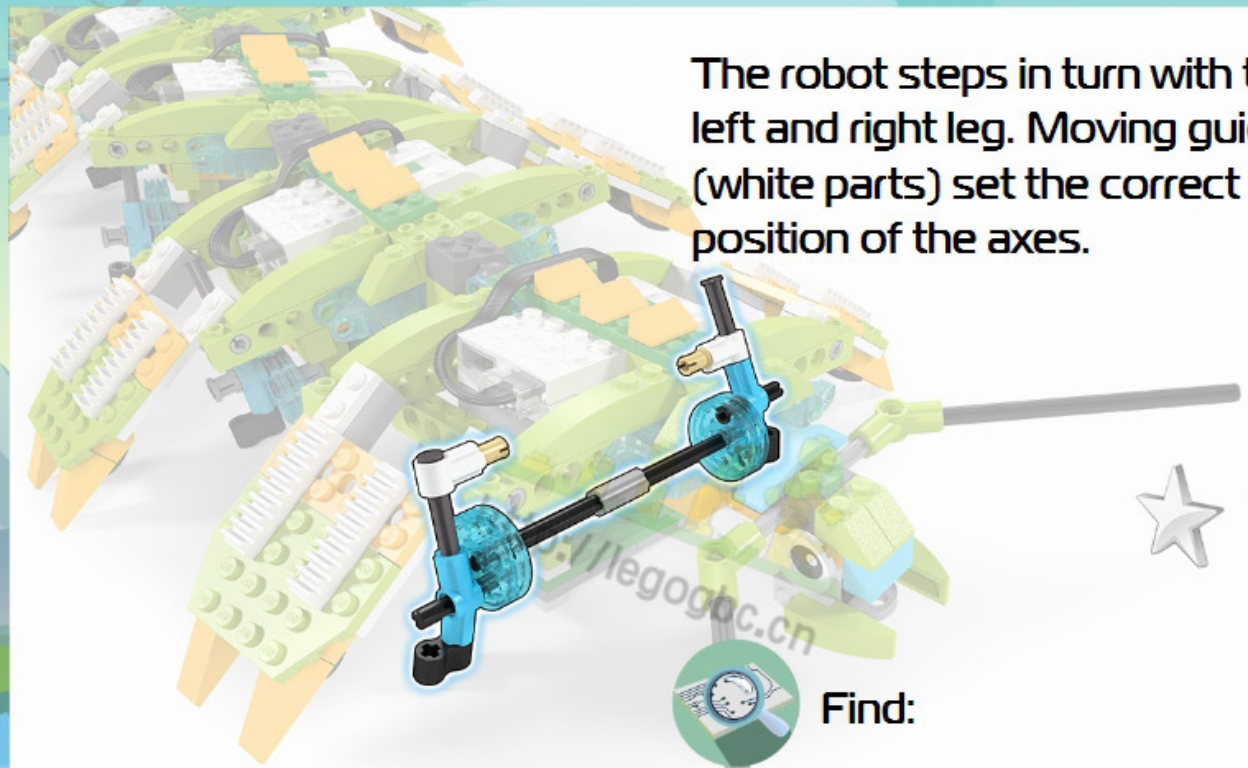
Design features



The robot steps in turn with the left and right leg. Moving guides (white parts) set the correct position of the axes.

Find:

- crank
- moving leg

Design features

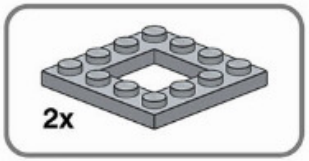
In order to set Arthropleura movement, you need to slightly raise the first segment of the robot and put it in the desired direction.

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:

Build the robot!

Arthropleura



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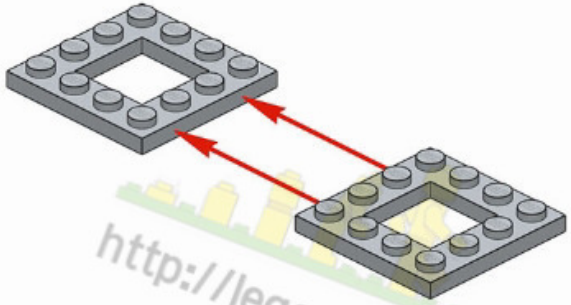

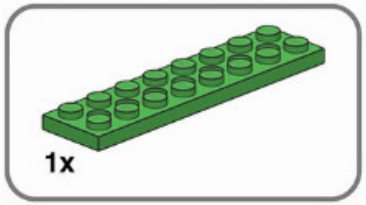

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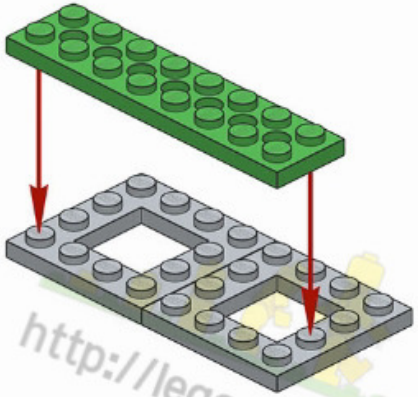

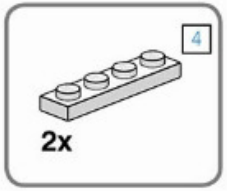

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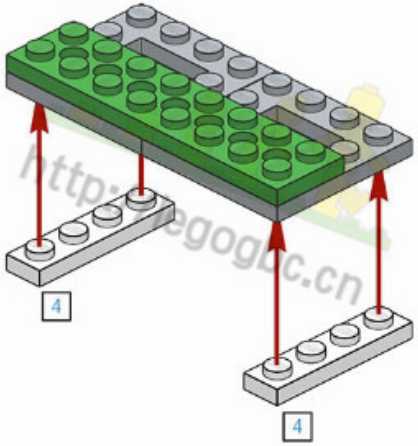

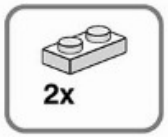

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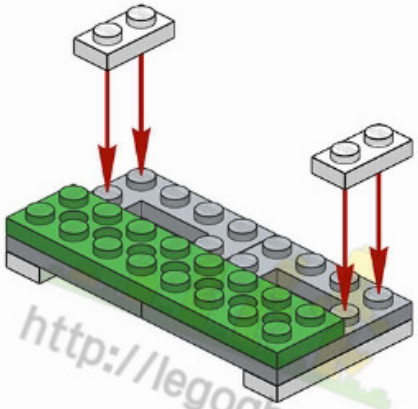

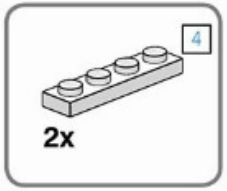

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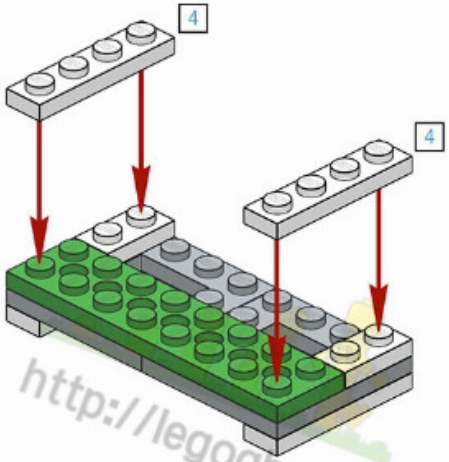

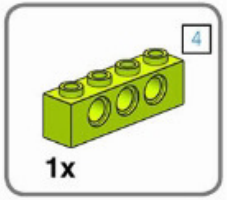

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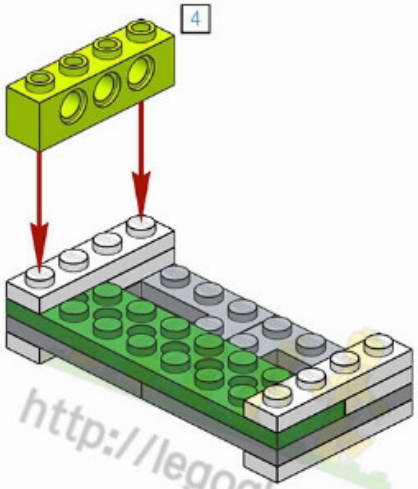

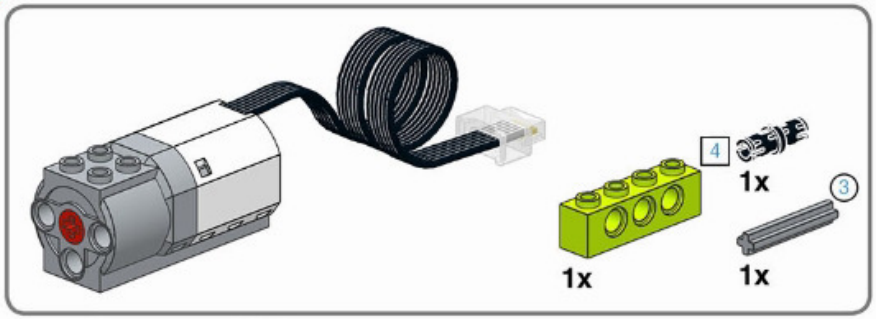

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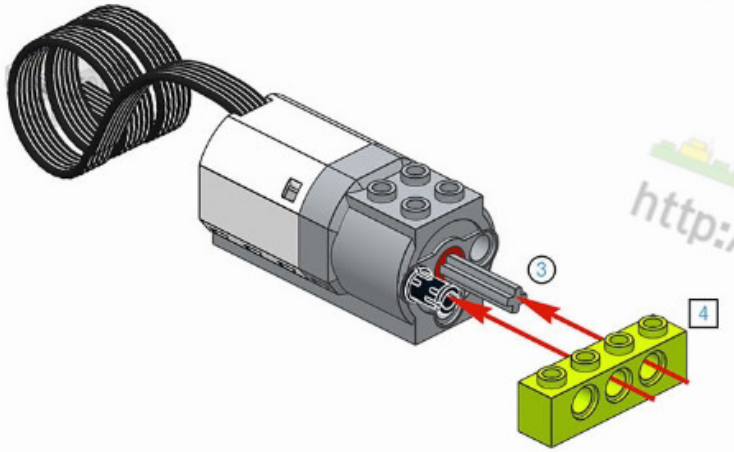

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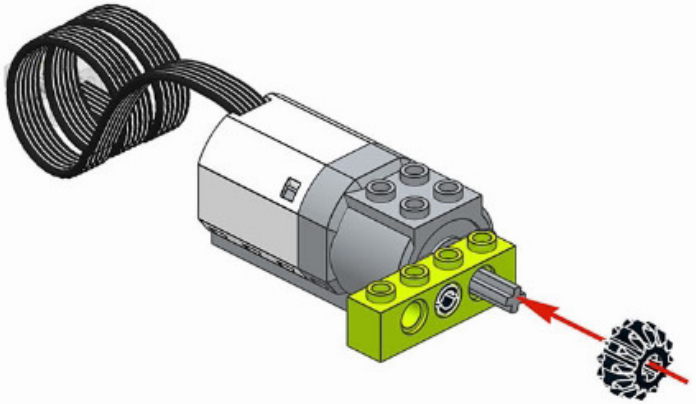

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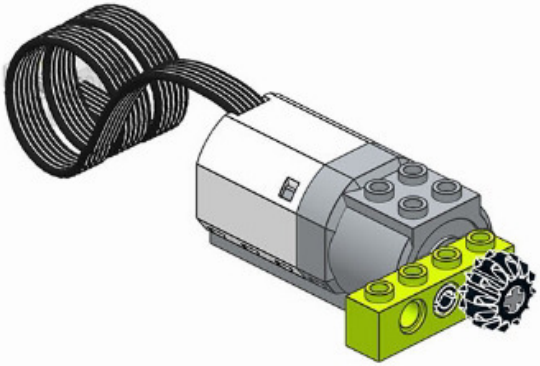

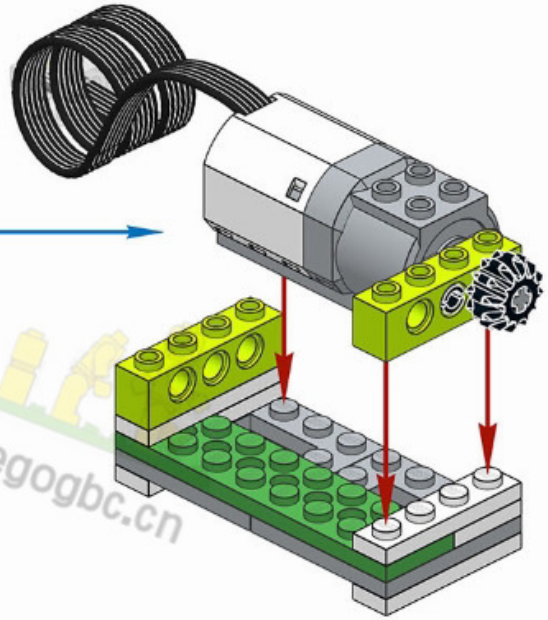

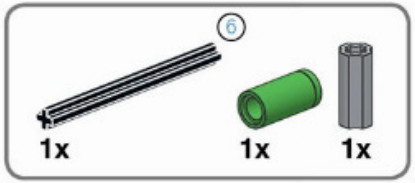

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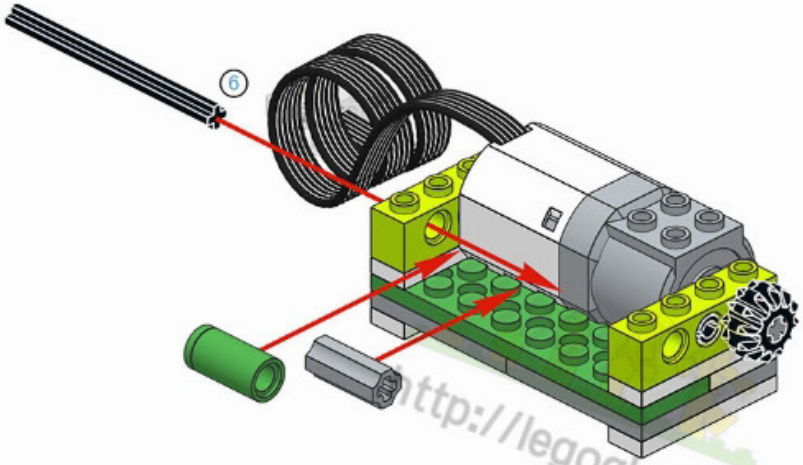

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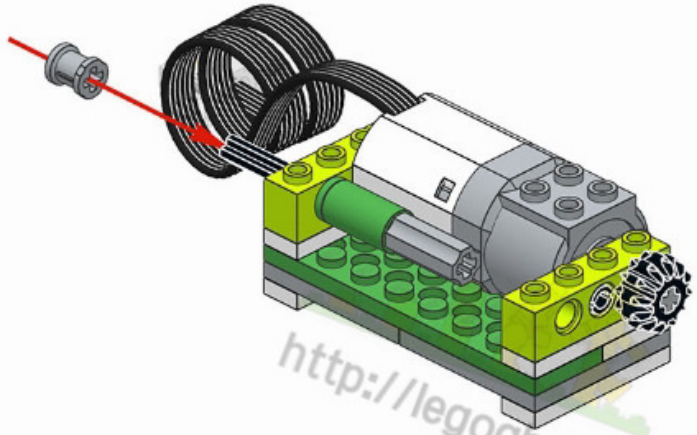

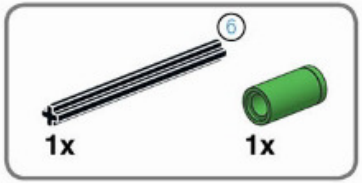

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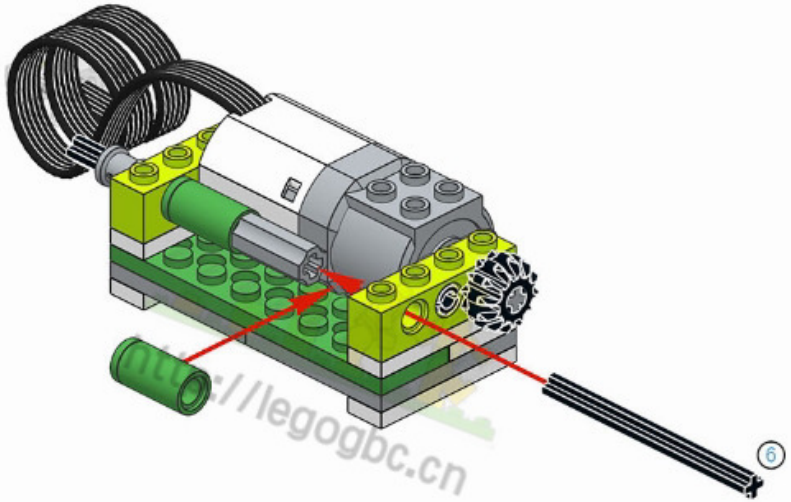

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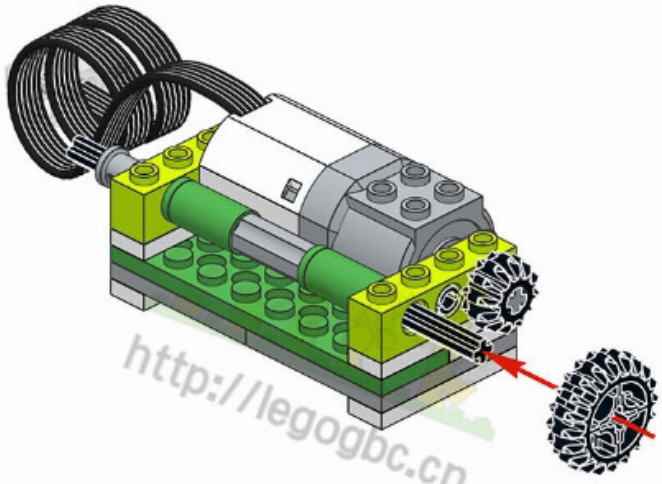

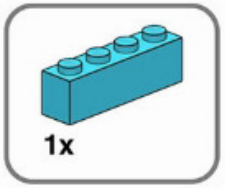

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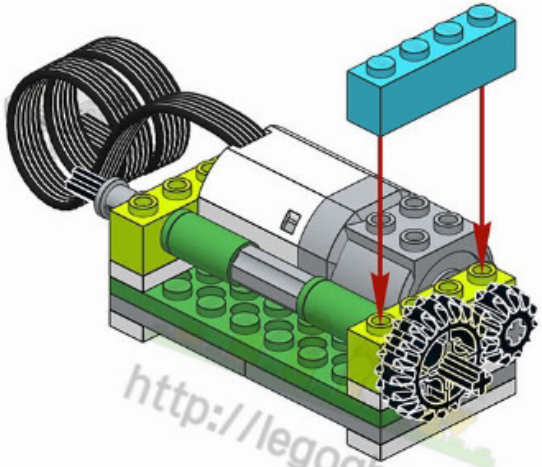

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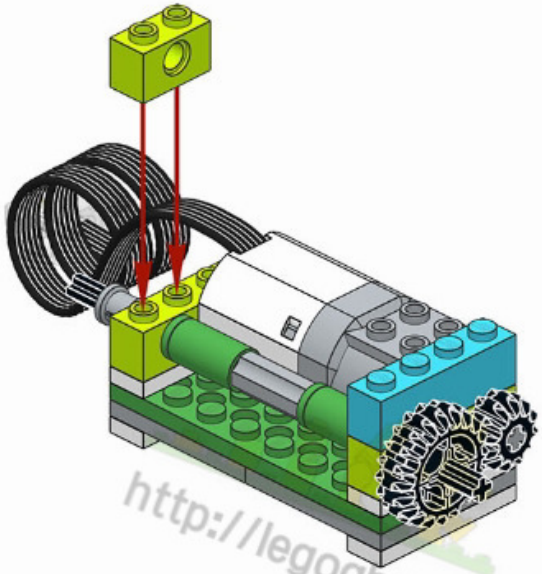

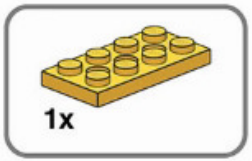

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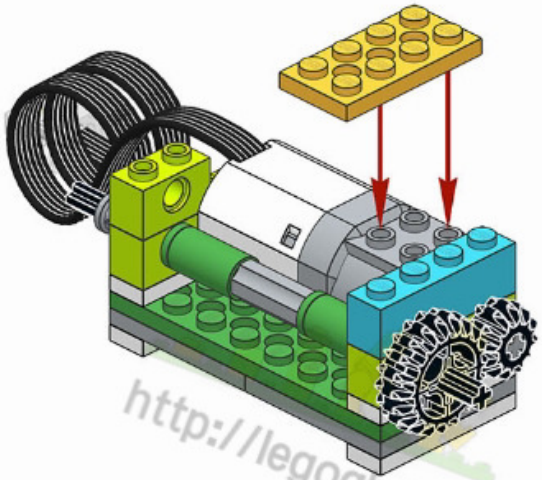

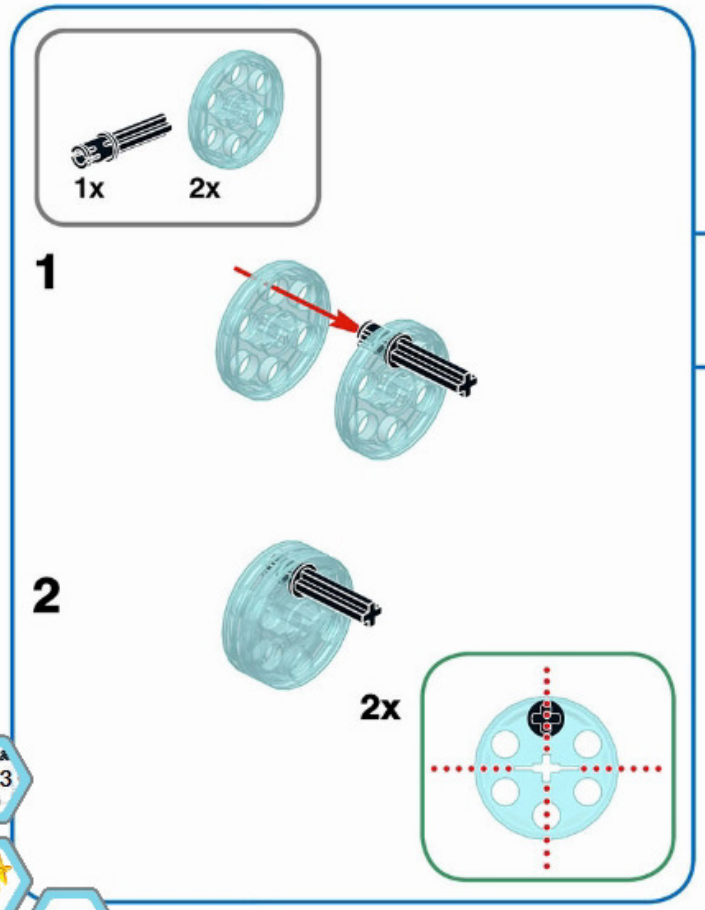

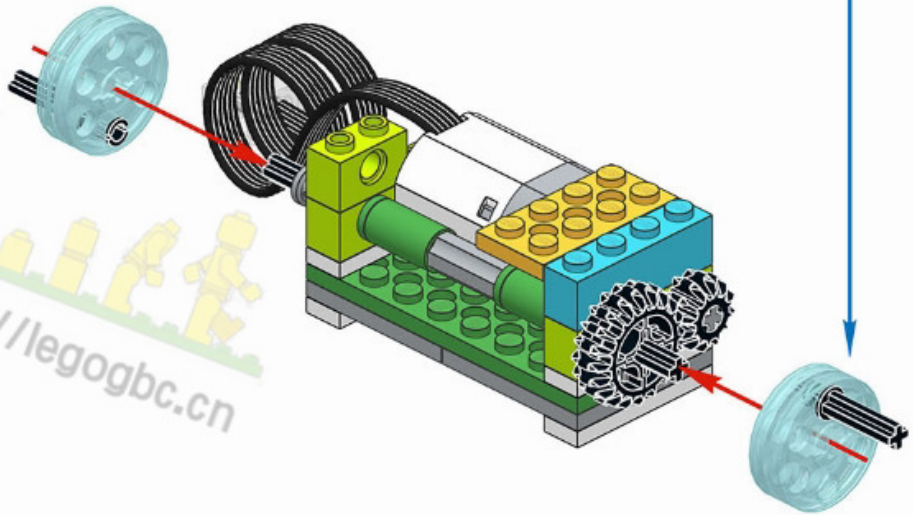

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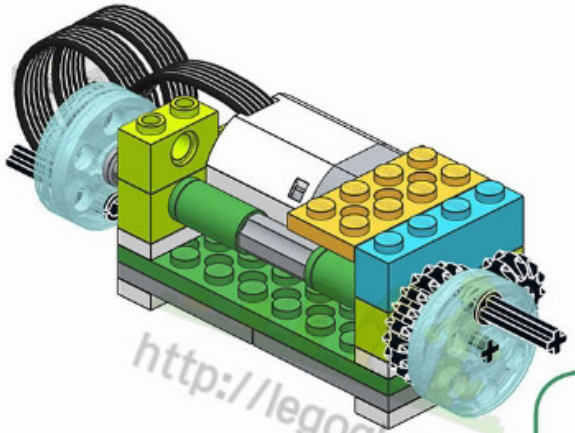

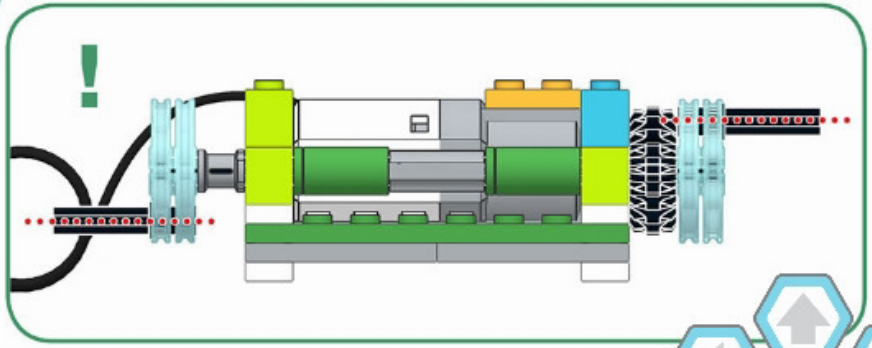

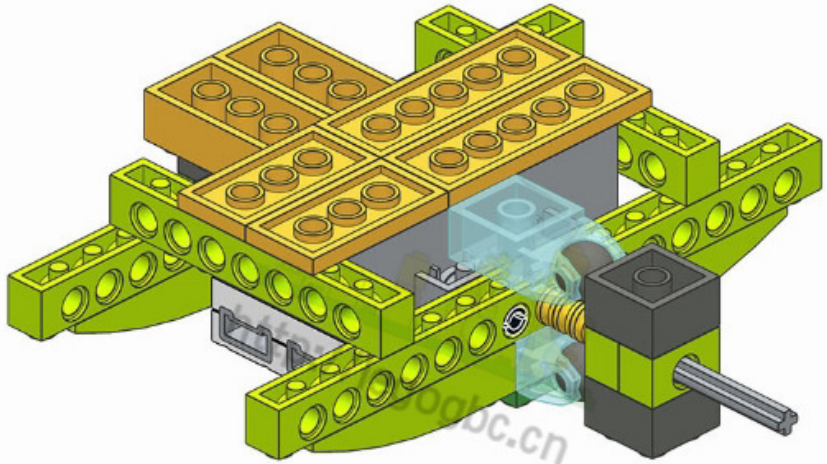

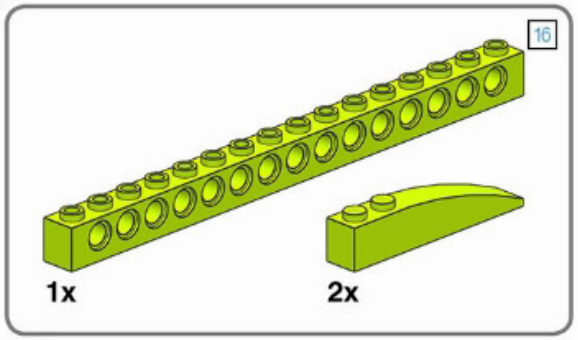

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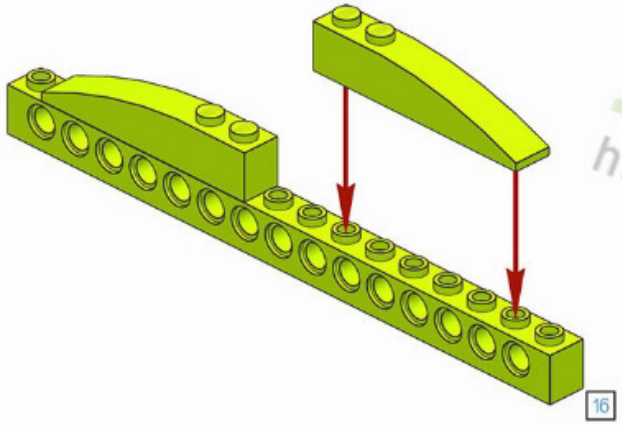

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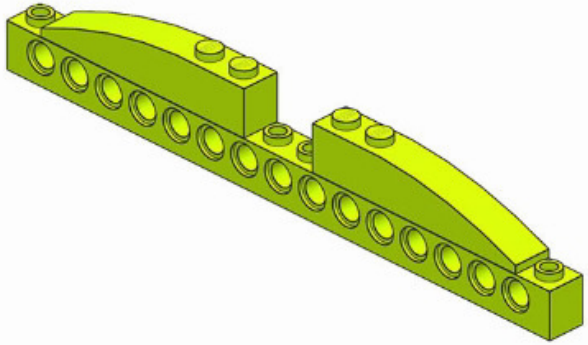

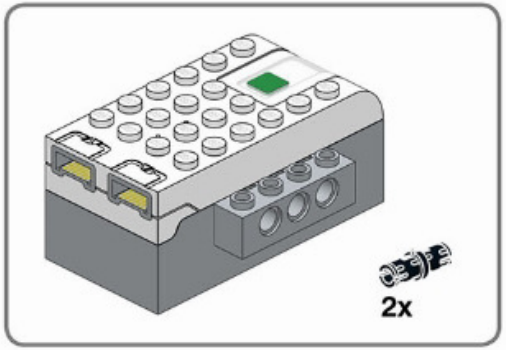

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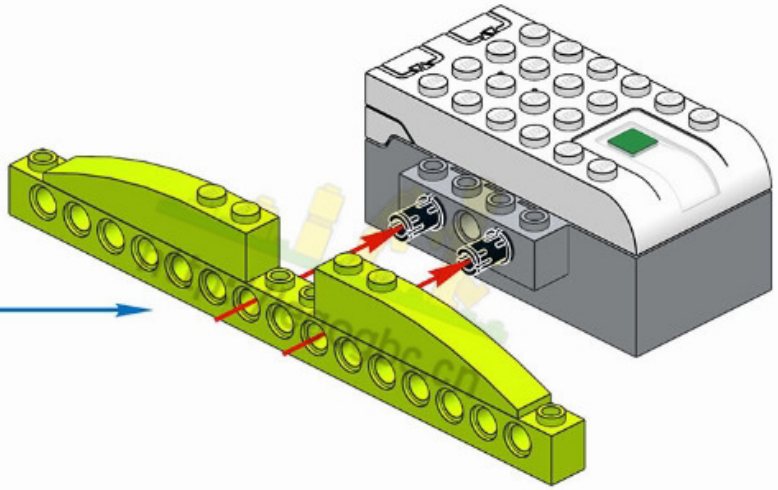

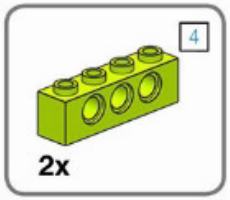

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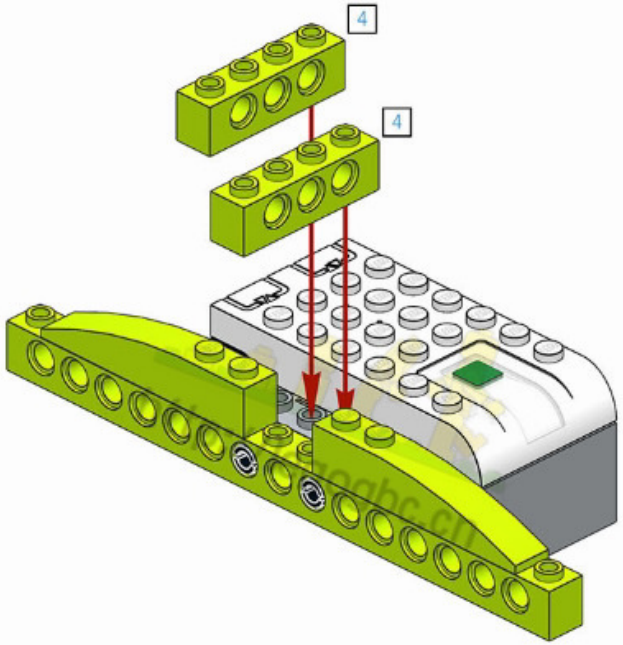

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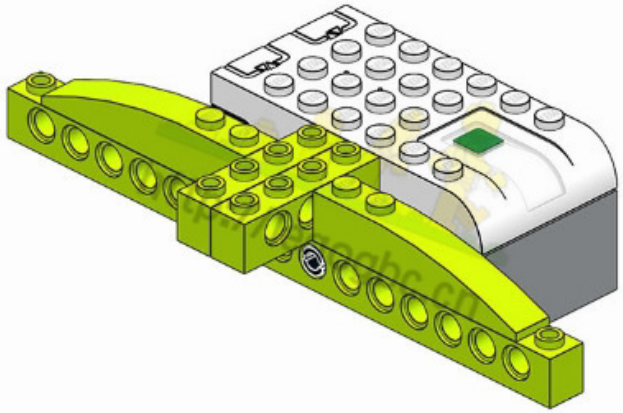

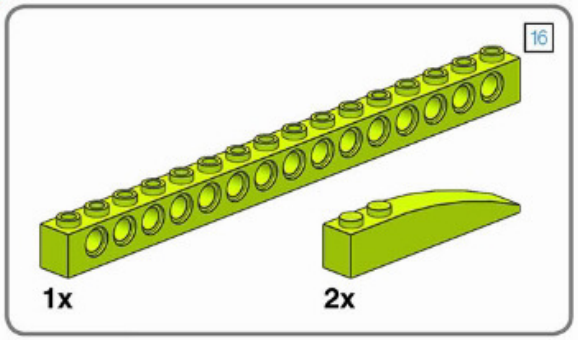

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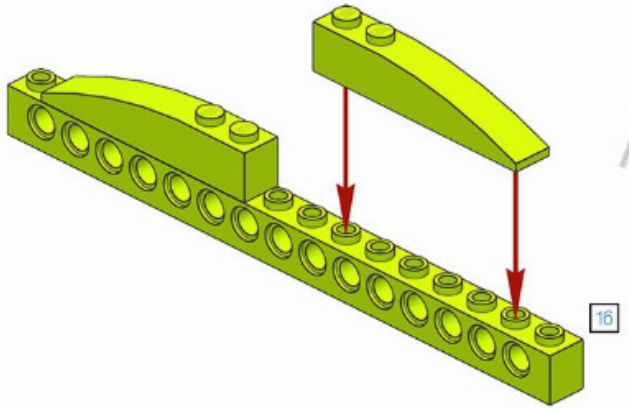

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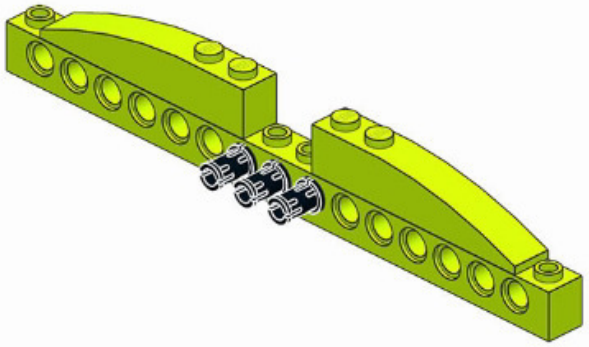

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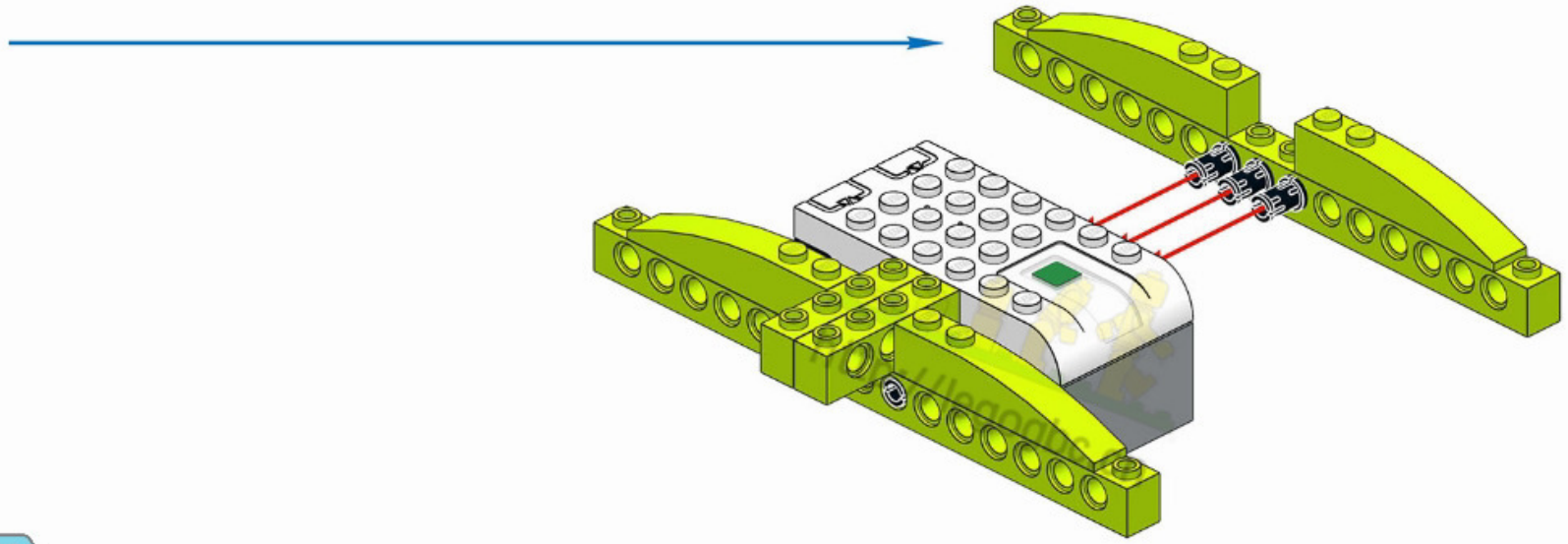

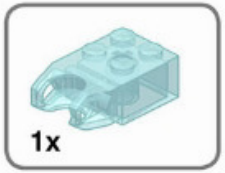

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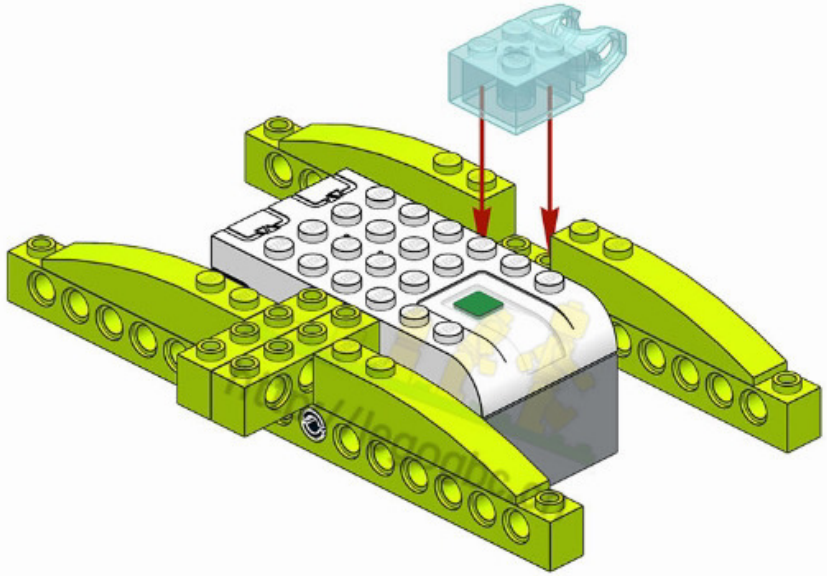

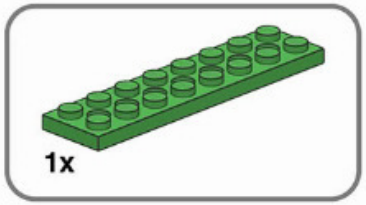

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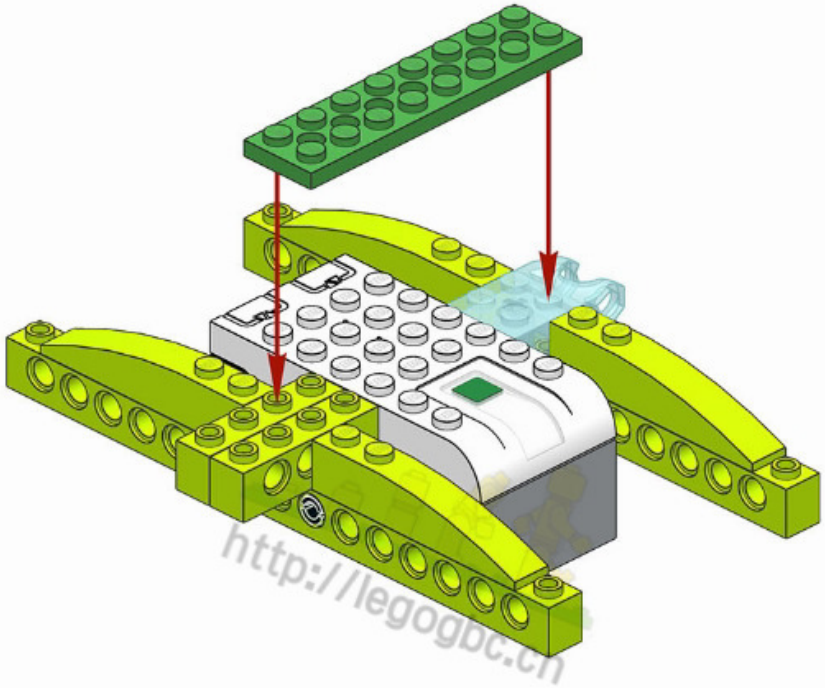

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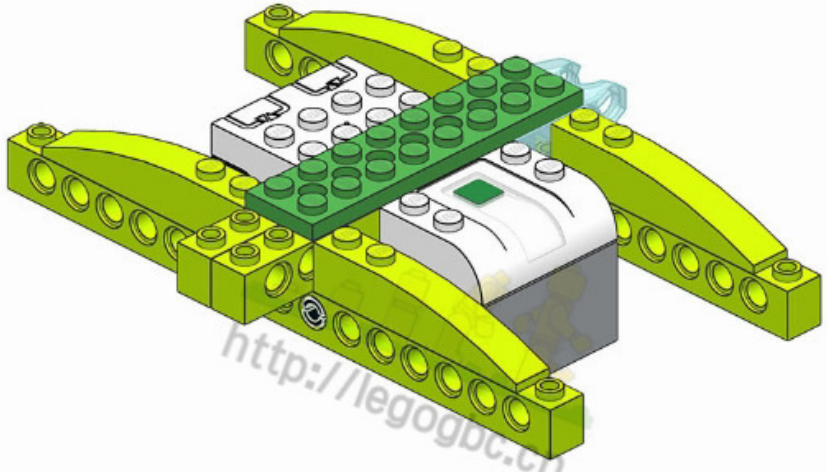

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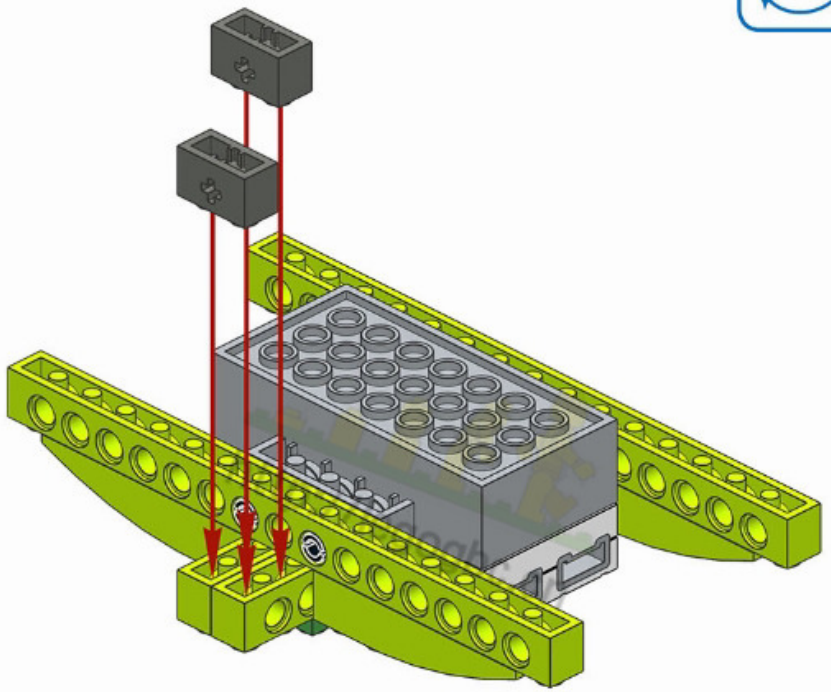

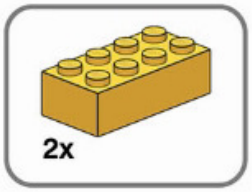

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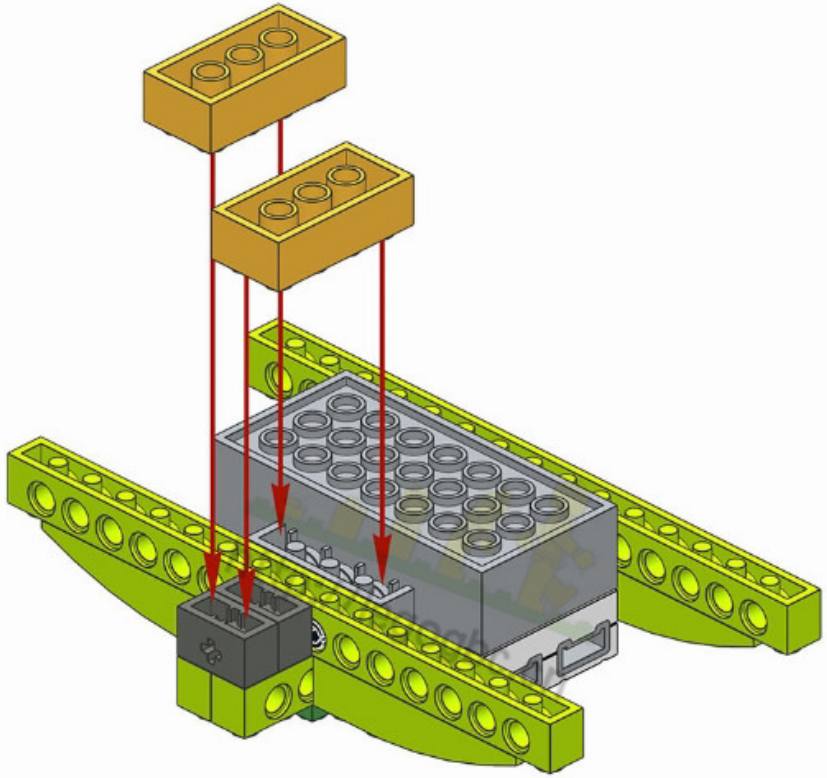

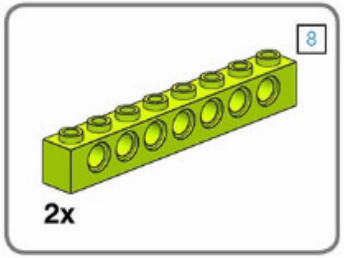

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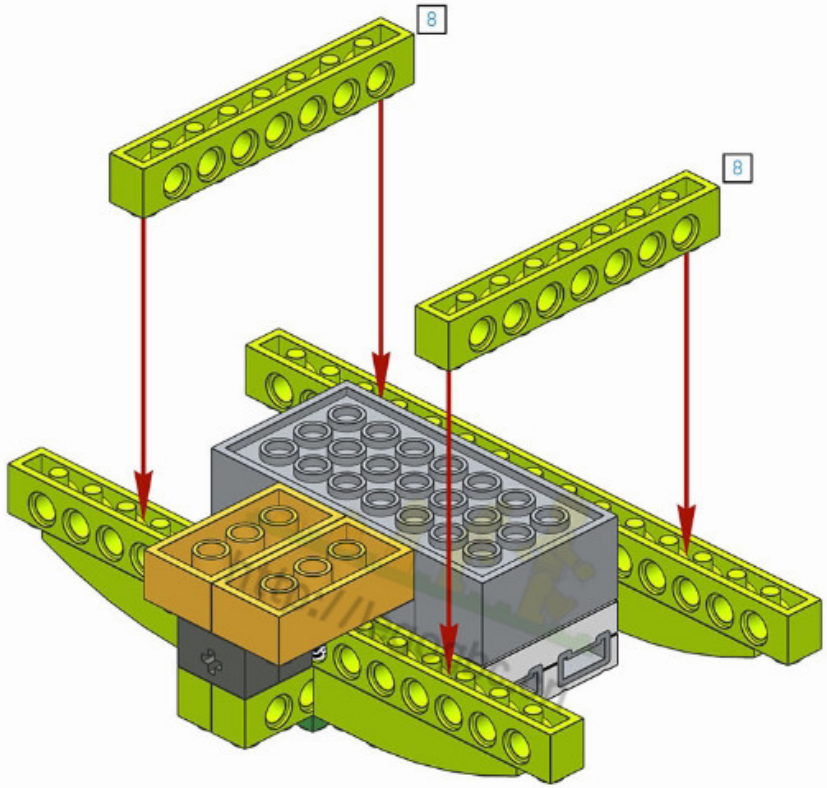

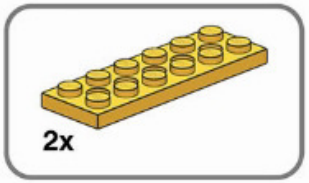

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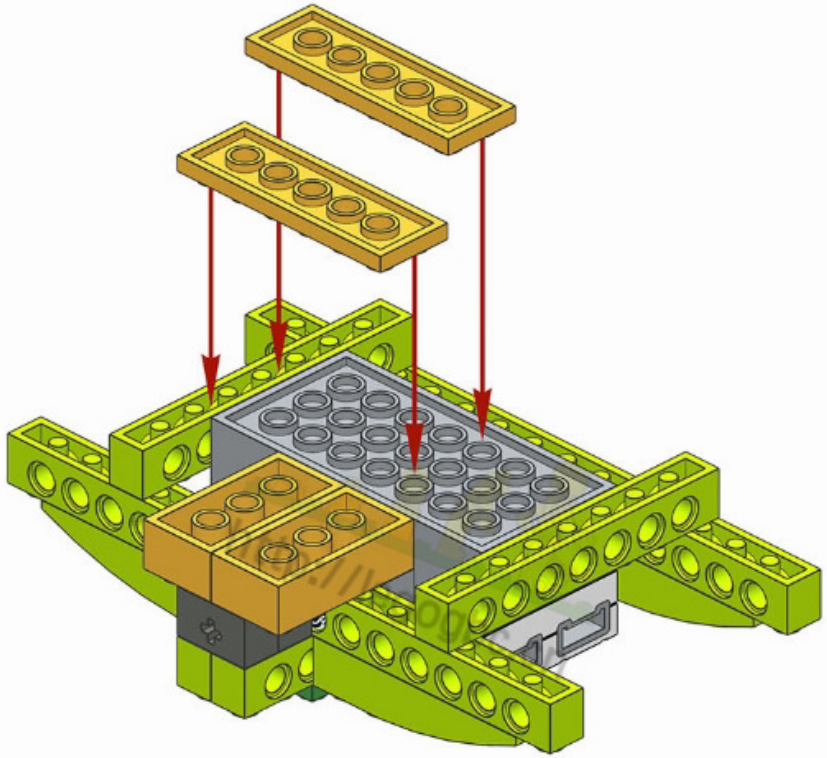

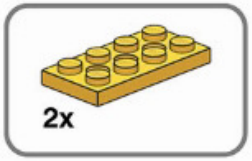

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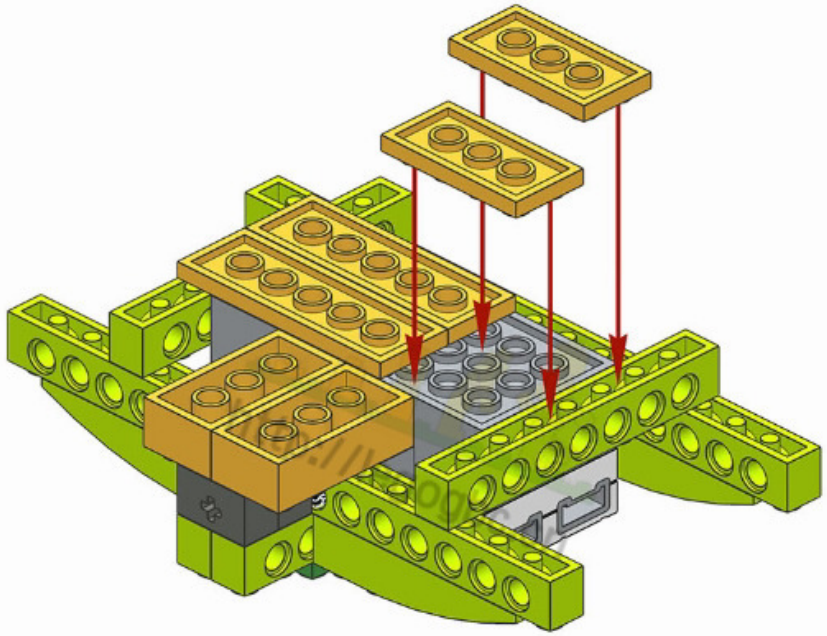

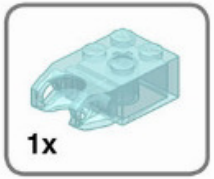

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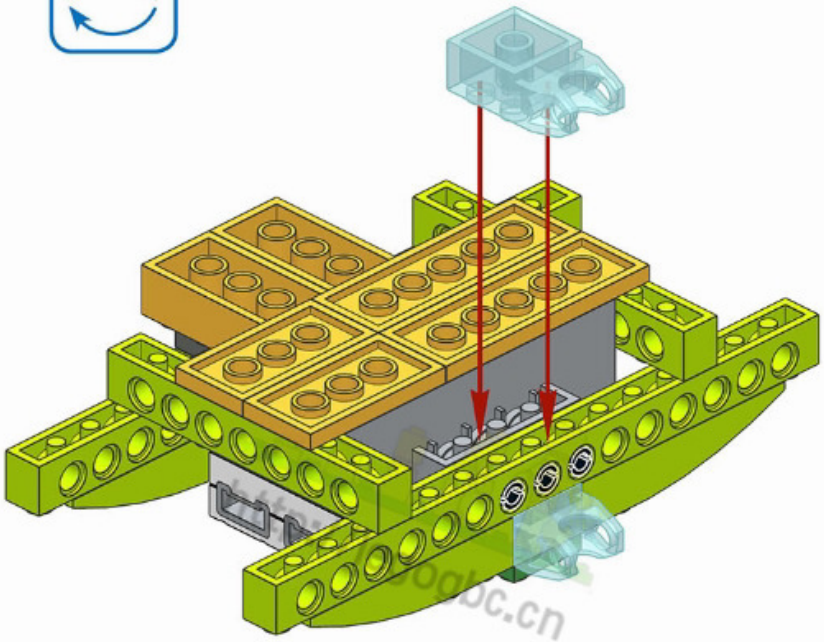

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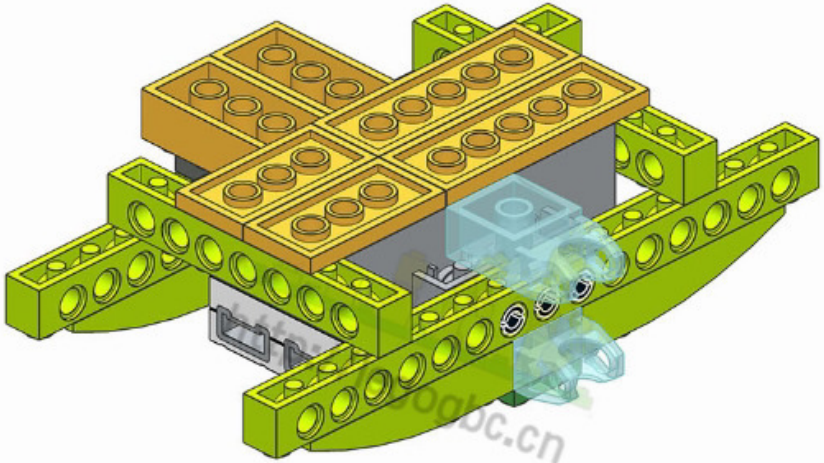

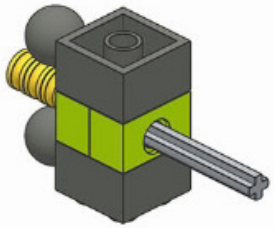

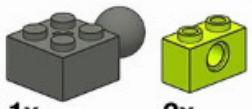

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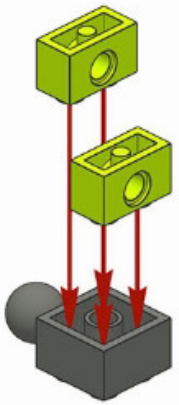

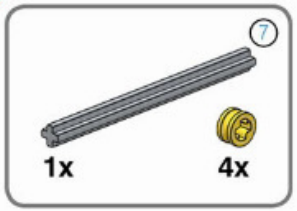

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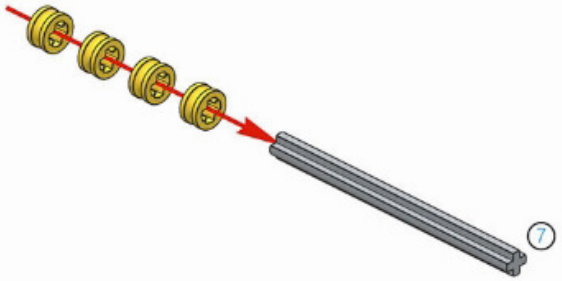

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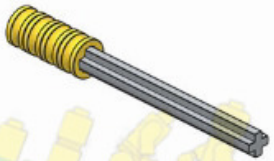

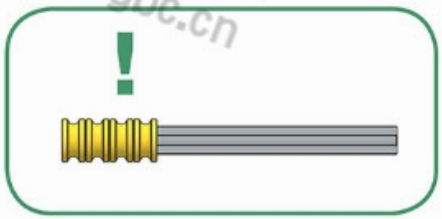

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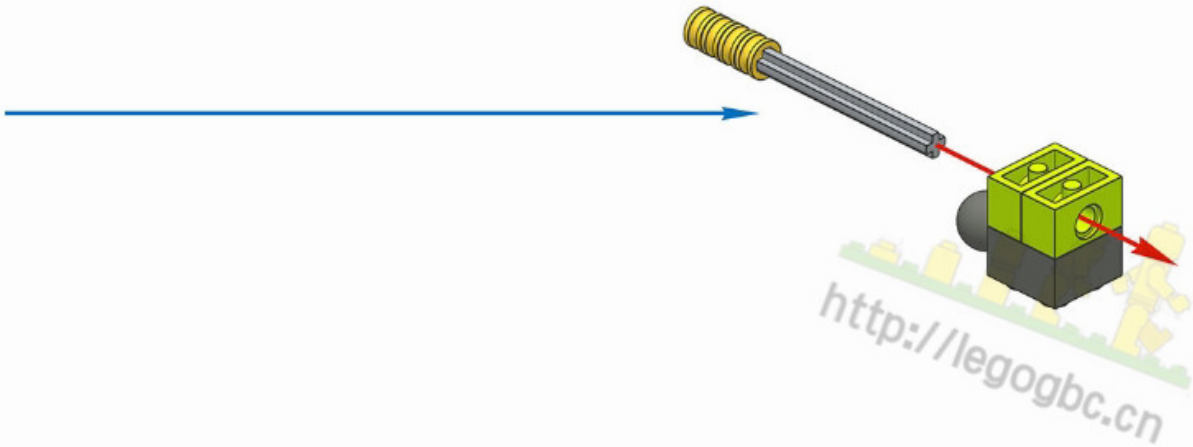

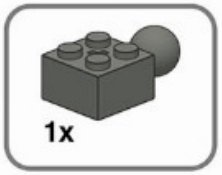

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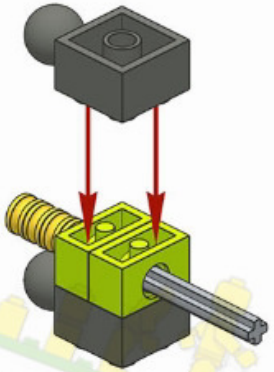

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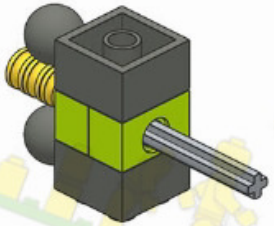

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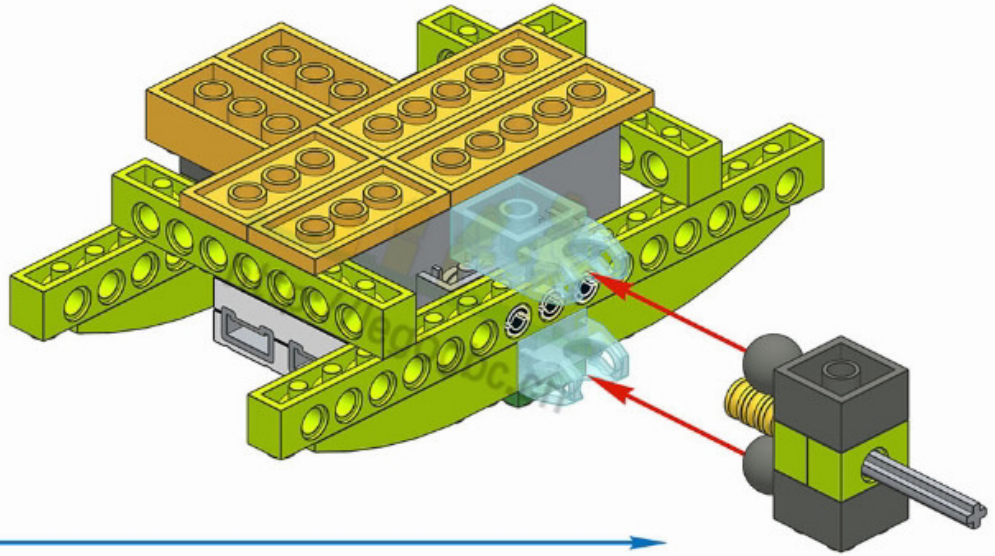

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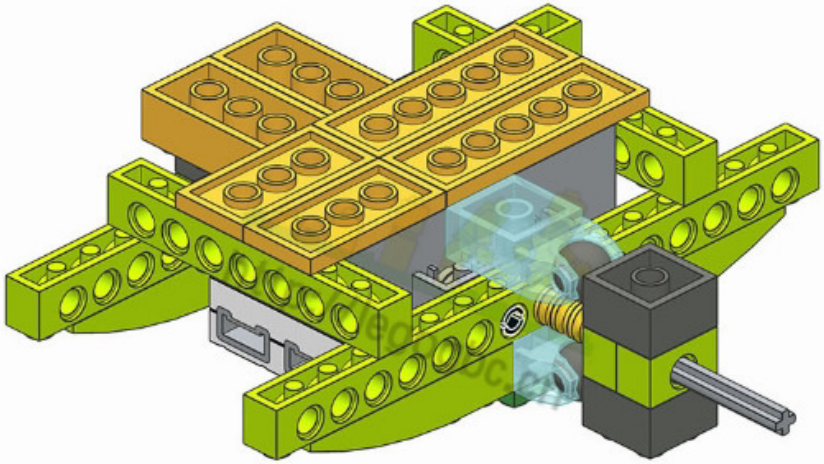

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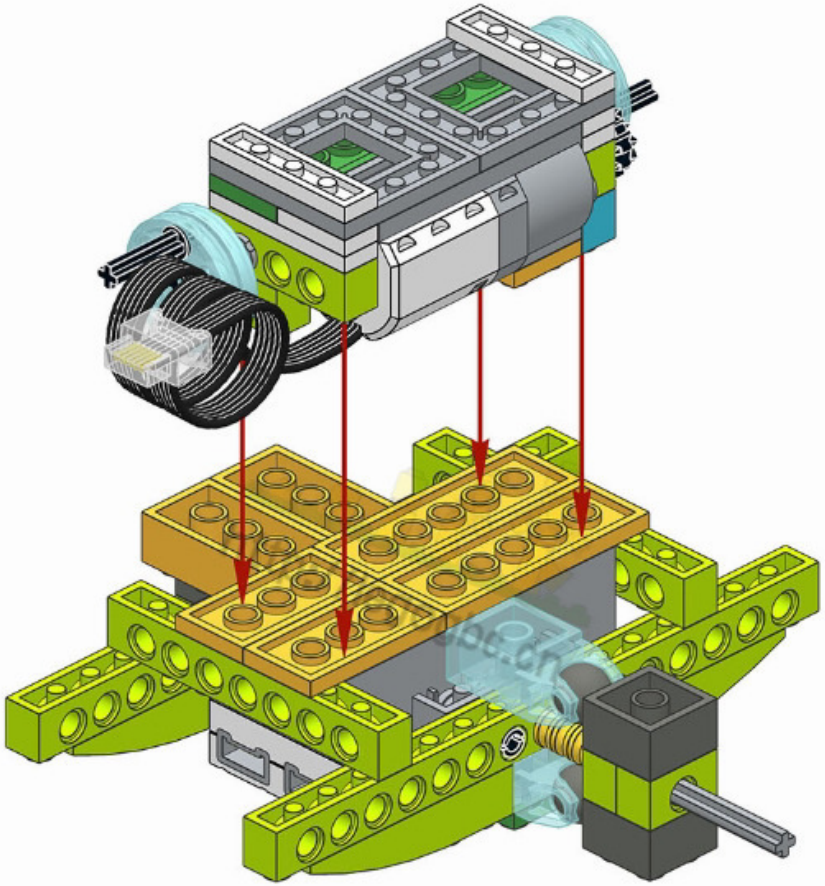

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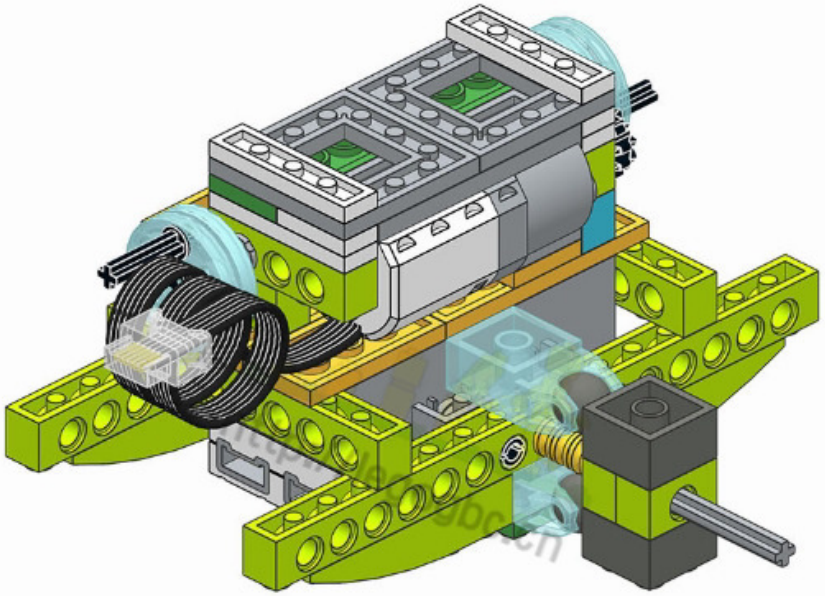

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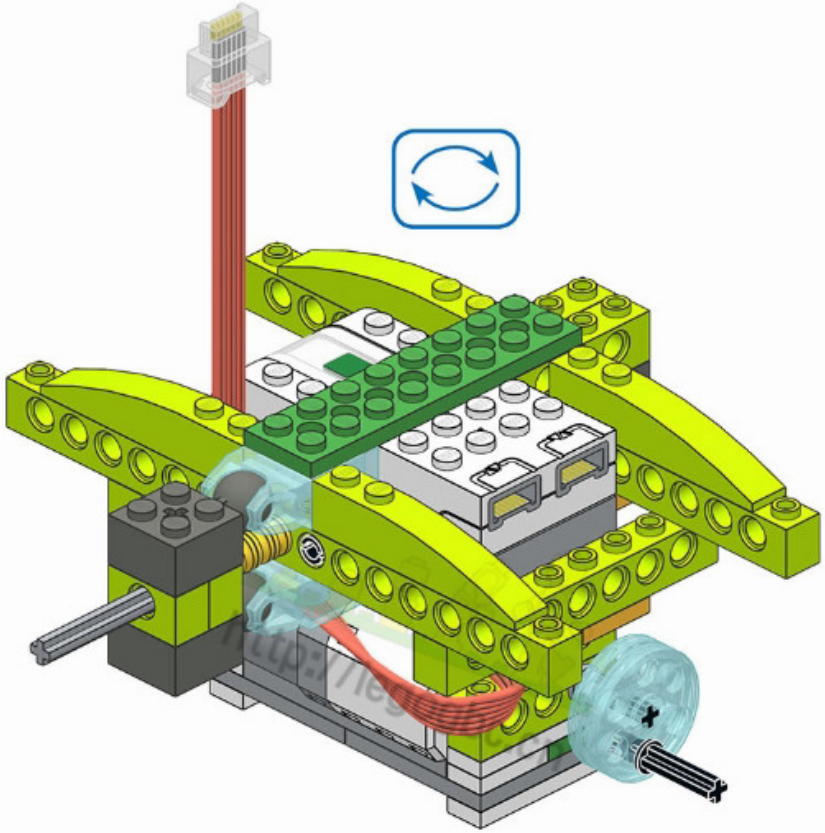

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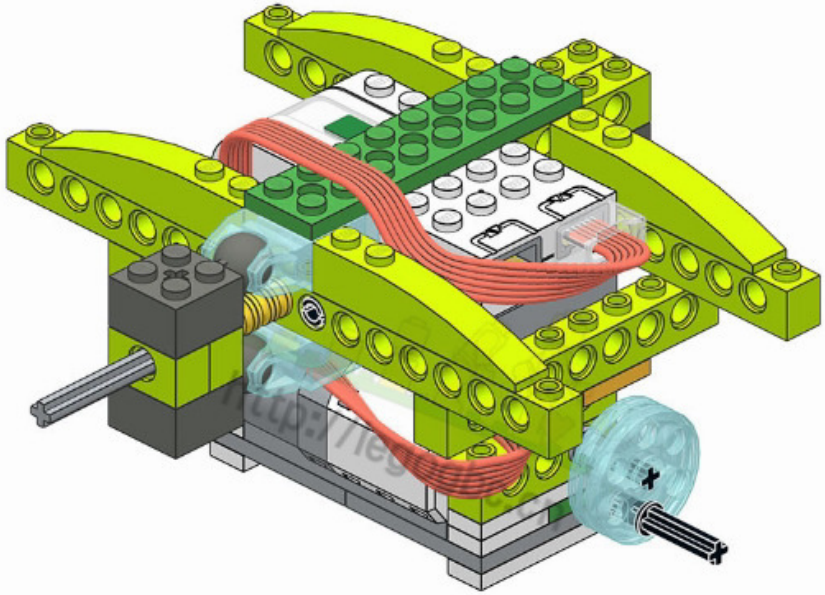

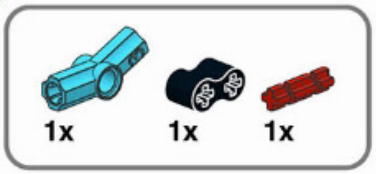

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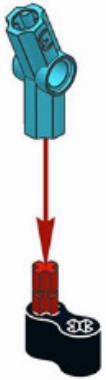

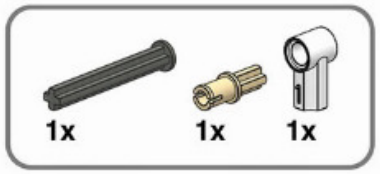

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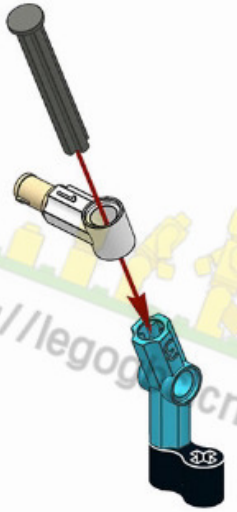

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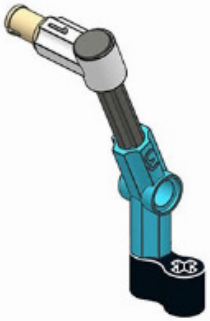

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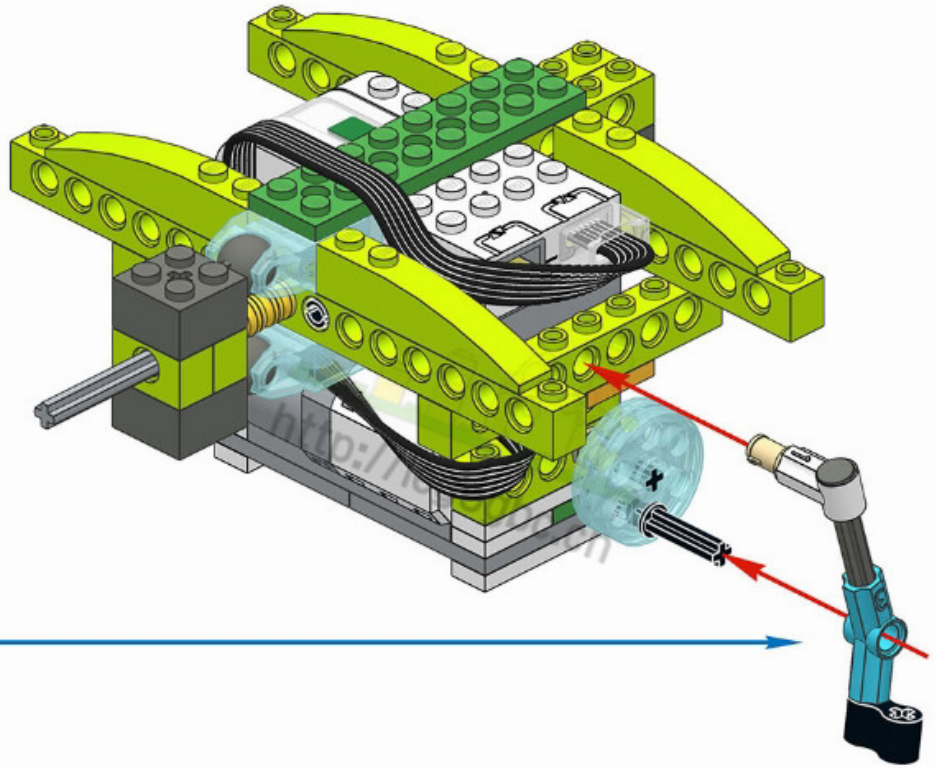

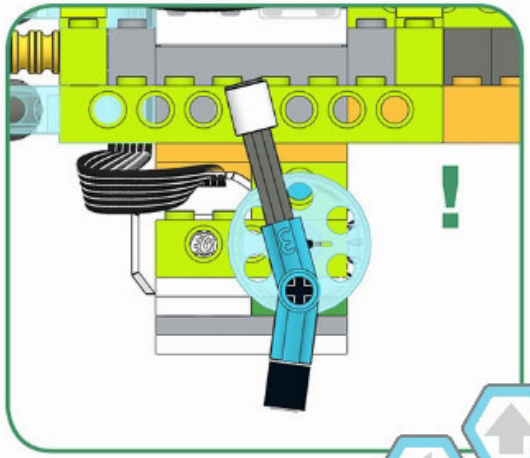

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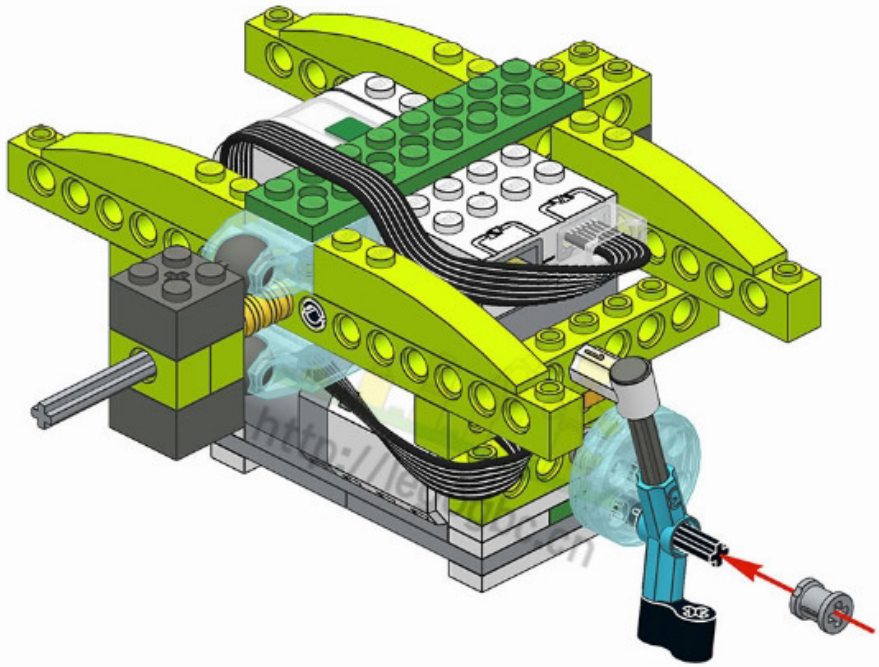

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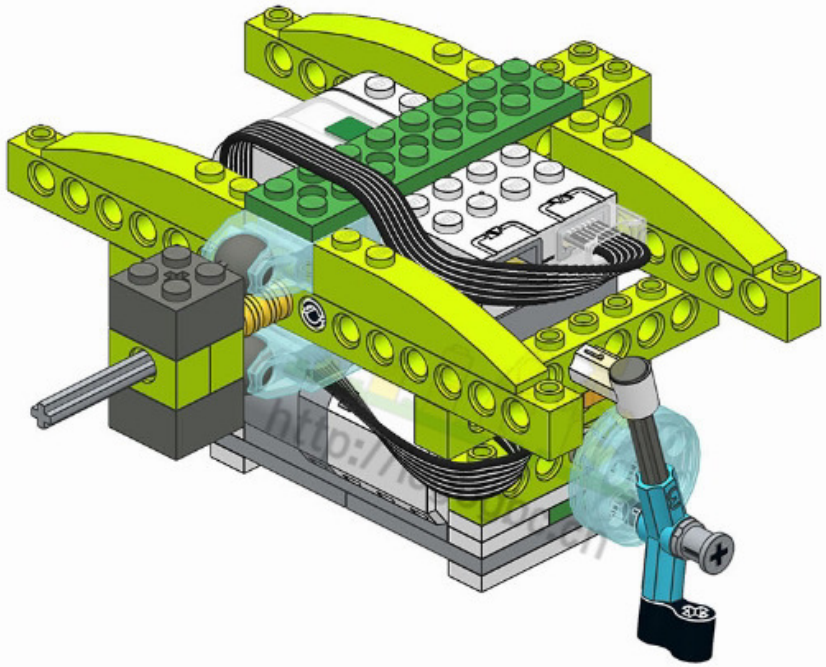

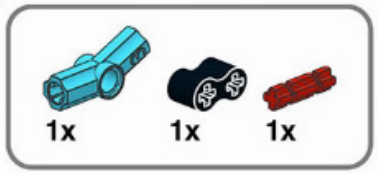

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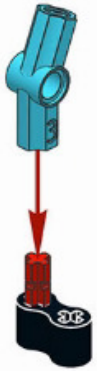

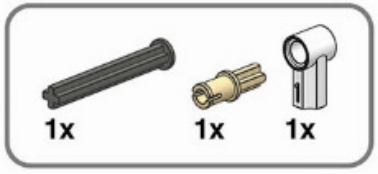

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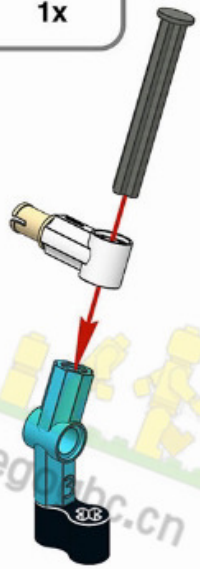

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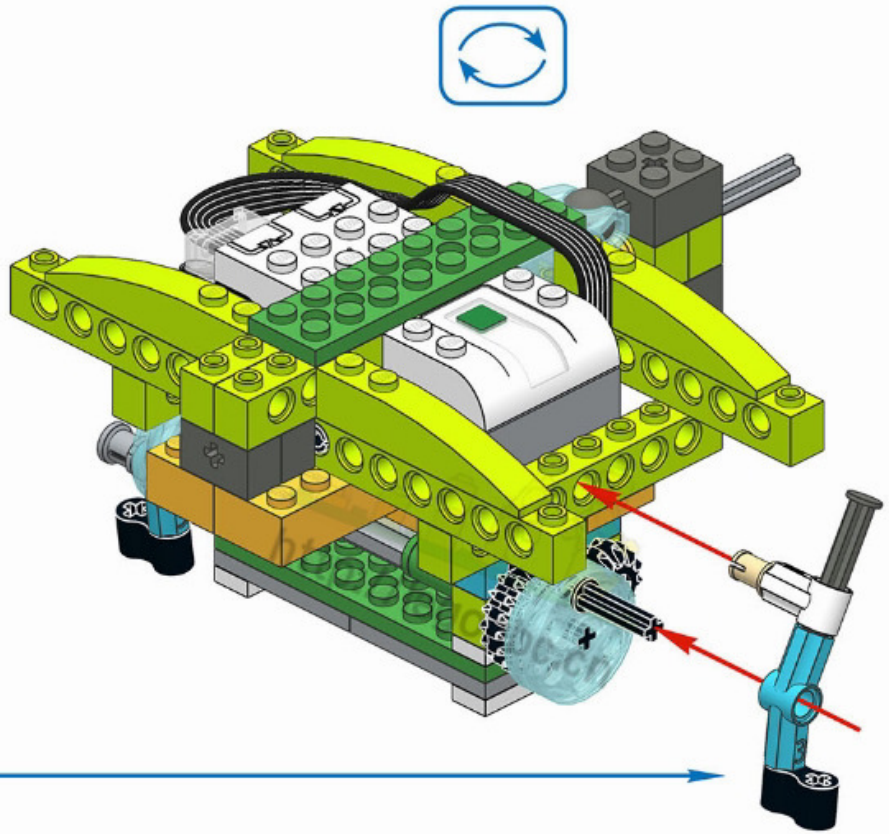

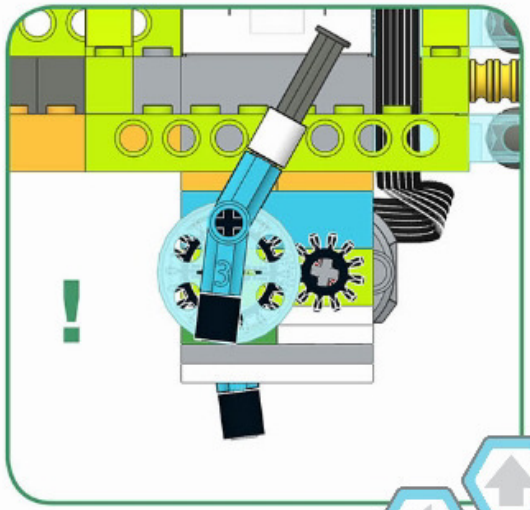

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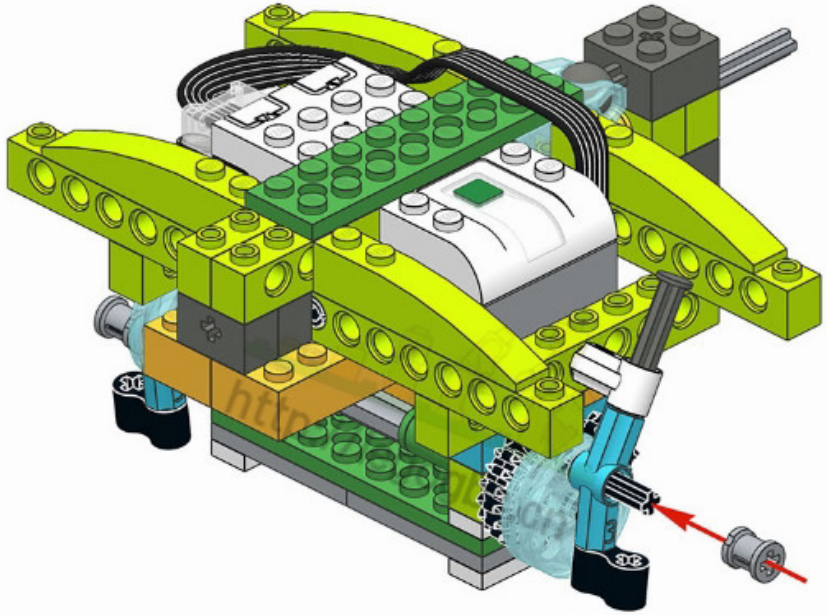

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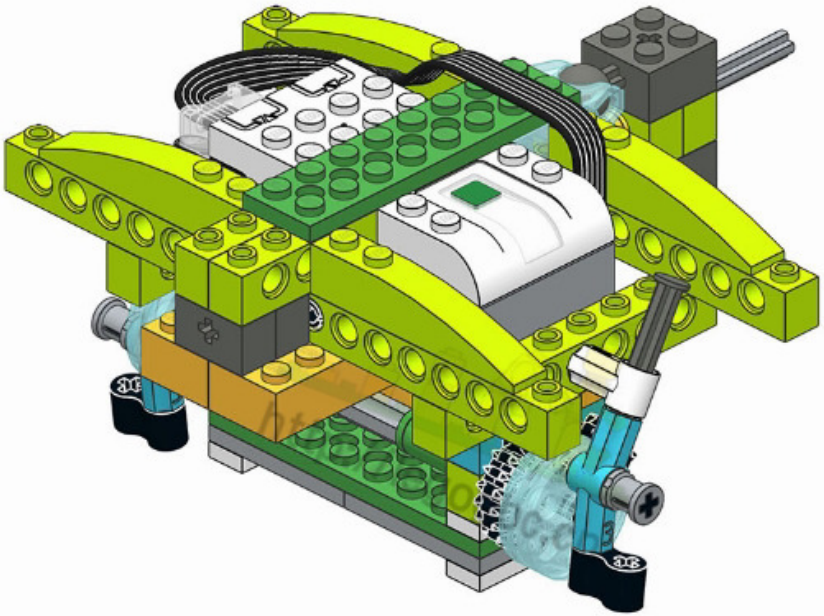
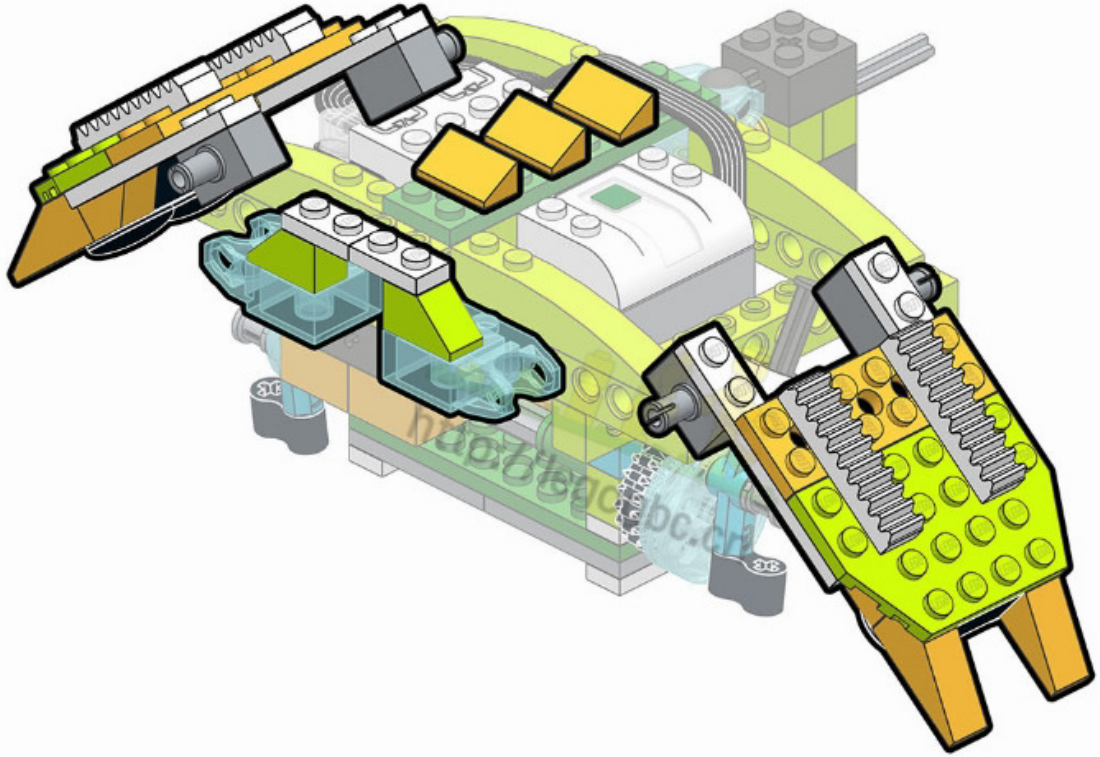


Enhanced version

Add external elements millipede`s legs and torso.

Arthropleura



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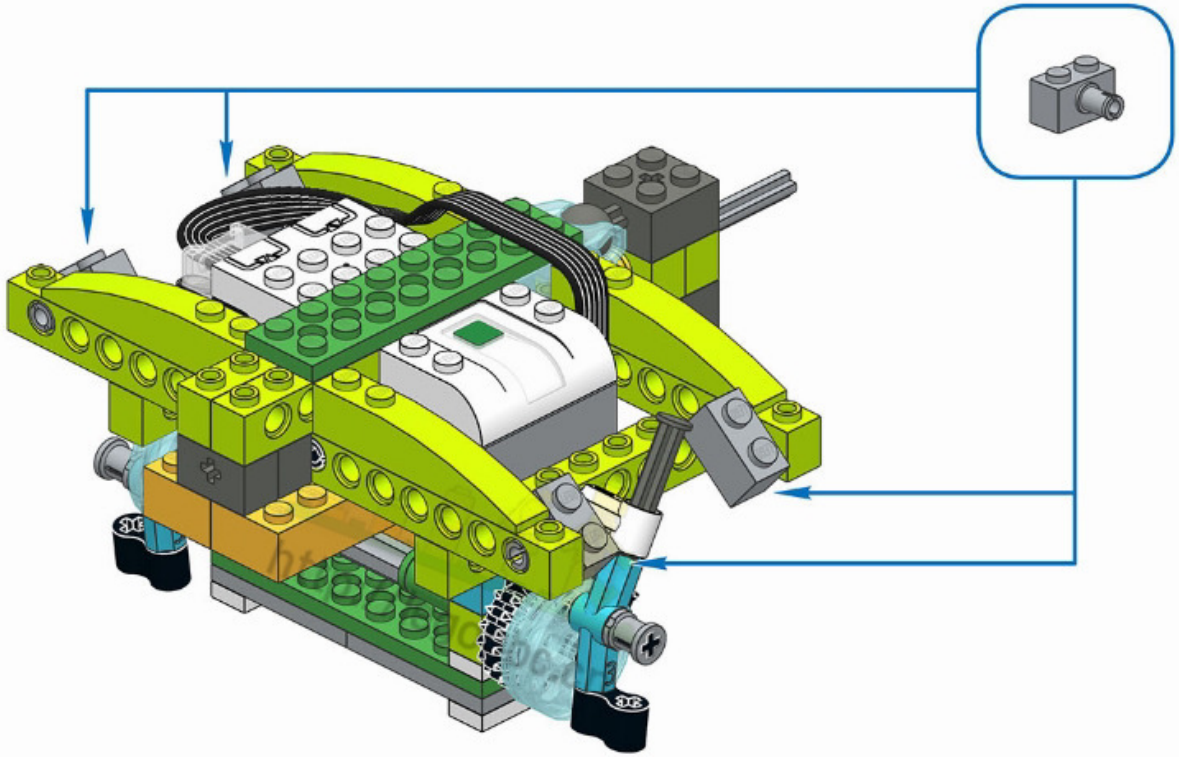

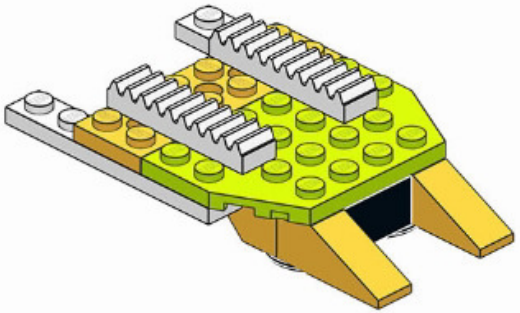

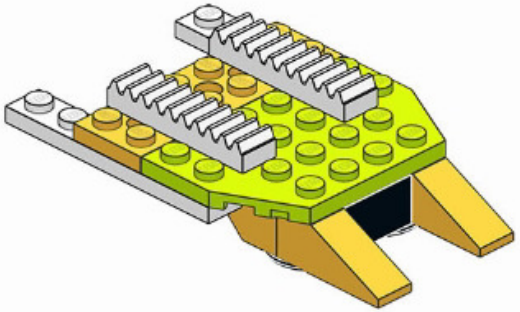

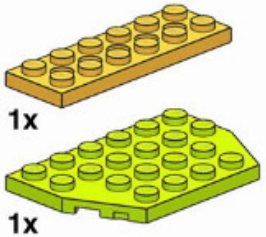

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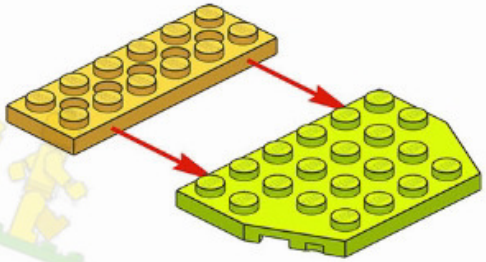

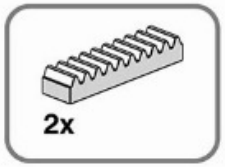

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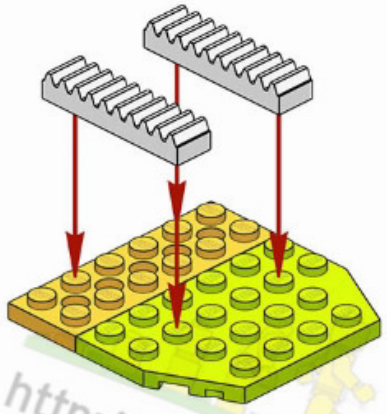

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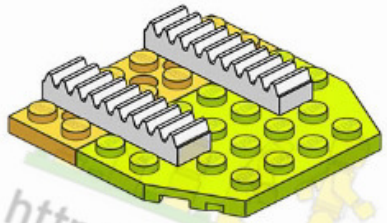

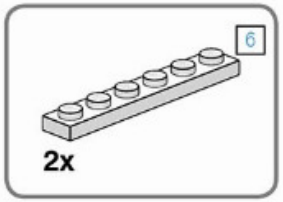

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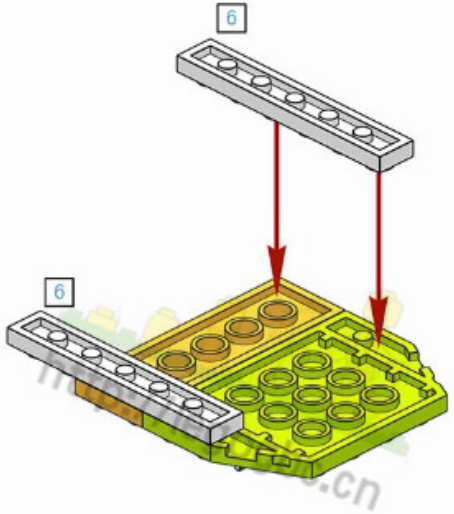

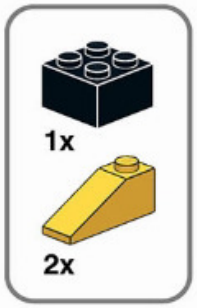

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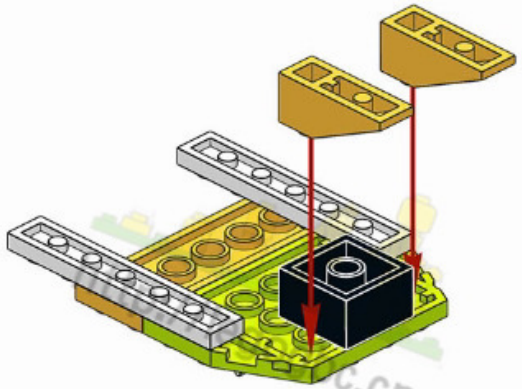

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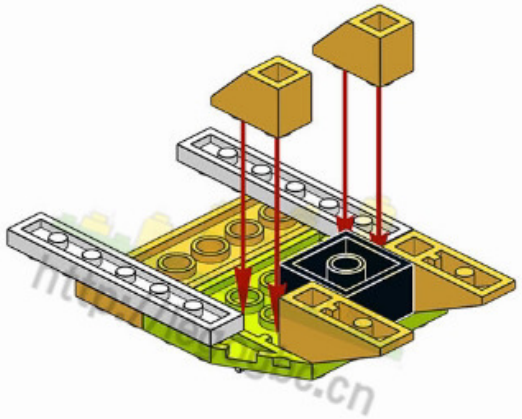

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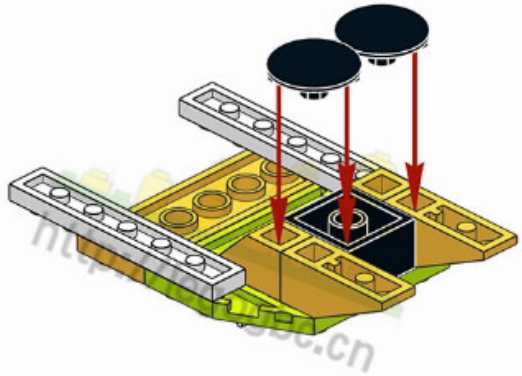

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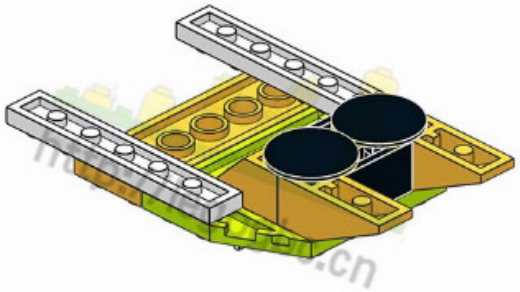

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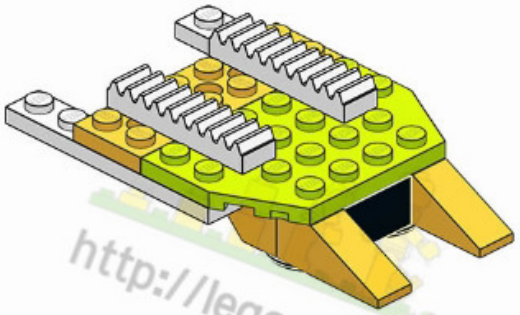

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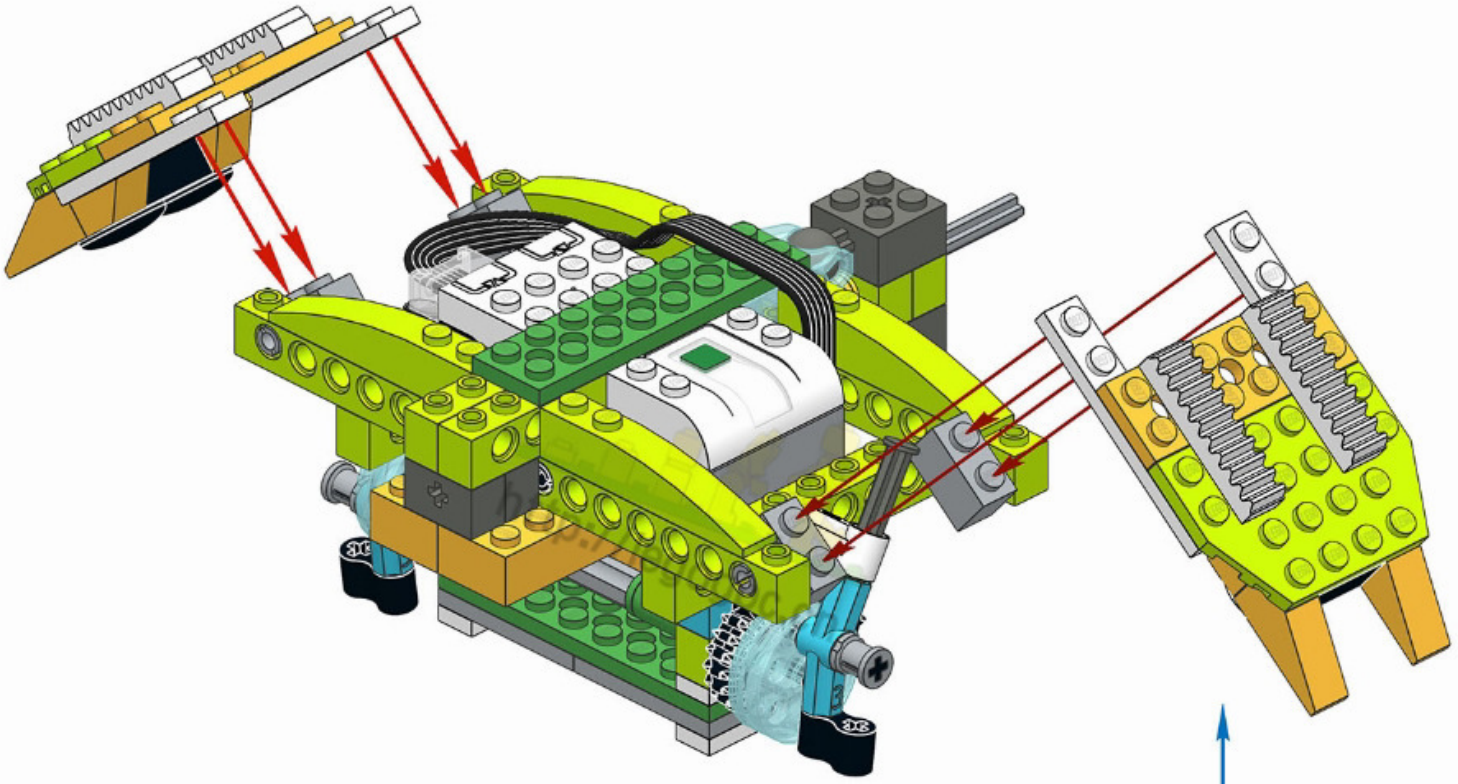

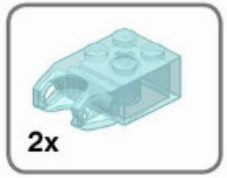

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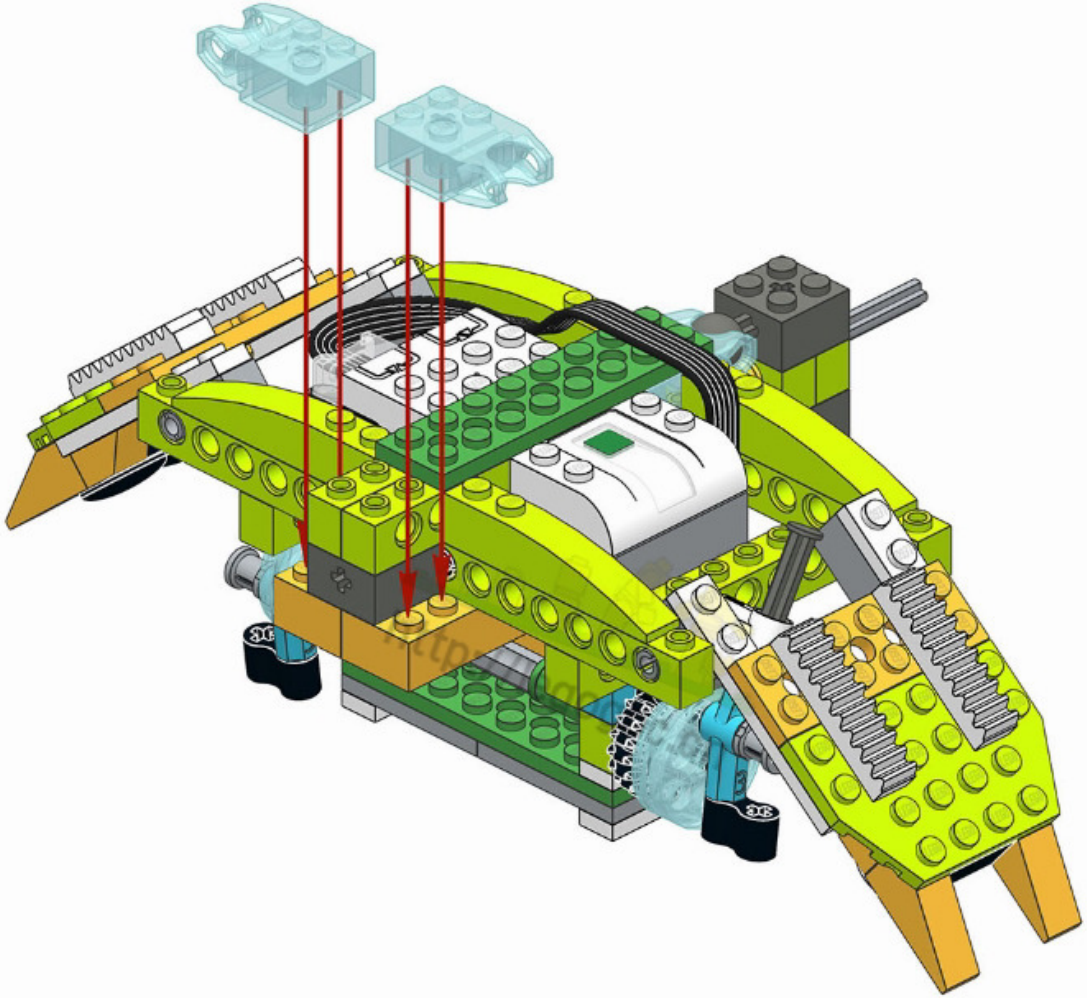

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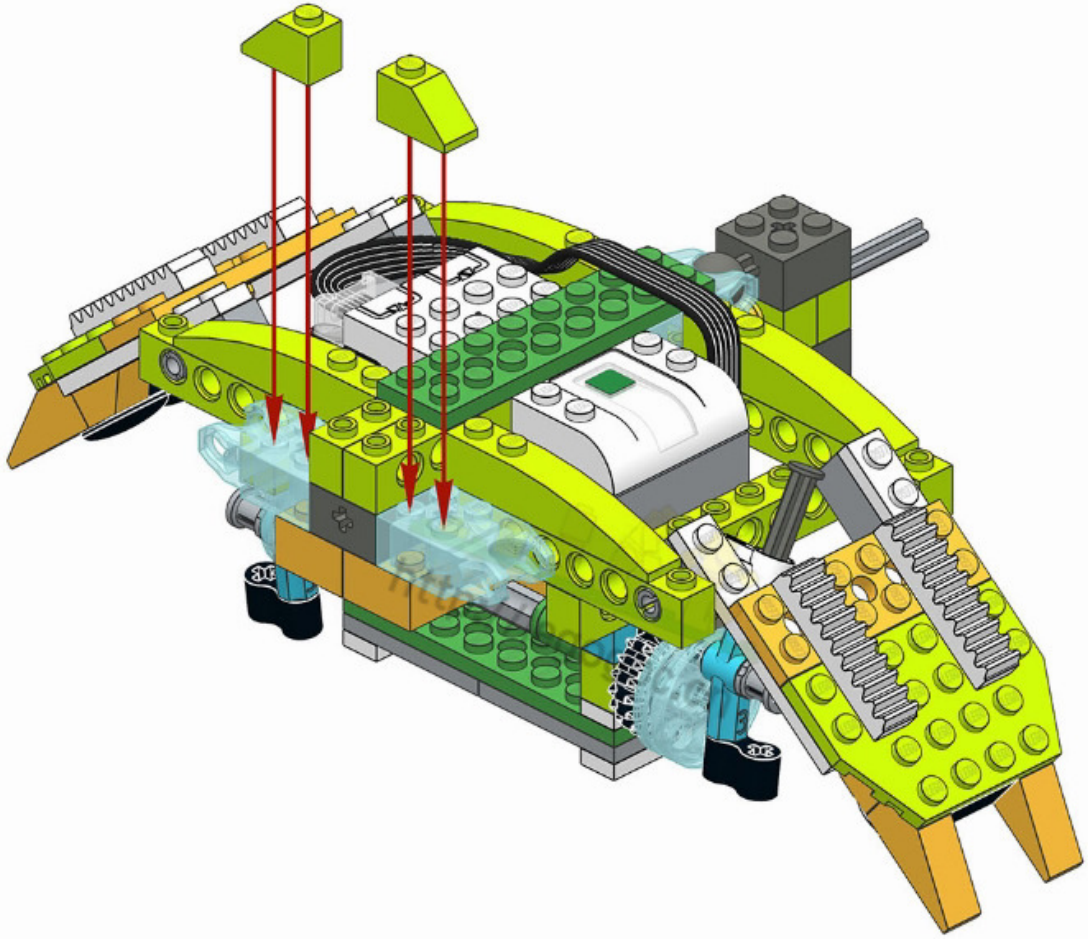

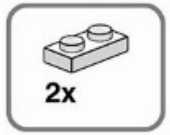

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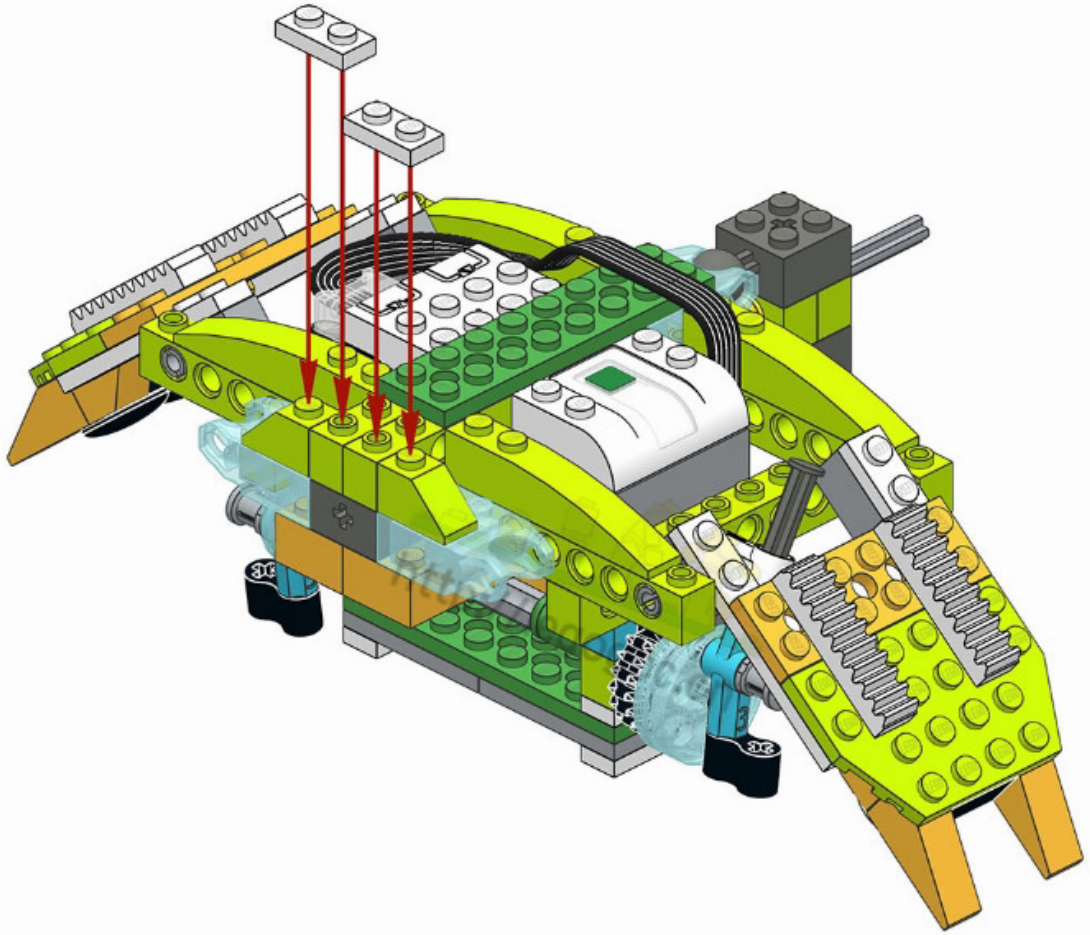

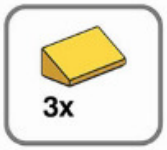

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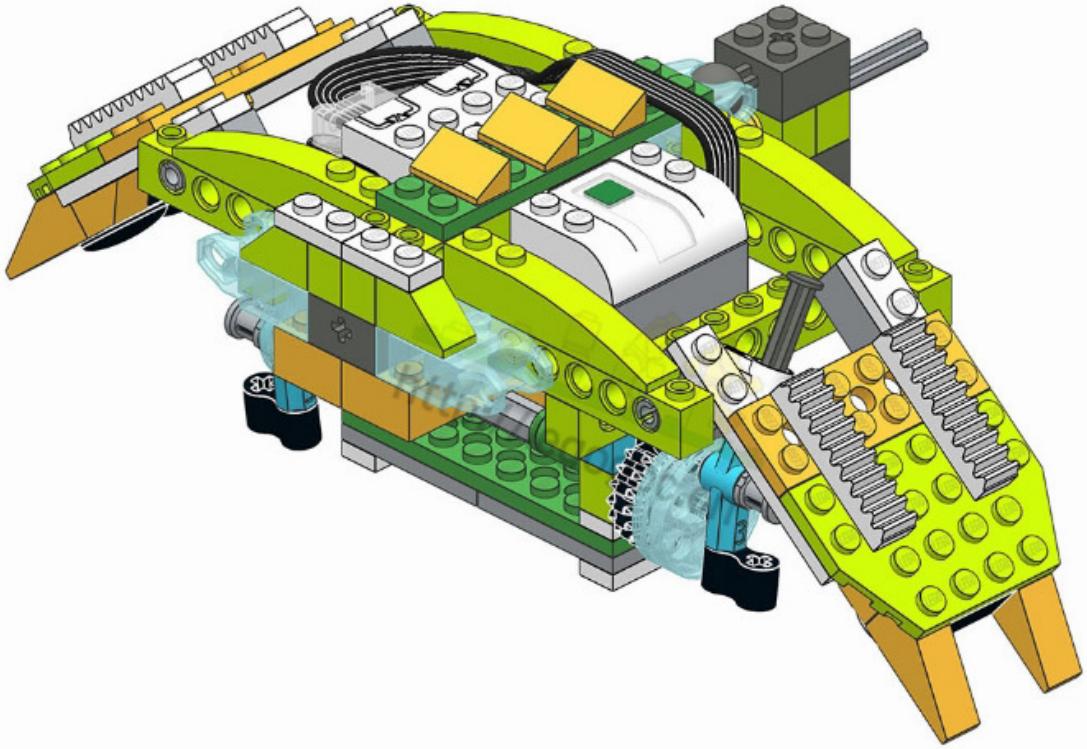
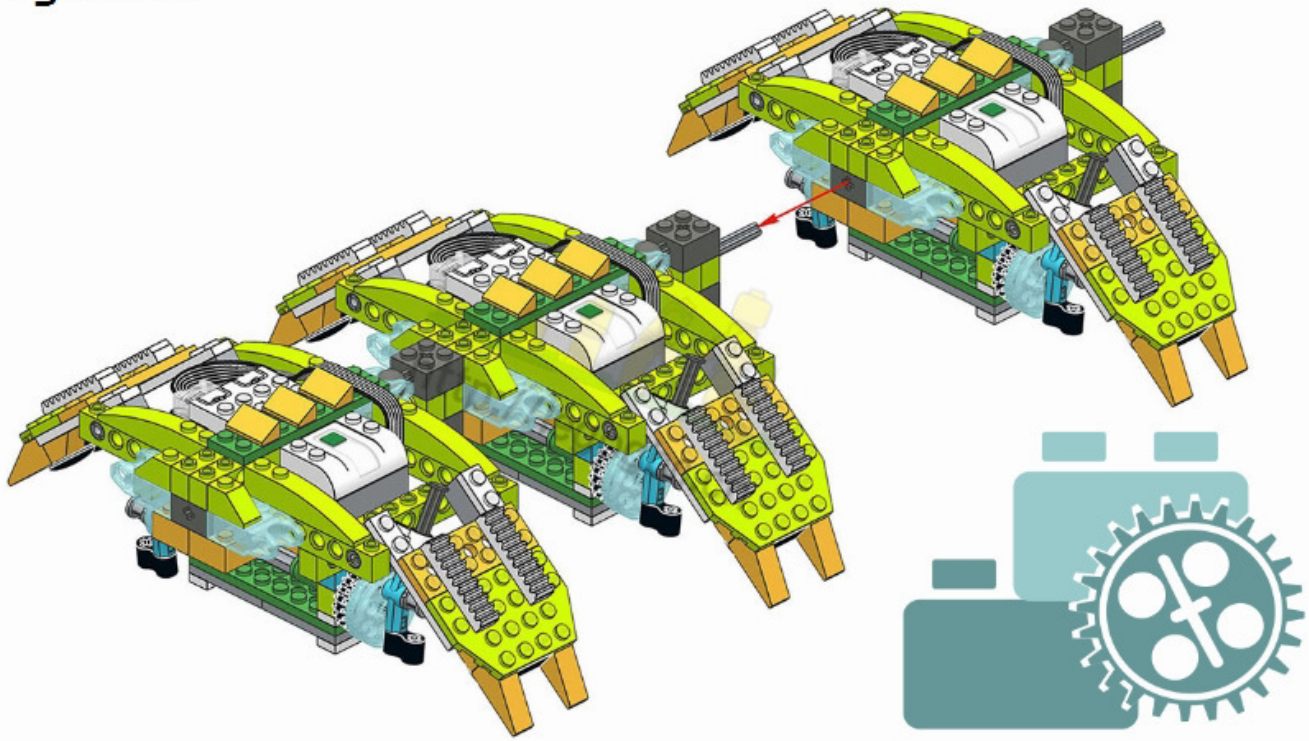


Robot`s segments

Connect built millipedes body segments:



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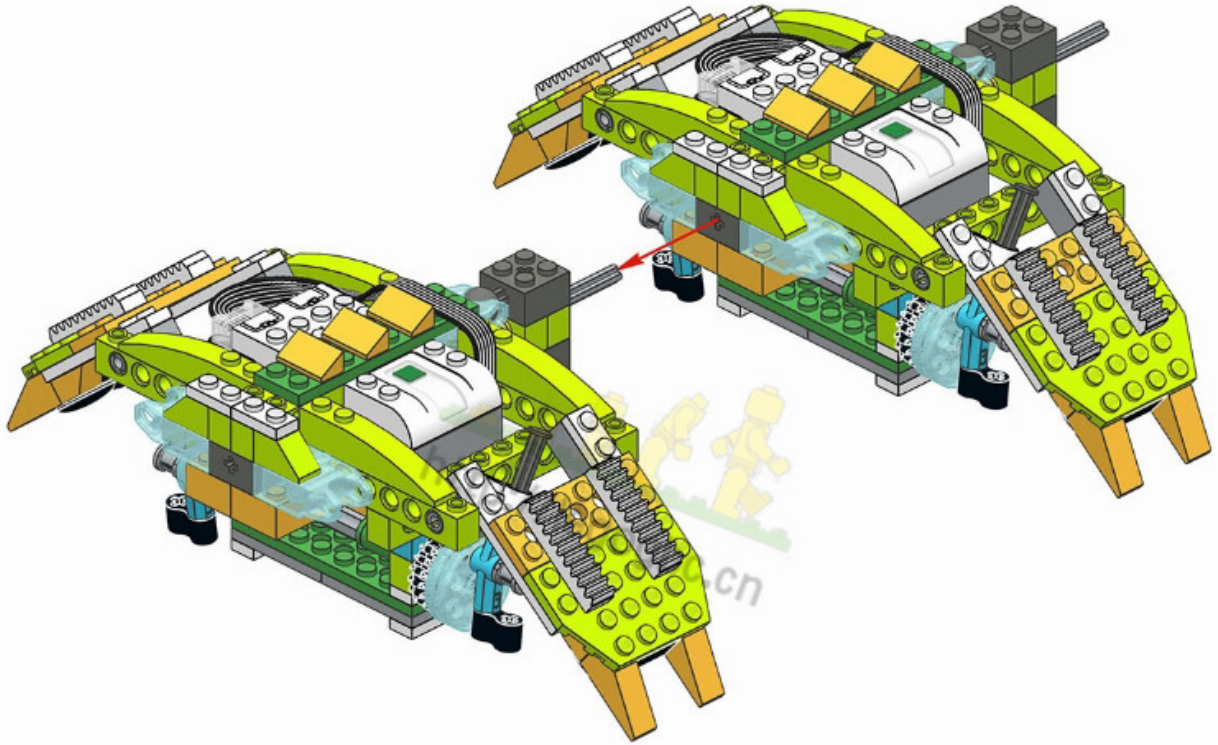

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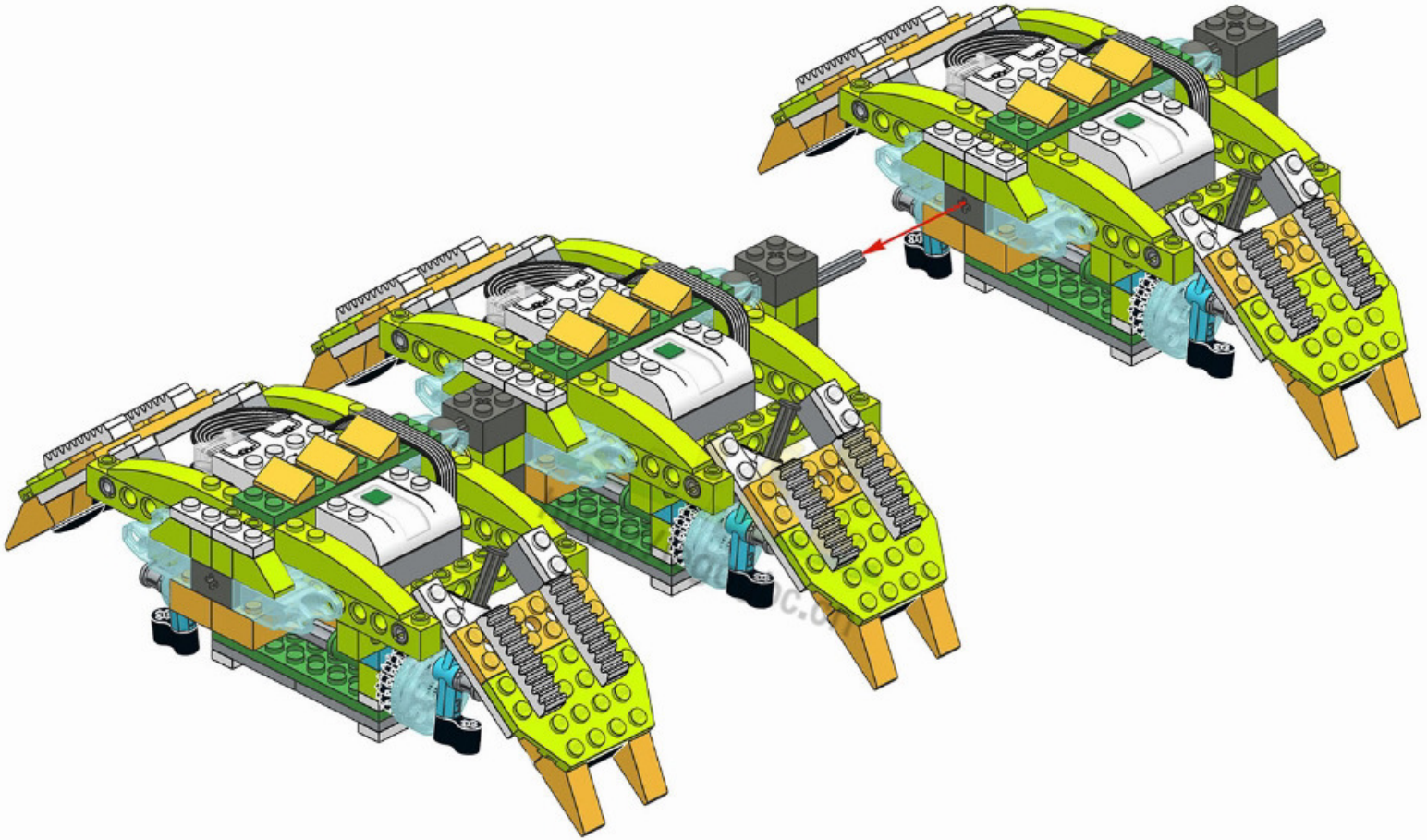

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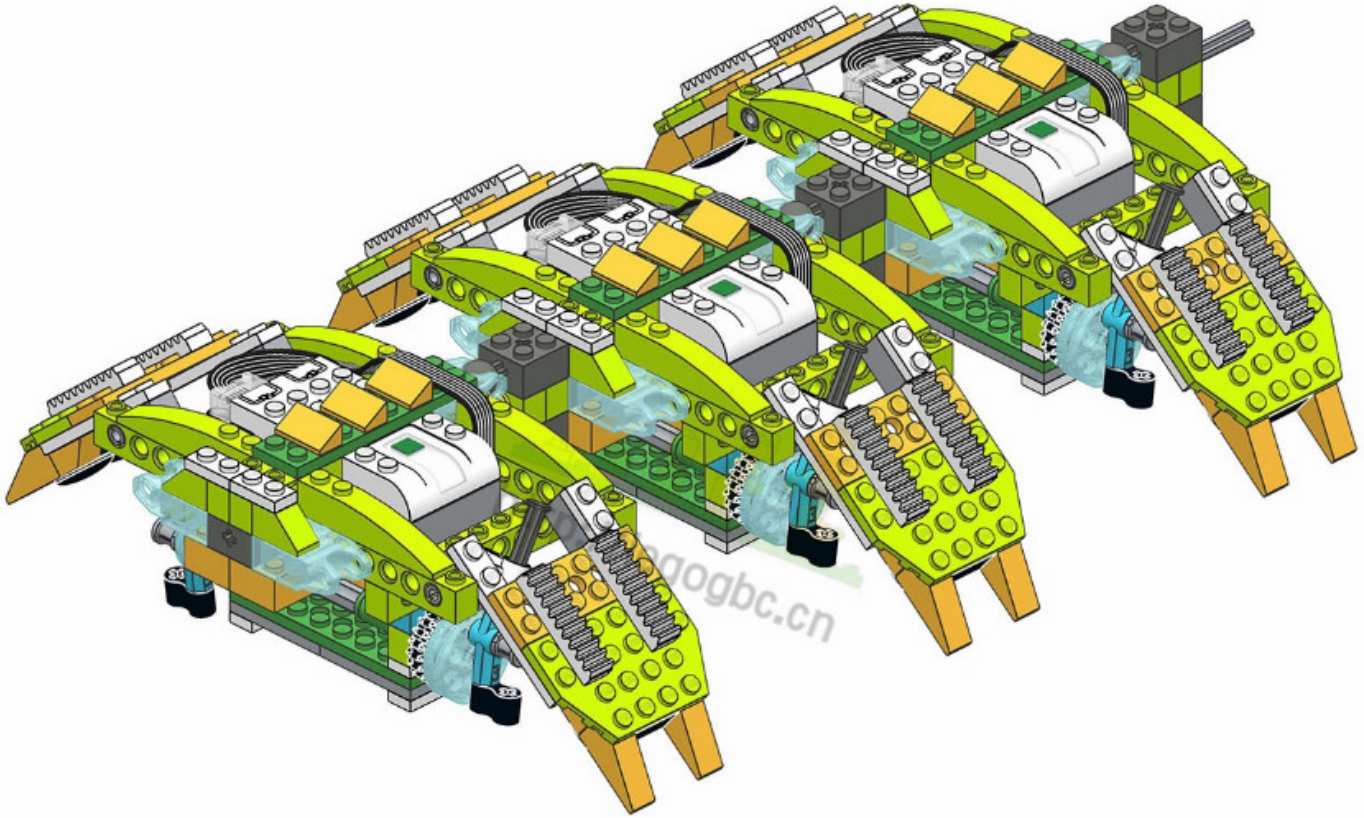

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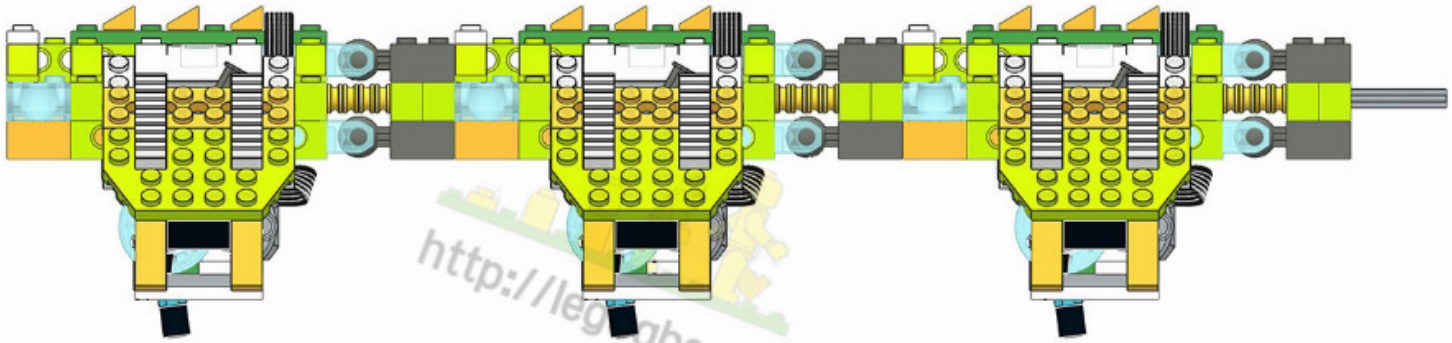
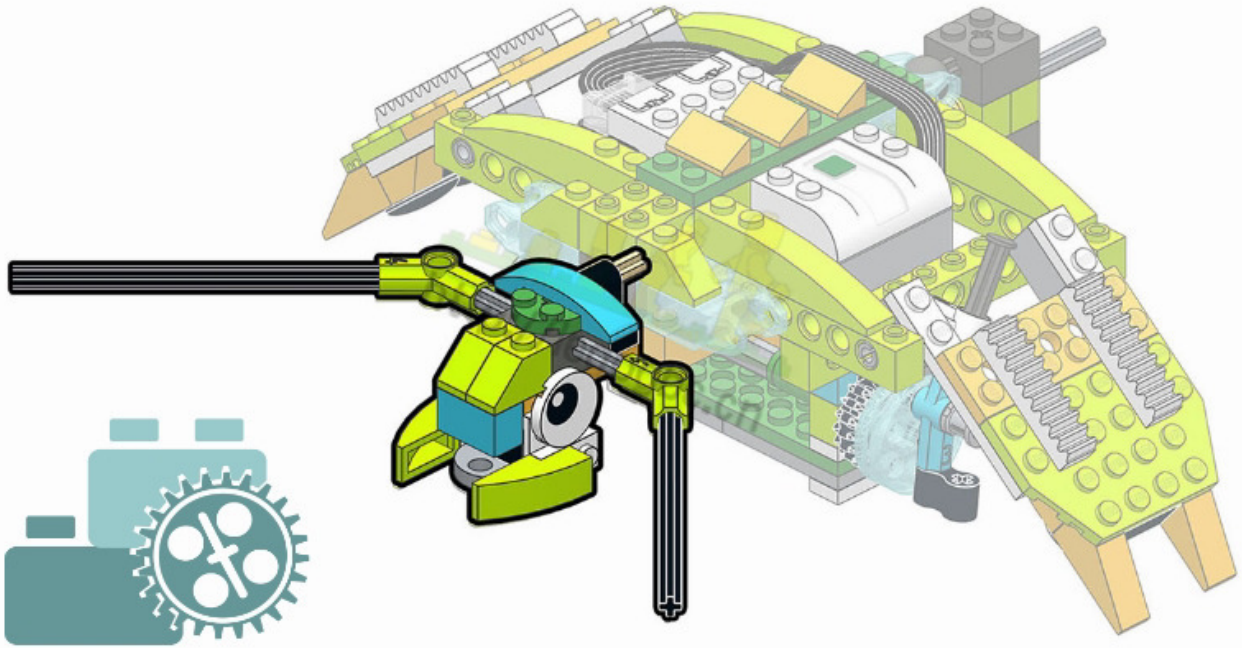
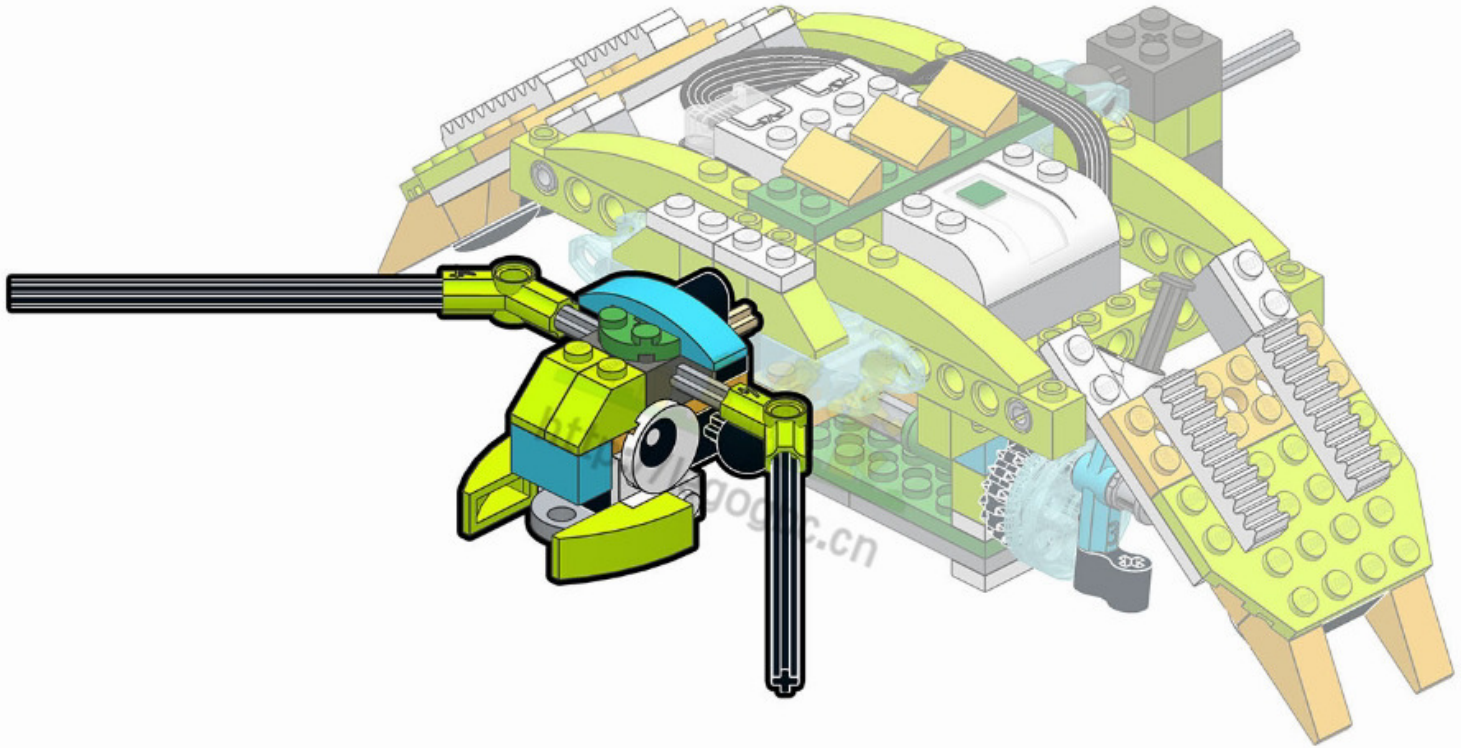
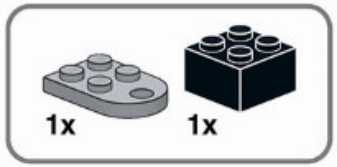


Head

The team that quickly built a robot can add a head to the robot`s first segment:







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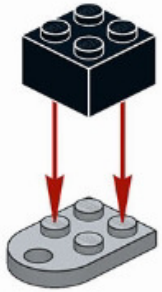

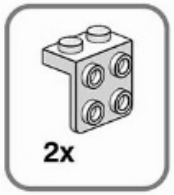

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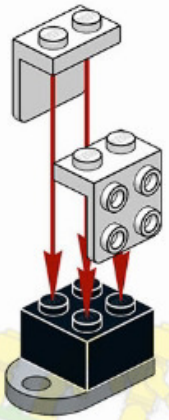

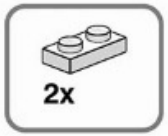

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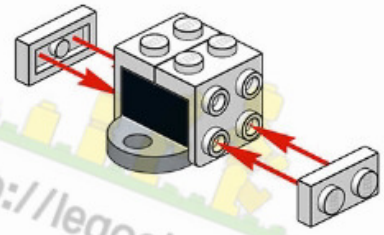

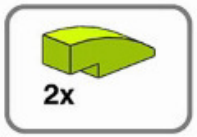

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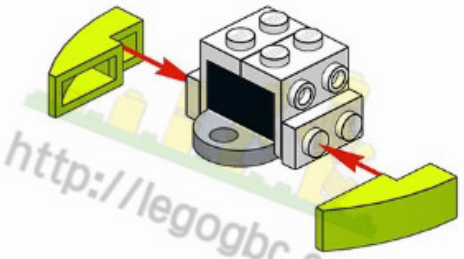

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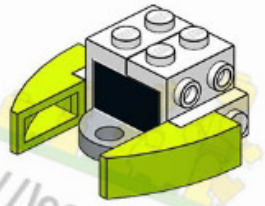

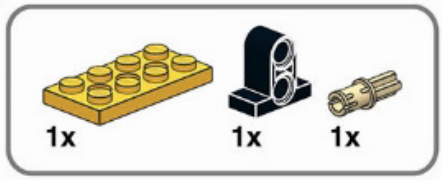

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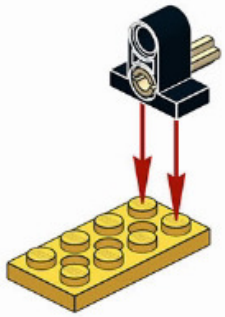

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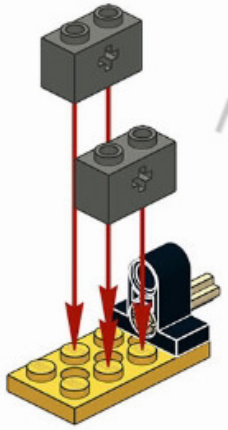

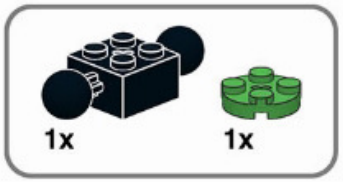

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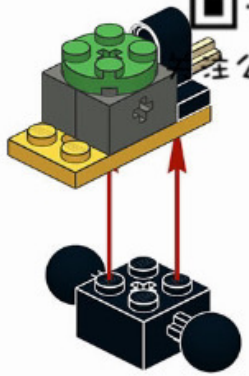

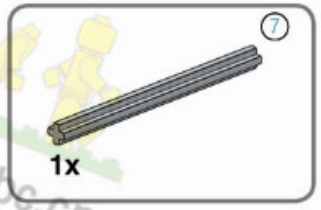

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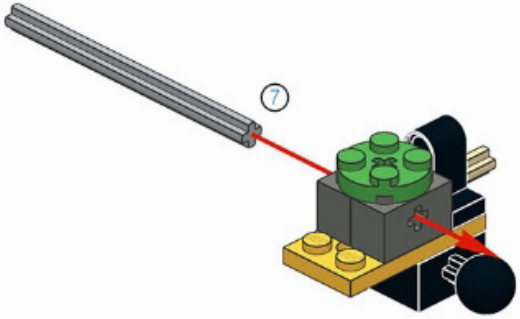

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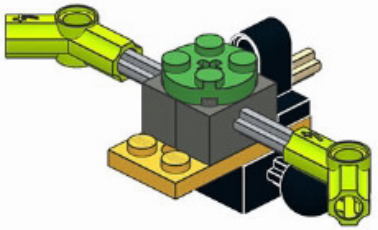

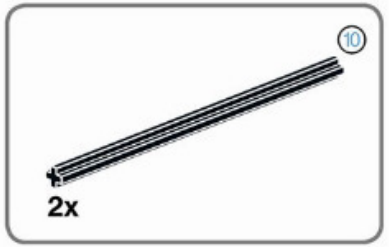

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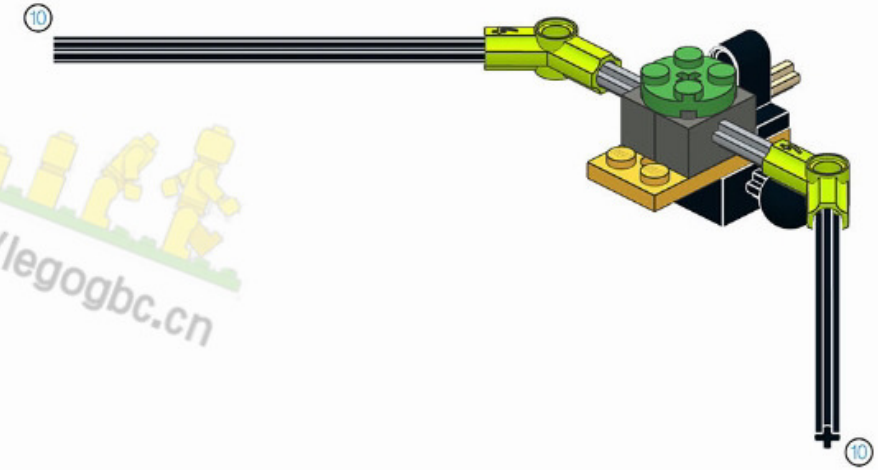

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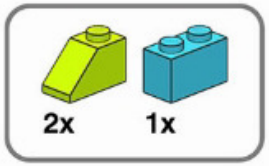

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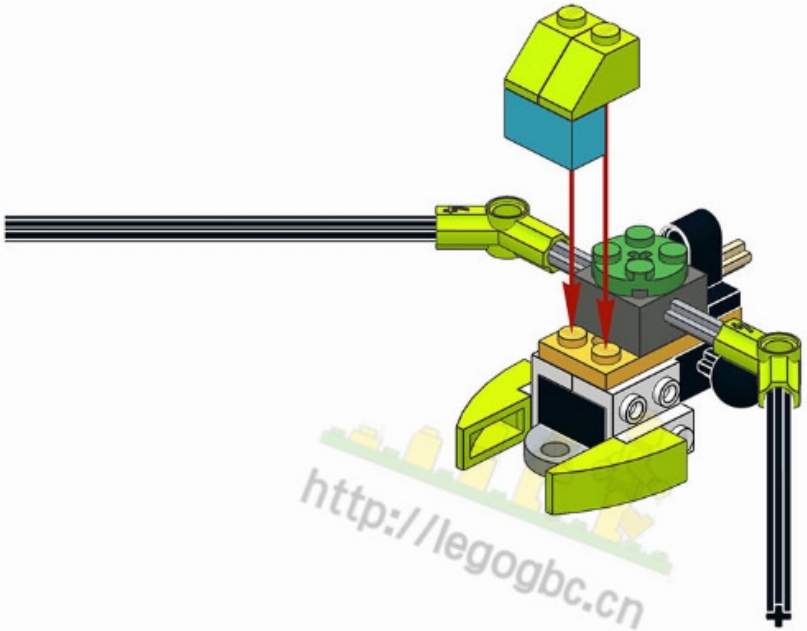

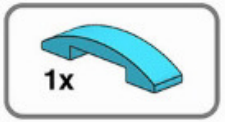

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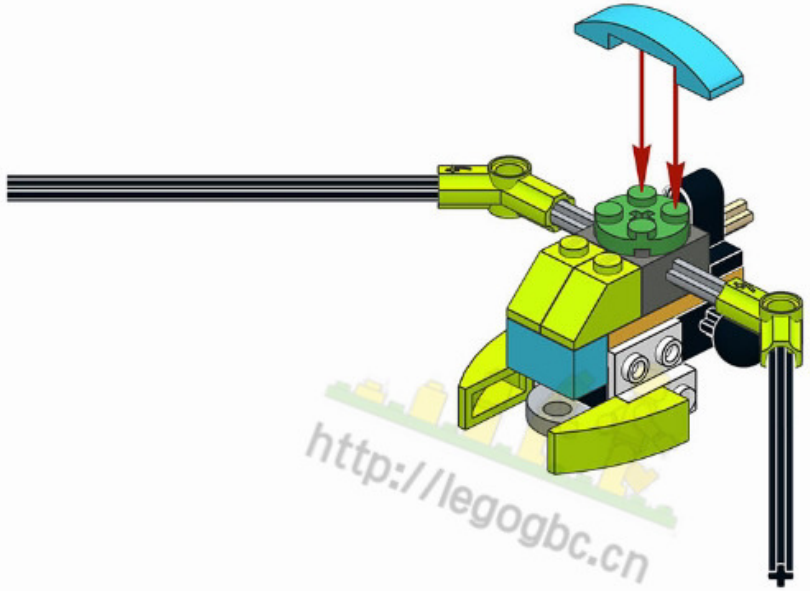

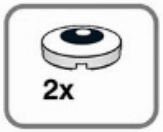

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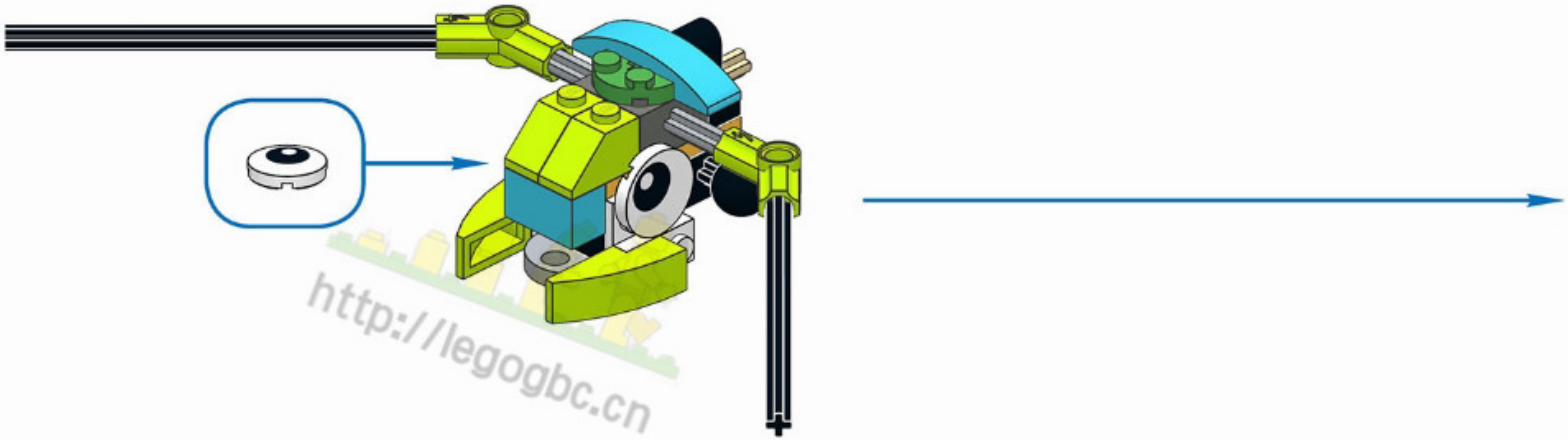

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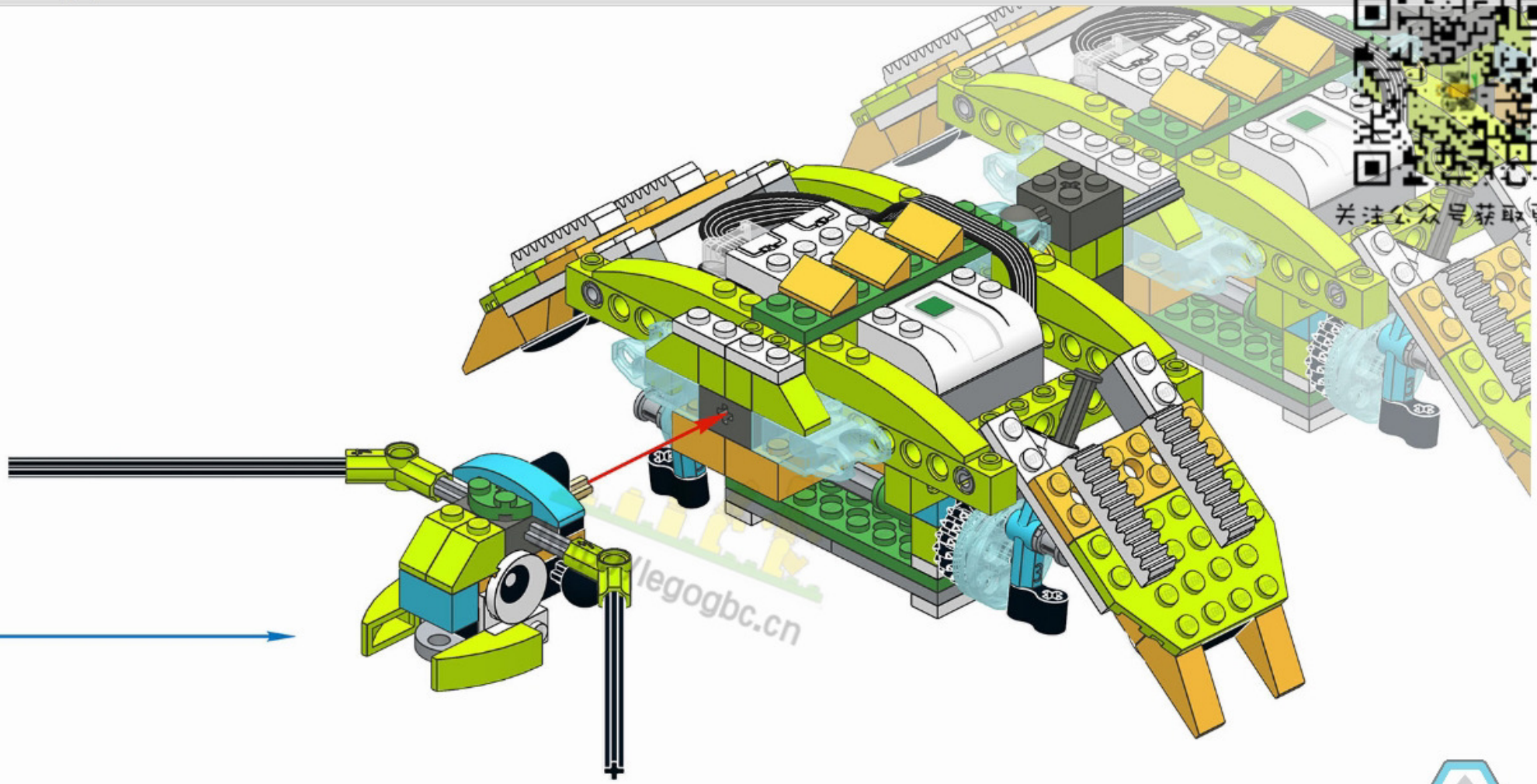

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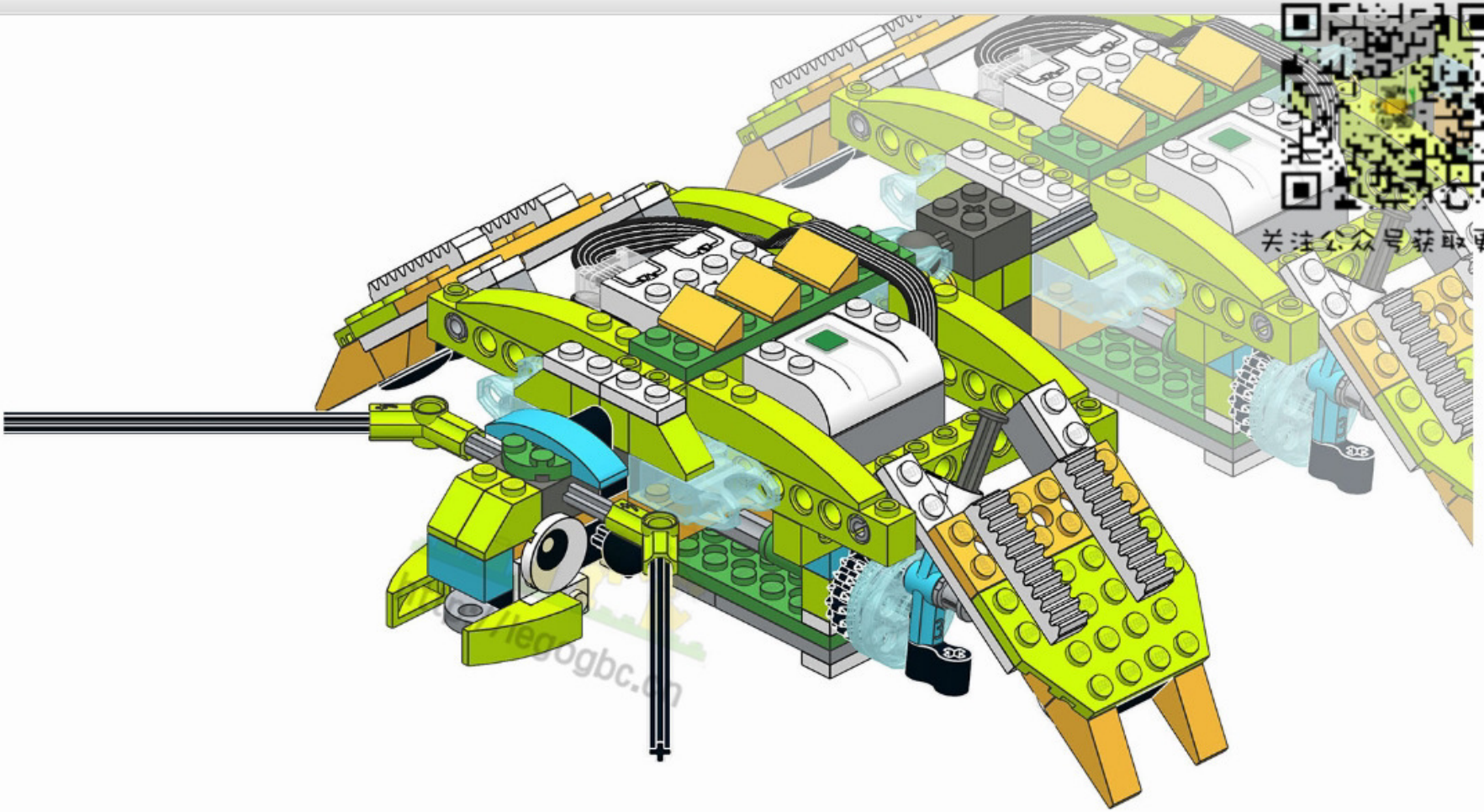
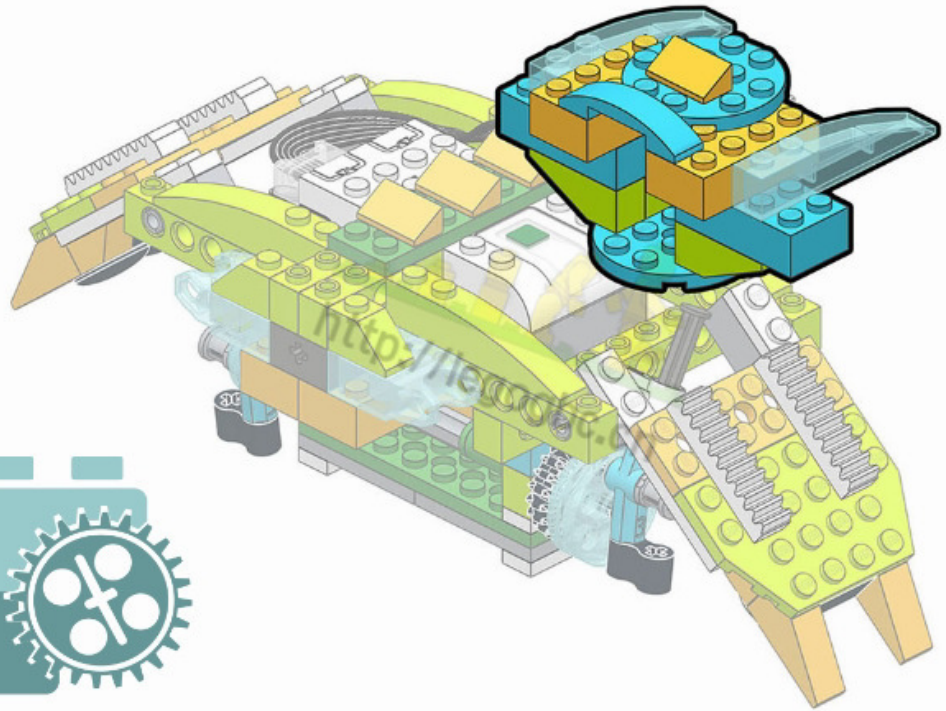
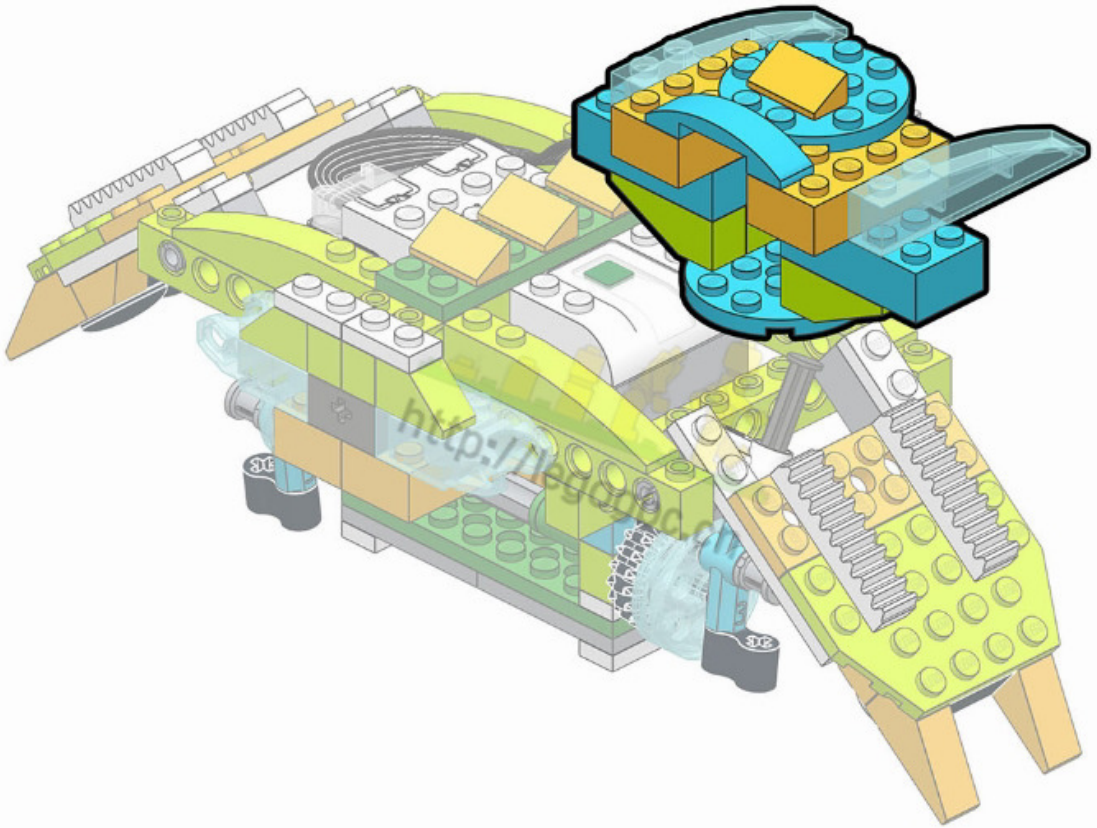
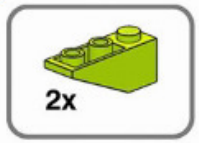


Tail

Another team that has already built its robot can add a tail to the robot`s last segment:







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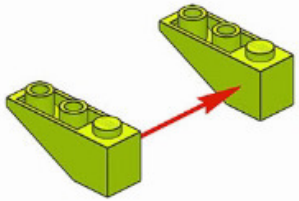

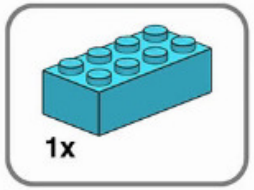

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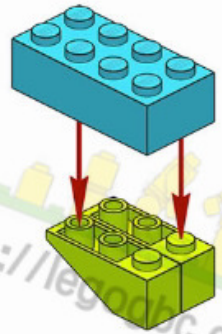

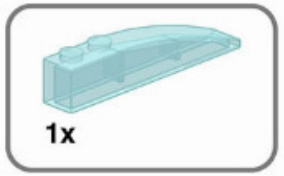

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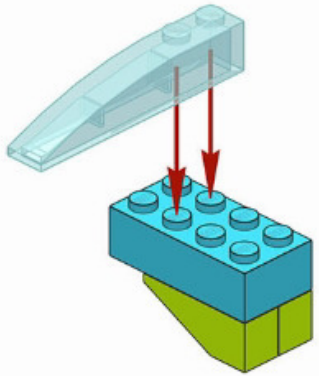

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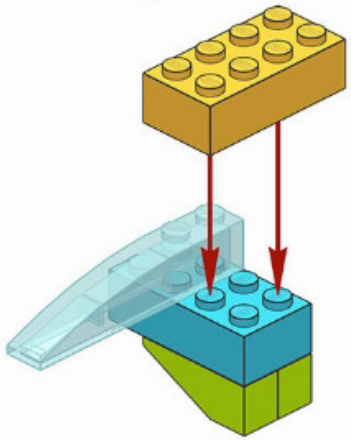

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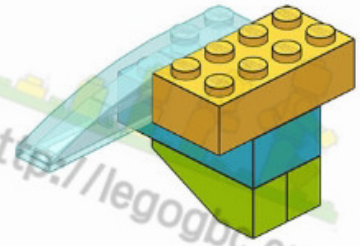

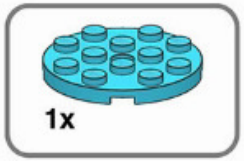

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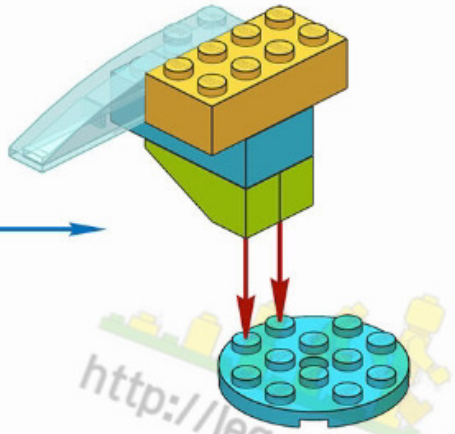

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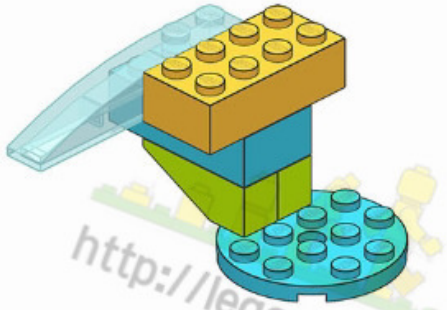

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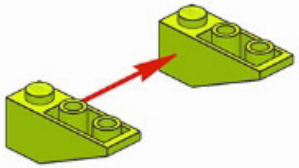

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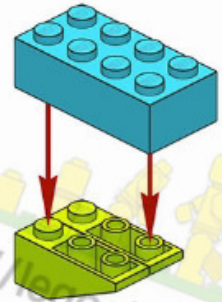

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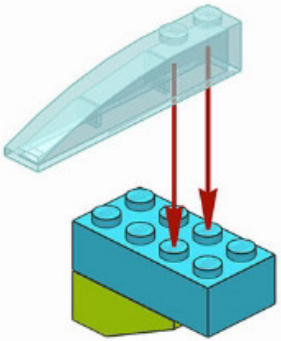

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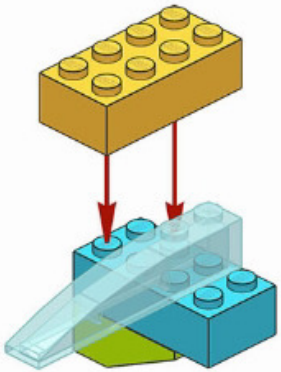

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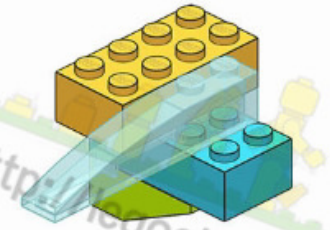

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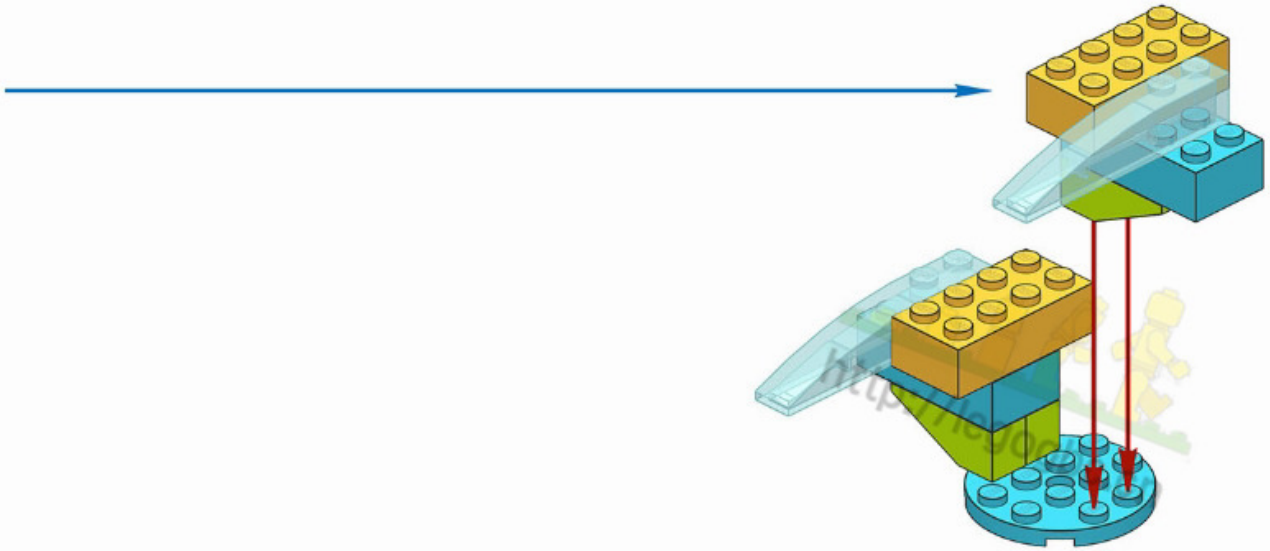

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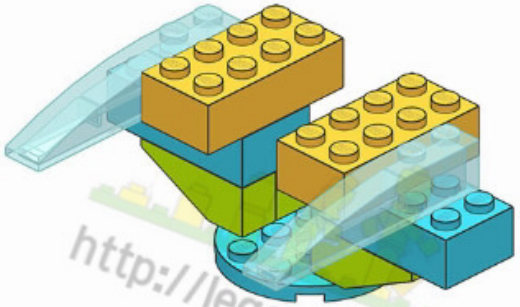

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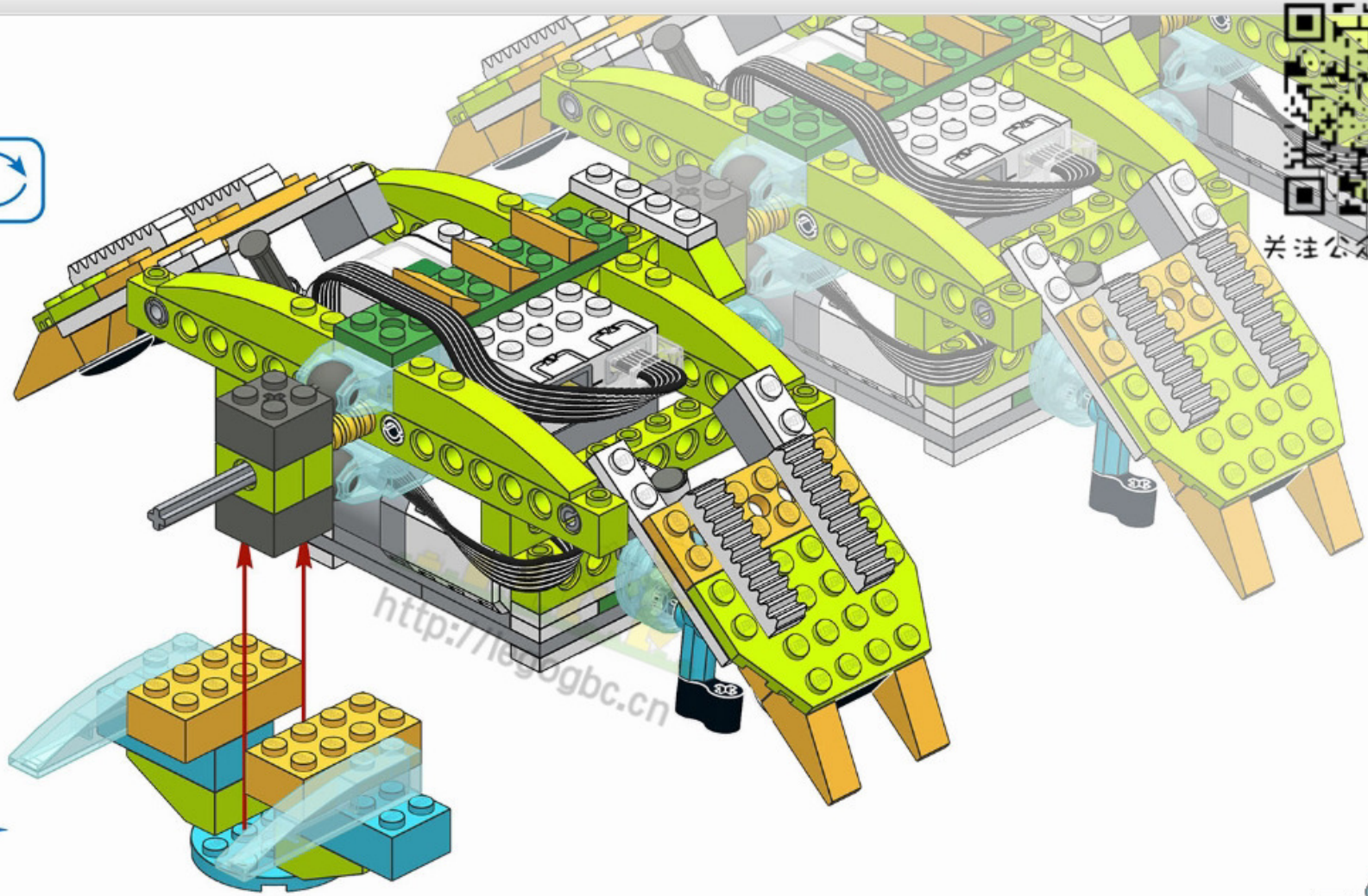

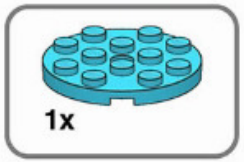

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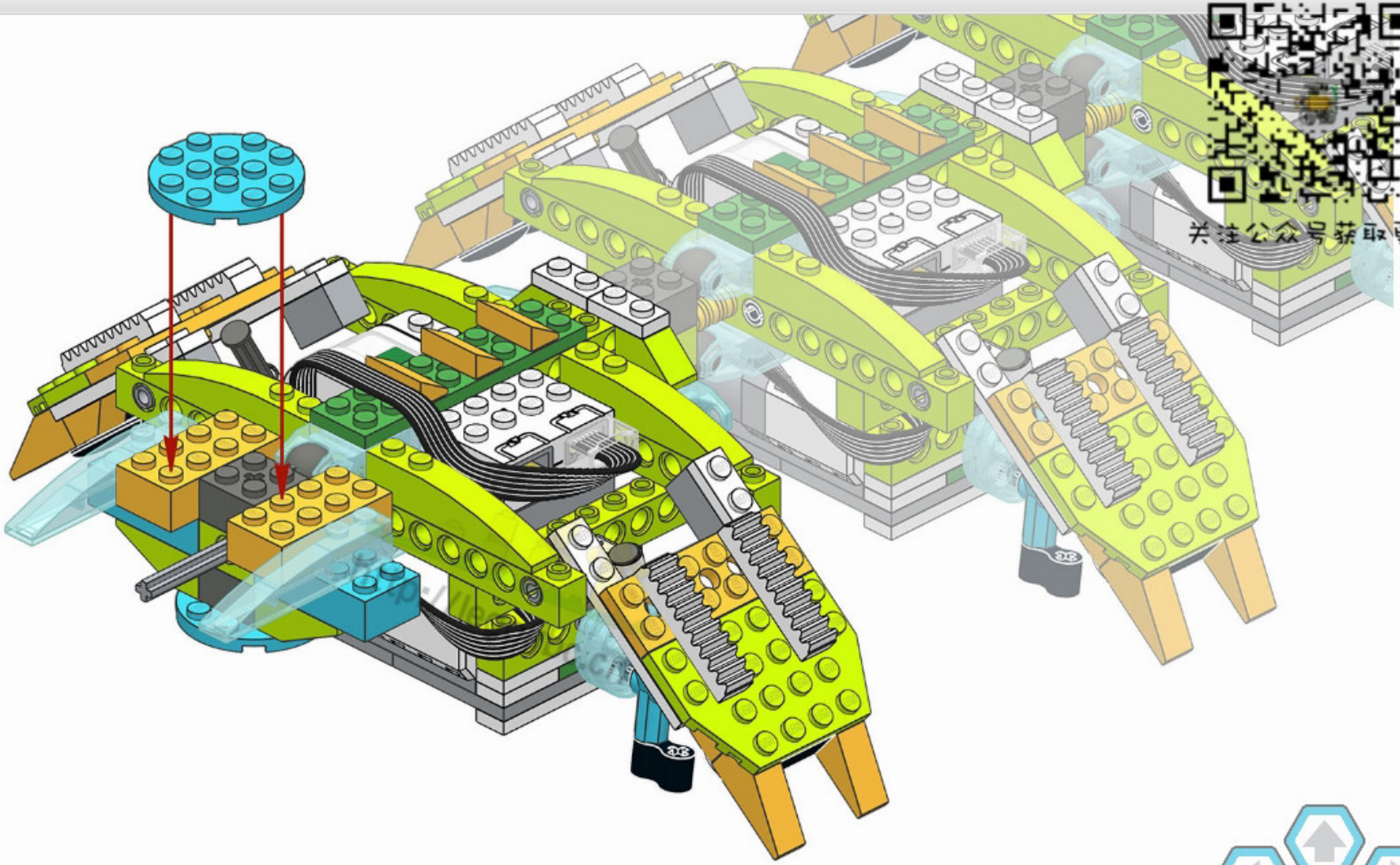

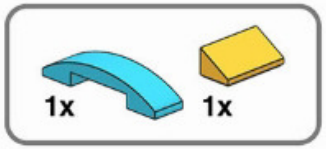

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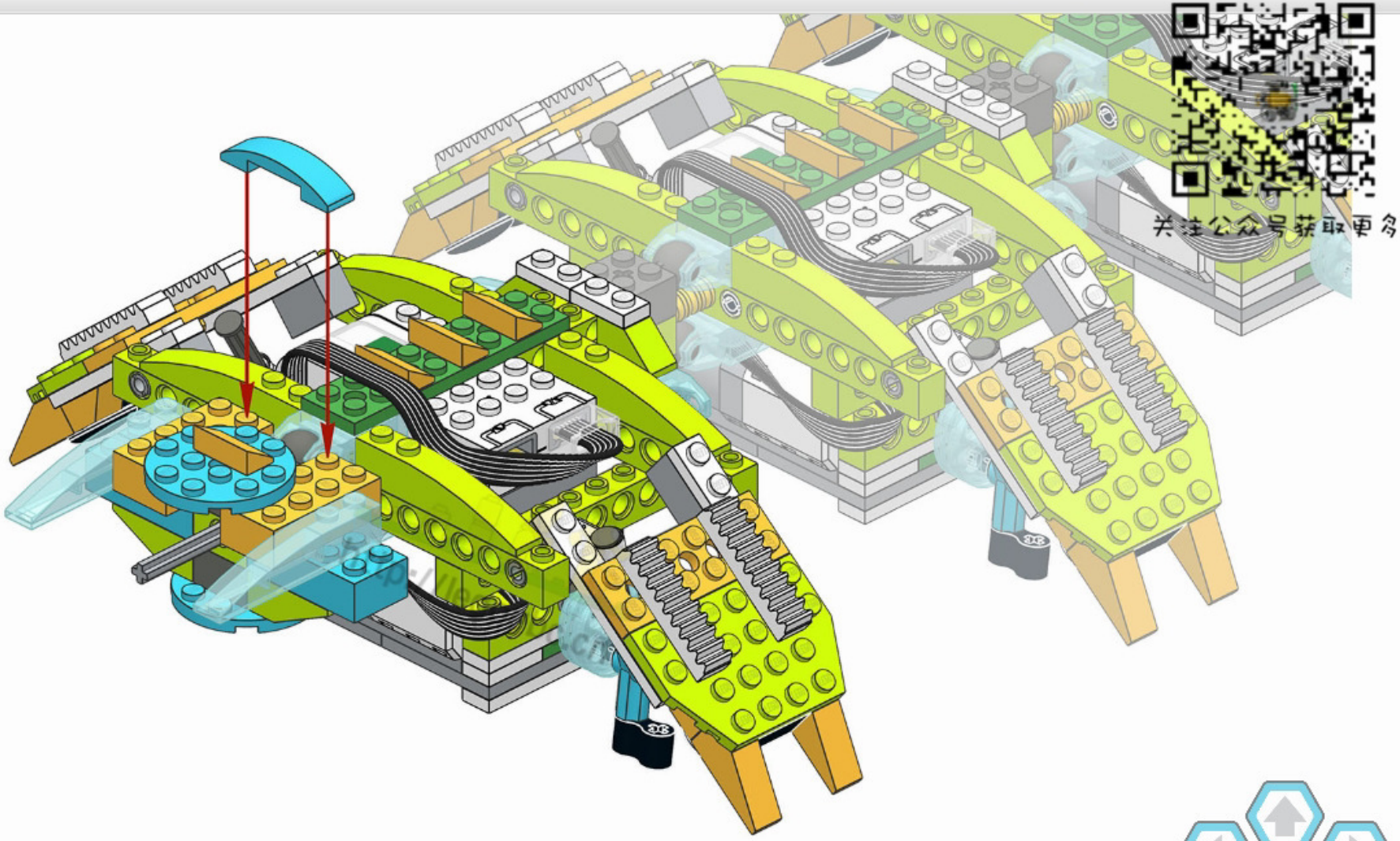

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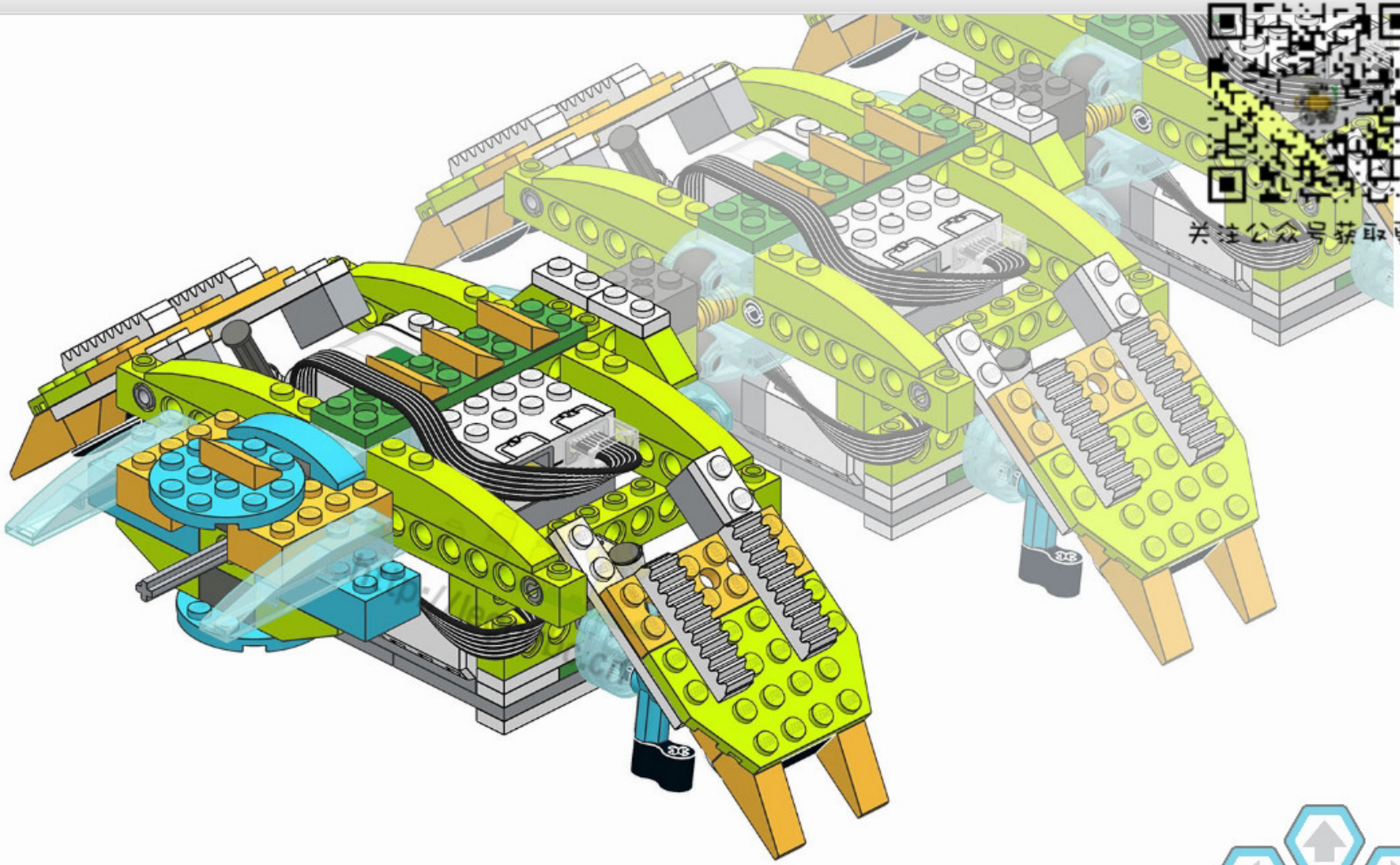

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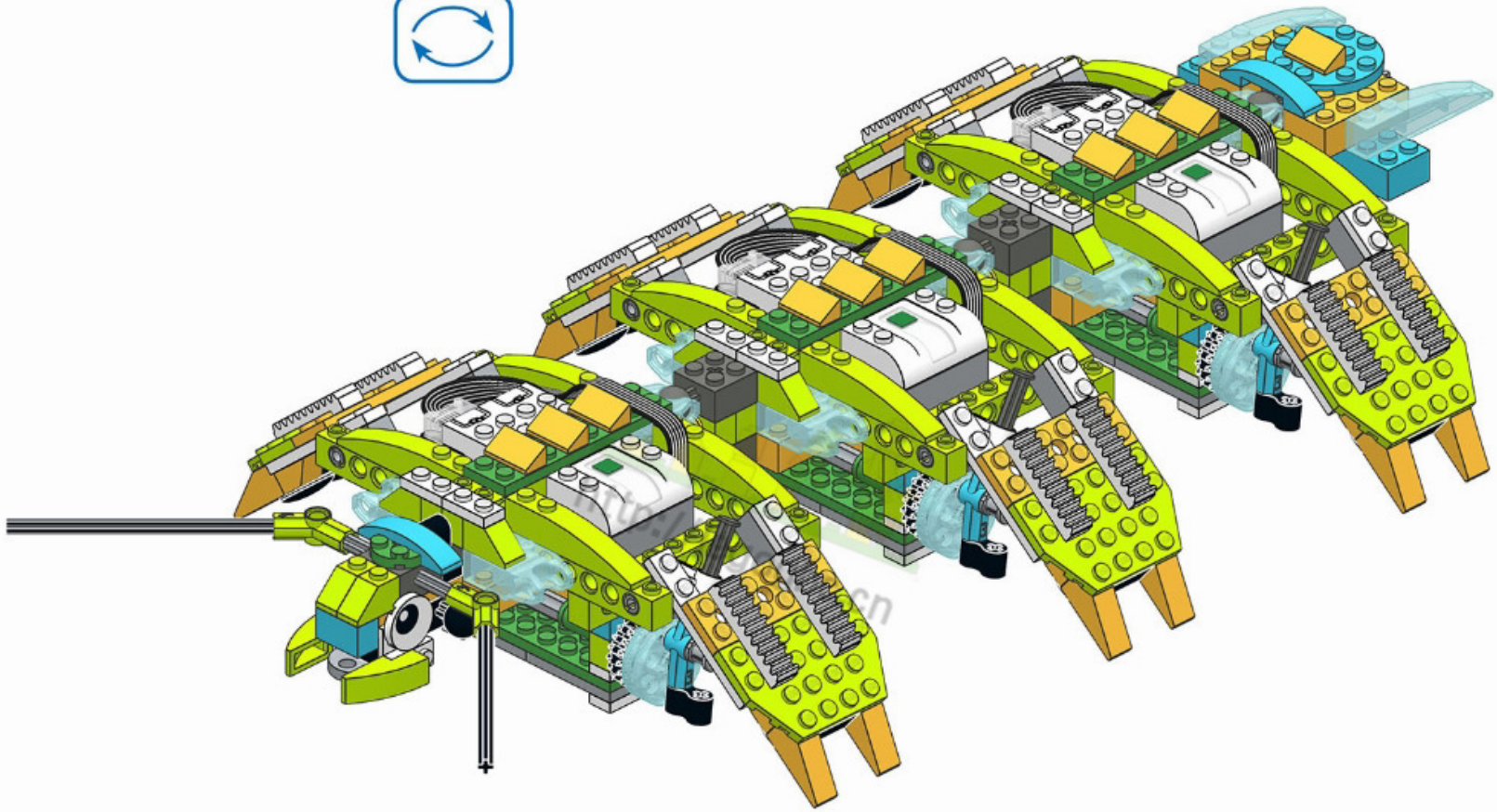


Check it out!

Avoid any friction between the cables while robot is moving.

TASK

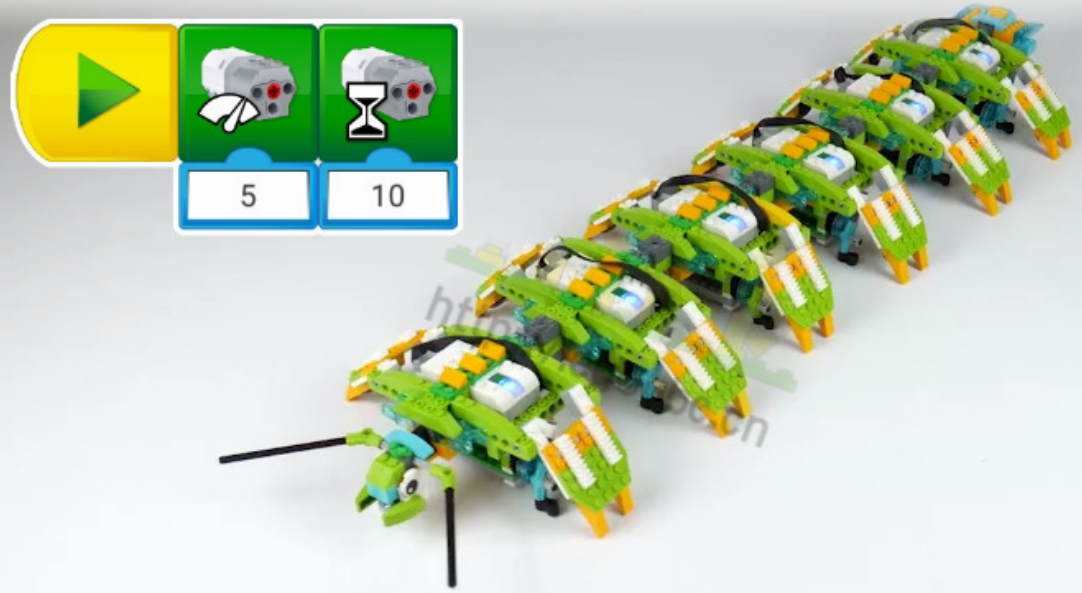
Place parts of the robot on the right places

Task 1

Program the robot to move forward for 10 seconds at power 5. Make sure that the mechanism works correctly.

Task 2

Under the teacher's command, run all the segments of the robot simultaneously (synchronously run the program for all robots). How is it moving? Are all segments working correctly?



Task 3

Experiment with angles between individual segments of the robot. How to make the robot move along the arc?

Task 4

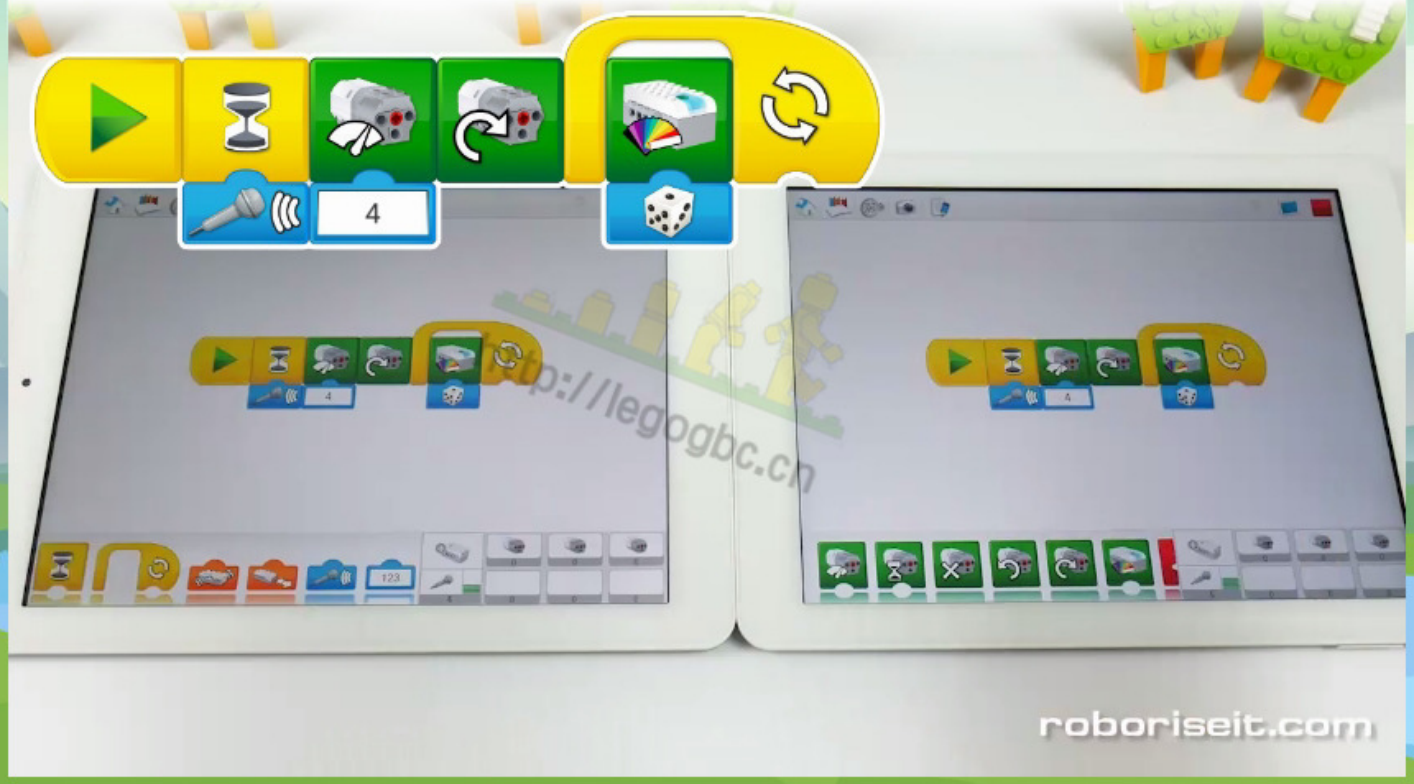
Program the robot so that all its segments begin to move simultaneously after a vowel applause.

Task 4

Program the robot so that all its segments begin to move simultaneously after a vowel applause.

Task 5 *

We do not know if these millipedes could shine, but some insects are able to.
Program the Smarthub color change while robot`s moving!



Task 5 *

We do not know if these millipedes could shine, but some insects are able to.
Program the Smarthub color change while robot`s moving!

Task 6

Count how many segments consist of your robot. What length does it have?

Question

What did most likely Arthropleura eat?

Dinosaurs

Fish

Ferns

Question

Why now do not live so large (about 2 meters in length) millipedes?

There is less oxygen in the air now

They do not have enough food now

It is too cold on the planet now

Question

What period of Earth history did Arthropleura live?

Paleozoic

Mesozoic

Cenozoic

Discuss!

- When did these gigantic millipedes live?
- Most likely, were Arthropleuras predators or herbivores?
- Where did Arthropleuras live?

Arthropleura