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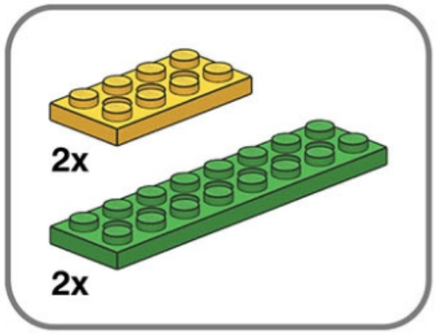

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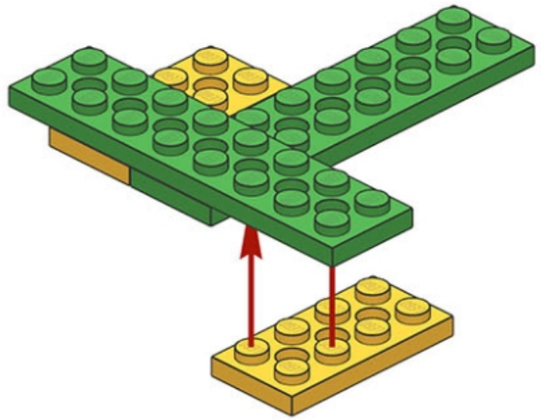

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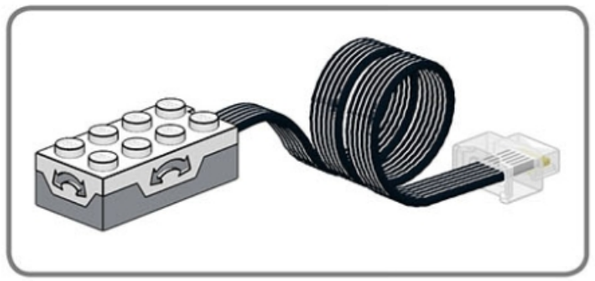

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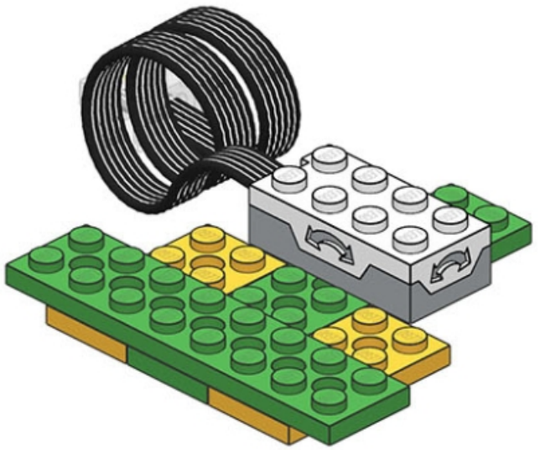

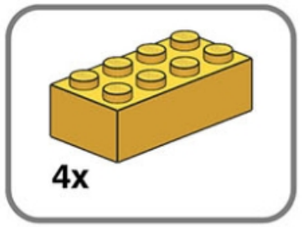

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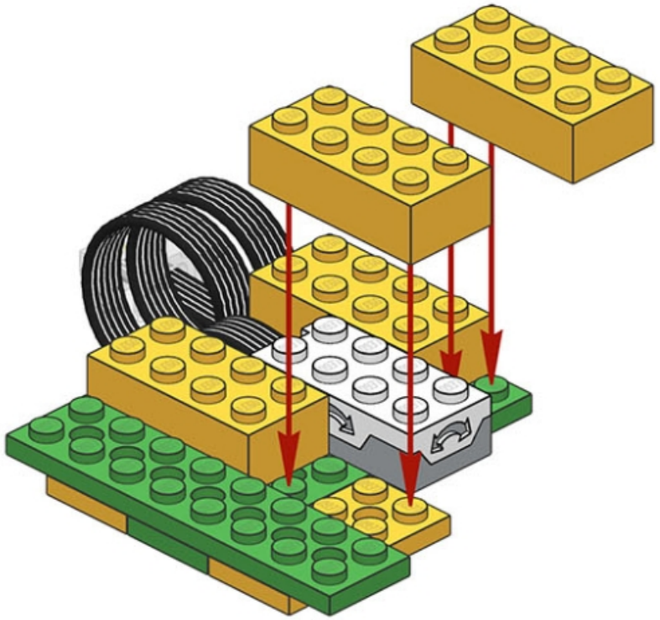

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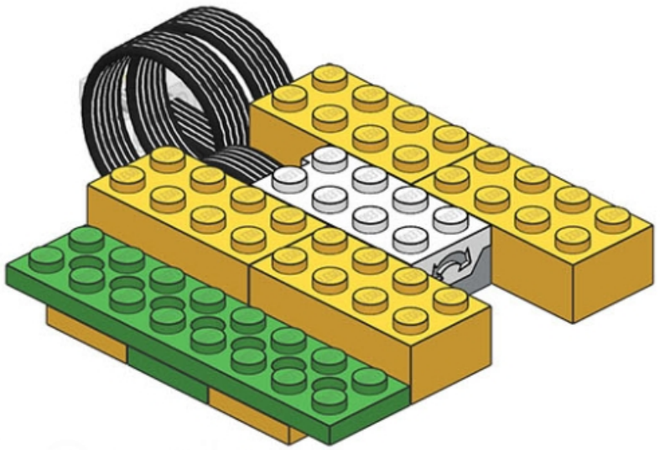

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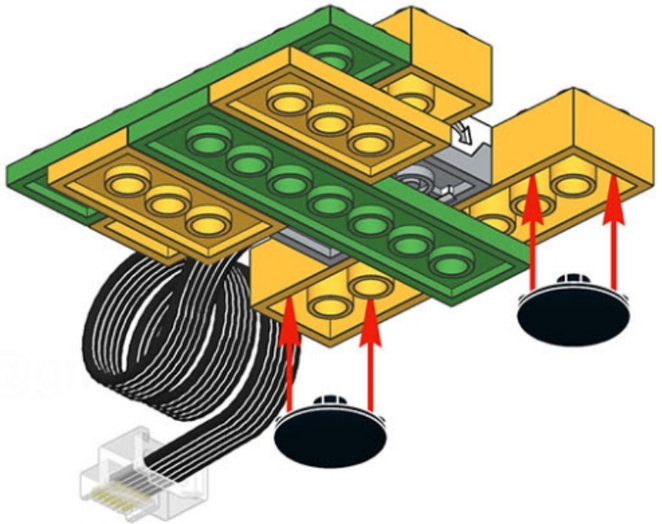

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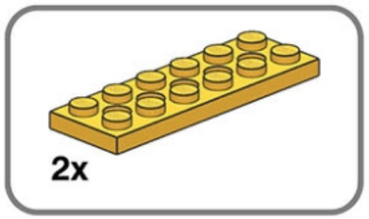

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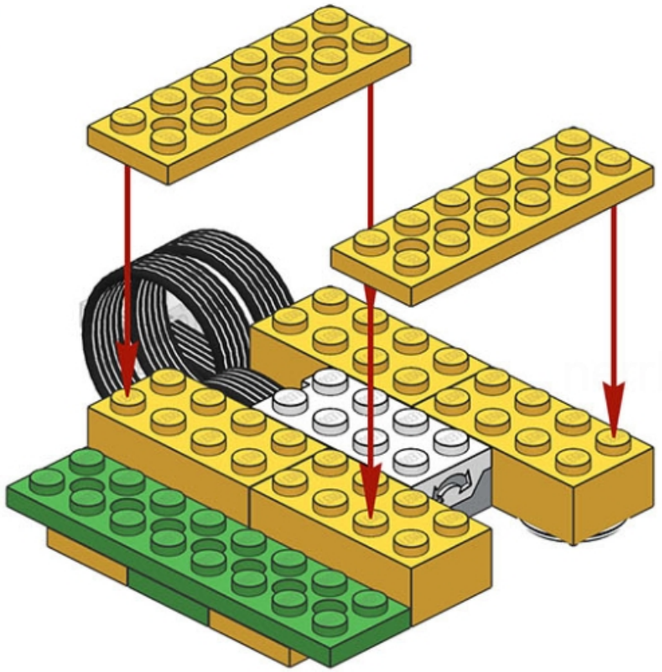

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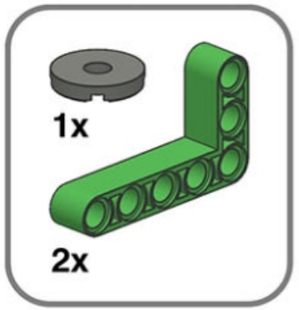

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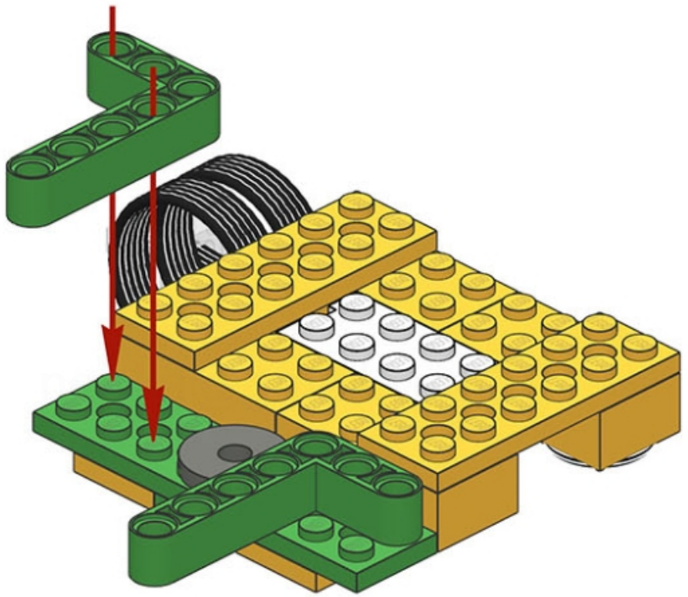

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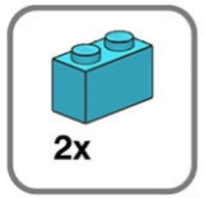

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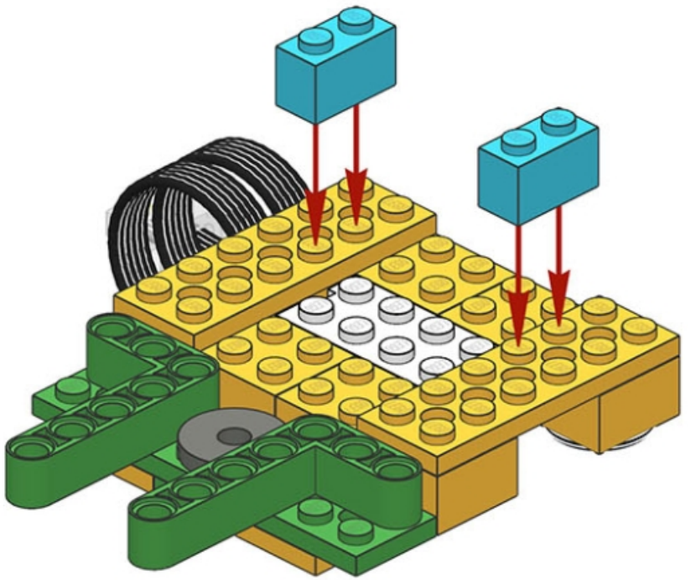

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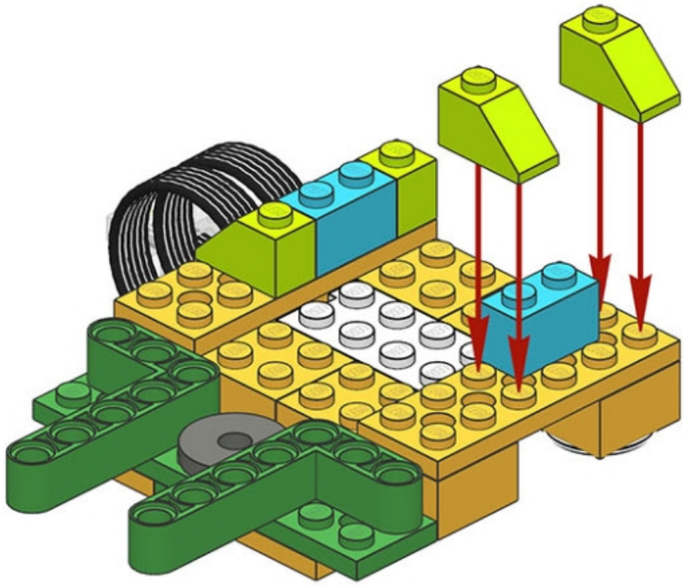

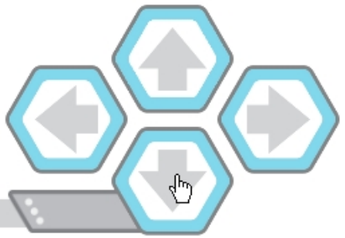

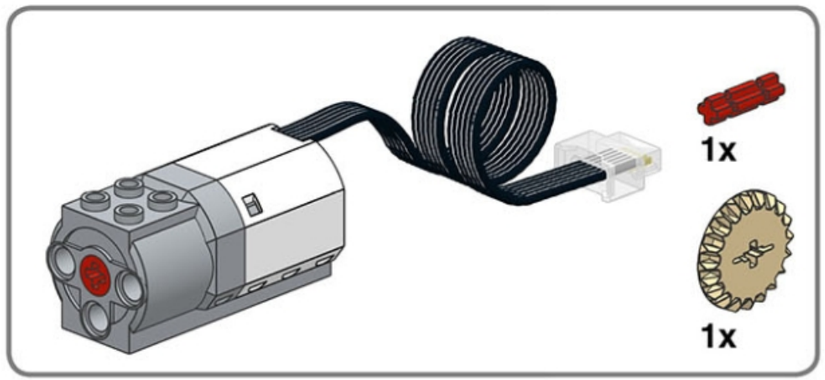

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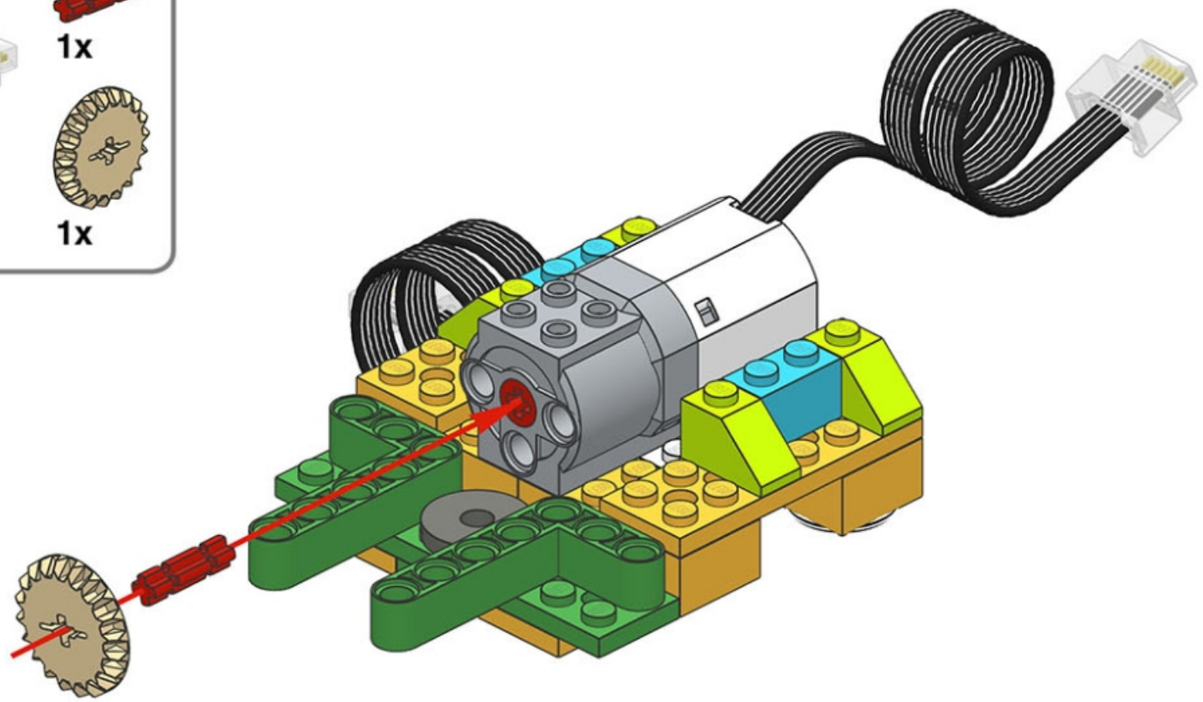

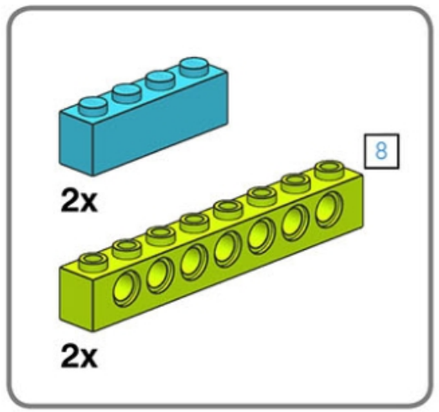

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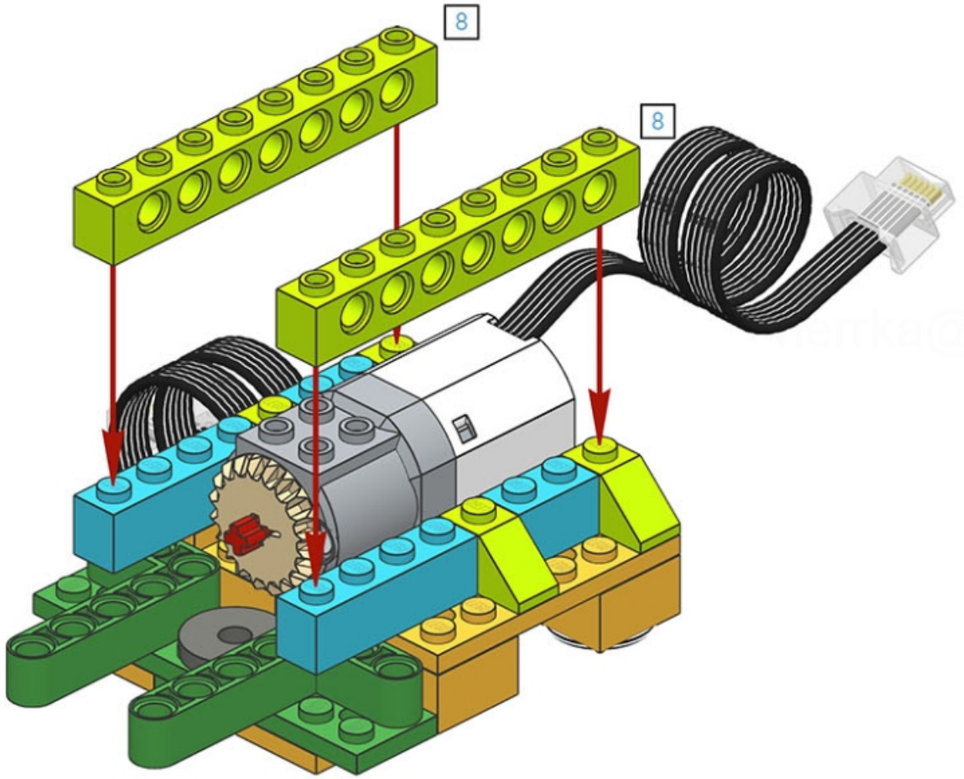

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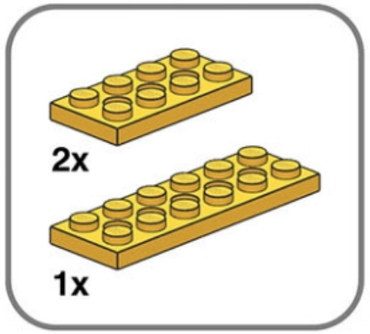

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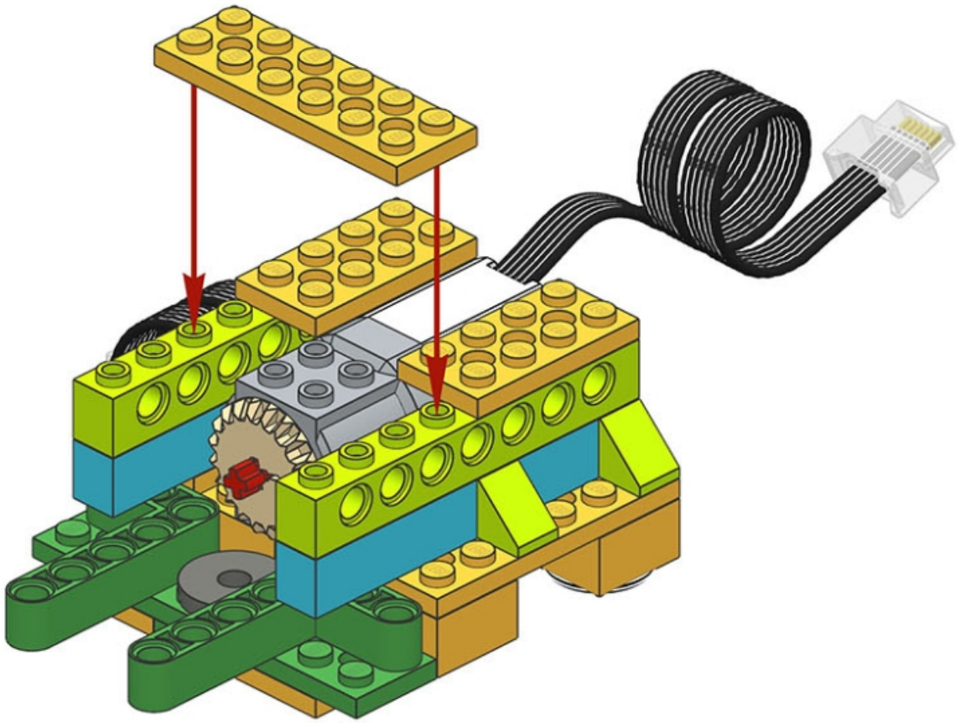

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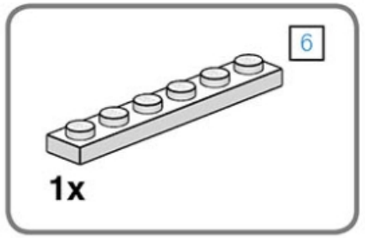

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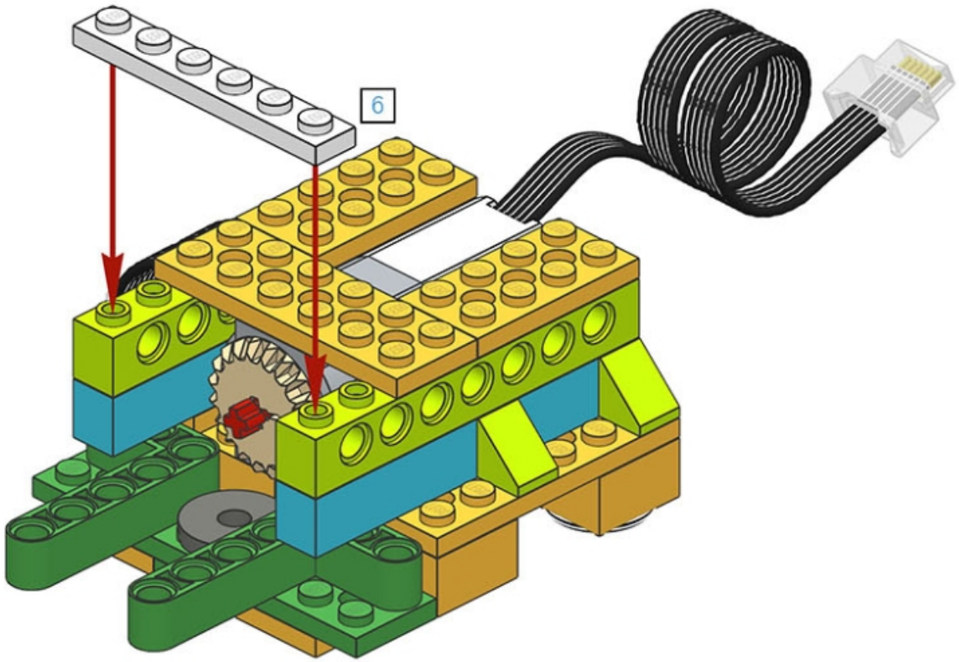

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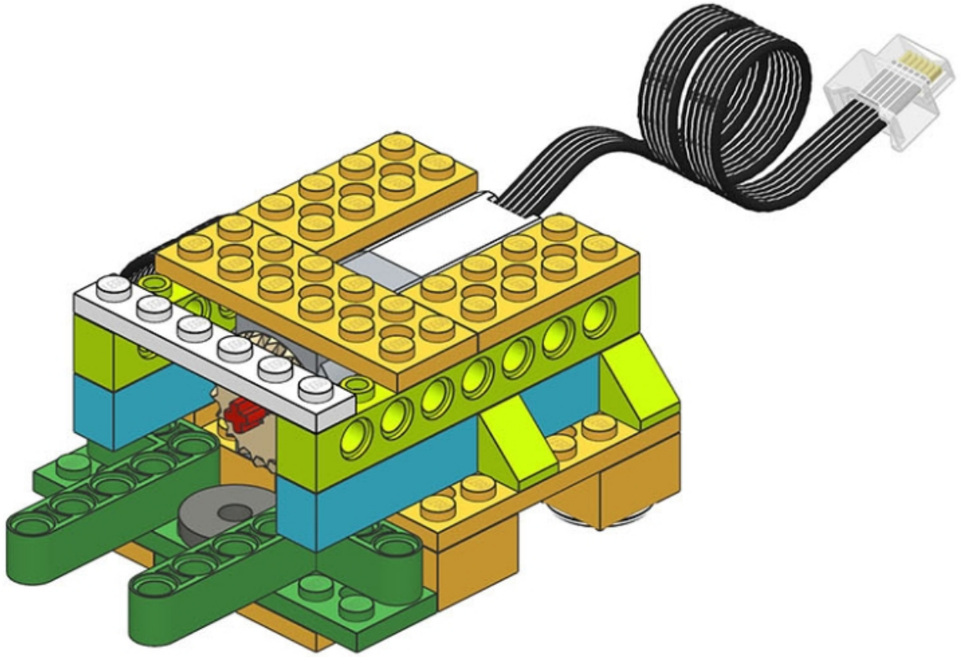

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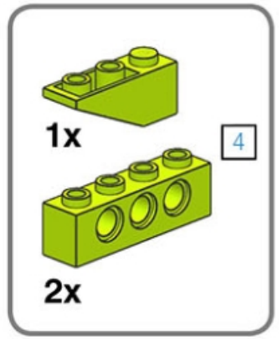

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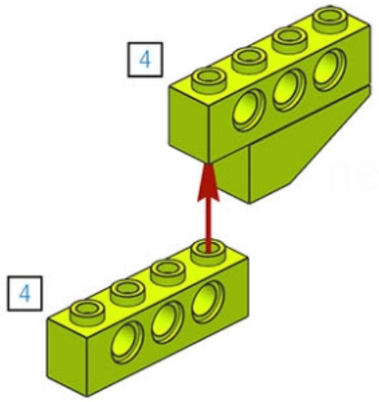

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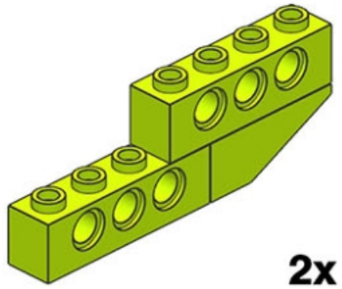

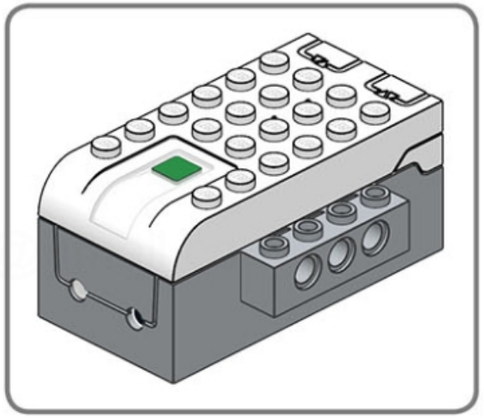

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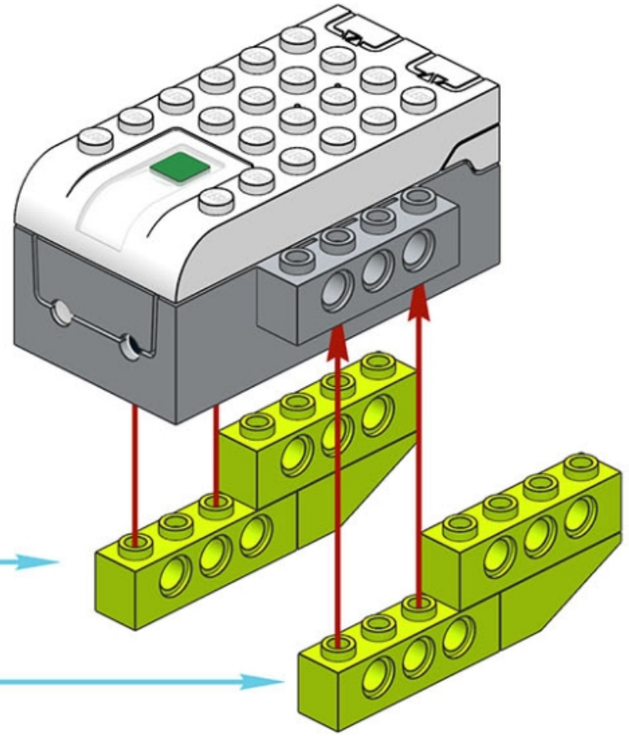

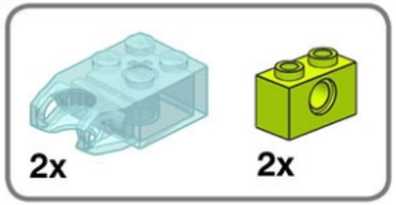

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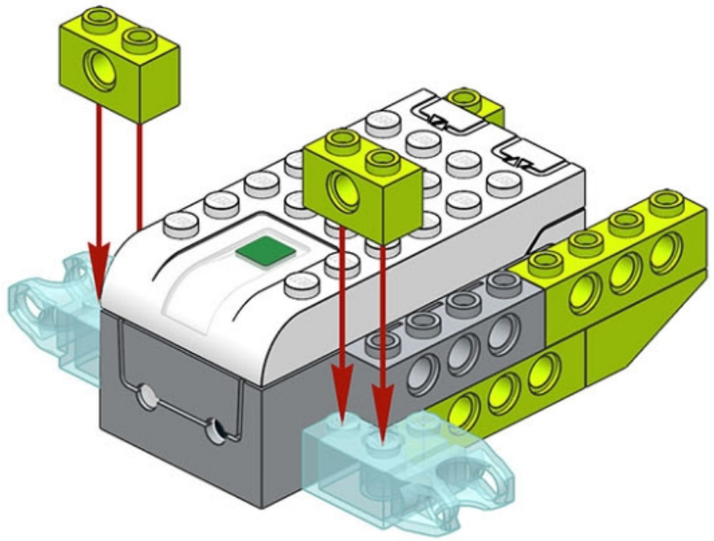

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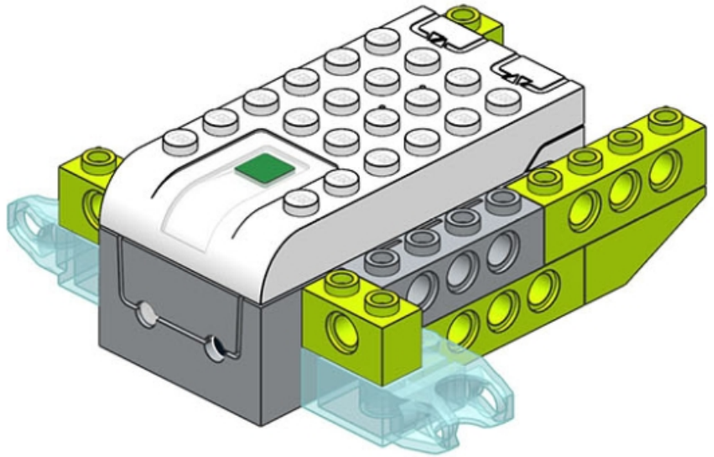

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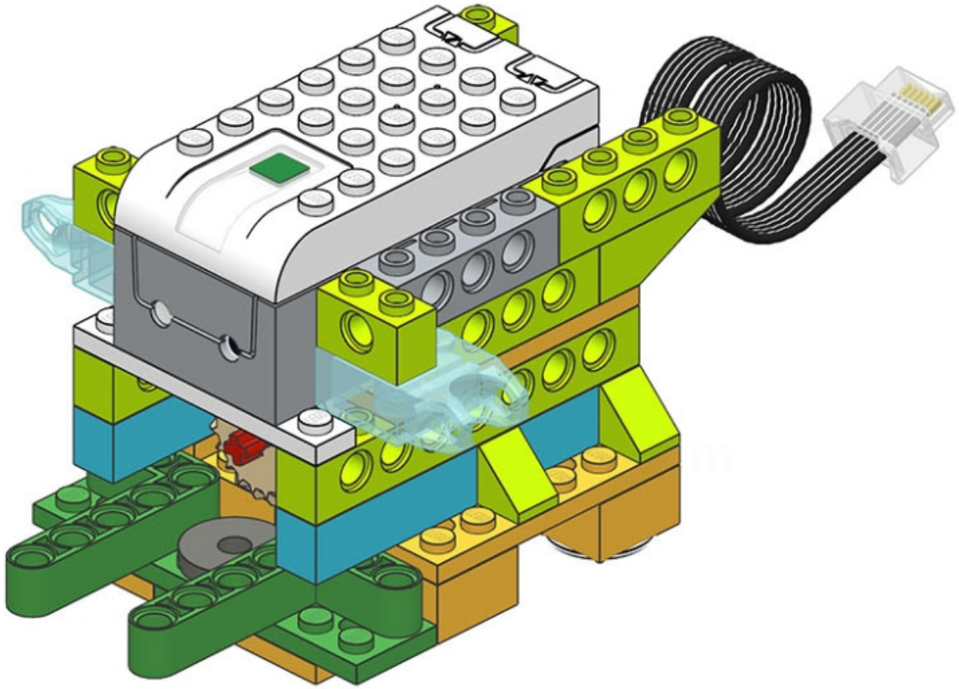

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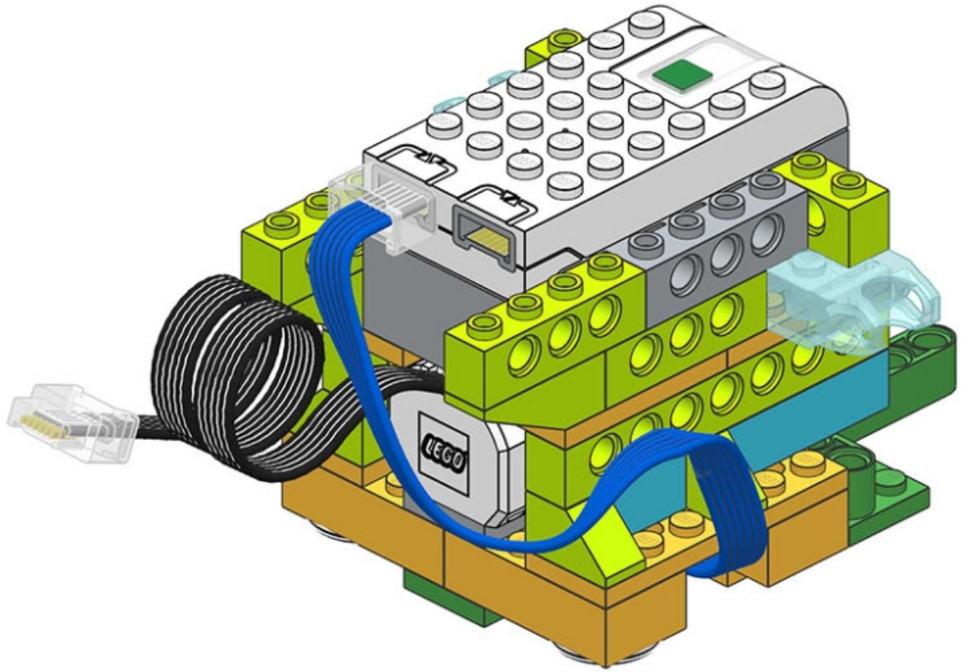

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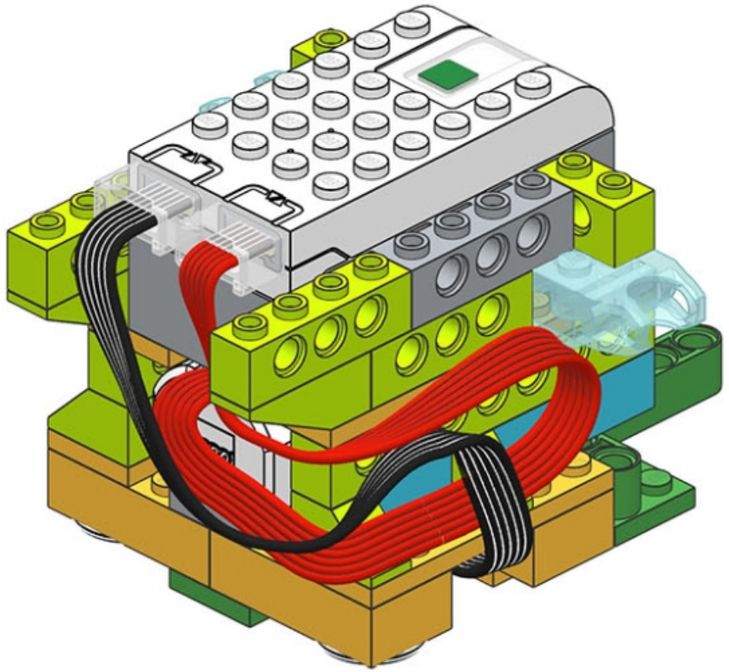

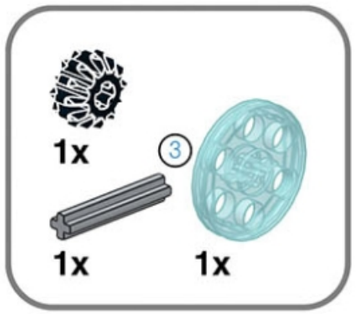

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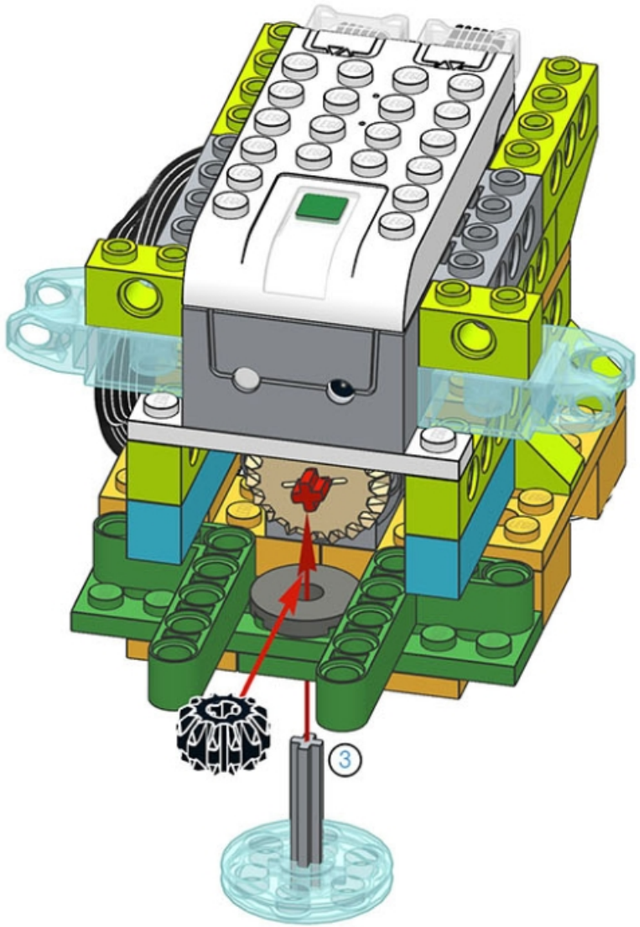

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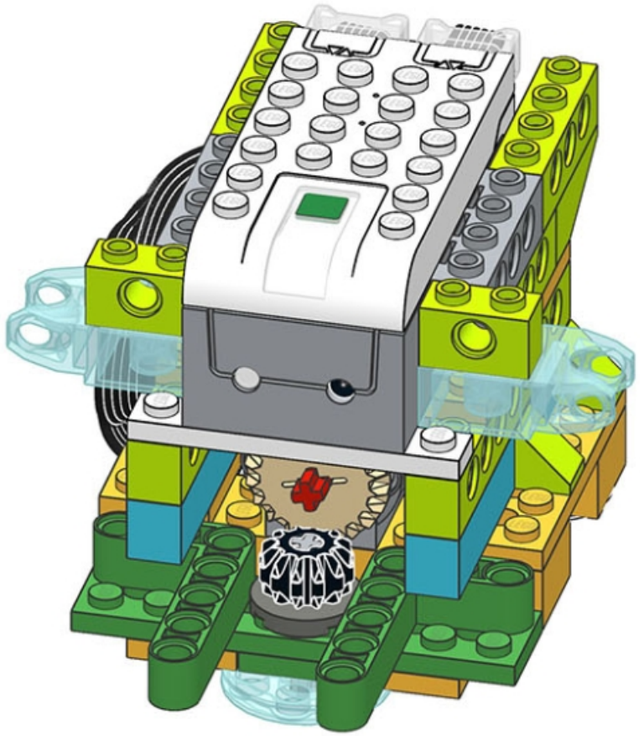

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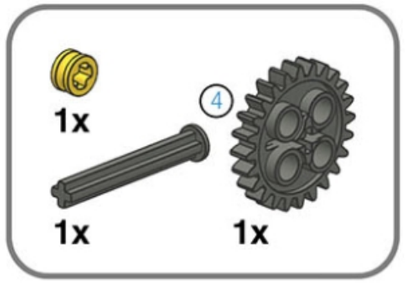

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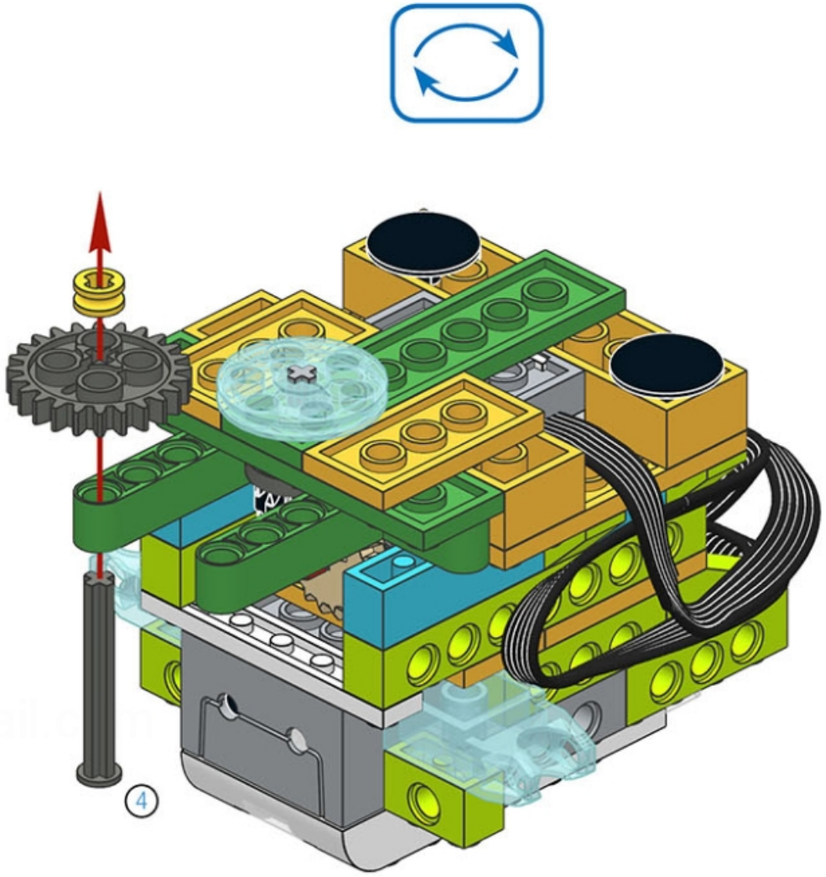

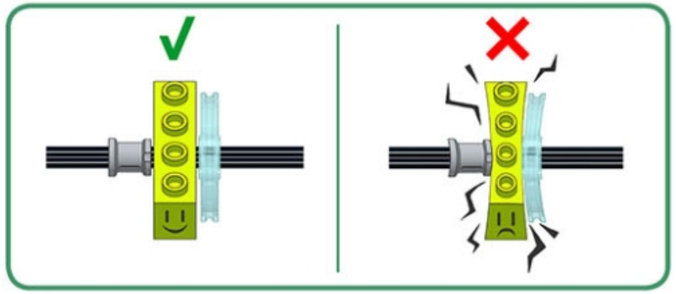

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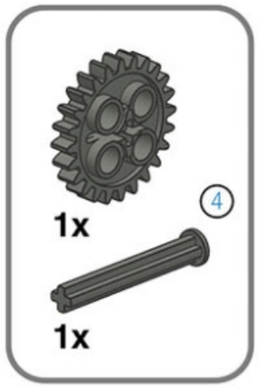

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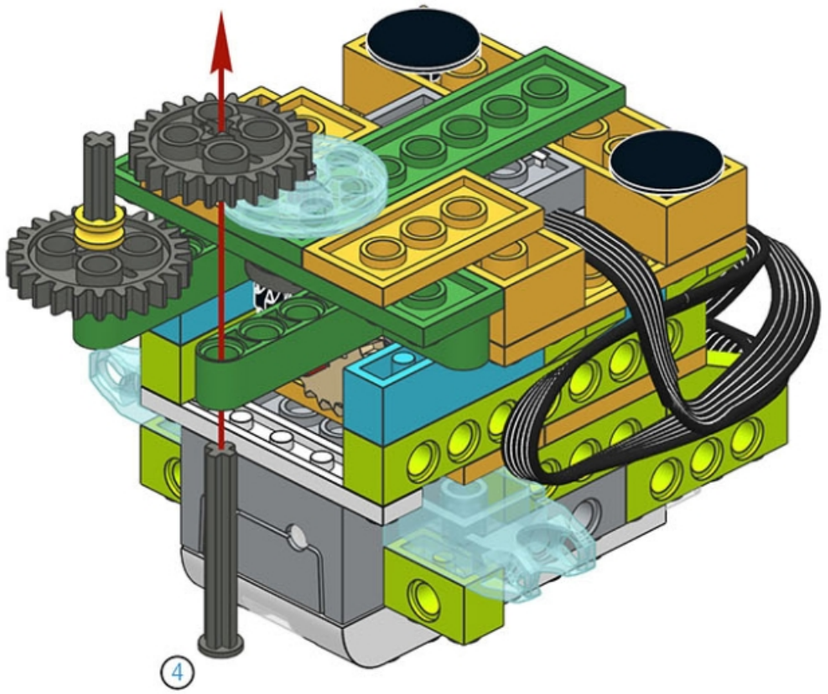

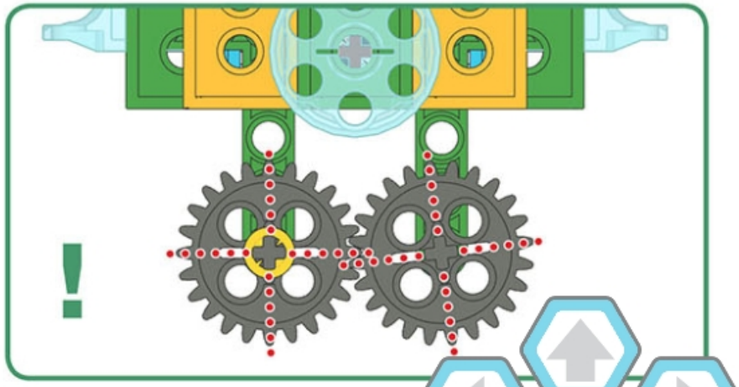

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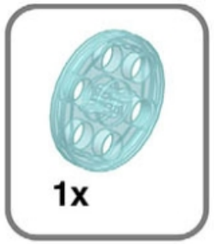

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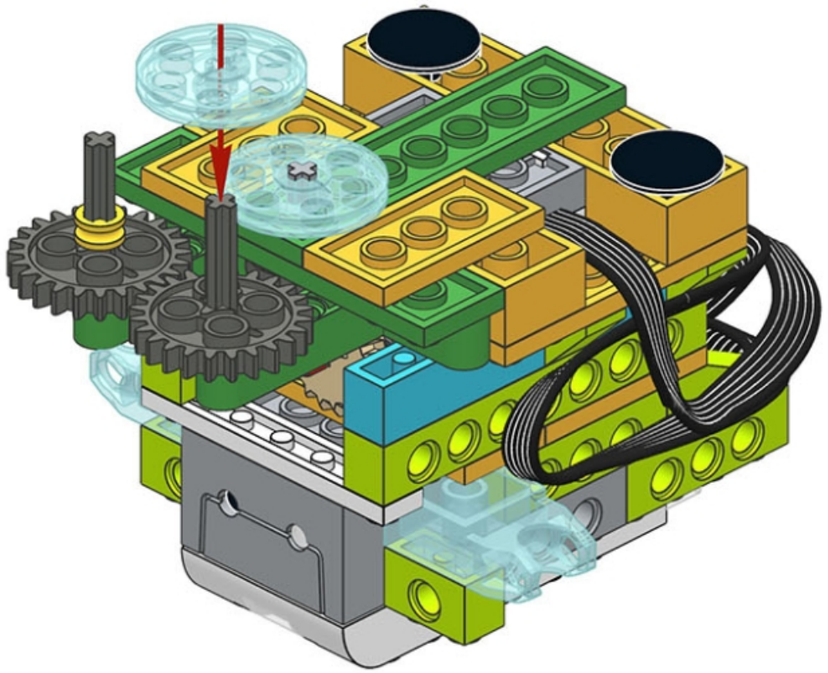

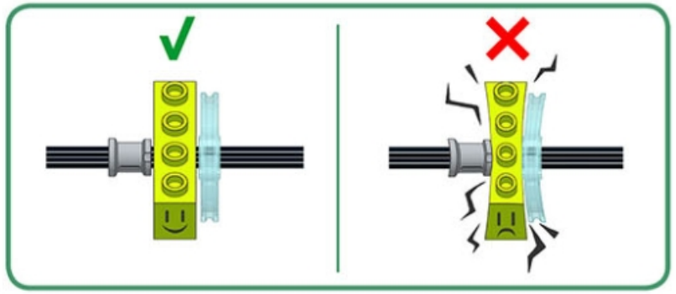

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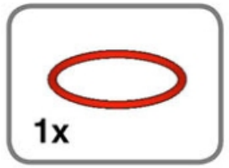

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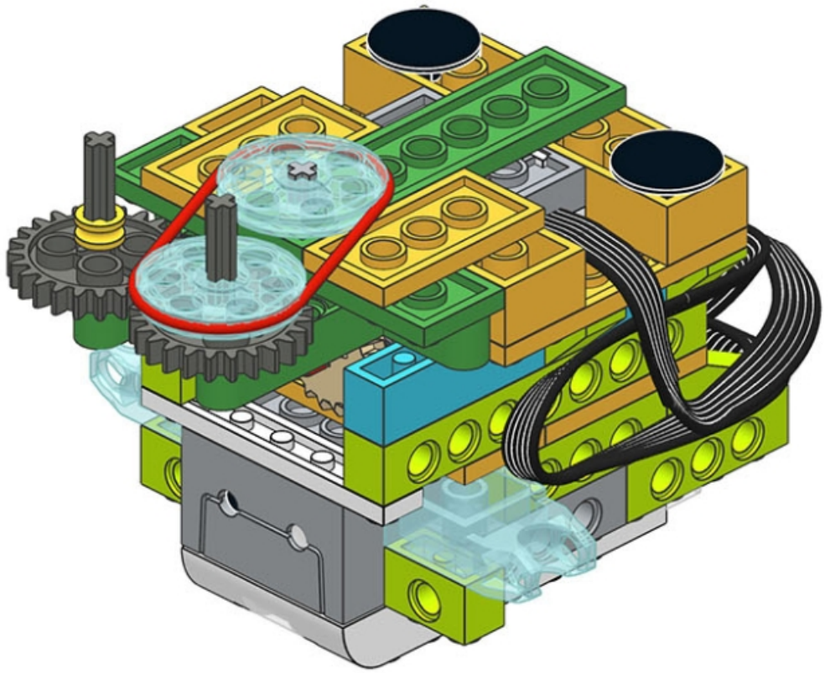

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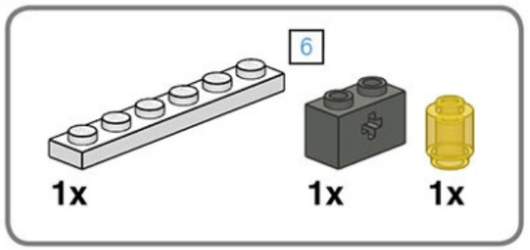

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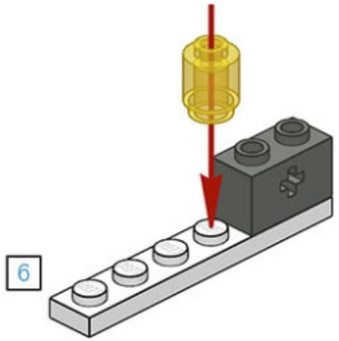

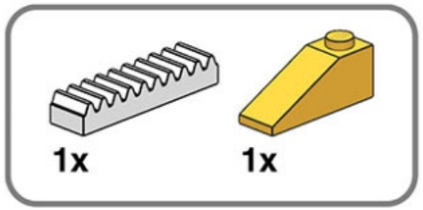

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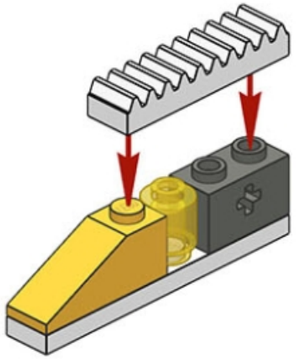

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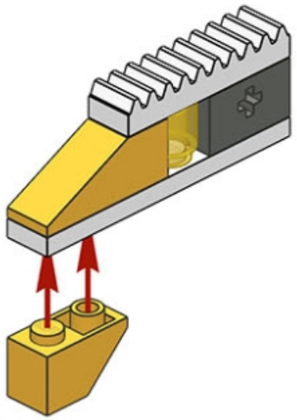

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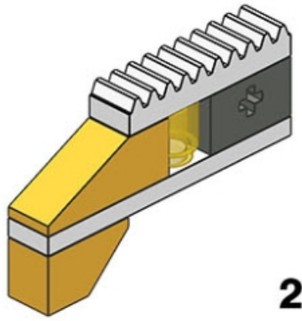

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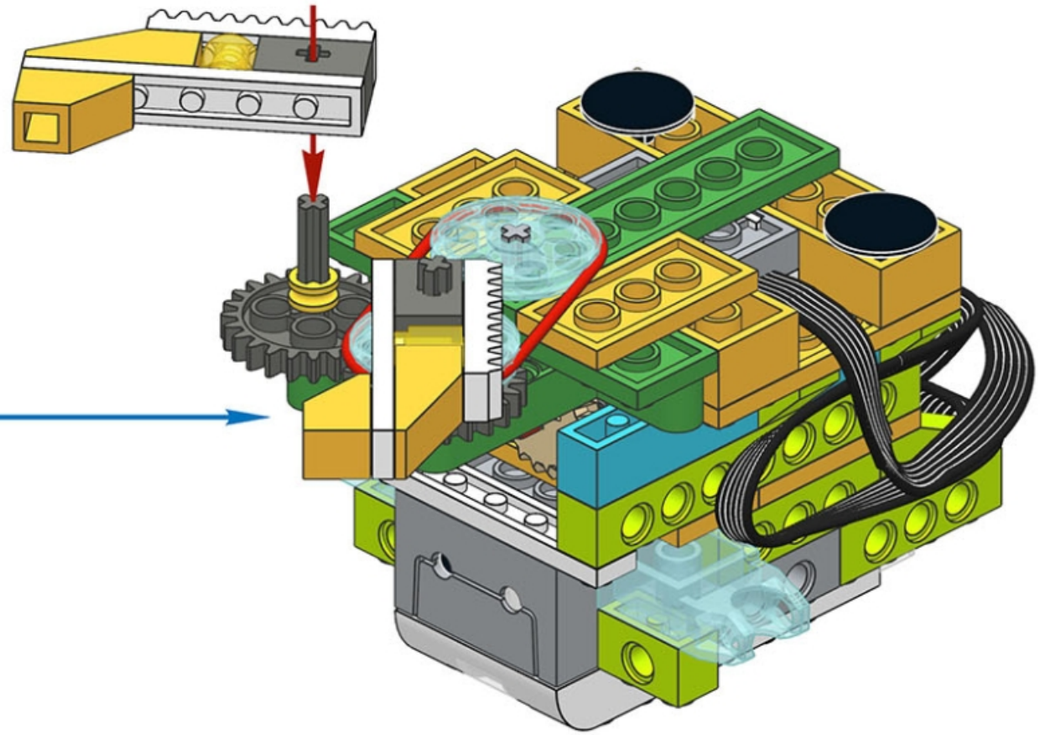

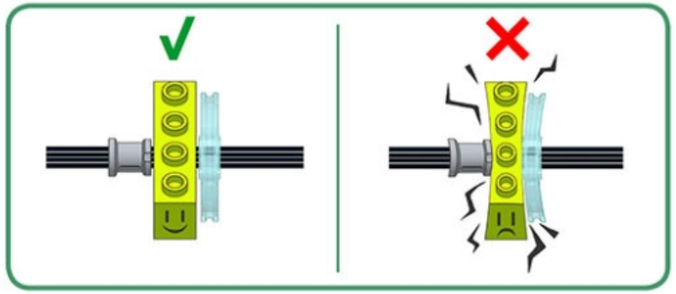

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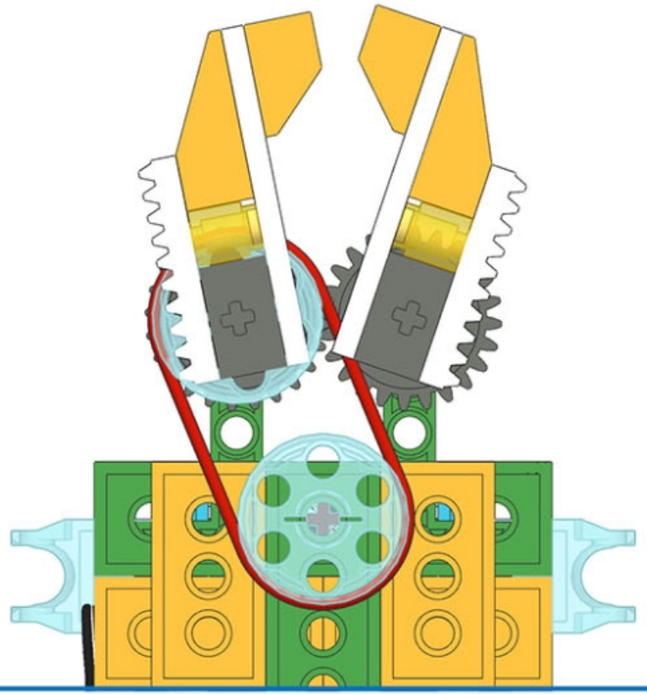

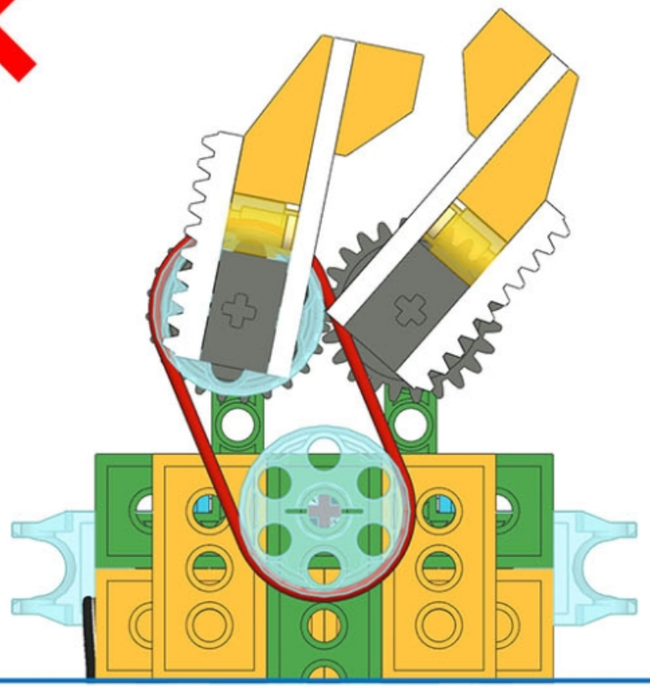

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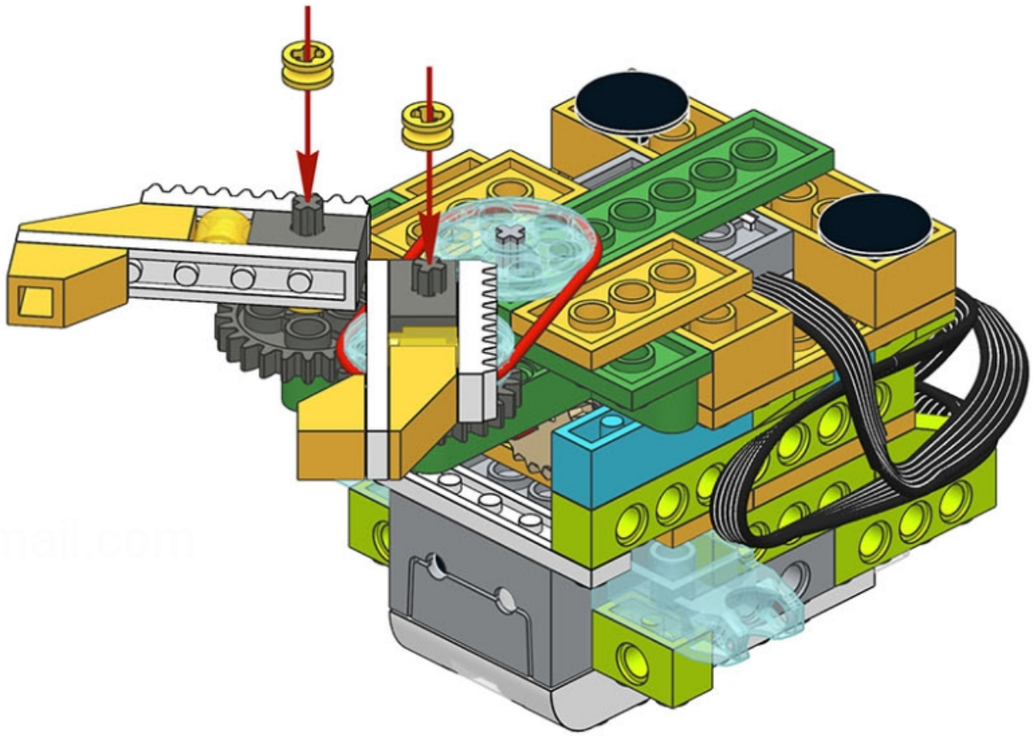

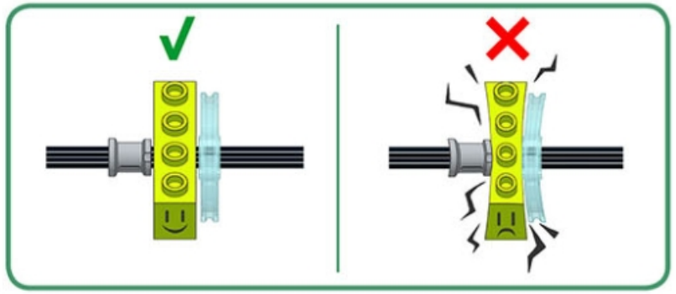

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2x

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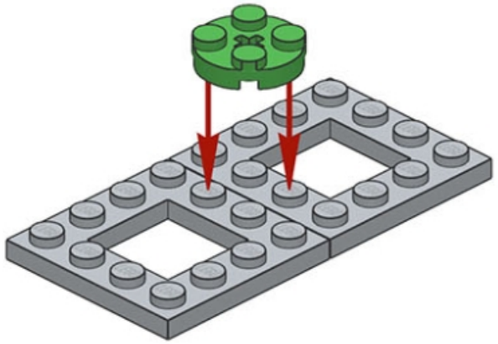

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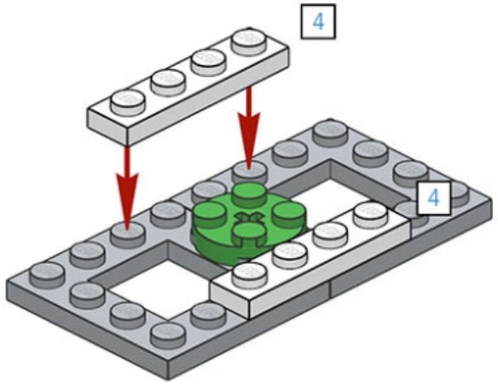

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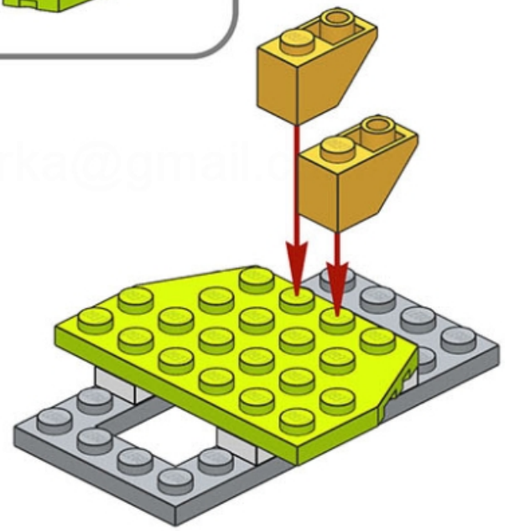

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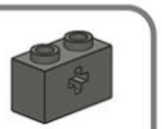

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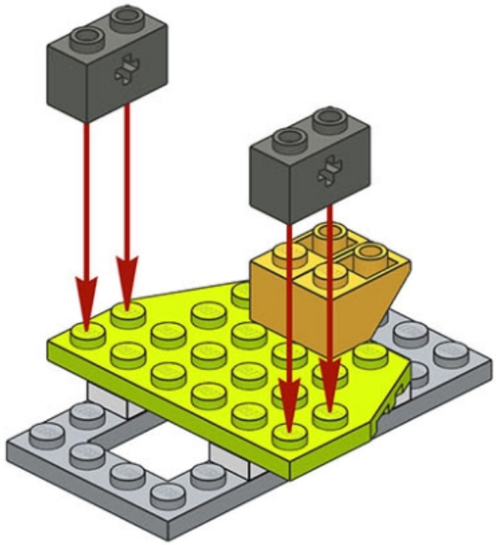

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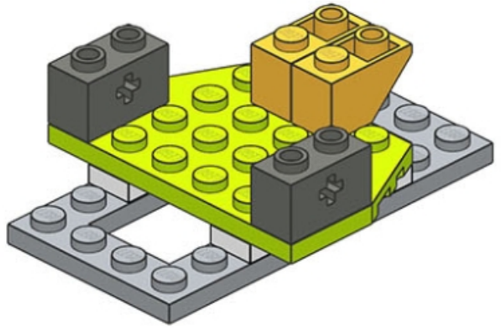

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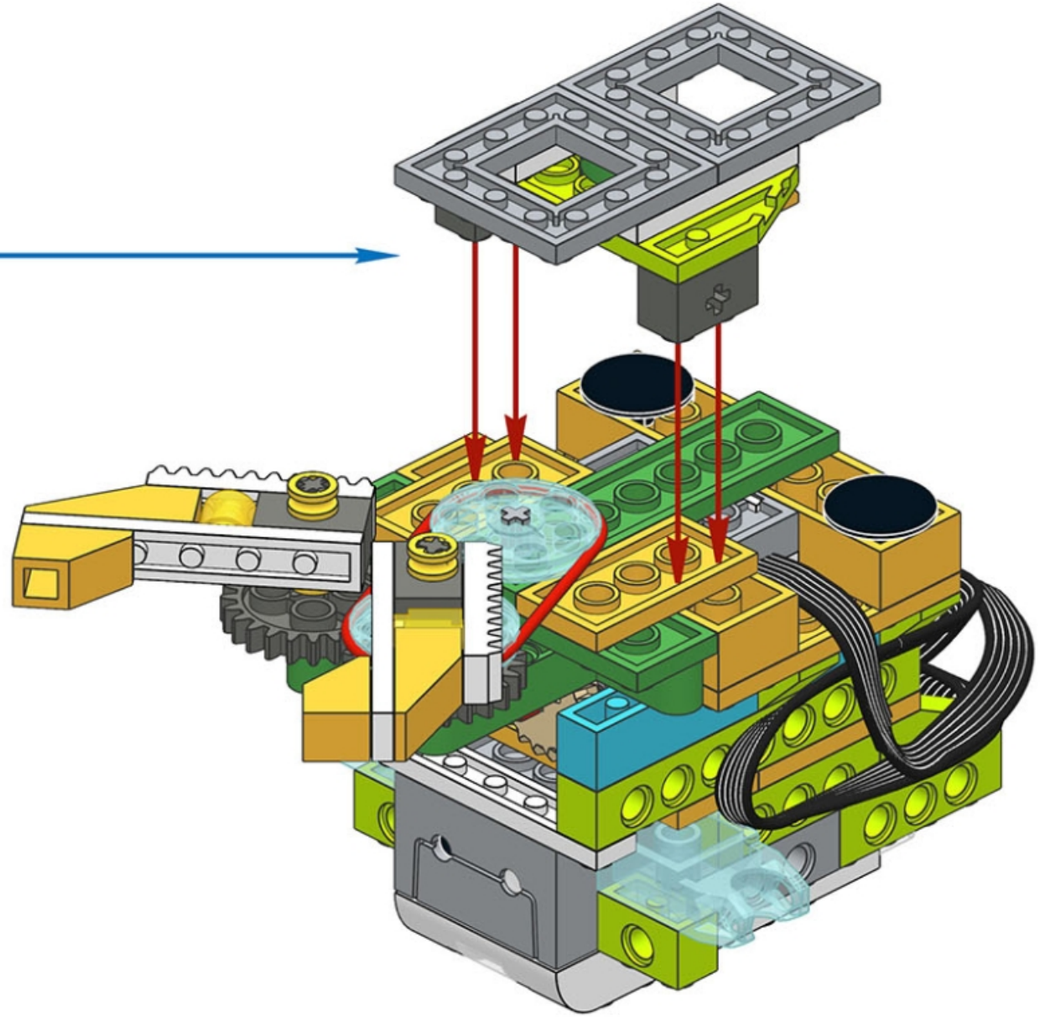

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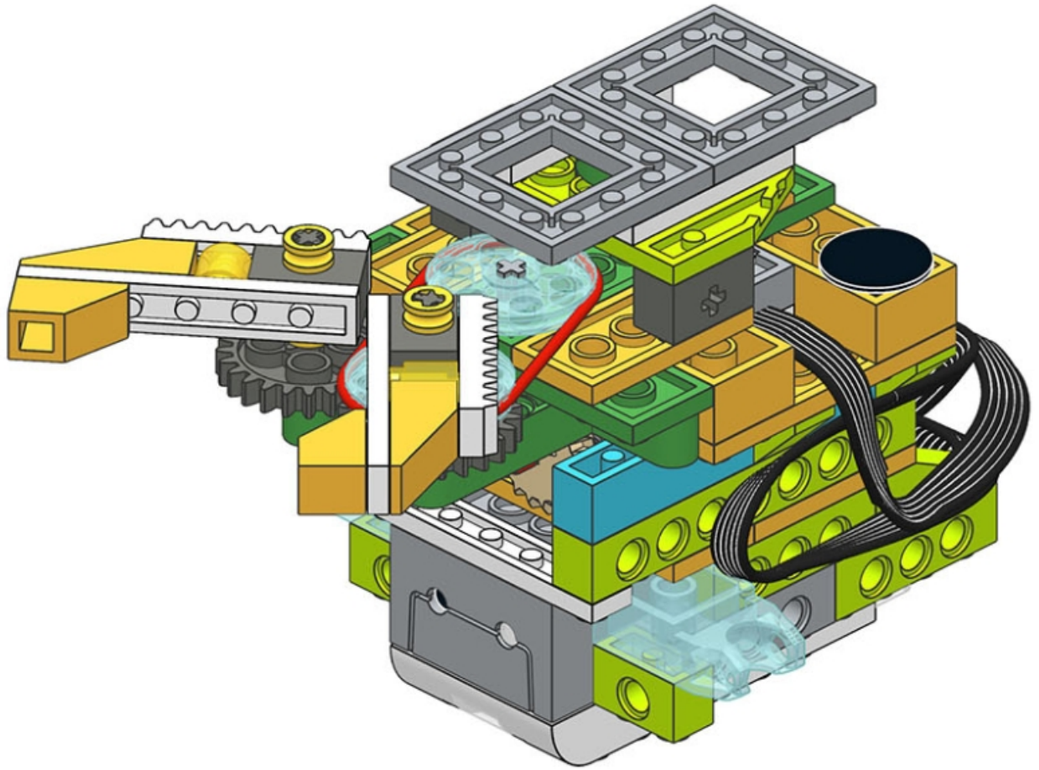

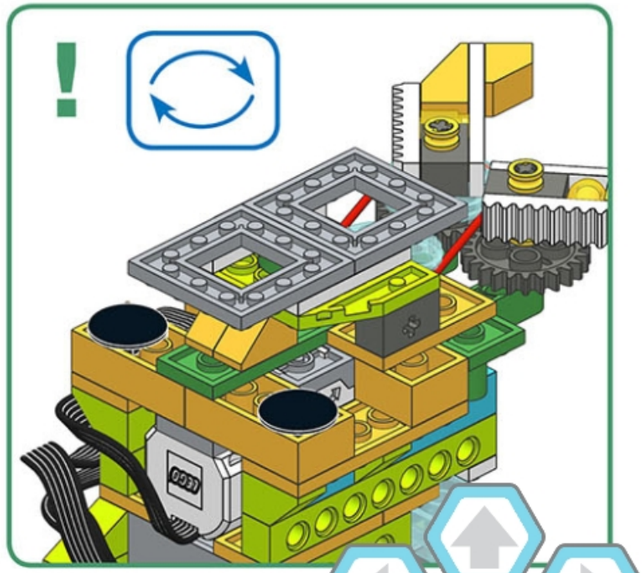

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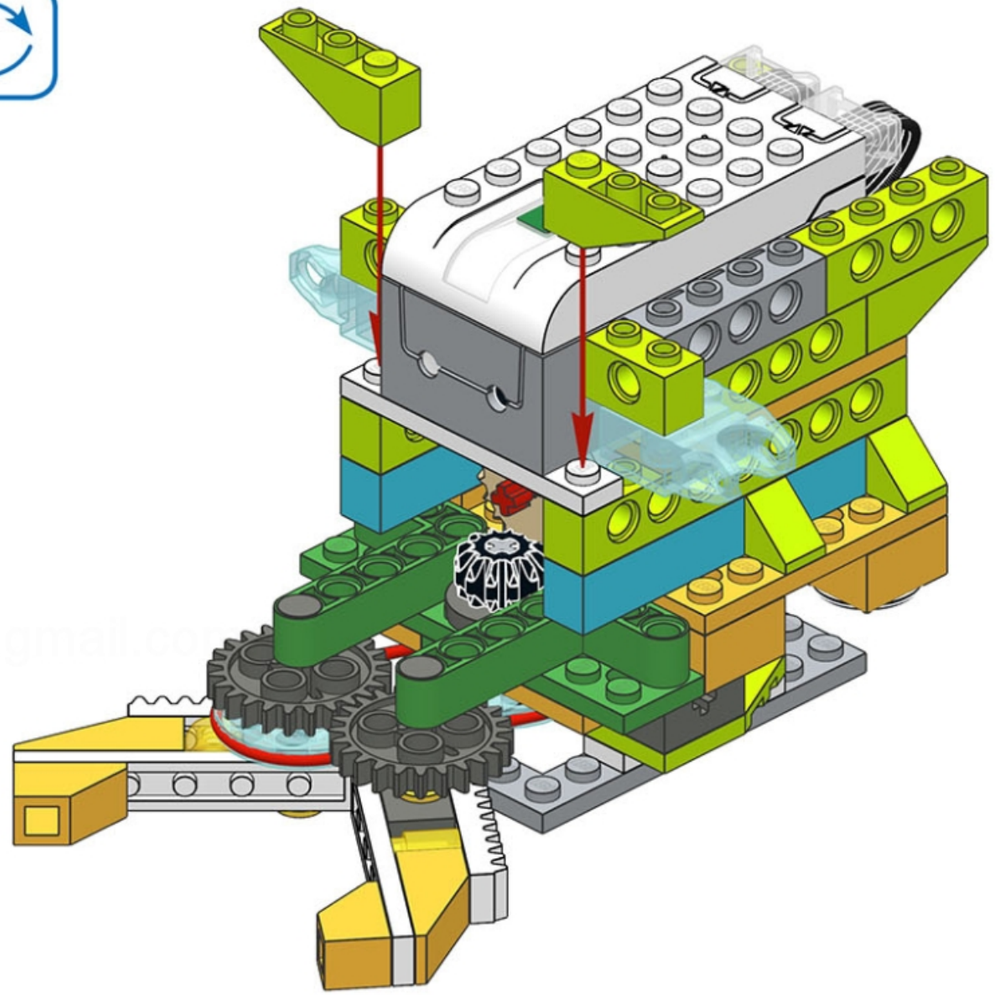

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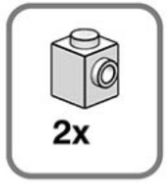

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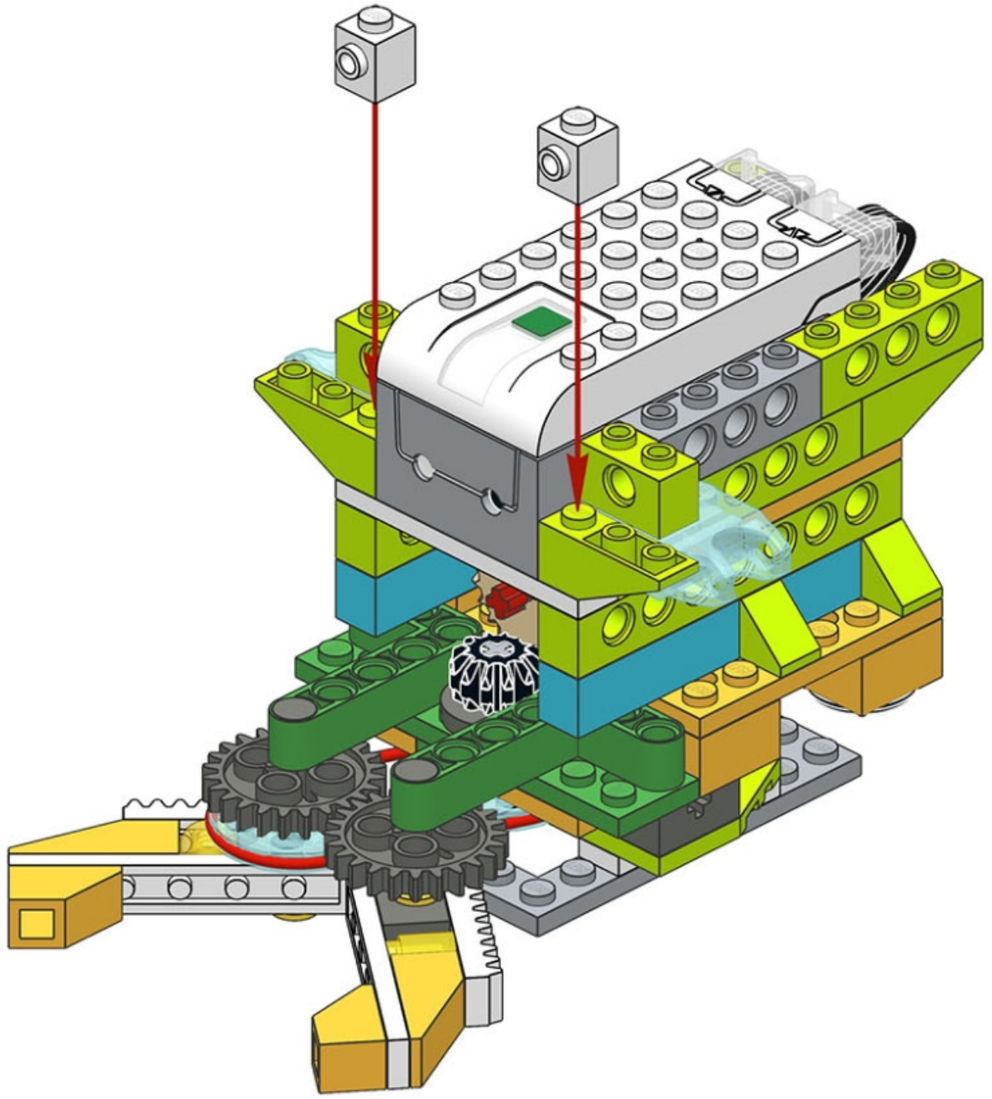

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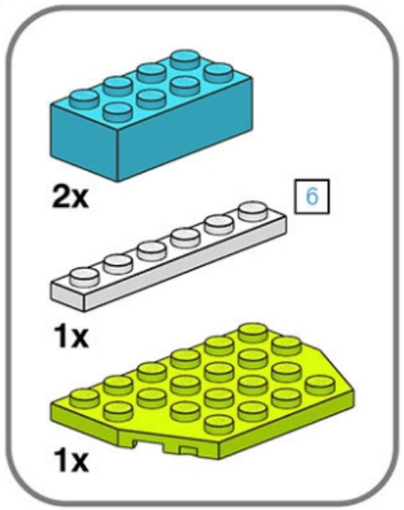

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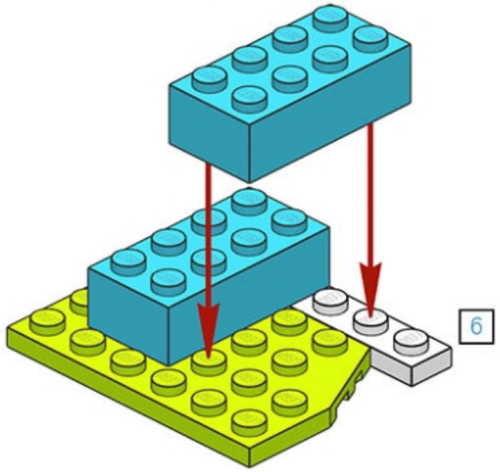

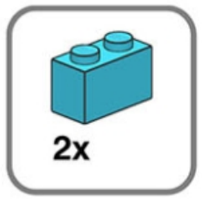

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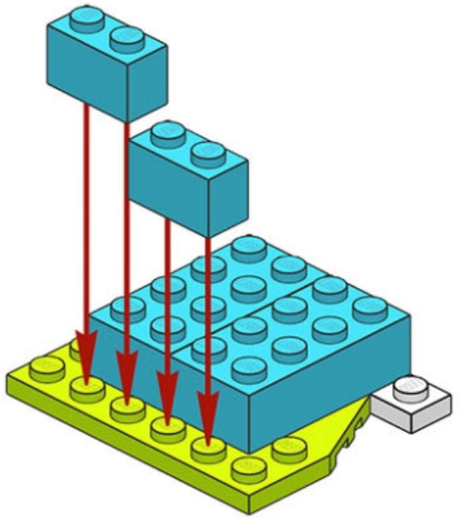

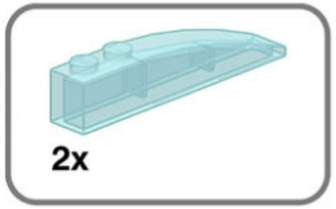

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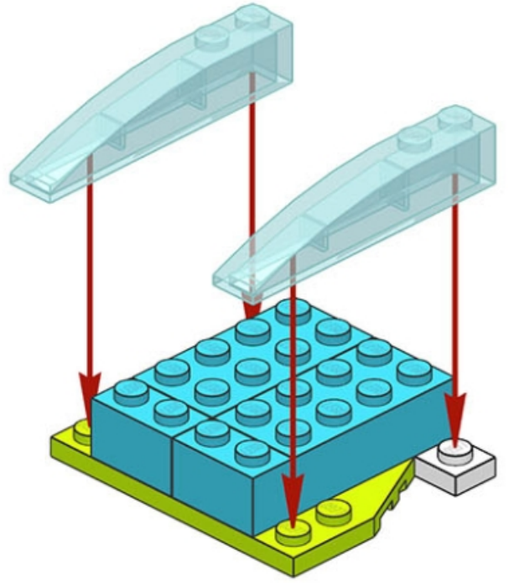

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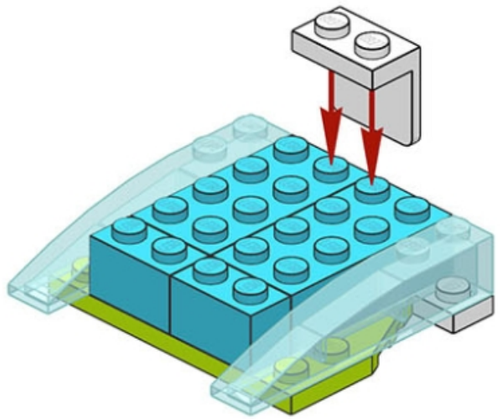

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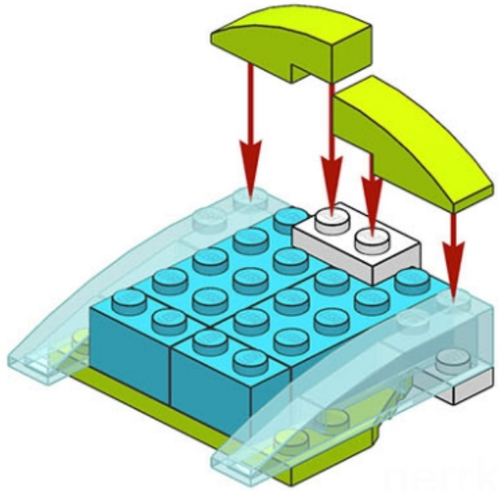

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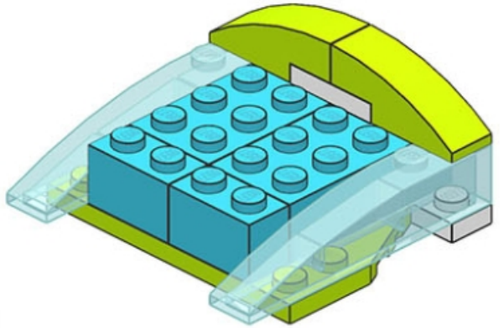

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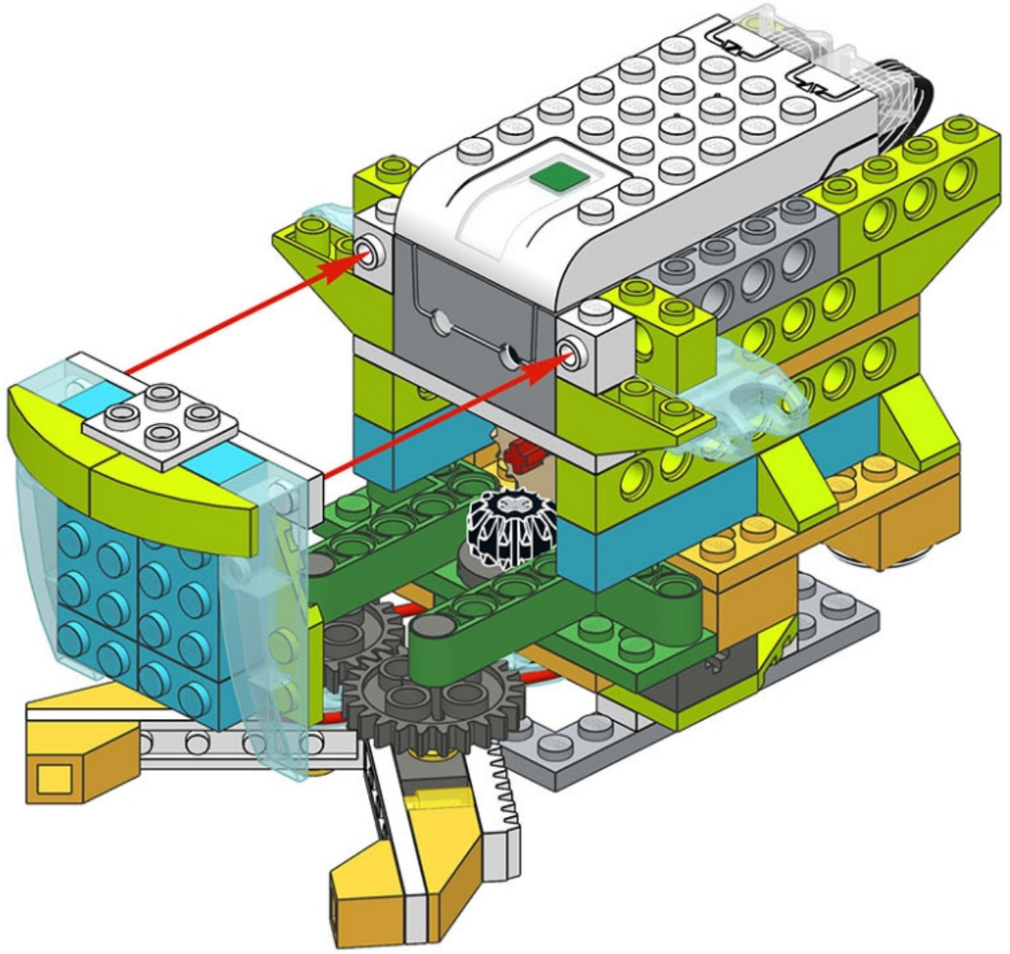

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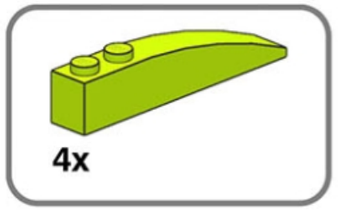

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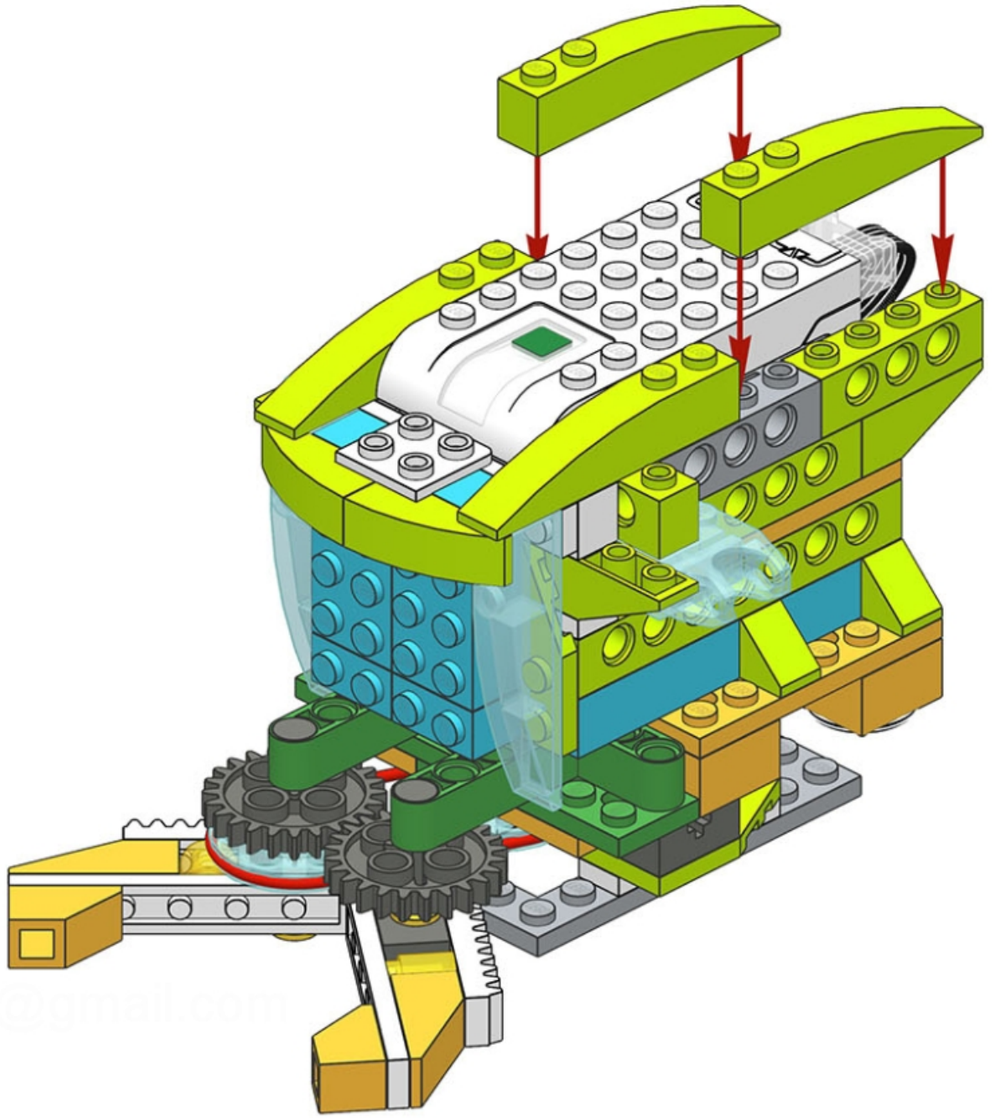

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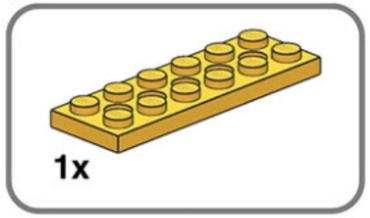

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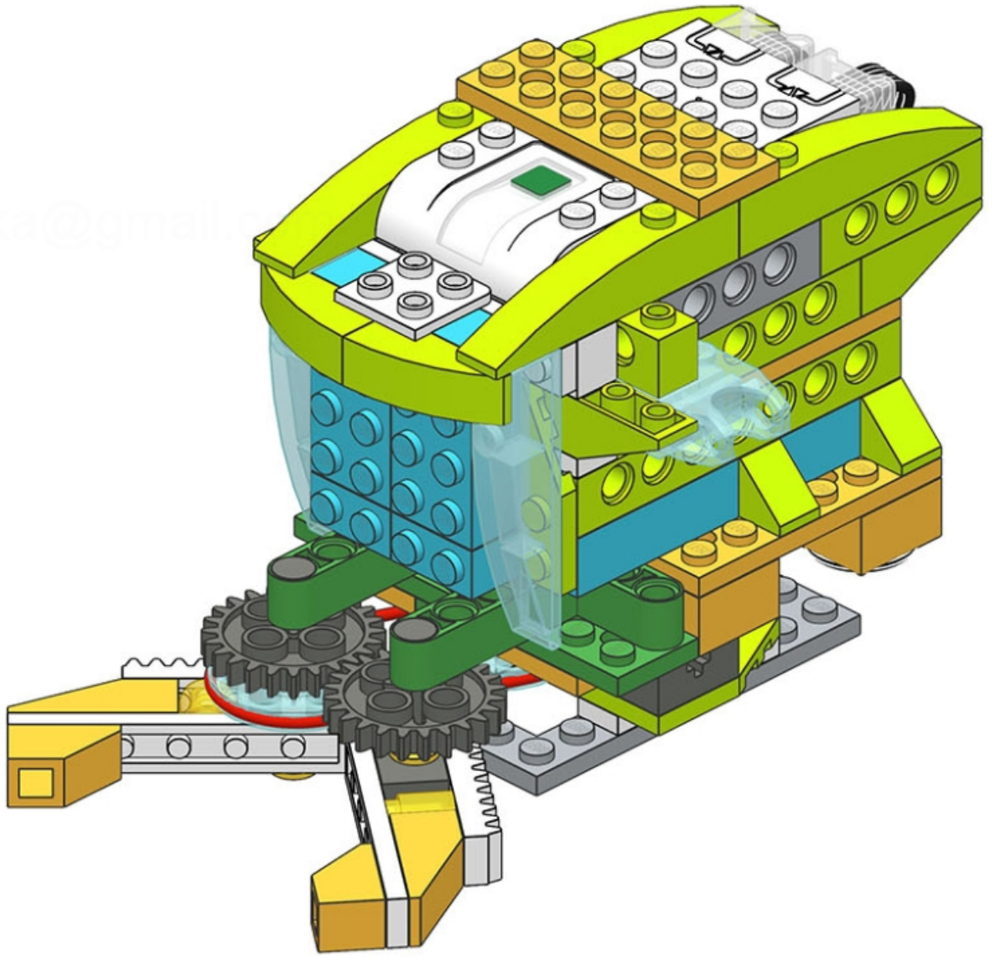

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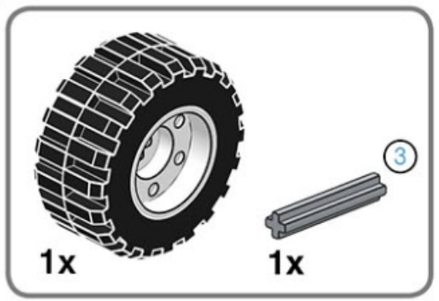

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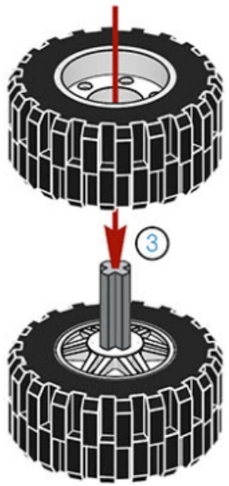

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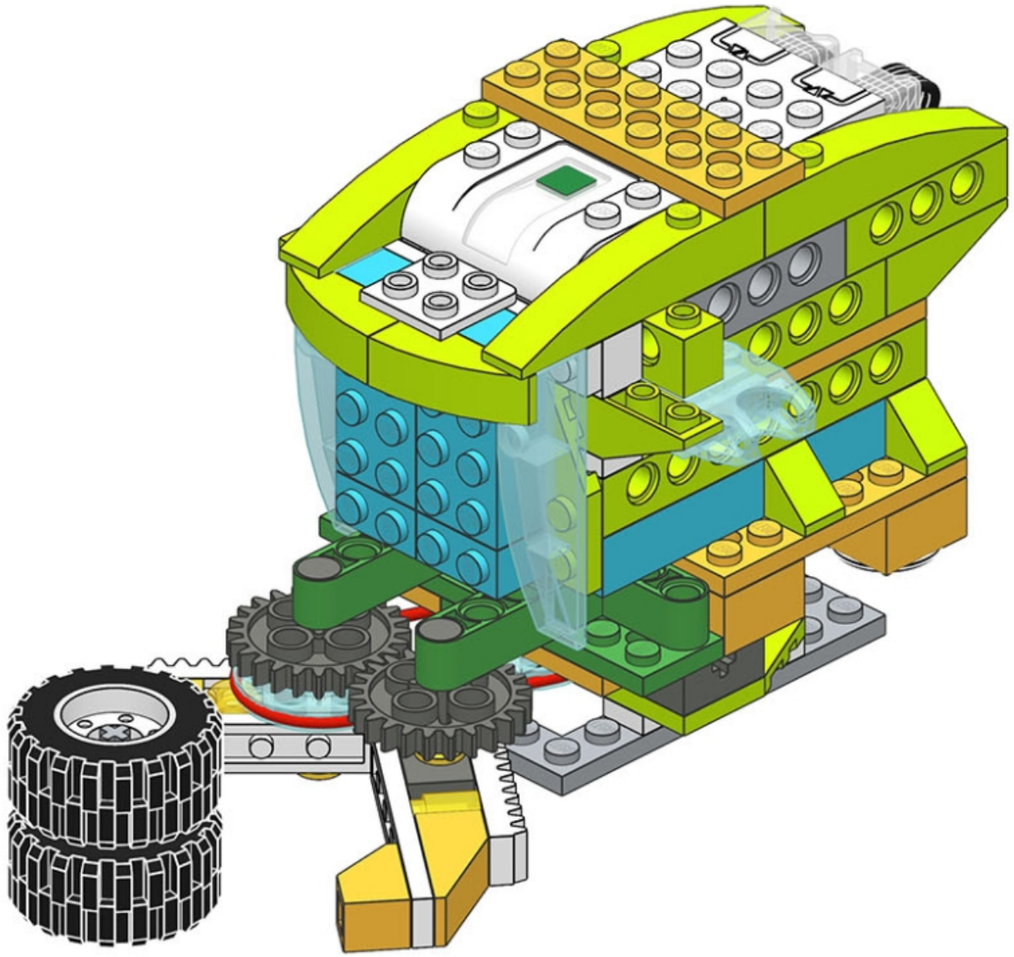

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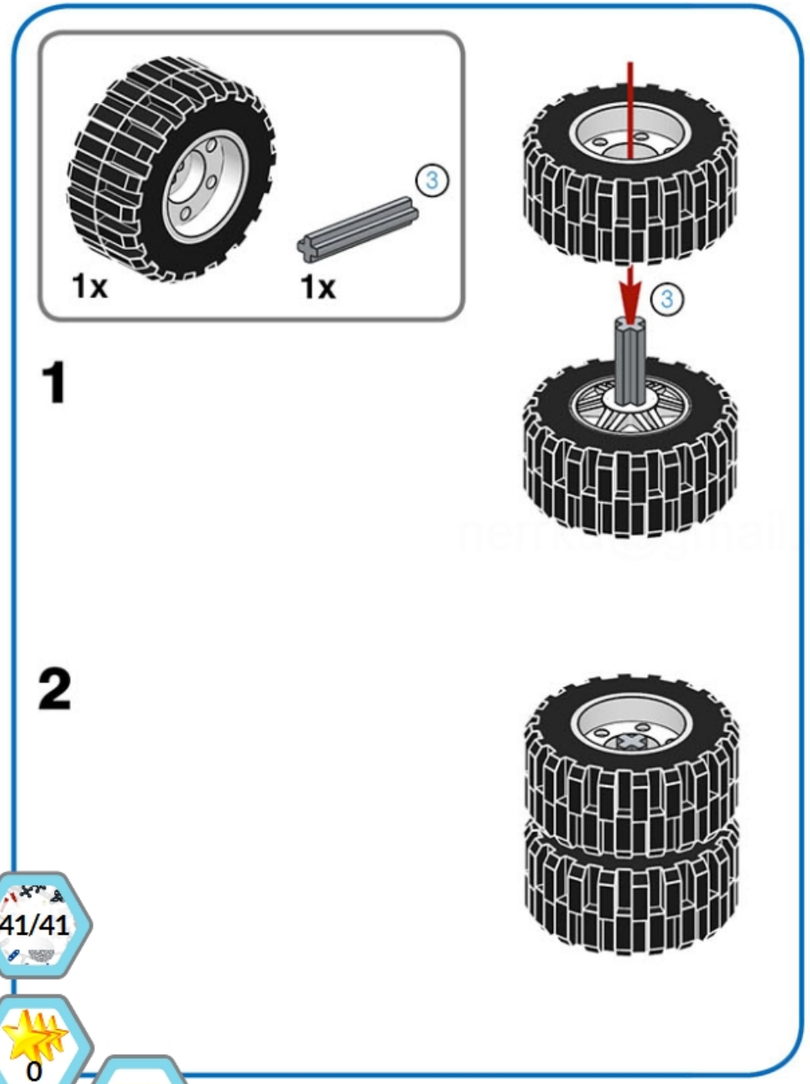

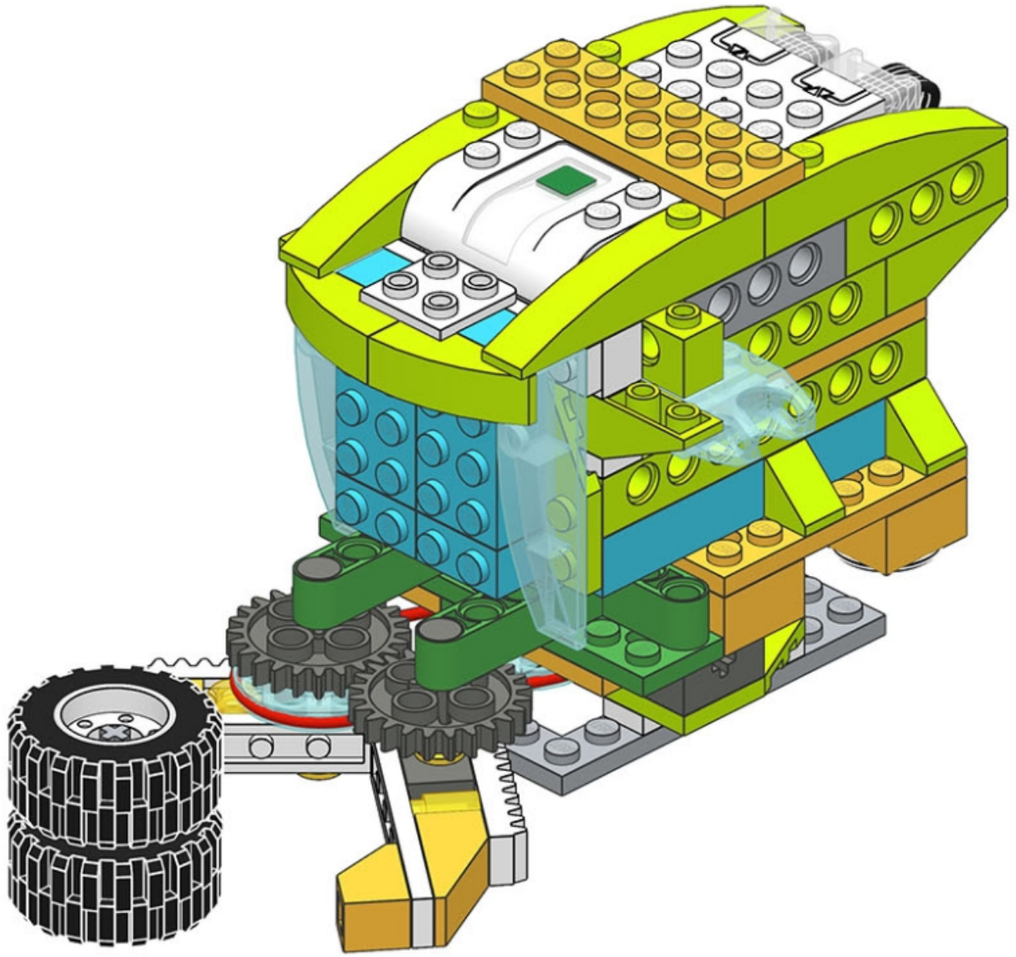

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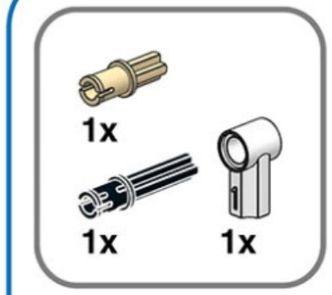

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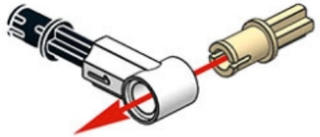

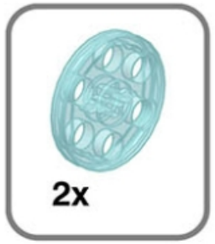

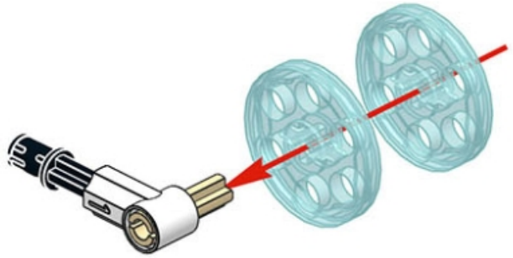

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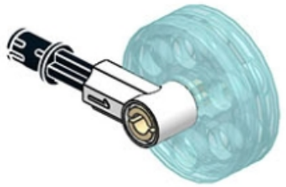

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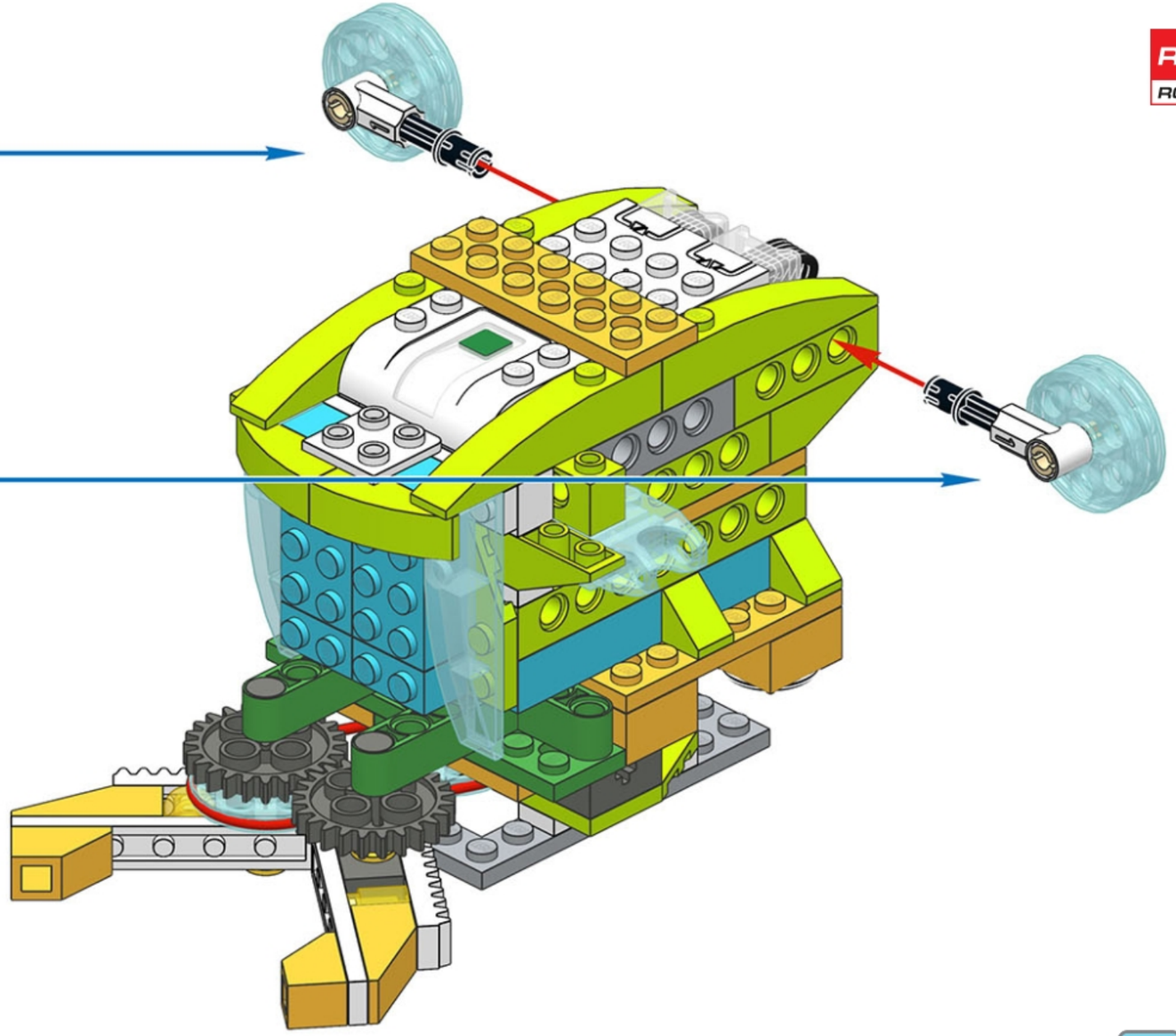

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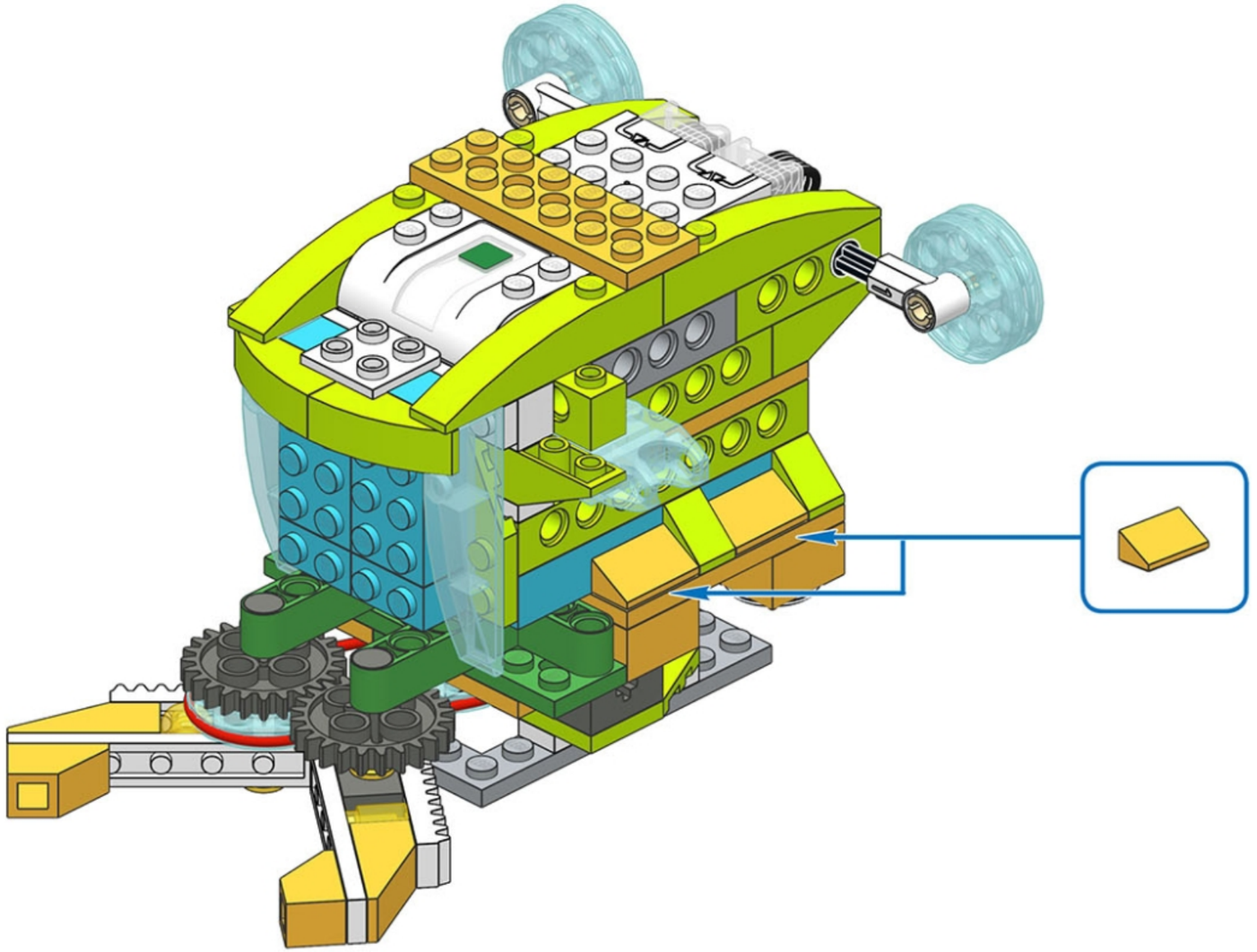

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76

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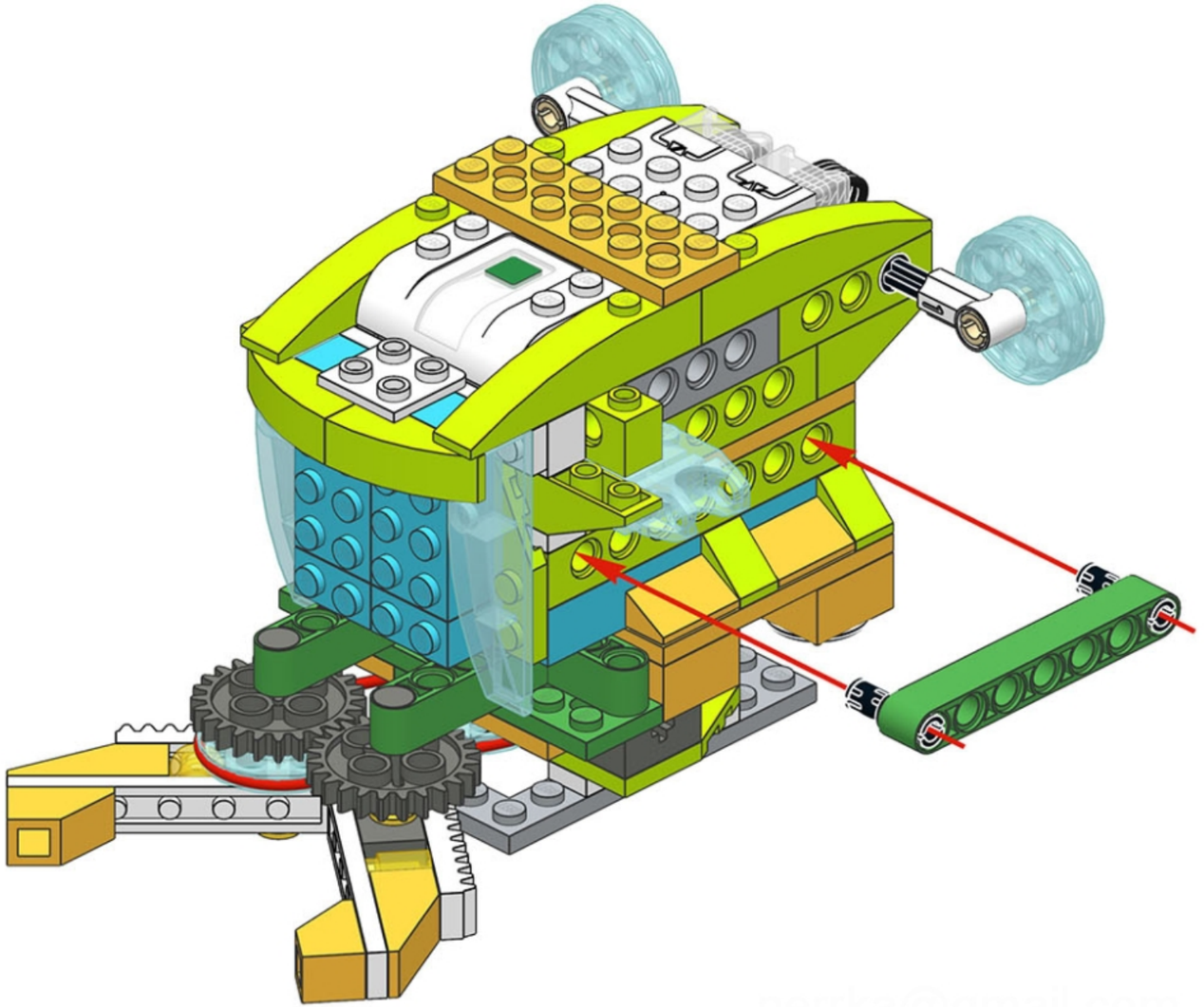

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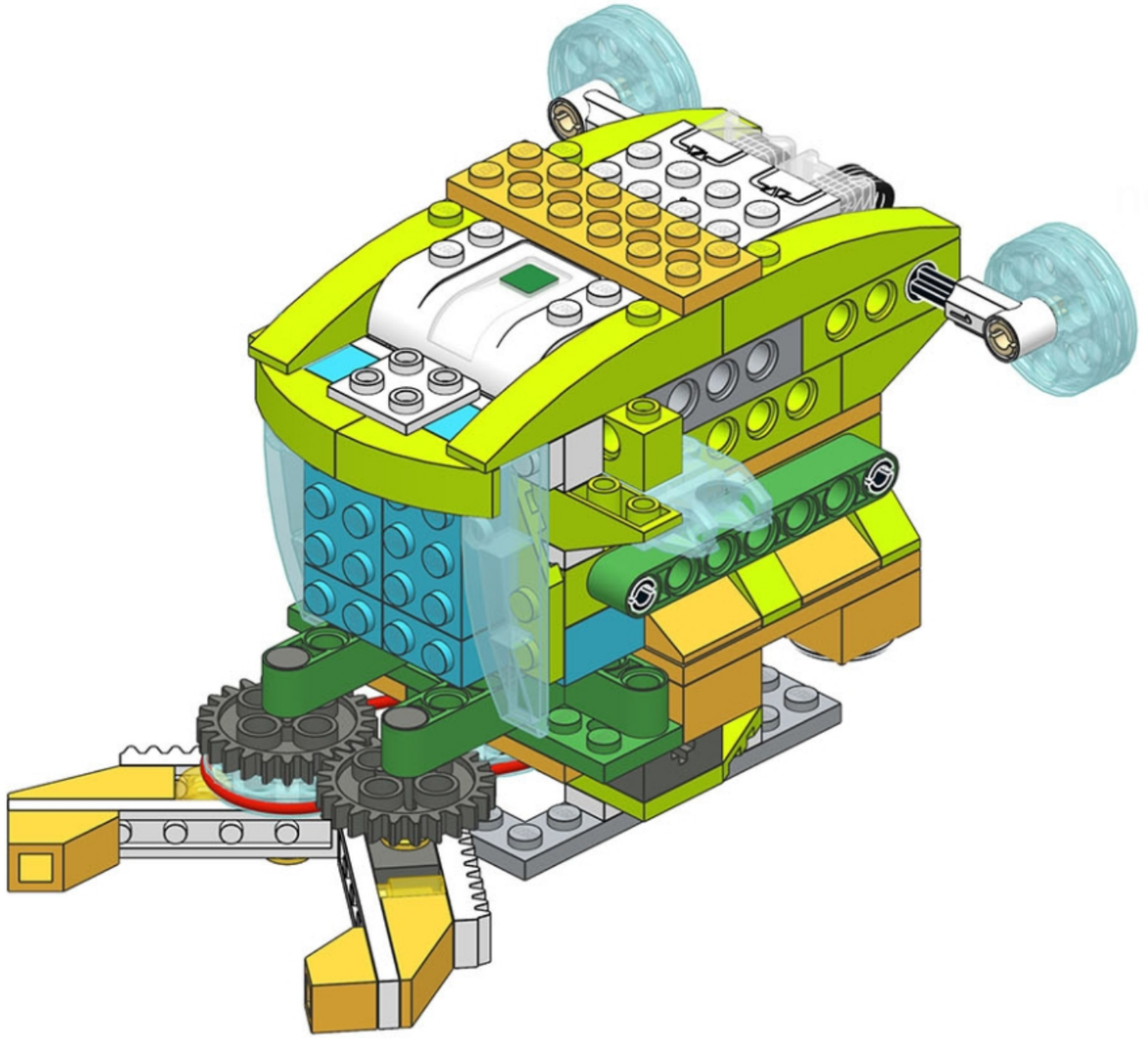

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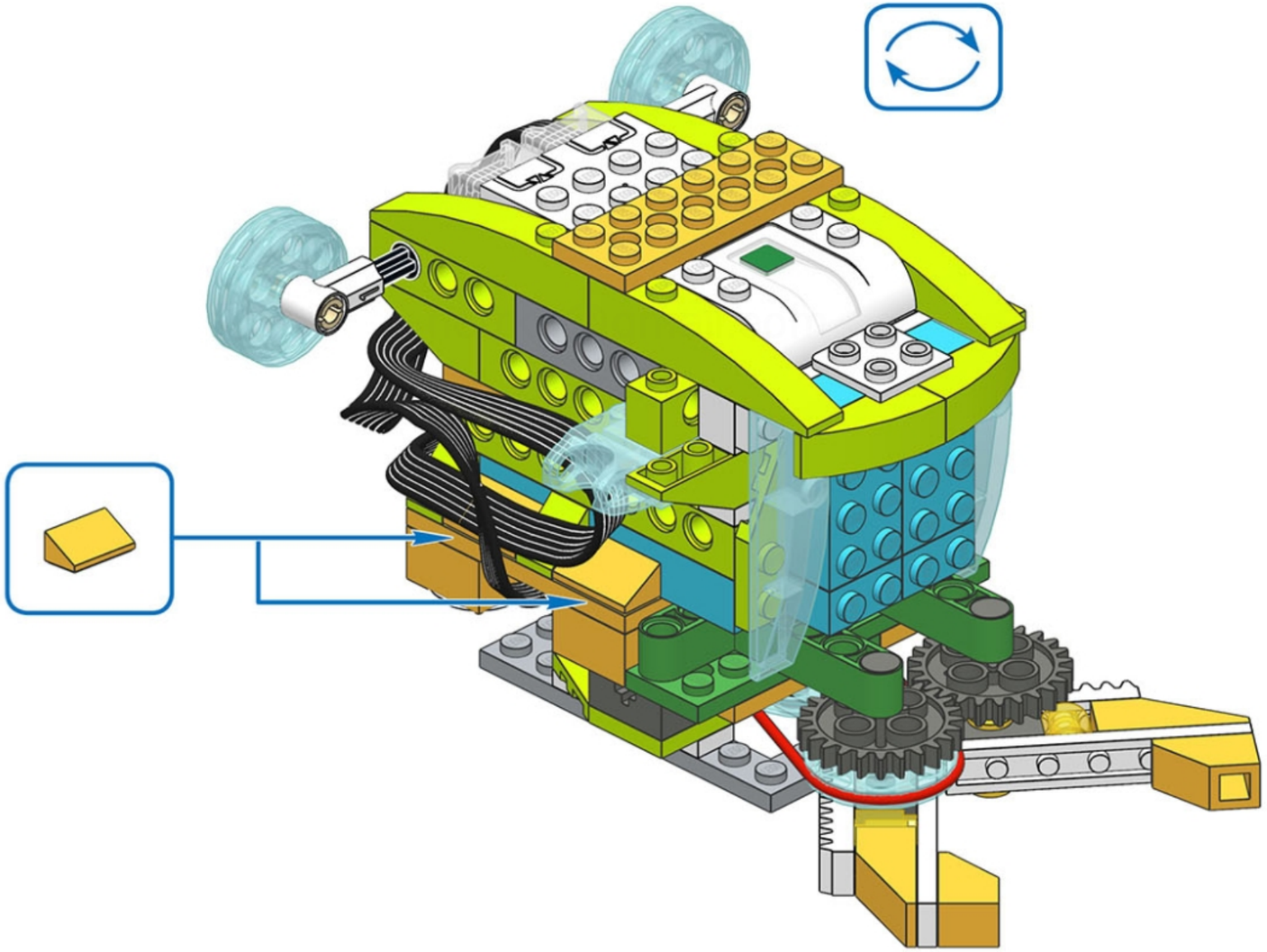

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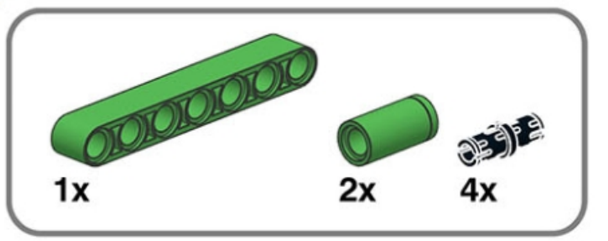

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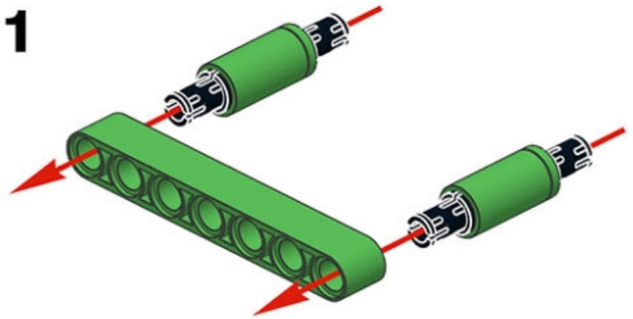

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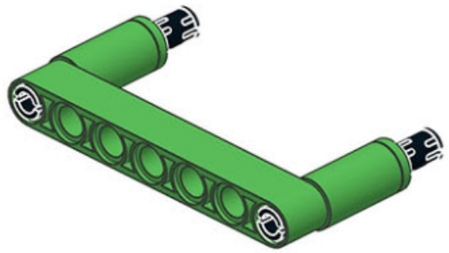

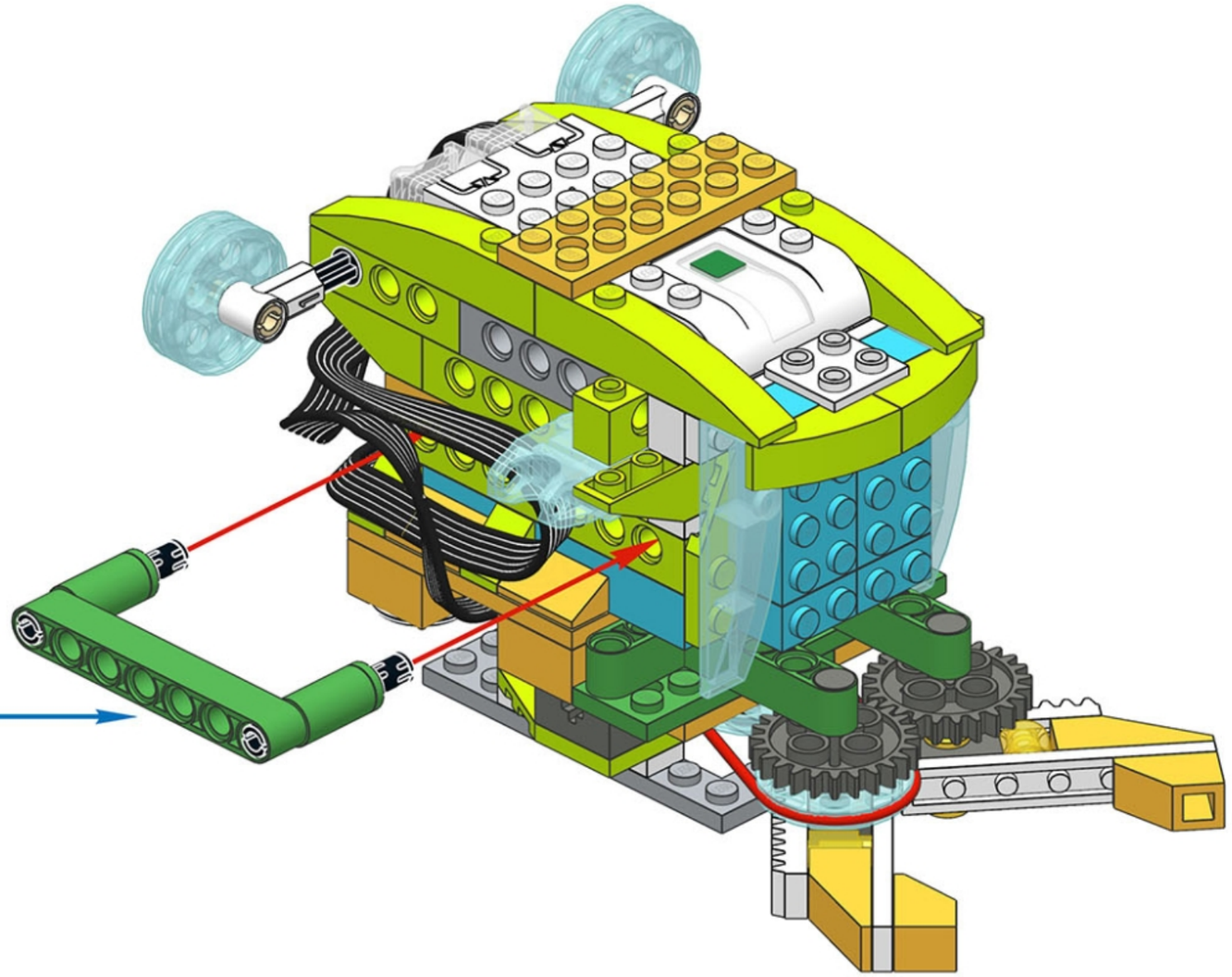

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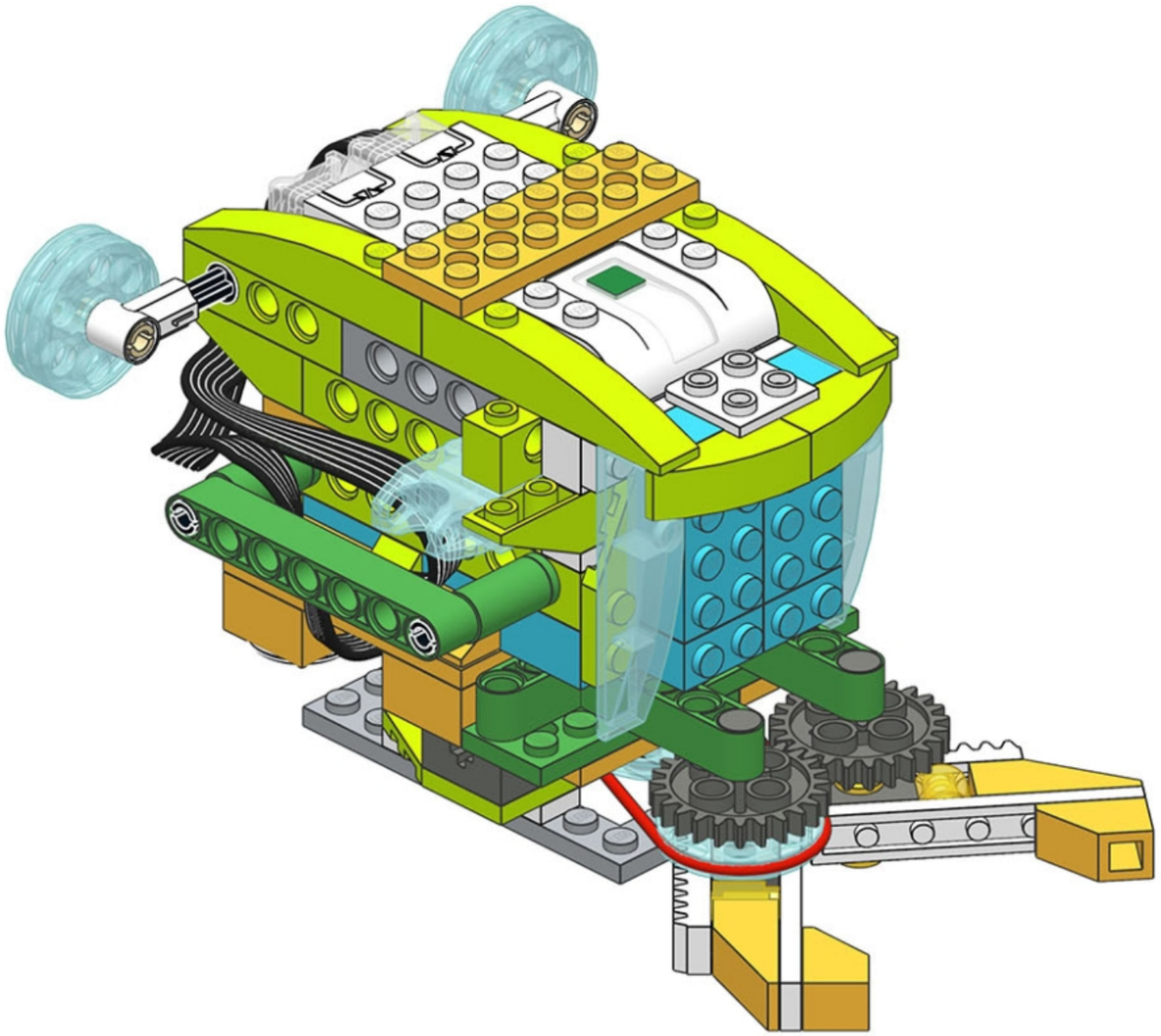

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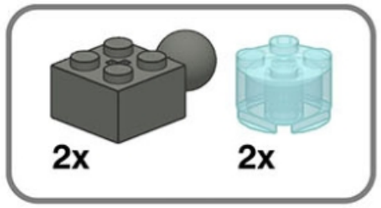

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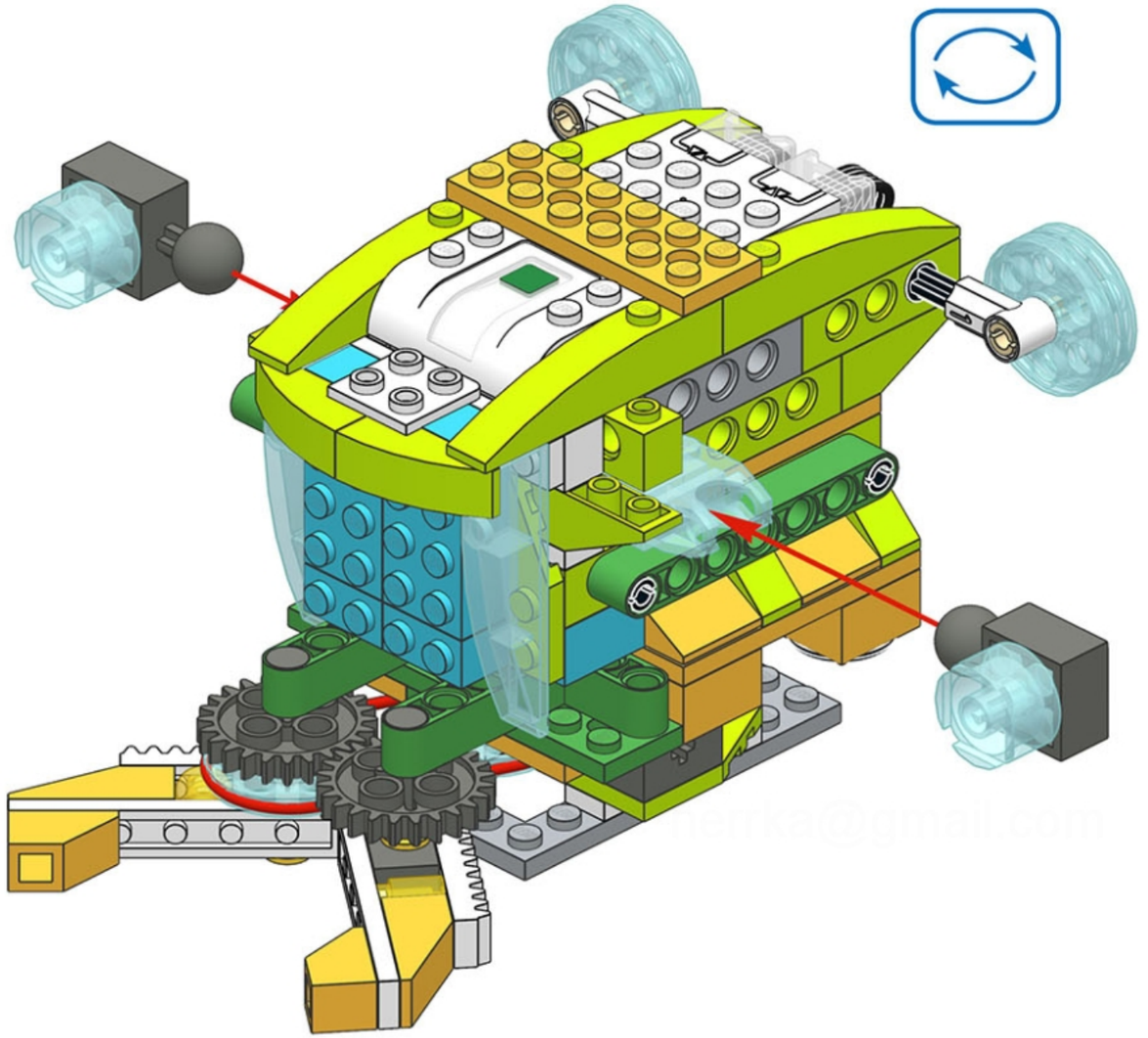

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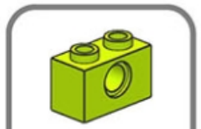

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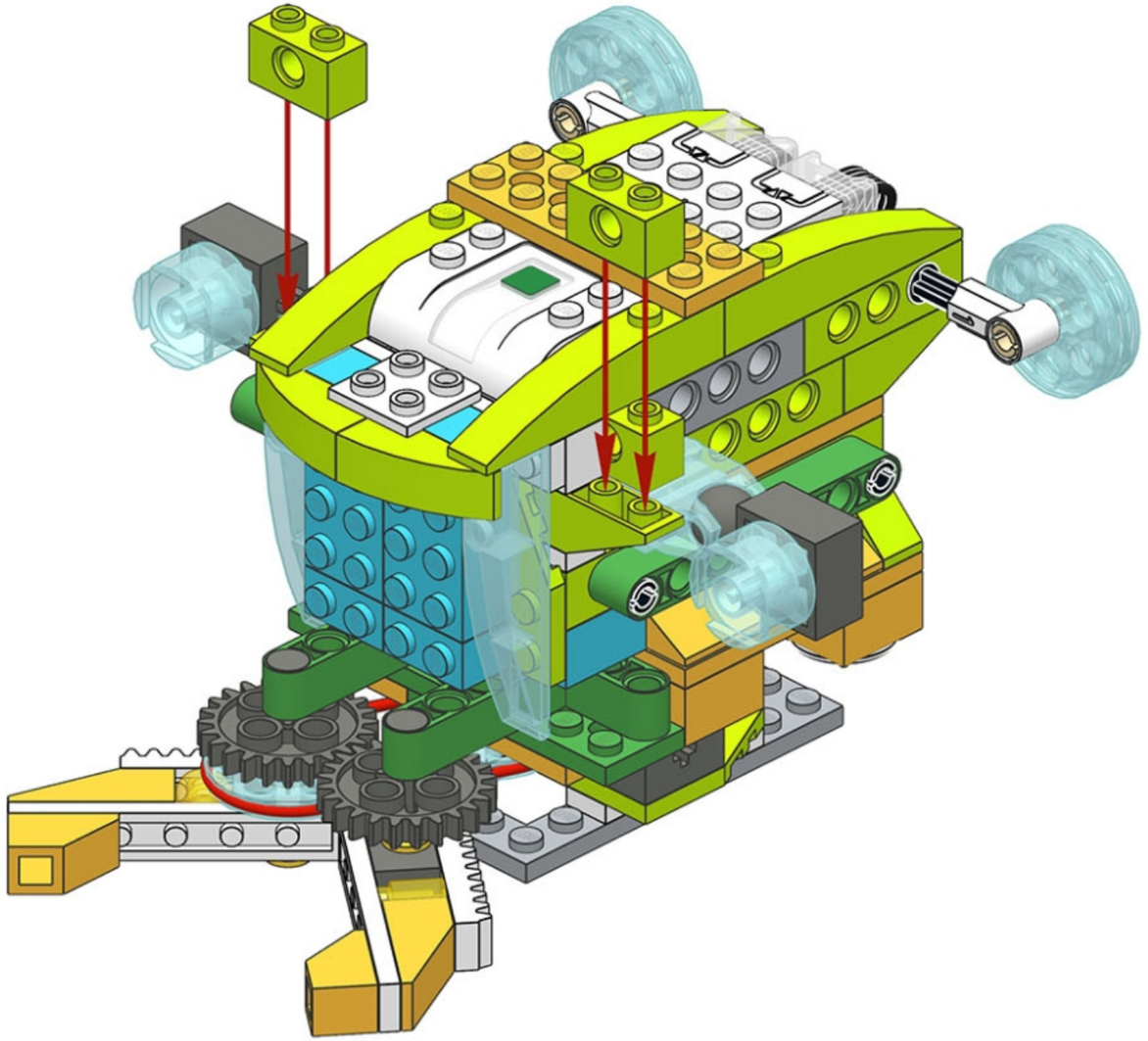

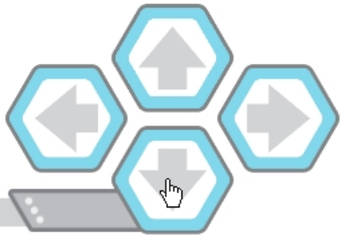

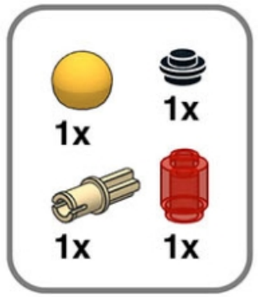

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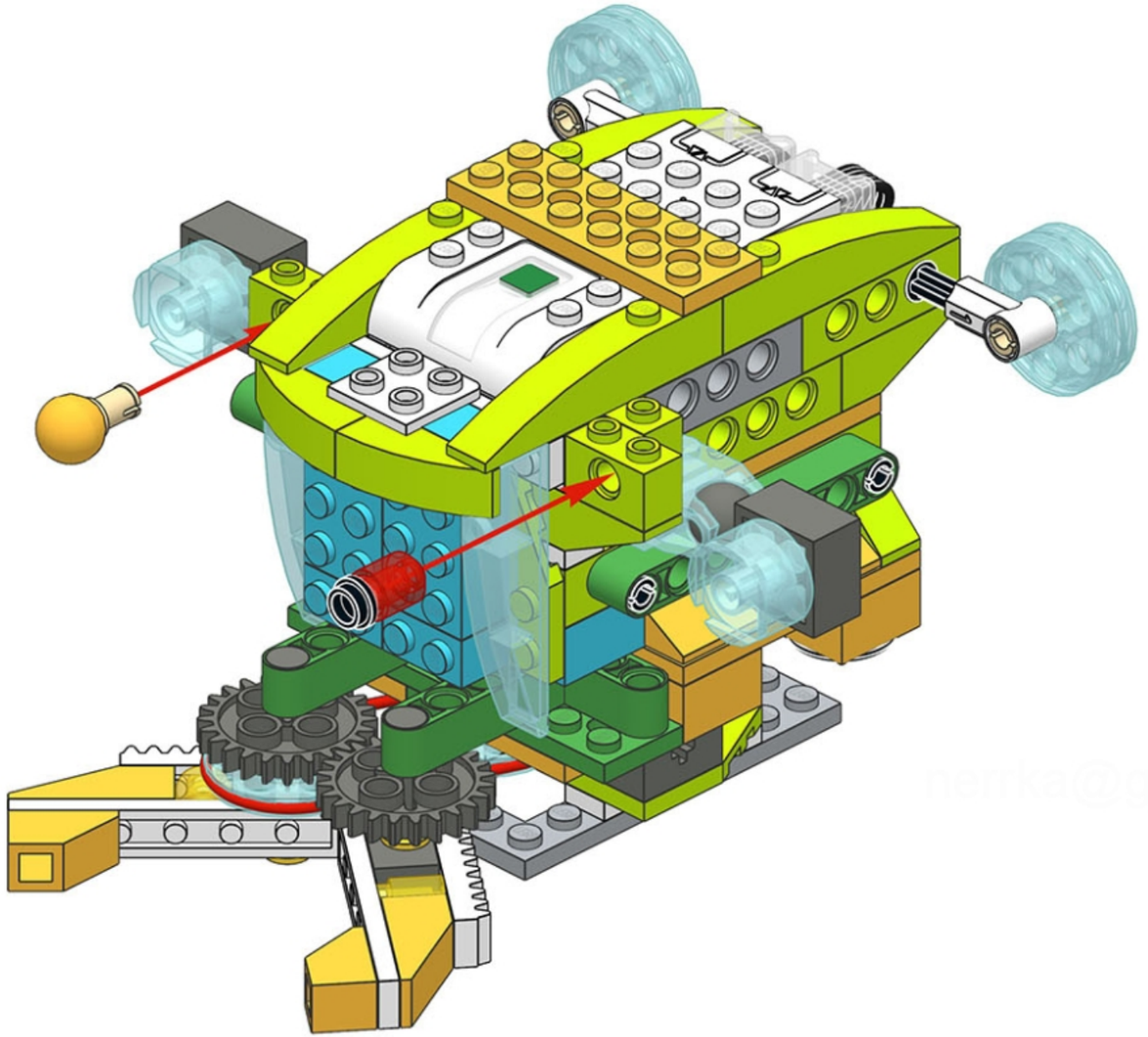

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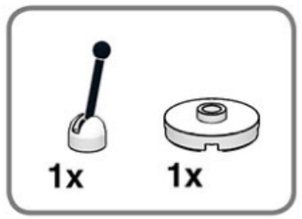

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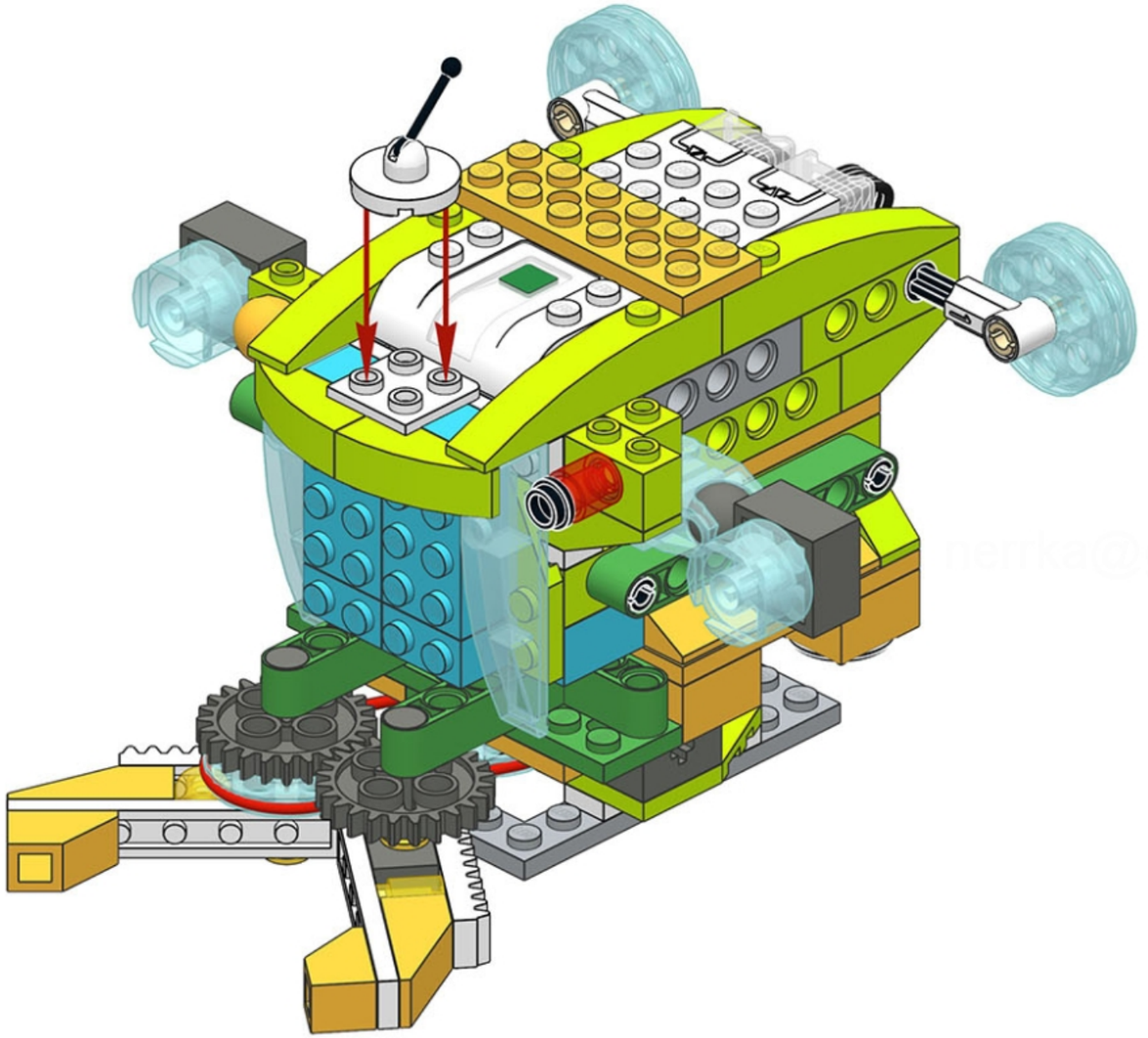

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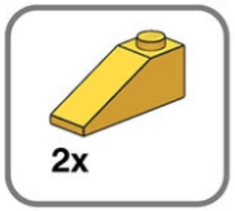

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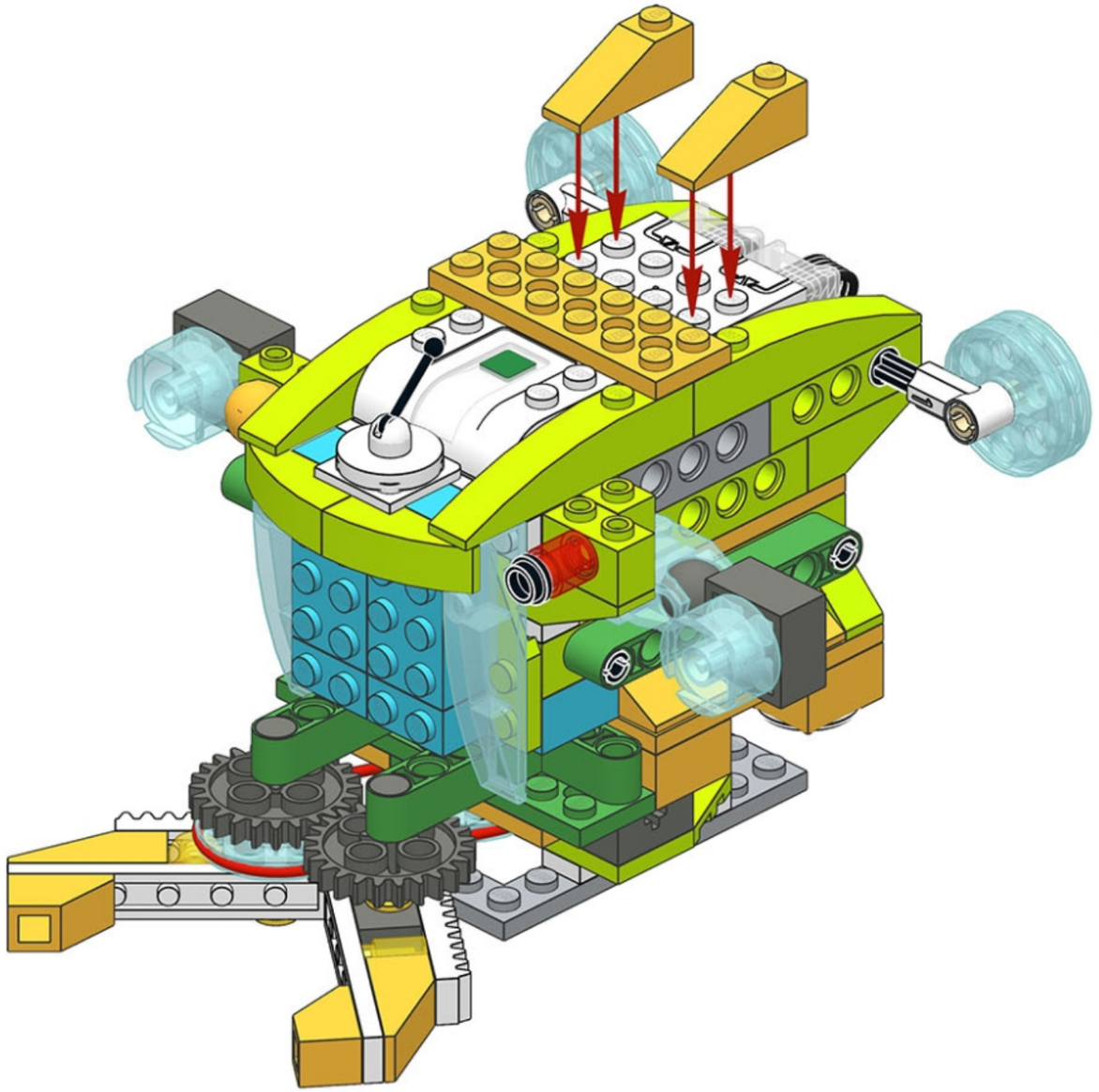

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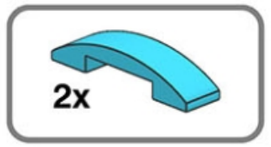

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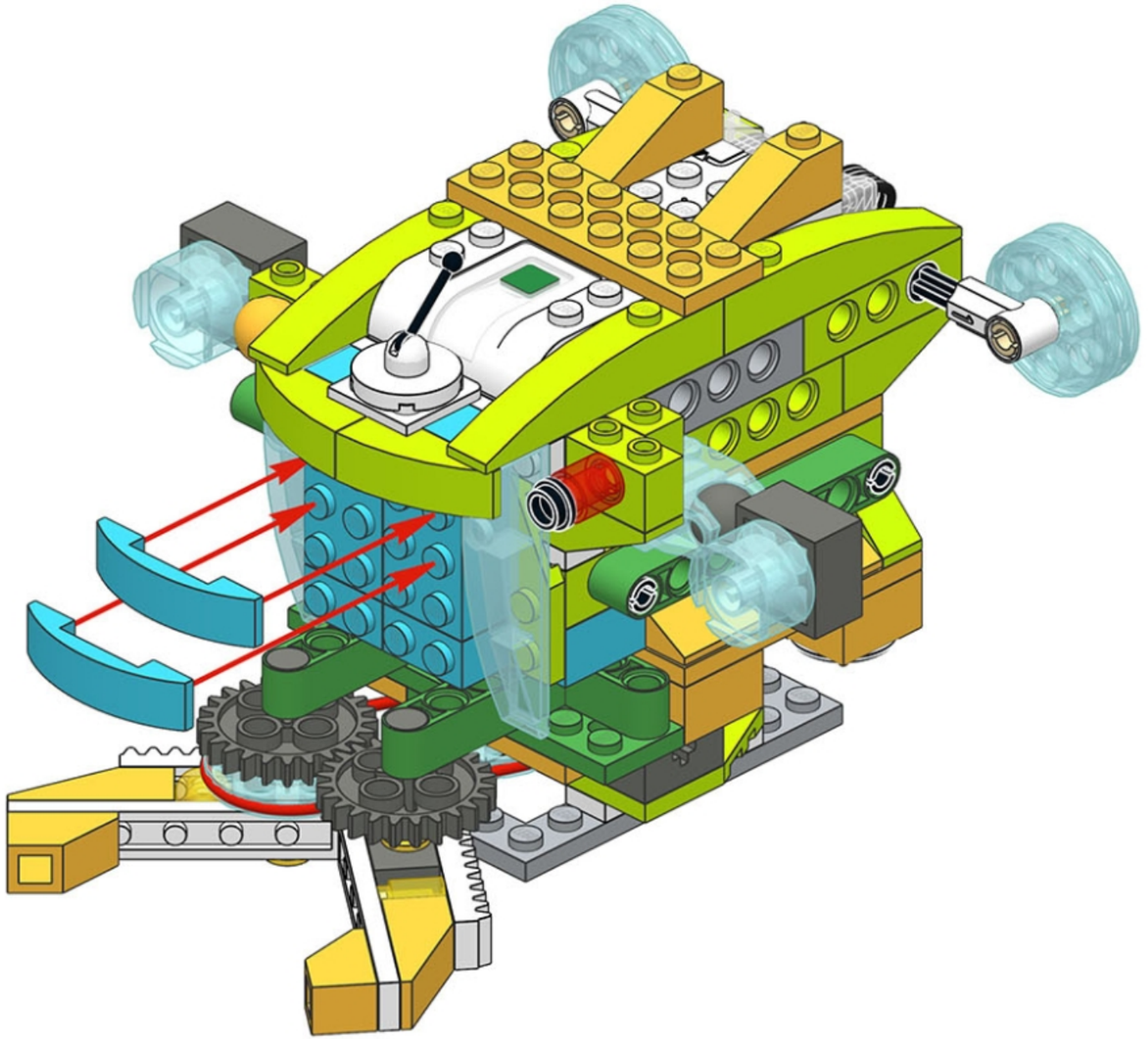

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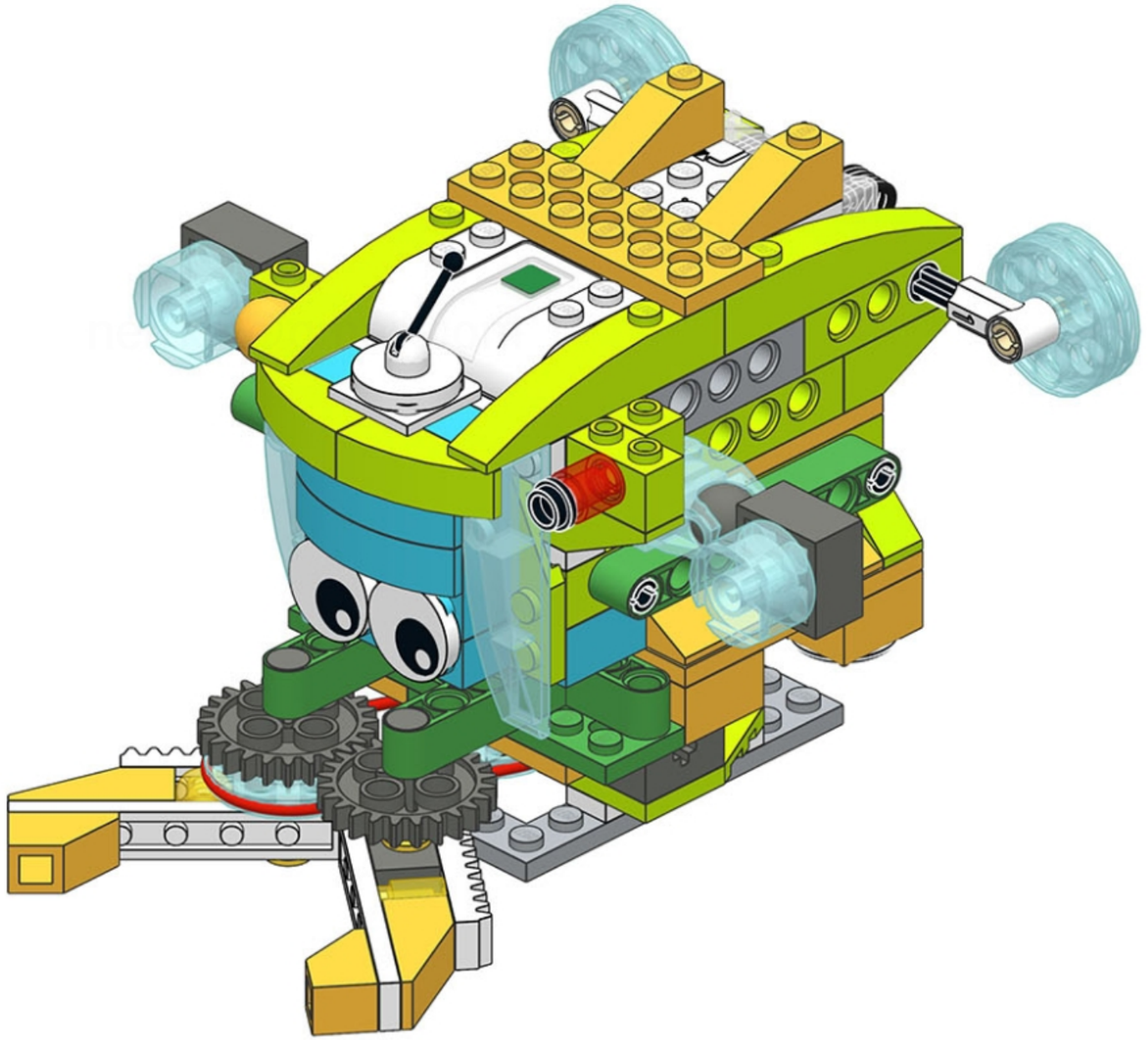

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Enhanced version

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Build the autonomous drone for testing the water.

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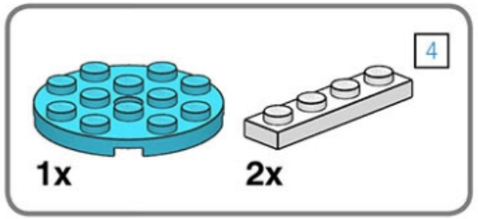

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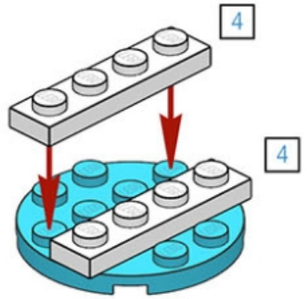

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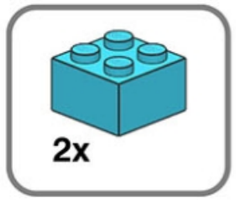

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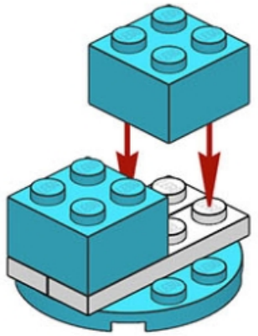

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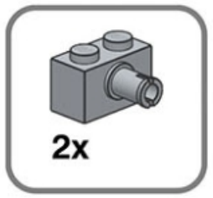

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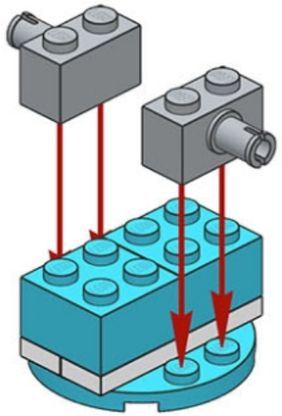

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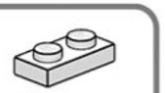

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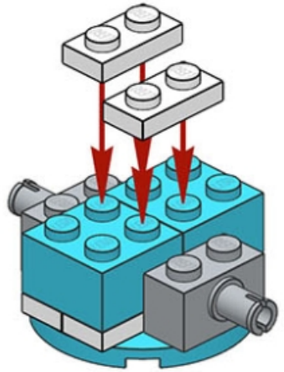

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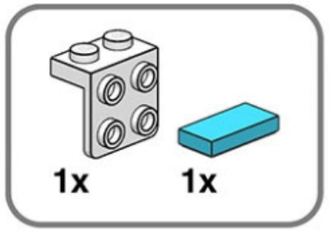

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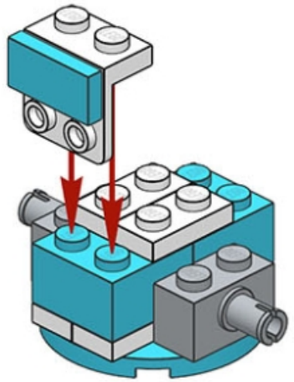

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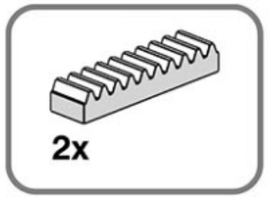

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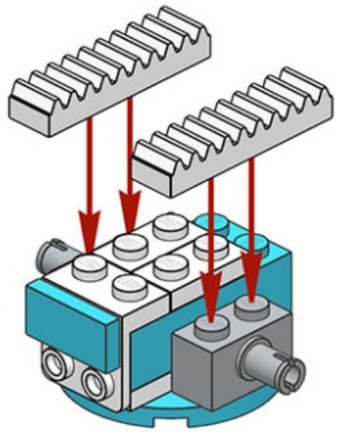

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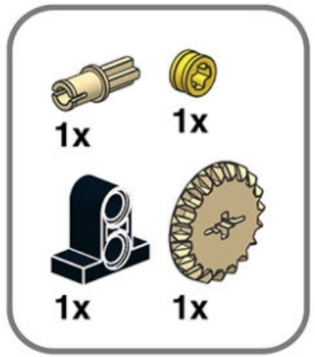

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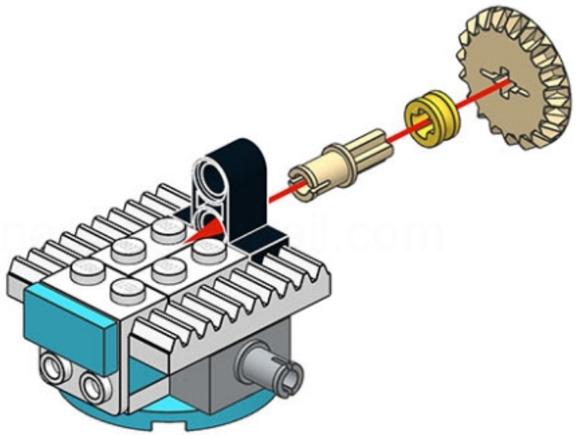

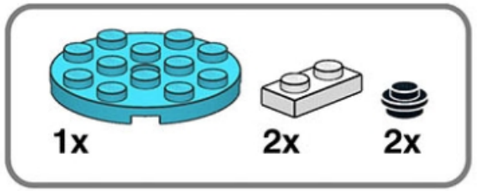

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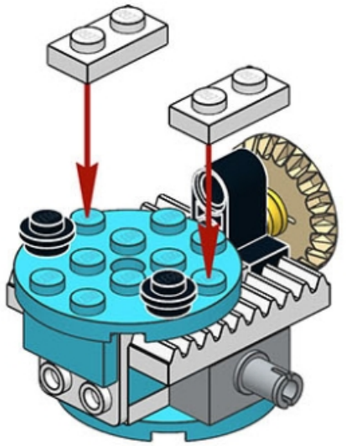

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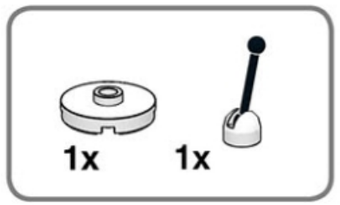

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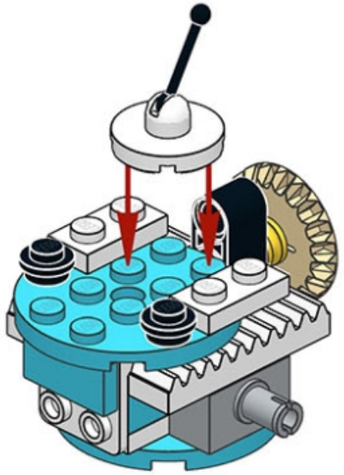

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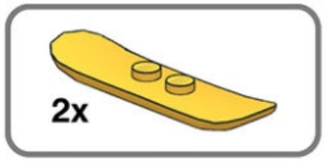

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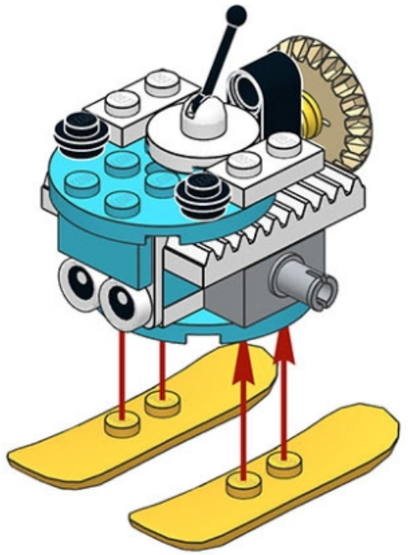

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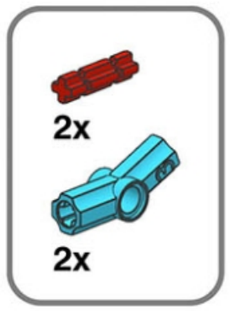

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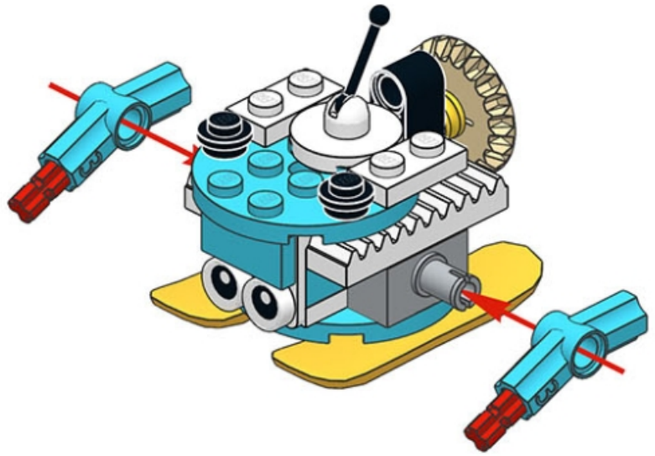

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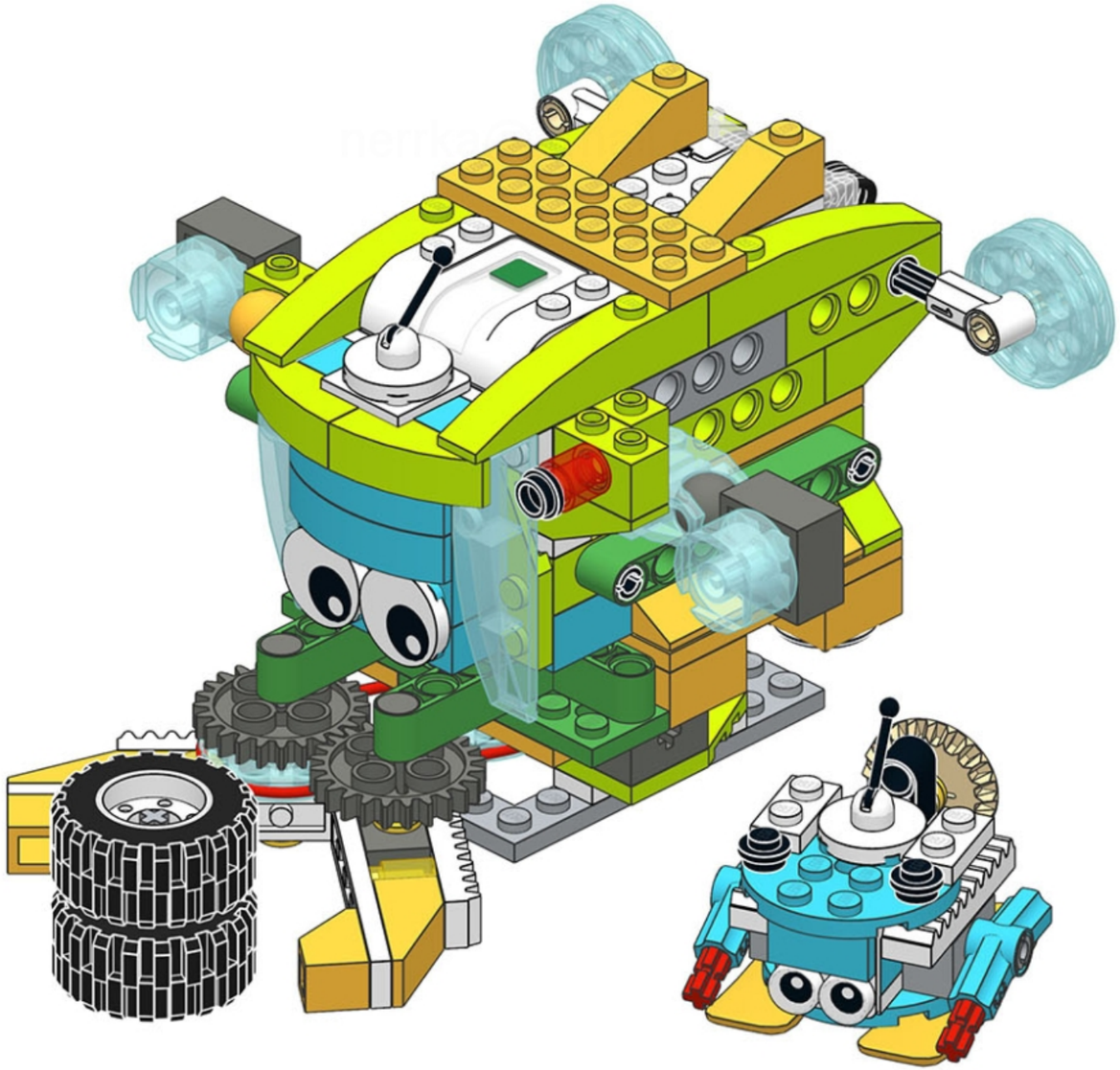

DeepSea

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New day at the robots` factory

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Hi!
During the preparation for the Games, an inspection of the water purity near the island was made. Scientists have found an increased concentration of harmful substances. In order to find and remove the source of pollution, it is necessary to develop an underwater vehicle

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3

TASK

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TASK

- To develop the underwater vehicle, that may find and remove the pollution source

Steps

- to know more about the pollution of the water
- to understand how underwater vehicles work
- to know more about the types of the underwater vehicles and create one of them

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Discussion of the task

How do you think, what pollution the scientists was find in the water near the island?

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Water pollution

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Water pollution is a changing of the water chemical, temperature and other parameters. It is usually a result of human activities.

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Water pollution

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Raw sewage and industrial waste dropped in the rivers, seas and oceans leads to chenges of the water conditions. All this changes may makes the water unsuitable for life.

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Discuss!

What do you know about organisations that protect the nature from human influence?

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Environmental organizations

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There are a lot of Environmental organizations. They seeks to protect, analyse or monitor the environment against misuse or degradation from human forces.

WWF®

Friends of the Earth

GREENPEACE

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Environmental organizations

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For example, the GreenPeace, founded in the in 1971, now has offices in 39 countries, has more than 42,000,000 online supporters around the world, 36,000 active volunteers and 3,300,000 people support the work of the organization with personal donations.

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Nuclear pollution

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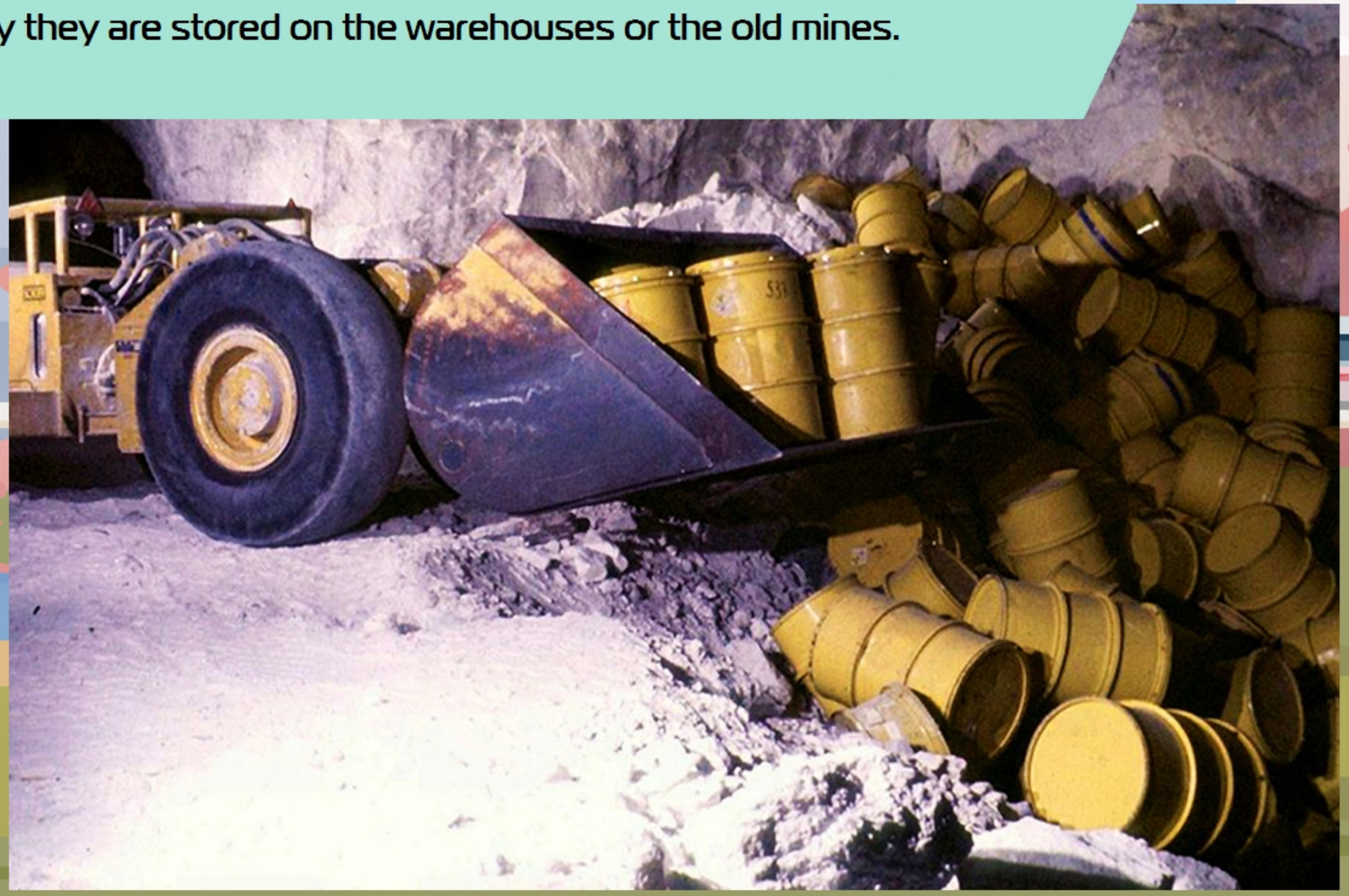
The nuclear power plants produces a waste that are hard to manage.
Usually they are stored on the warehouses or the old mines.



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Nuclear pollution

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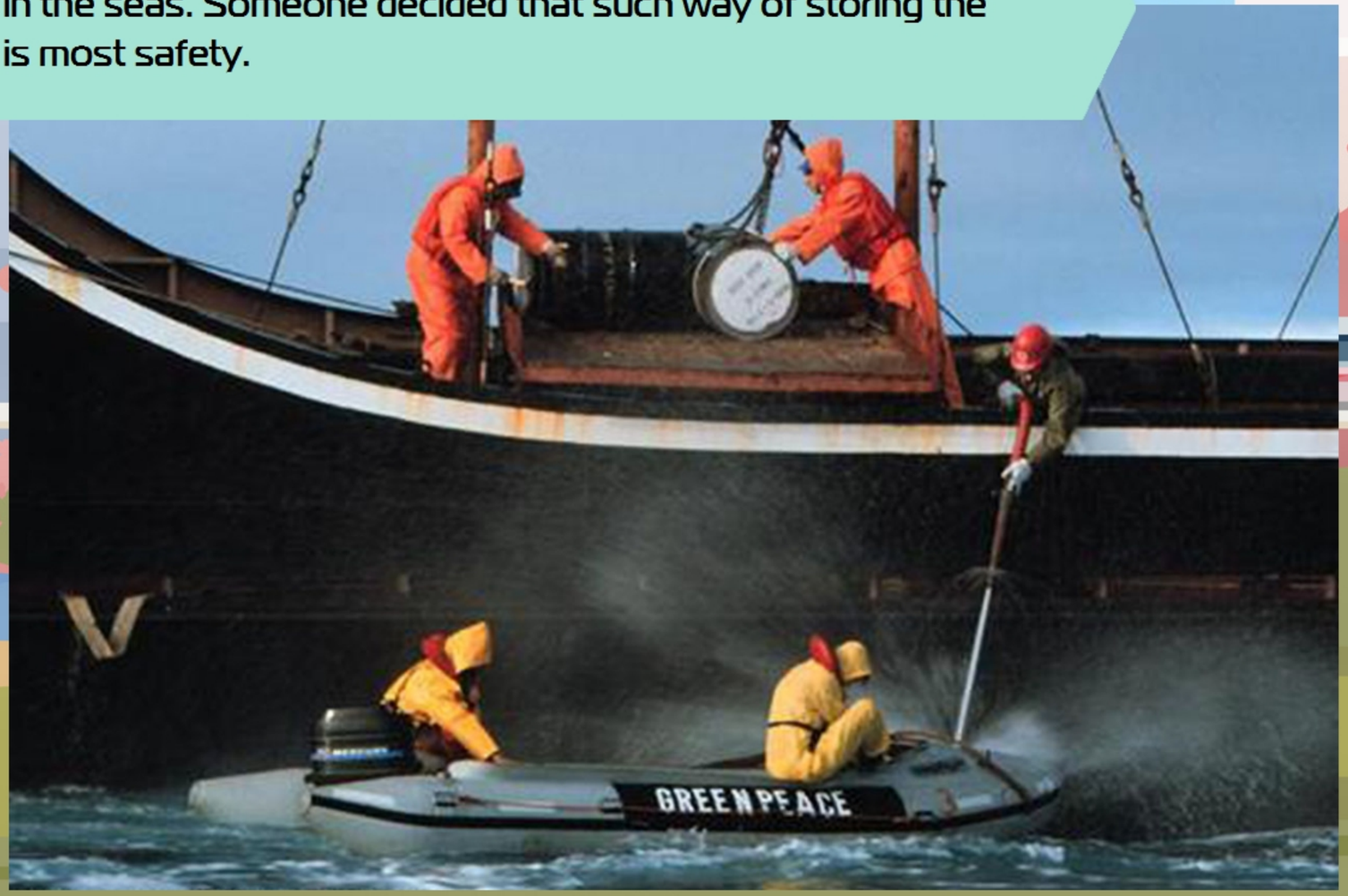
In 80's GreenPeace make a lot to prevent the dumping of nuclear waste in the seas. Someone decided that such way of storing the waste is most safety.



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Nuclear pollution

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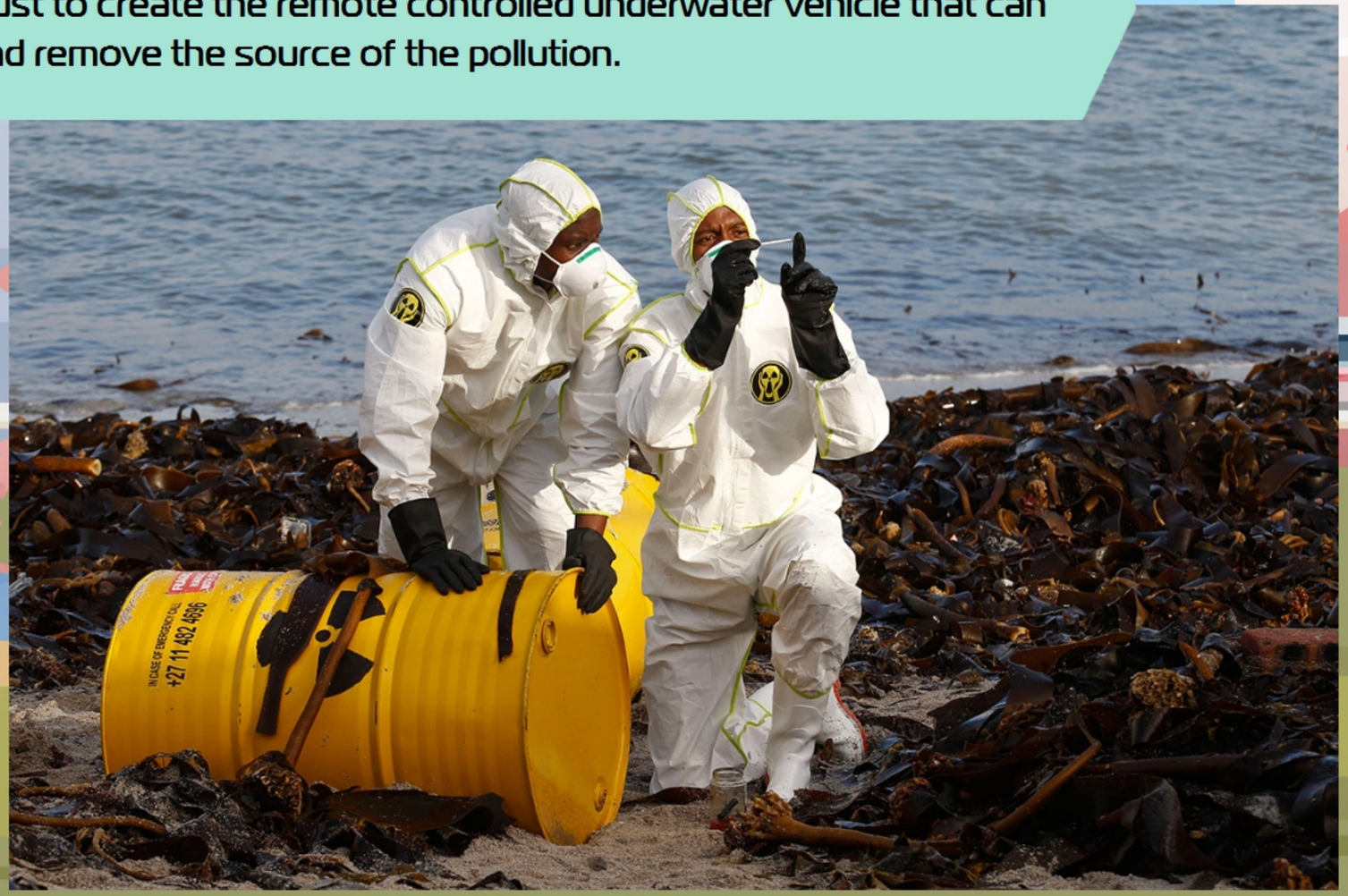
In the water near the island the high radiation level has been detected. We must to create the remote controlled underwater vehicle that can find and remove the source of the pollution.



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Nuclear pollution

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Looks like the source of the pollution is on the bottom of the sea. It is a good idea to use a "clean" drone for the searching the pollution and a more heavy machine for catching and removing it.

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Discuss!

What underwater vehicles do you know? Why they not sink? How they pop up?

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Underwater vehicles

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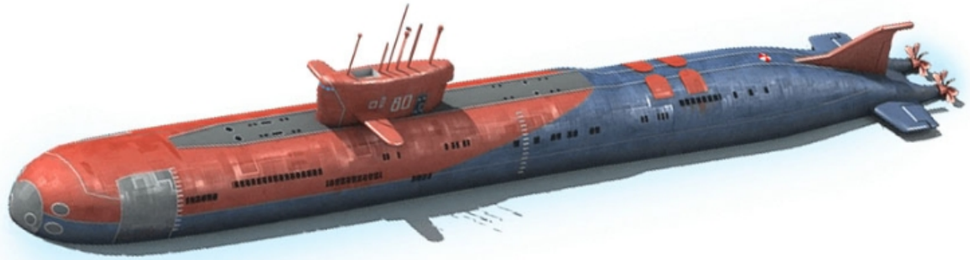
The submarines, bathyscaphes, remote controlled underwater vehicles and autonomous underwater drones may be classified as underwater vehicles.



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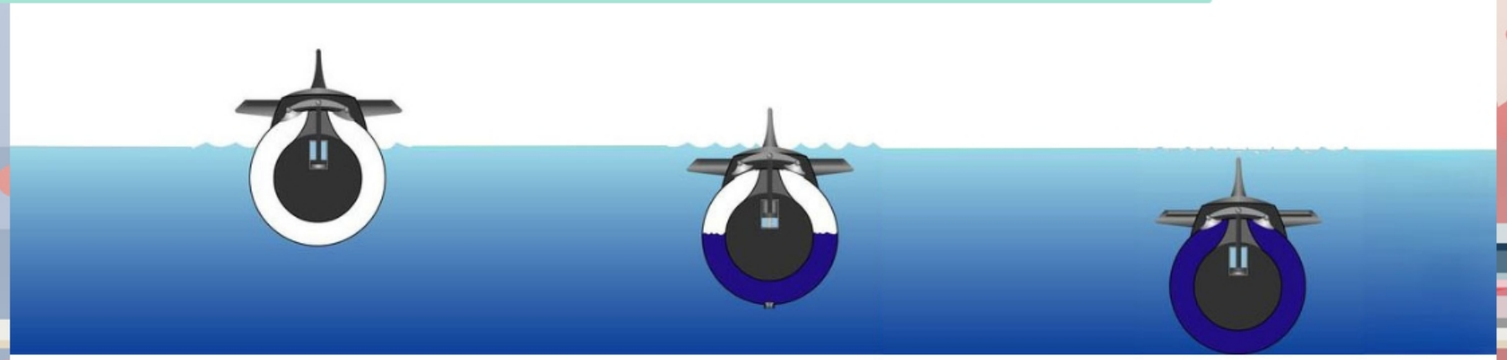
Underwater vehicles

The submarine may pop up if it is lighter, than the same volume of the water. Each type of underwater vehicles has tanks that may be filled by something that has a less density than water. In the Submarines this is the tanks with compressed air.



For pop up the tanks must be filled by air. In this case the submarine's average density is less than the water's.

In this case the submarine's average density is equal to the water's.

For the dive the tanks must be filled by the water. In this case the submarine's average density is more than the water's.

Submarines

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The submarines mostly are military. They can operate on the depth about 500 meters. The typical nuclear submarine has length over 100m and a crew - over 80 people and a maximum speed about 80 km/h.

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Bathyscaphe

This vehicle usually has very small crew and used for deep sea operations. It consist of very massively built crew cabine that withstand a huge pressure and light tank outside.

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Bathyscaphe

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Pictured below Shinkai 6500 can dive on 6500 meters with two pilots and one researcher. It has an electric motor that provides maximum speed about 4.6 km/h.

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ROVs

The Remote operated underwater vehicles are used by scientists in deep sea investigations and also for maintaining the underwater equipment like cranes on the pipelines. They have a great maneuroabilyty and may be used in dangerous operations.

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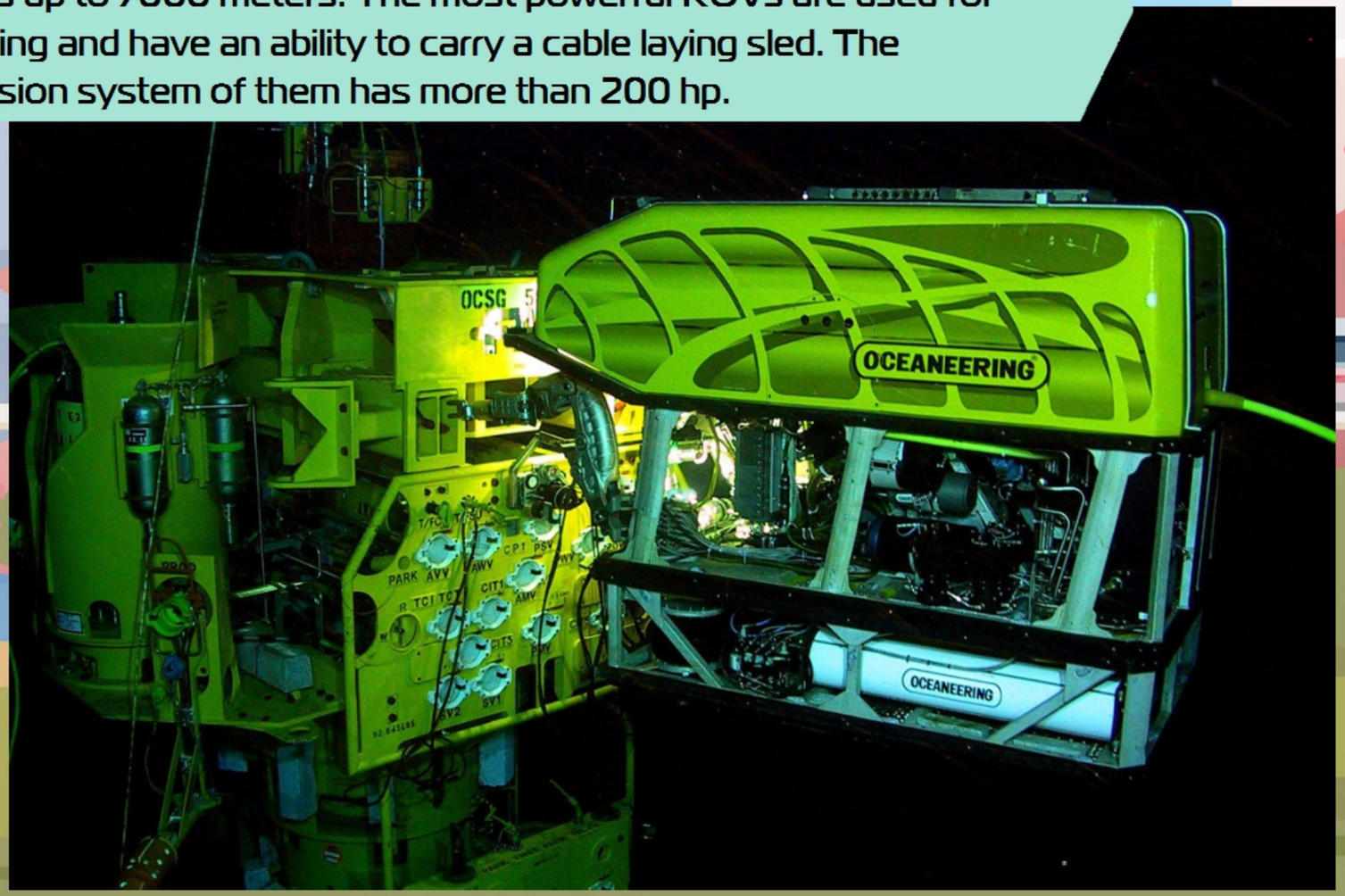
ROVs

Depends on the ROV class, it have the working depth from few dozens up to 7000 meters. The most powerful ROVs are used for trenching and have an ability to carry a cable laying sled. The propulsion system of them has more than 200 hp.



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ROV controlling

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To decrease the number of the crew, the automated functions may be added to the ROV. The navigation may be pre-programmed, while the manipulator controlling still needs human operator. Also the human operator must to make the final decision in the controversial situations.

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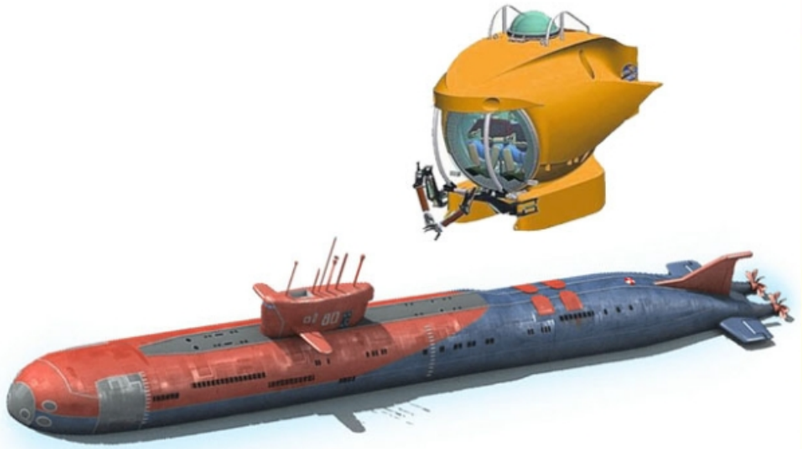
Let's summaries

We need the underwater vehicle that will find and remove the source of the water pollution. It must be:

- equipped with a lot of sensors and manipulators for effective operating
- very maneuver
- operated remotely or be autonomous



Discussion of the task

What do you think, which type of the underwater vehicles is better for our needs?

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Meet DeepSea!

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This is a ROV with manipulator and sensors for testing the water.

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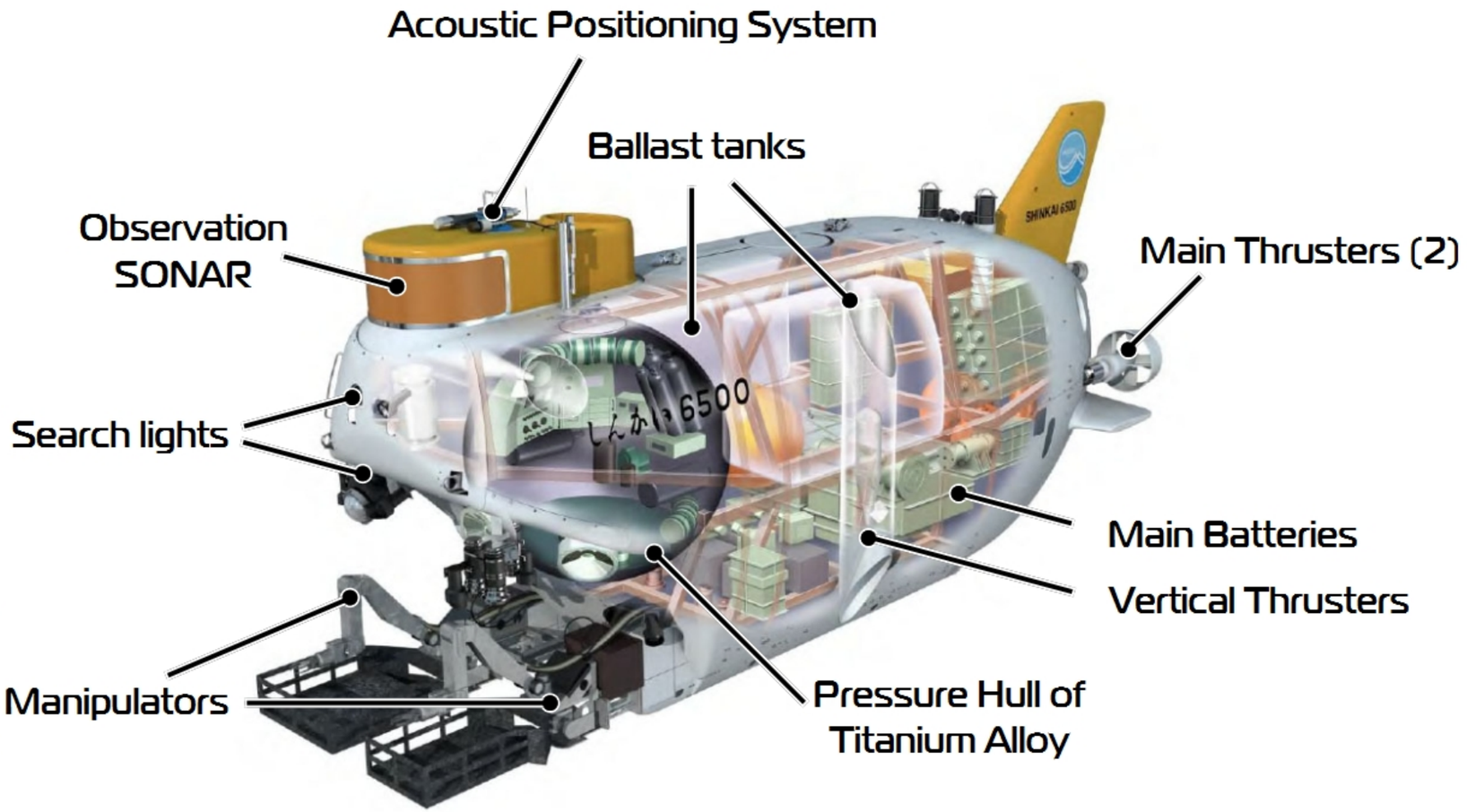
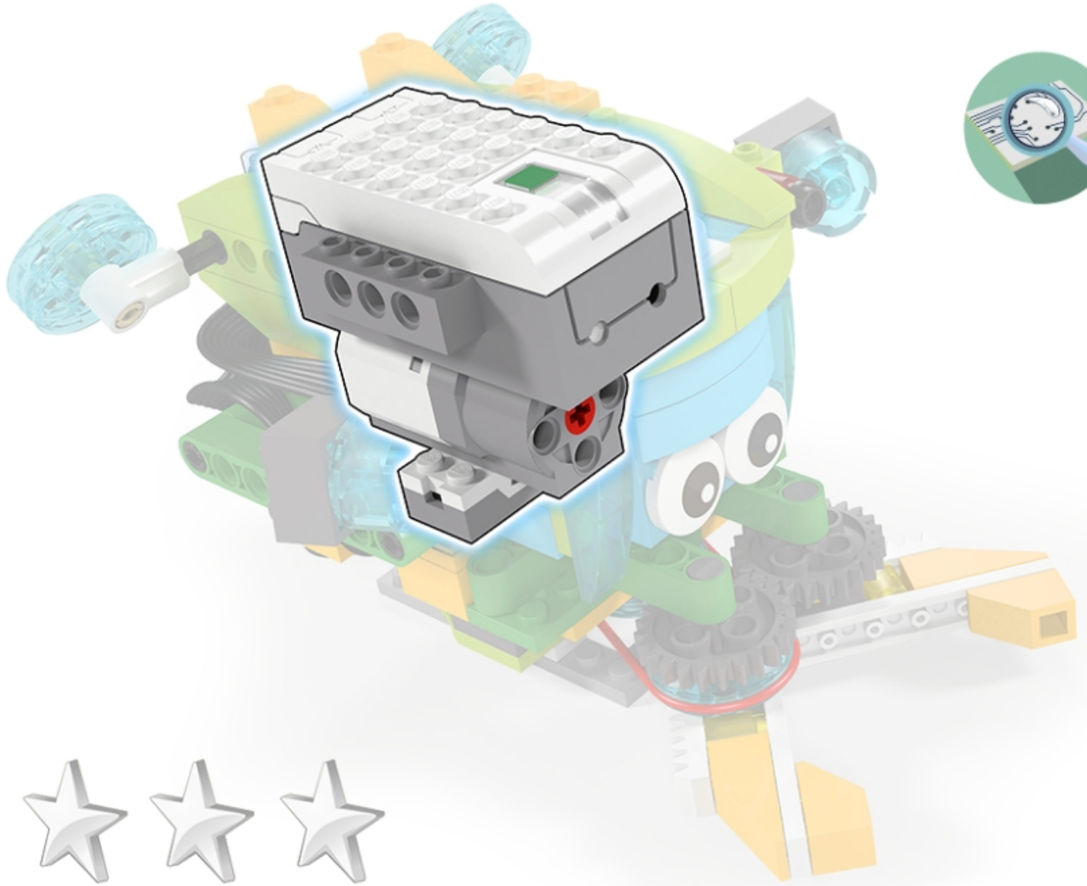
Bathyscaphe's elements



Features

The motor is used for drive the manipulator. The Tilt sensor may be used for control the manipulator.



Find:

- smarthub
- motor
- sensor

Features

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The two 24-tooth gears provides synchronous movement of the left and right part of the manipulator.

Find:

- Angular gear
- Belt drive
- 24-tooth gears

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Features

The Angular Gear and the Belt Drive are used in the bathyscaphe's arm transmission.

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Build the robot!

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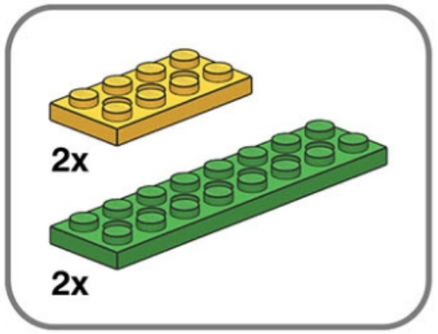

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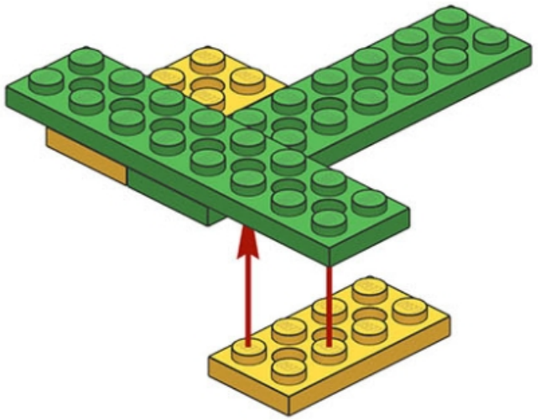

nerrka@gmail.com

Enhanced version

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Add some external equipment to your robot!

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Enhanced version

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Build the autonomous drone for testing the water.

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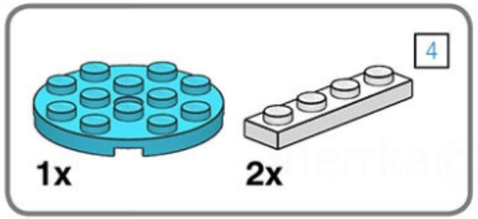
ROBOTIC EDUCATION



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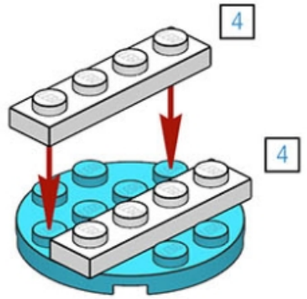

Check it out!

Avoid any friction between the cables while robot is moving.

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TASK

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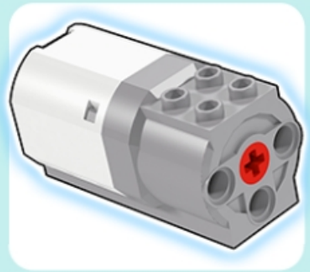
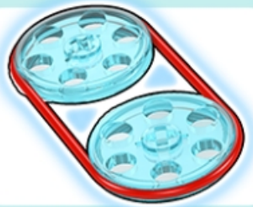
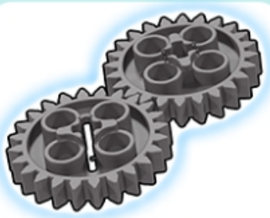
Place parts of the robot in the right places.







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Task 1

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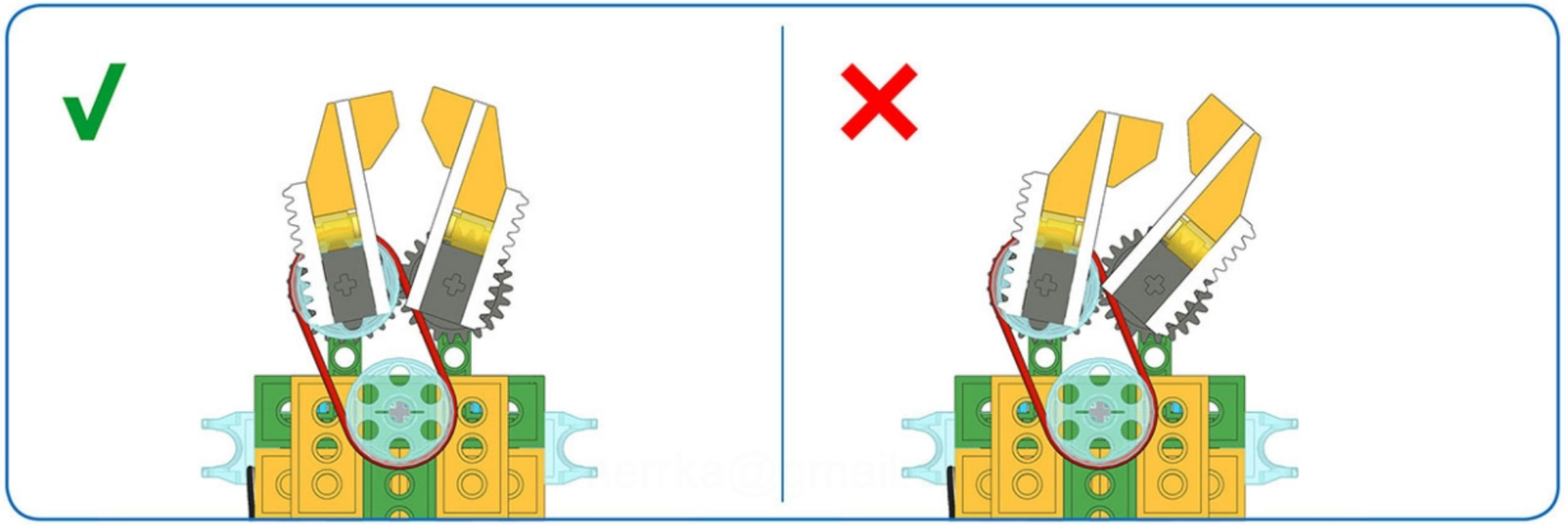
Check the mechanism. The left and right parts of the manipulator must open and close synchronously.



Adjustments and testing

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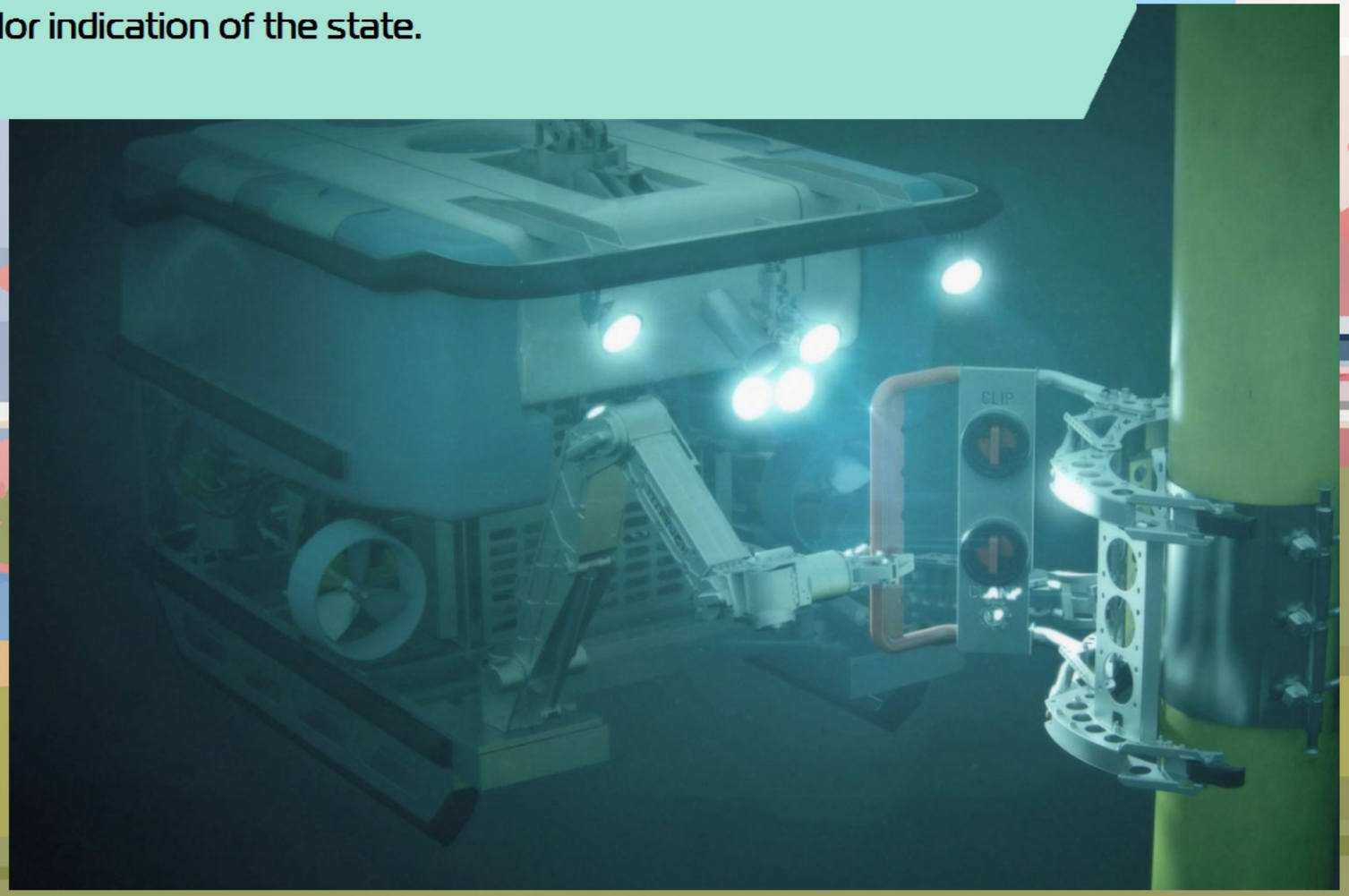
During debugging and testing the robot it is very convenient to use the color indication of the state.



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Task 2

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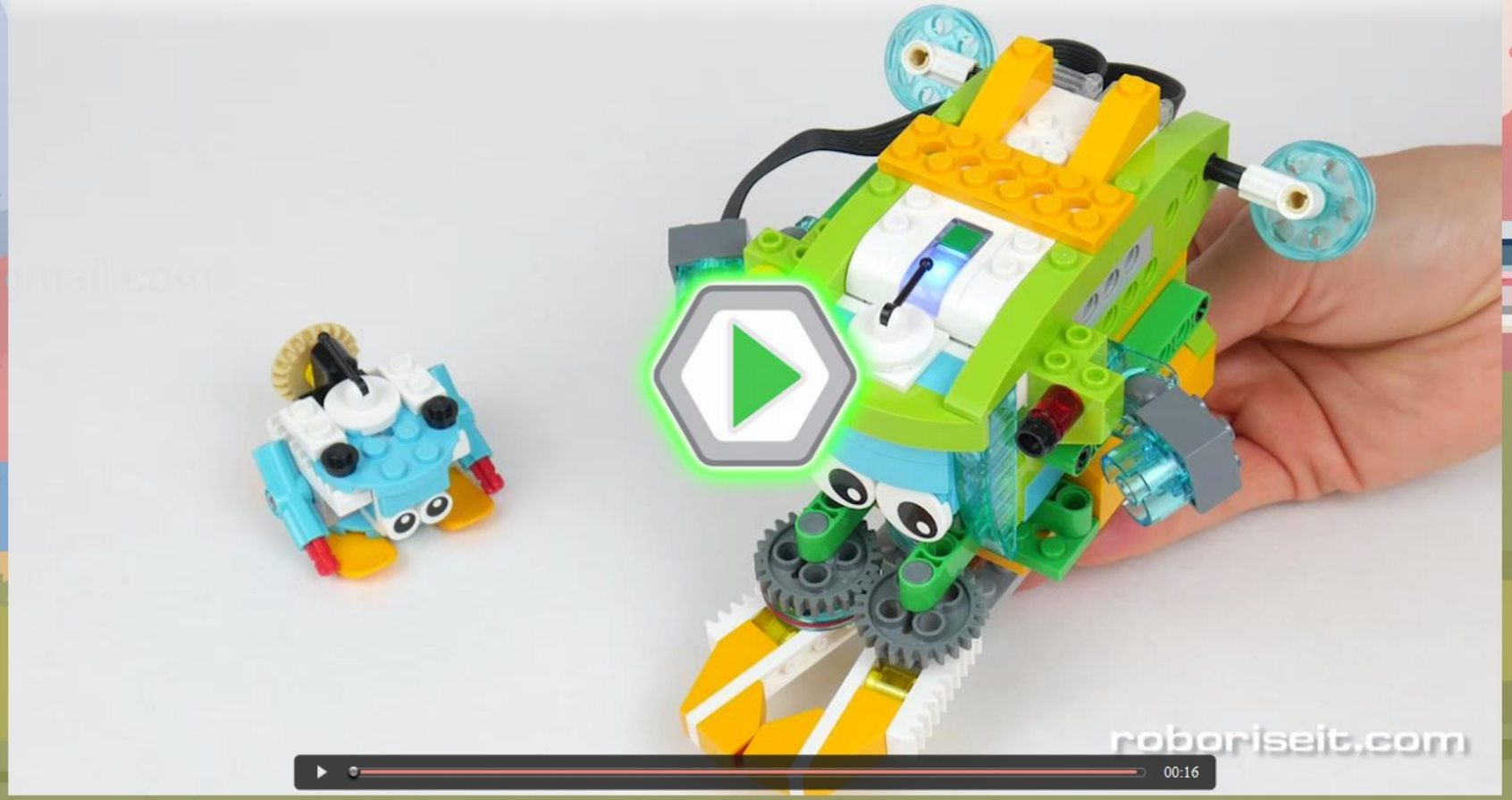
Program the correspondence between the color of the Smarthab and the angle of the robot's tilt.



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ROV controlling

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The controlling of the ROV that has a lot of sensors and manipulators is a hard task. A few human operators needed to make it effective.

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Task 3

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Program the manual controlling of the manipulator.
Take a part in the team competition. One team member will control the manipulator while another one will control the robot's body. Which team will catch more barrels in a minute? The autonomous dron may be used for finding the barrels!

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ROV controlling

Do you remember how the ROVs are controlled?
Usually not all functions are the manually. A lot of them may be pre-programmed. It makes the controlling easily.

Task 4

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Program the automatic work of the manipulator, initiated by changing of Tilt sensor position. When robot is tilted backwards, manipulator must opening. When robot is tilted forward, manipulator must closing.

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Task 4. Algorithm

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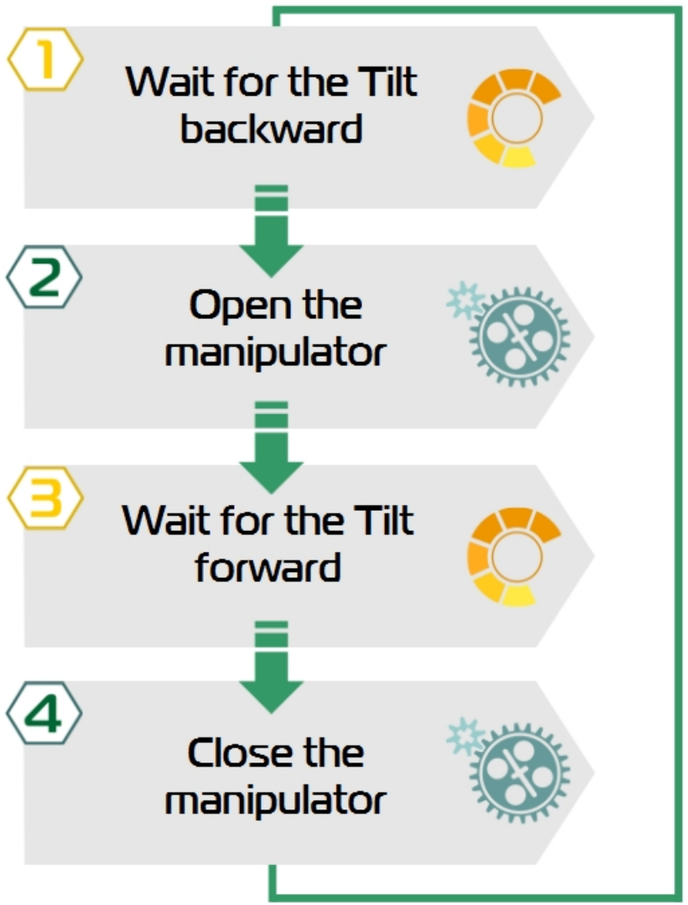
The program should run by the following algorithm:



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Task 4. Program

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1 Wait for the Tilt backward

Крок: 1 2 3 4 5

0

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Task 4. Program

ROBORISE-IT!
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1 Wait for backv 2 Open the manipulator

Крок: 1 2 3 4 5

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Task 4. Program

ROBORISE-IT!
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1 Wait for backv | 2 Oper manipu | 3 Wait for the Tilt forward

Крок: 1 2 3 4 5

0

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Task 4. Program

1 Wait for backw 2 Oper manipu 3 Wait for forw 4 Close the manipulator

Крок: 1 2 3 4 5

Task 4. Program

ROBORISE-IT!
ROBOTIC EDUCATION

1 Wait for backv | 2 Oper manipu | 3 Wait for forwa | 4 Close the manipulator

Крок: 1 2 3 4 5

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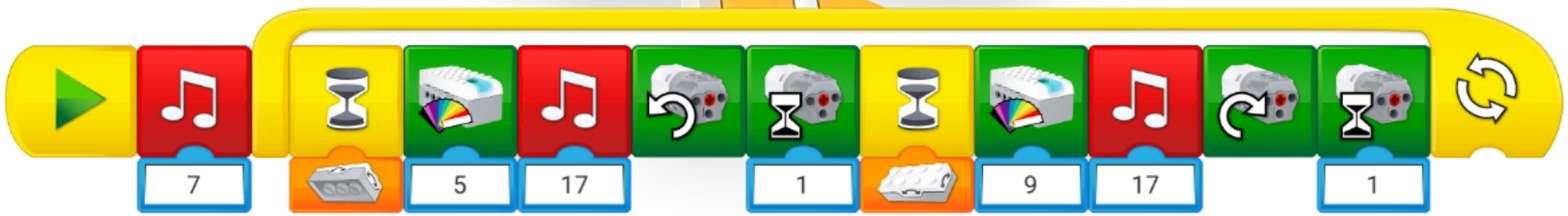
Task 5*

Add the Sounds and color indication to your program to make the robot more realistic.



Task 6

The last program needs sequential actions: opening and closing. Sometimes it may be not convenient. The program that used messaging may be more suitable.

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Task 7

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Take a part in the individual competition. The last program allows to catch the barrels without additional help. Is it more convenient than a team work or not? How many barrels you can catch in one minute?

Task 8*

We know, that any object will pop up from the water, if it's weight is less, than the weight of the water with same volume. It is known that Max, weighing 25 kg, when diving into the pool pushes 27 kg of water. Will he stay above the water if he stops moving?

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Congratulations!

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Now the ocean near the city is clear and safe. The Games may be held without any worries.

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TASK

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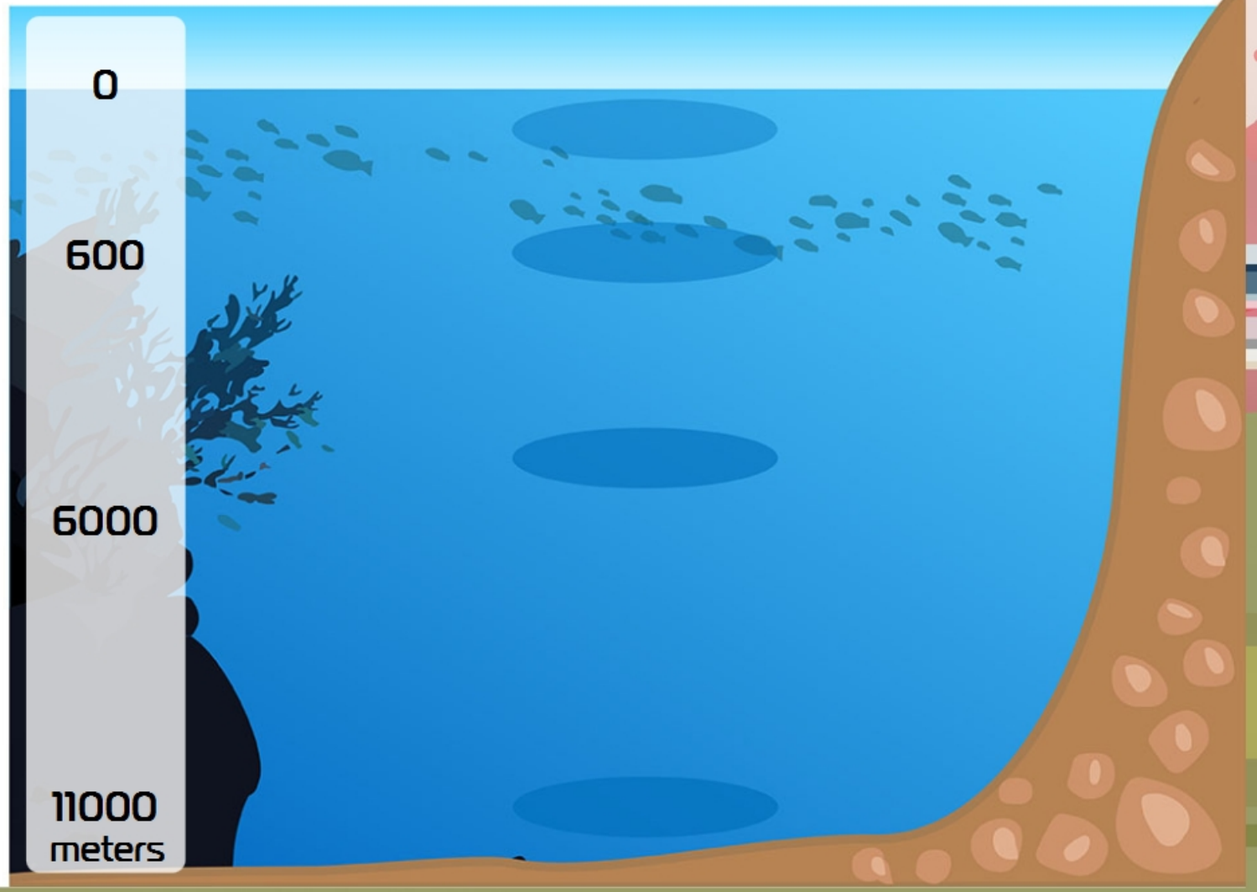
Who can dive deeper?
Drag and drop the pictures to the corresponding depth.



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Discuss!

- What type of water pollution do you know?
- How underwater vehicle may control the depth of diving?
- Why does ROVs need a powerful light, even if they work during the day?

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Your achievements

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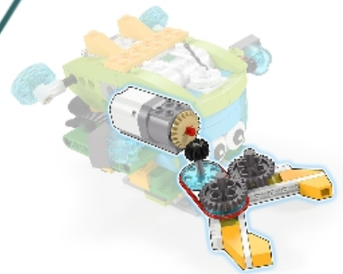
Total count: 0

1

2



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Mission complete!

ROBORISE-IT!
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