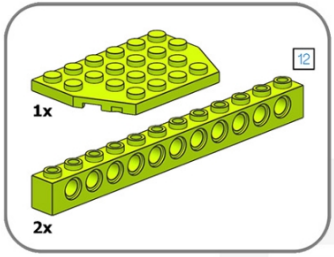

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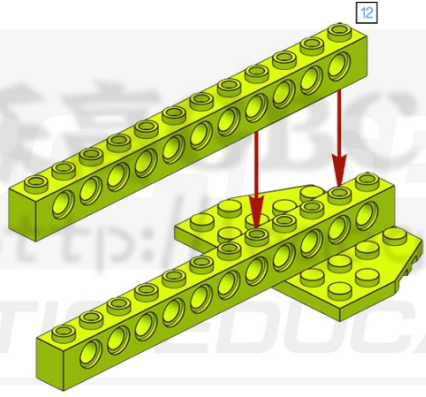

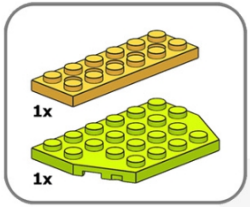

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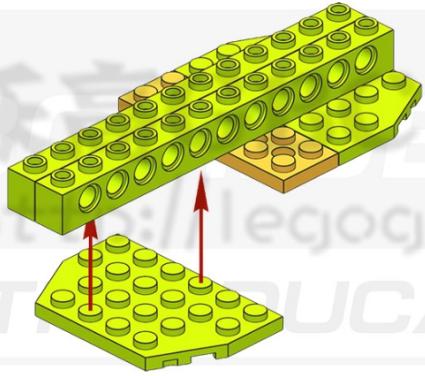

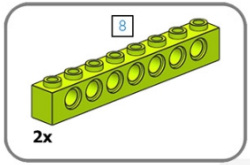

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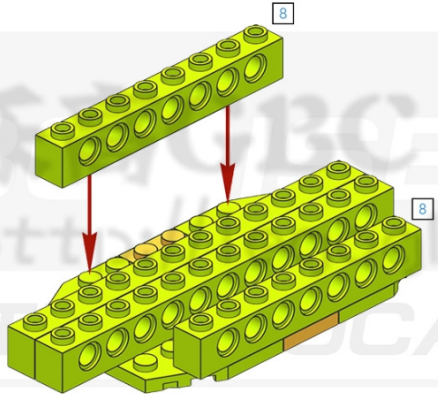

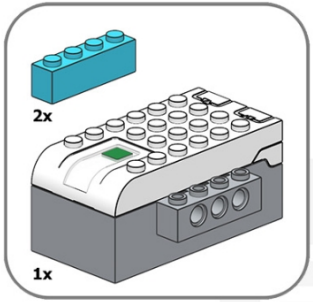

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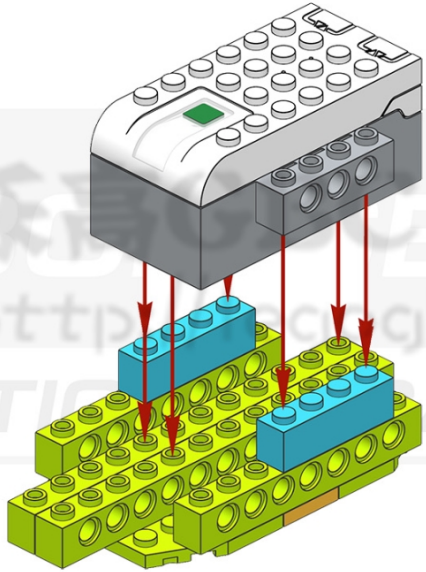

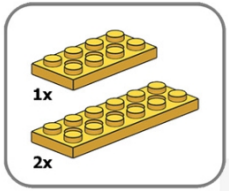

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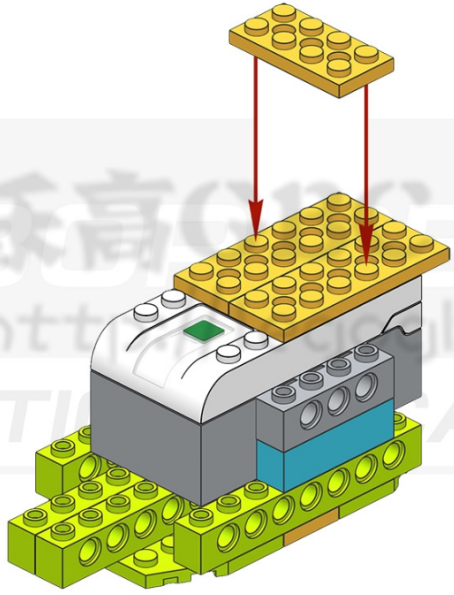

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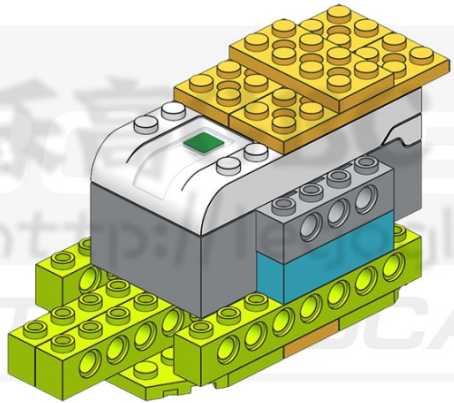

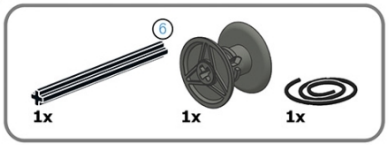

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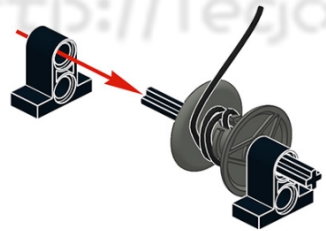

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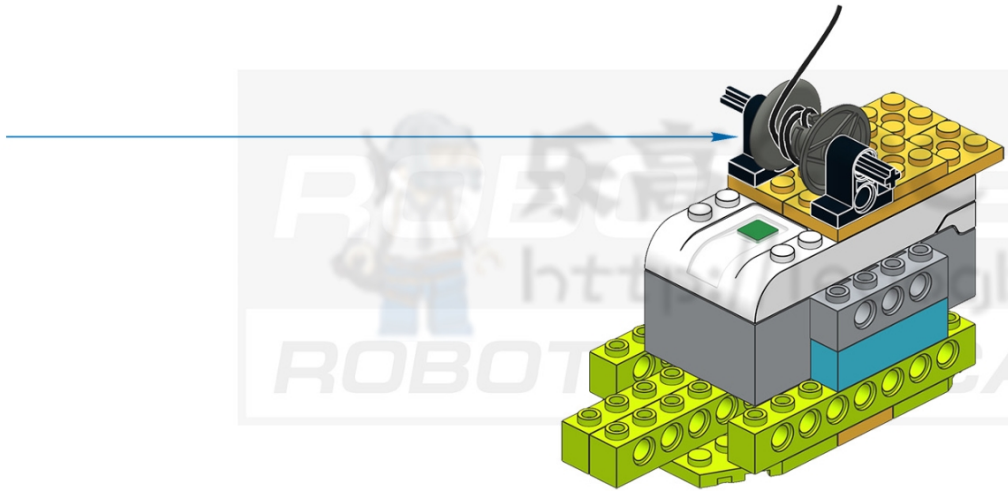

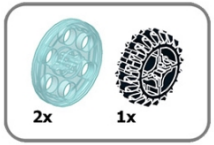

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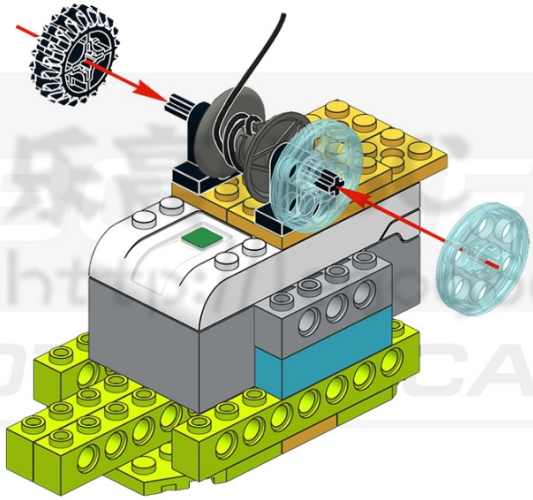

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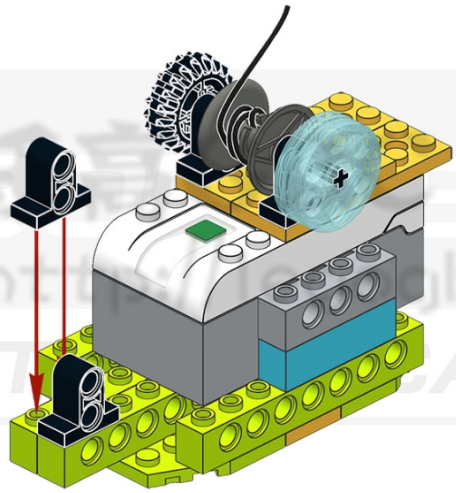

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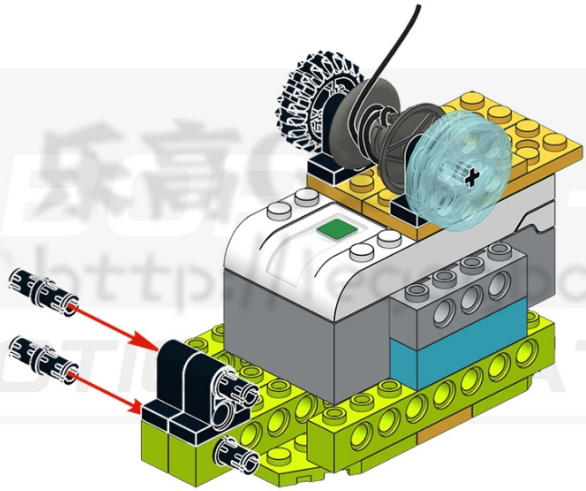

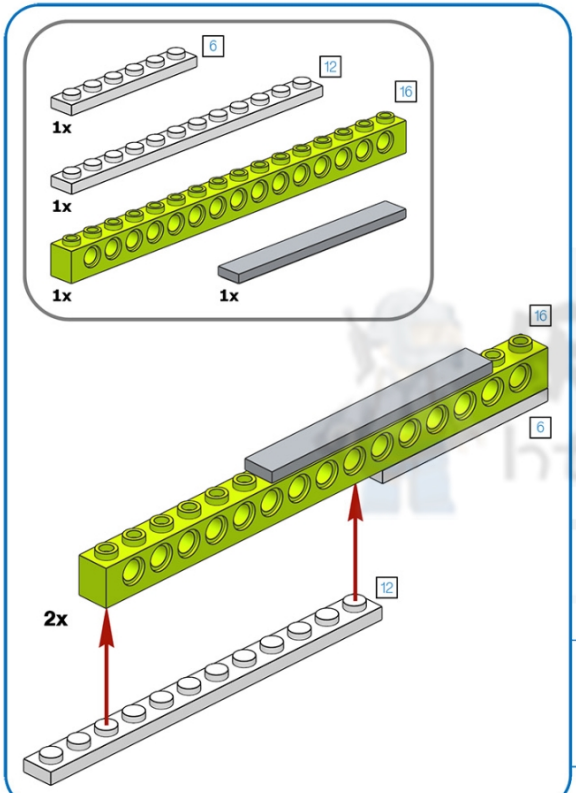
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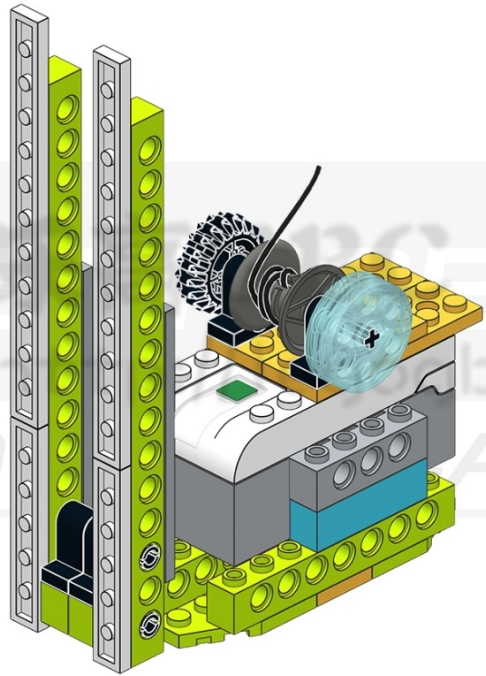

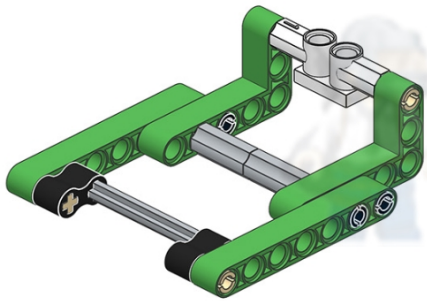

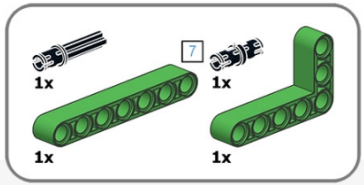

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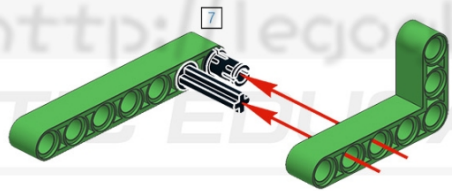

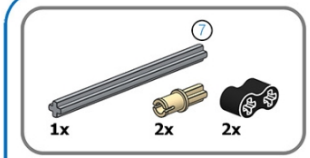

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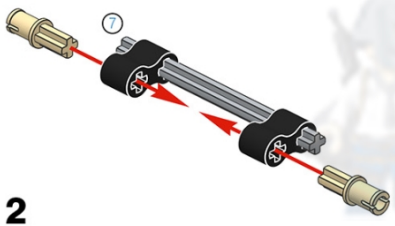

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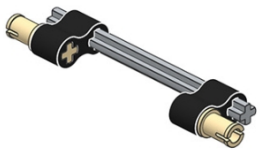

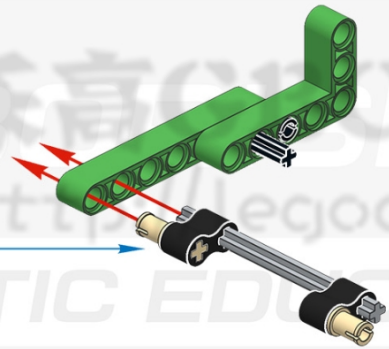

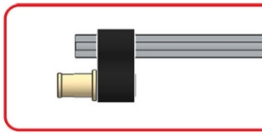

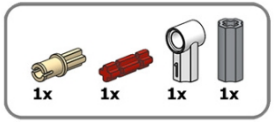

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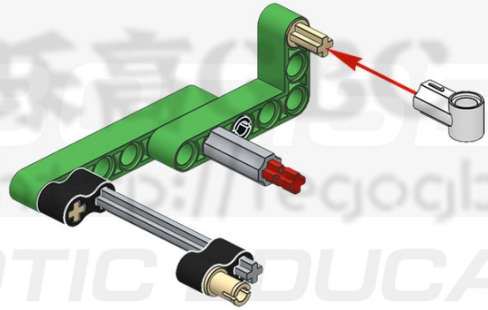

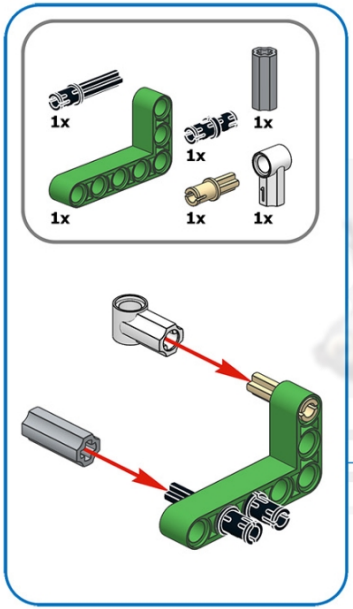
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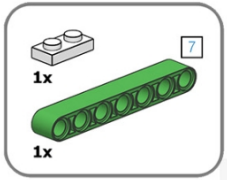

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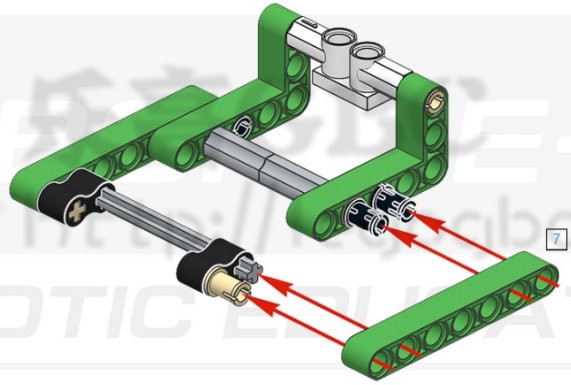

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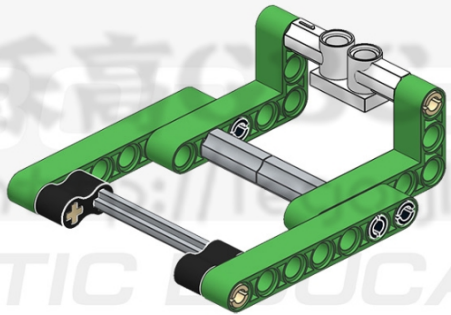

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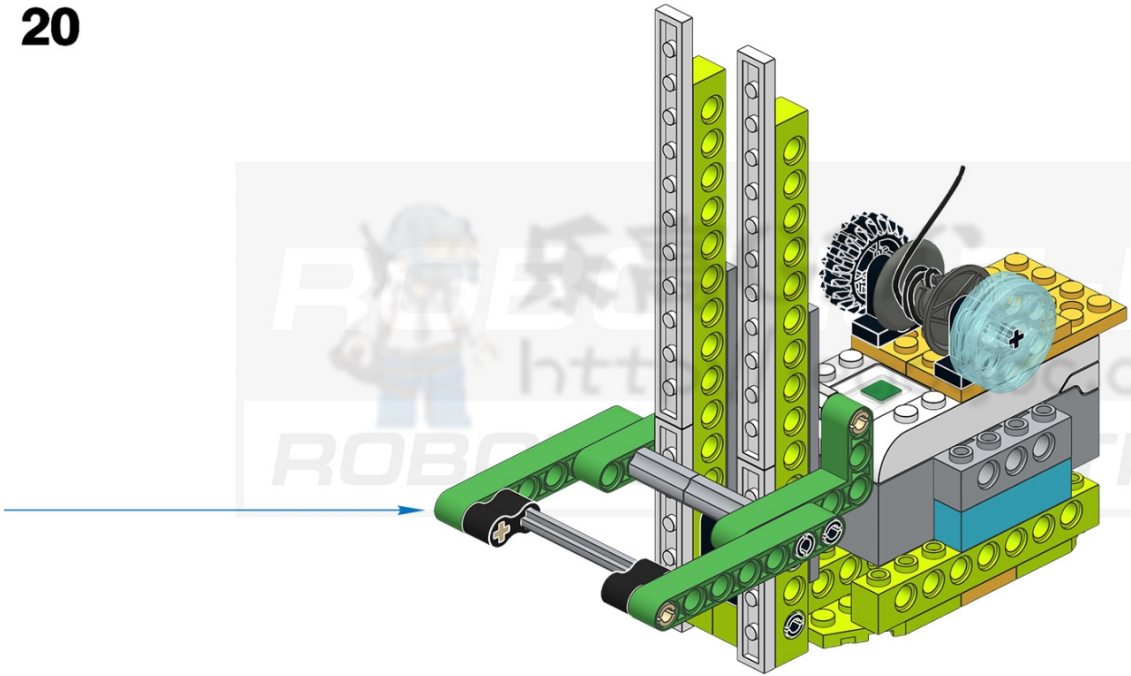

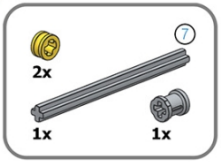

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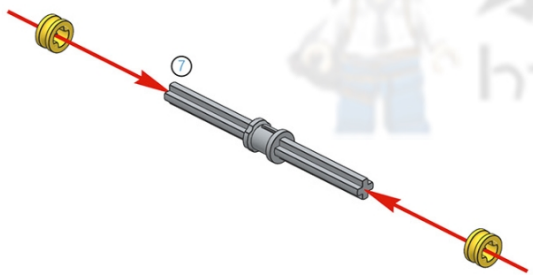

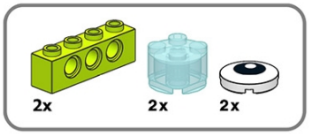

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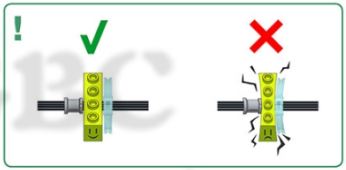

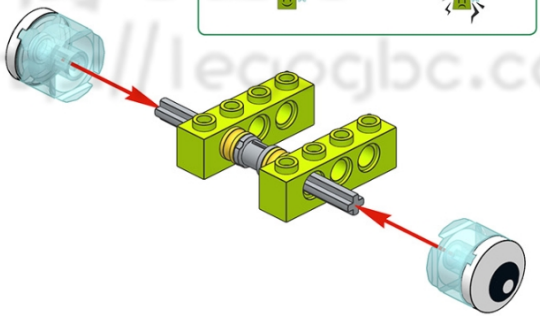

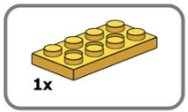

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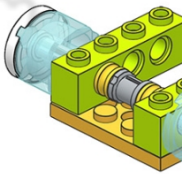

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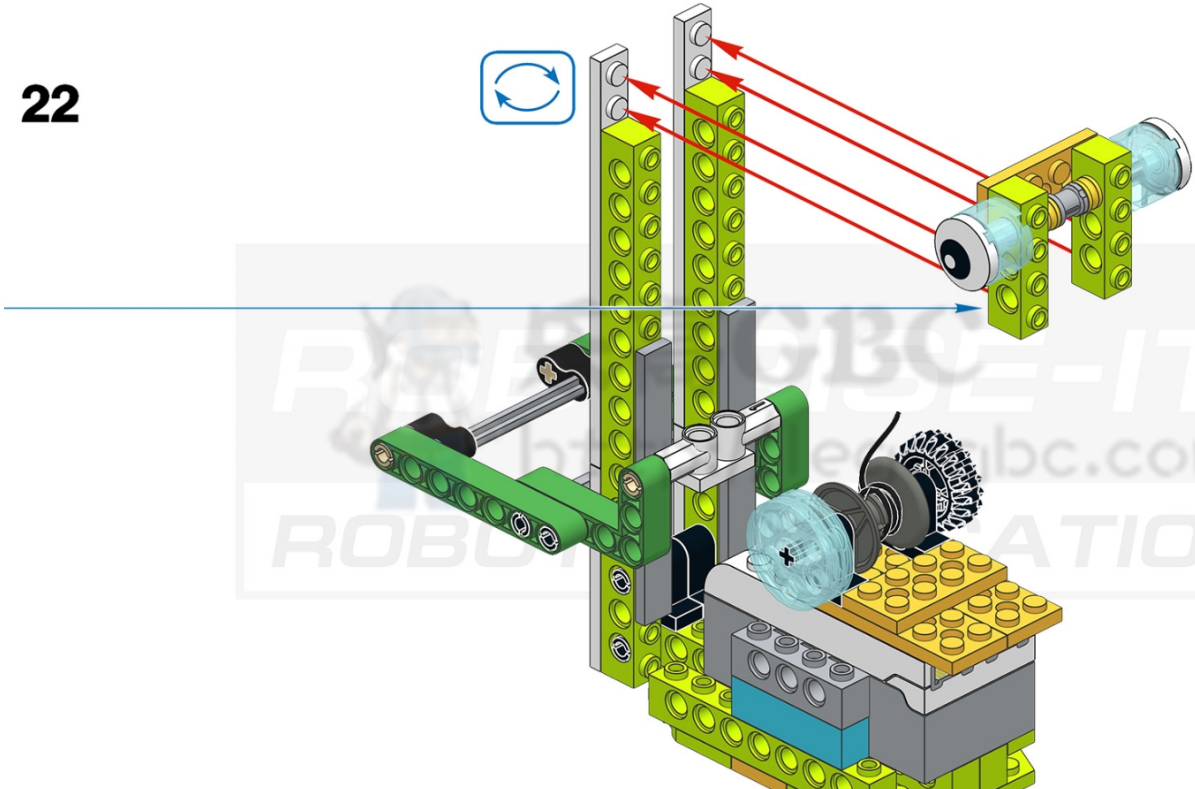

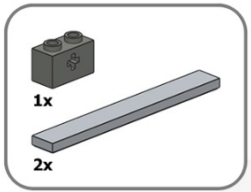

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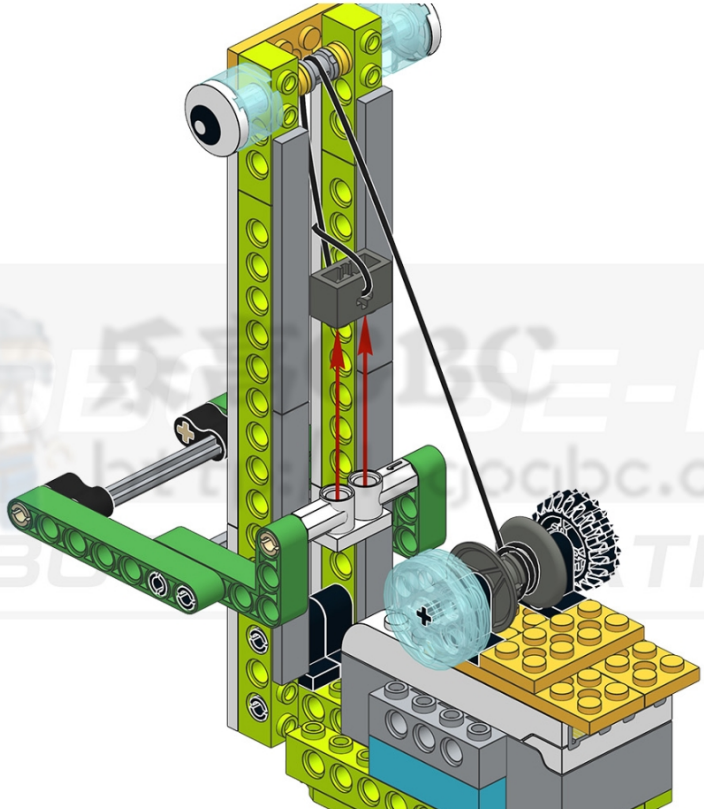

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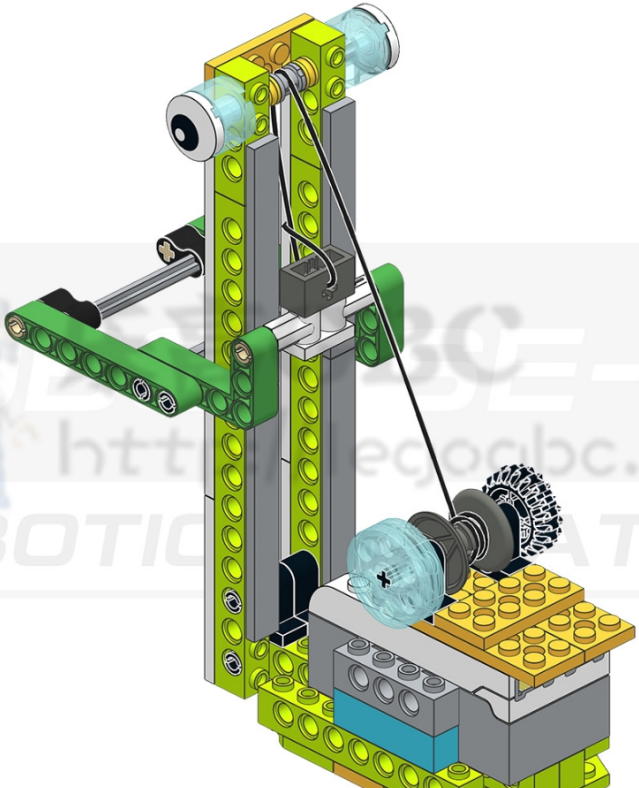

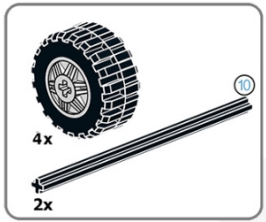

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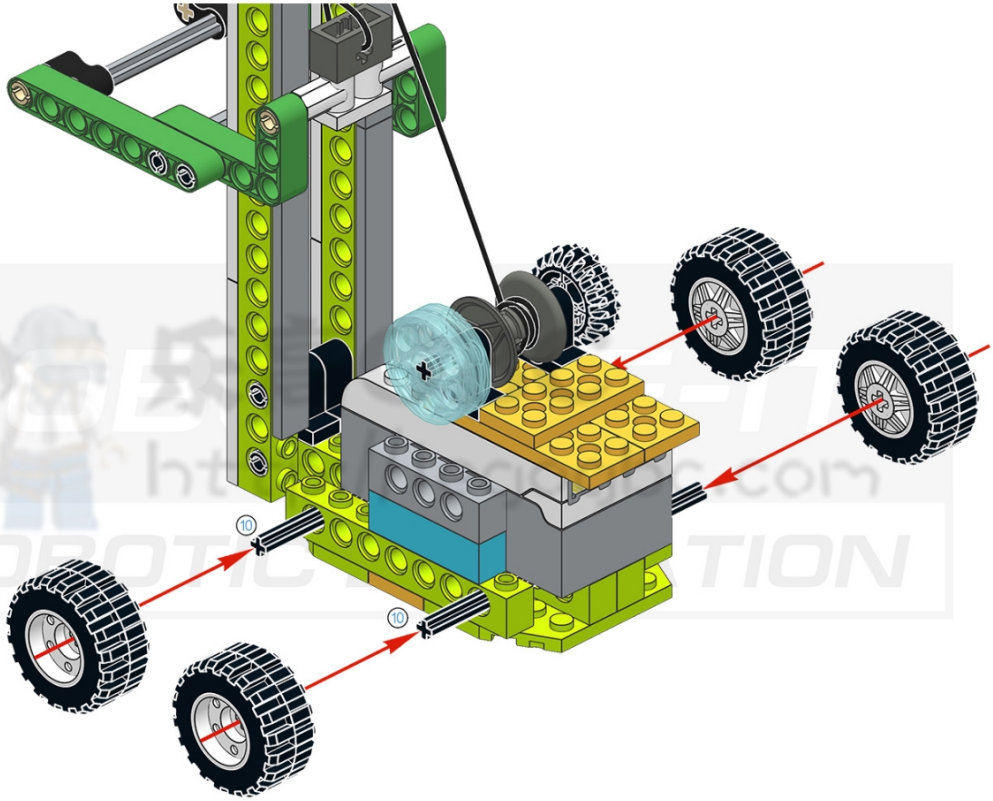

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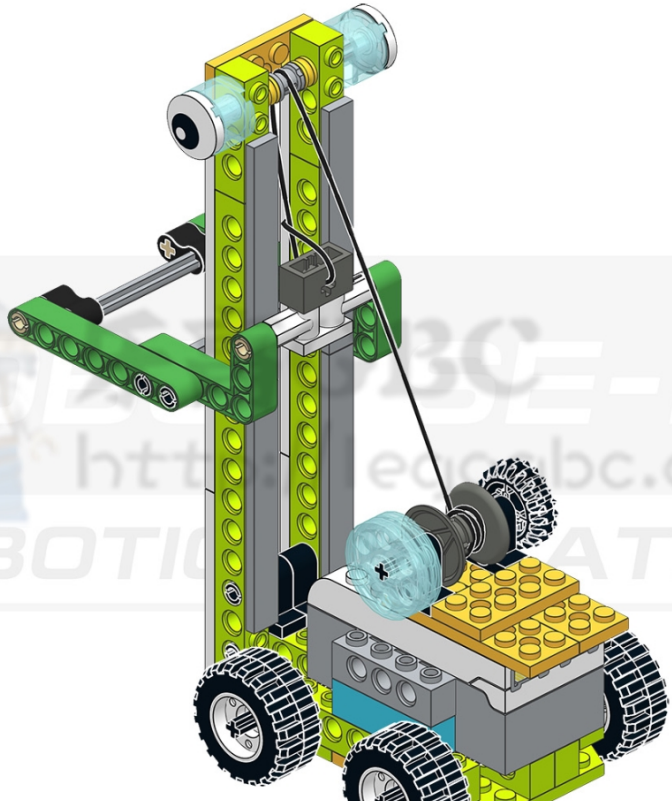

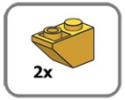

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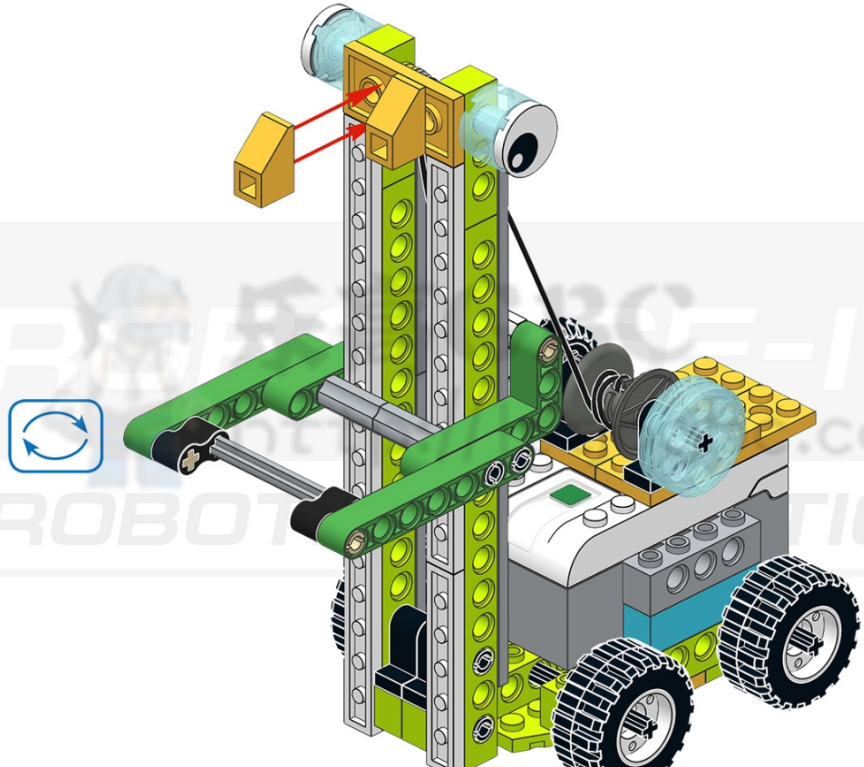

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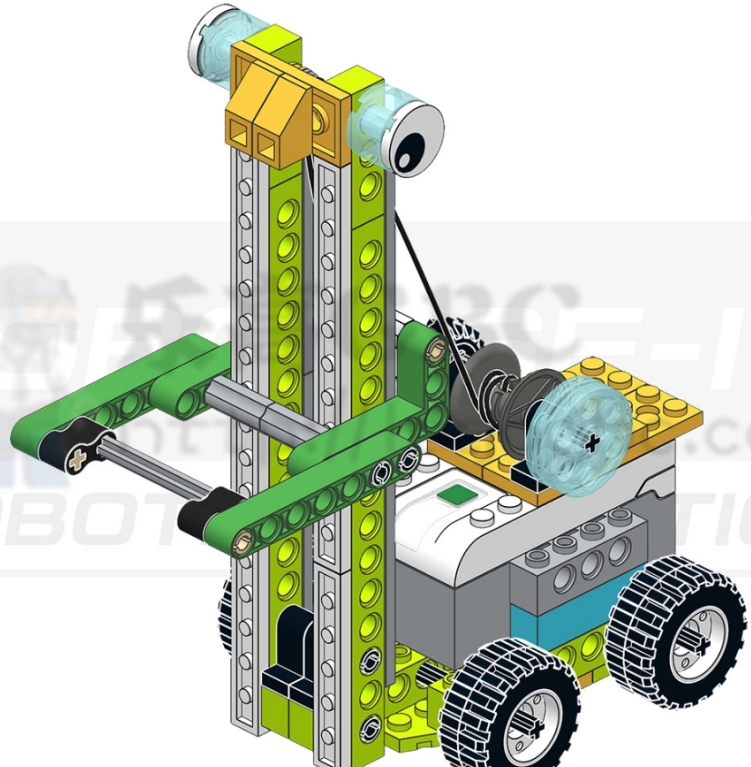

Cargo

Build pallet and cargo

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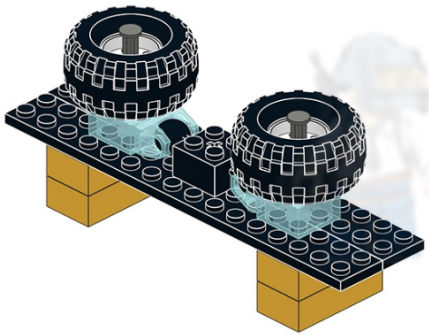

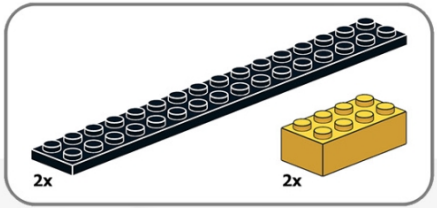

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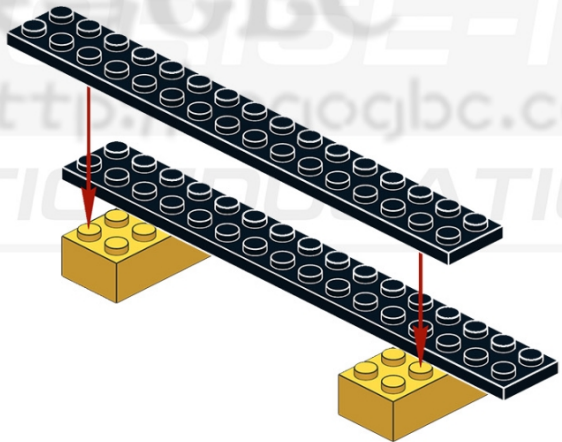

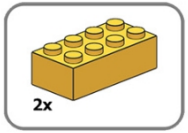

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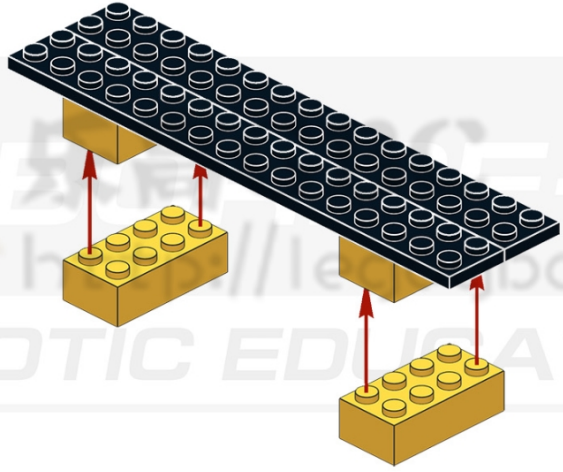

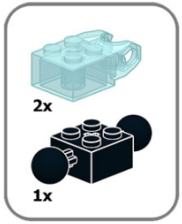

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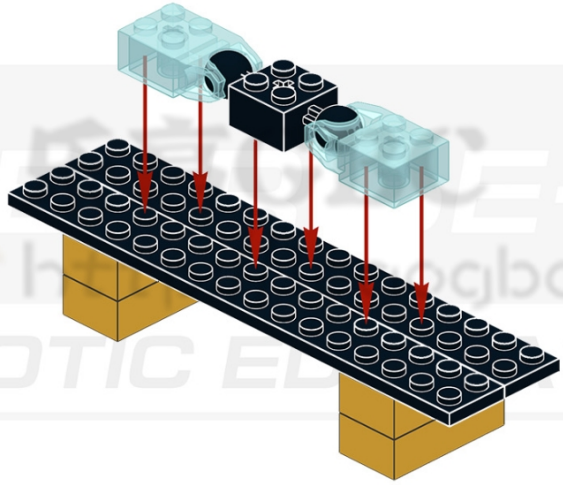

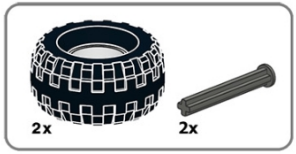

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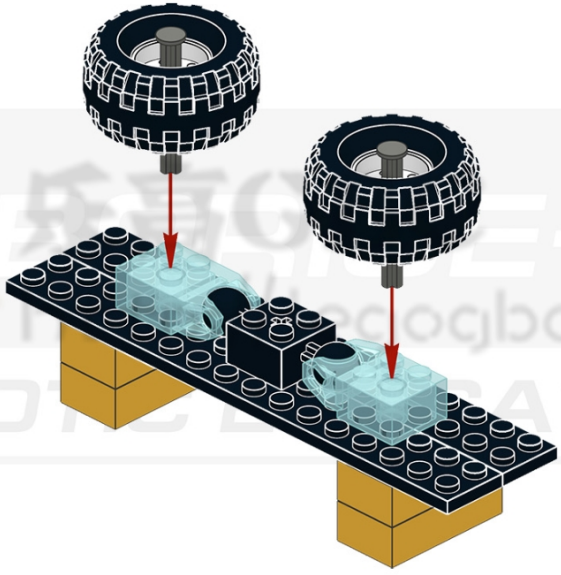

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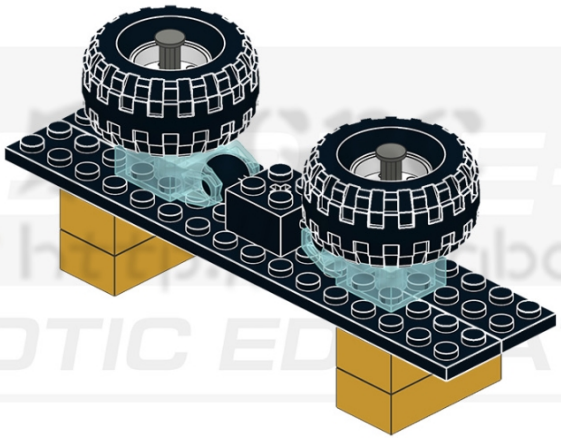


Note!

The cabels must not rub while the robot is moving!

Task 1

Check the transmission of the robot. How is the position of the loader forks now controlled?

Discuss!

How can I increase the speed of the forks and not use manual winch rotation?

Task 2

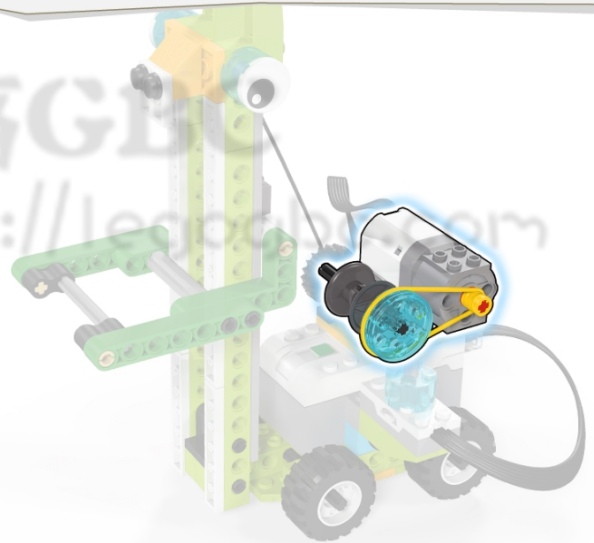
One of the possible solutions to the problem is the use of a winch drive from a motor. In this case, it is more convenient to use a belt drive, since when the forks are blocked in the extreme upper position, the belt will slip, and the structure of the robot will not be destroyed.

Design features

The drive from the motor to the winch can be built using a belt drive, which reduces the rotation speed by three times and does not block the motor when the cable is blocked in the extreme position of the forks.

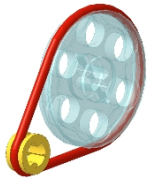
Find:

- motor
- belt drive
- winch



Belt drive

Belt drive is widely used for transmission of rotation. It consists of at least two pulleys and a belt. This transmission has minimal vibration and noise, but cannot transmit much power. The speed of rotation of the pulley depends on the ratio of the pulley diameters.

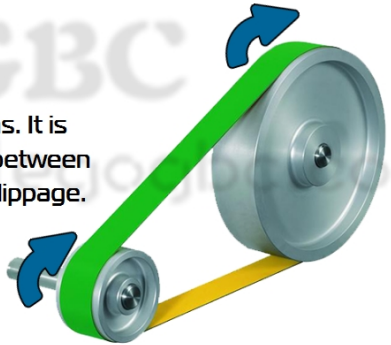


LEGO Belt Drive

Belt drive

Note! The belt may slip and the original axle may not always rotate as you expect. For example, a heavy robot may not move at all, although if it is lifted, the wheels will rotate.

The pulley has a recess in which the belt runs. It is made in order to increase the contact area between the belt and the pulley and thereby reduce slippage.



When using a belt drive, keep in mind that the direction of rotation of the input and output axes is the same.

Task 2

Motorize the robot by adding a motor and winch belt drive.

Tasks

Place the robot parts in the correct places

Task 3

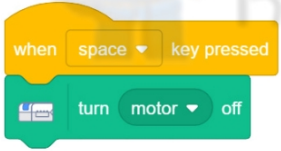
Program the winch control using the PC or tablet buttons.

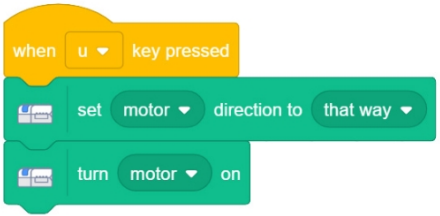
Task 3. Program

Scratch | WeDo Software

Program the robot controls using the buttons.

In the Scratch 3.0 programming environment, the program looks like this:





Task 3. Program

Scratch | WeDo Software

Program the robot controls using the buttons.

In WeDo Software, a similar program looks like this:

Task 4

Test the robot with one yellow rubber belt in gear. What is the maximum weight the robot can lift?

Task 5

Add a second yellow belt. What is the largest weight the robot can now lift?

Task 6

Replace the two yellow belts with one red one and retest. Can a robot lift a pallet with a load on it?

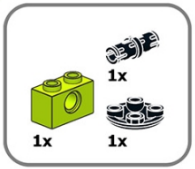
Discuss!

Our next task is to implement external control of the position of the robot's forks. What is the best sensor to use to create such a manipulator?

Tilt sensor

Extend the tilt sensor handle for external robot control

Go to the first slide of the instruction



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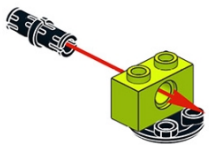

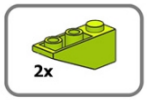

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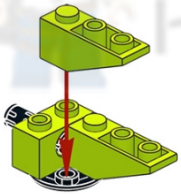

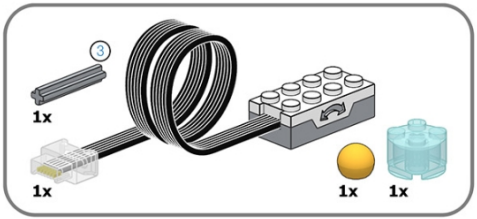

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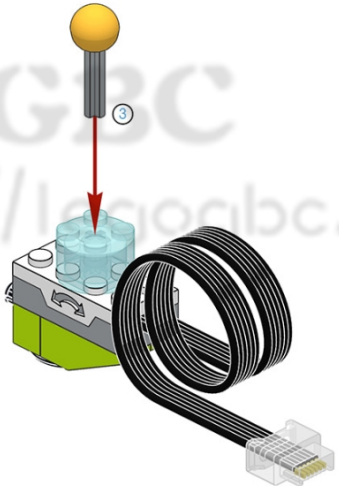

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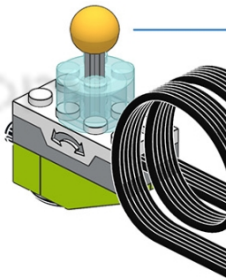

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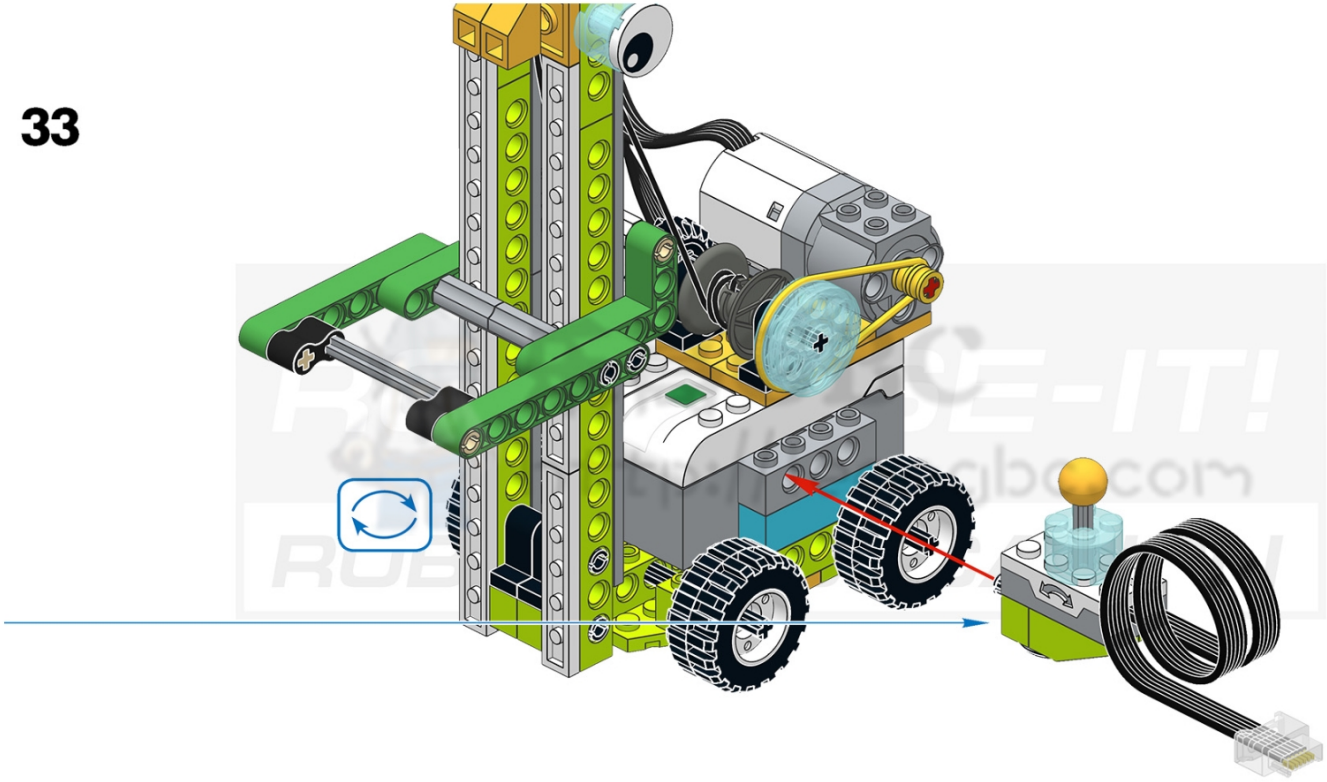

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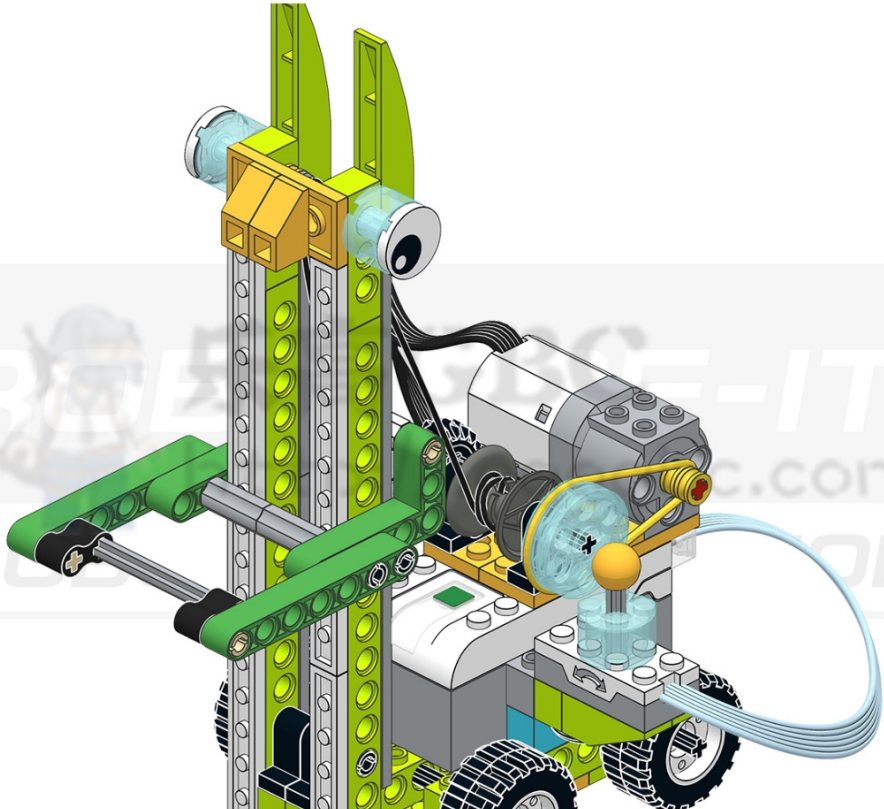

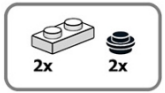

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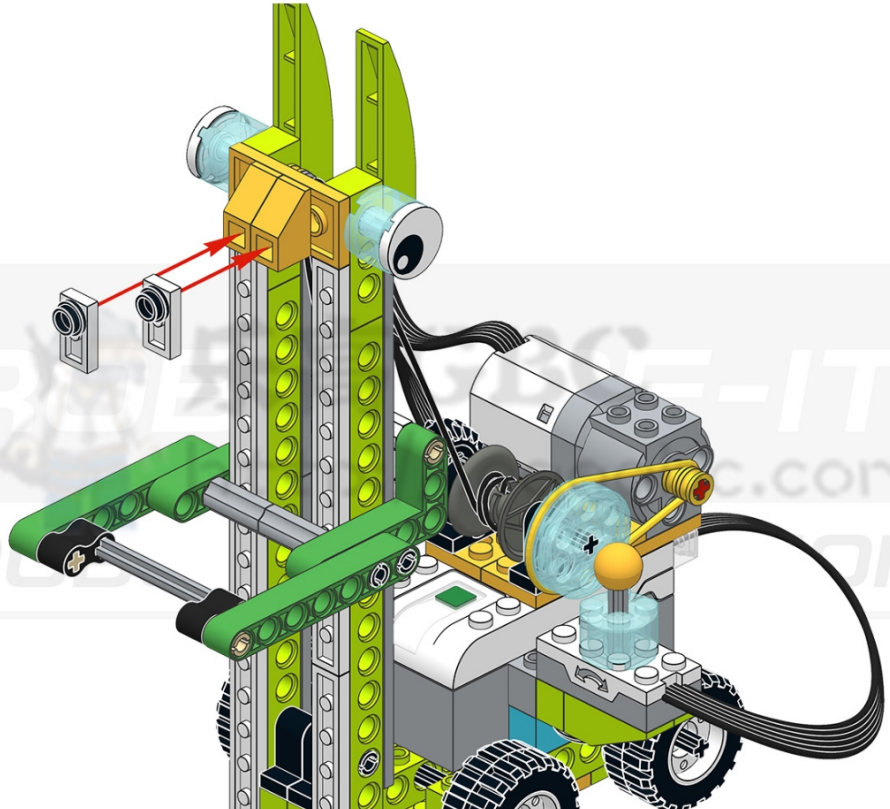

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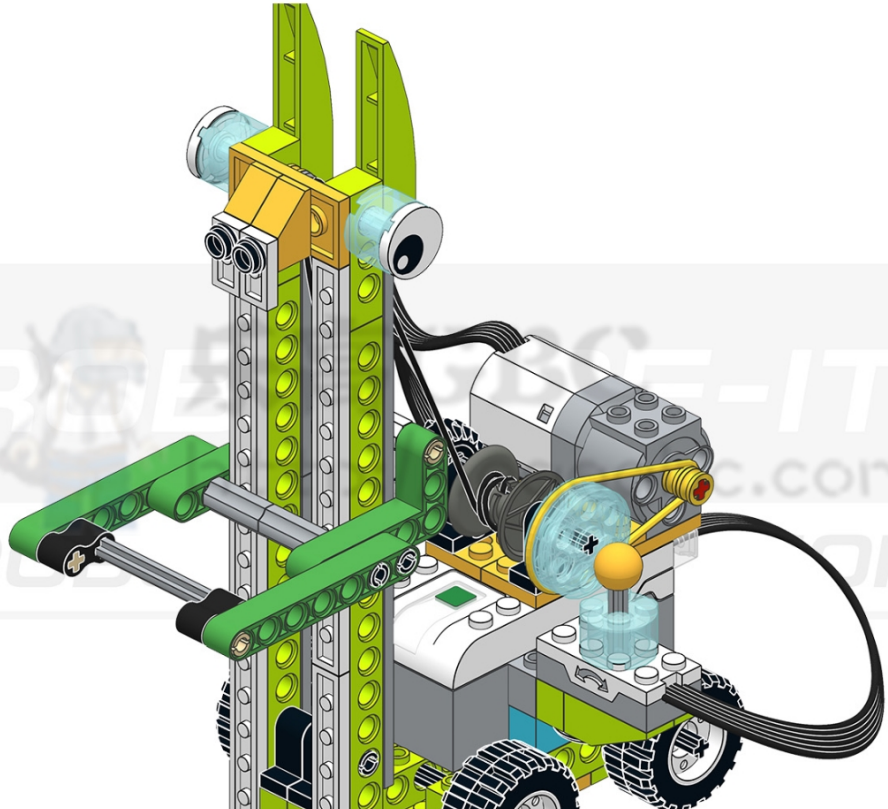


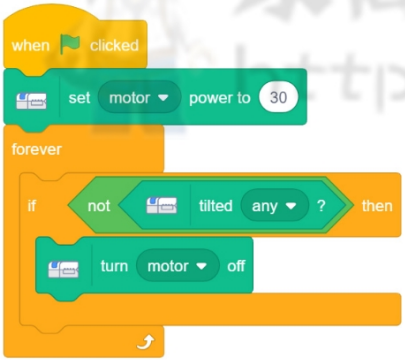
Task 7

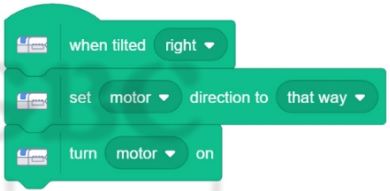
Program and test the robot's fork control using the handle with the tilt sensor attached to it.

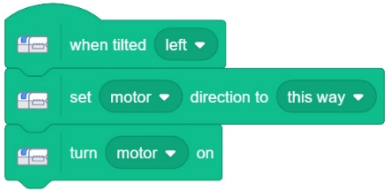
Task 7. Program

Scratch | WeDo Software

Modify the program you wrote as follows:



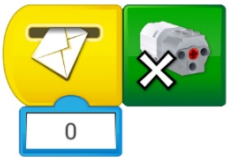


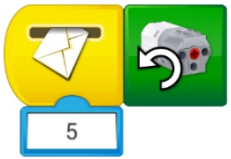


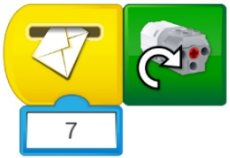
Task 7. Program

Scratch | WeDo Software

Modify the program you wrote as follows:







Question

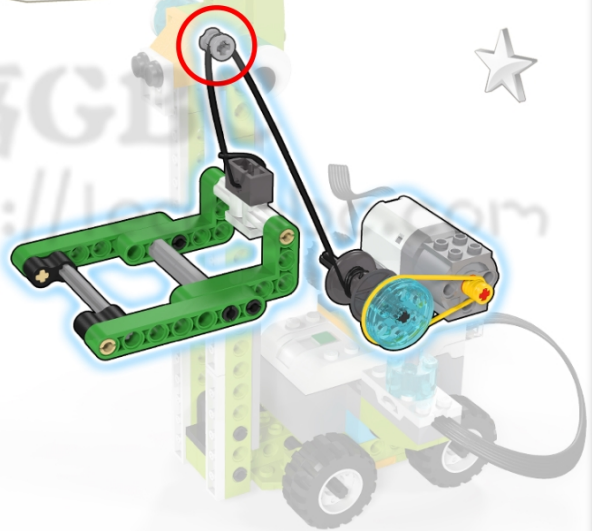
What is the purpose of the immovable block at the top of the robot?

Change the direction of the force, which entails the cable

Increase the force with which the cable pulls the forks

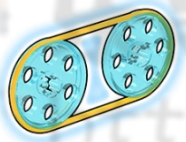
Decrease the force with which the cable pulls the forks

Accelerate load lifting



Question

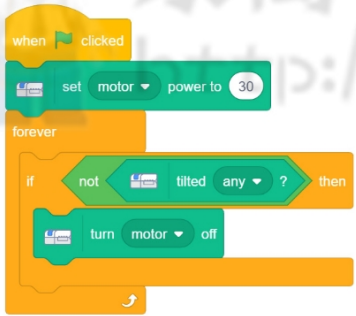
What other mechanism (besides the winch) can be used when building a forklift to ensure the movement of the forks (converting the rotation of the motor into a forward motion)?



Question

Scratch | WeDo Software

Which of the blocks shown is executed by a part of the program when a certain condition occurs?



Question

Scratch | WeDo Software

Click on the block that follows the direction of the tilt sensor.

Discuss!

- What and where are forklifts used?
- Which belt allows you to transfer more power?
- What features does the belt drive have, why is it advisable to use it in today's robot?
- What can the tilt sensor detect? How did you use it?

Your achievements

Total: 0

1

2

3

4