



# Build the robot!

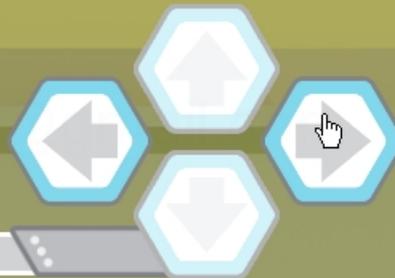
**ROBORISE-IT!**  
ROBOTIC EDUCATION

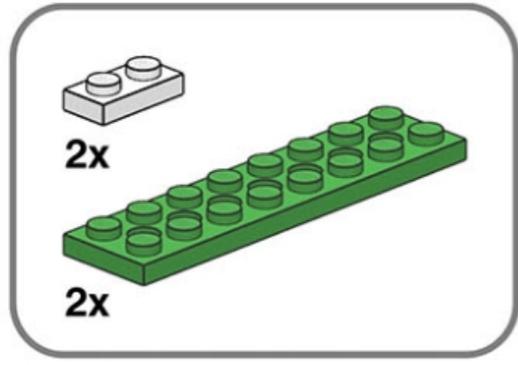


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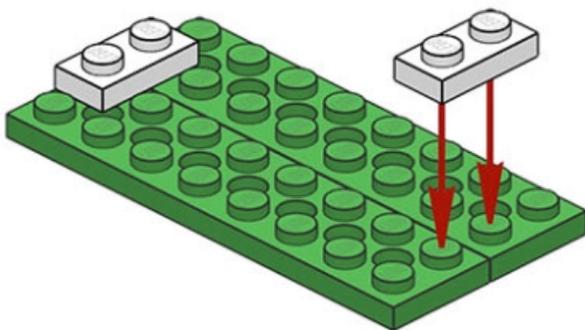


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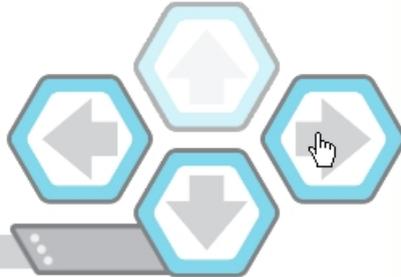


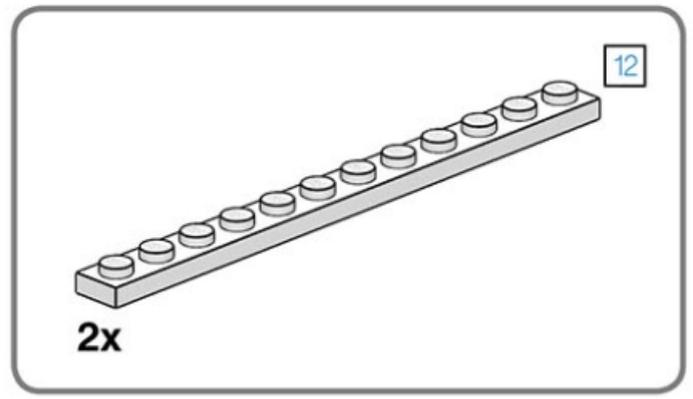


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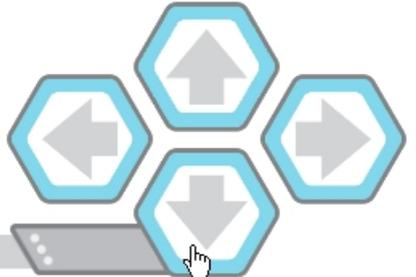
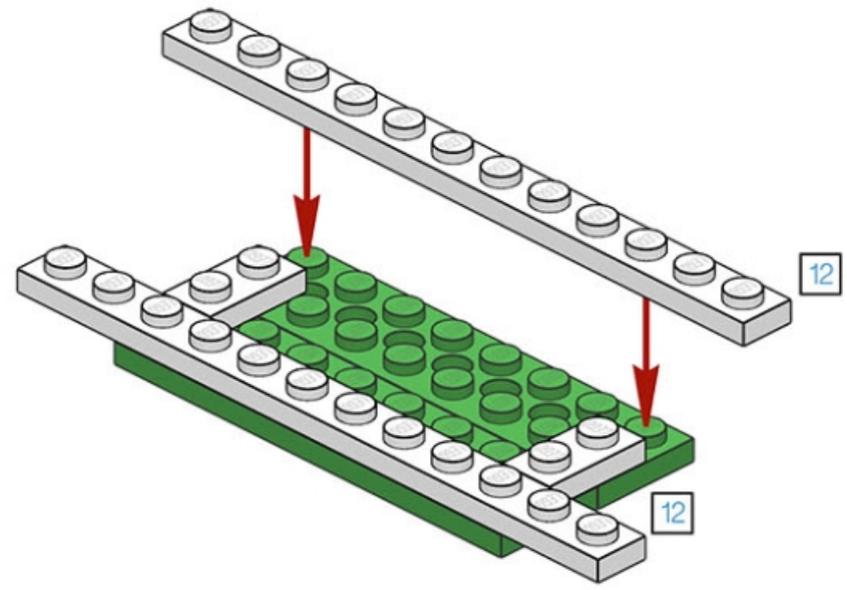


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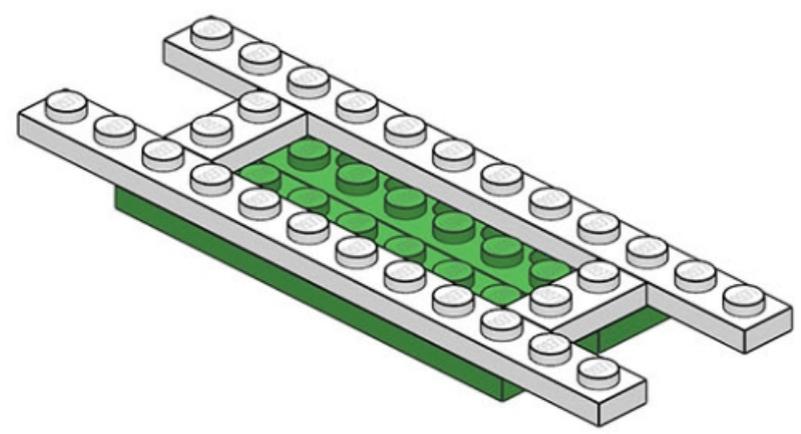


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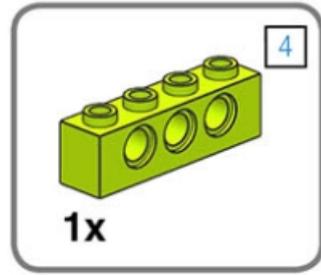
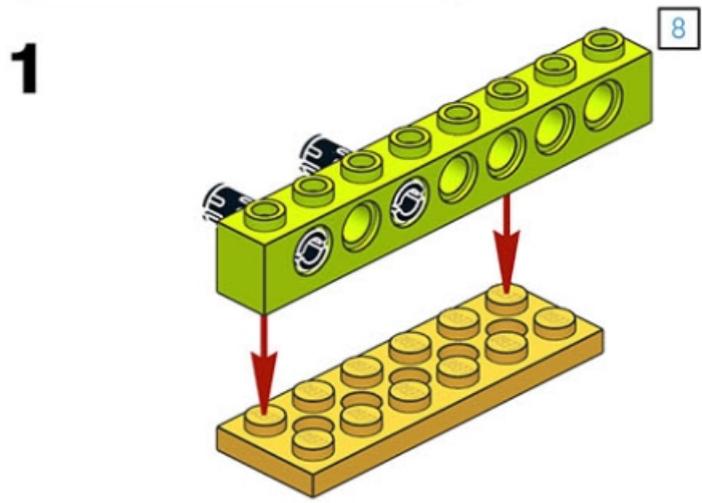
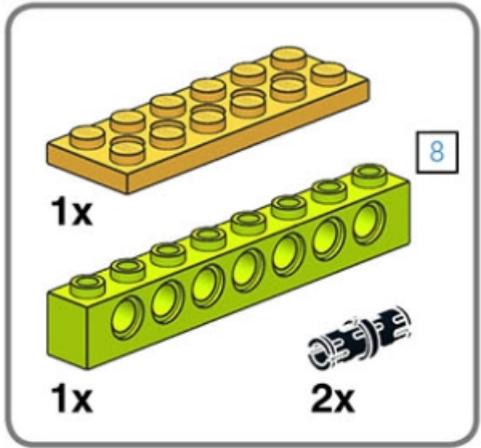
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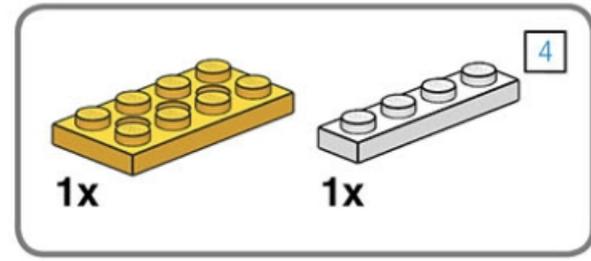
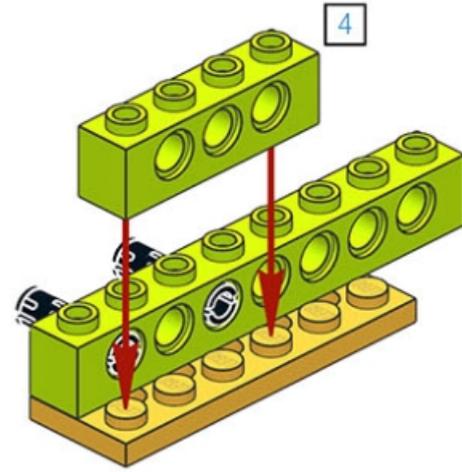
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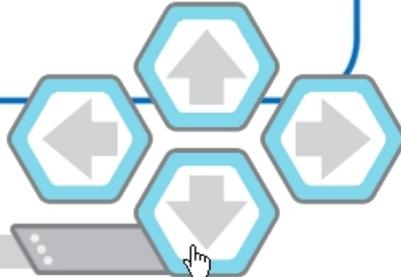
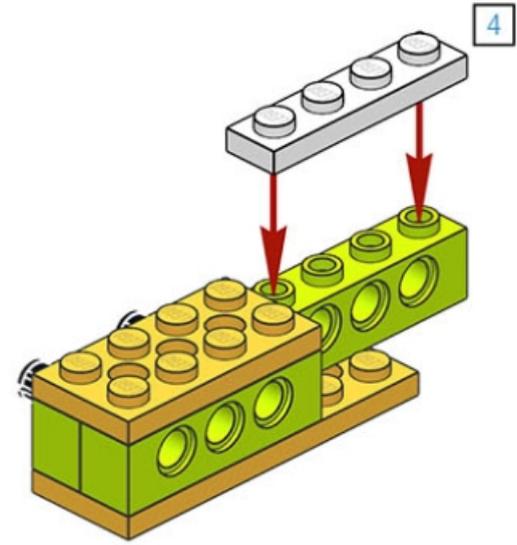
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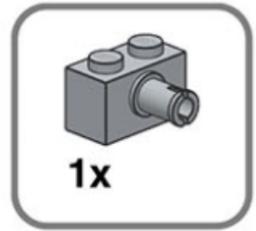
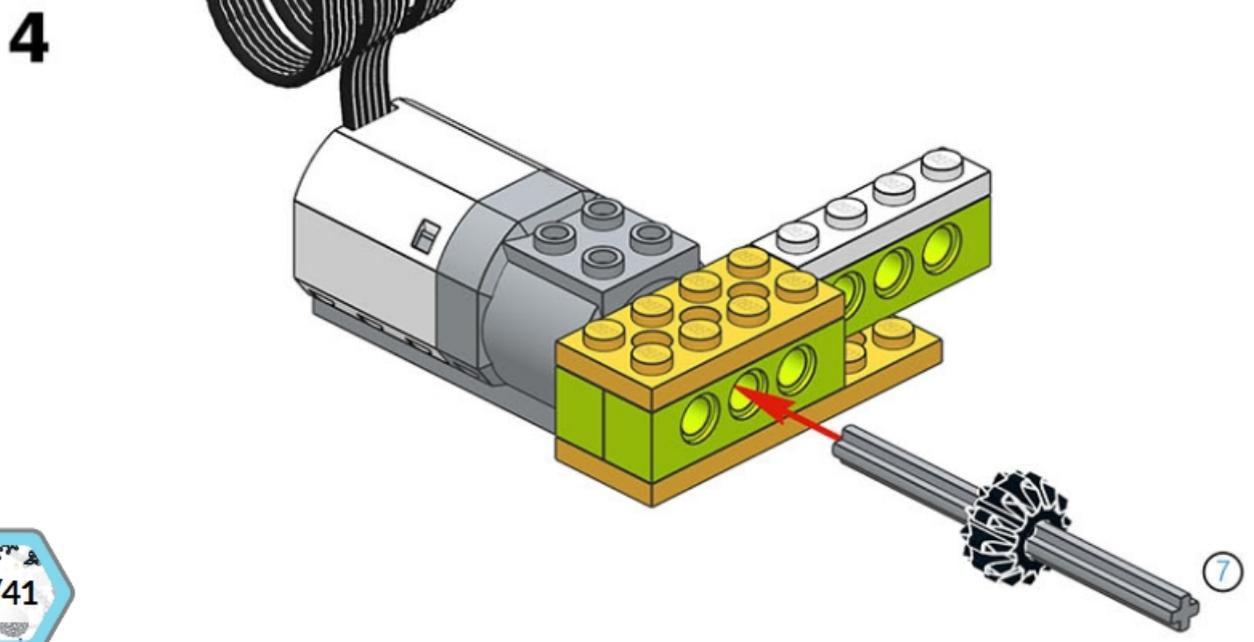


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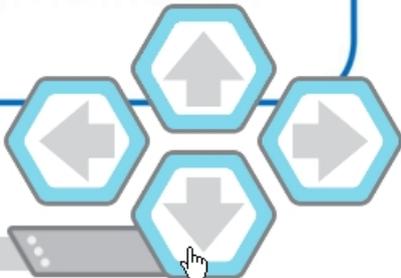
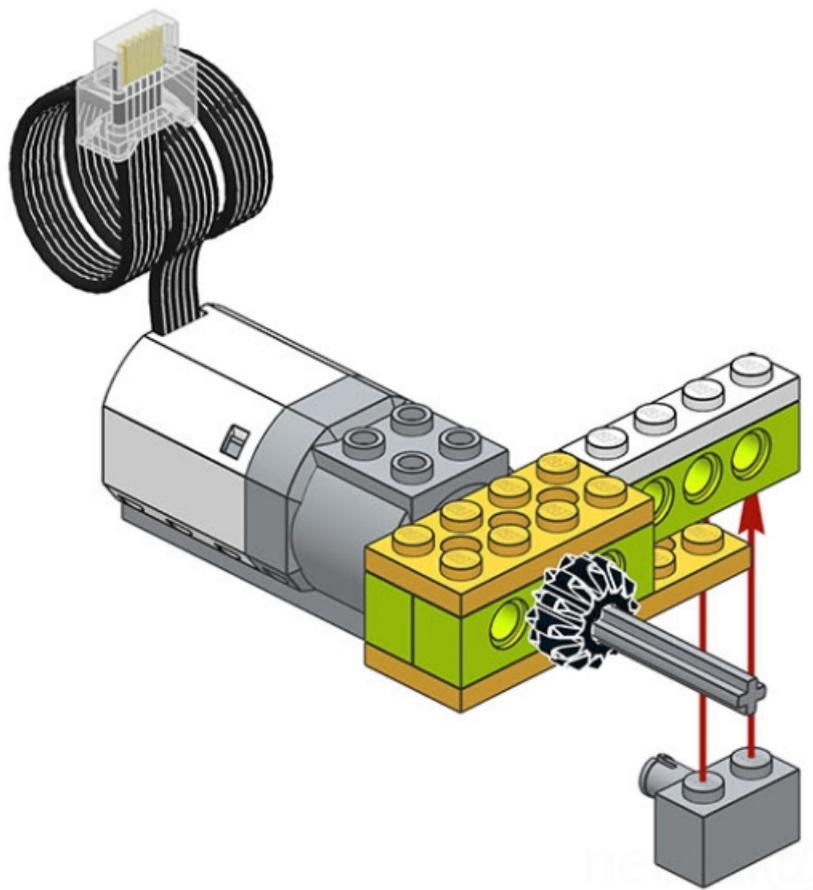


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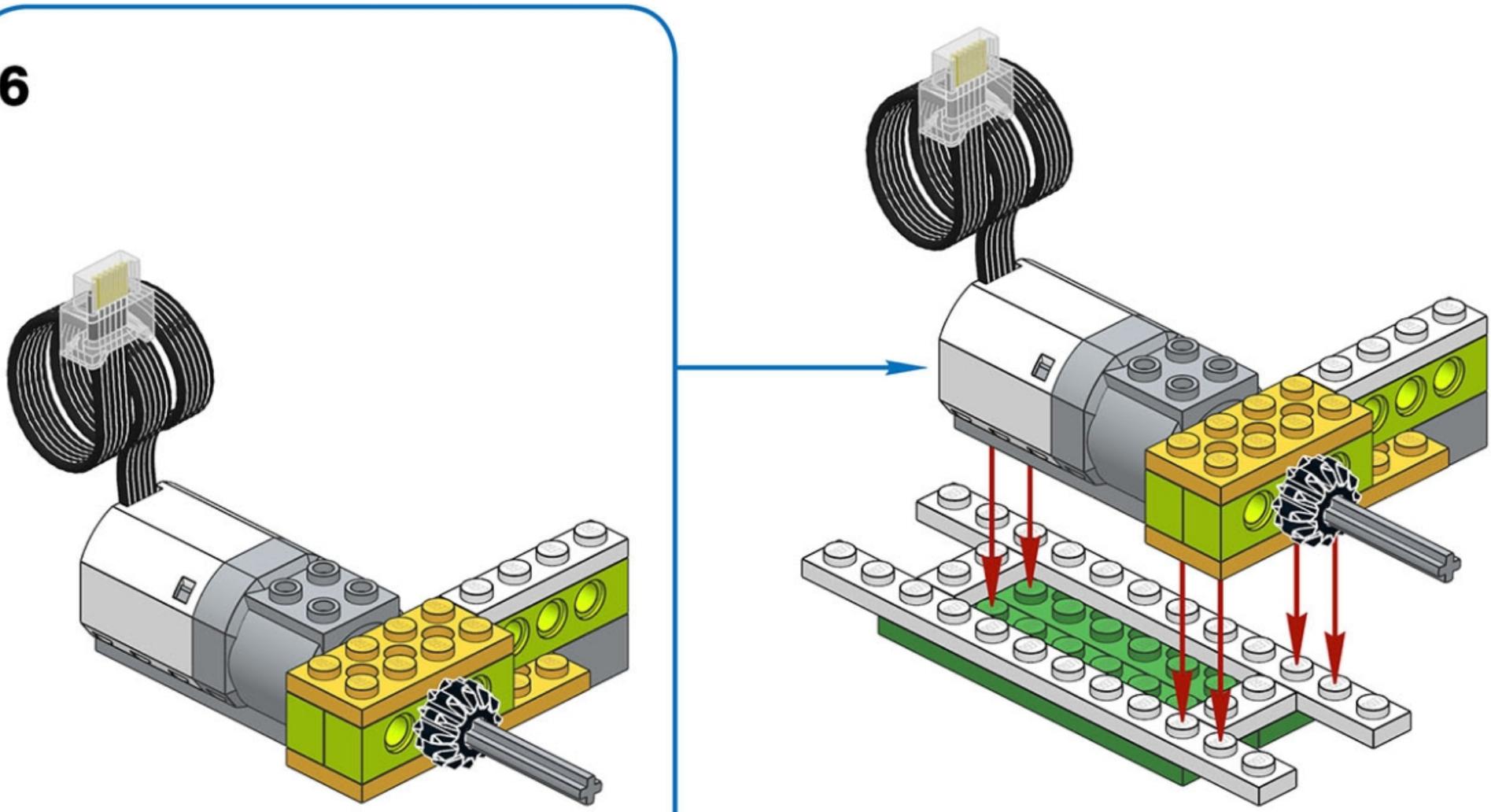




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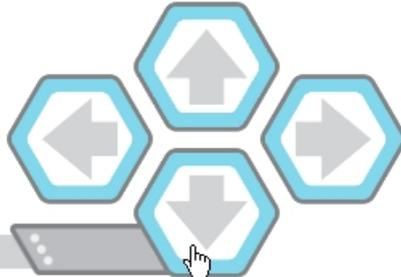


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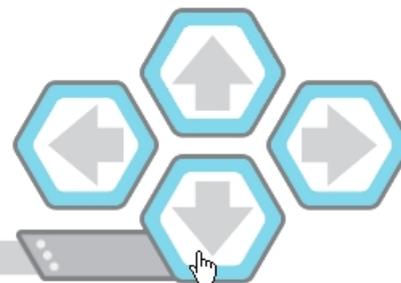
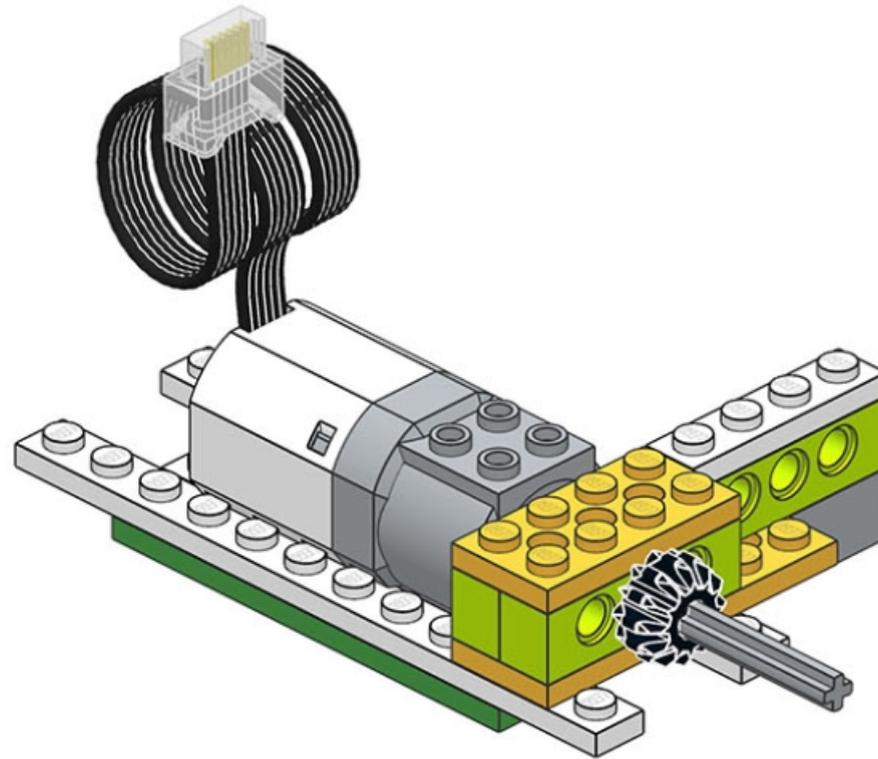
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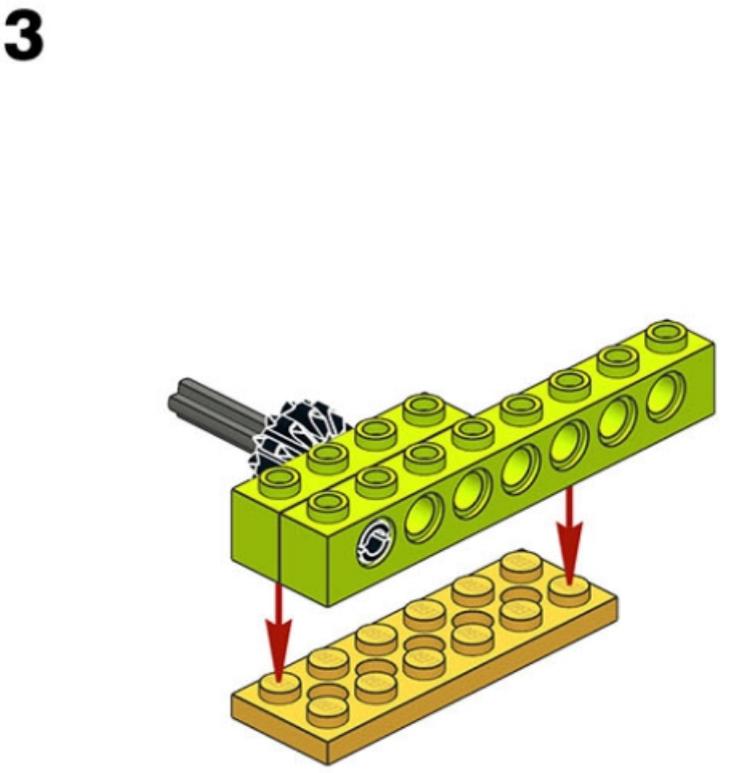
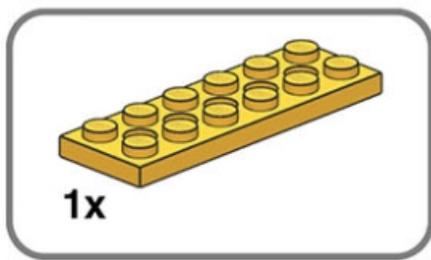
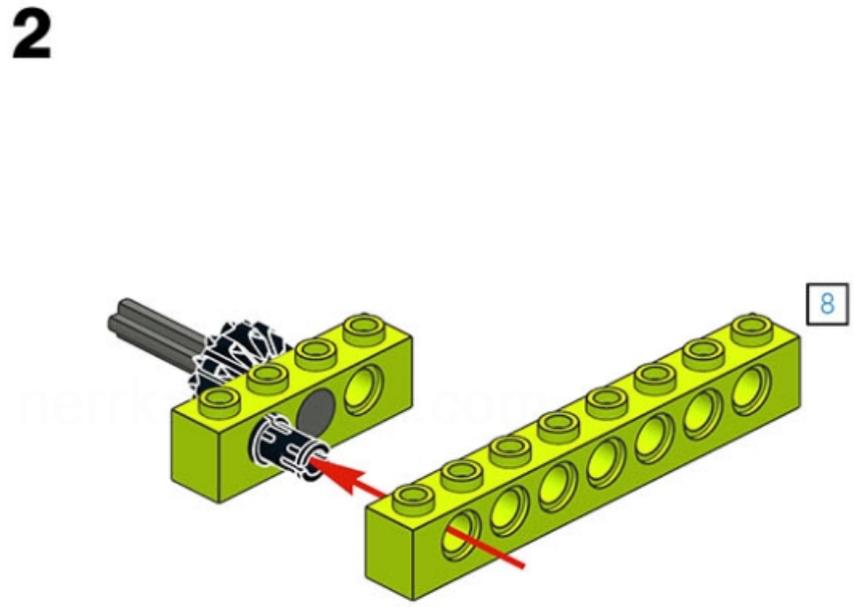
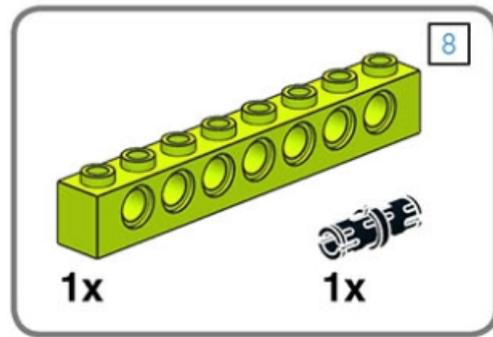
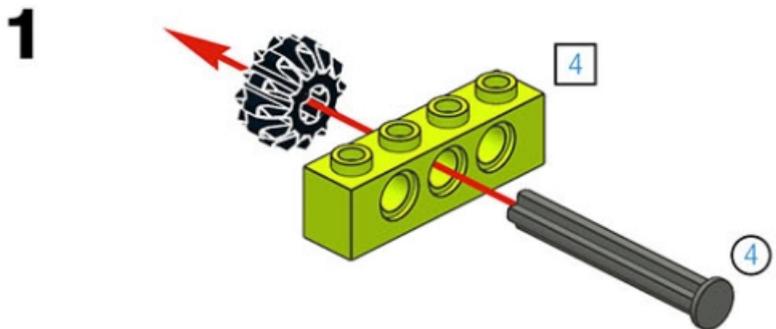
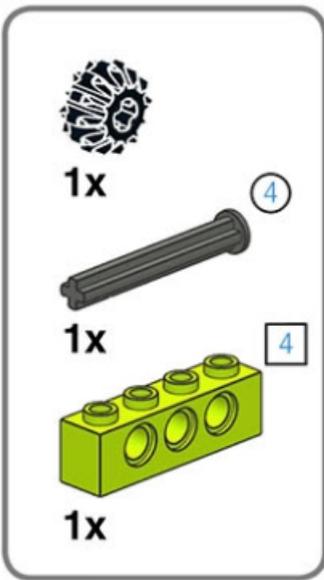
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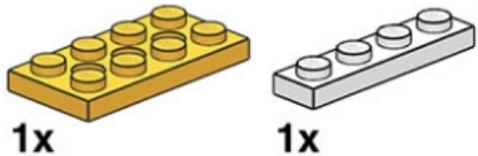
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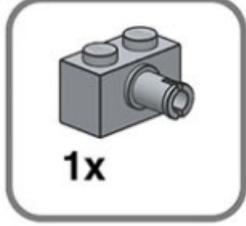
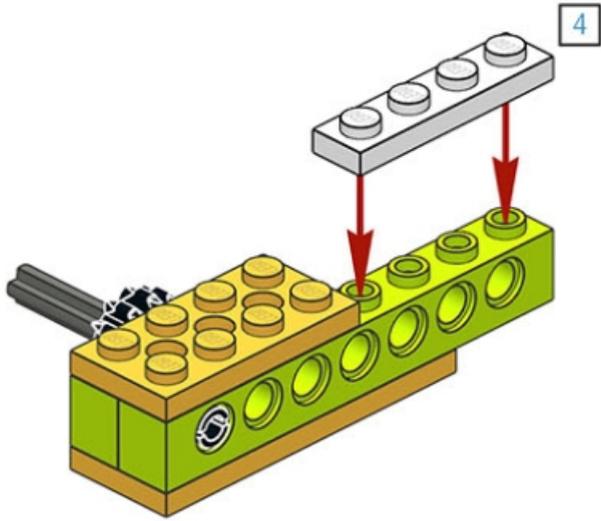
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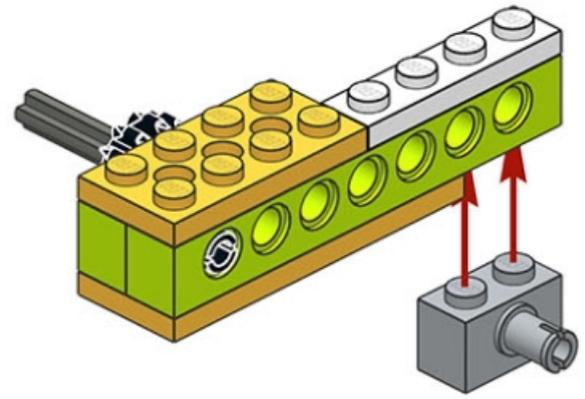




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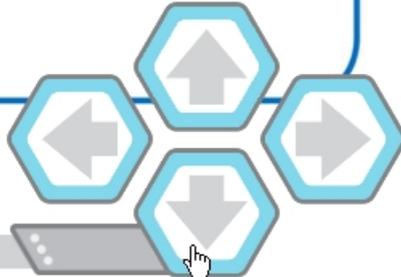
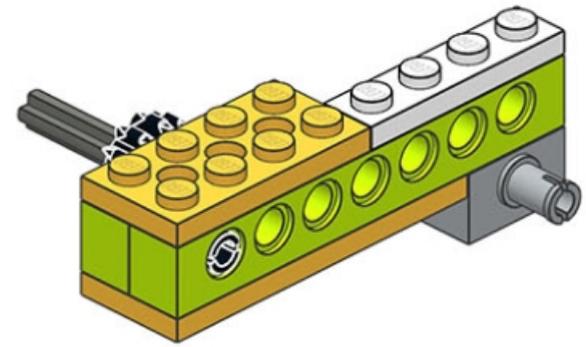


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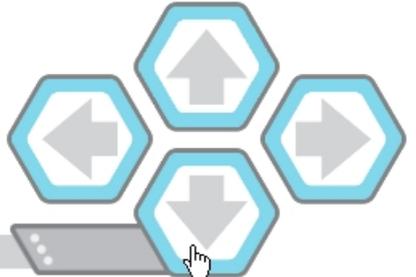
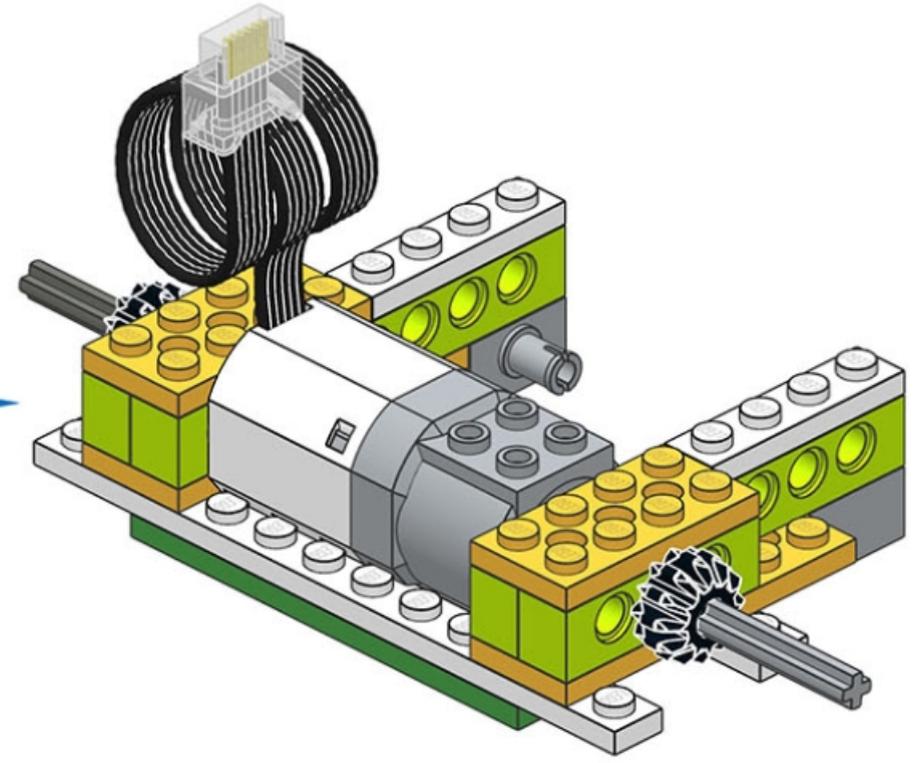
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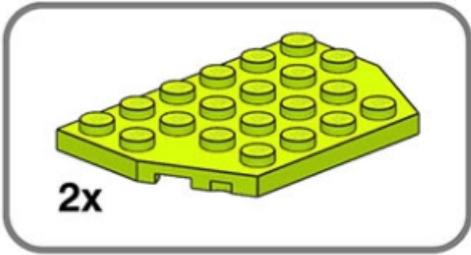
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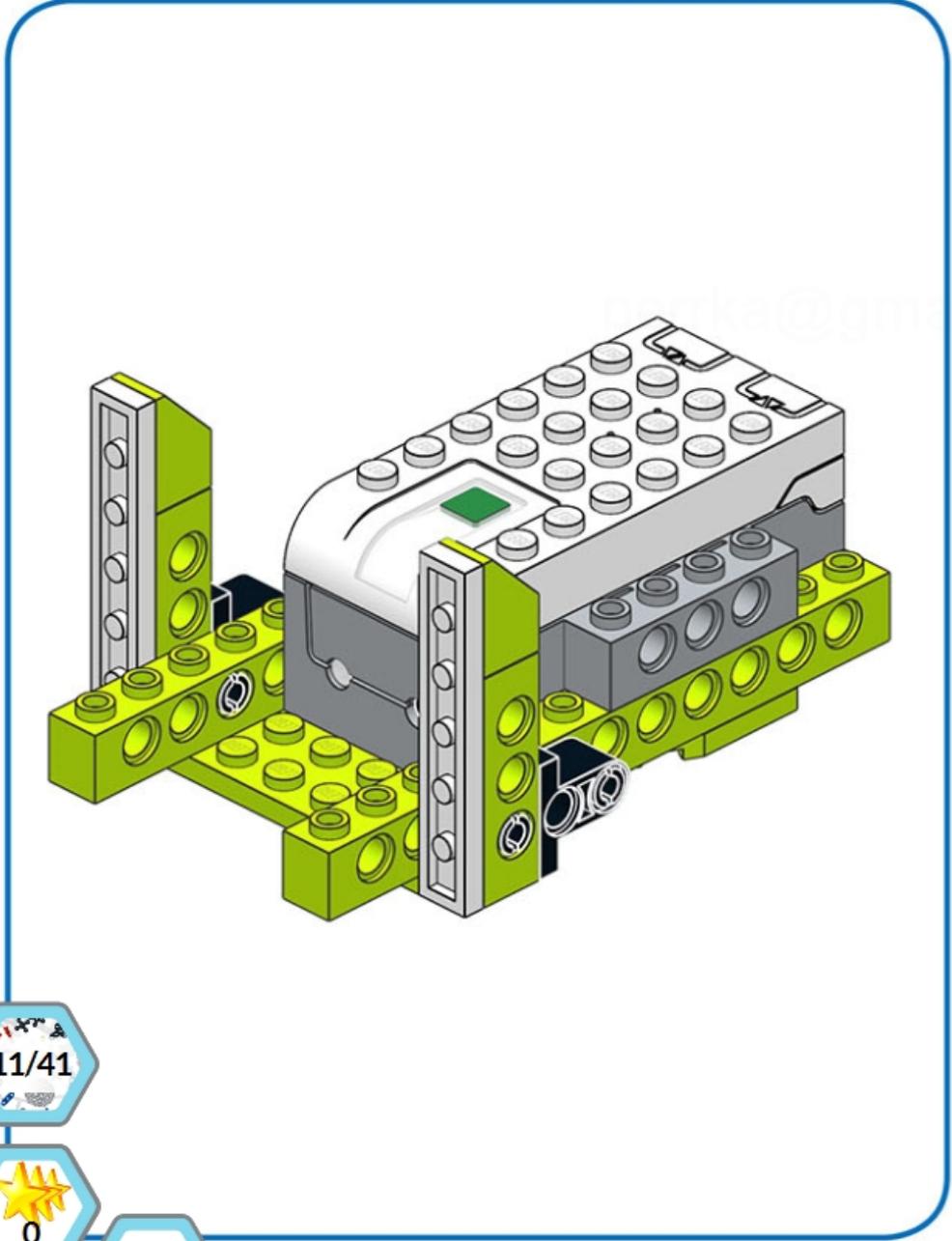
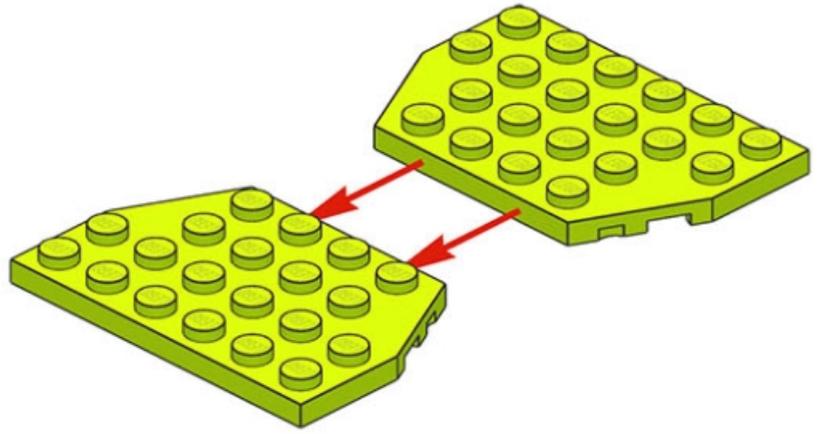
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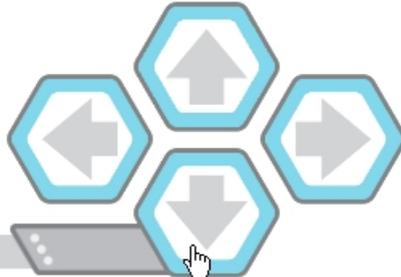
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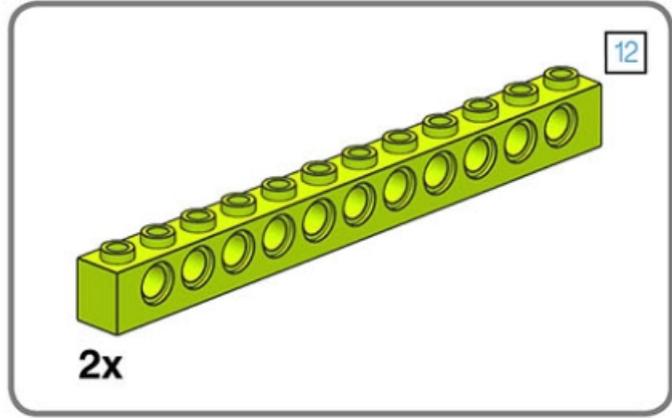


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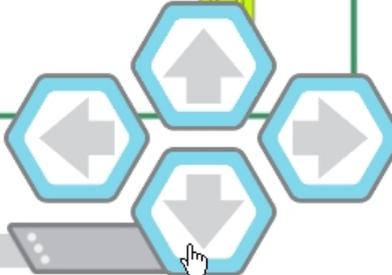
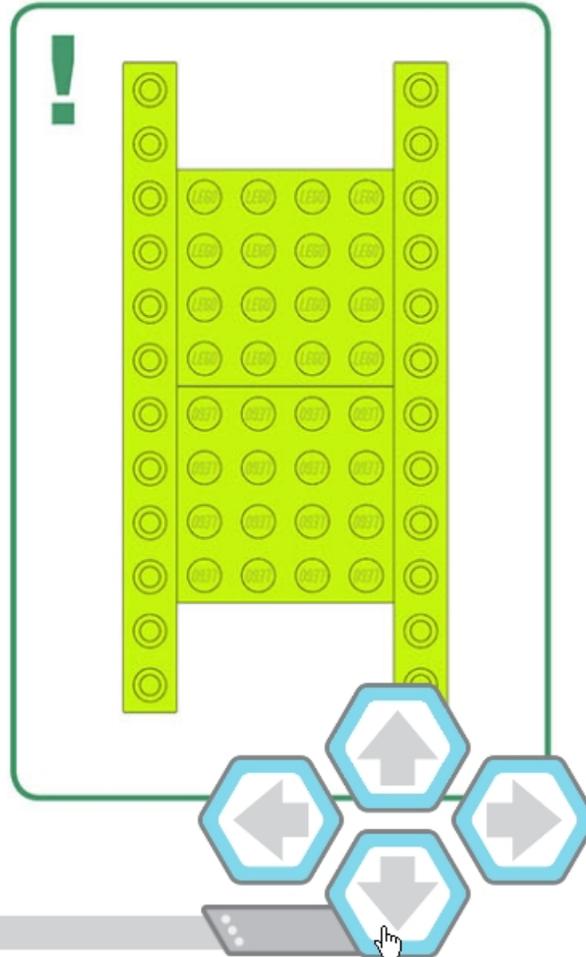
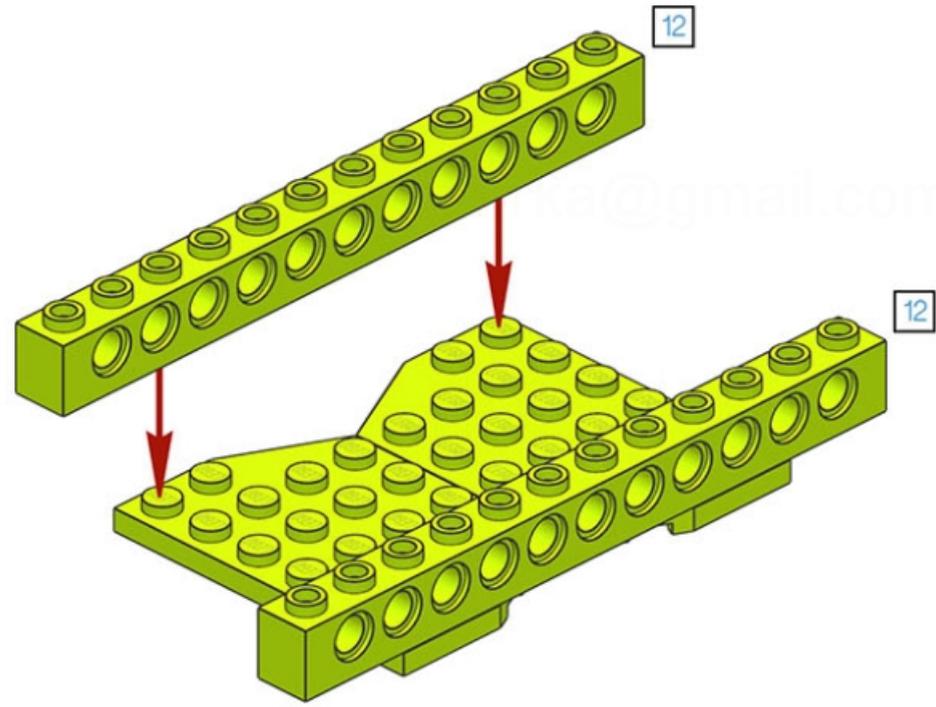
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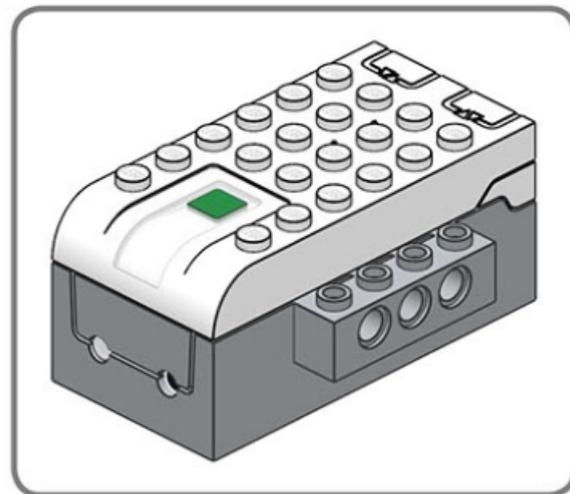
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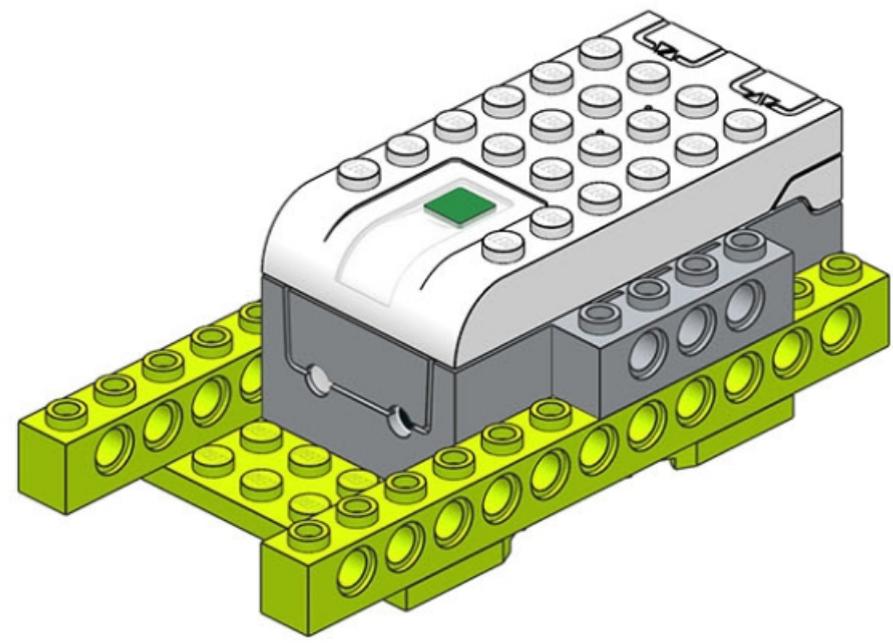


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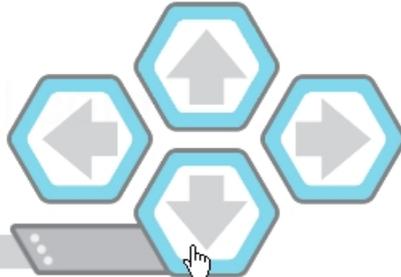
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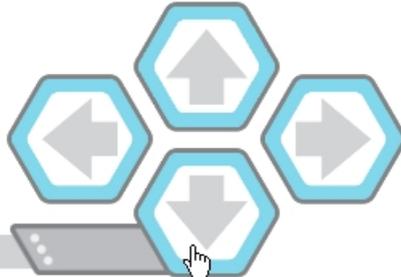
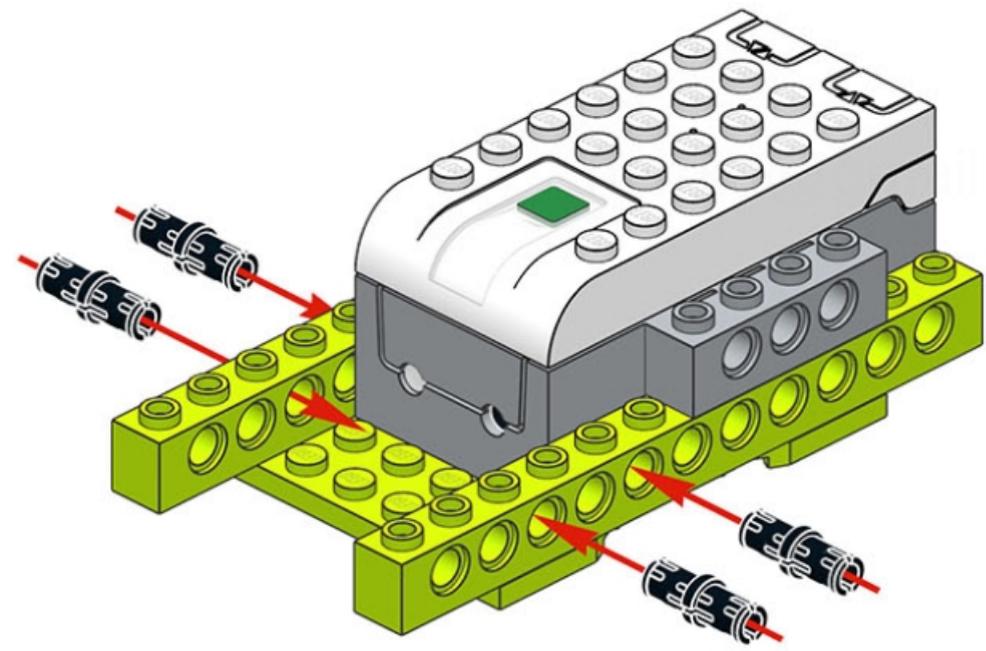


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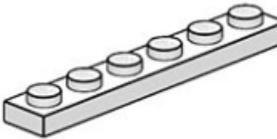
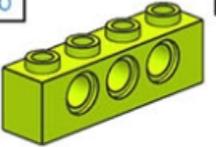




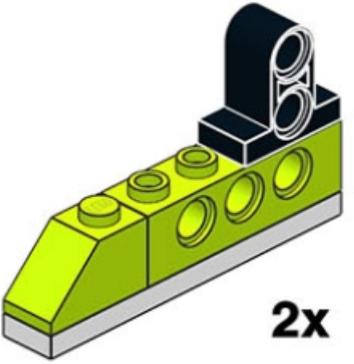
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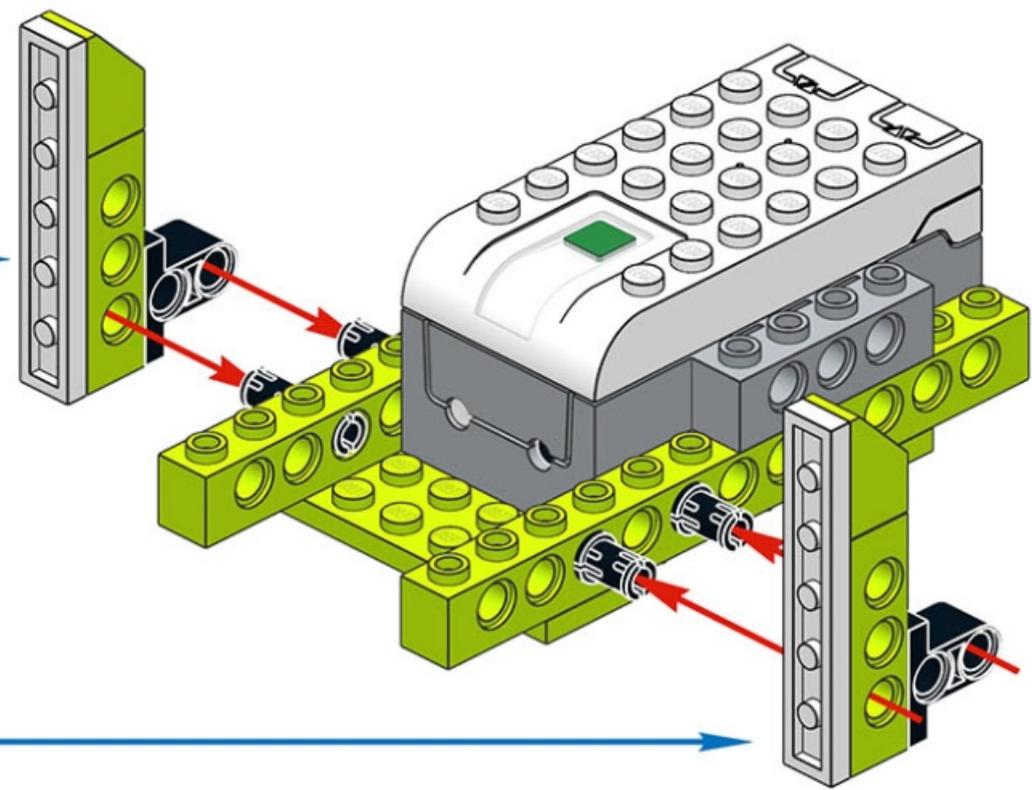
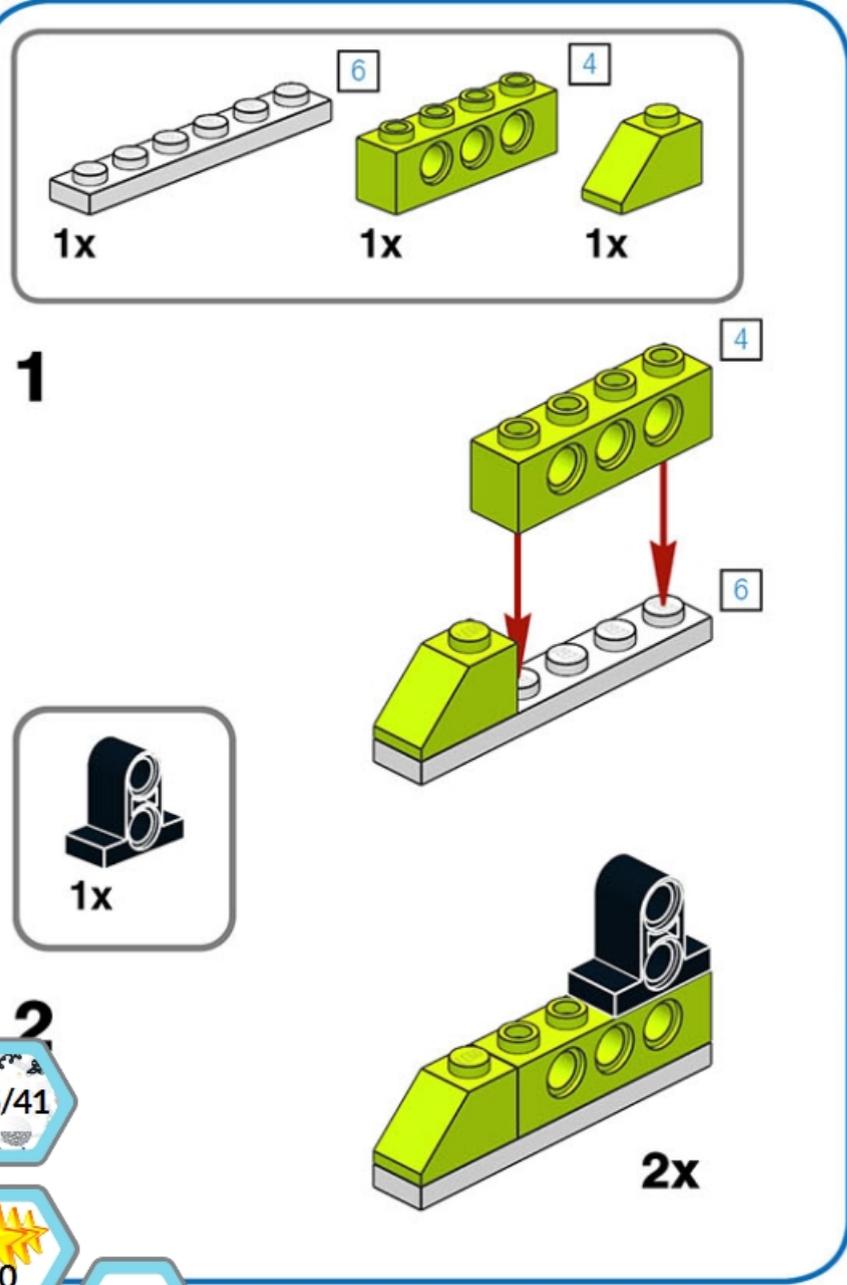


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1x  **4**

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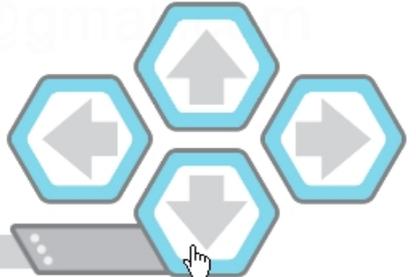
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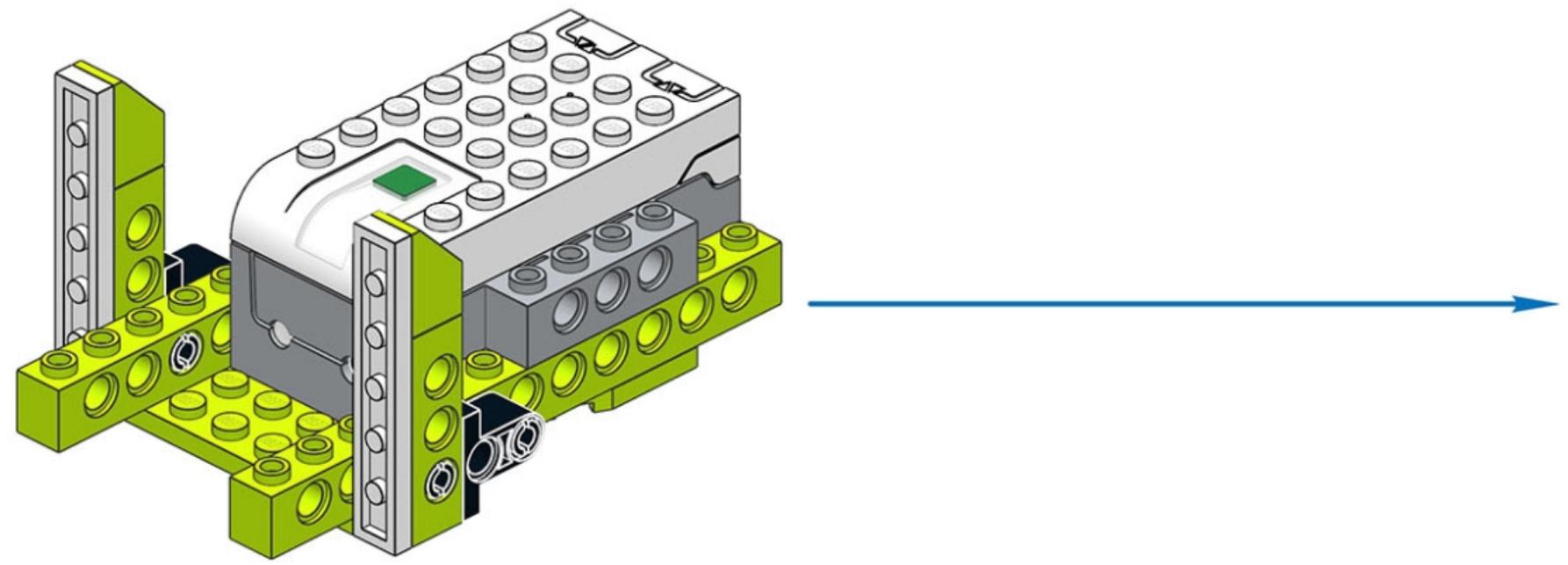
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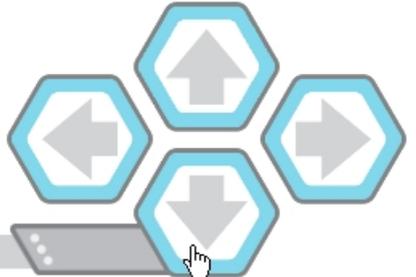
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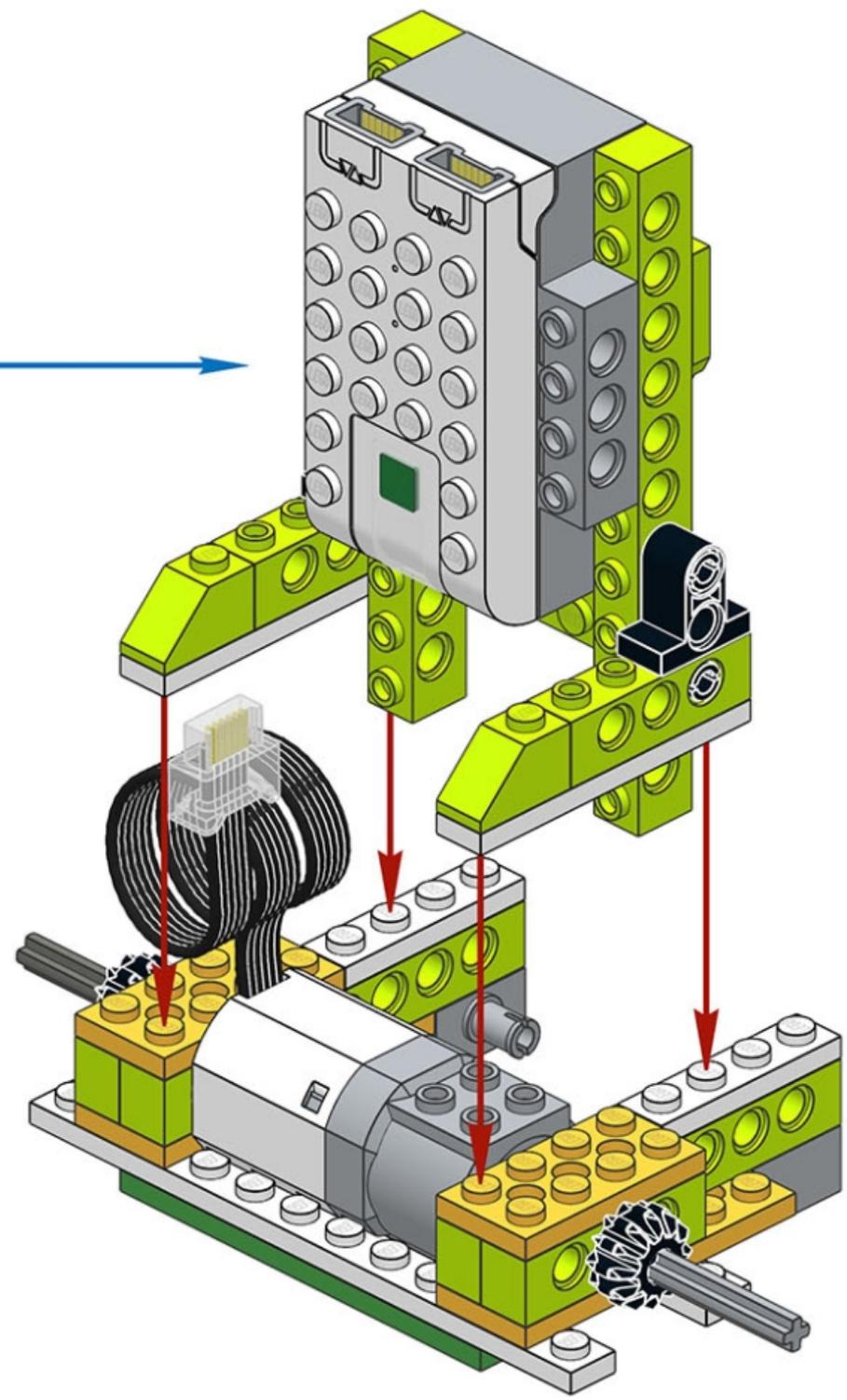
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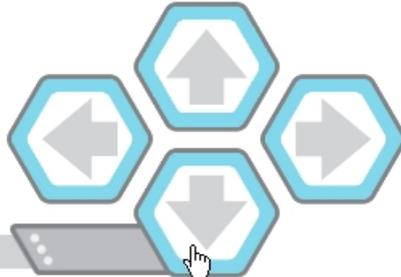


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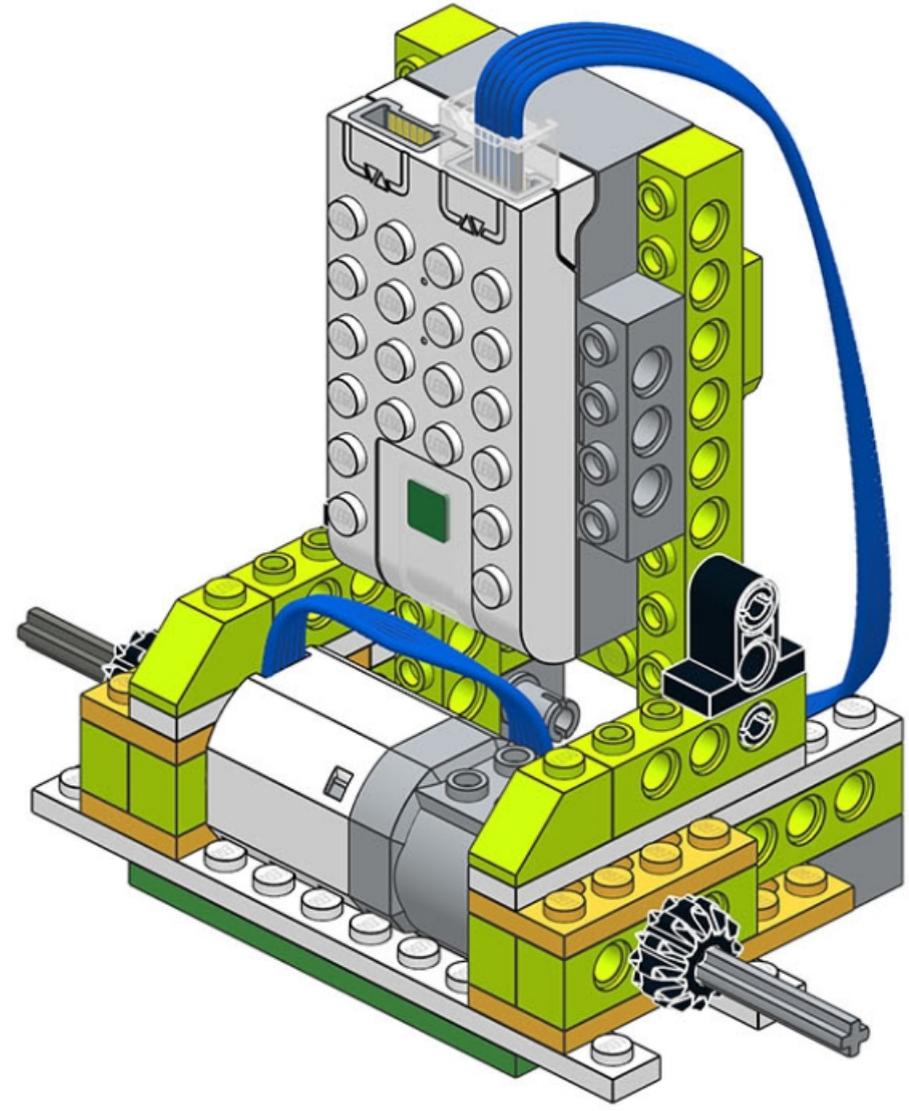
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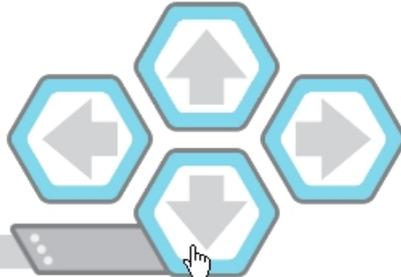


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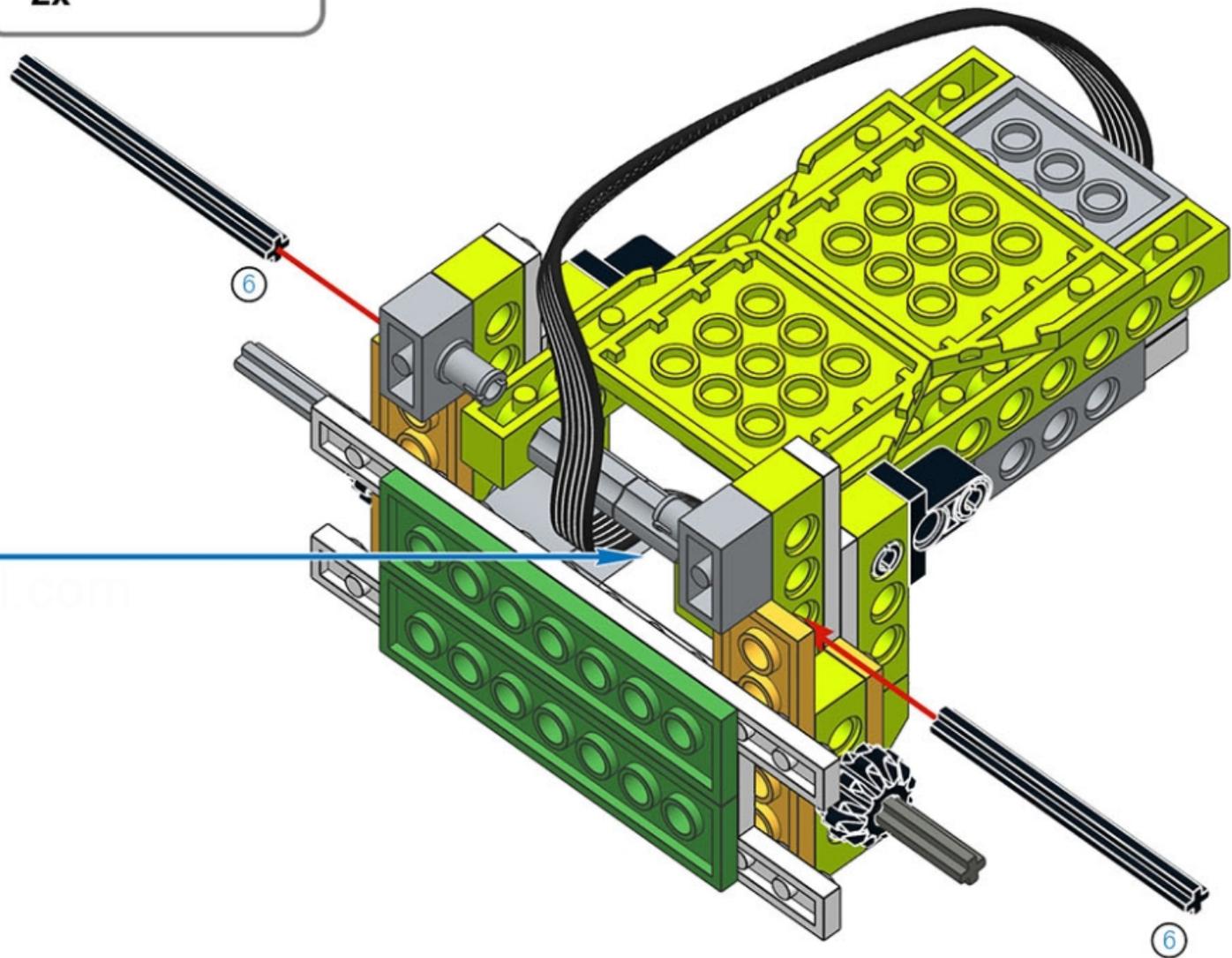
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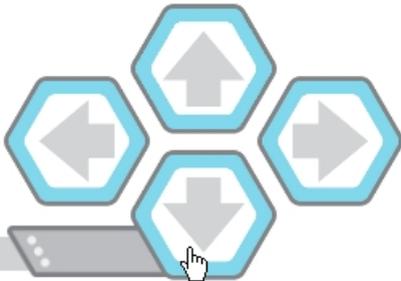
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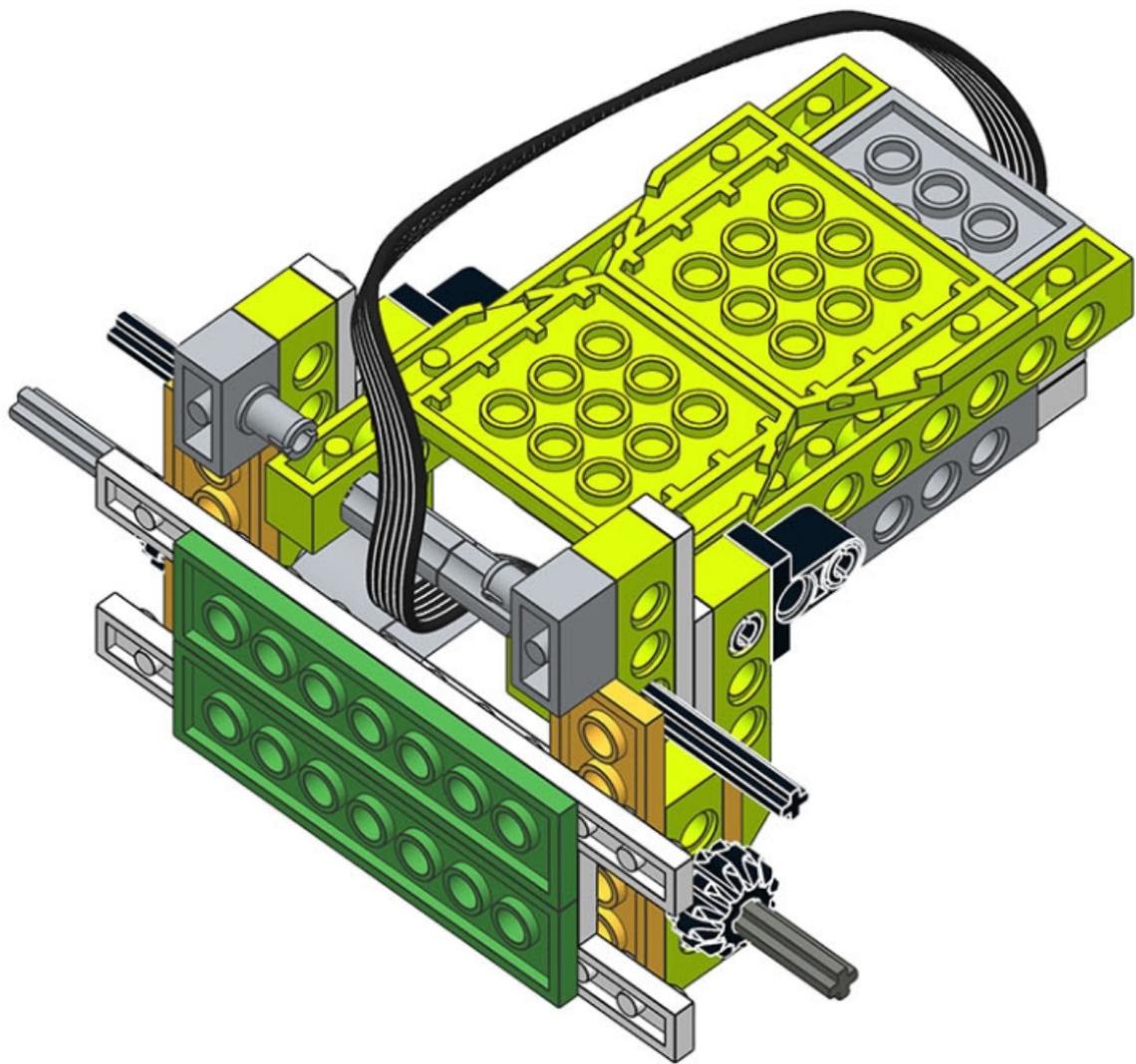
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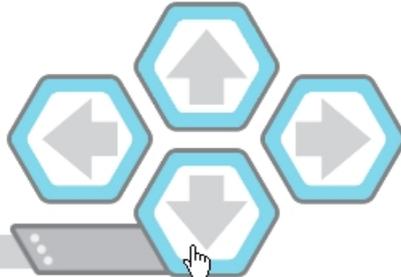
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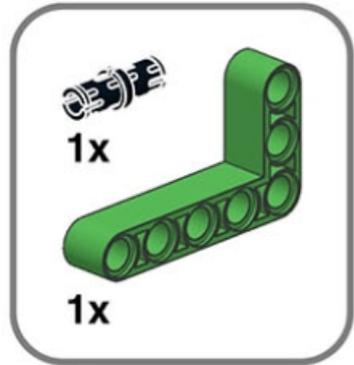


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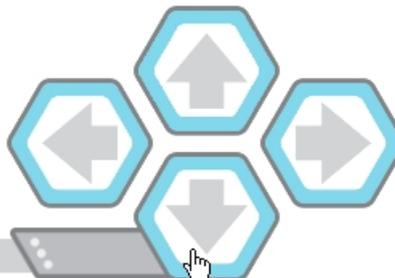
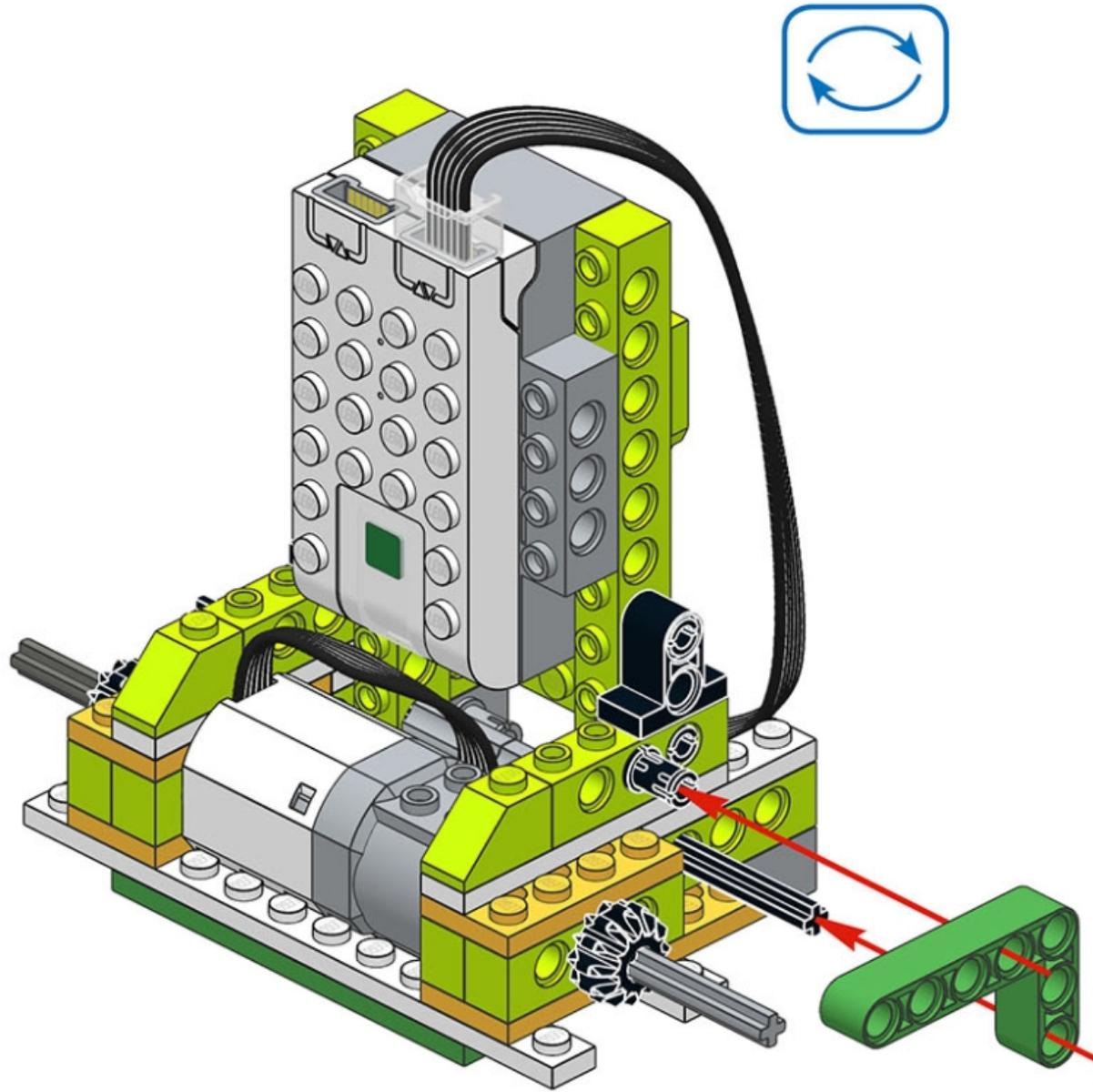
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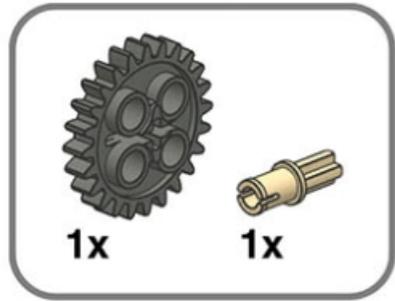
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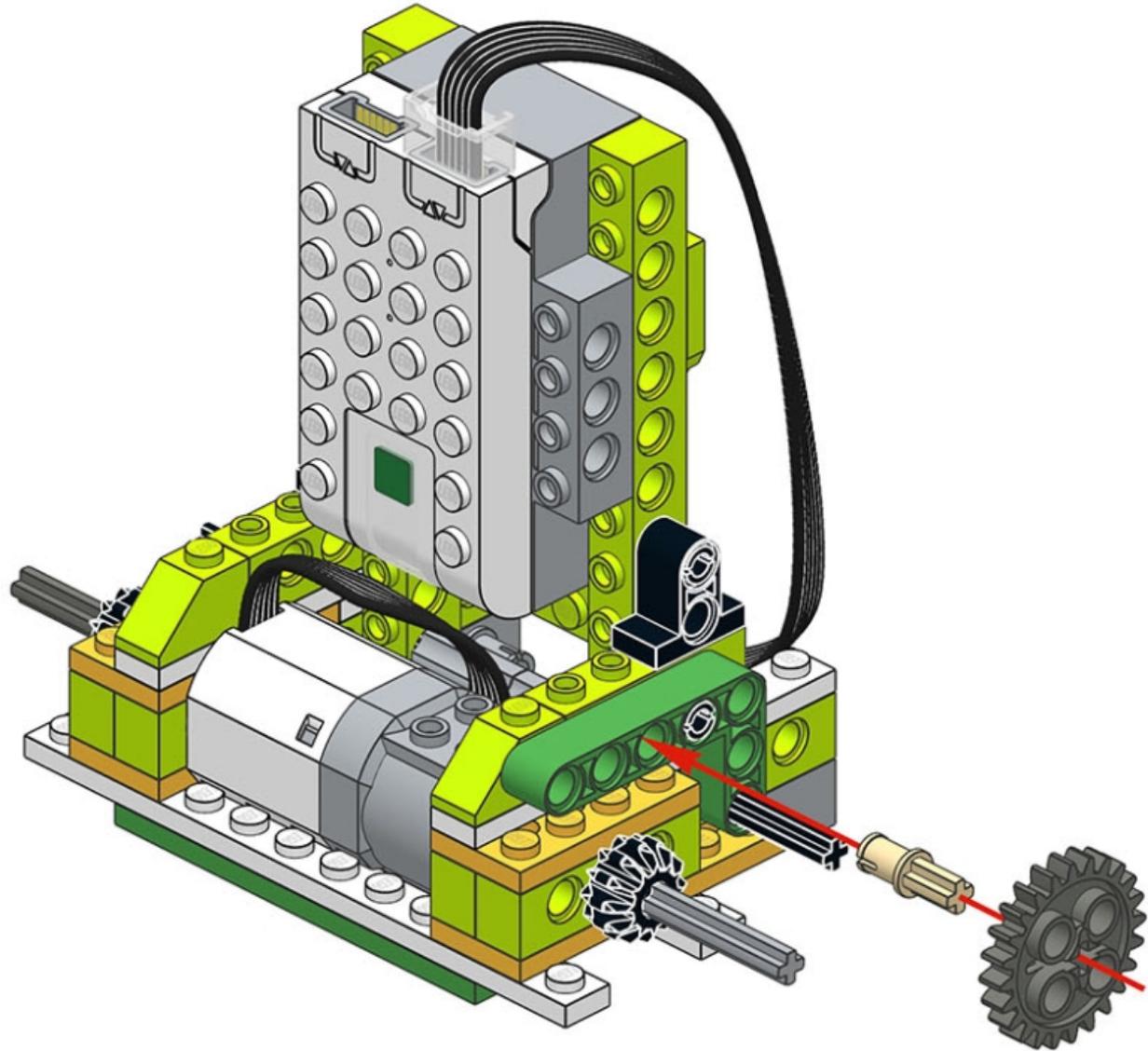


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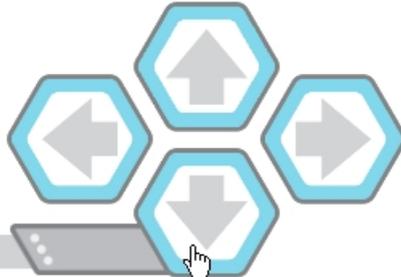
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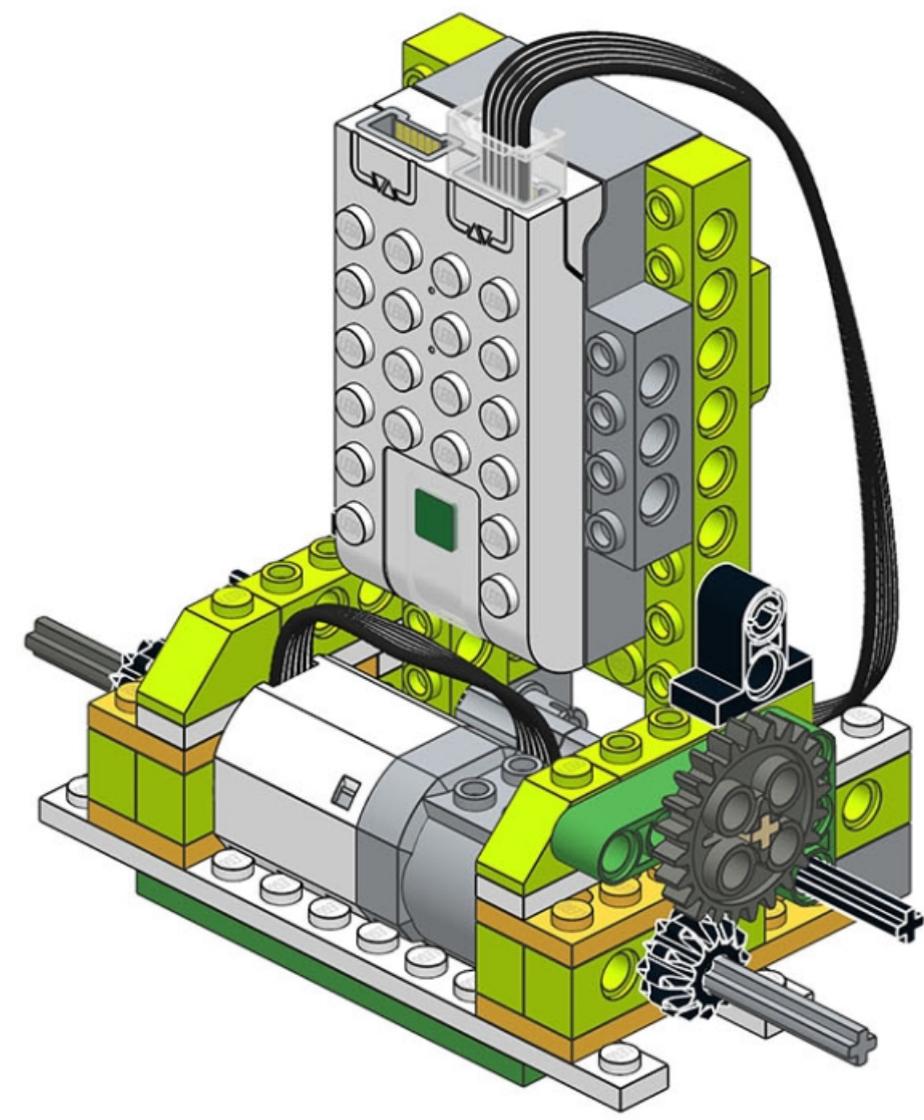
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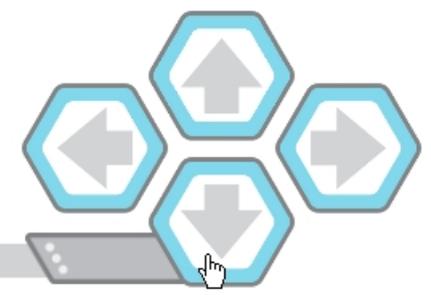
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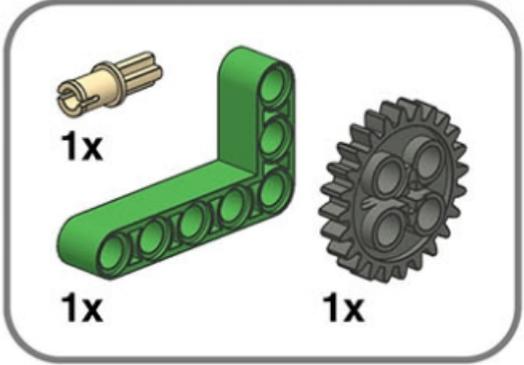
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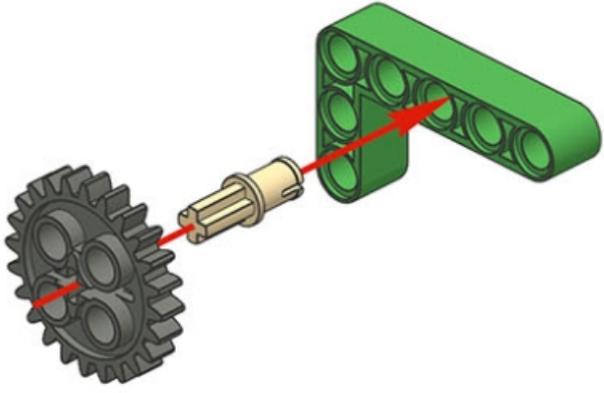




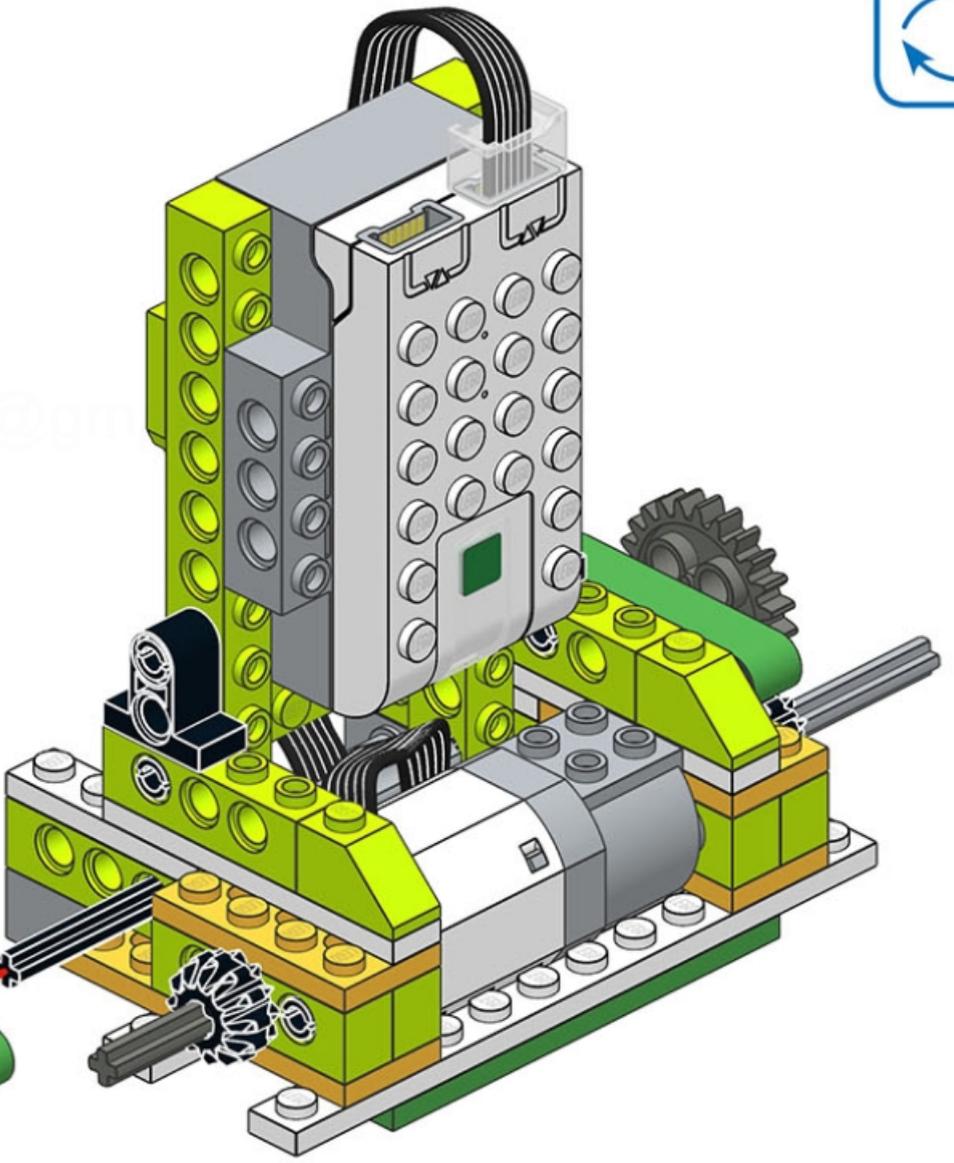
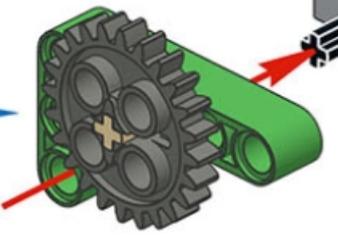
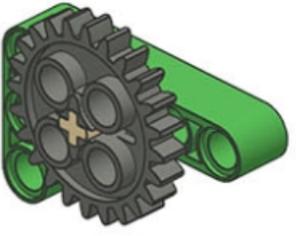
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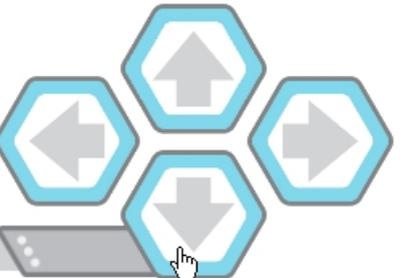
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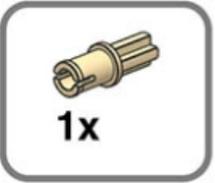


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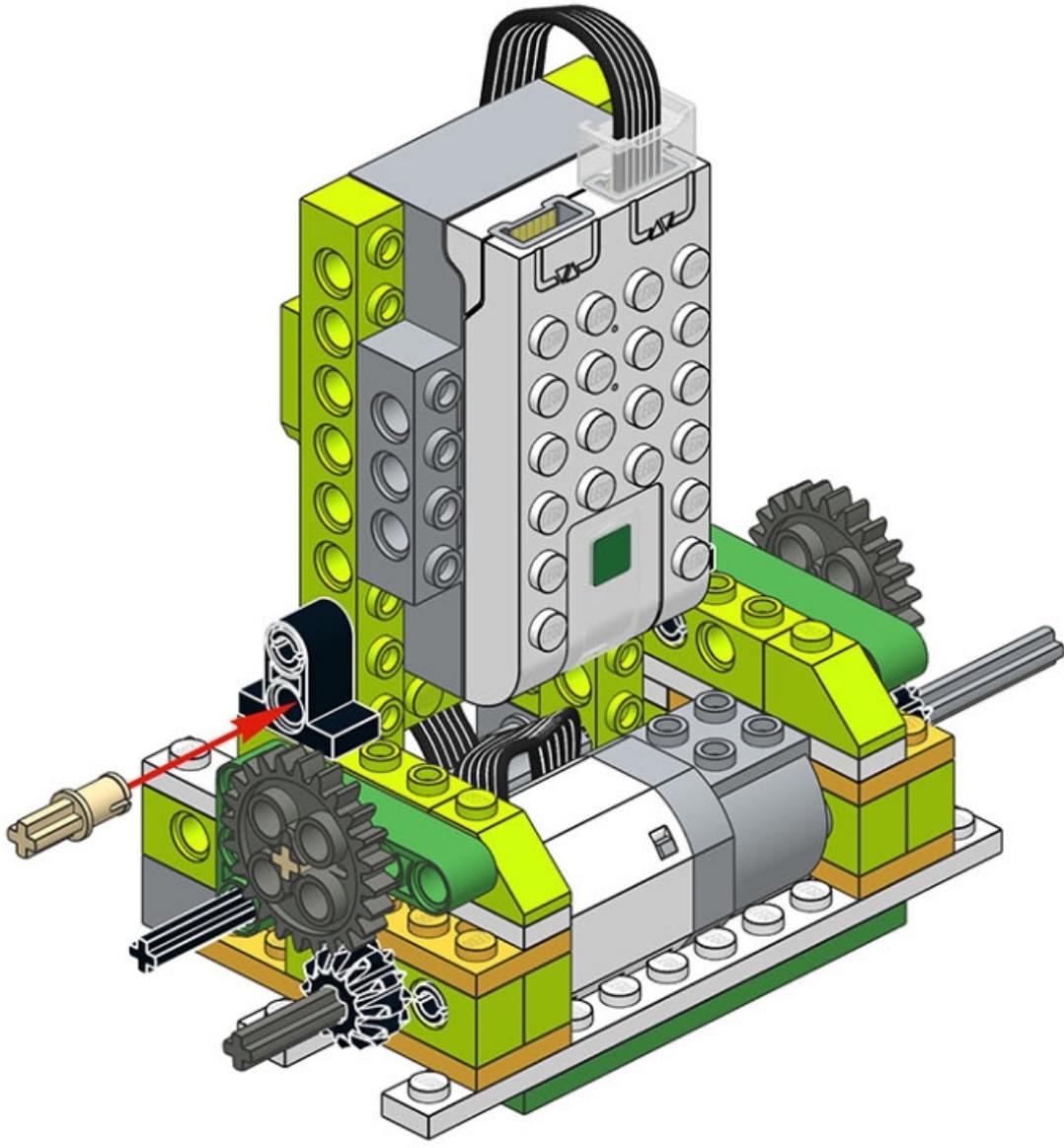
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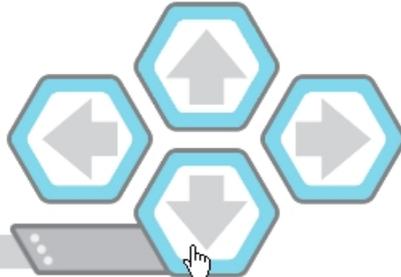
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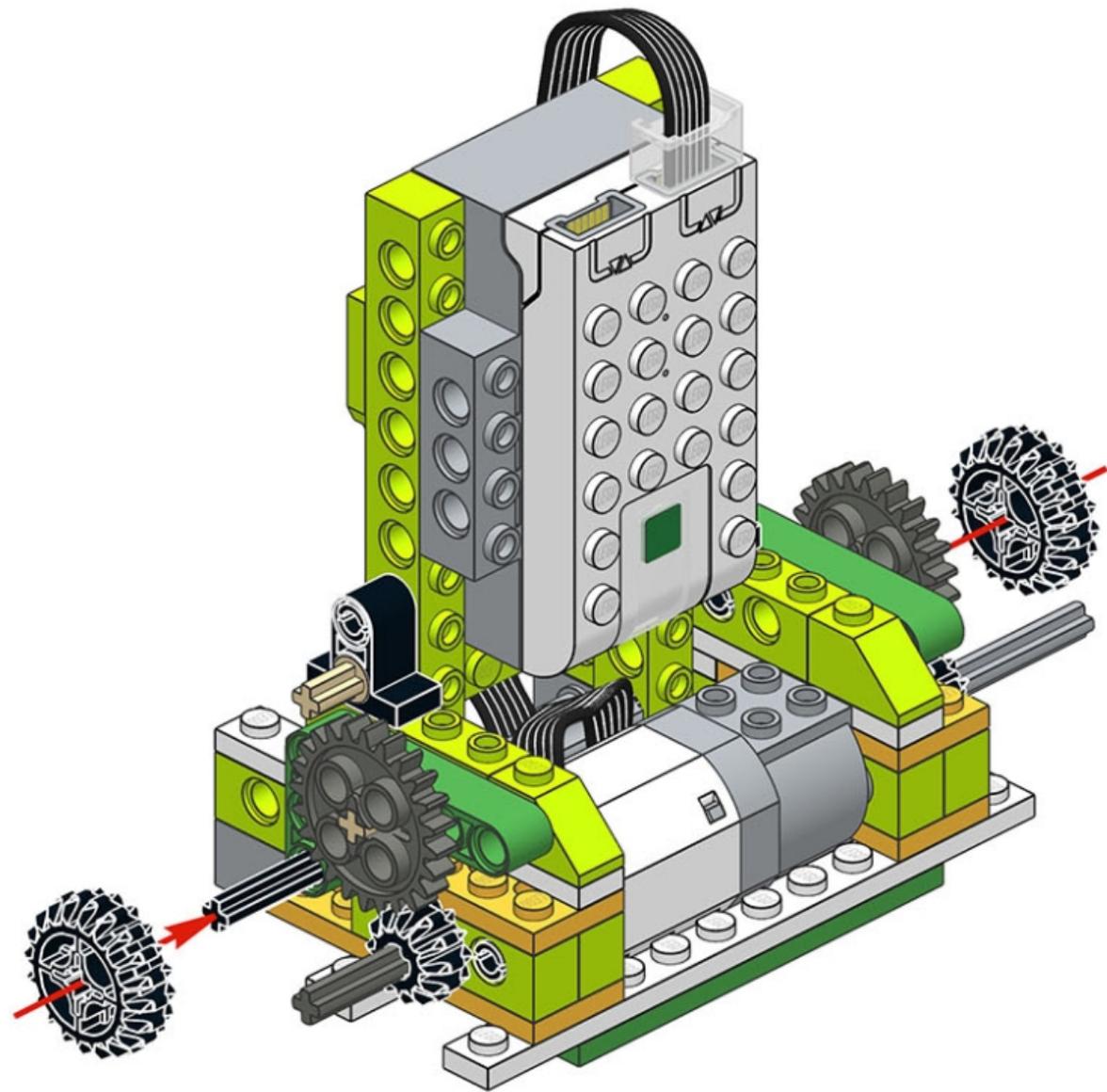


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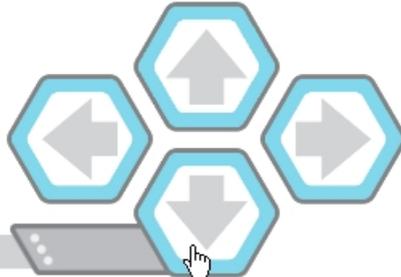


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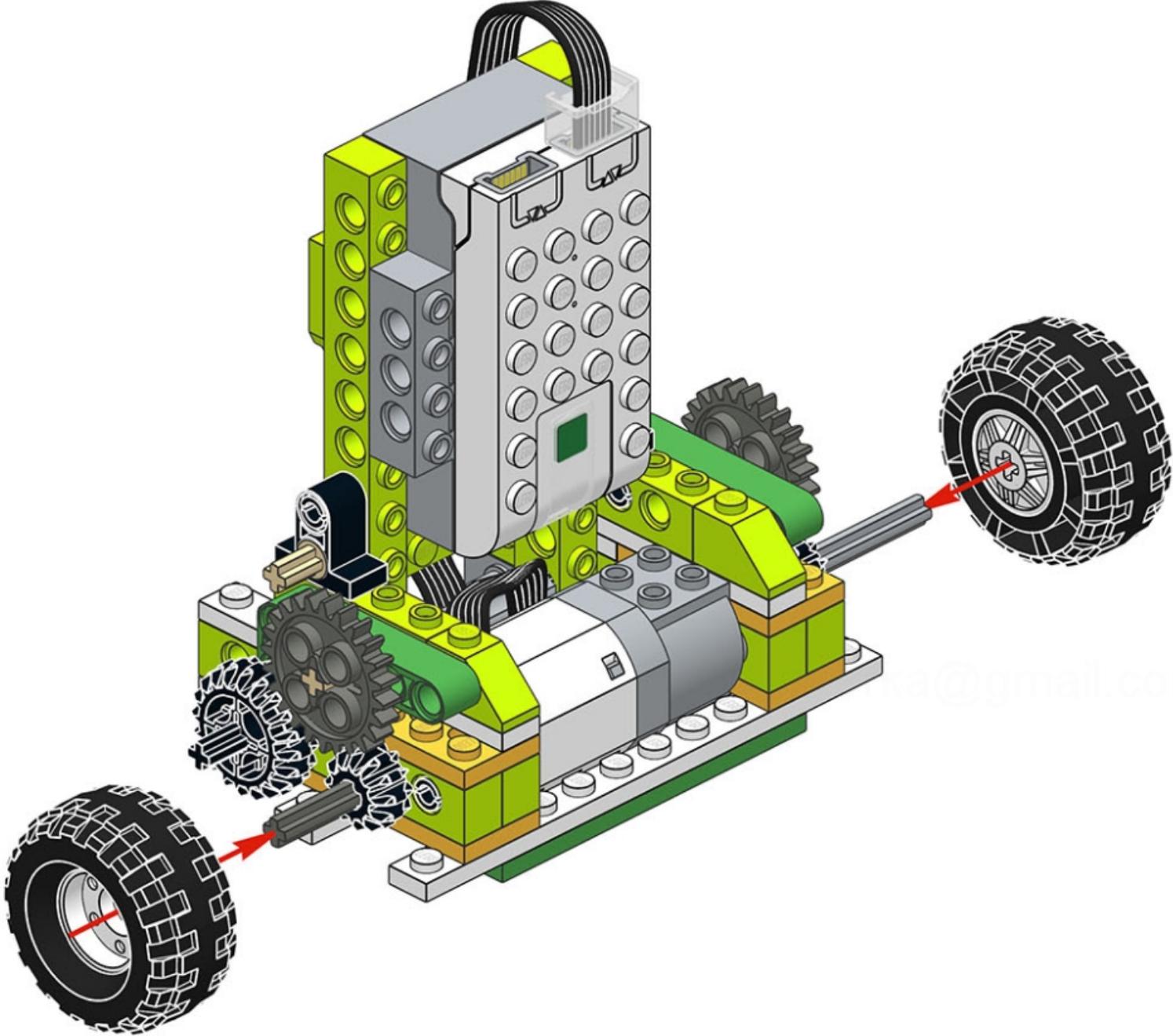
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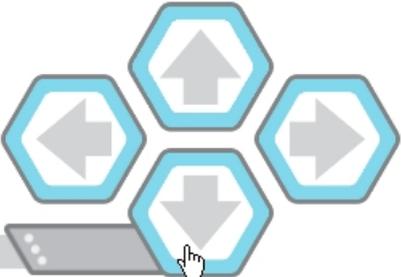
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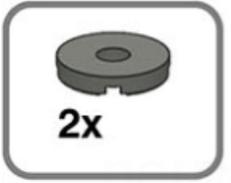


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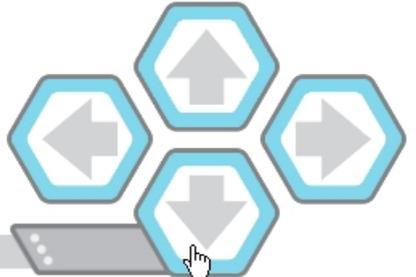
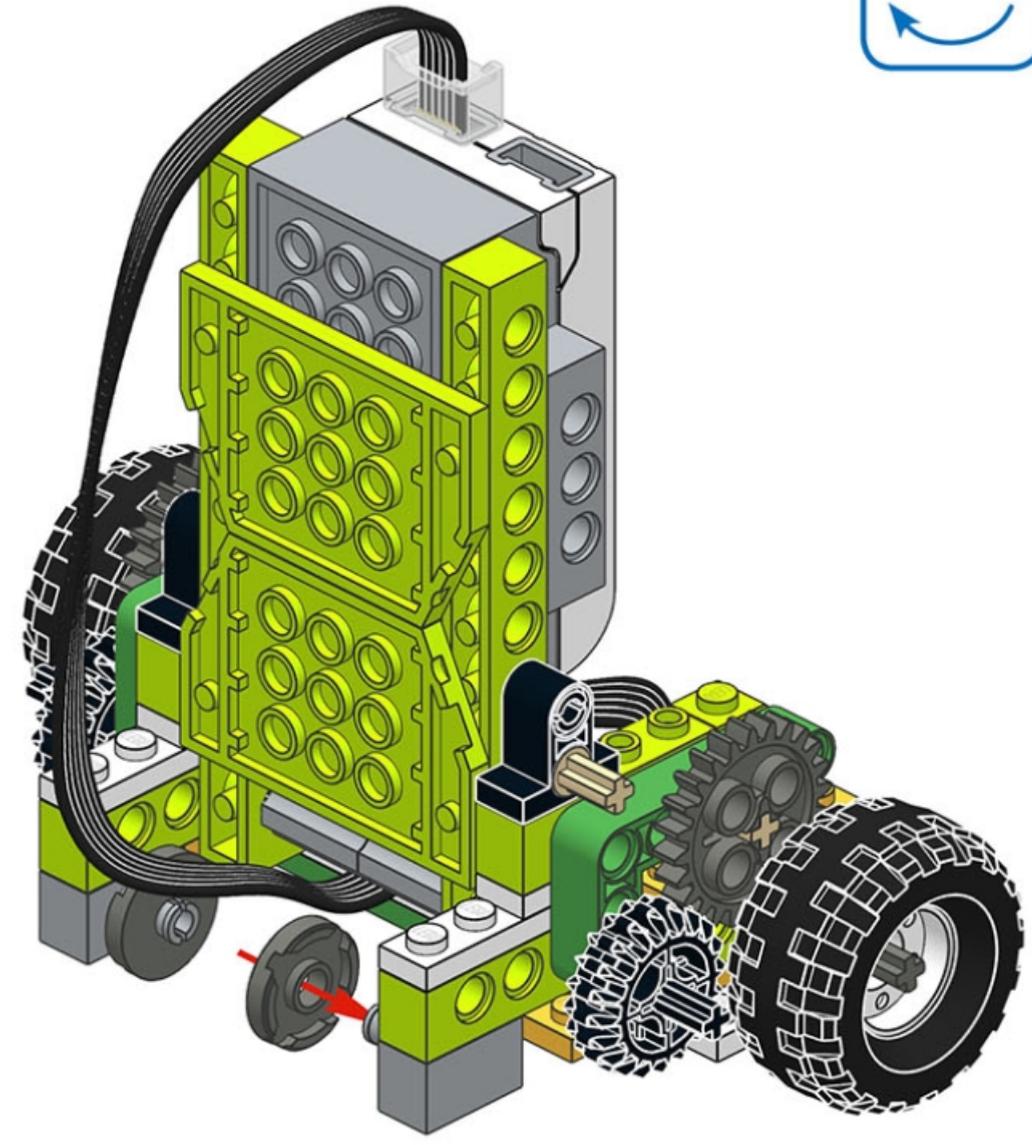


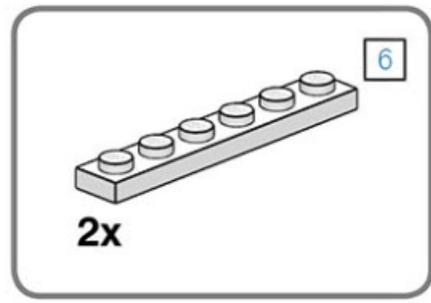
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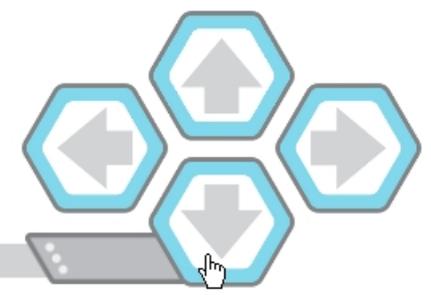
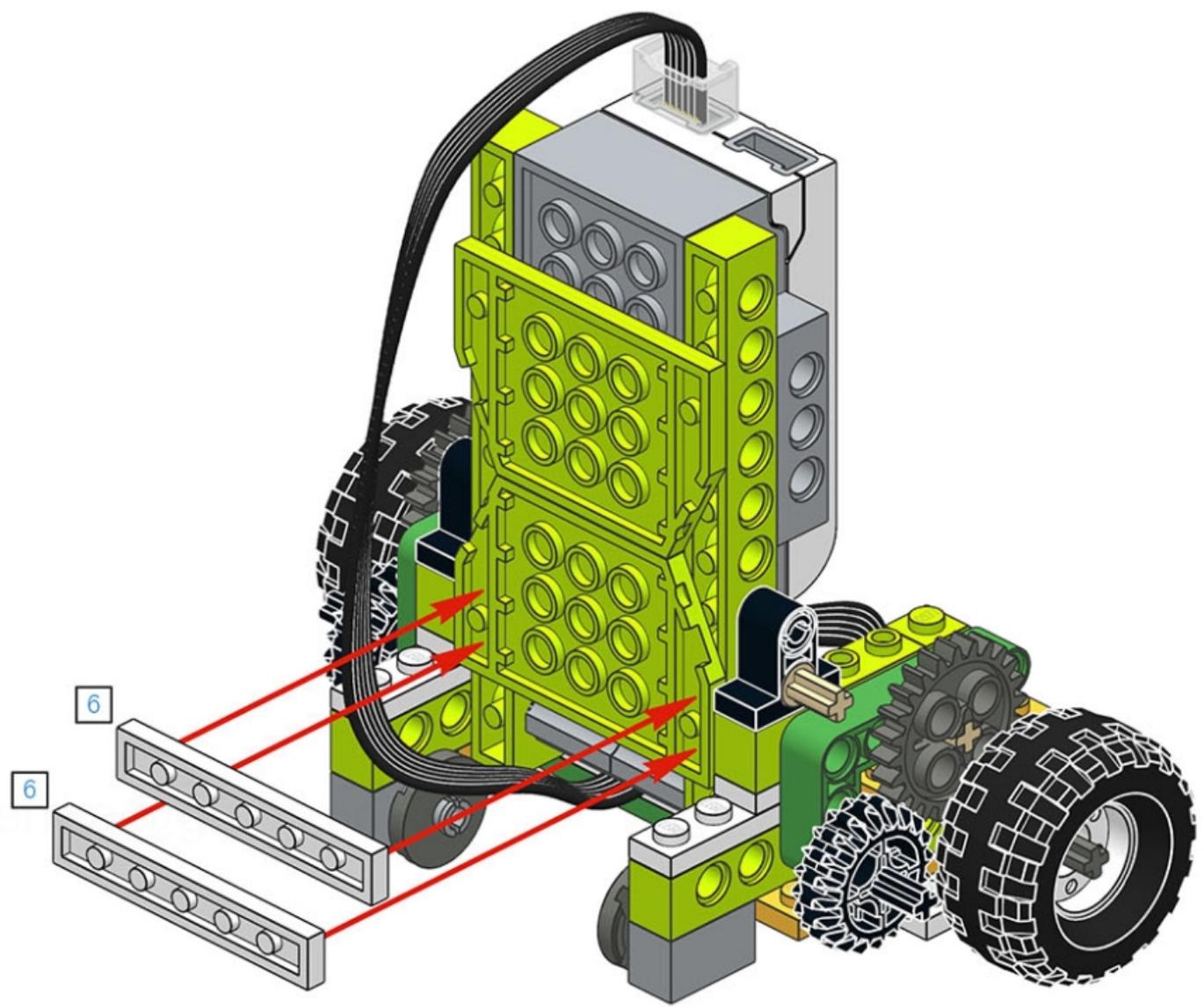


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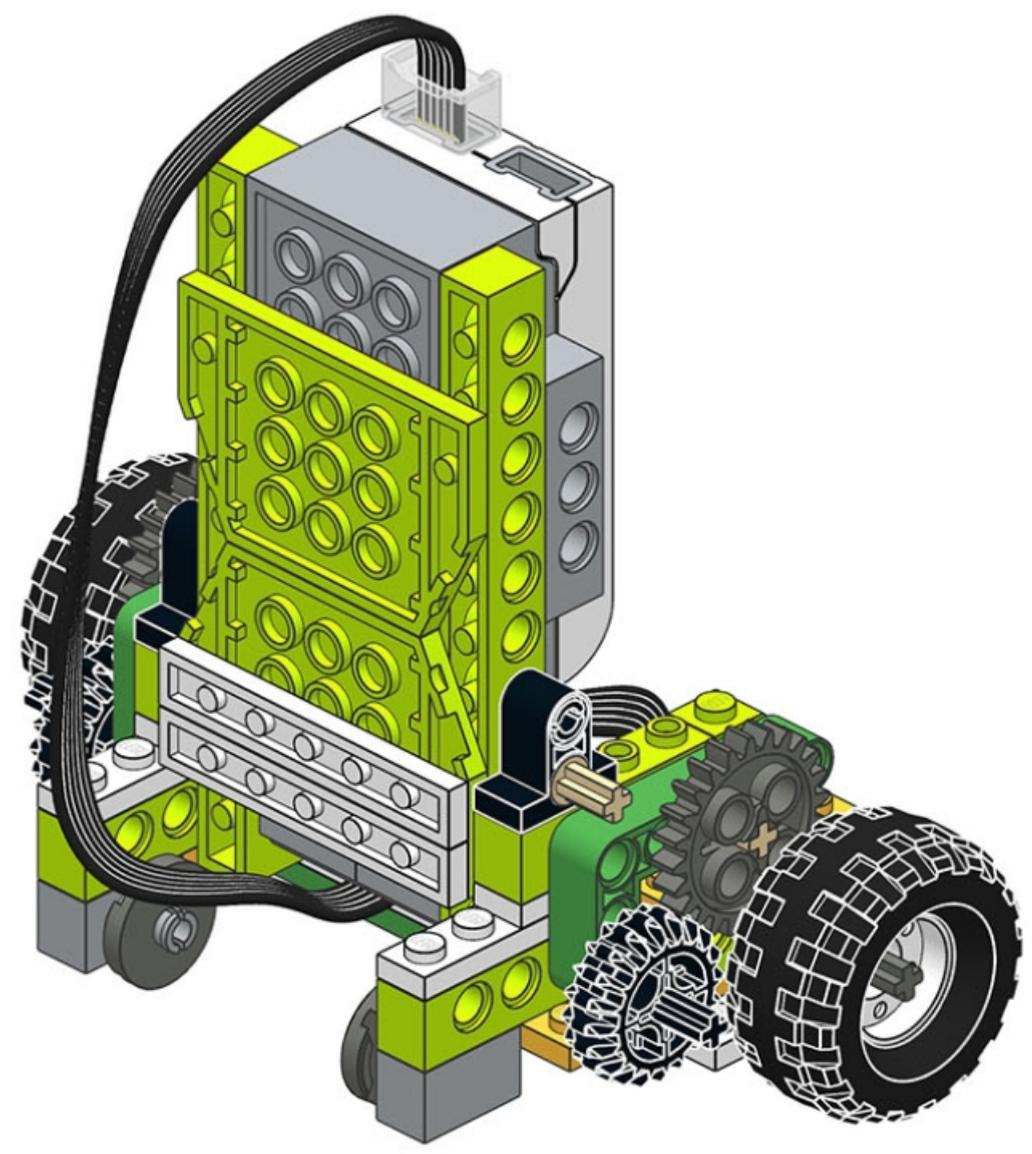




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# 30

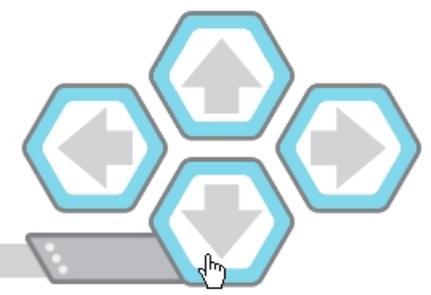


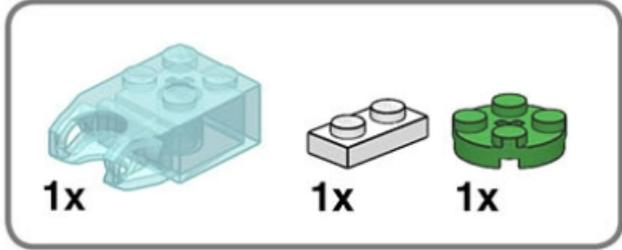
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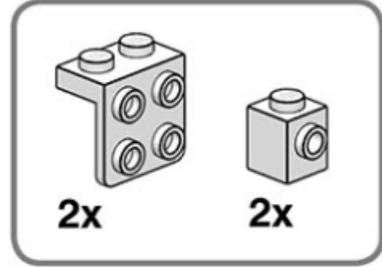
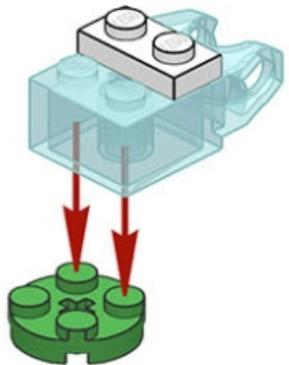
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nerka@gmail.com

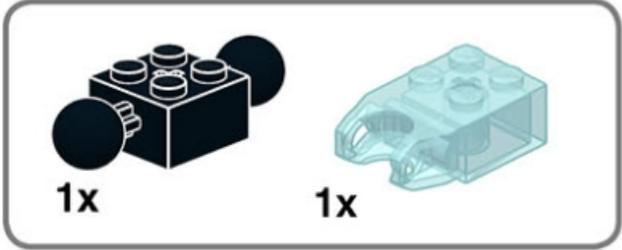
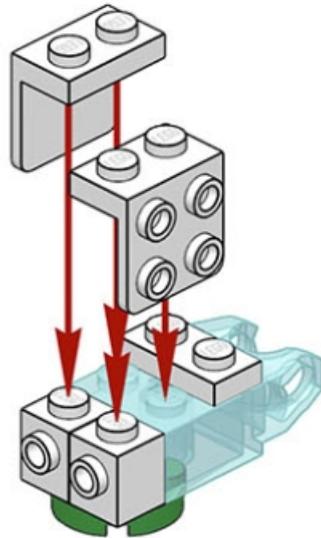




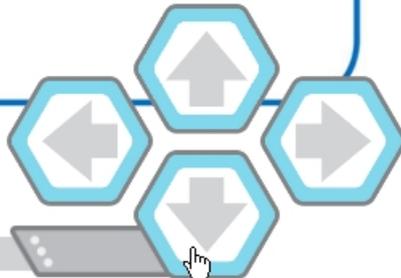
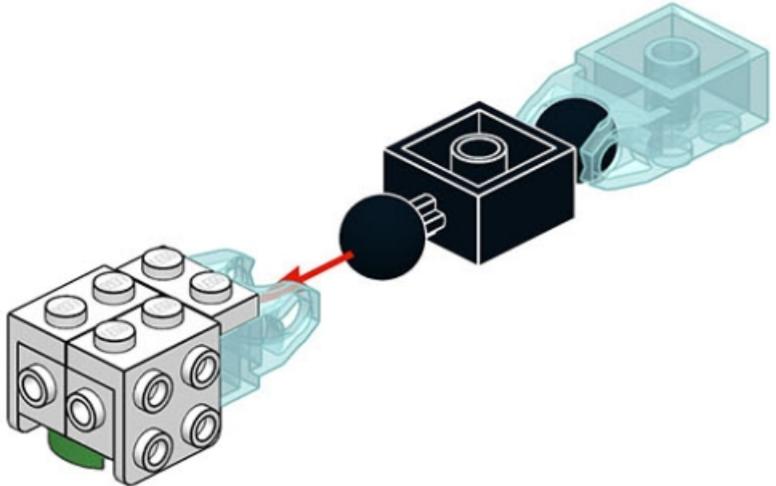
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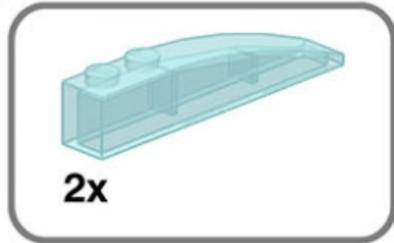


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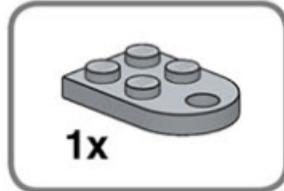
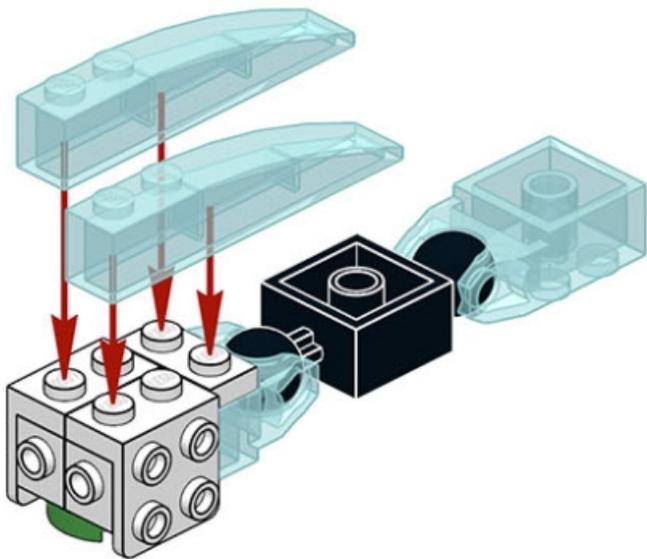


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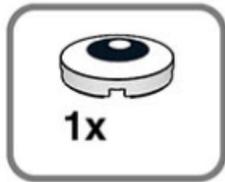
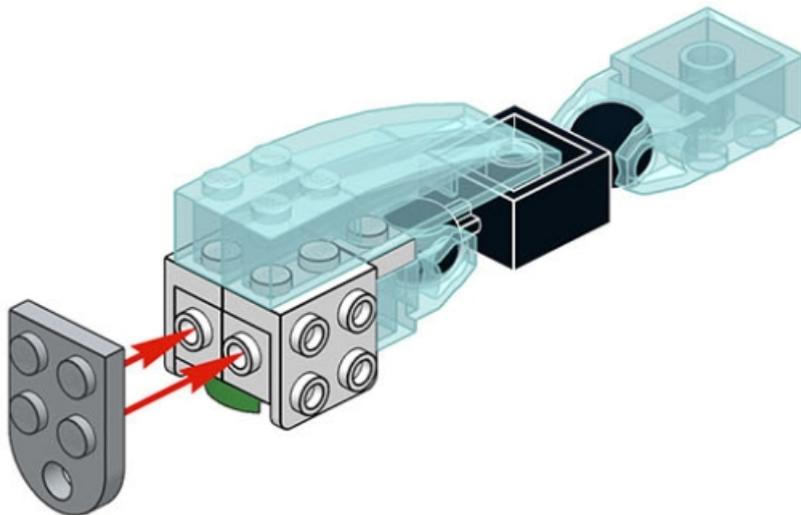




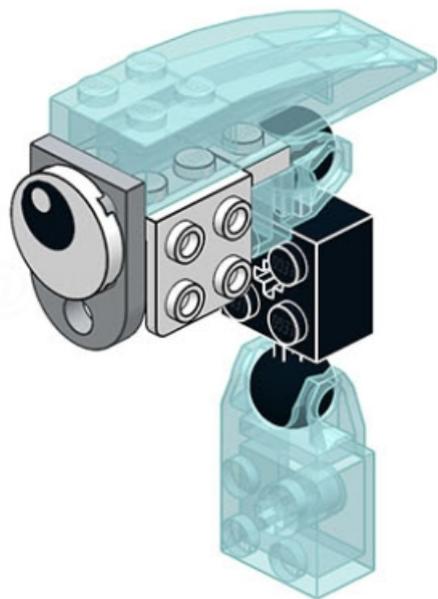
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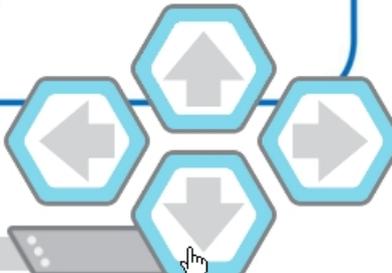
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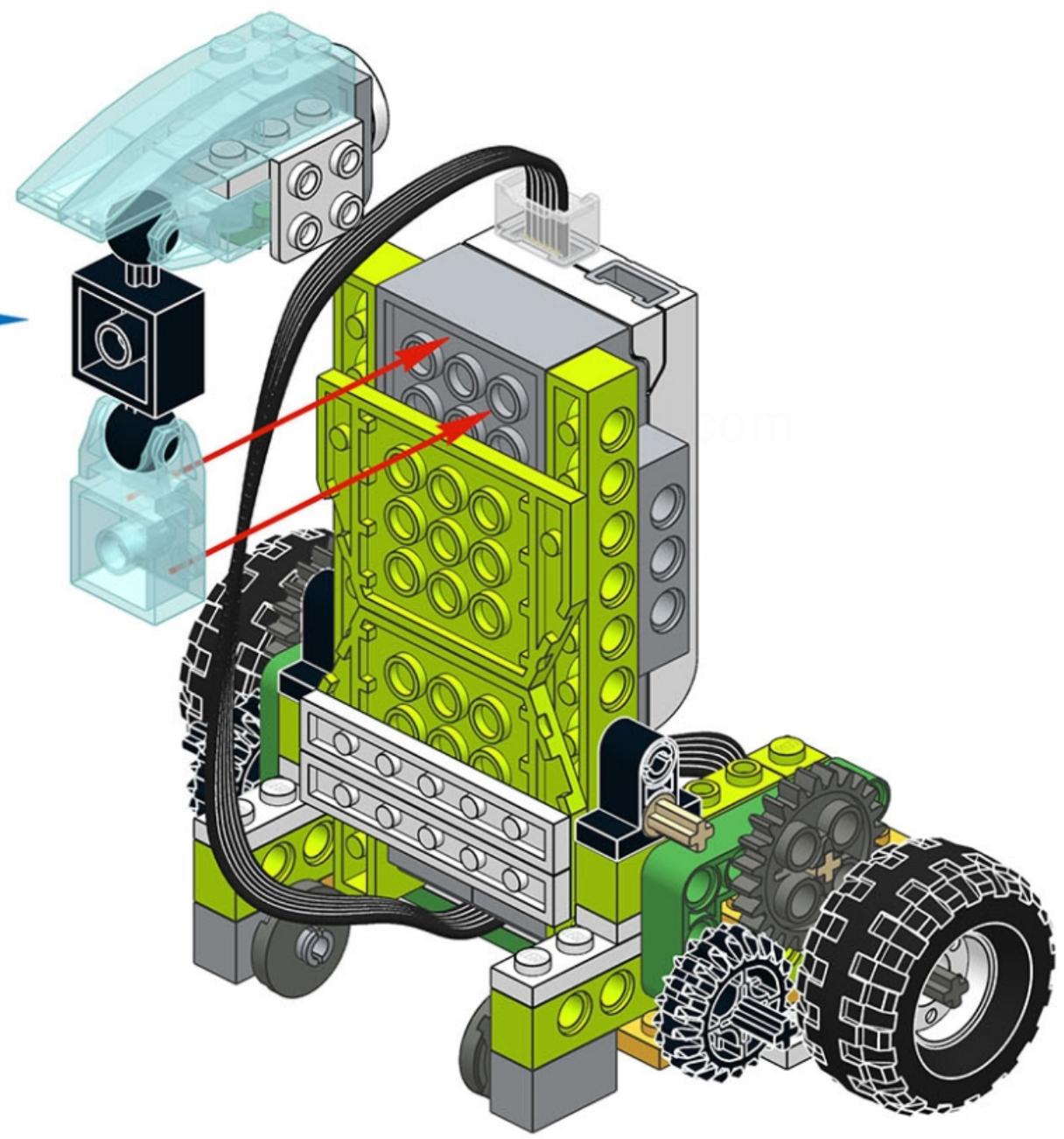
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49



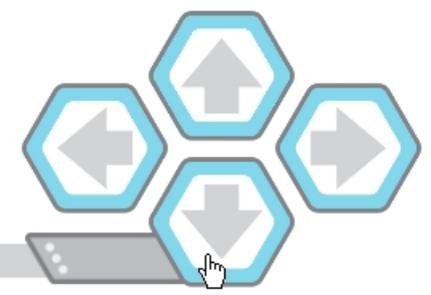
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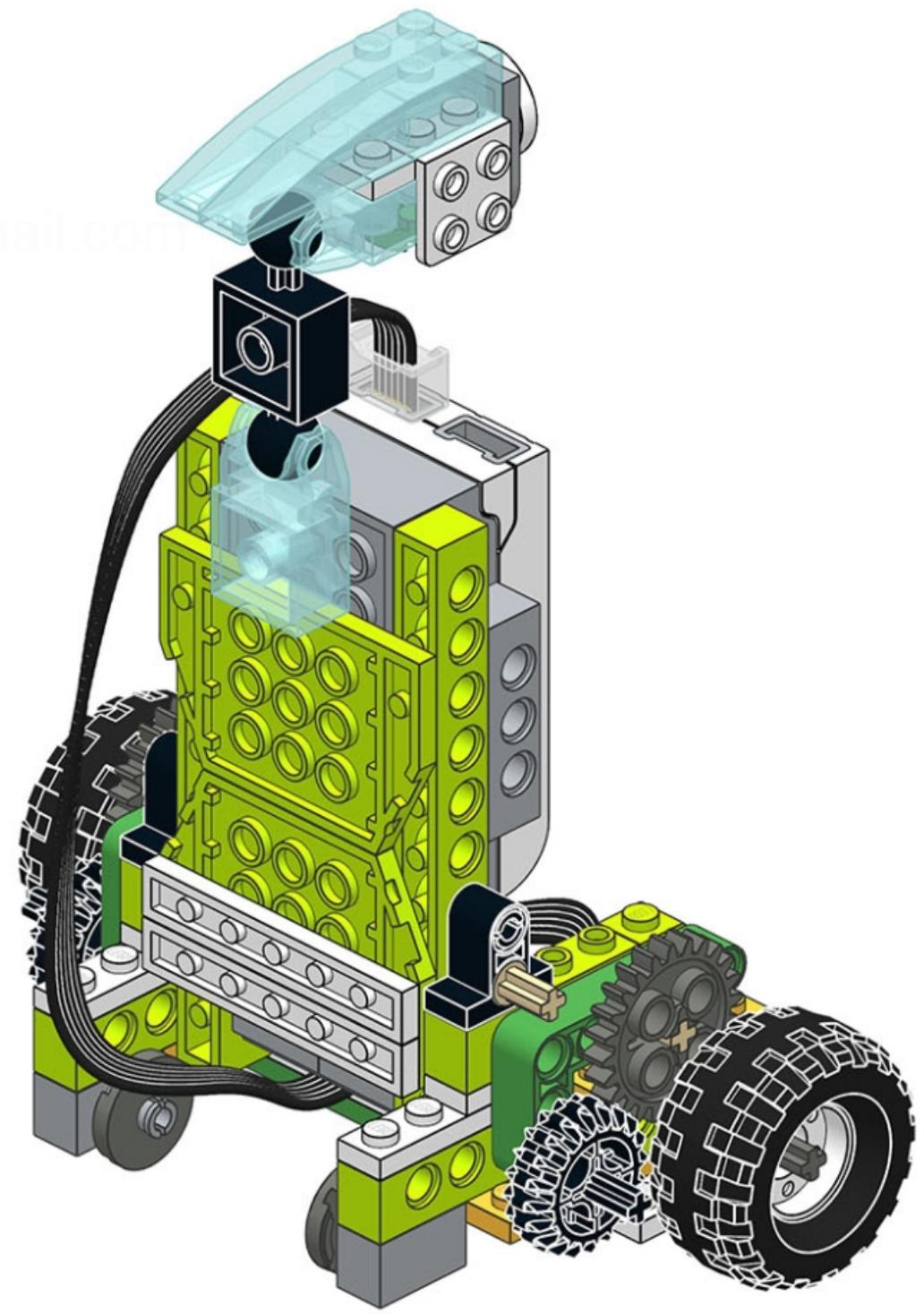
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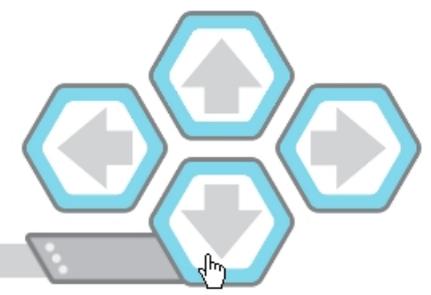
nerrka@gmail.com

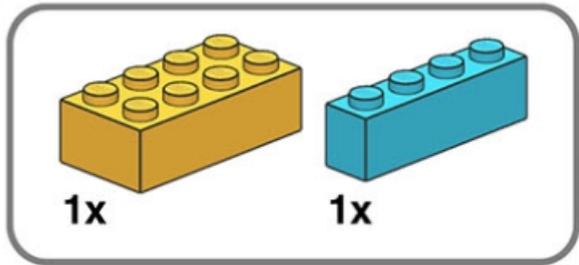


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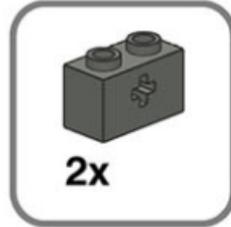
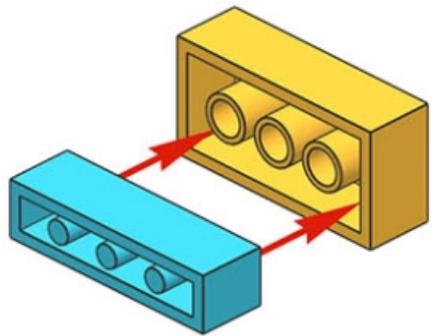
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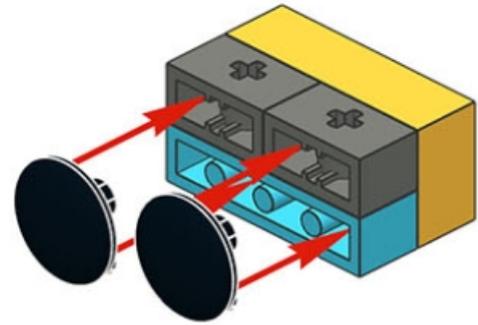
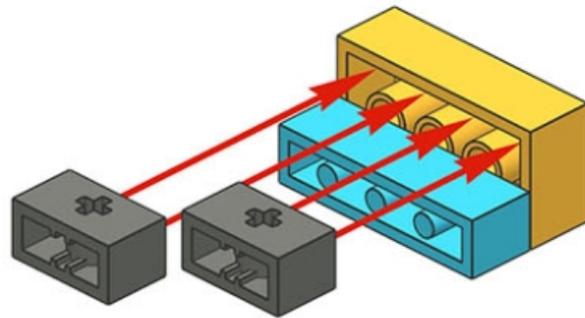




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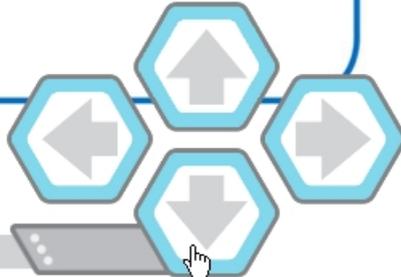
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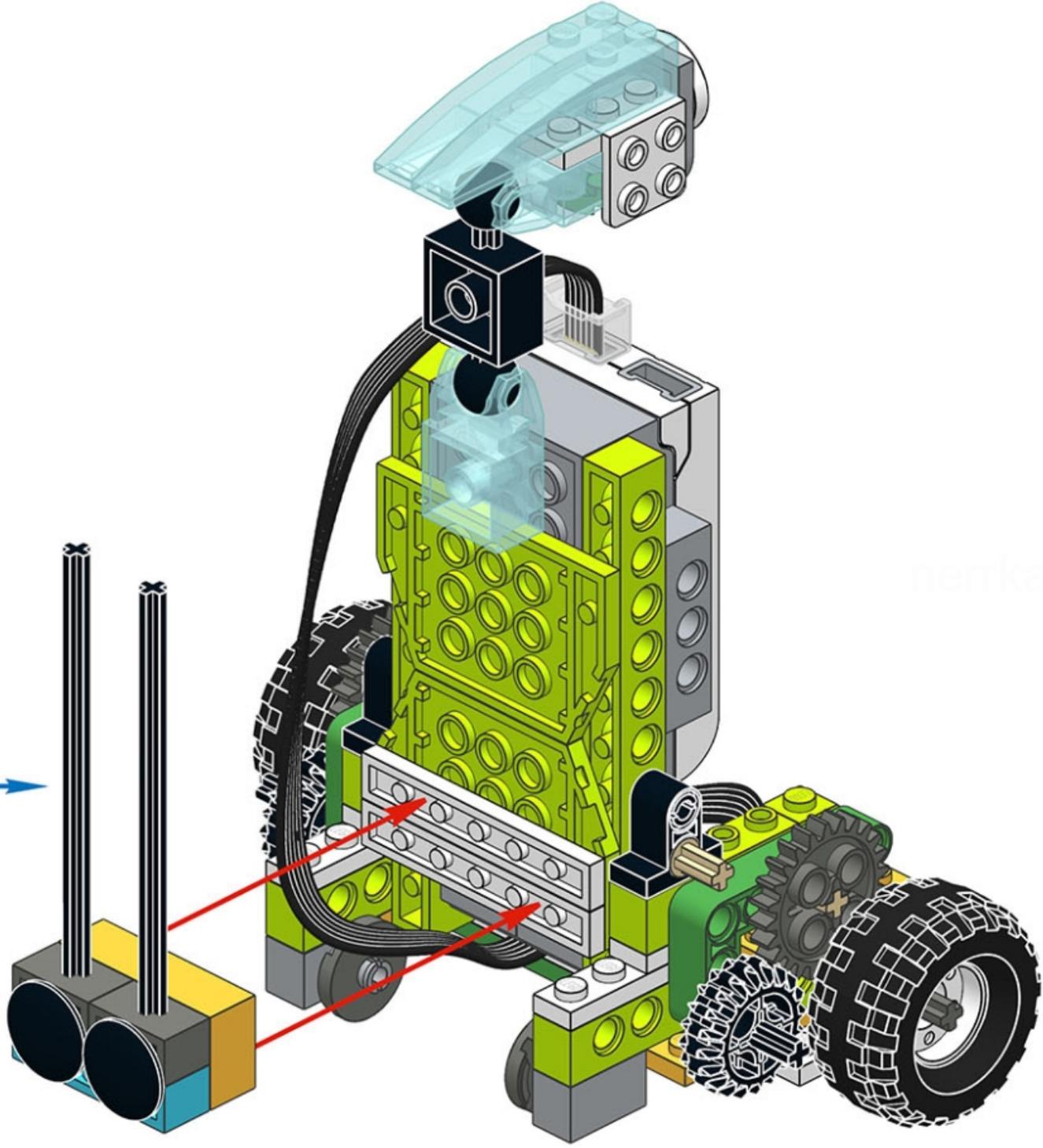
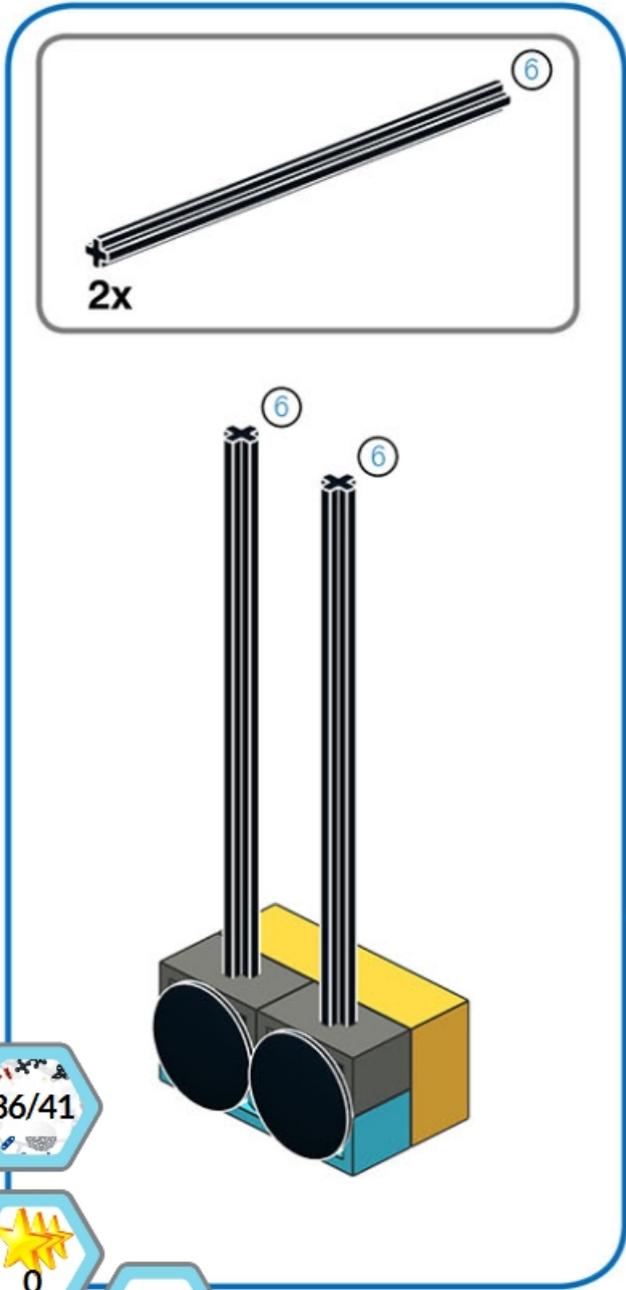


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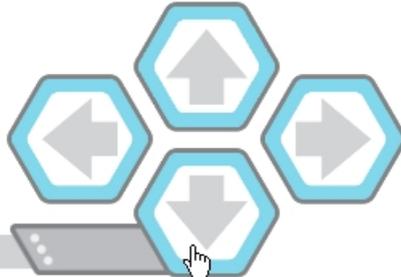




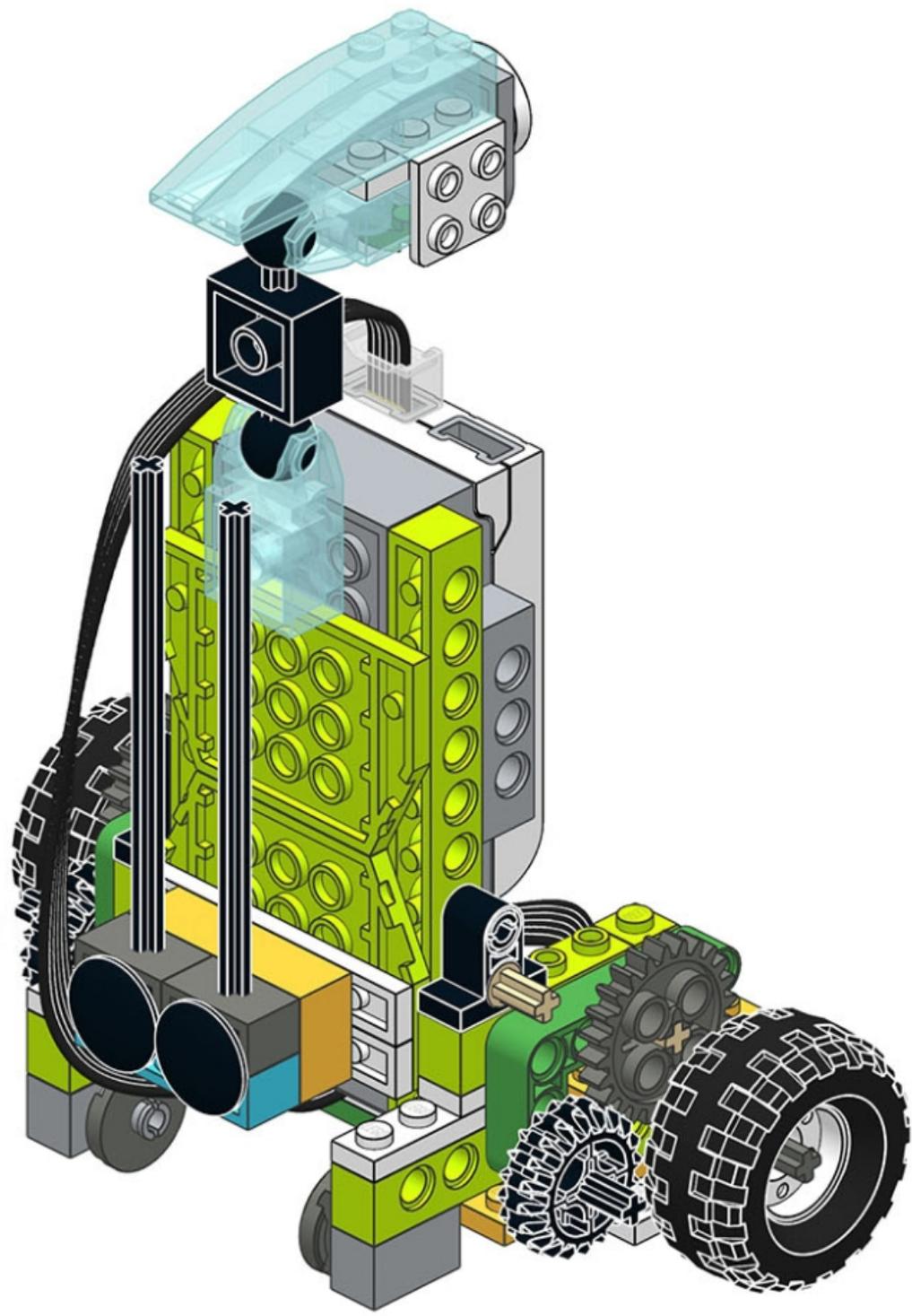
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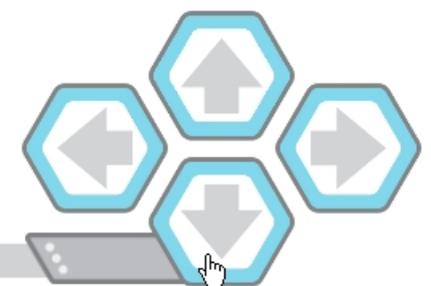


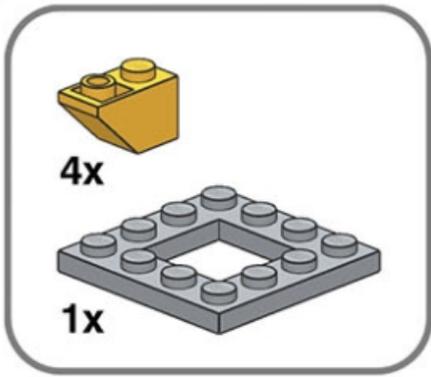
nerika©

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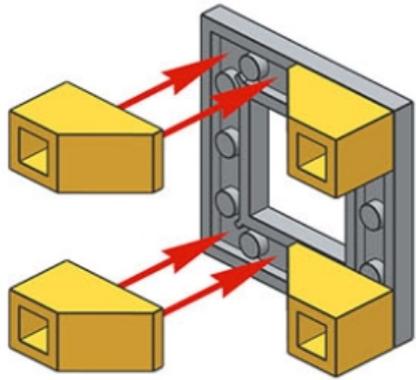
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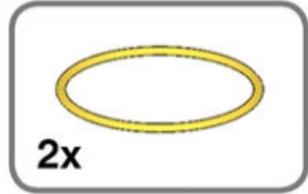
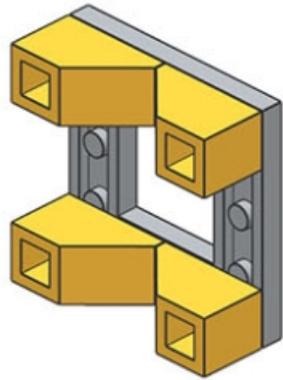




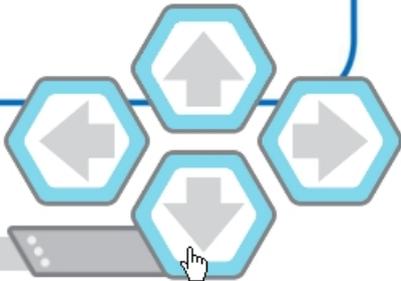
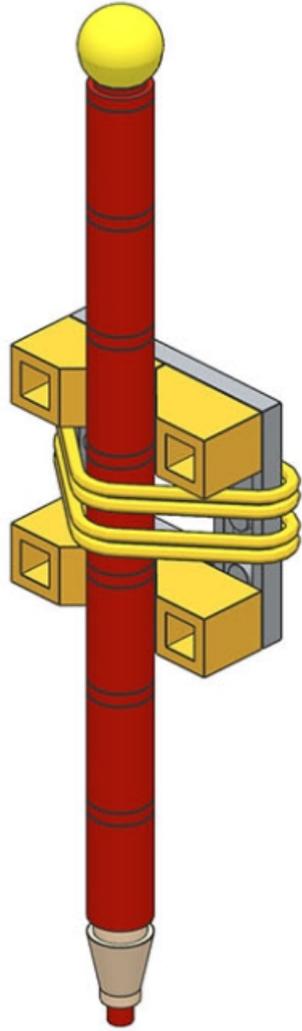
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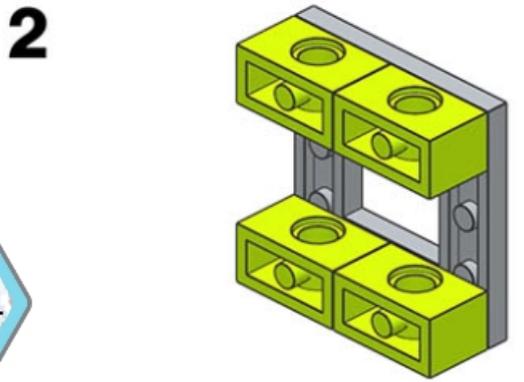
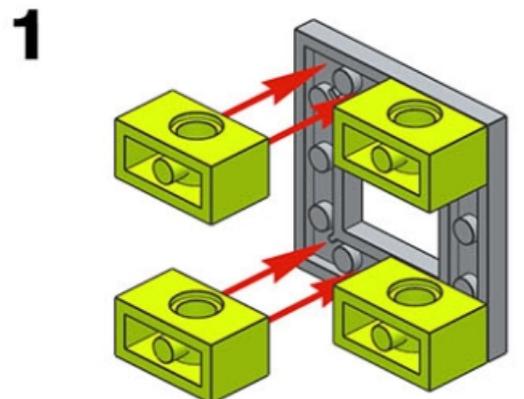
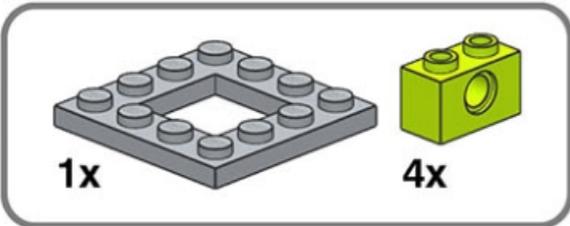


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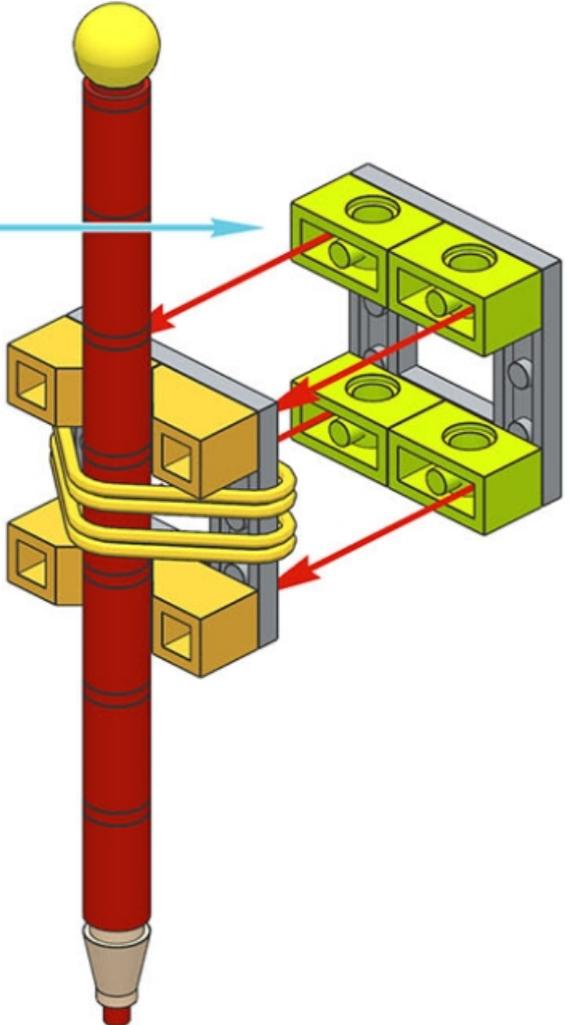


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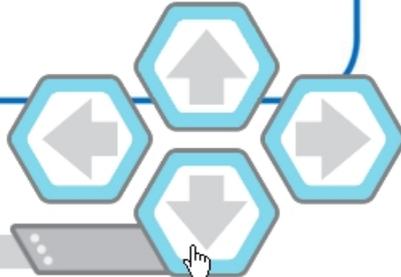
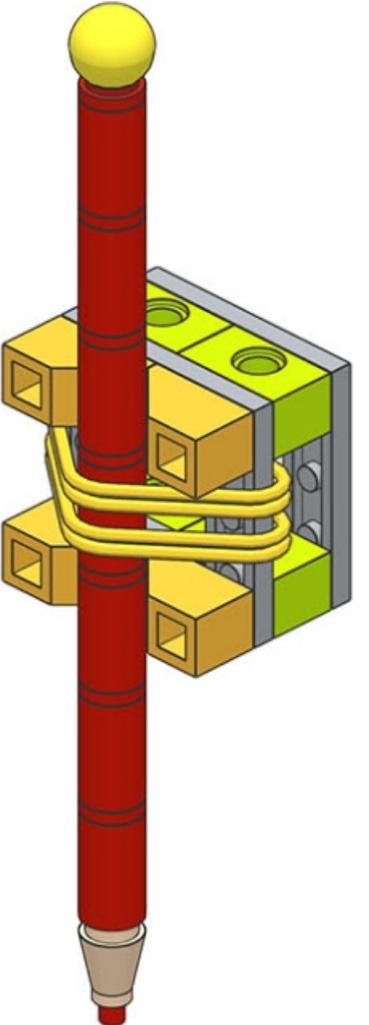




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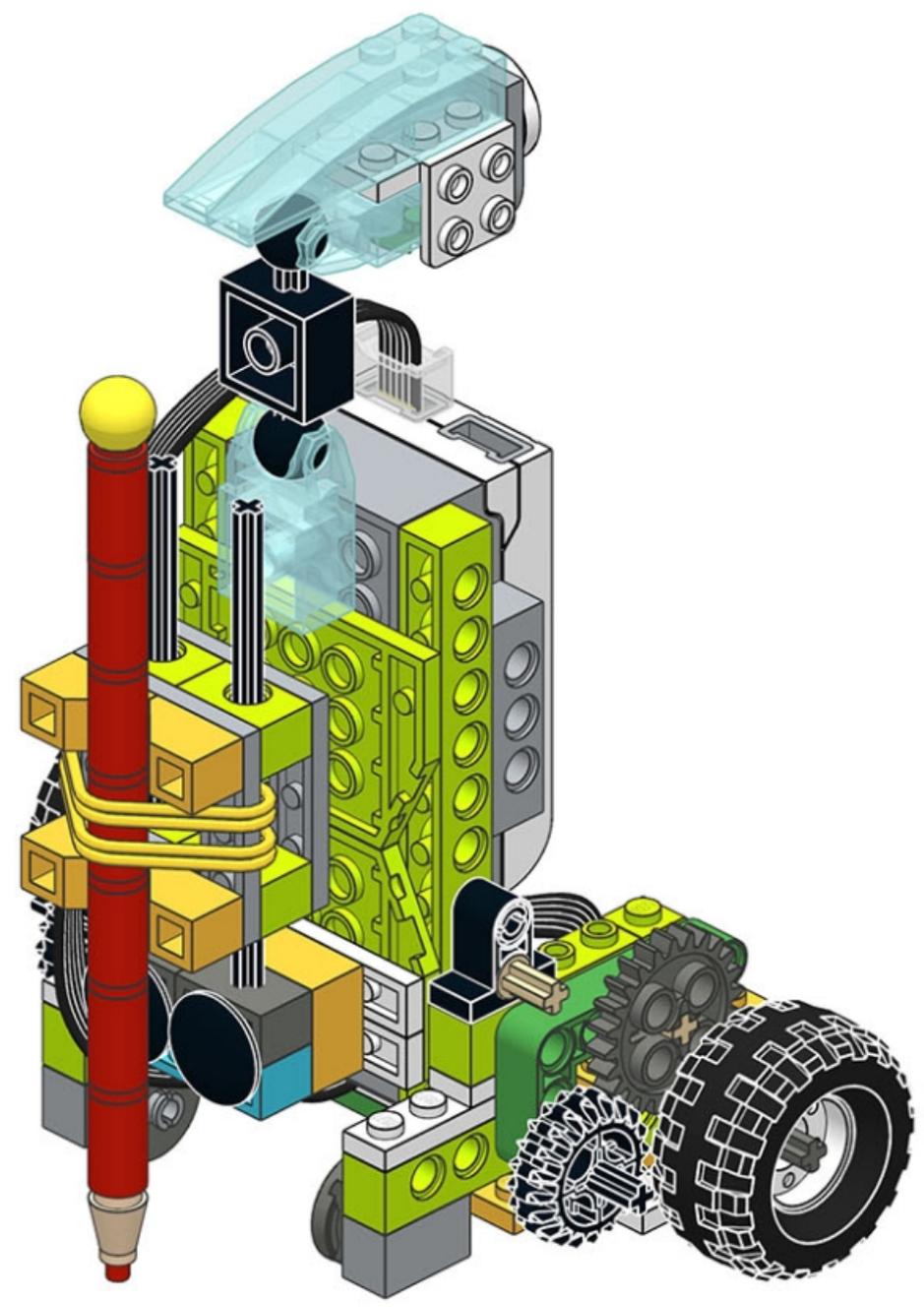


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40

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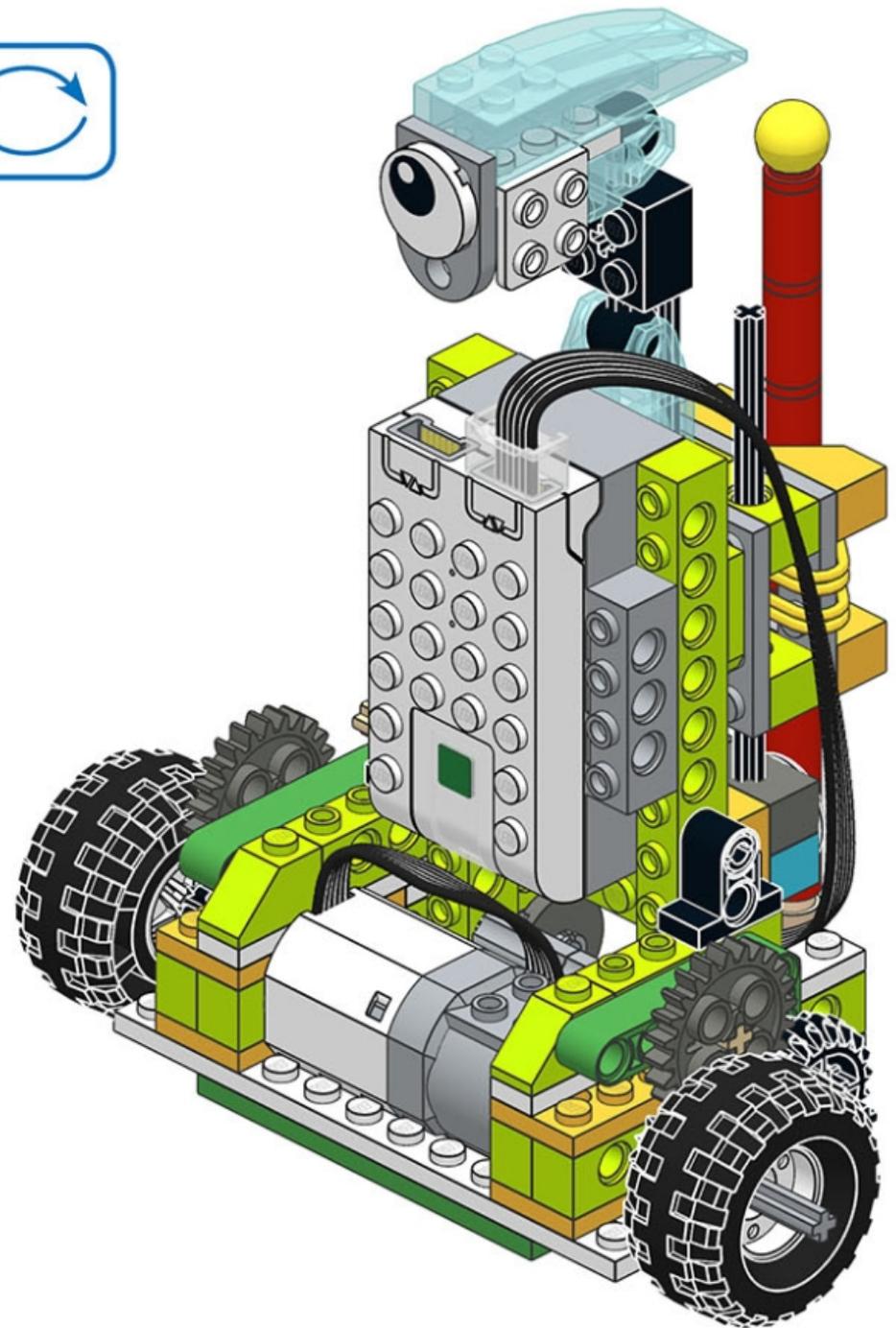


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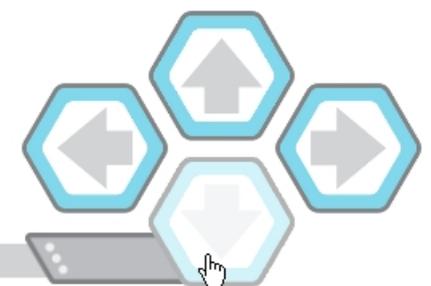
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nerrka@gmail.com

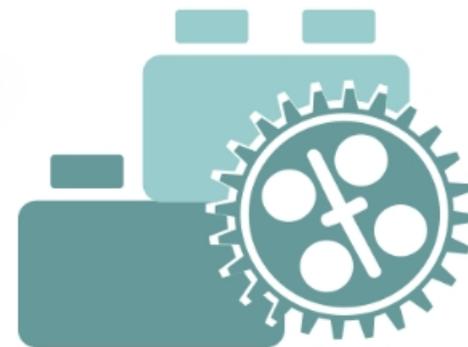




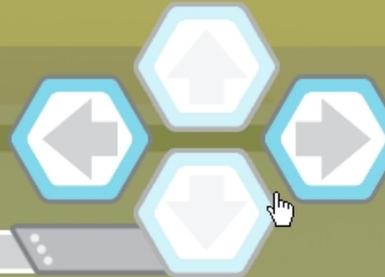
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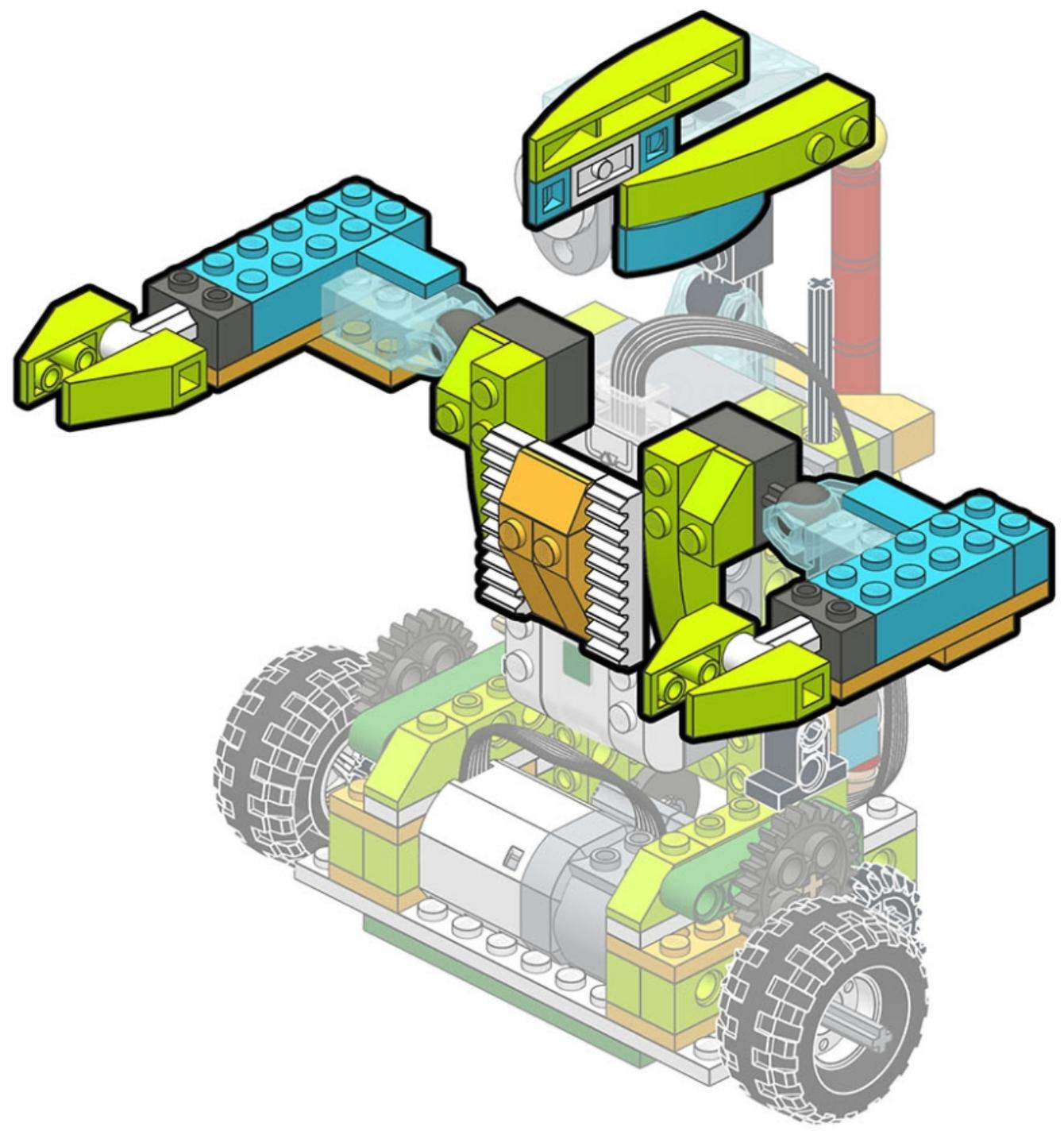
ROBORISE-IT!  
ROBOTIC EDUCATION

Add the hands and some external equipment!



59

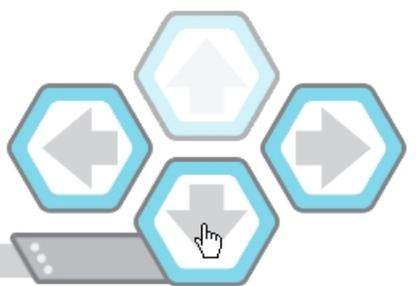


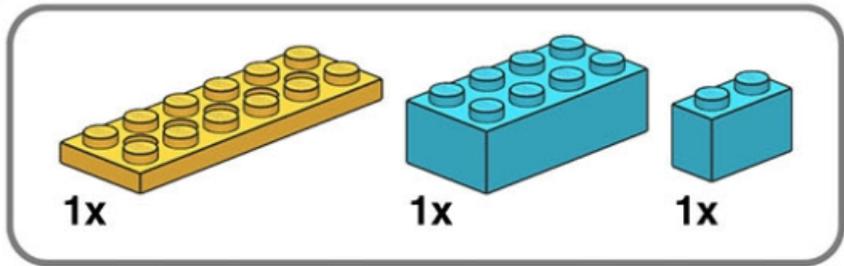


1/16

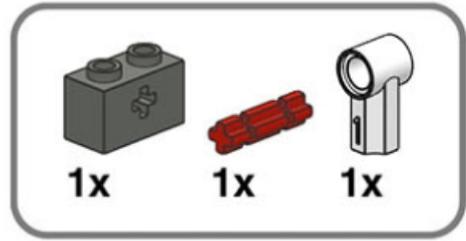
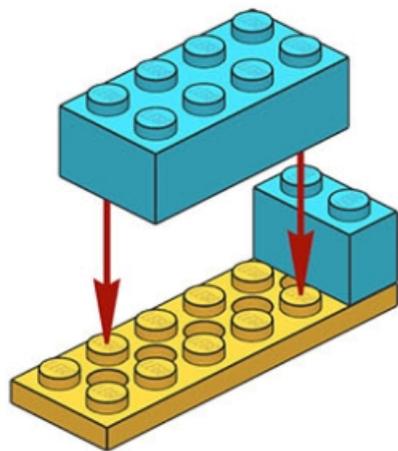
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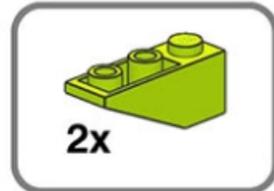
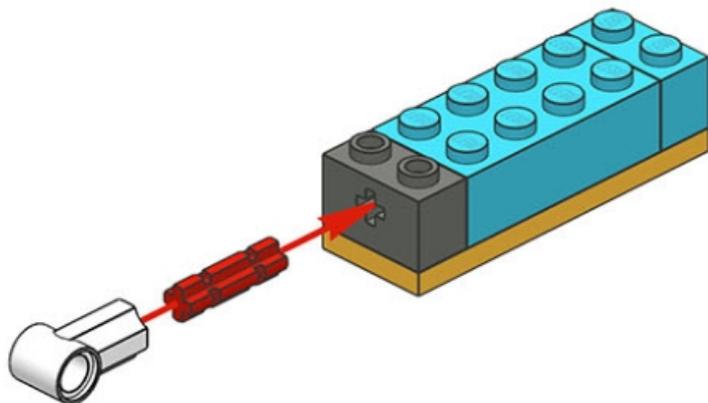




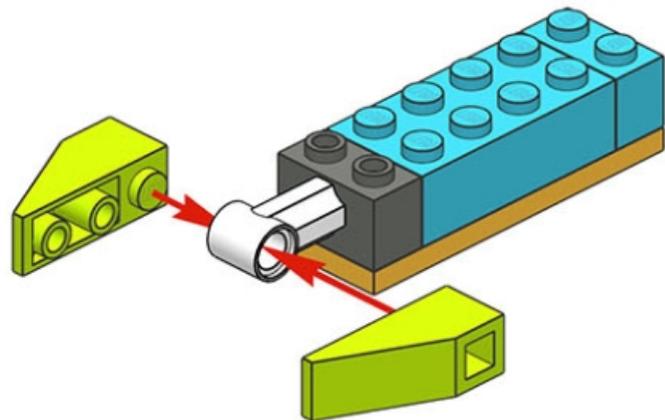
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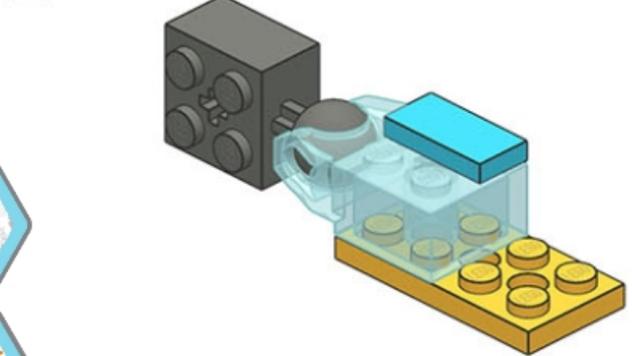
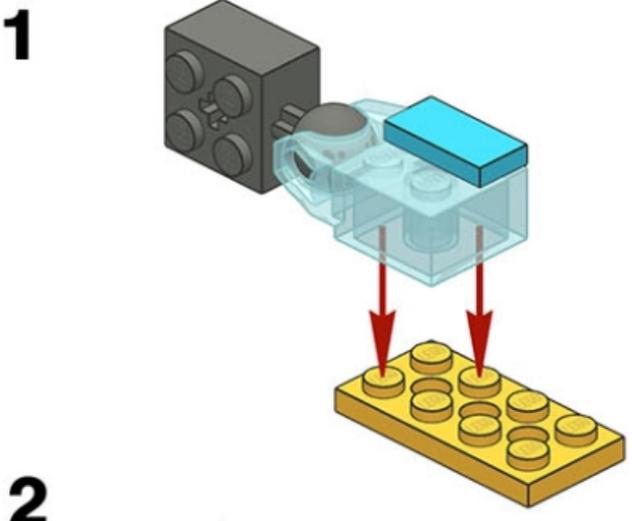


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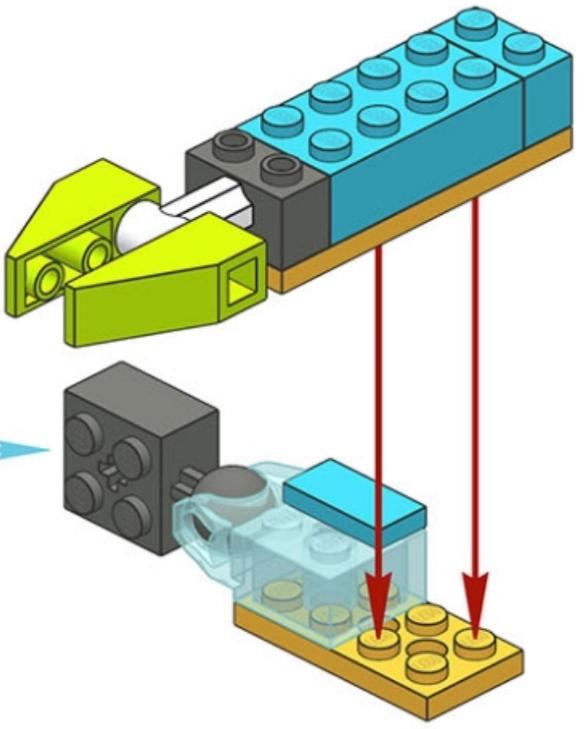


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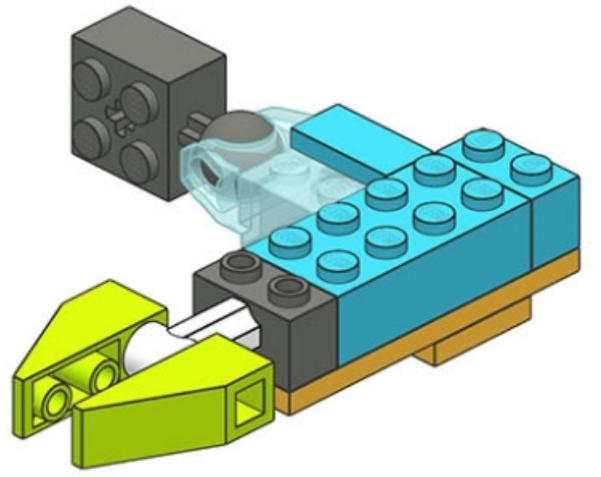
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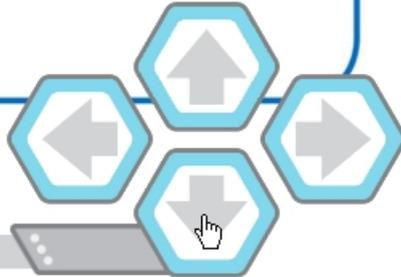
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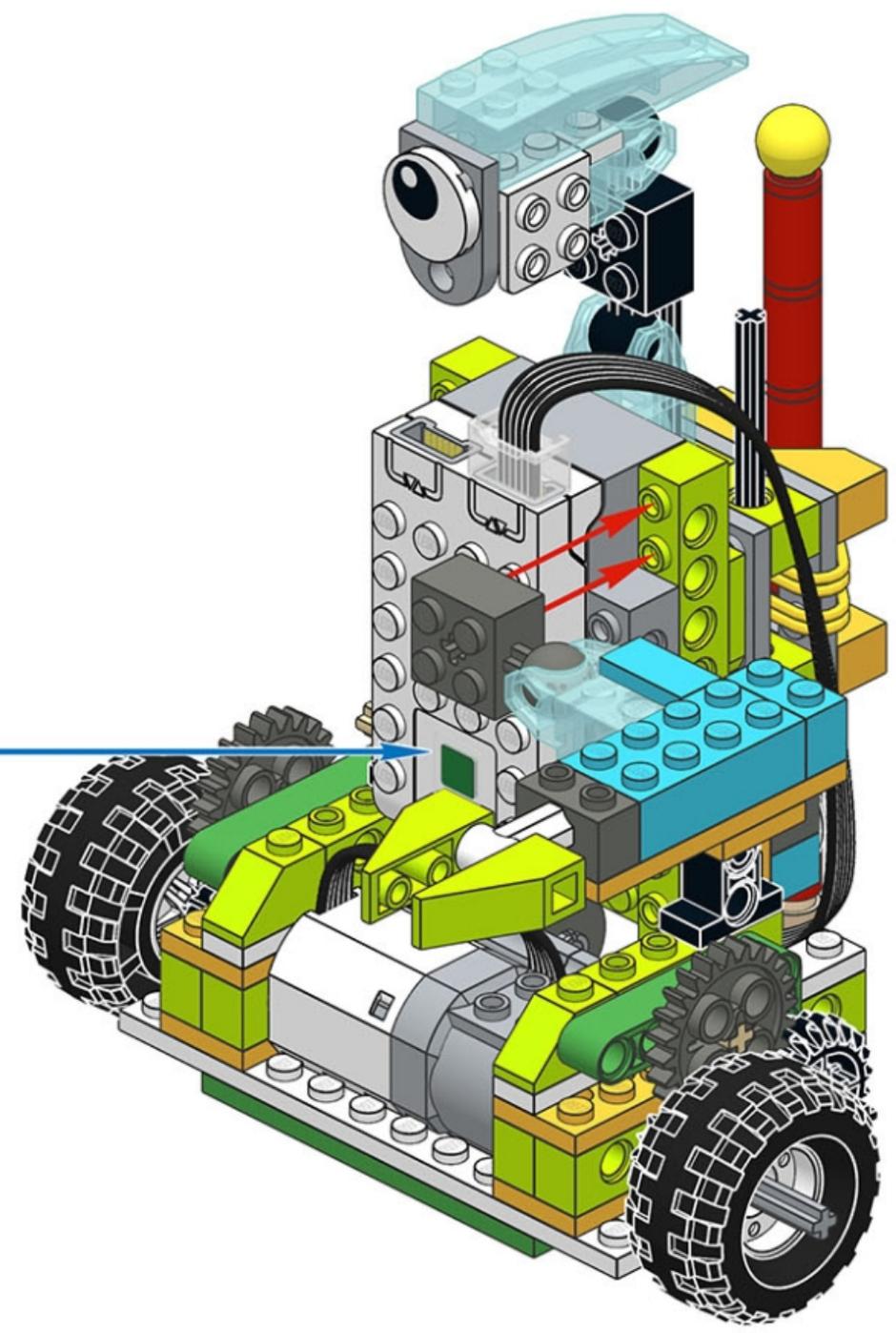
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62



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44

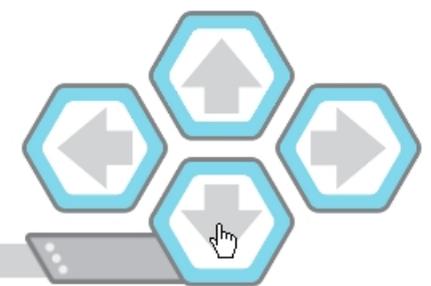


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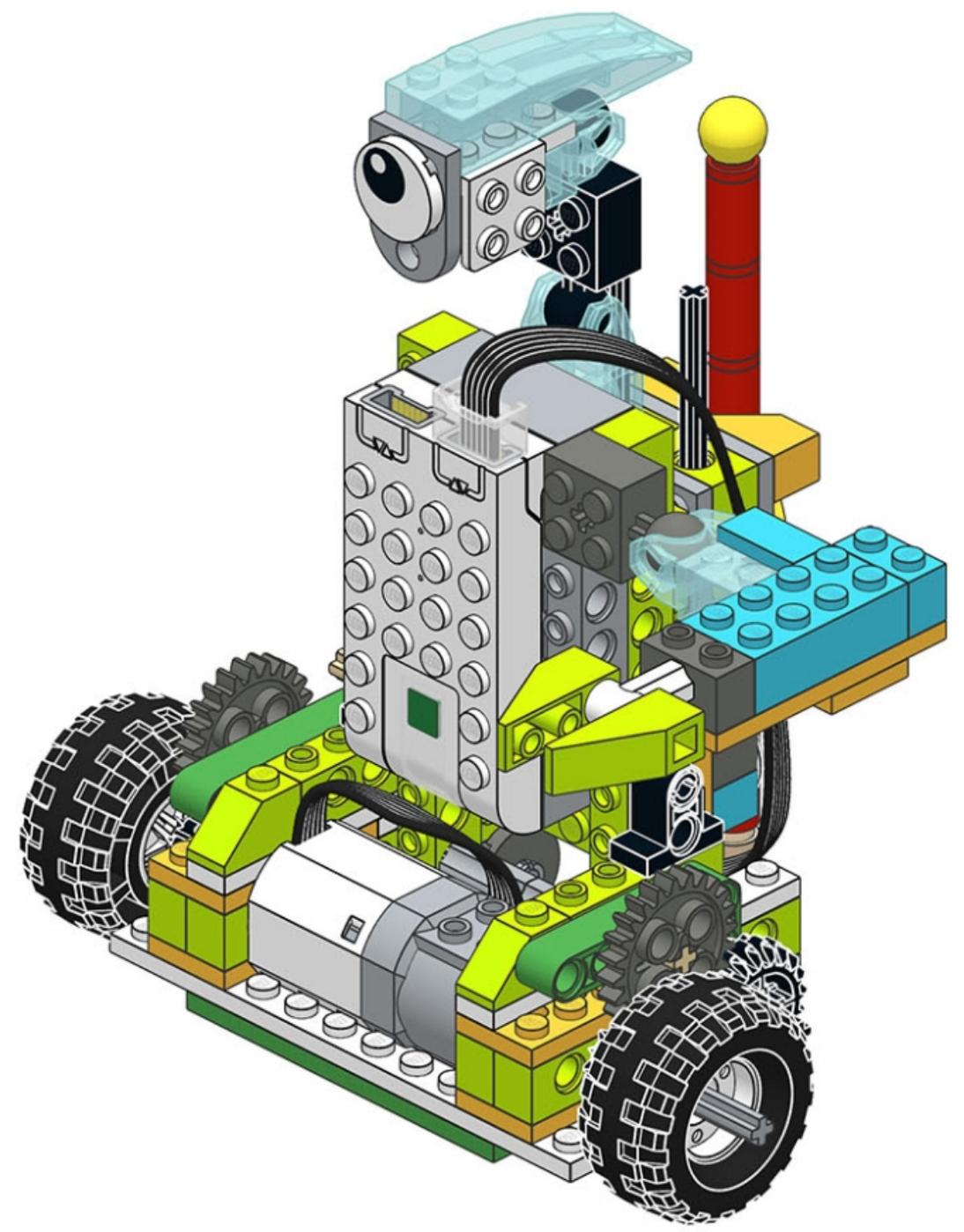
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63



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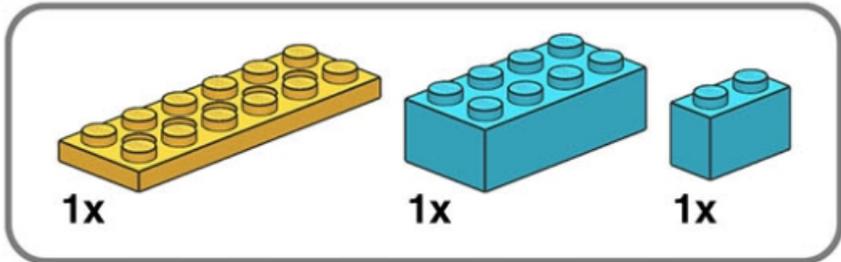


nerka@gmail

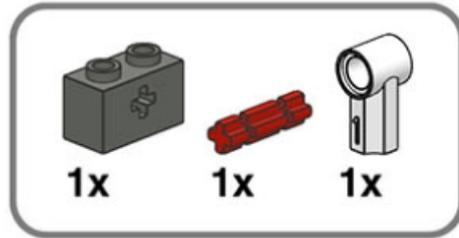
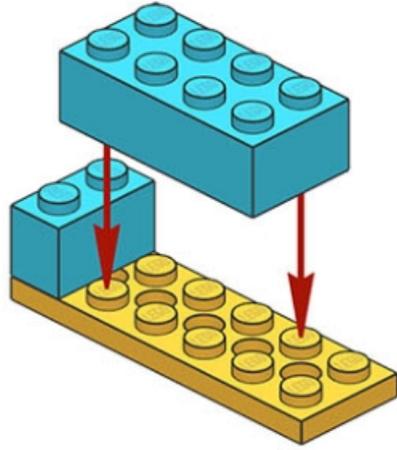
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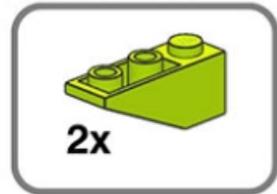
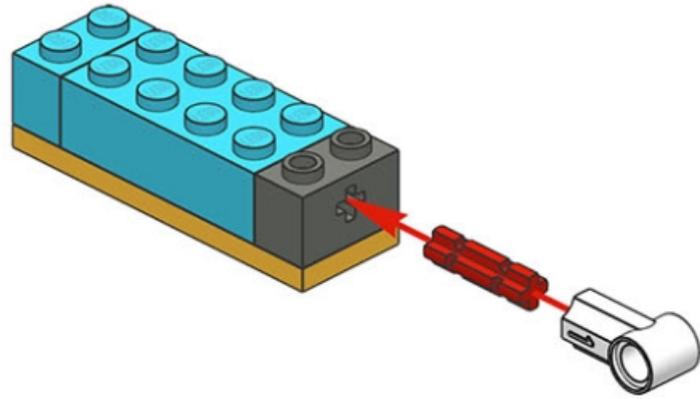
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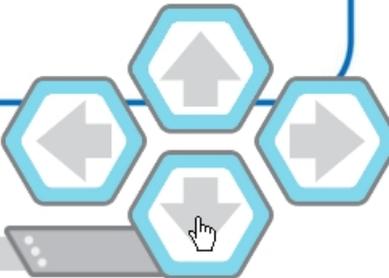
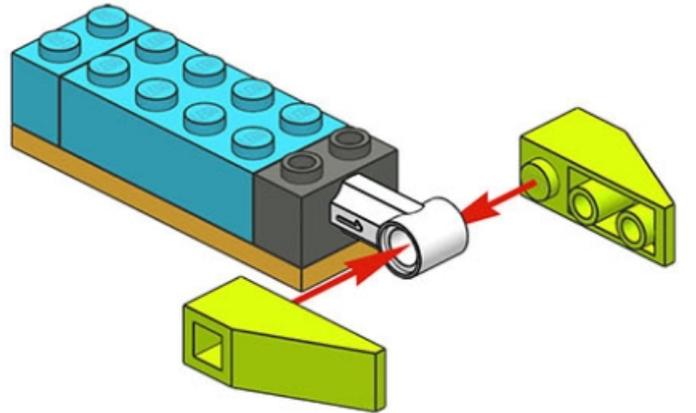
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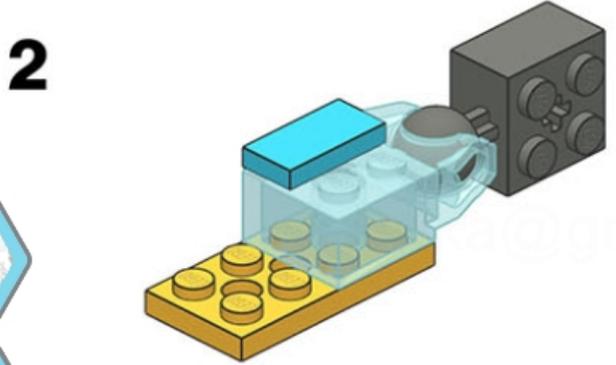
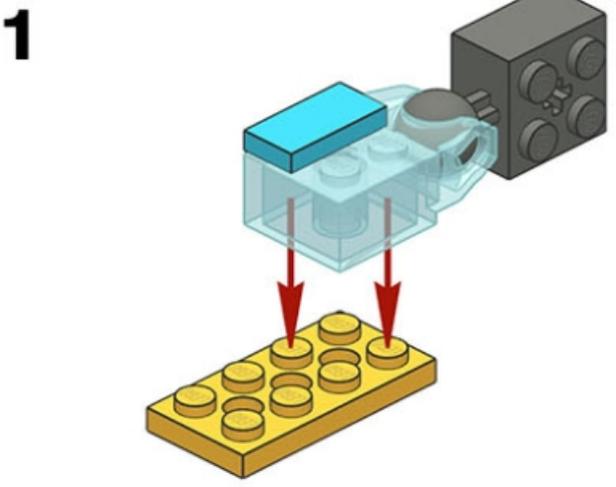
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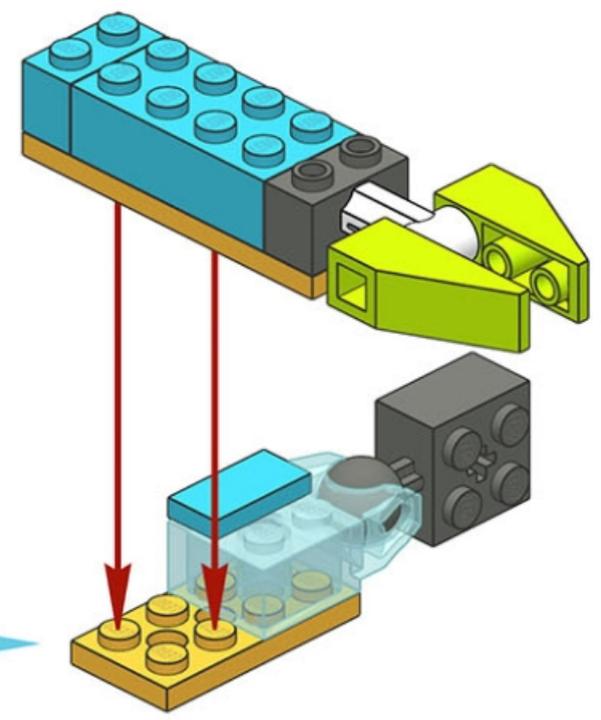
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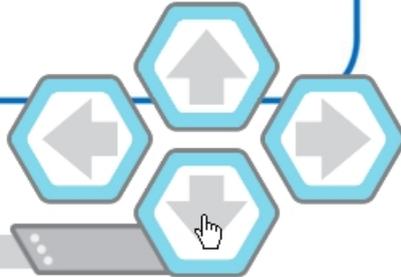
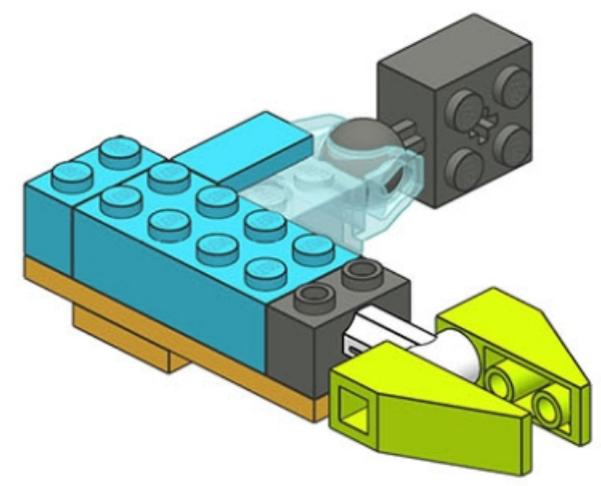
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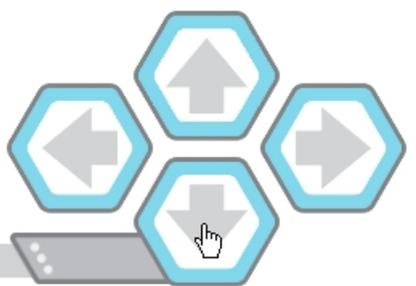
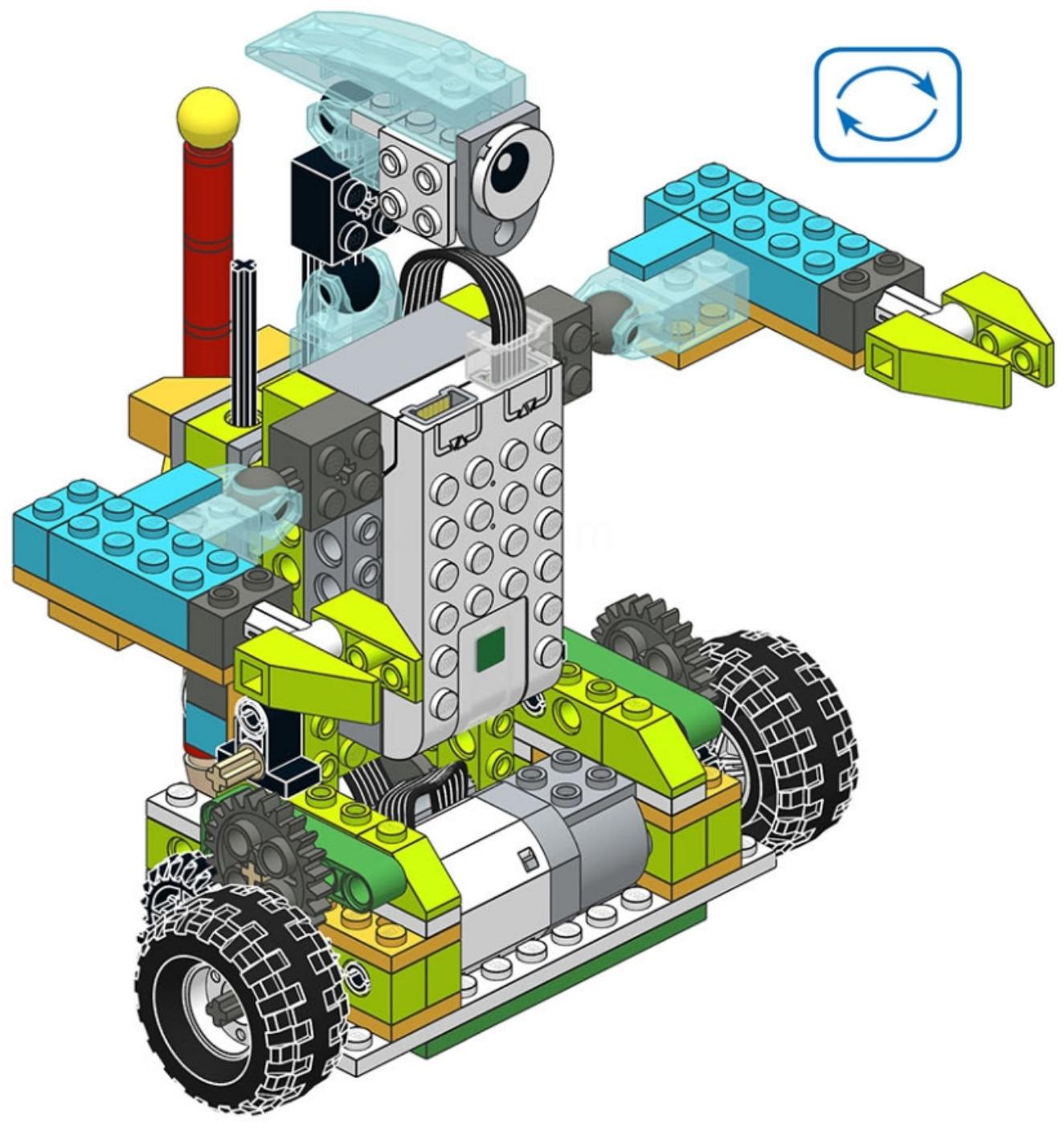
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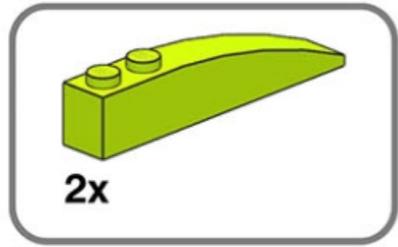


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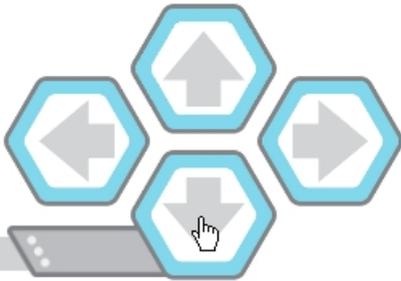
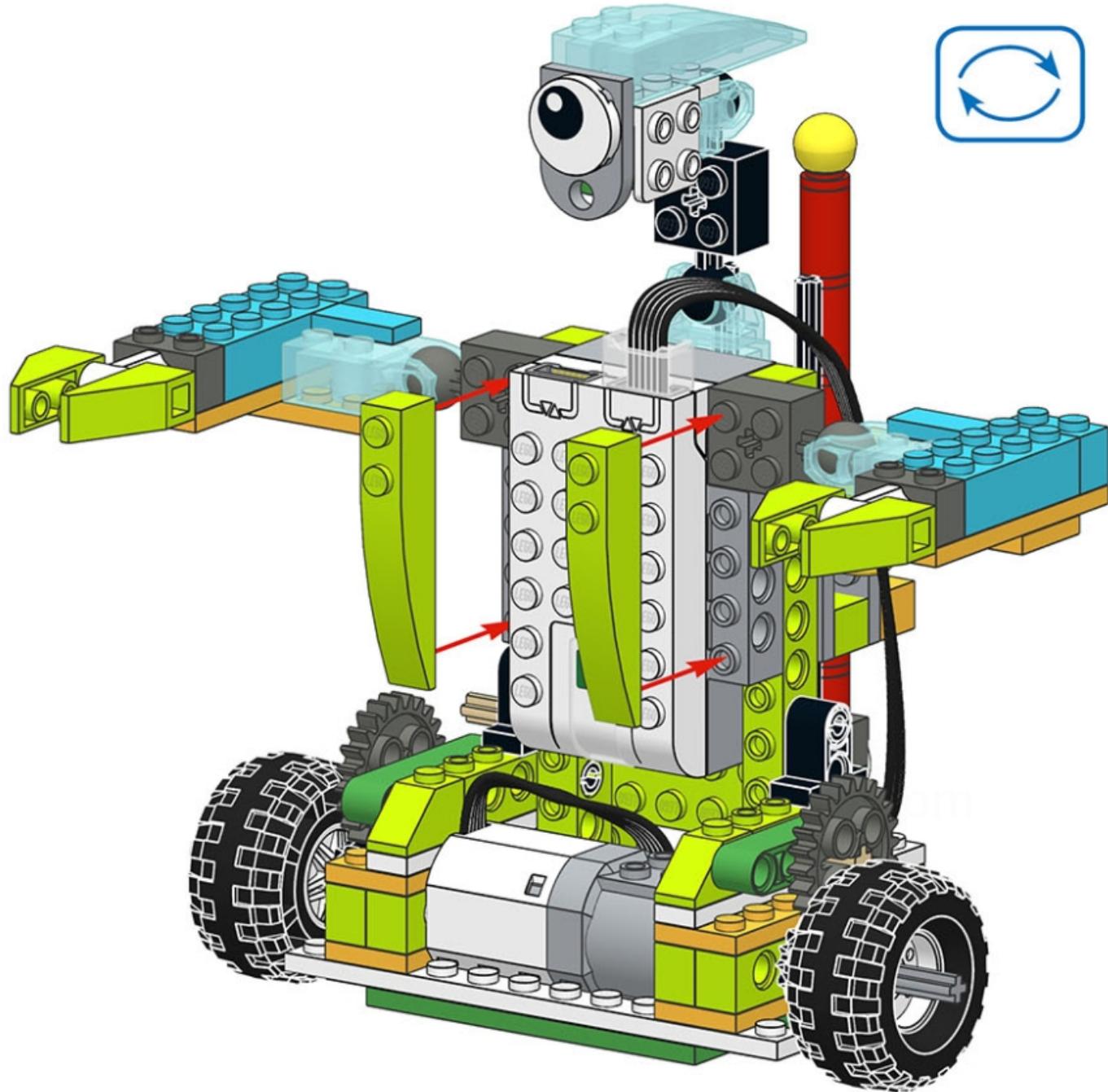


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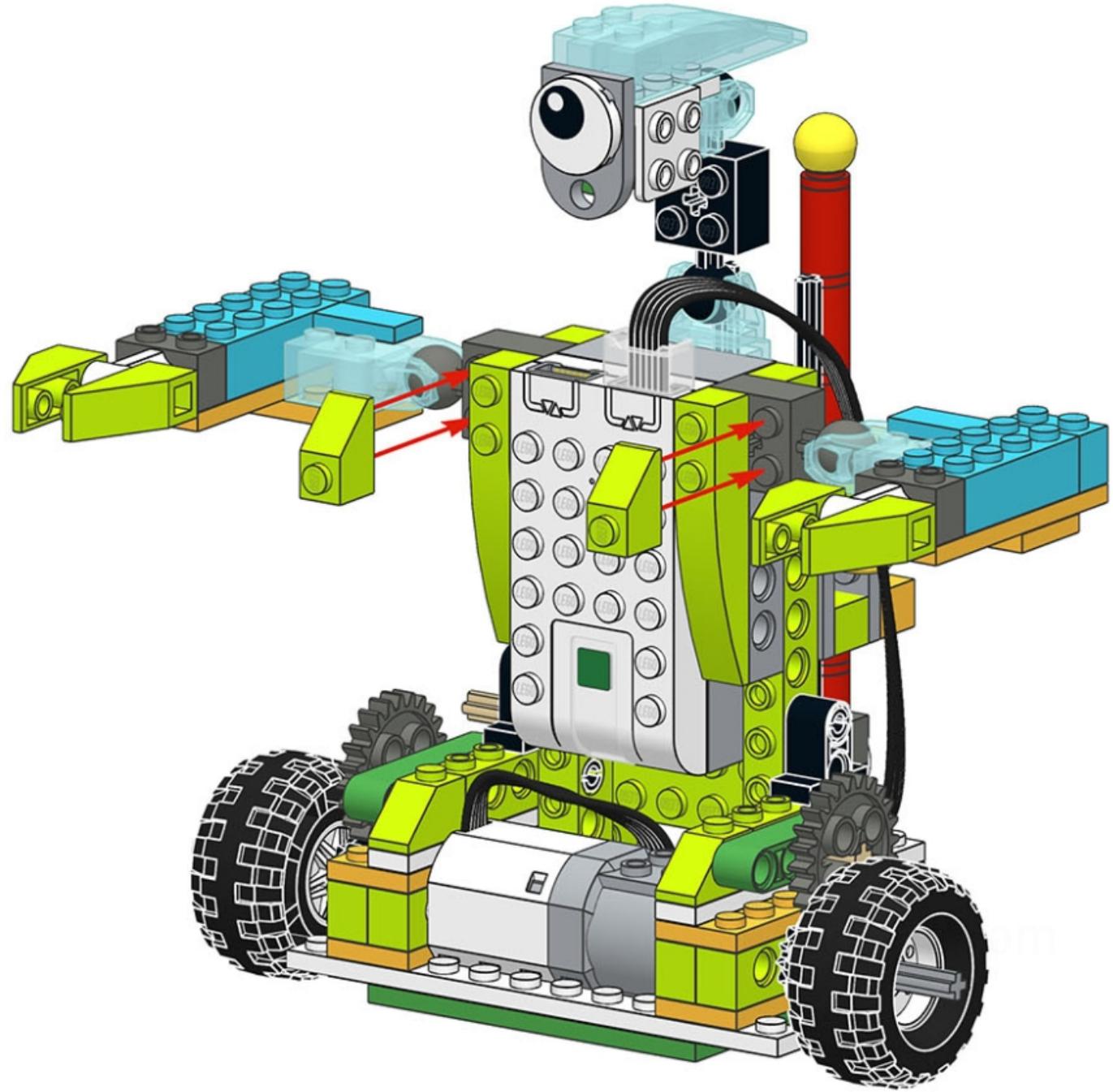


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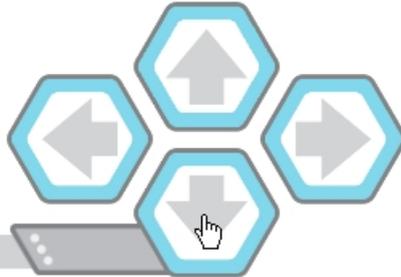
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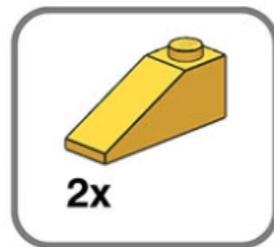


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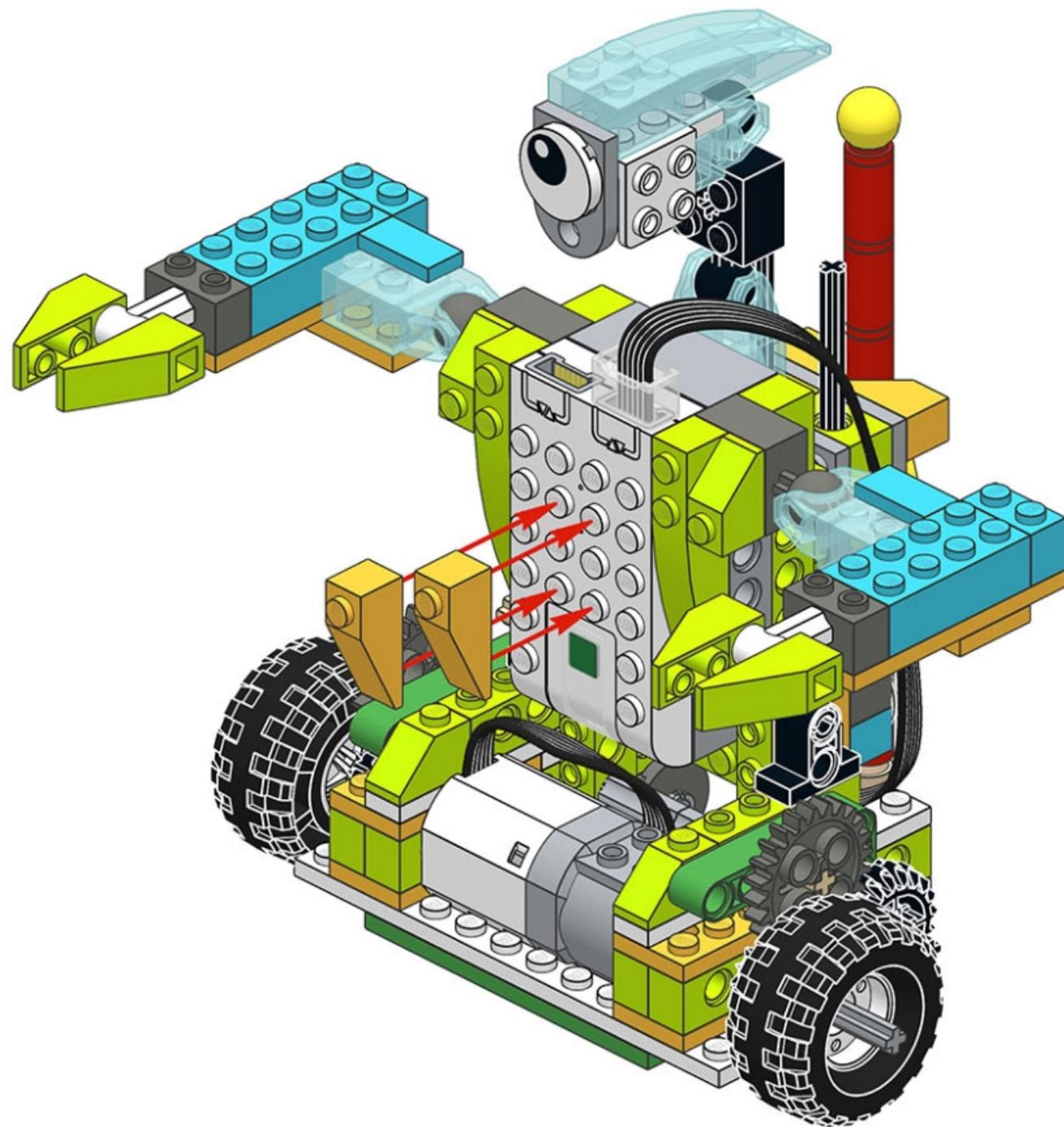
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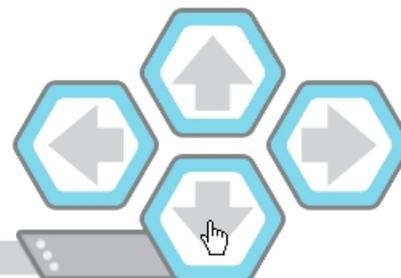
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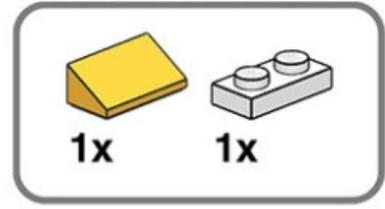


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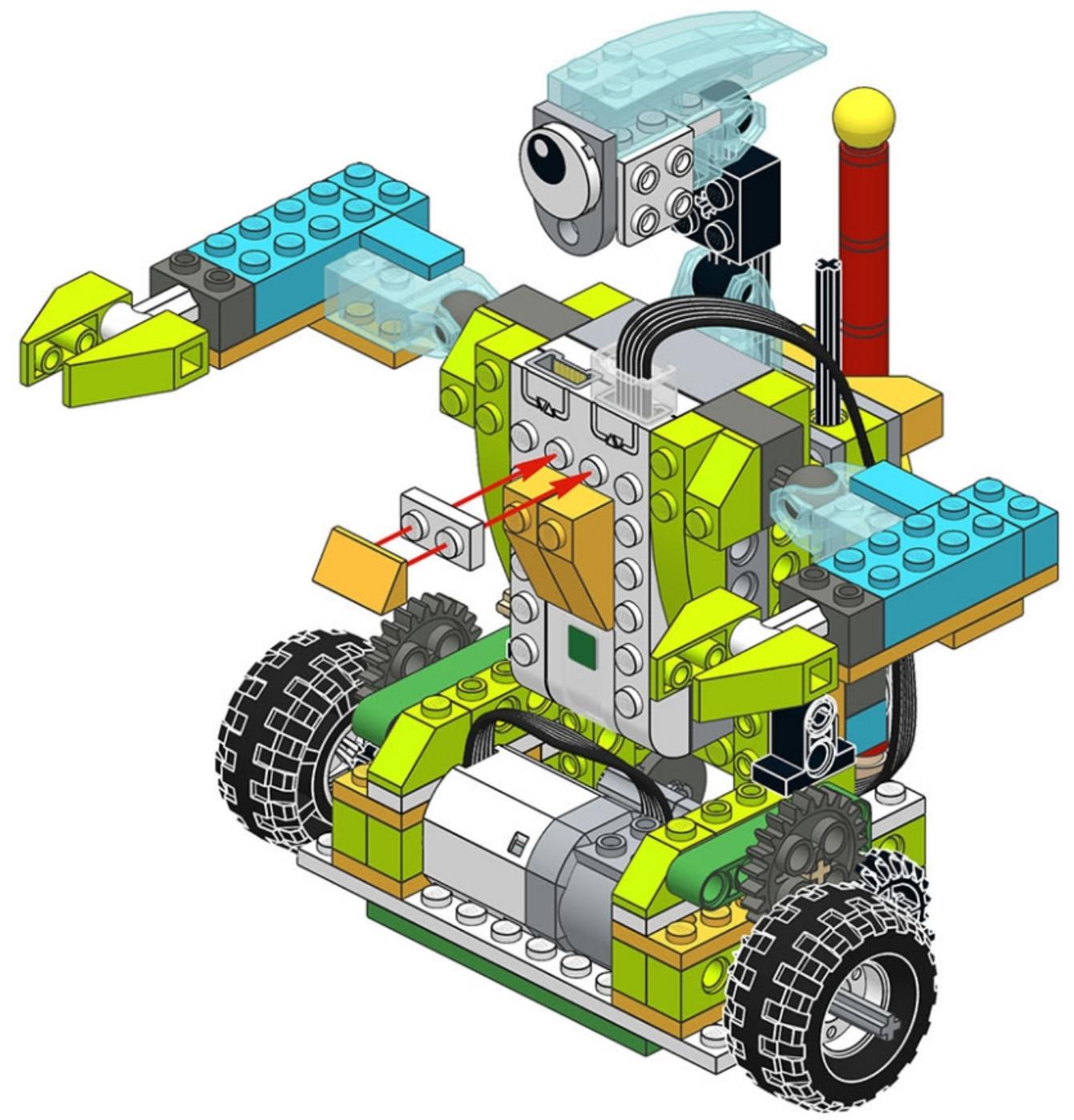
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70





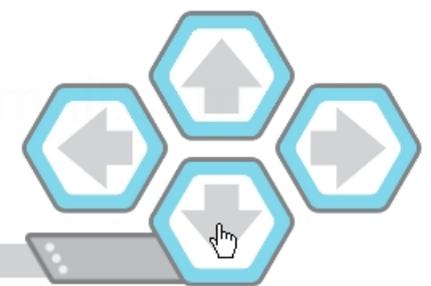
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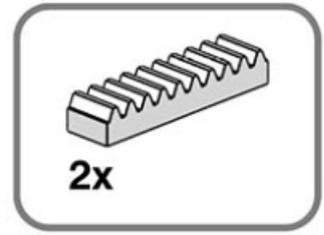
12/16

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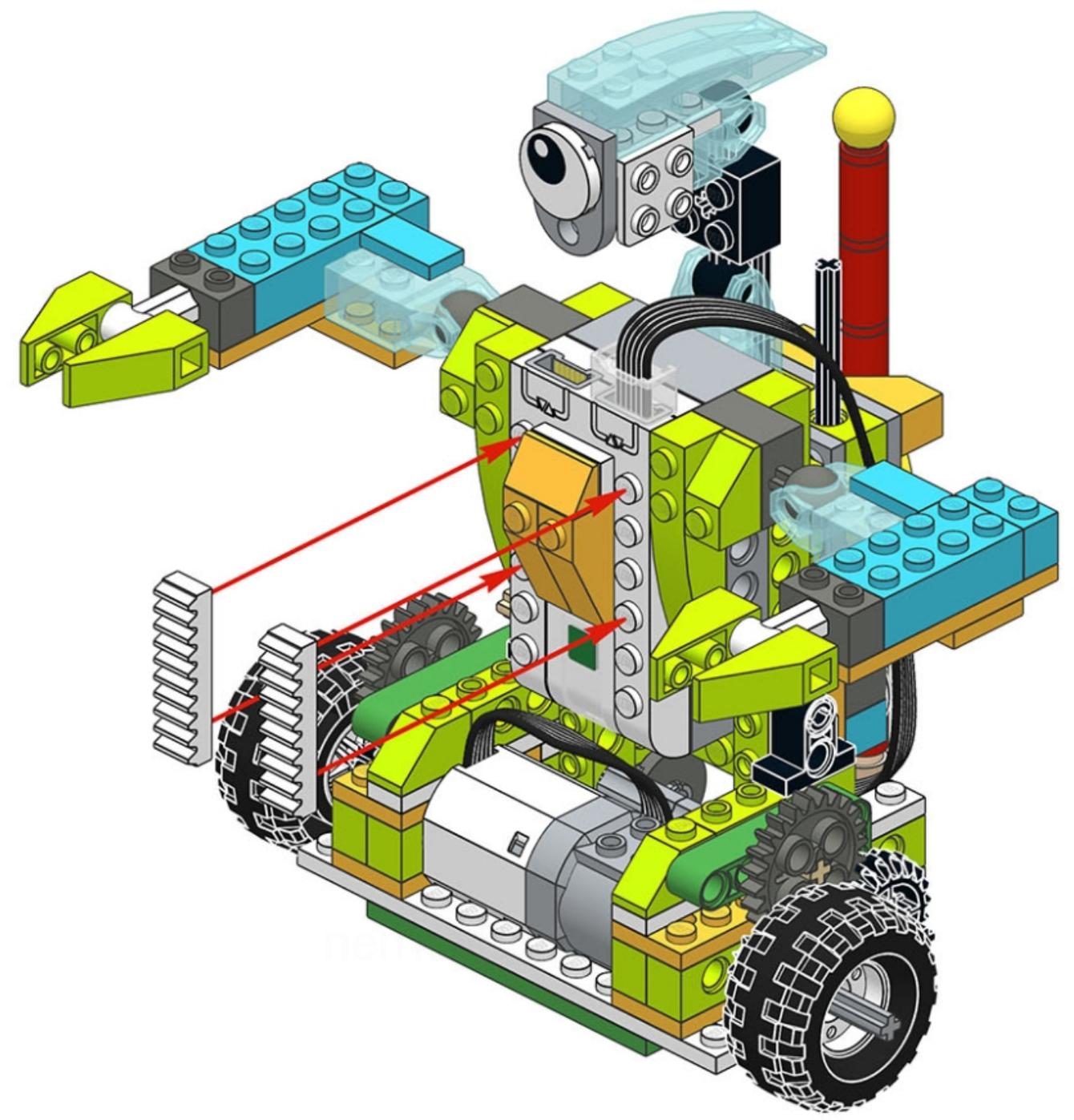
71



henka@g



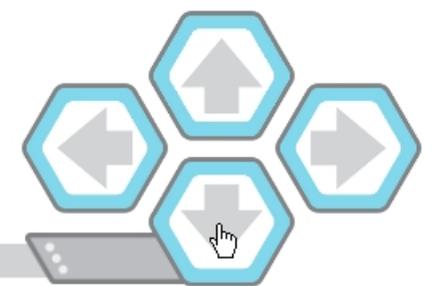
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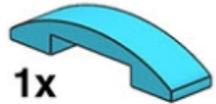


13/16

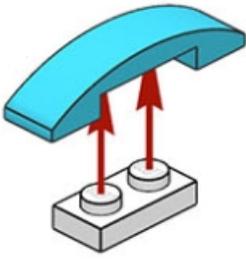
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72

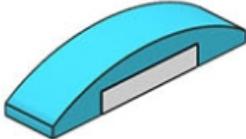


1x  1x 

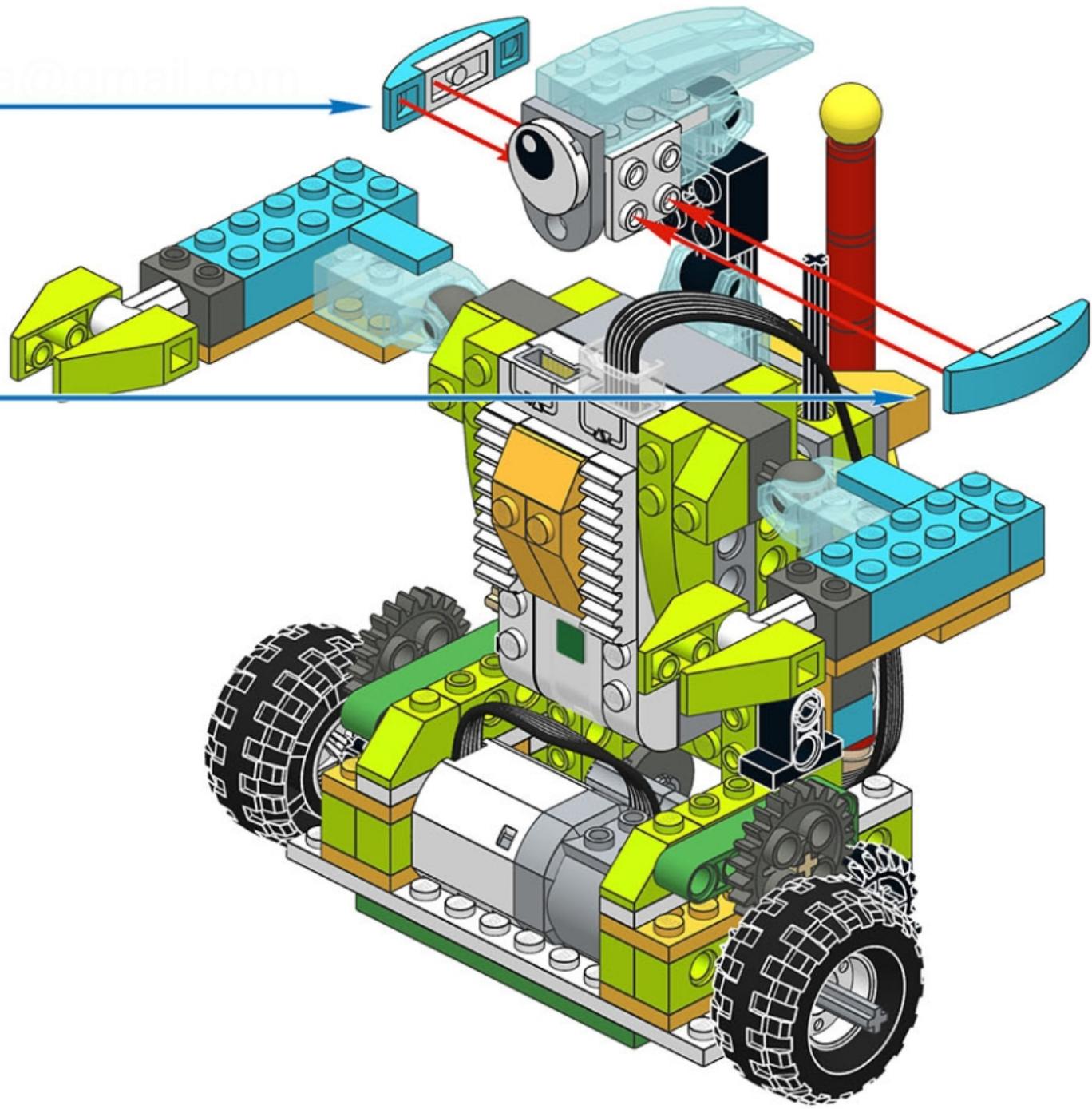
**1**



**2**



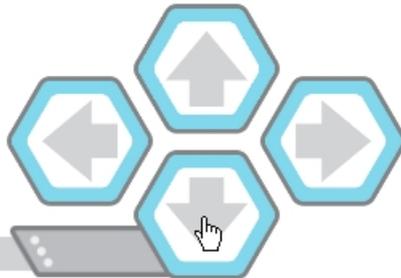
2x

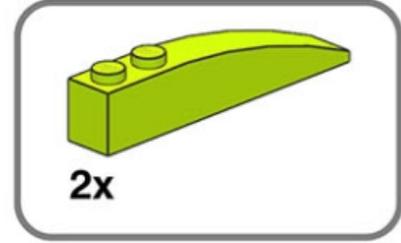


14/16

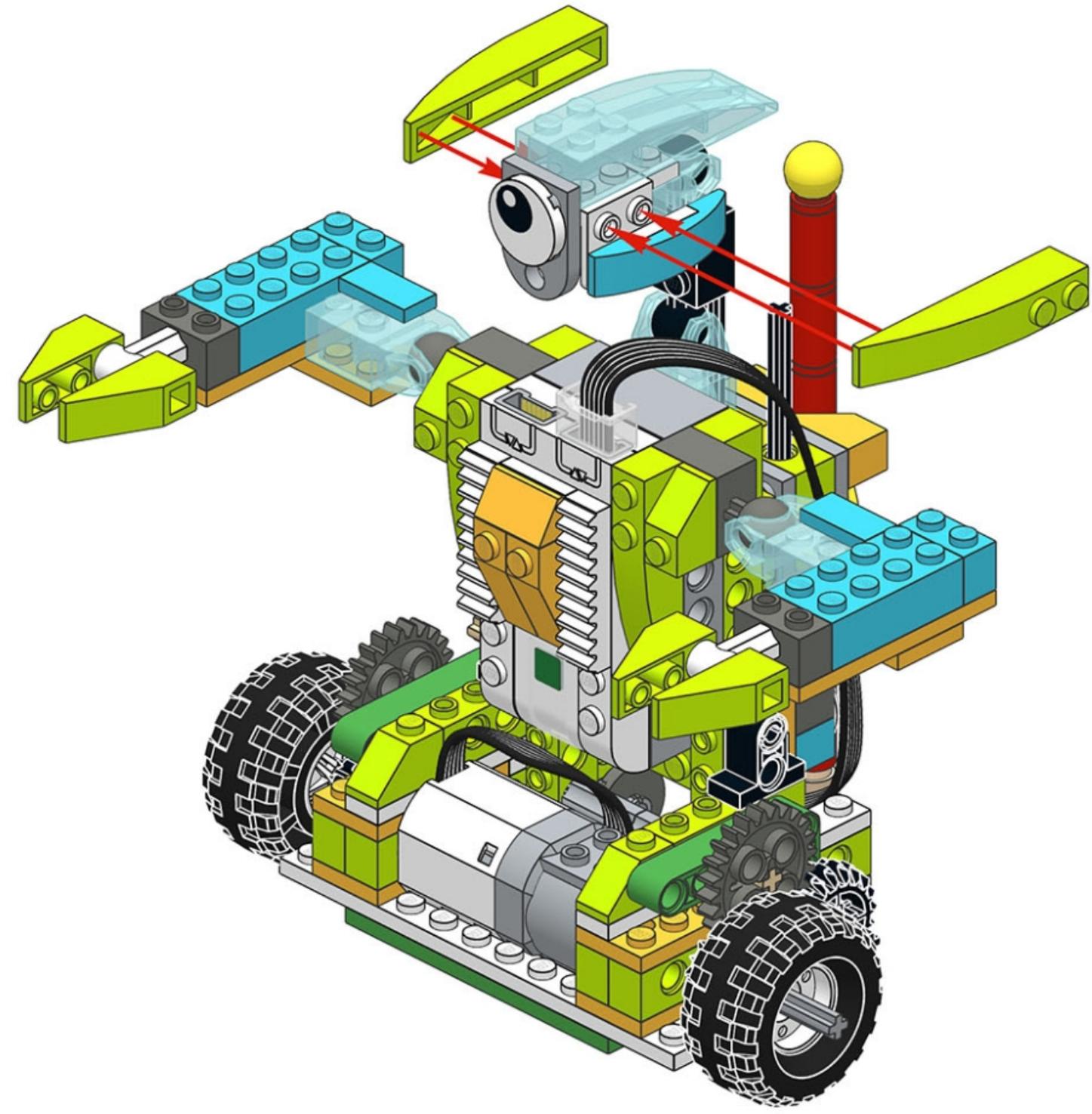
0

73





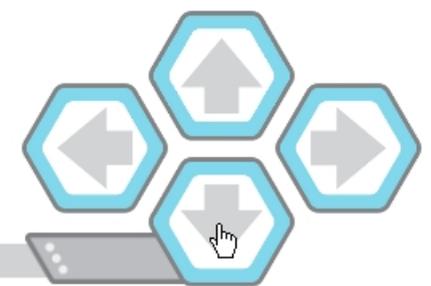
**55**



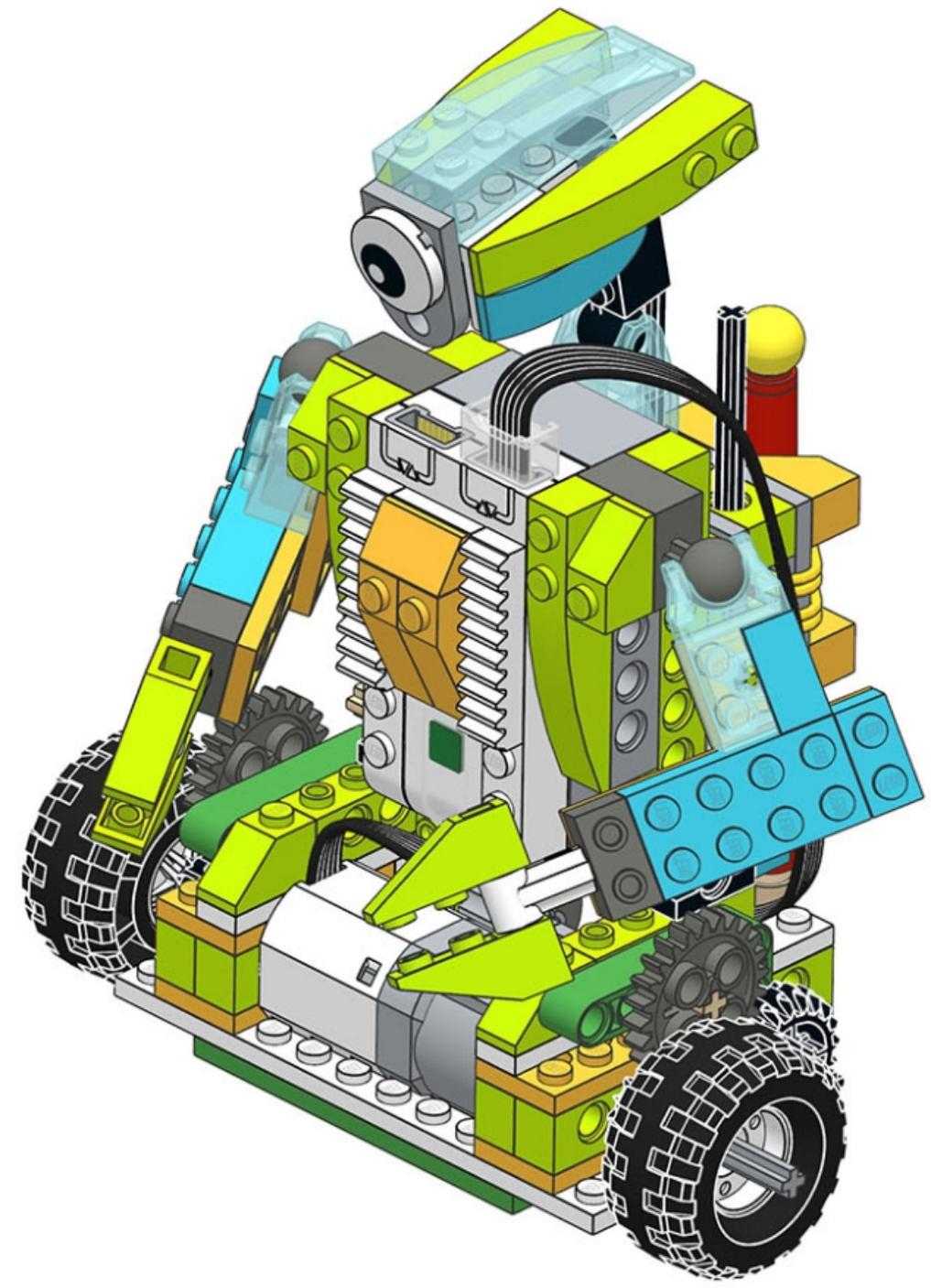
15/16

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74



56



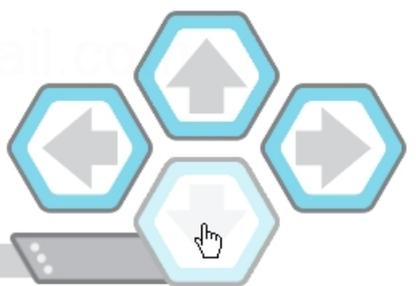
16/16

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75



nerka@gmail.com





Sketch

0 

1 





# New day at the robots` factory

**ROBORISE-IT!**  
ROBOTIC EDUCATION



Hello!  
The playfields of the stadiums needs some maintenance. Our next task is to create the robot for drawing the field marks. It will update all marks on the all fields very accurate and quick!





# TASK



## TASK

- to develop the robot for drawing the playfield marks



## Steps

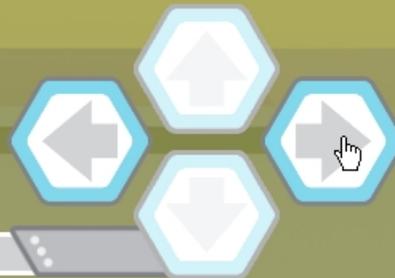
- to define which types of lines are used for mark the playfields
- to choose the chassis type for the robot
- to build and program the robot



0

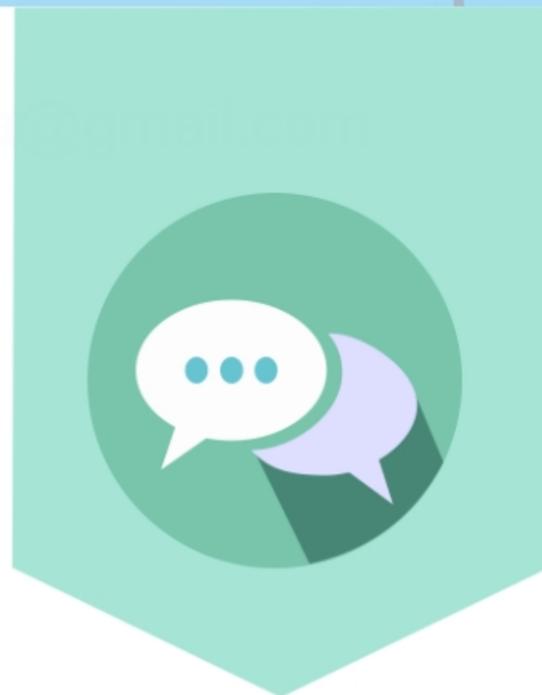


4





# Discussion of the task



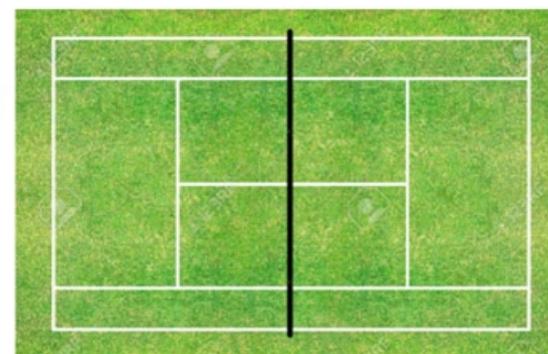
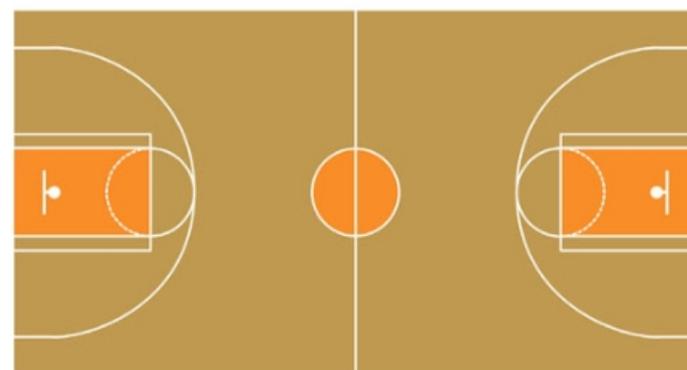
What marks are used on the different playfields? Do you ever see how they have been created?





# Marks on the playfields

The different games needs the different marks on the fields or courts. But usually this is the straight lines and circles or the parts of the circles.



0  
6

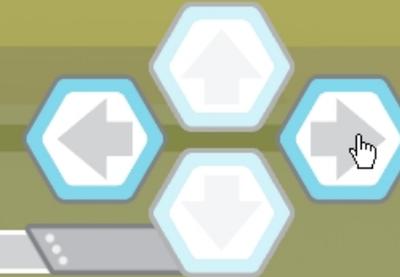
A set of navigation icons including arrows for back, forward, up, and down, and a hand icon for interaction.



# Marks on the playfields

**ROBORISE-IT!**  
ROBOTIC EDUCATION

For creating the marks the special Line Marking Machines are used. They has the tank with the paint and the aerograph that spray paint.

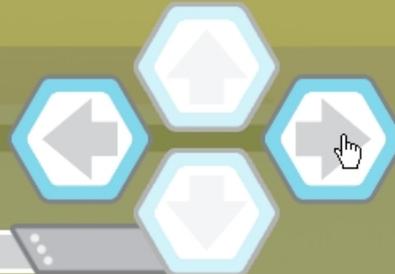




# Robot for drawing the marks

**ROBORISE-IT!**  
ROBOTIC EDUCATION

The Intelligent One robot uses the *GPS* signals for very accurate painting. It has many different patterns and may be adjusted for any field dimensions.





# Let's summaries

We must to create the robot that:

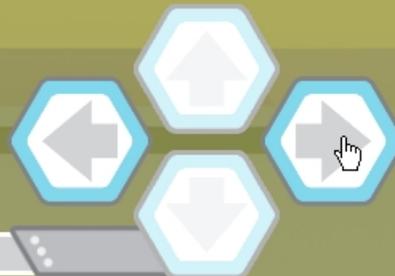
- May draw the straight lines and circles.
- May be controlled manually for different corrections.



0

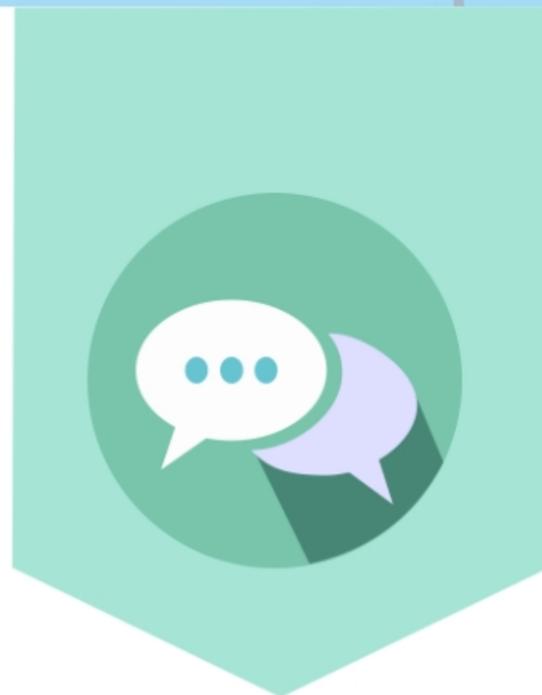


9





# Discussion of the task



What do you think, the wheeled or the caterpillar chassis is better for this task?

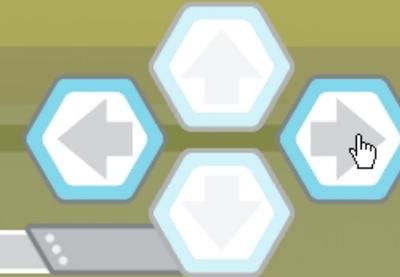
@gmail.com



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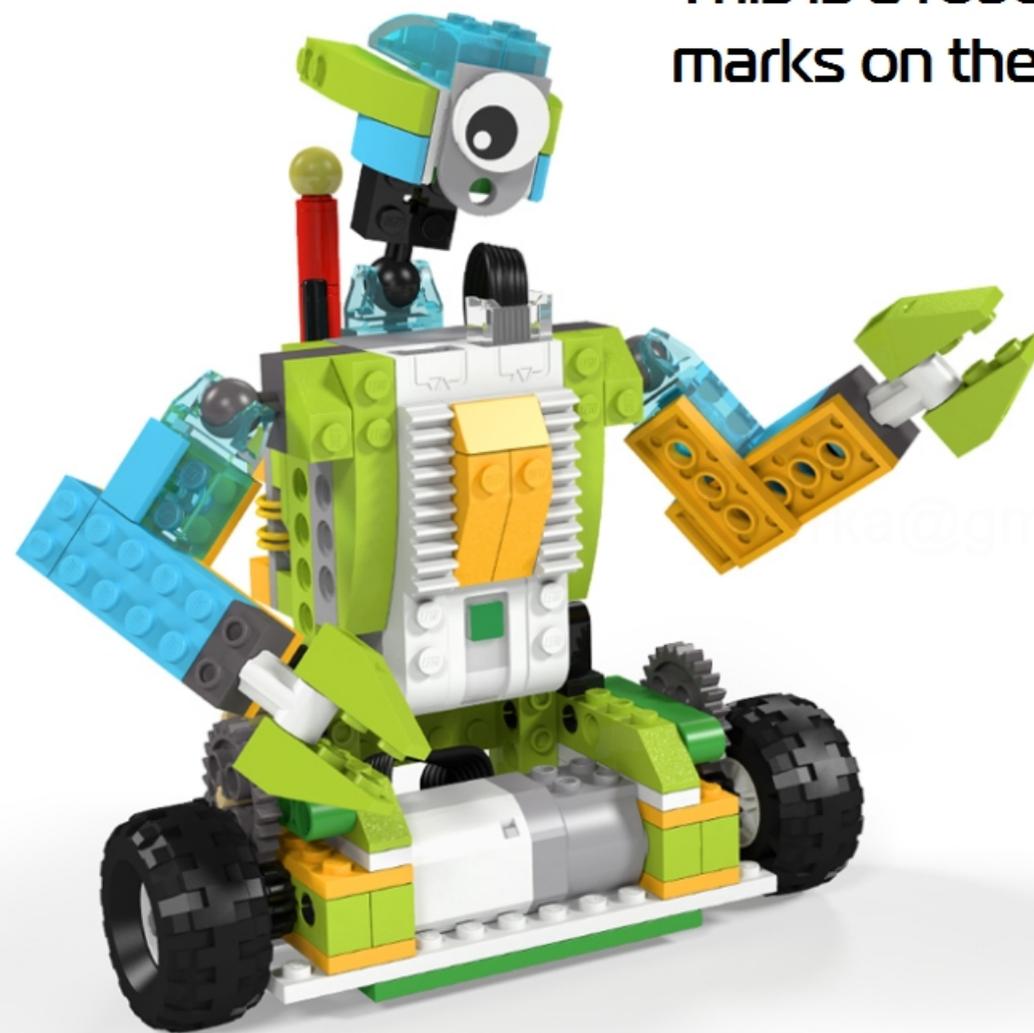




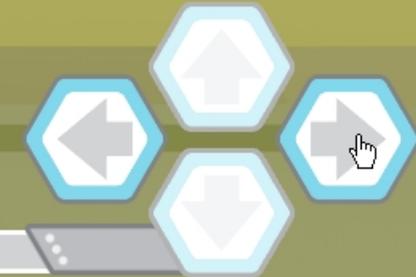
# Meet Sketch!

**ROBORISE-IT!**  
ROBOTIC EDUCATION

This is a robot for create the marks on the playfields.



**Sketch**

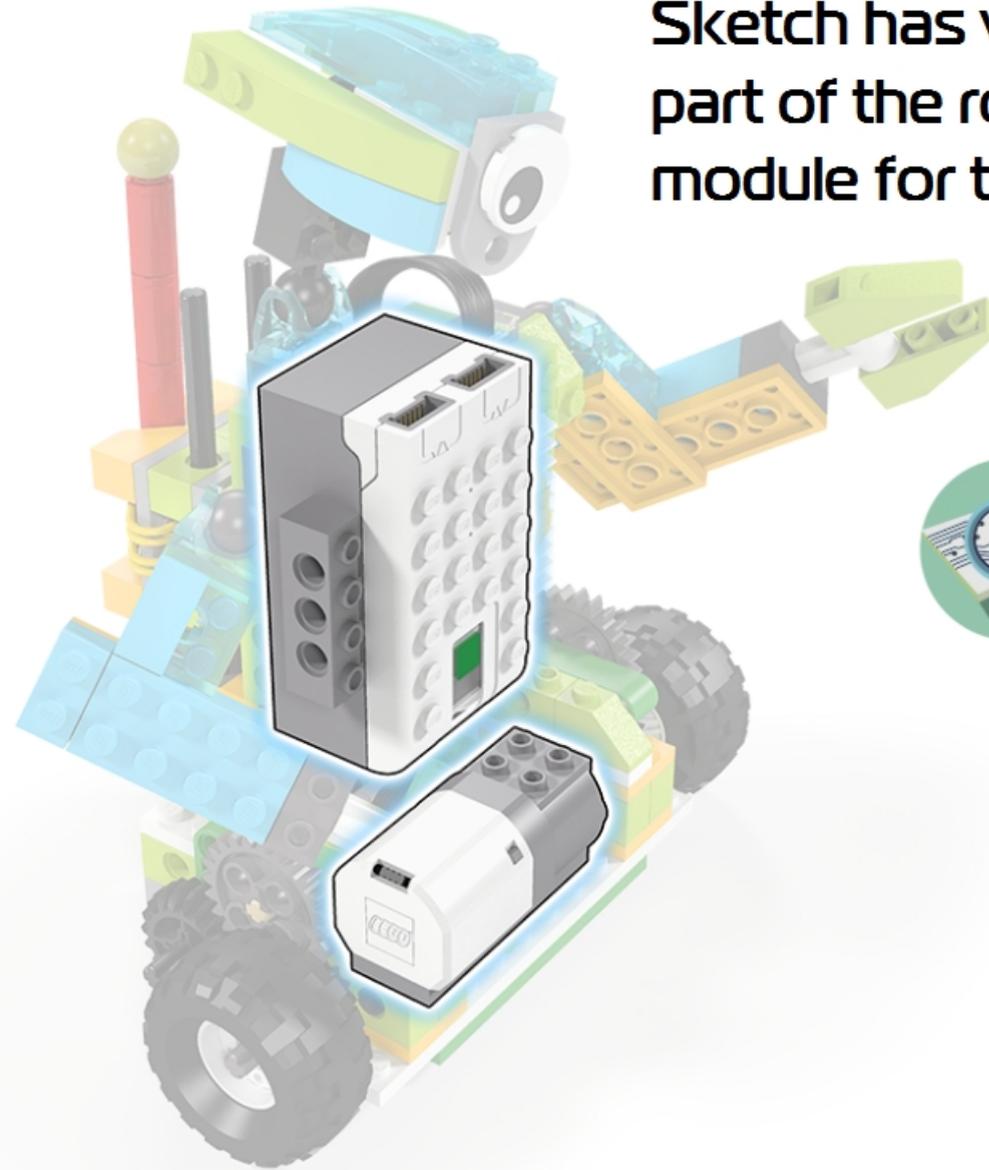




# Features

nerrka@gmail.com

Sketch has vertical design. In the rear part of the robot attached the mounting module for the markers.



Find:

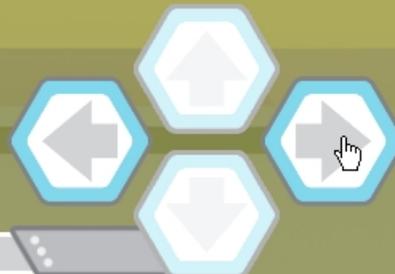
- ▶ smarthub
- ▶ motor



0



12





# Features

**ROBORISE-IT!**  
ROBOTIC EDUCATION

The module for attaching the marker has the easy adjustable mounting place. It allows to fix any marker. The pressure for drawing is created by the weight of marker, that's why pencils will draw worse.



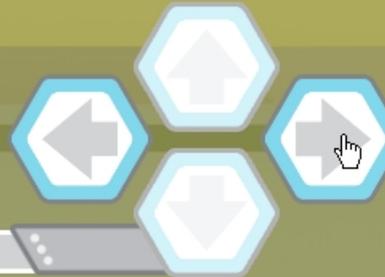
roboriseit.com



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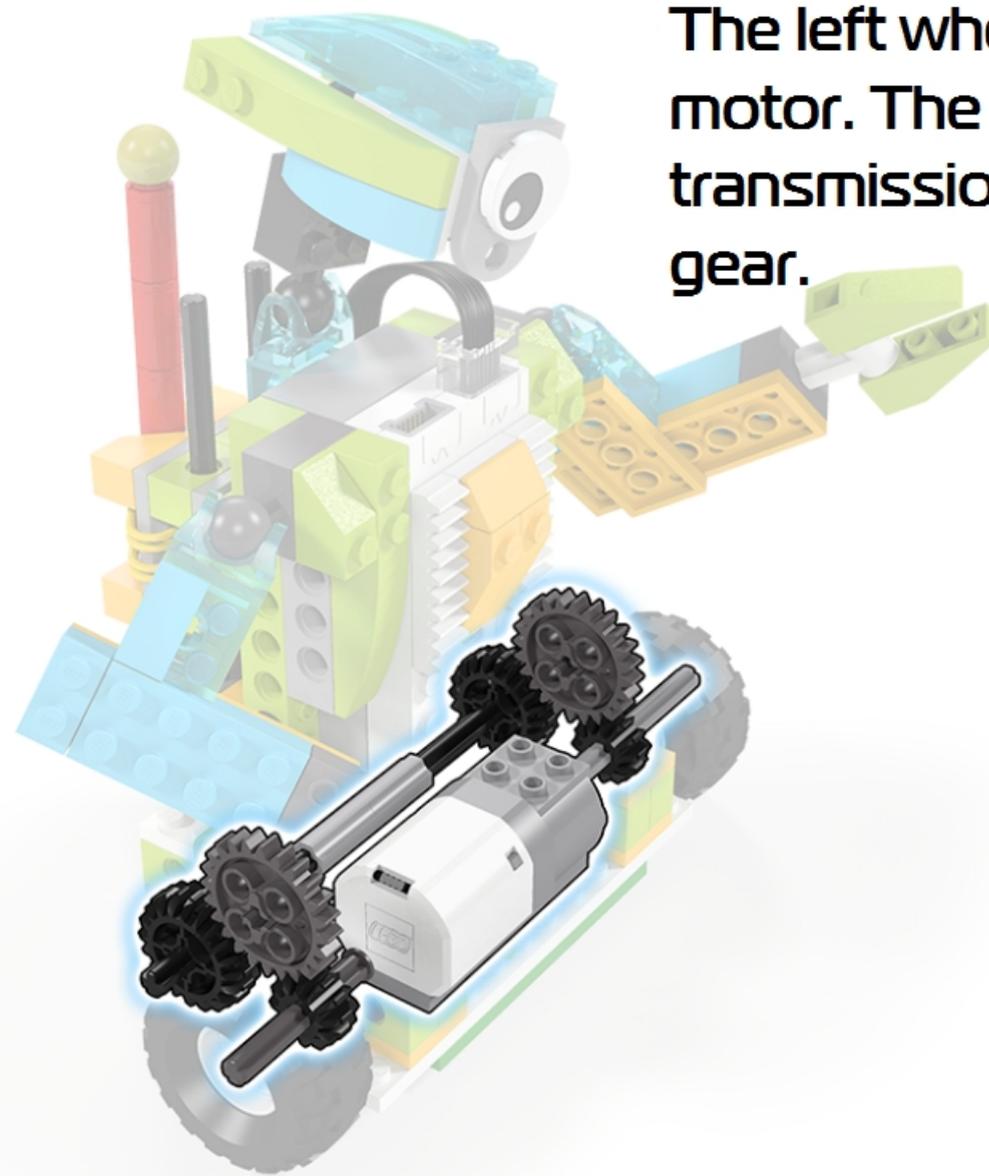


13





# Features



The left wheel attached directly to the motor. The right wheel is driven via transmission that includes movable gear.



Find:

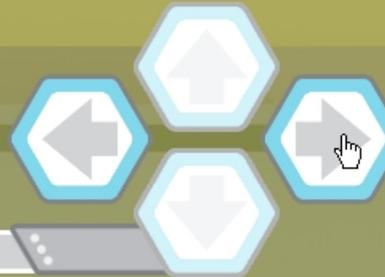
- ▶ Drive and support wheels
- ▶ Transmission
- ▶ Movable gear



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14





# Features

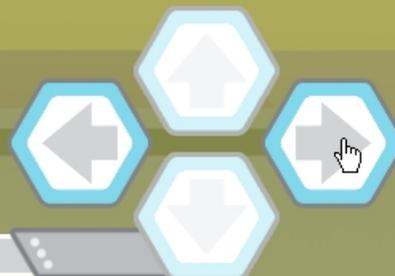
nerka@gmail.com

**ROBORISE-IT!**  
ROBOTIC EDUCATION

The left drive wheel of the robot is always connected to the motor. But the right wheel is connected only when robot moves forward. This part of the transmission has movable gear. When robot tries to move backward, the minimal friction in the mechanism leads to movable gear 'jumping'.



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15



# Features

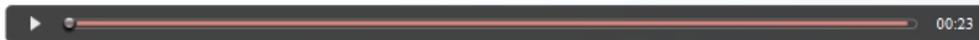
**ROBORISE-IT!**  
ROBOTIC EDUCATION

Such transmission design allows robot to move like on the video below:



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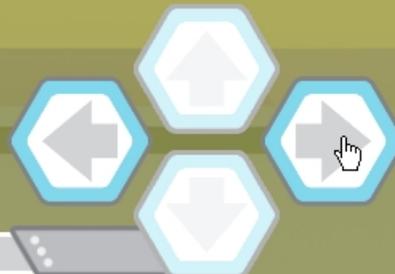
roboriseit.com



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16





# Build the robot!

**ROBORISE-IT!**  
ROBOTIC EDUCATION

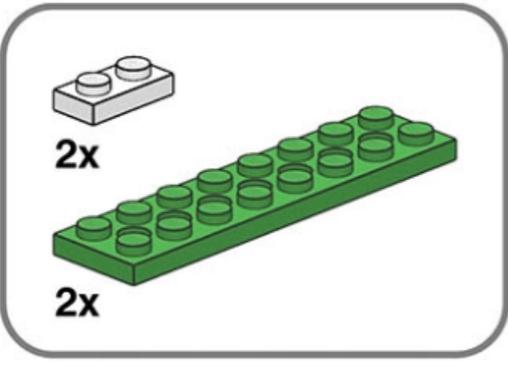


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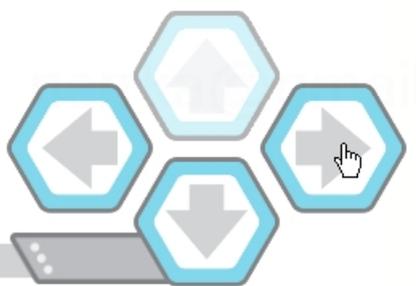
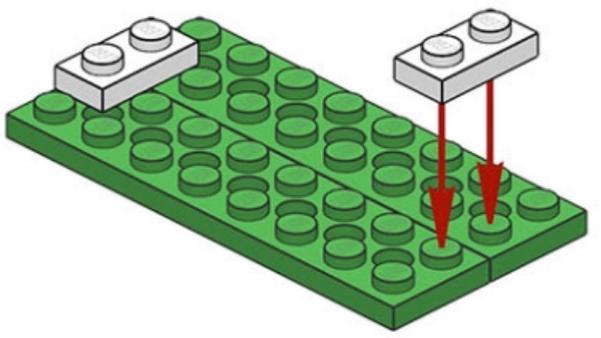


17





**1**

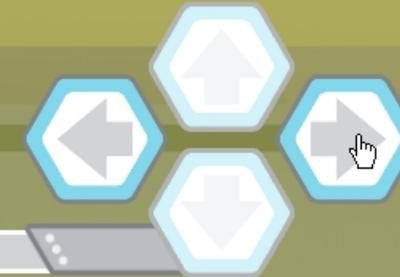
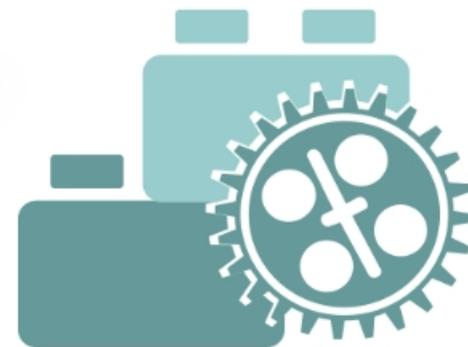


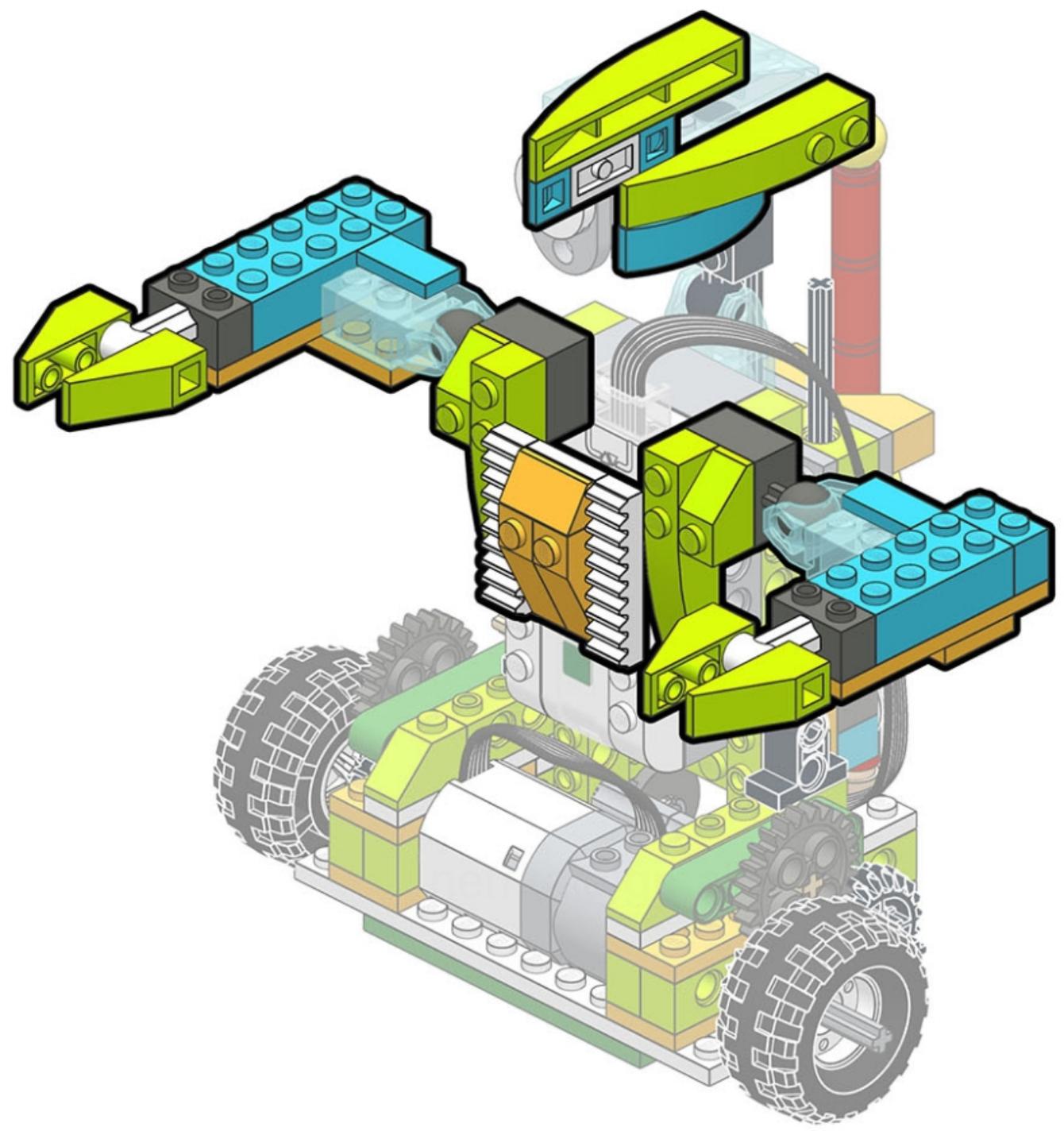


# Enhanced version

**ROBORISE-IT!**  
ROBOTIC EDUCATION

Add the hands and some external equipment!

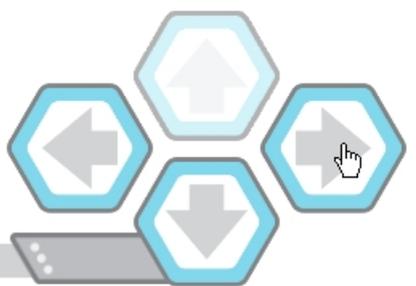




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60



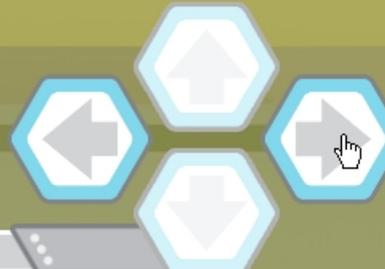


# Check it out!

Avoid any friction  
between the cables  
while robot is moving.

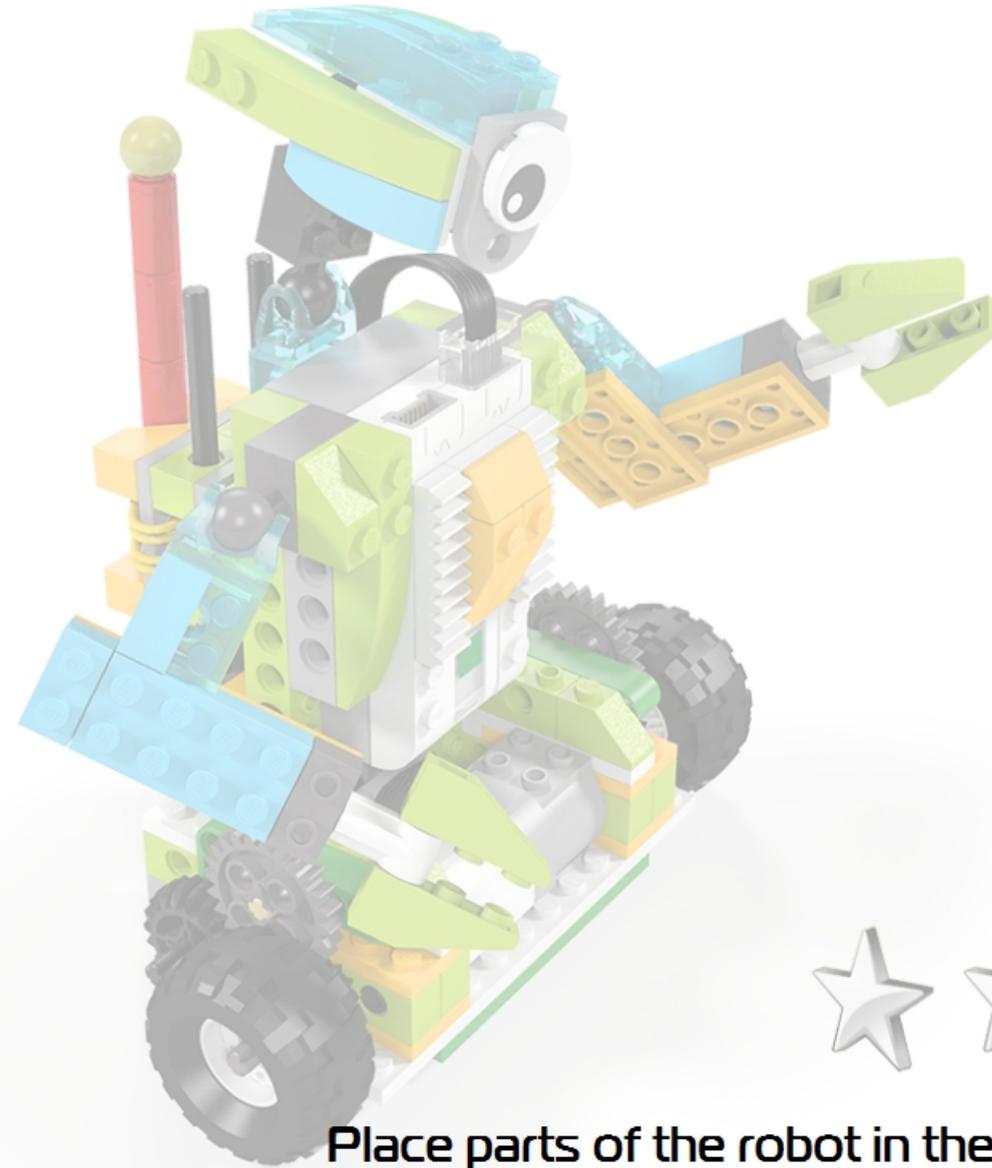


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# TASK



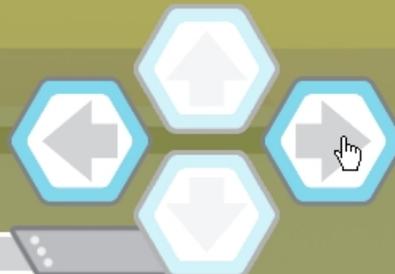
Place parts of the robot in the right places.



0



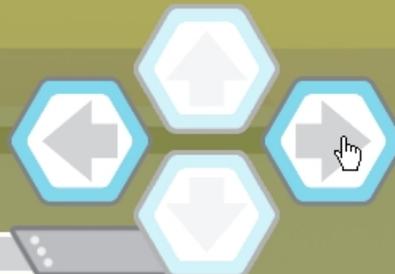
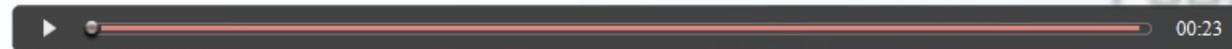
77





# Task 1

Program your robot for the manual controlling of the robot's movement.



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78



# Task 1. Program

Write the program for the manual control of the robot.



This program is for drive forward



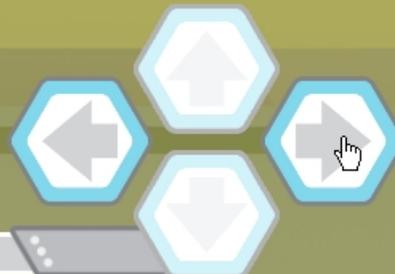
This program is for stop the robot



0



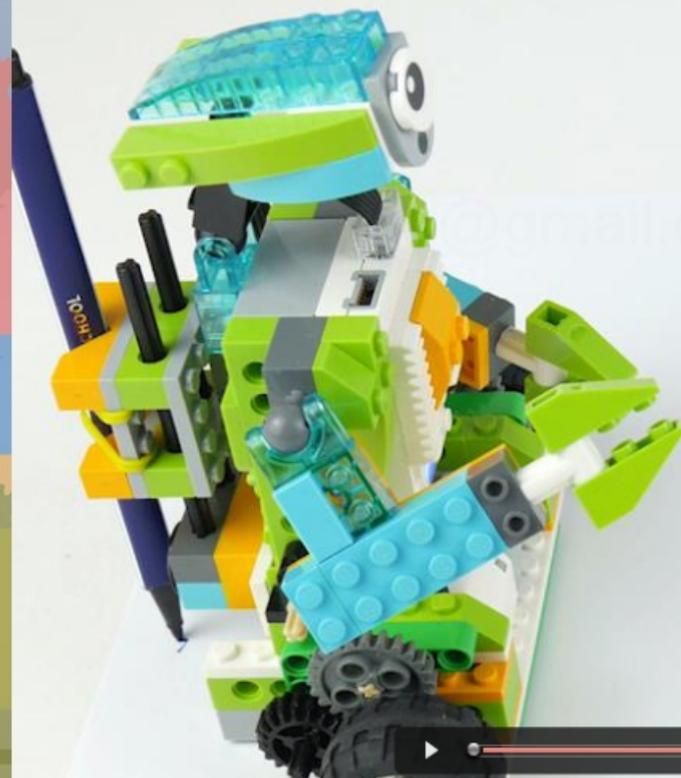
79





## Task 2

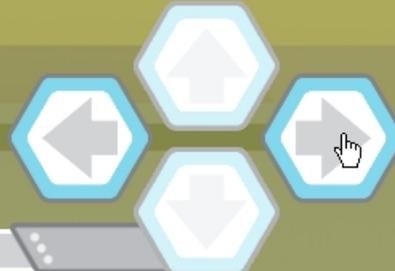
In the previous task we proposed to use the lowest speed "1" for robot's movements. But what will happen if we try to increase the speed? Test the robot at the different speeds by drawing the straight lines.



0



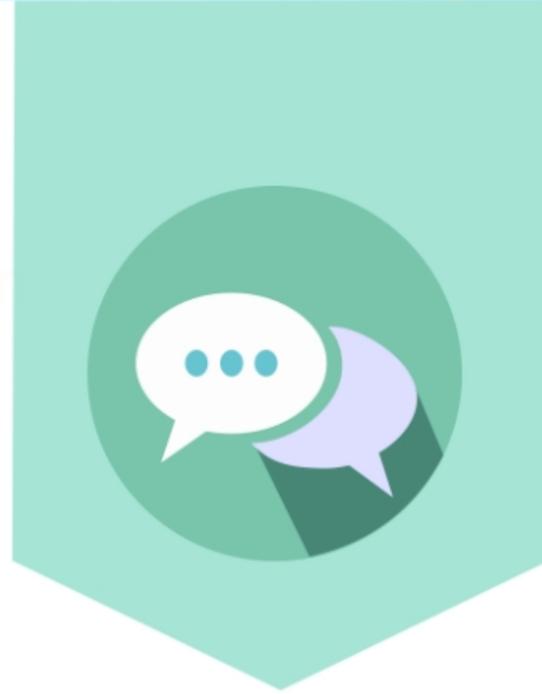
80





# Discuss the result!

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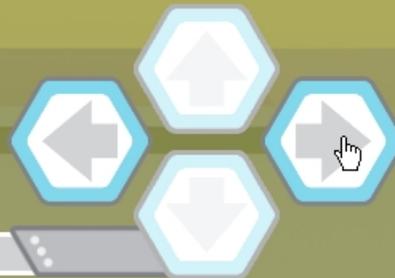
Look to the lines. What differences they has? Which power is more suitable for the straight lines drawing?



0



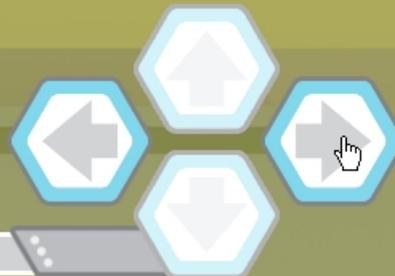
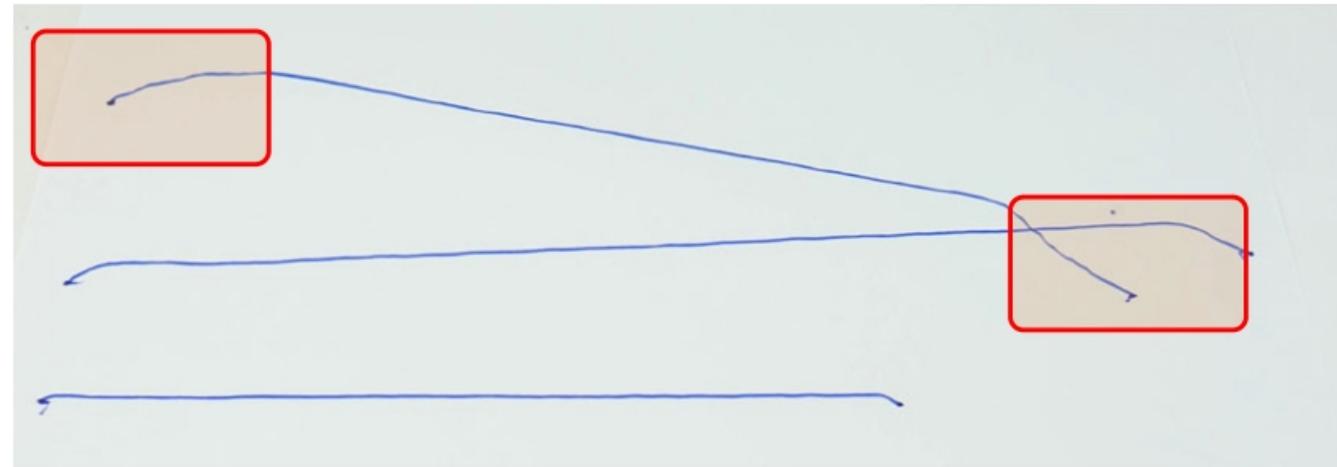
81





## Task 2

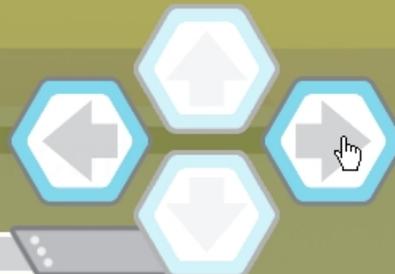
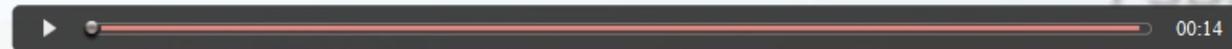
The line, that was been drawn at the high speed has the curved part at the start and at the end. It appears due to slippage and transmission design. That's why for drawing the accurate lines it is better to use the low speed.





# Task 3

Your robot may draw the circles when motor rotates Clockwise. Write a program to do this and draw the circle.  
How to measure the size of the circle?

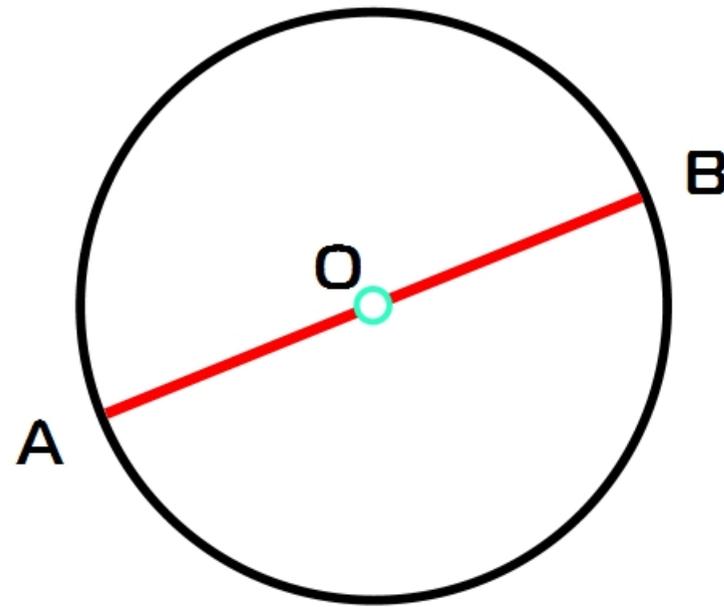




## Task 3. Diameter

The Diameter is used for speaking about the size of the circle.

Diameter is the part of the line that passes through the center of the circle and whose endpoints lie on the circle:



On this picture:

O - center of the circle

AB - diameter

The length of the diameter is  
a length of the segment AB

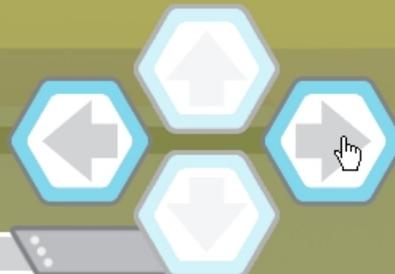
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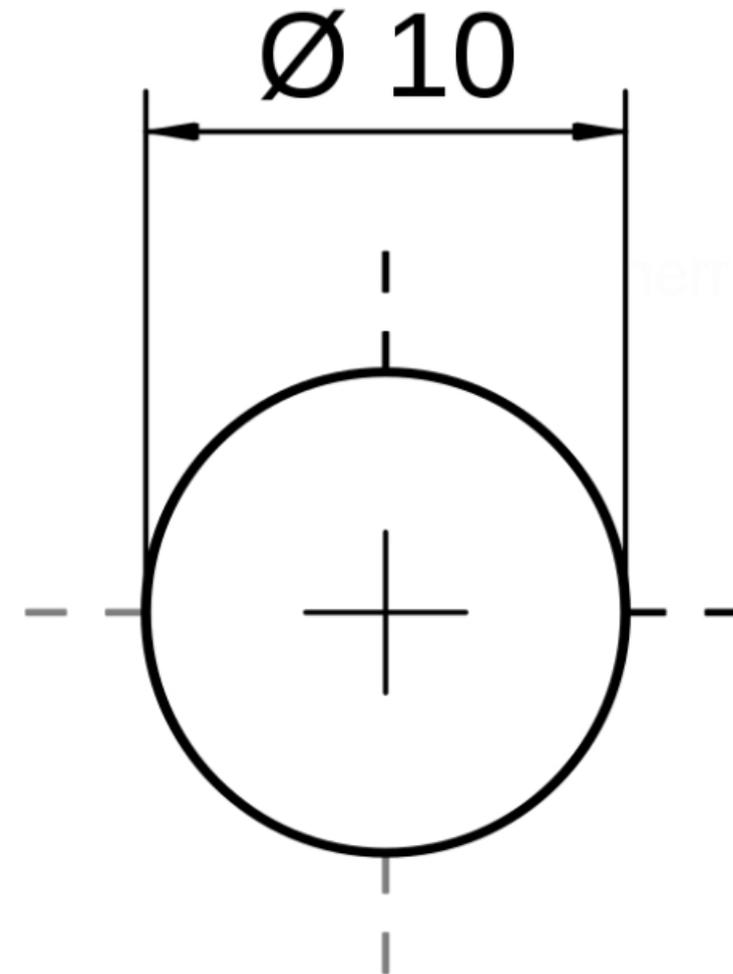
84





## Task 3. Diameter

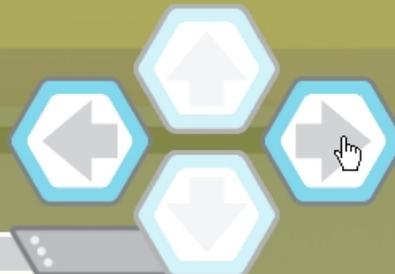
In technical drawing the following marks are used:



0



85

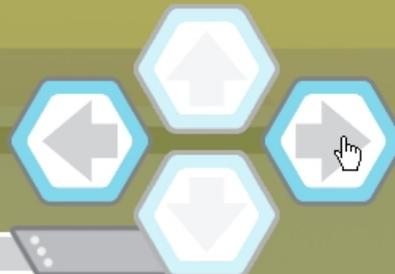
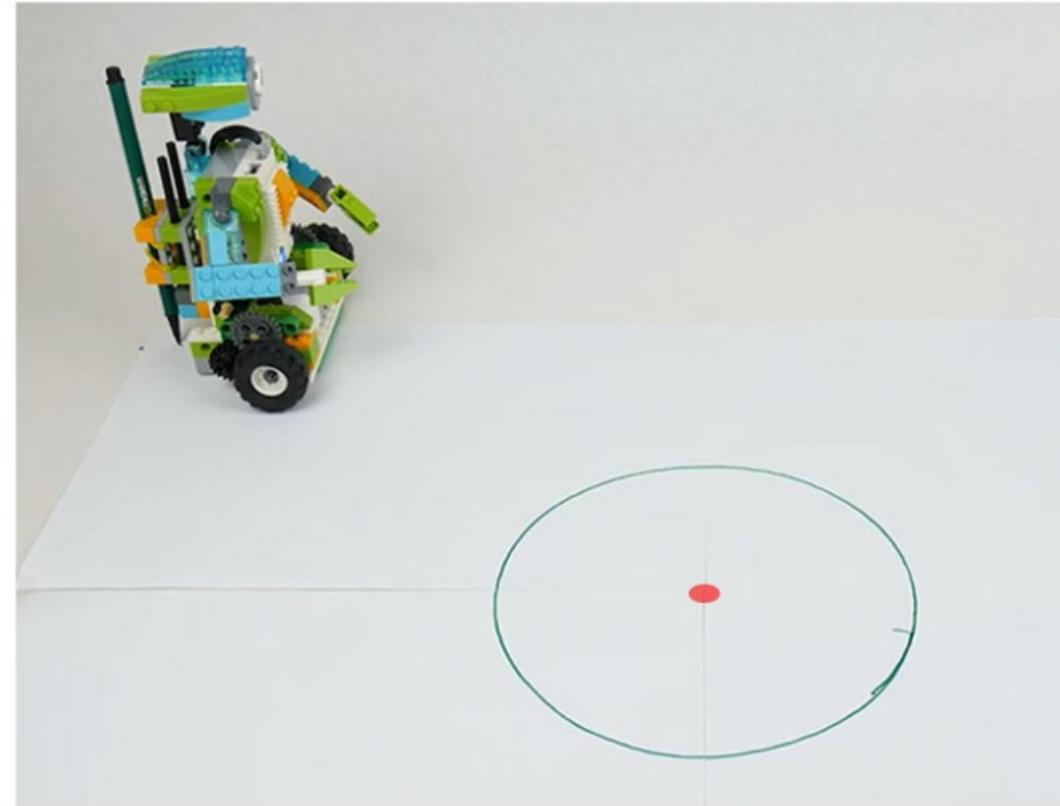




## Task 3. Diameter

Measure the diameter of the circle, drawn by the robot.

To do this mark the center of the circle (in this point motionless wheel was touched the paper). Then take a ruler and draw the line through the center and measure the line segment between the points where line cross the circle.

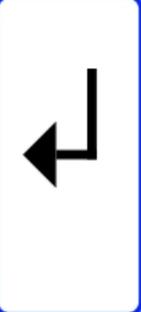




# Task 3. Diameter

Write the measured diameter to the worksheet and check it below:

Measured diameter	Result cm 
-------------------	---

1	2	3	<	
4	5	6		
7	8	9	0	

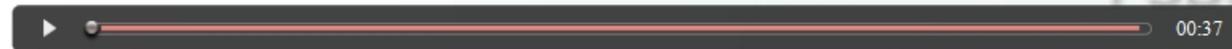
Enter the result and press





# Task 4

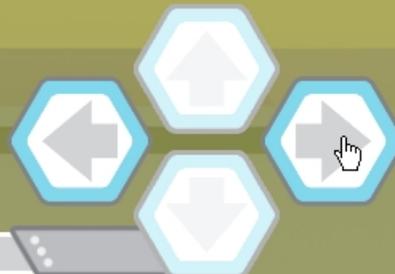
Prepare the playfield to the competition! Draw the field marks with your robot!



0



88

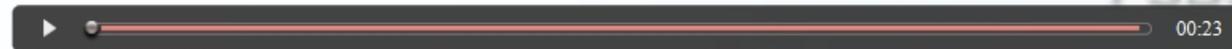




# Task 5

Draw the nice pattern. Adjust the durations of the movements for make it perfect. Also you may change the color of the marker.

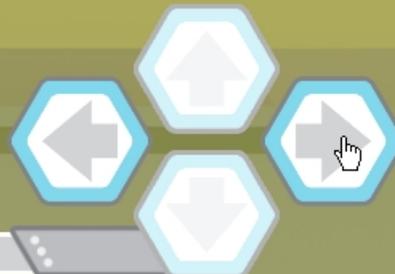
A sequence of programming blocks for a robot. It starts with a yellow play button, followed by a green block with a motor icon and a '0' duration, a green block with a rotation icon and a '1' duration, a green block with a motor icon and a '1' duration, a green block with a rotation icon and a '1' duration, a green block with a motor icon and a '1' duration, a green block with a rotation icon and a '1' duration, and ends with a yellow repeat button.



0



89



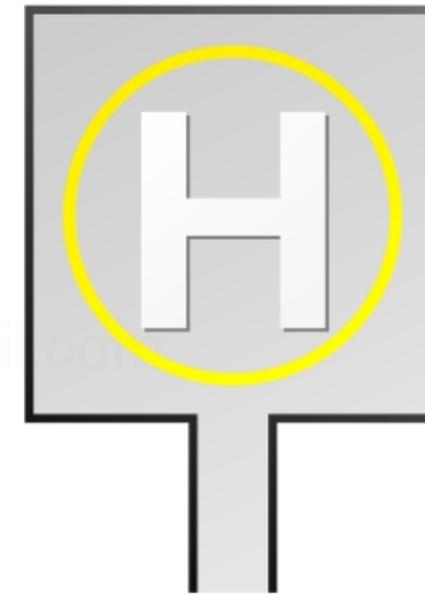


## Task 6\*

Use your robot for drawing the marks for the Helipad.

To do this you must to draw the circle with maximum diameter.

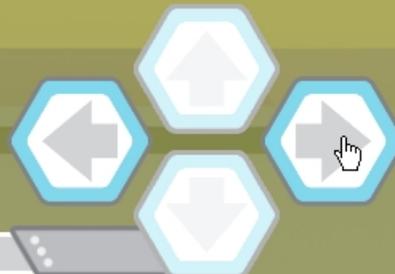
Change the design of the robot for increasing the distance from the movementless wheel to the pencil.



0



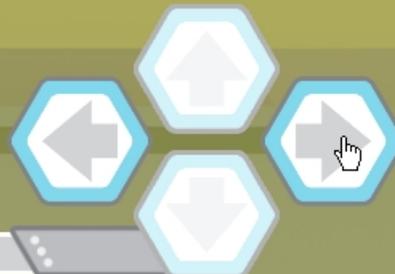
90





# Discuss!

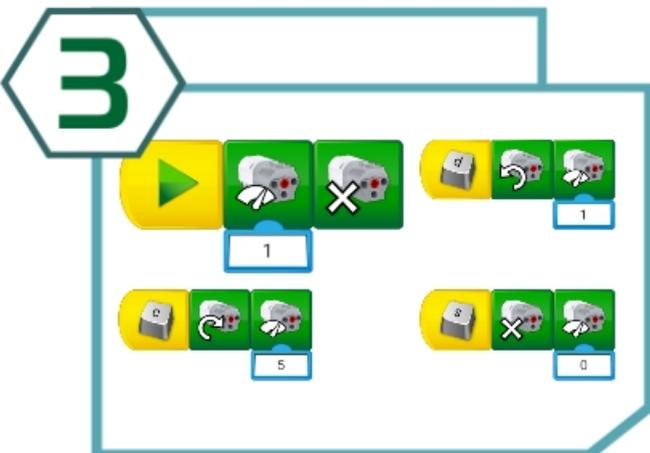
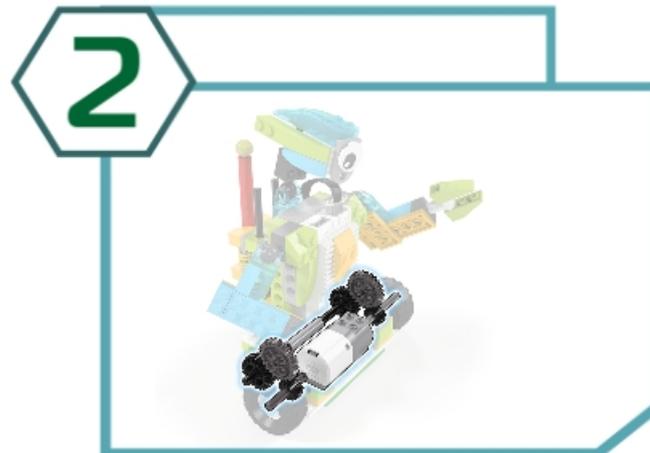
- How robot with only the one motor can perform some maneuvers?
- Will you use such solution for obtain two actions from the one motor in your own creations?
- What is the Diameter of the circle? How to measure it?



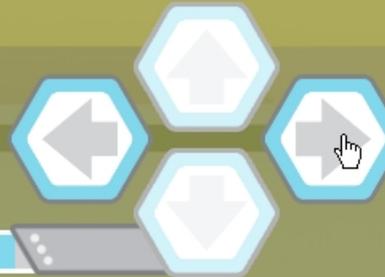


# Your achievements

Total count: 0



92





# Mission complete!

**ROBORISE-IT!**  
ROBOTIC EDUCATION



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