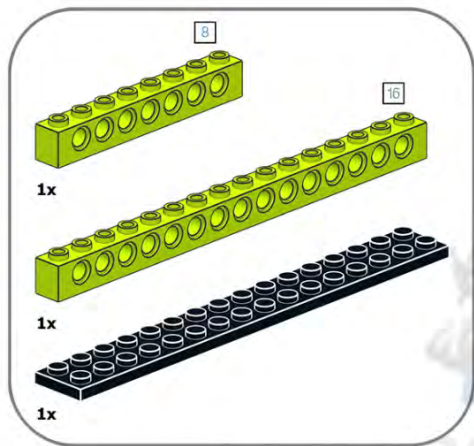
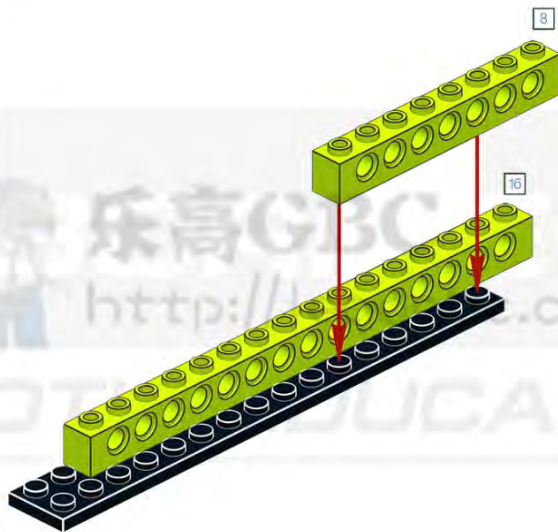


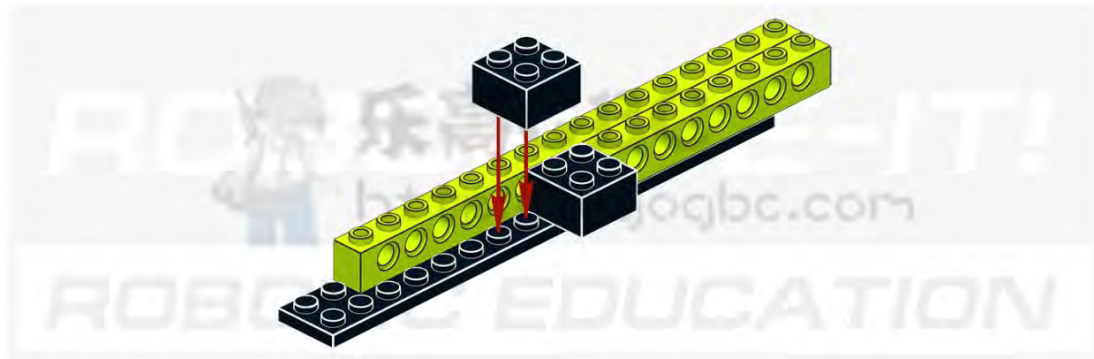


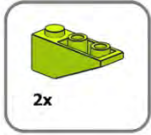
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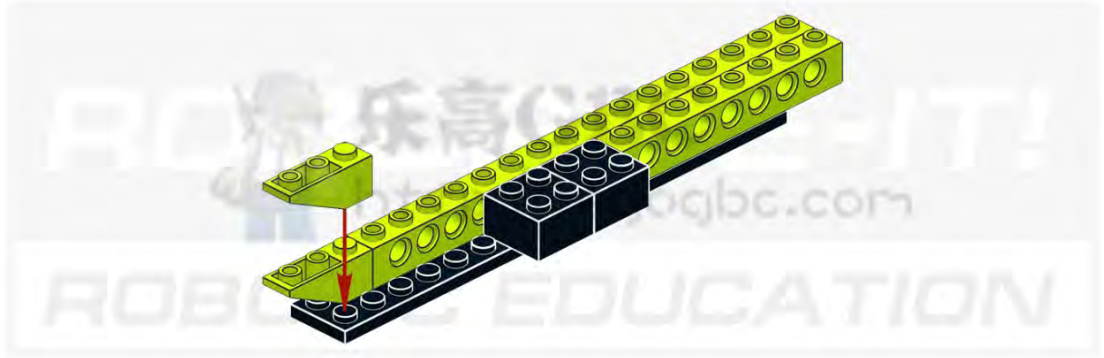


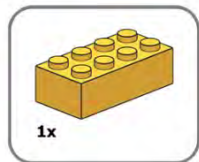
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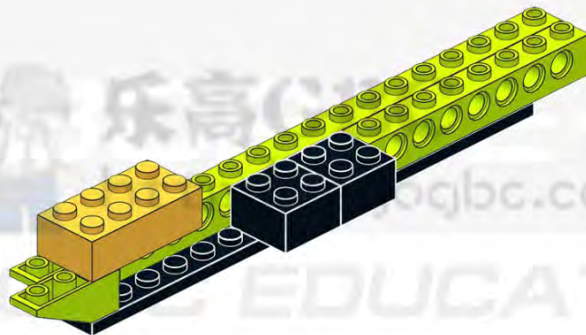


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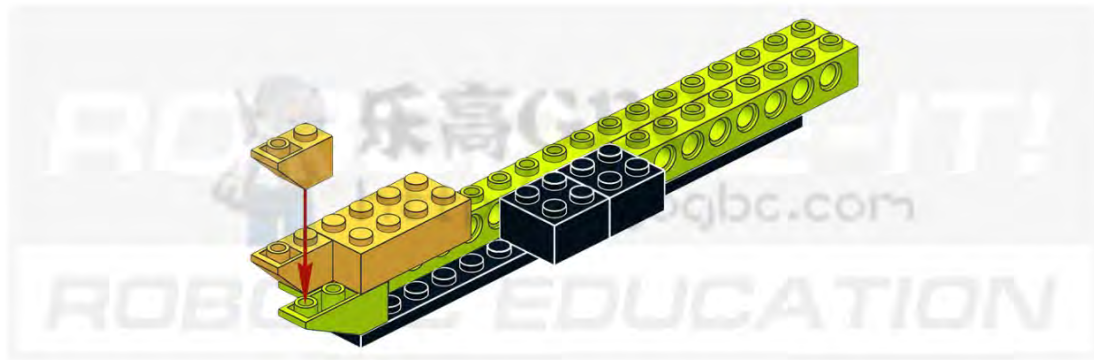


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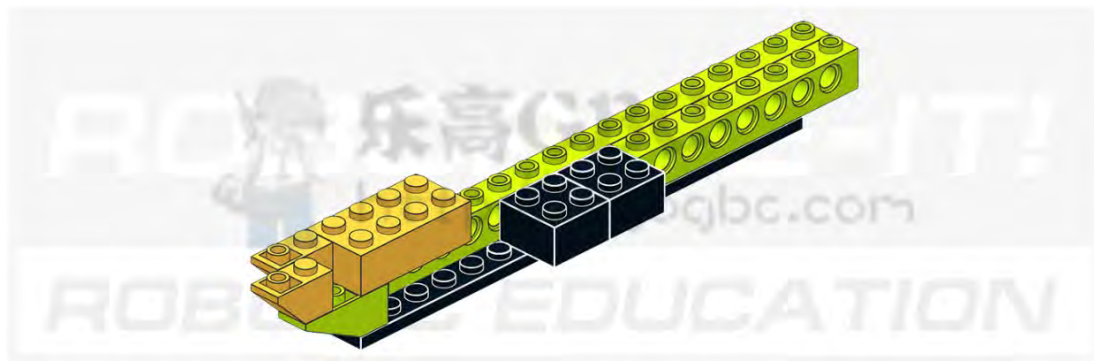


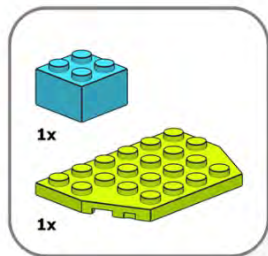


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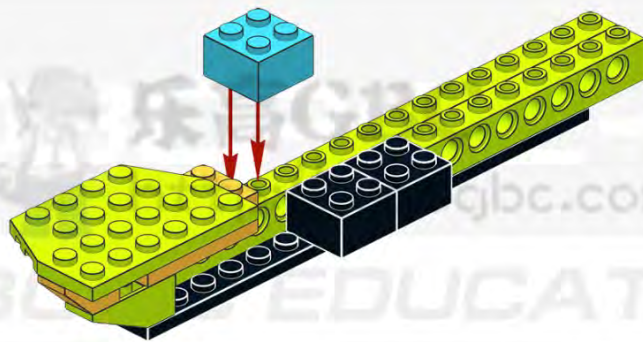


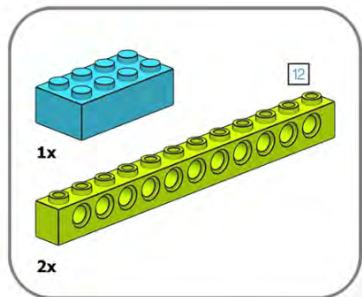
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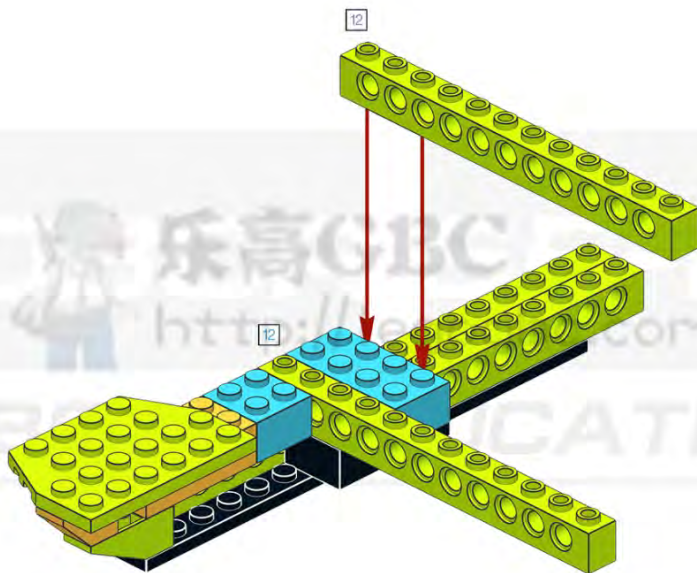


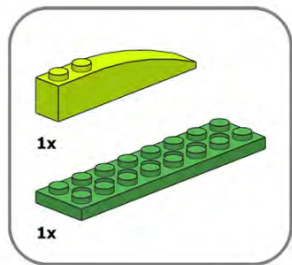
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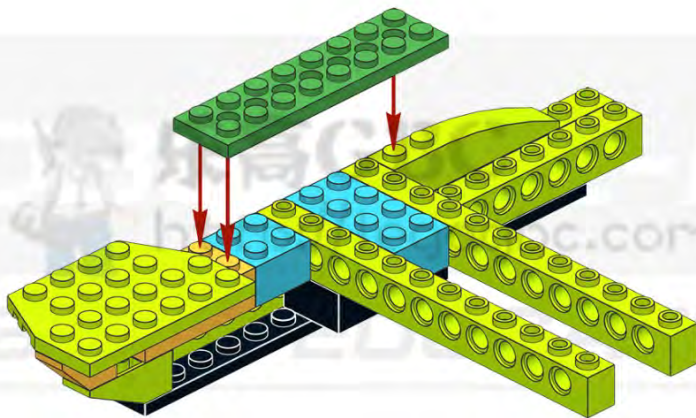


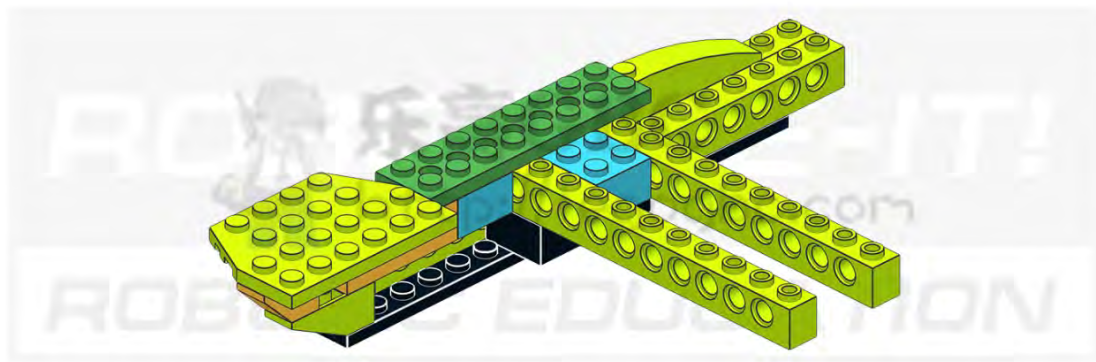
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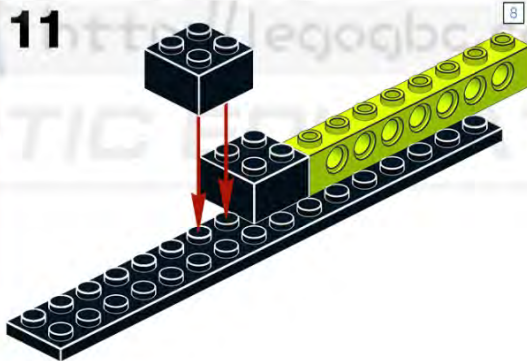
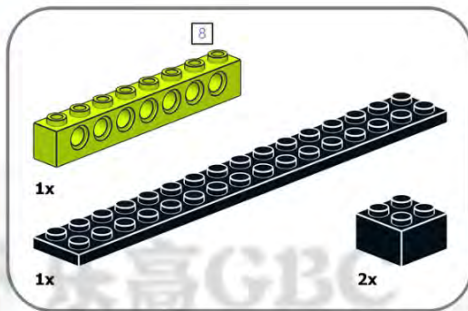
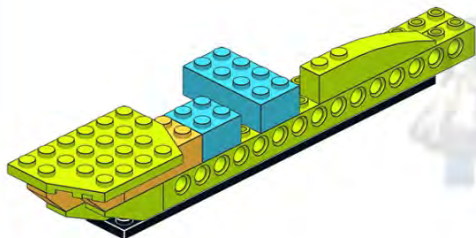


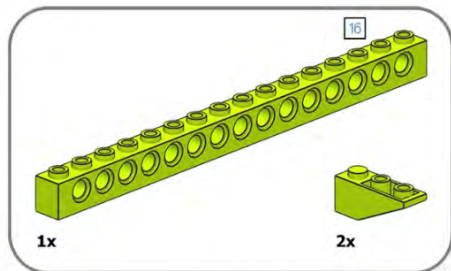


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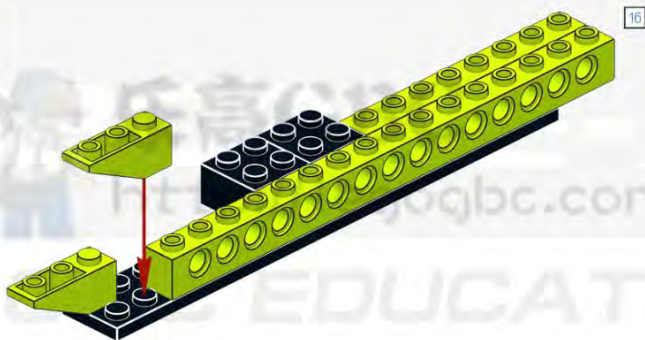


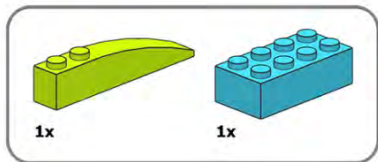




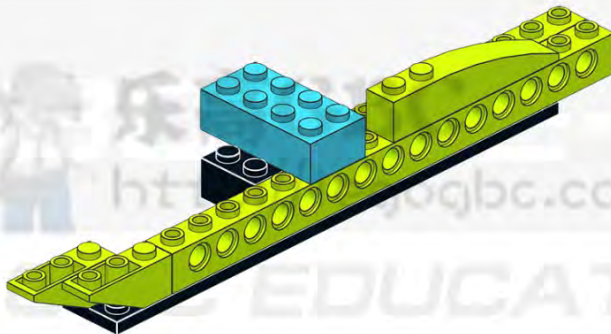


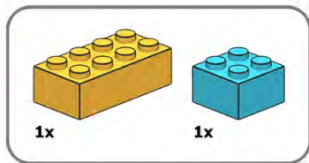
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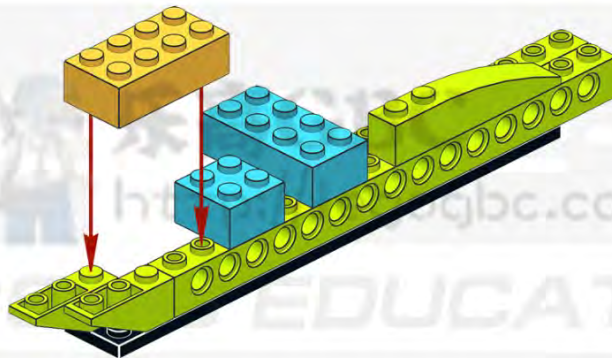


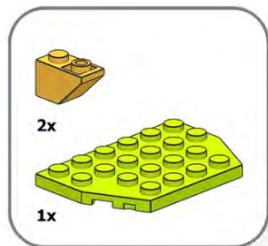
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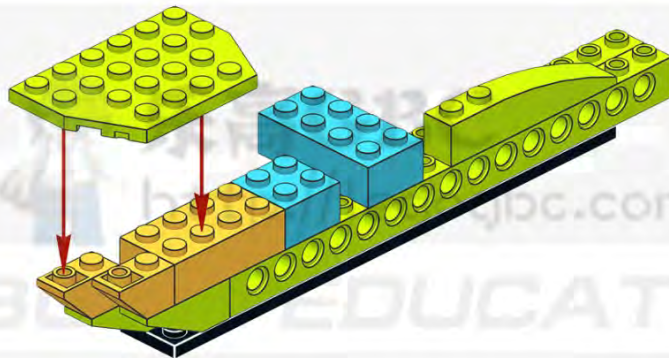


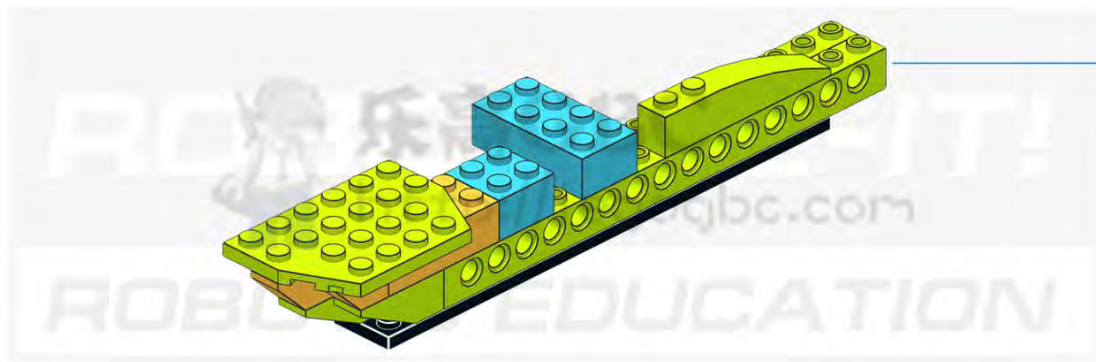
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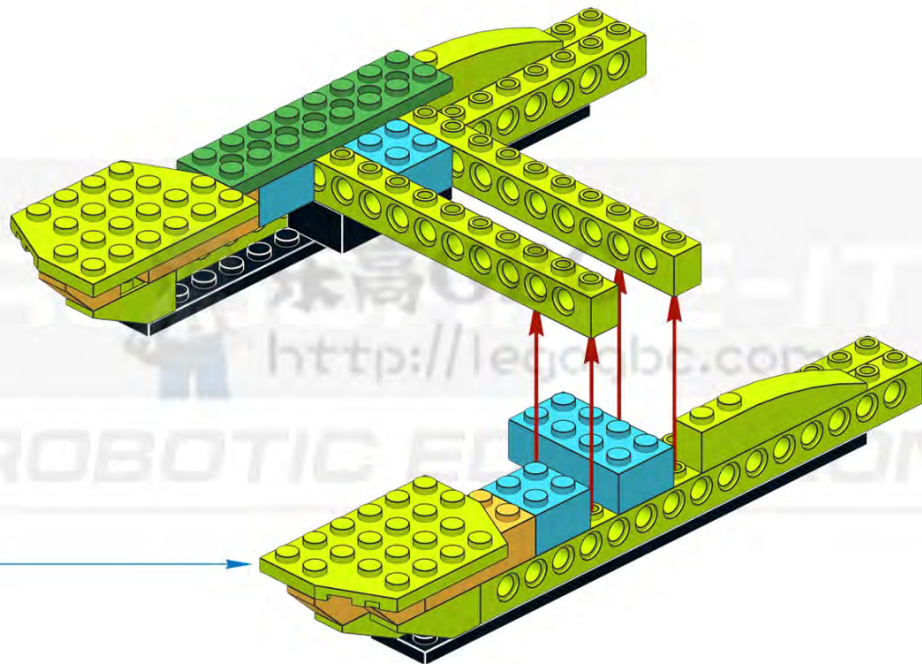


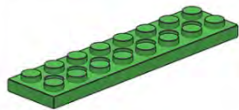
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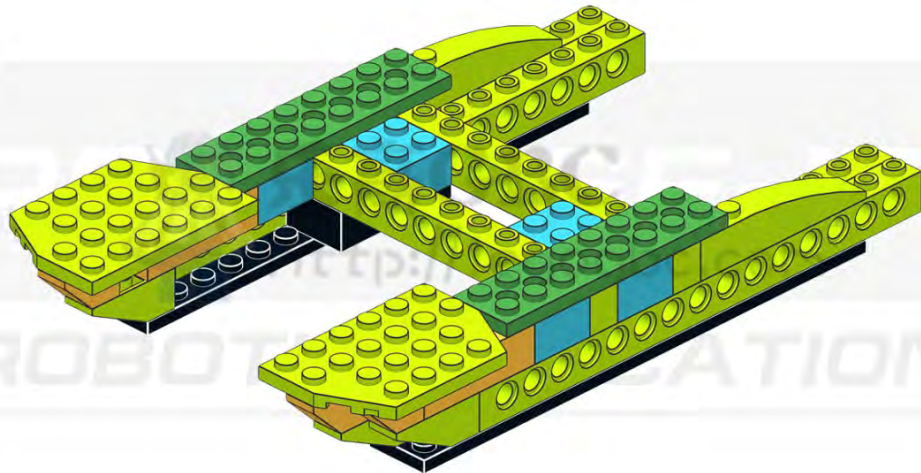
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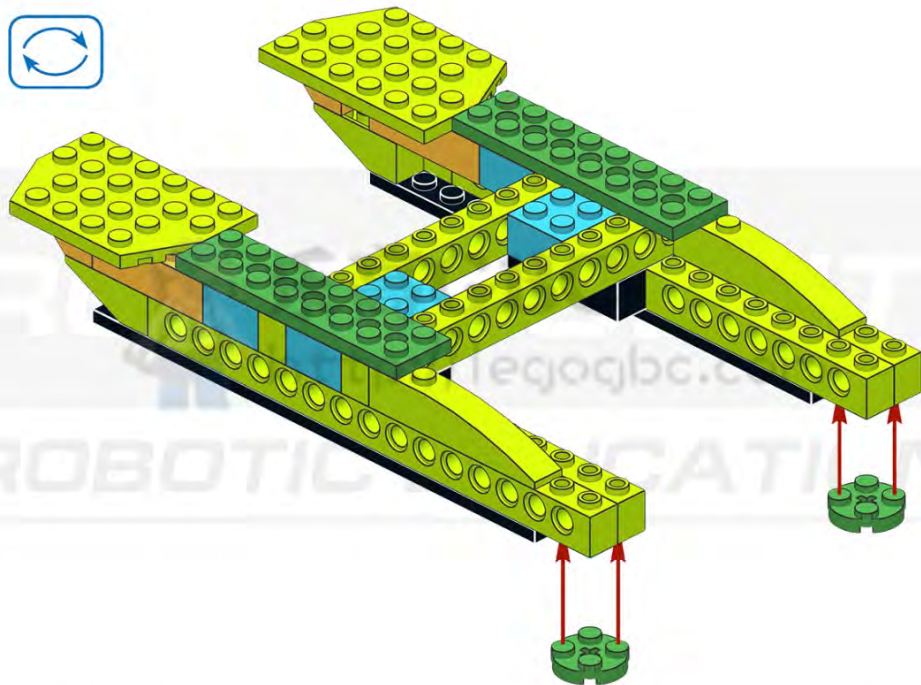
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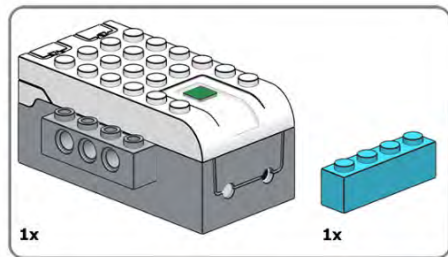
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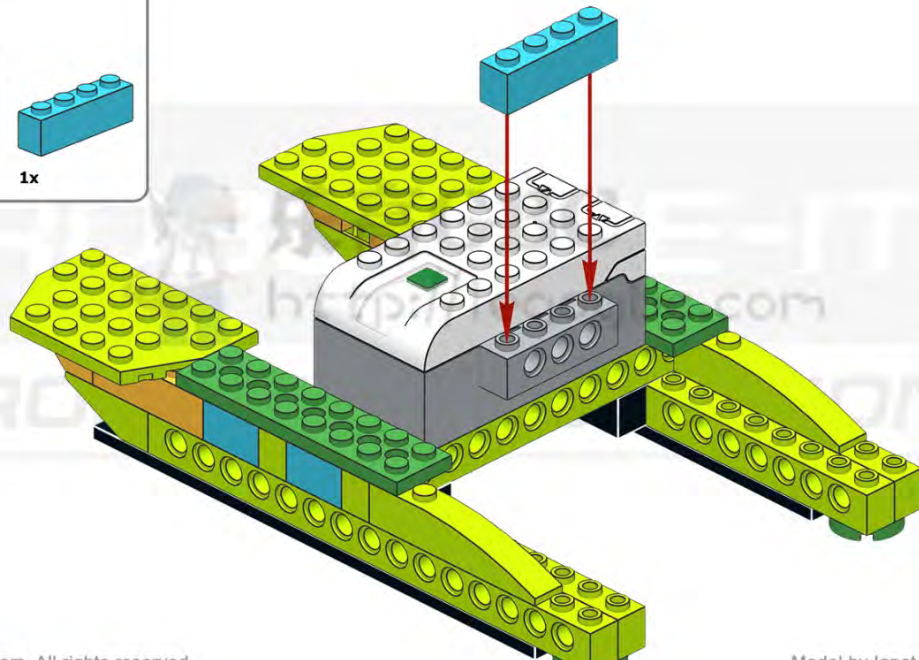


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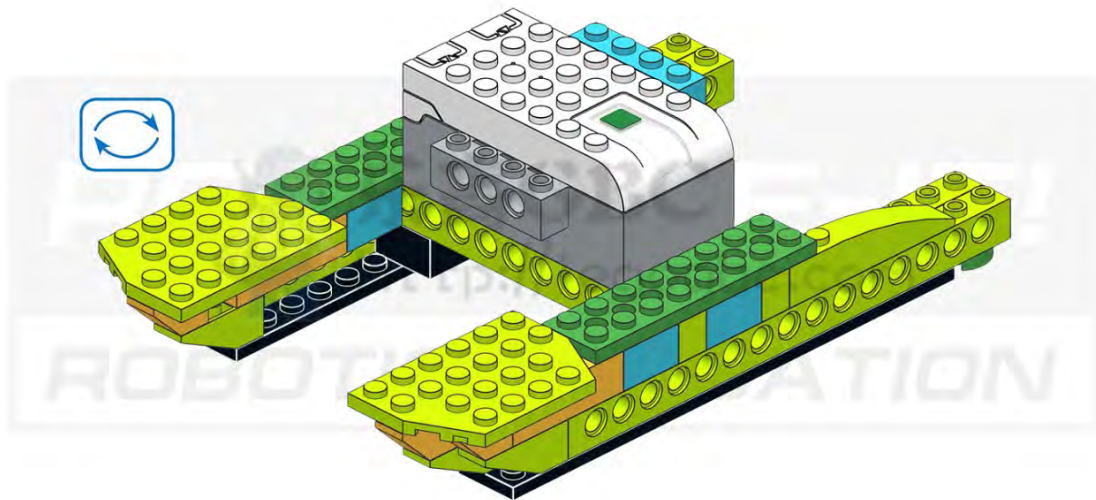


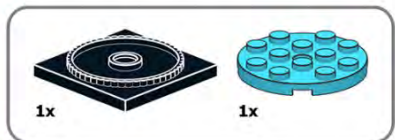
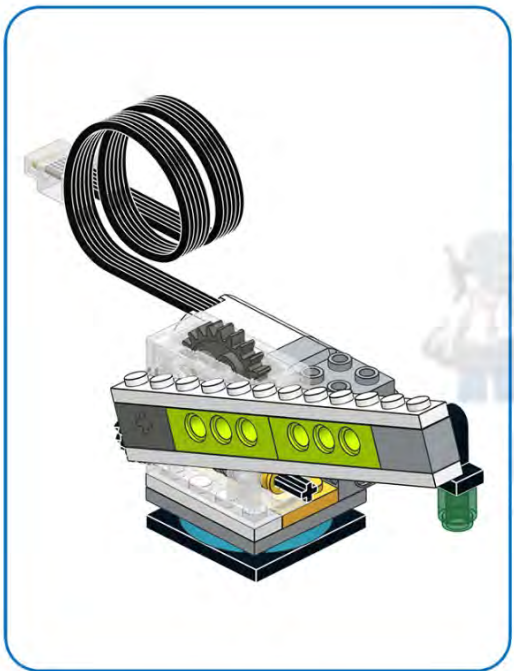


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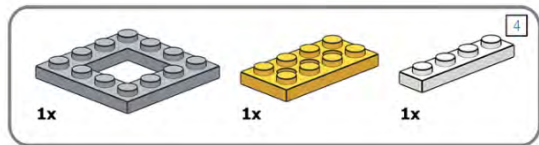
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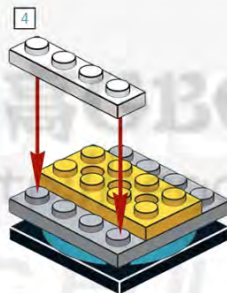


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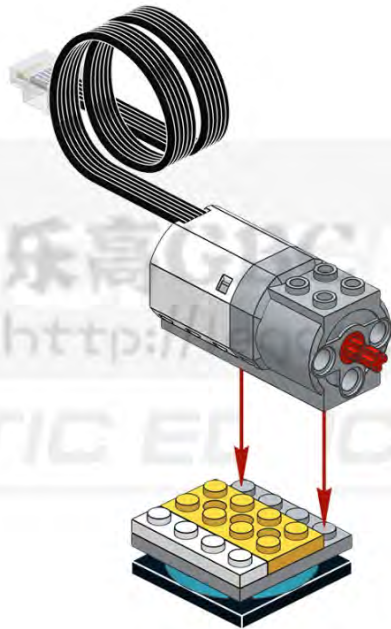


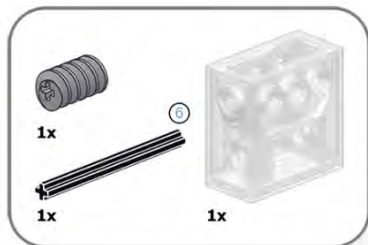
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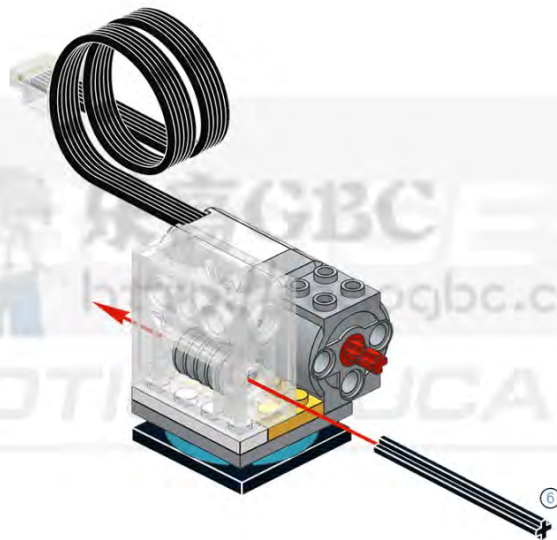


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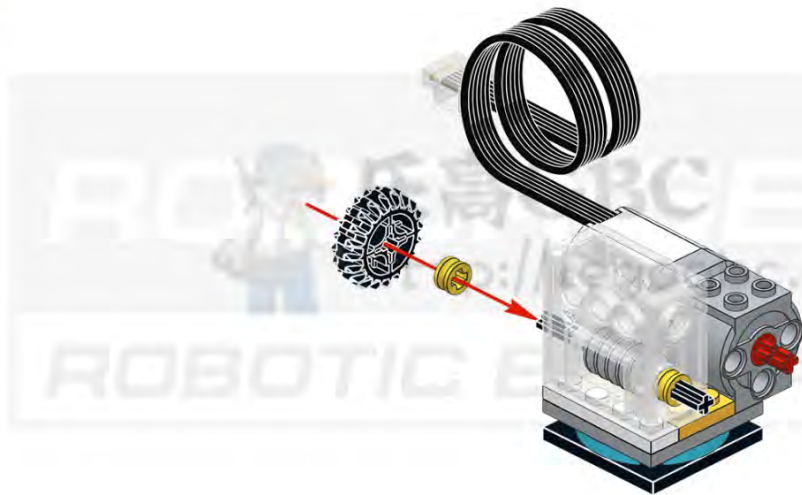


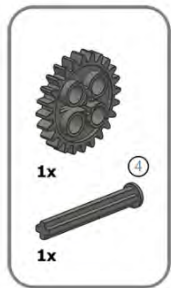
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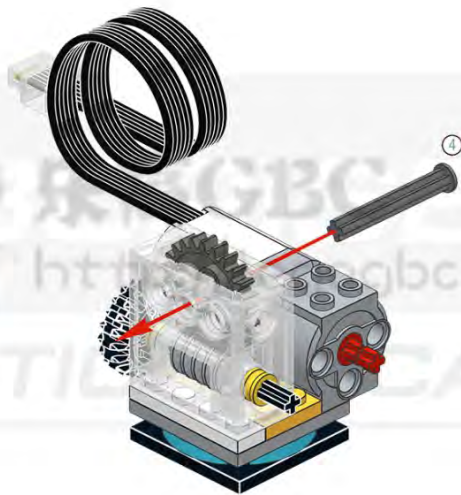


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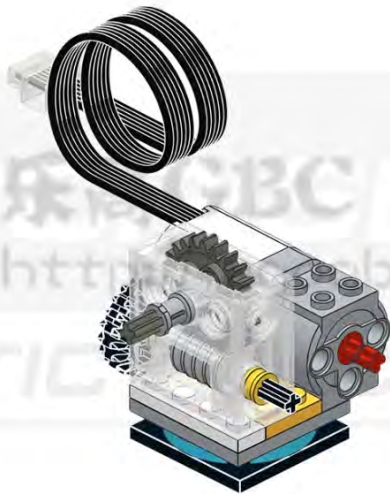
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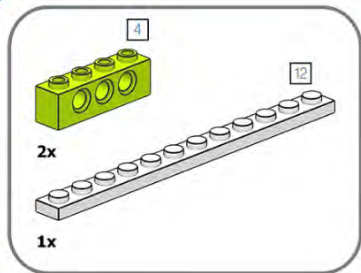




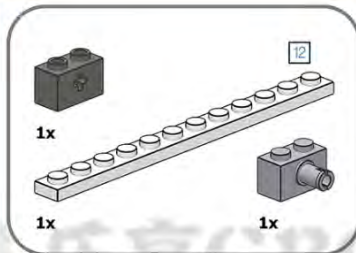
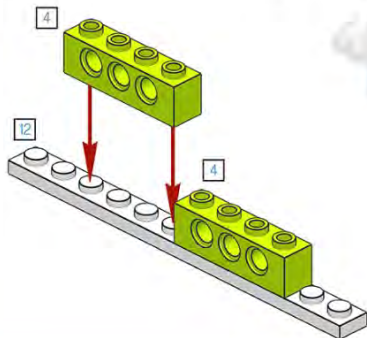
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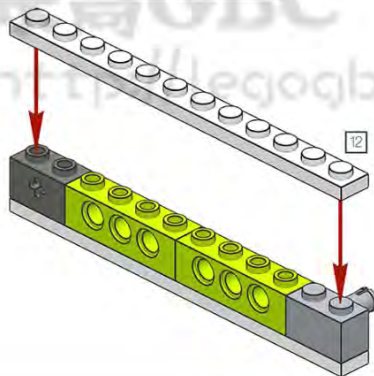




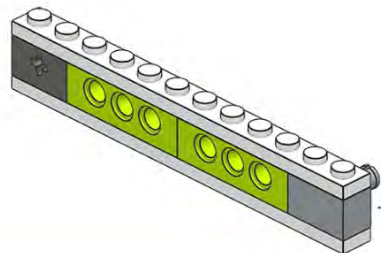
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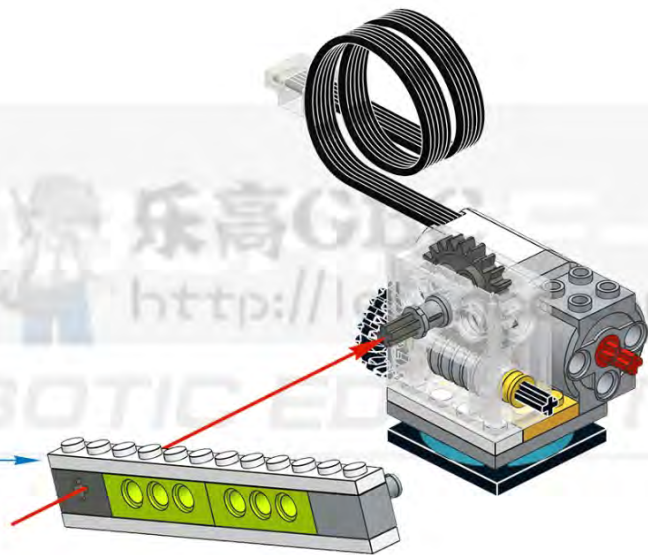
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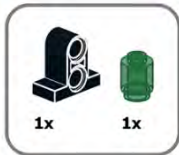


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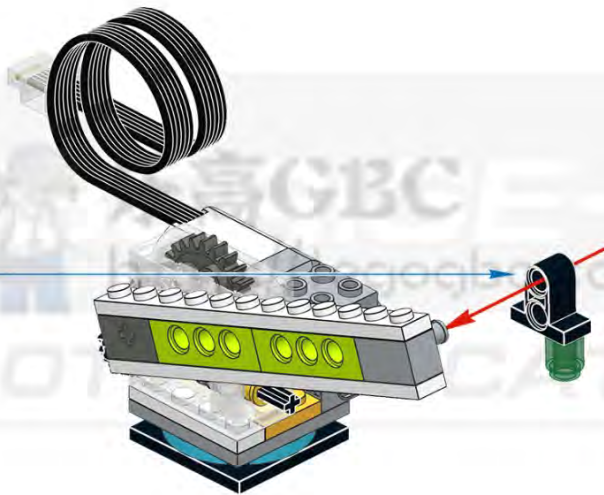




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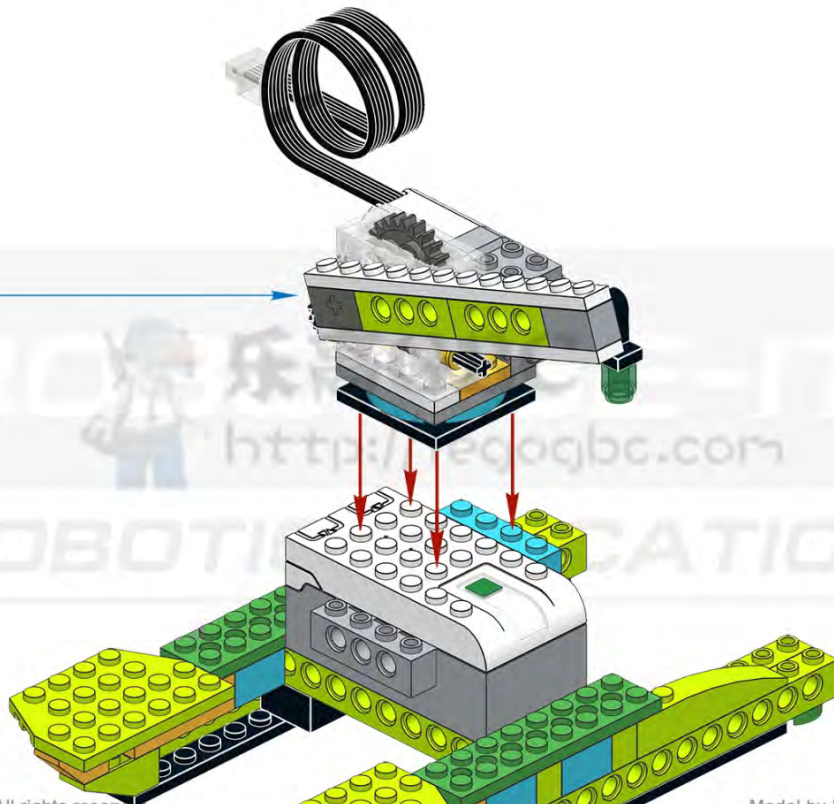


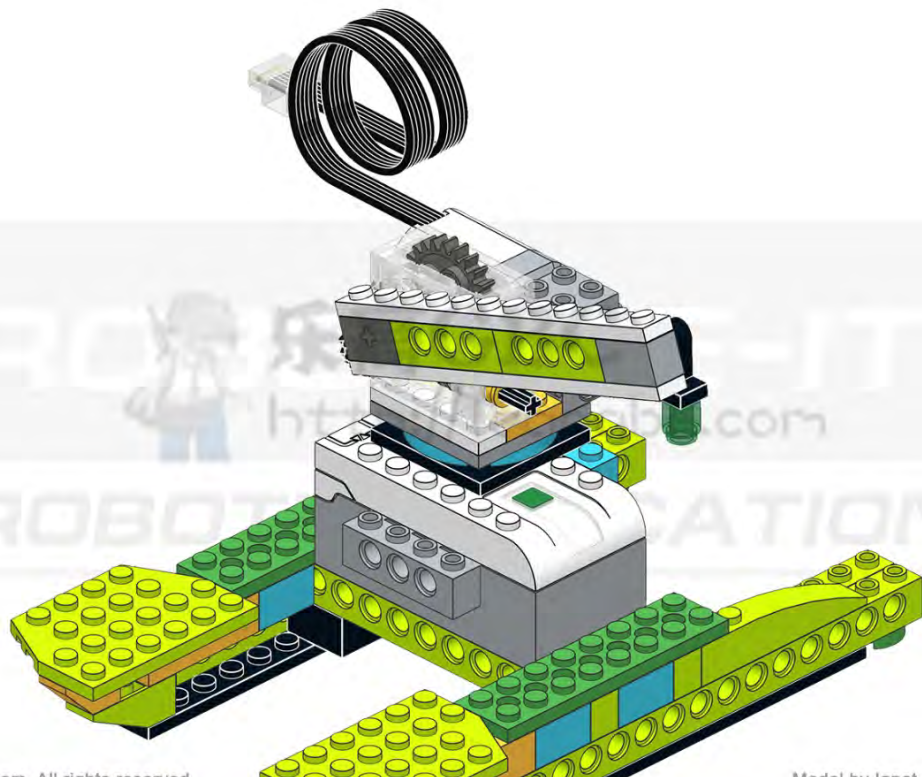
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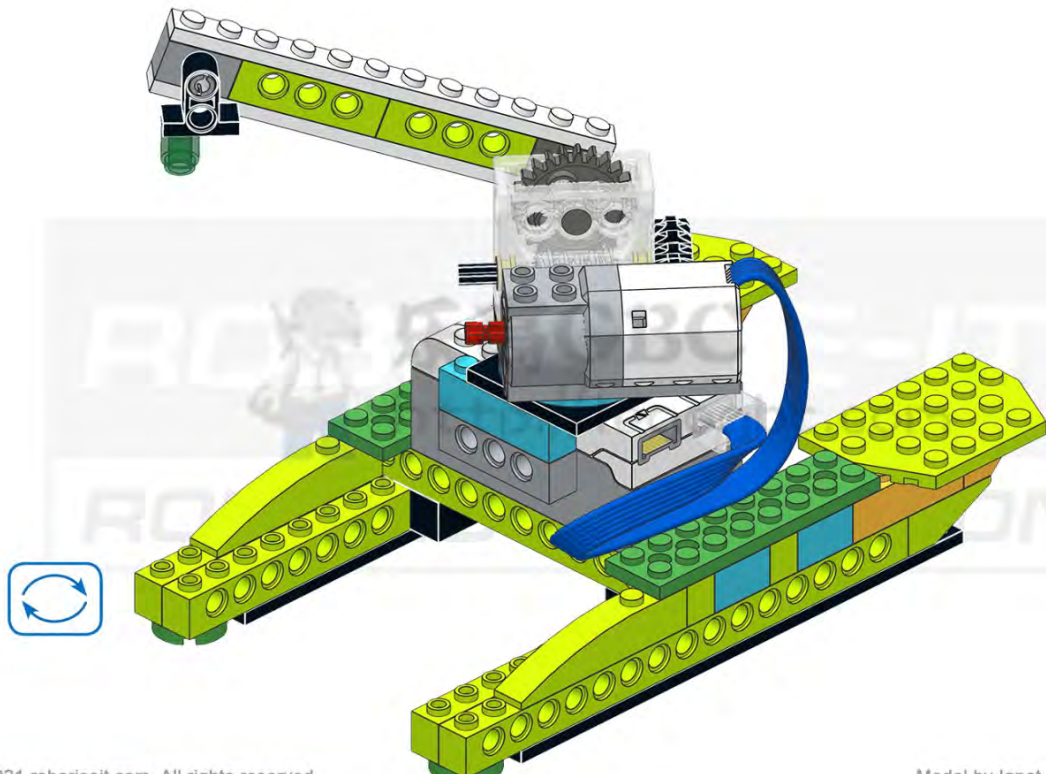


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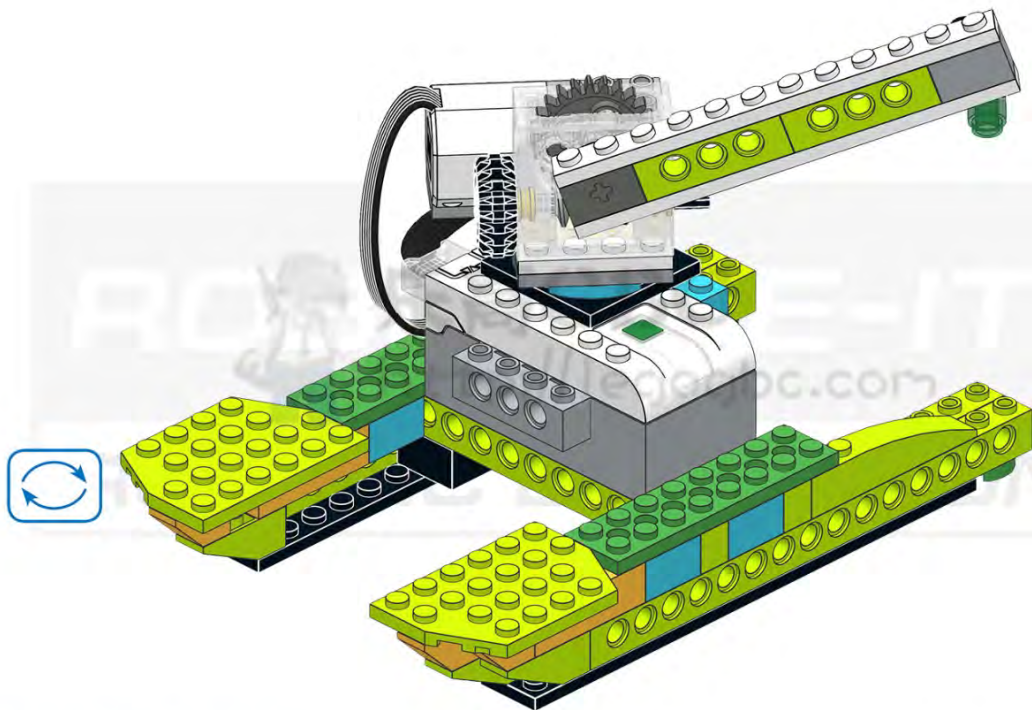




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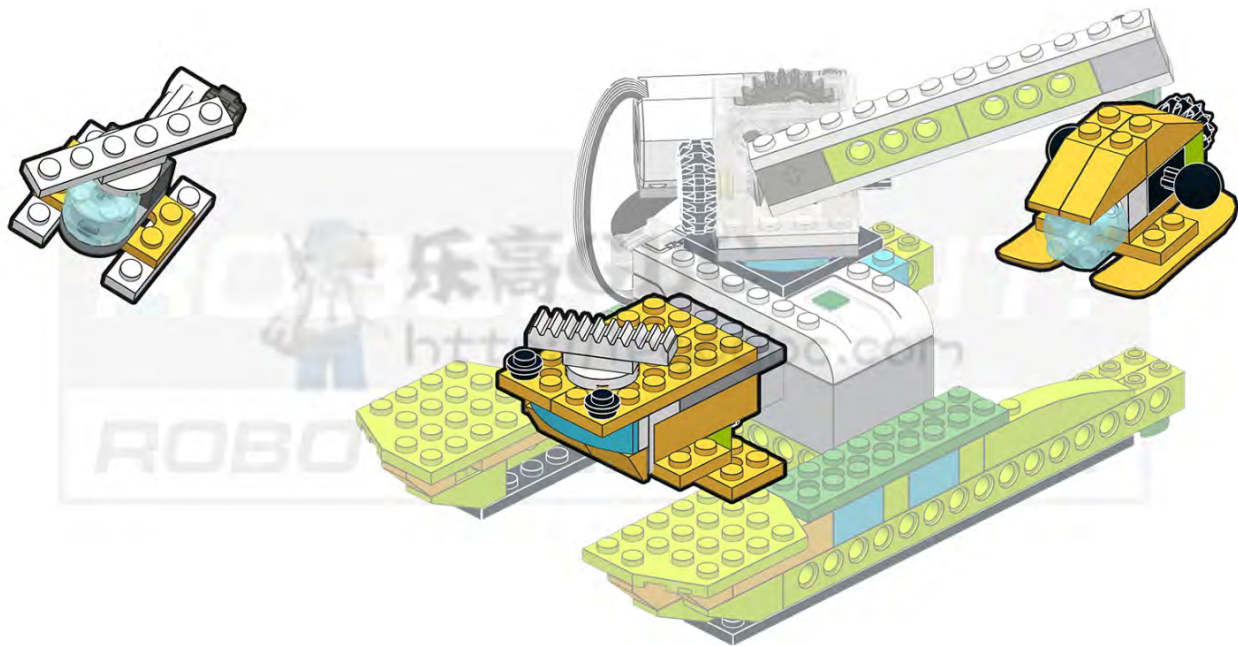
Extended version

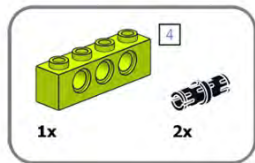


Complete the helicopter, underwater drone and captain's bridge

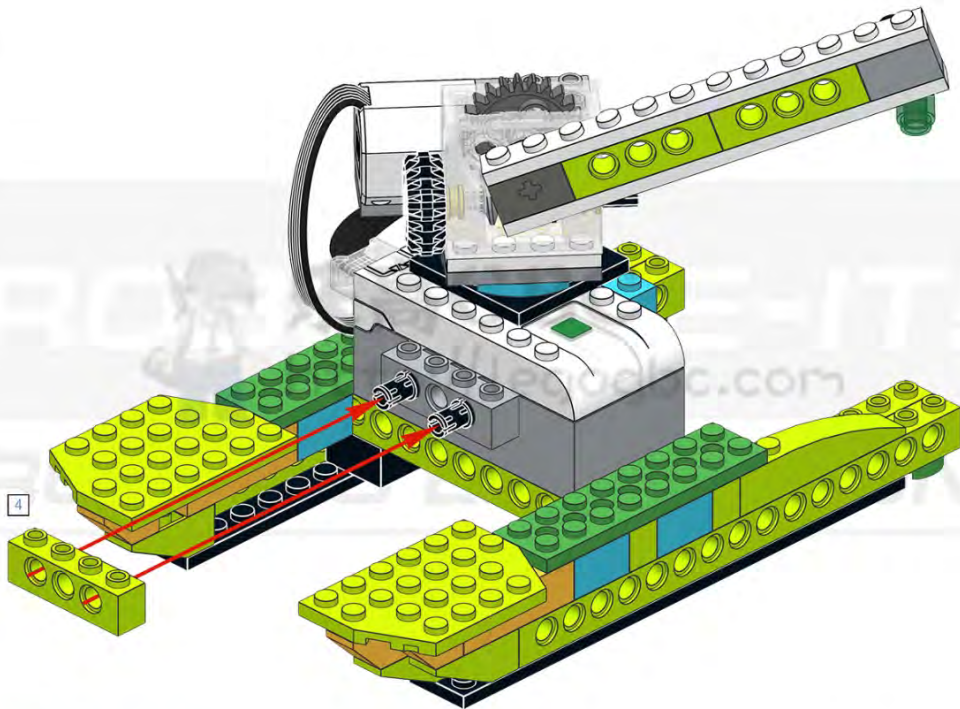


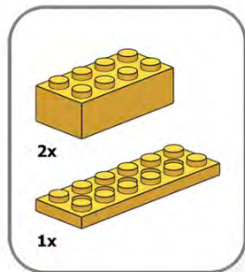
Go to the first slide of
the instruction



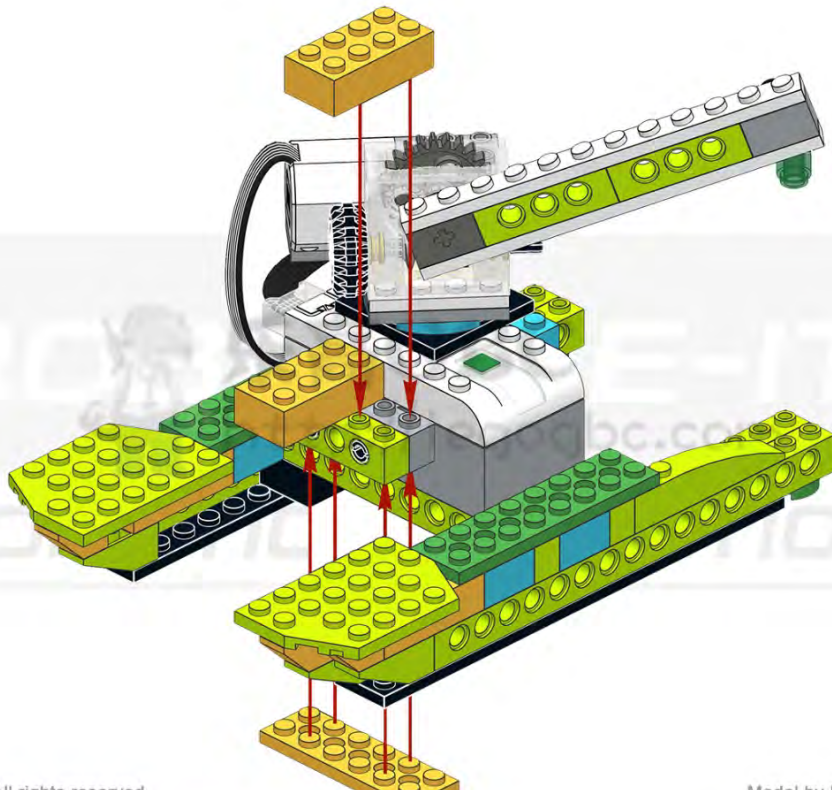


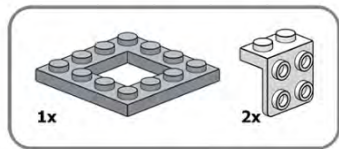
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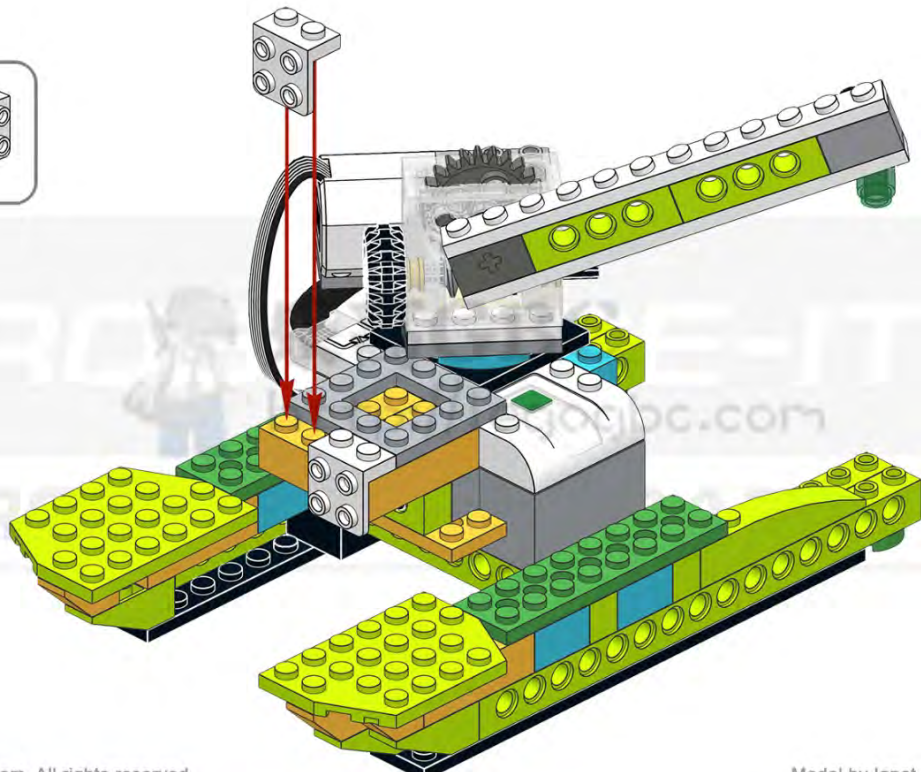


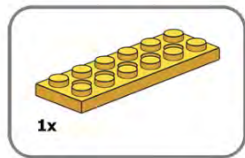
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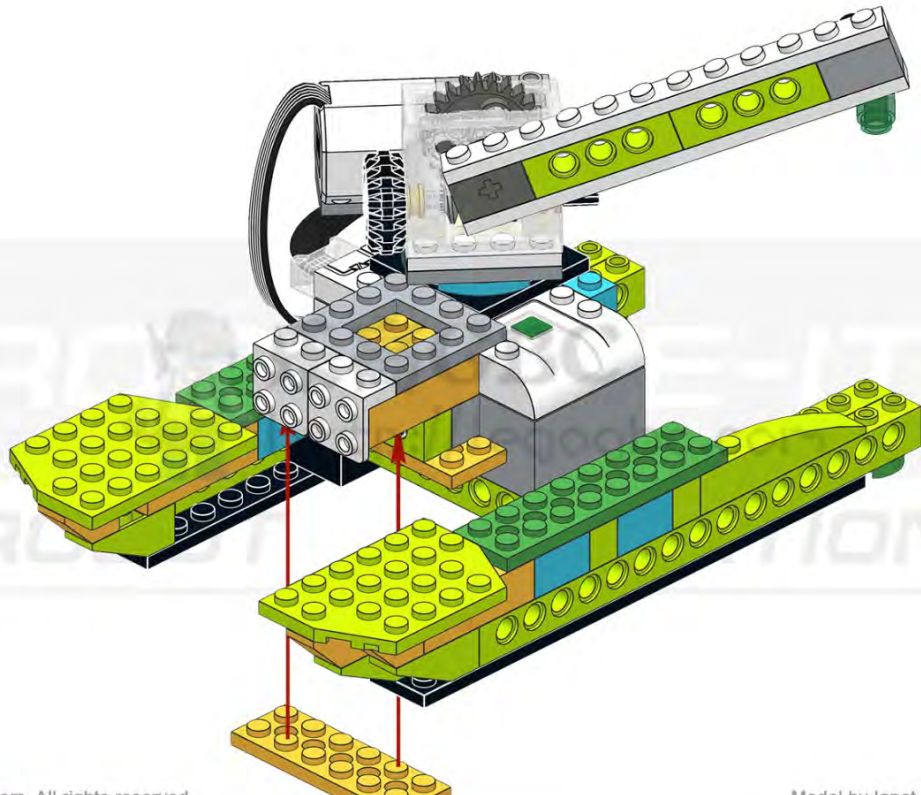


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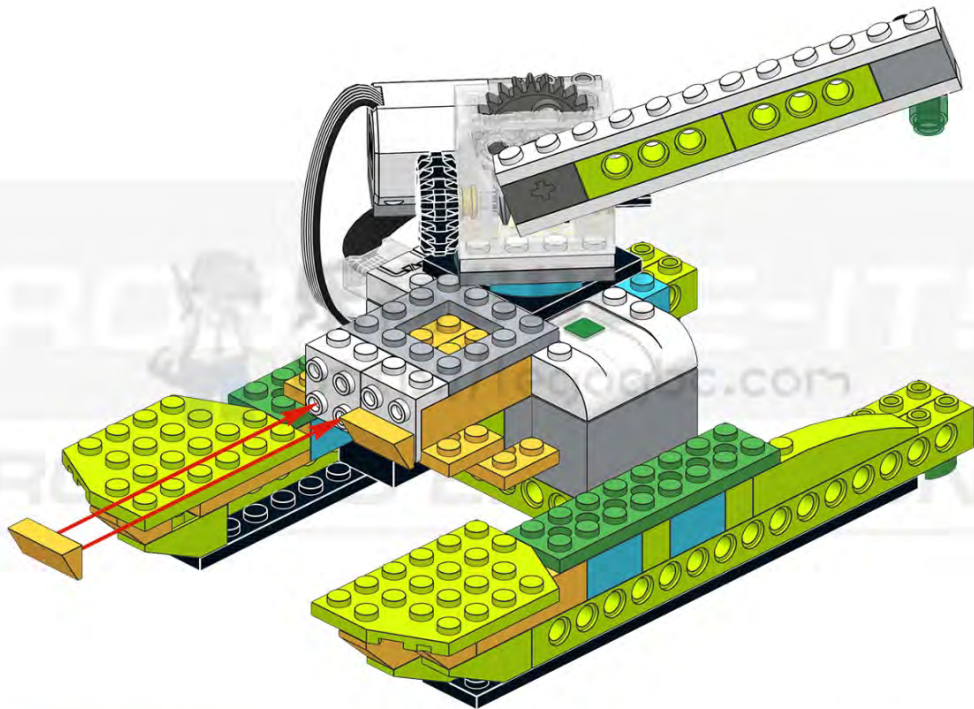


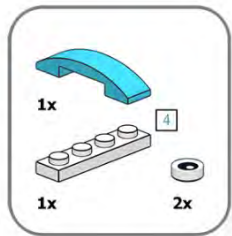
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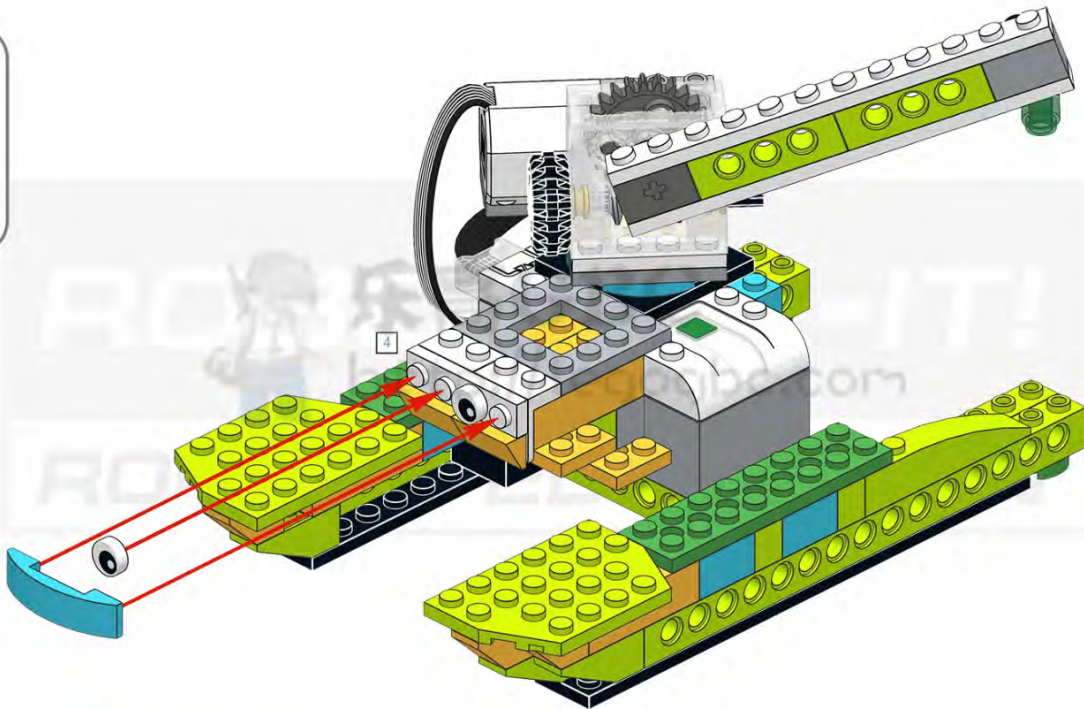


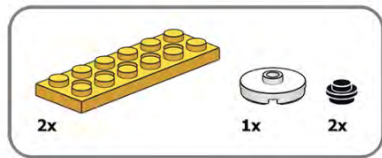
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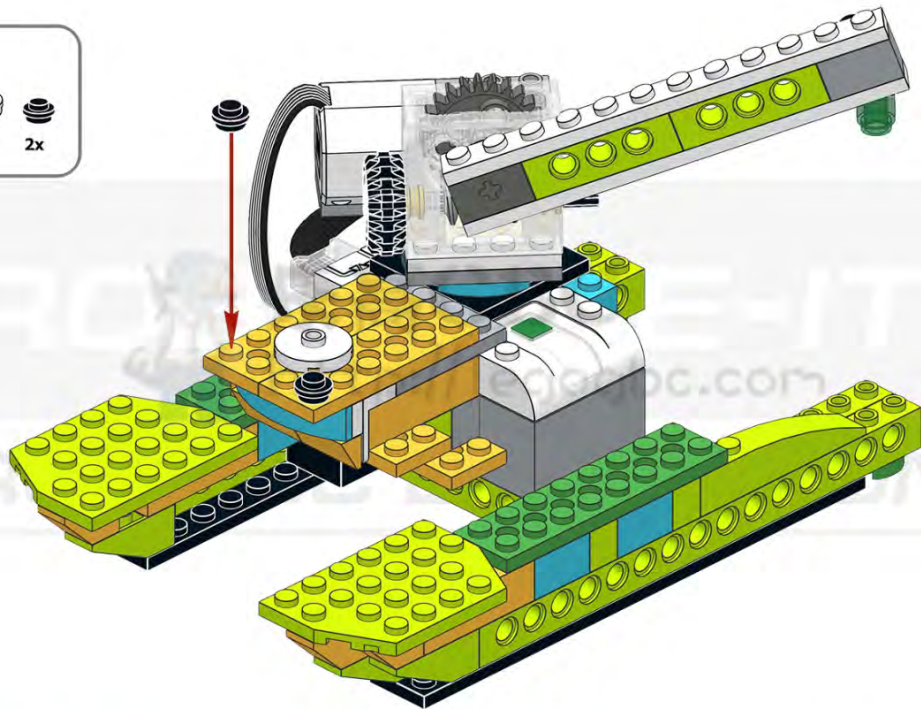


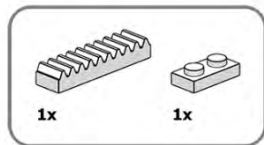
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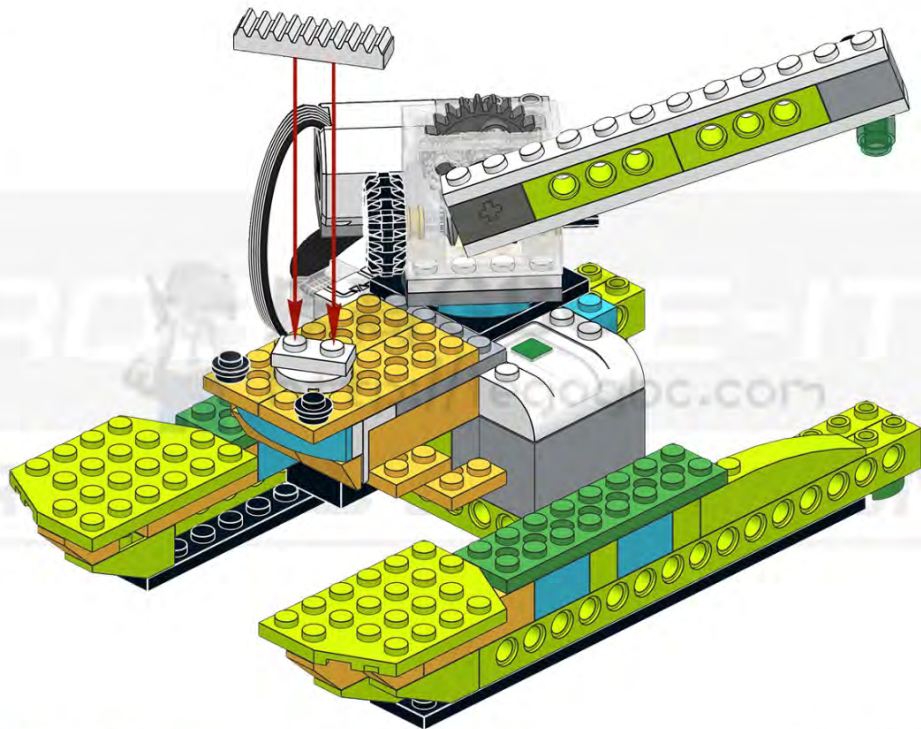


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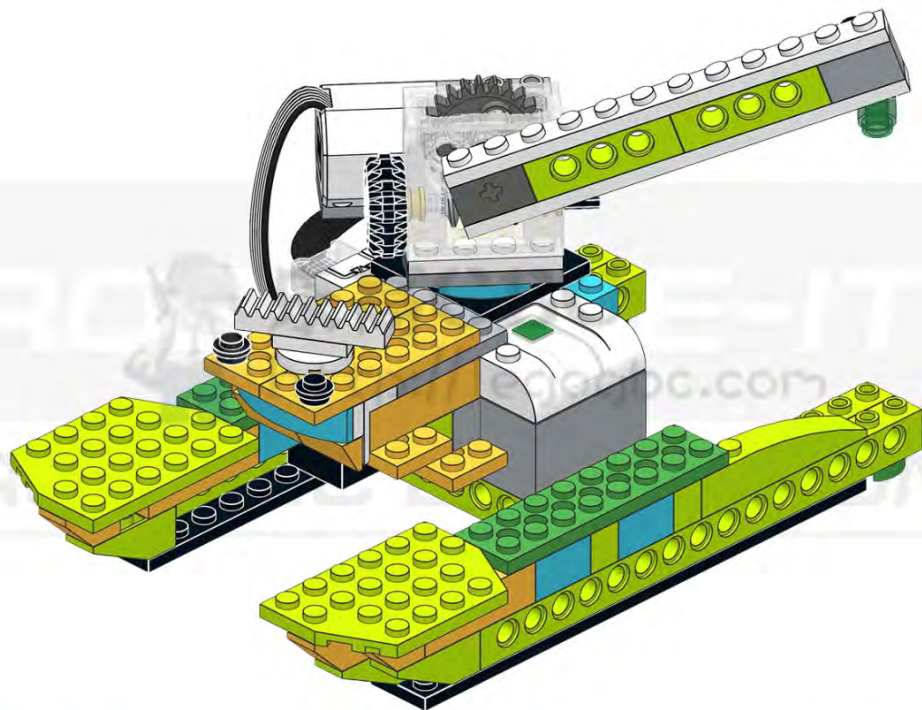


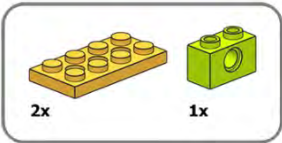
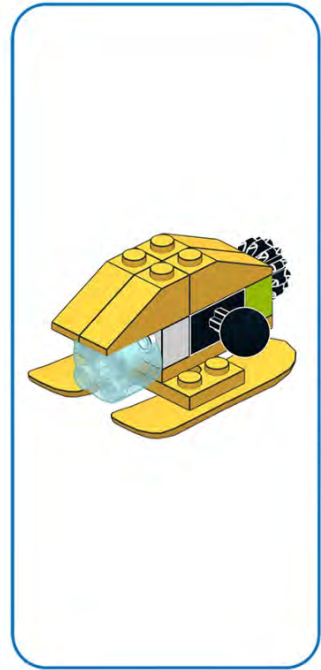


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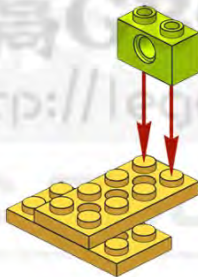


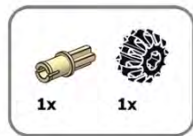
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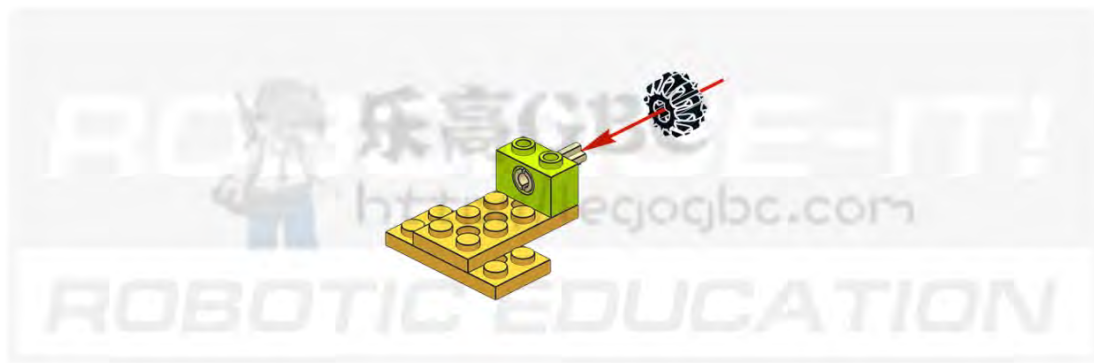


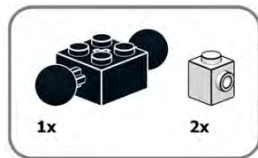
Diagram illustrating step 47: A yellow 1x2 brick is being attached to the top of a yellow 1x4 brick. Two red arrows indicate the alignment of the holes in the 1x2 brick with the studs on the 1x4 brick.



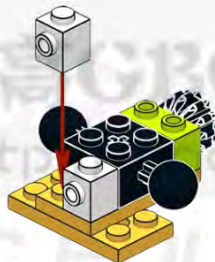


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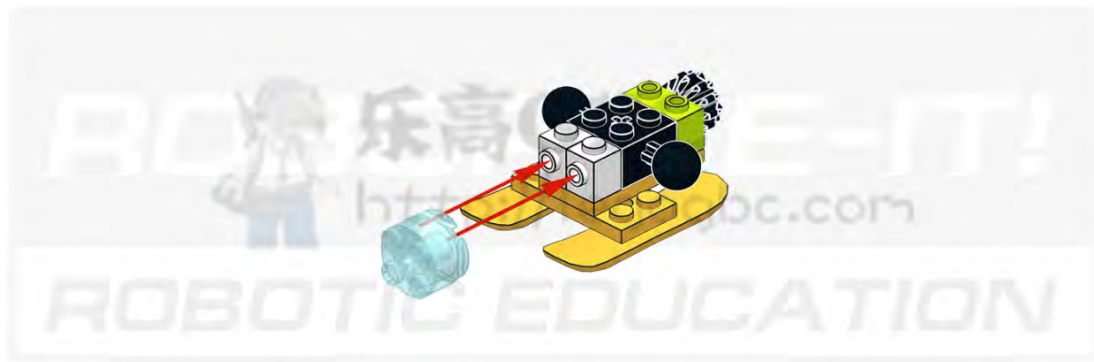


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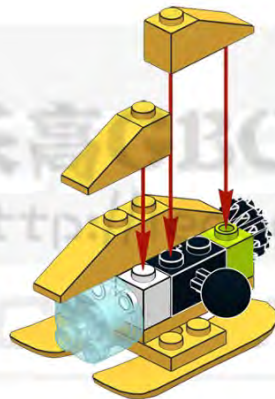


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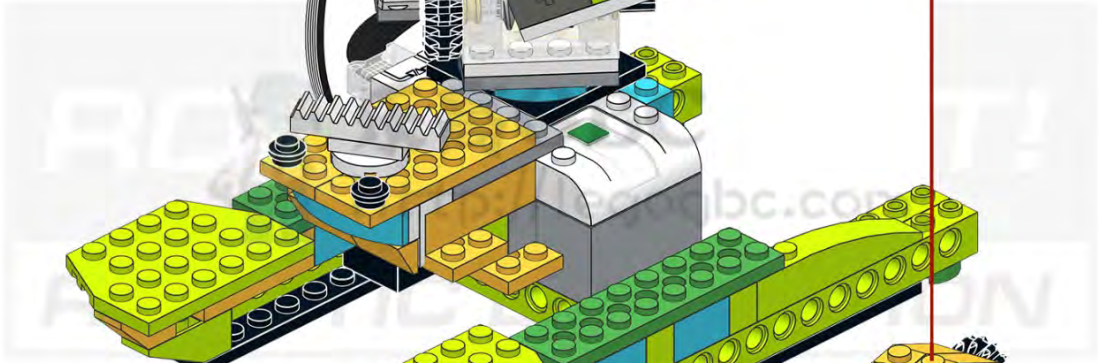


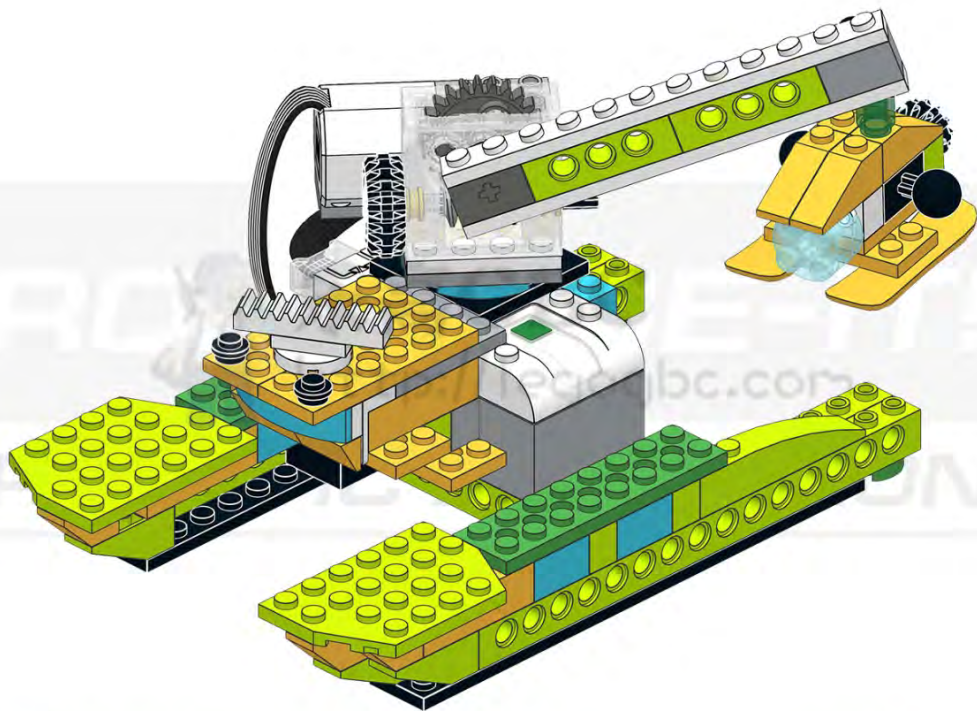
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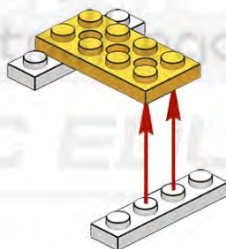
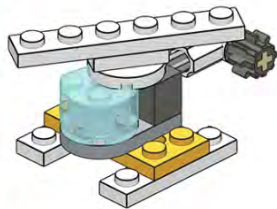
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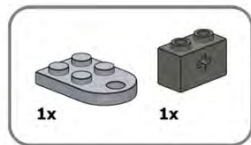




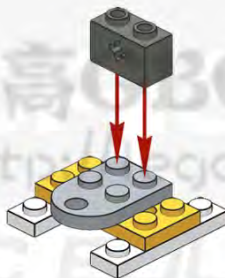


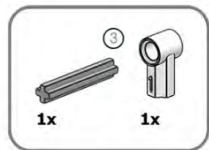
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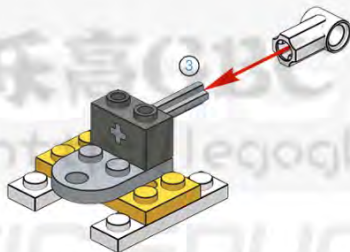


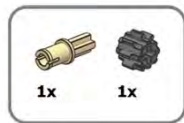
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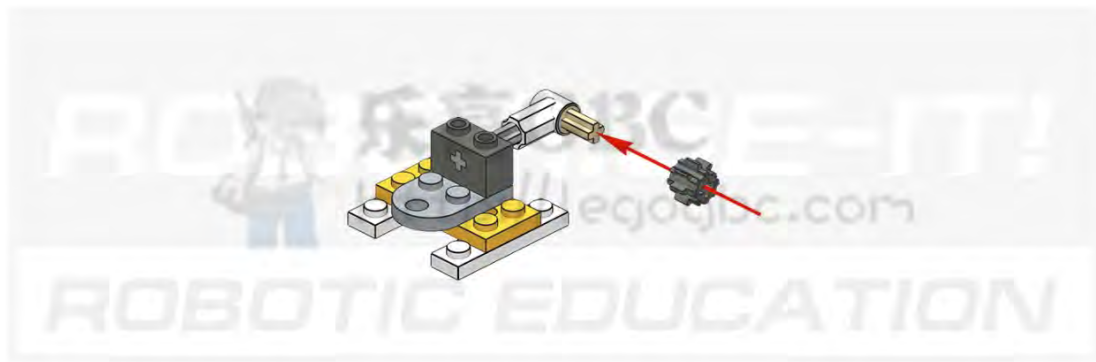


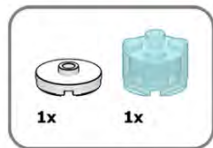
58



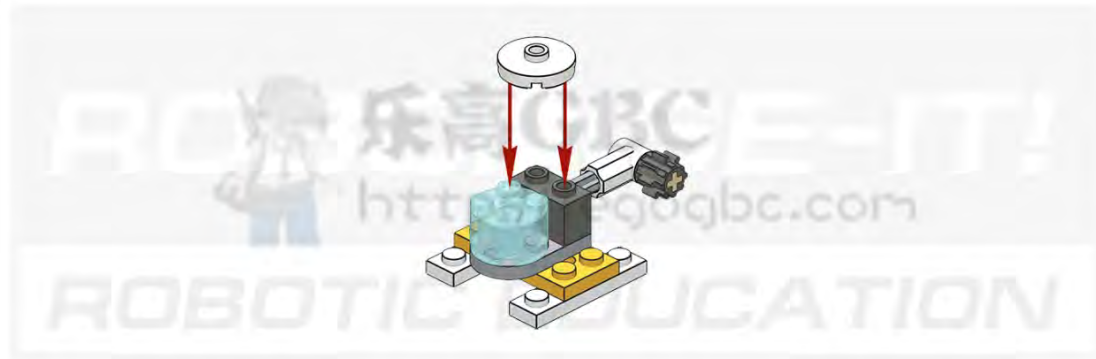


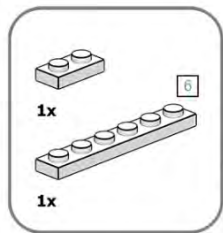
59



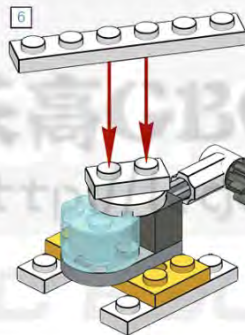


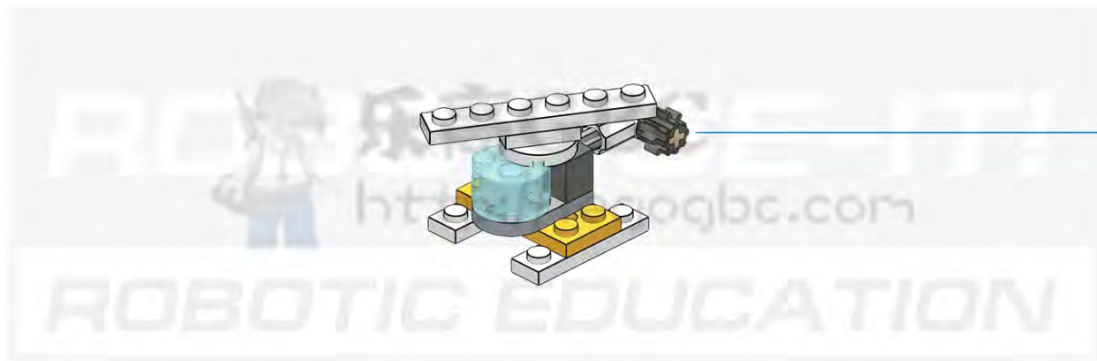
60



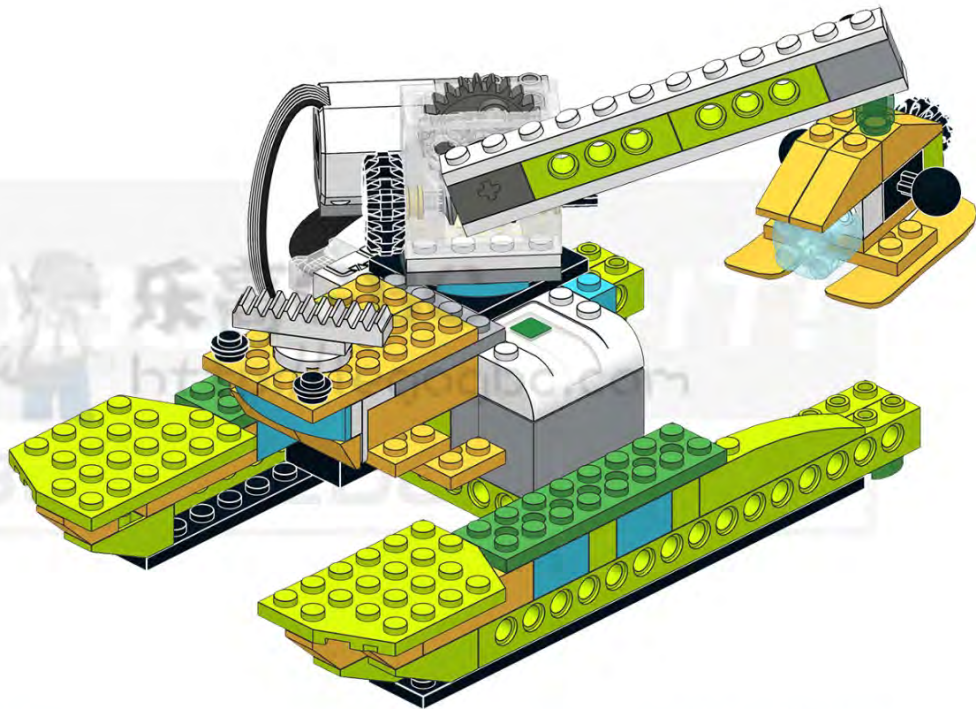


61





63





Note!



The cables must not rub while the robot is moving!





Task 1



Try to move your underwater drone from deck to water and pick it up after exploring the bottom.





Discuss!



乐高OBC

<http://legogbc.com>

**Examine the robot. Why does the lifting and lowering of the crane boom only work in manual mode?
How can this problem be solved?**



Design features

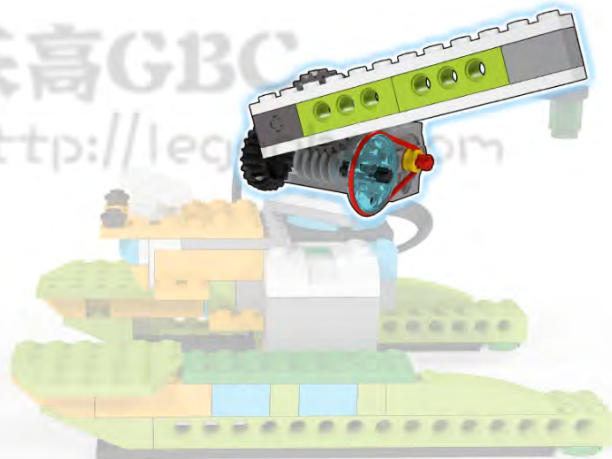


The worm gear significantly increases the force that the crane lifts. Therefore, it is better to use a belt drive in the drive, which will begin to slip when the crane jib is blocked.



Find:

- motor
- pulleys
- rubber belt





Task 2



One possible solution is to use a belt drive. Install the pulleys and belt.





Tasks



Place the robot parts in the correct places



乐高GBC

<http://legogbc.com>





Task 3



Program the crane controls of the robot using the buttons. This will make drone manipulation much easier.





Task 3. Program



Scratch

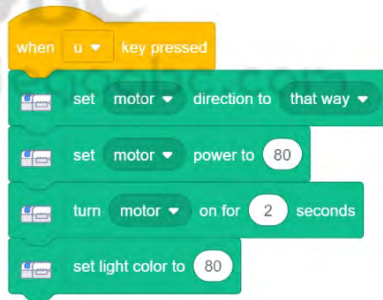
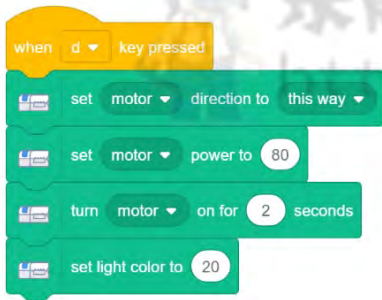


WeDo Software



Program the crane controls using the buttons.

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





Task 3. Program



Scratch



WeDo Software



Program the crane controls using the buttons.

In WeDo Software, similar programs look like this:





Discuss!



The programs you have written require constant monitoring of the current boom angle. If it is raised to the maximum angle, it is not advisable to turn on the motor for further lifting.

How can you make protection against too large angles of inclination up and down?



Task 4



Attach the tilt sensor to the crane boom. It will report the current tilt of the boom and the robot will be able to turn off the motor when it reaches critical angles.

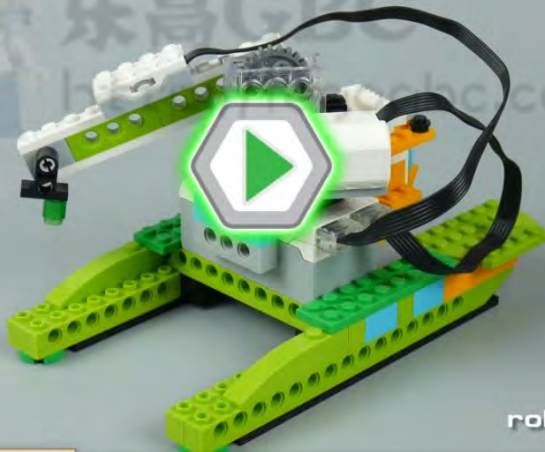




Task 5



Modify the programs you have written so that the robot turns off the motor when the boom reaches critical angles.





Task 5. Program



Scratch



WeDo Software



Modify the programs you have written as follows:

when d key pressed

set motor direction to this way

set motor power to 80

turn motor on

wait until tilted down ?

turn motor off

when u key pressed

set motor direction to that way

set motor power to 80

turn motor on

wait until tilted up ?

turn motor off



Task 5. Program



Scratch



WeDo Software



Modify the programs you have written as follows:





Question



Which of the ships depicted is a catamaran?





Tasks



In which direction do you need to turn the handle in order for the crane to rise?



Check
answer





Question



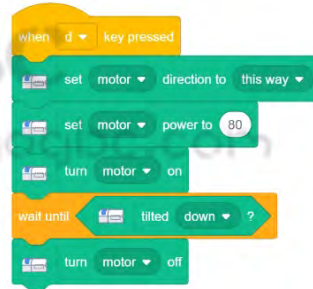
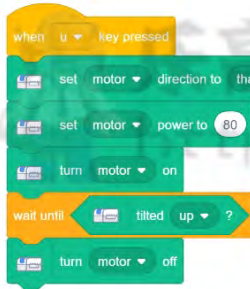
Scratch



WeDo Software



Which of the software sides shown below will stop the motor when the sensor is tilted up?





Question



Scratch



WeDo Software



Which of the programs below will stop the motor when the sensor is tilted up?





Discuss!

- Why did the robot only have manual control of the crane?
- What gear did you use to fix the robot's transmission?
- What is a catamaran and what are its features?
- What equipment can a research vessel have?
- How did you implement the protection of the crane against too large boom angles?





Your achievements

Total:

0



1



2



3



4

