Mars challenge. Surveyor

ROBORISE-IT!
ROBOTIC EDUCATION

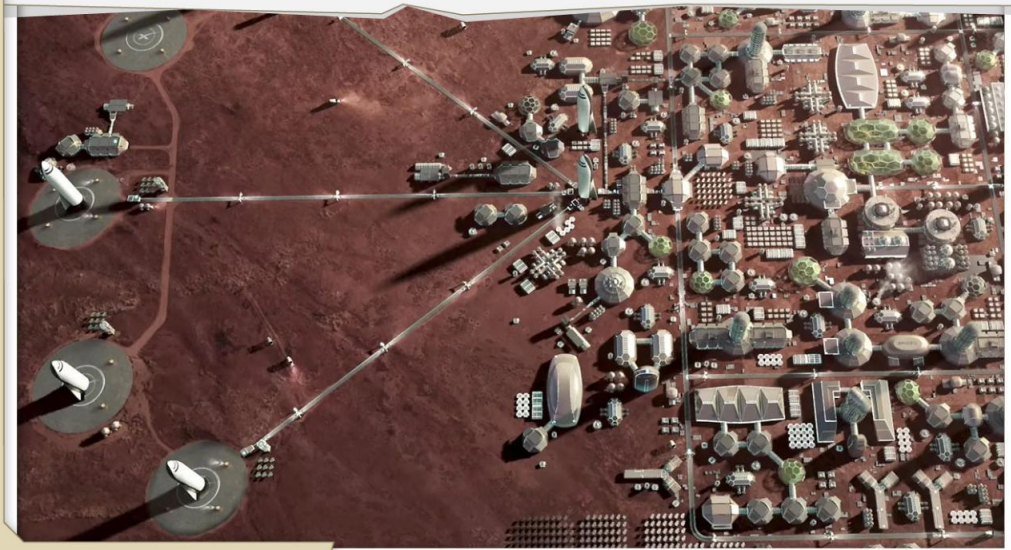
Surveyer

Is there life on Mars?

Humanity has been interested in this question for a long time. But very soon we will have a definite answer. Yes, there is life on Mars, because we founded a colony there! In any case, one person on Earth is absolutely sure that it will be so. Elon Musk has a data plan for the colonization of Mars.

Colony on Mars

As SpaceX works with Elon to realize his dream, we will try to imagine what technologies and robots can be useful in order for colonization to be successful. After all, making humanity a multi-planet is a very interesting and ambitious task!



Development of a colony on Mars

The colony will grow gradually, but this growth must be designed correctly. Then the new modules will not interfere with the old ones and the resources will be used as efficiently and rationally as possible.

Command structure

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In our mission, we will be assisted by a team of assistant robots. They have tremendous experience that will help us solve any problems!

Today's Mission

Today we will take the first step towards building a base on the surface of the planet. The Surveyer robot will help us with this. It will mark the surface and lay magnetic marks that other robots can use for navigation.

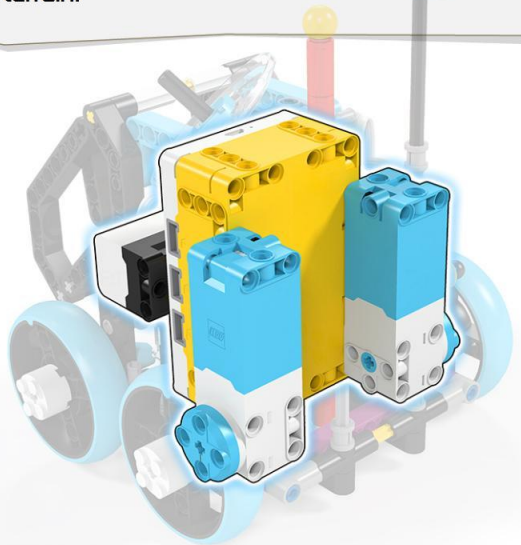
Surveyer

Design features

The robot is driven by two medium servomotors. The ultrasonic distance sensor can be used to activate the robot or to detect interference when moving through medium terrain.

Find:

- Smarthub
- Motors
- Sensor

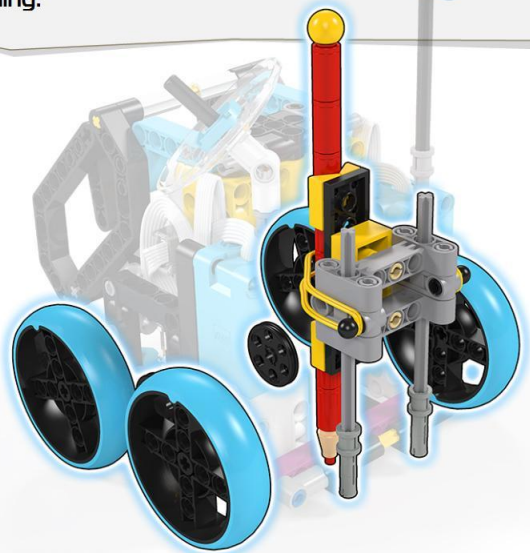


Design features

The marker is mounted in a special holder that moves along the guides. The marker must be exactly between the drive wheels - then the robot will not draw arcs when turning.

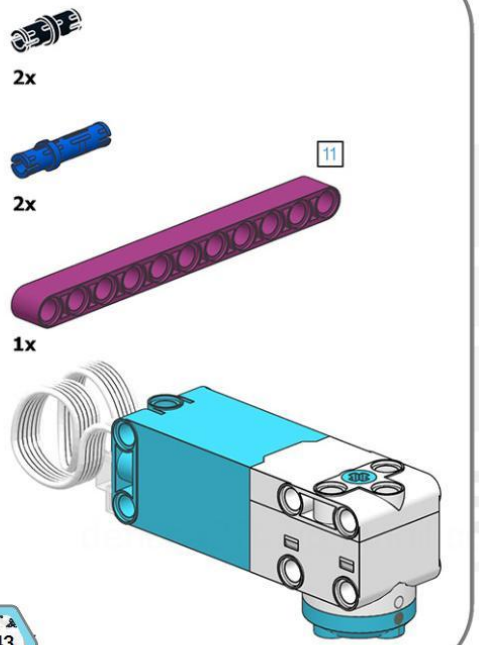
Find:

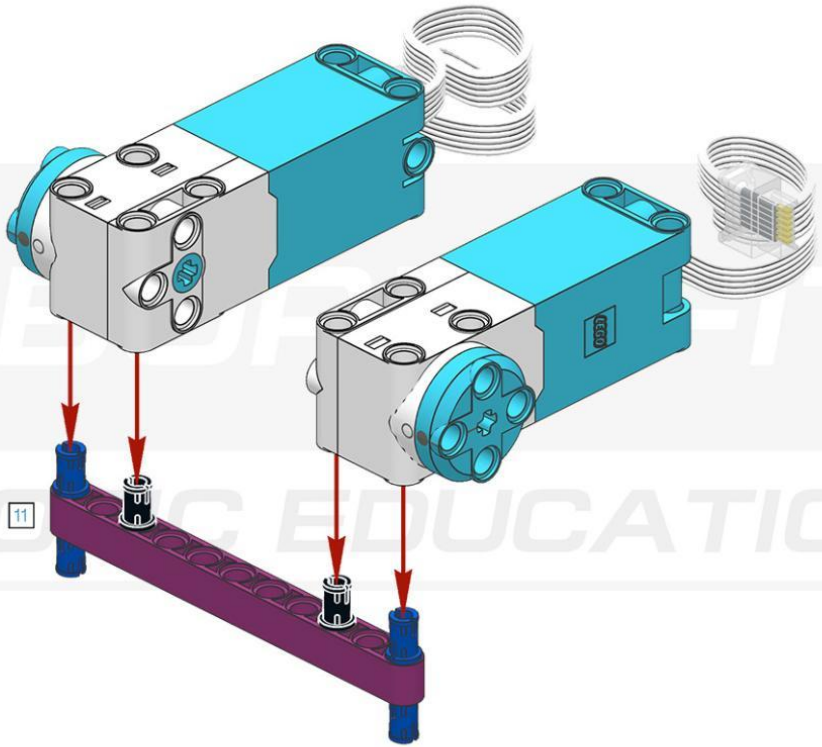
- drive and support wheels
- marker and guides
- fake wheels



Build a robot

Go to the first page of instructions





Model by Ignat Khliebnikov

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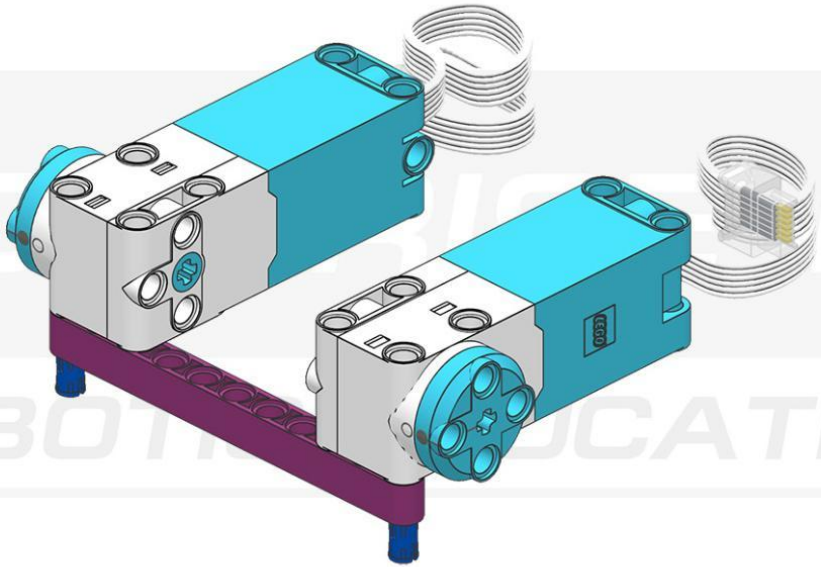

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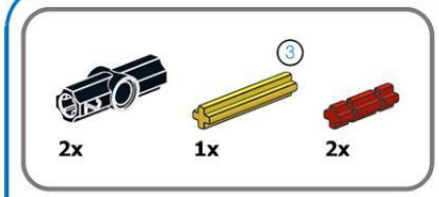

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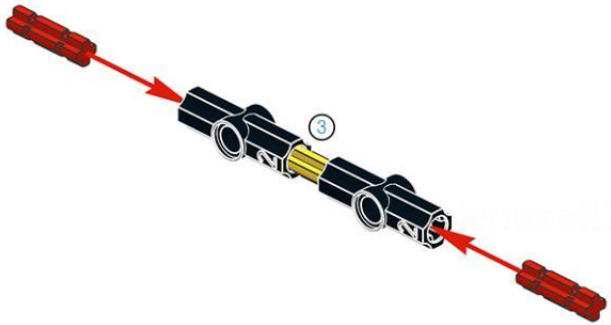

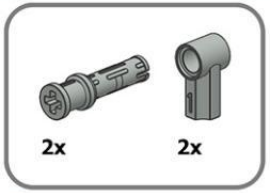

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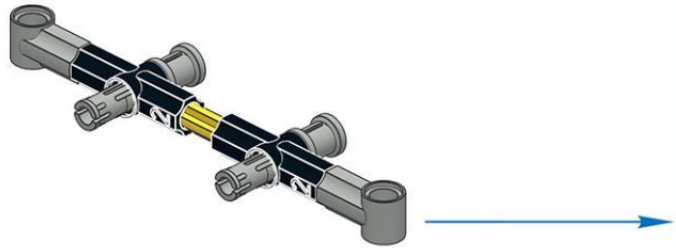

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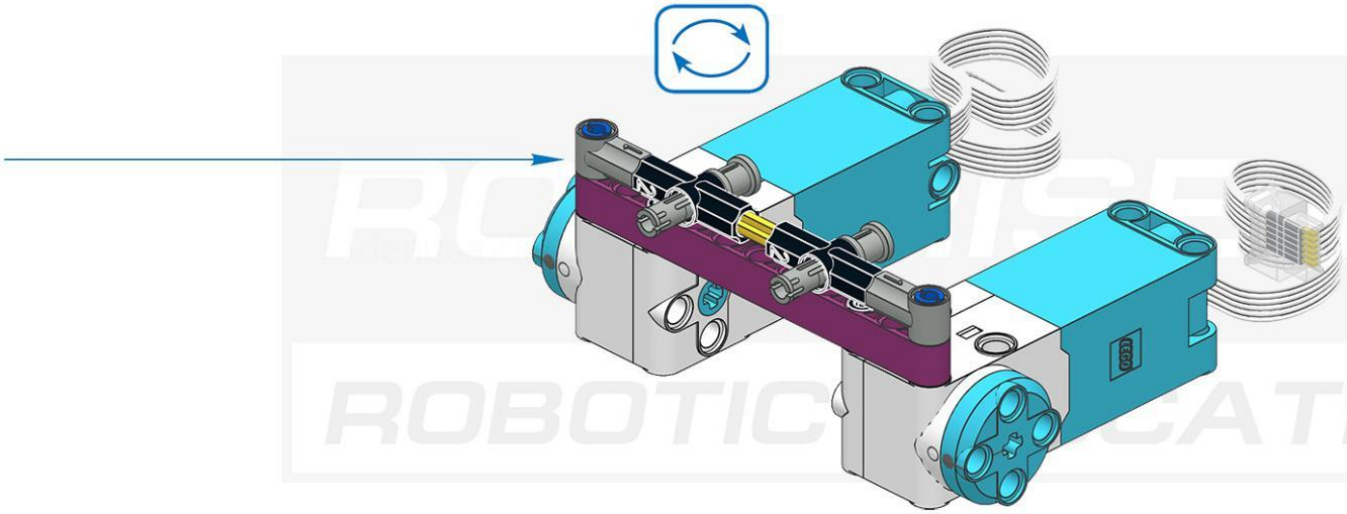

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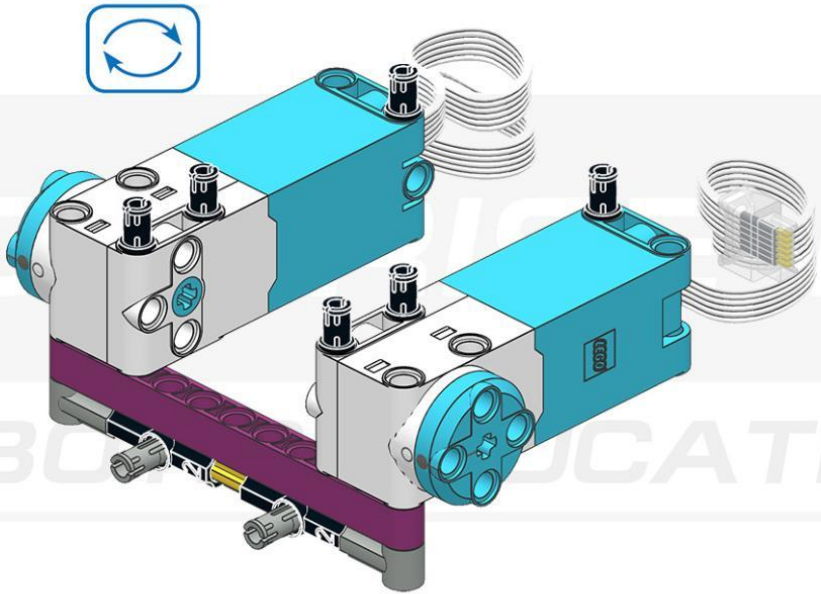

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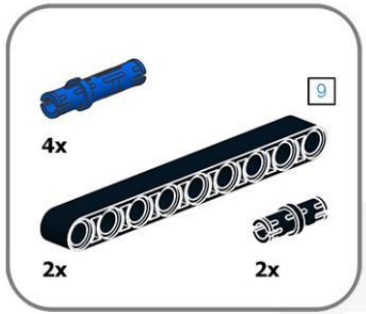

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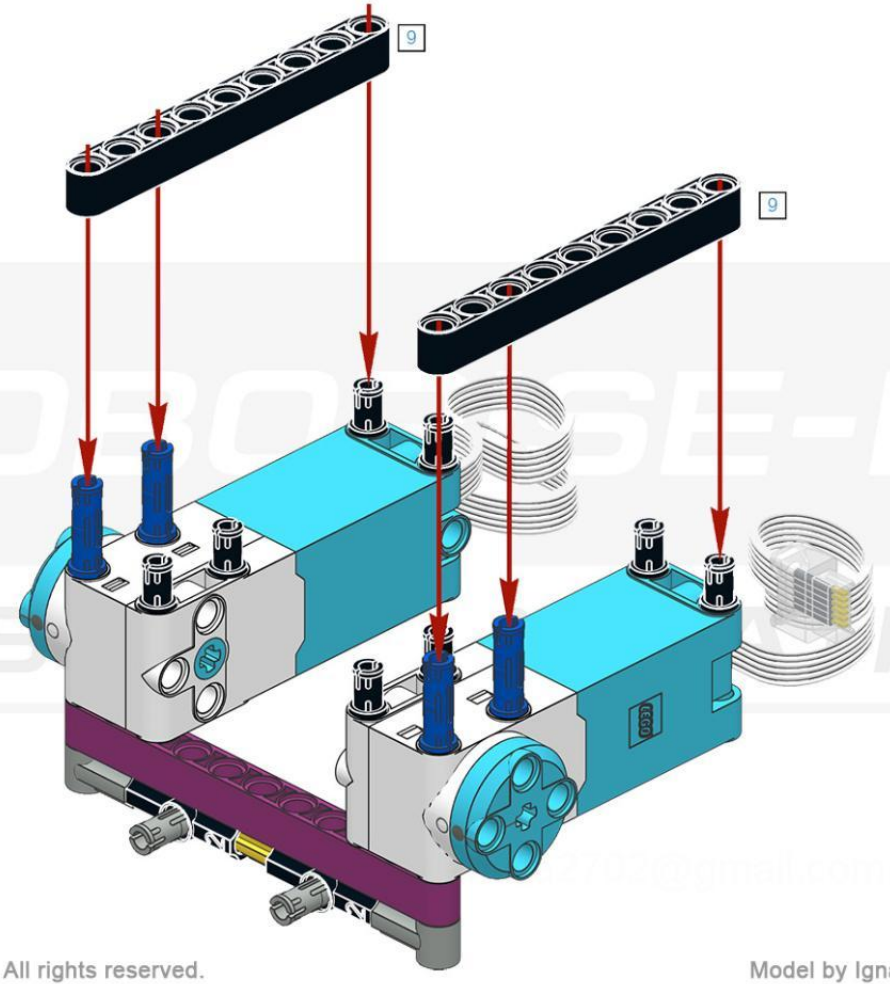

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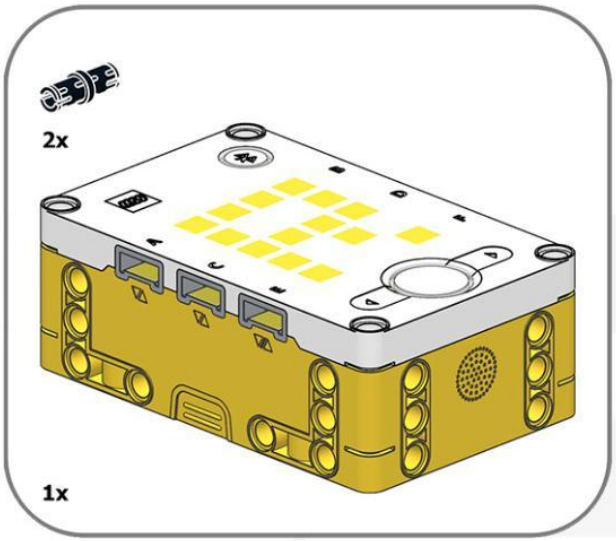

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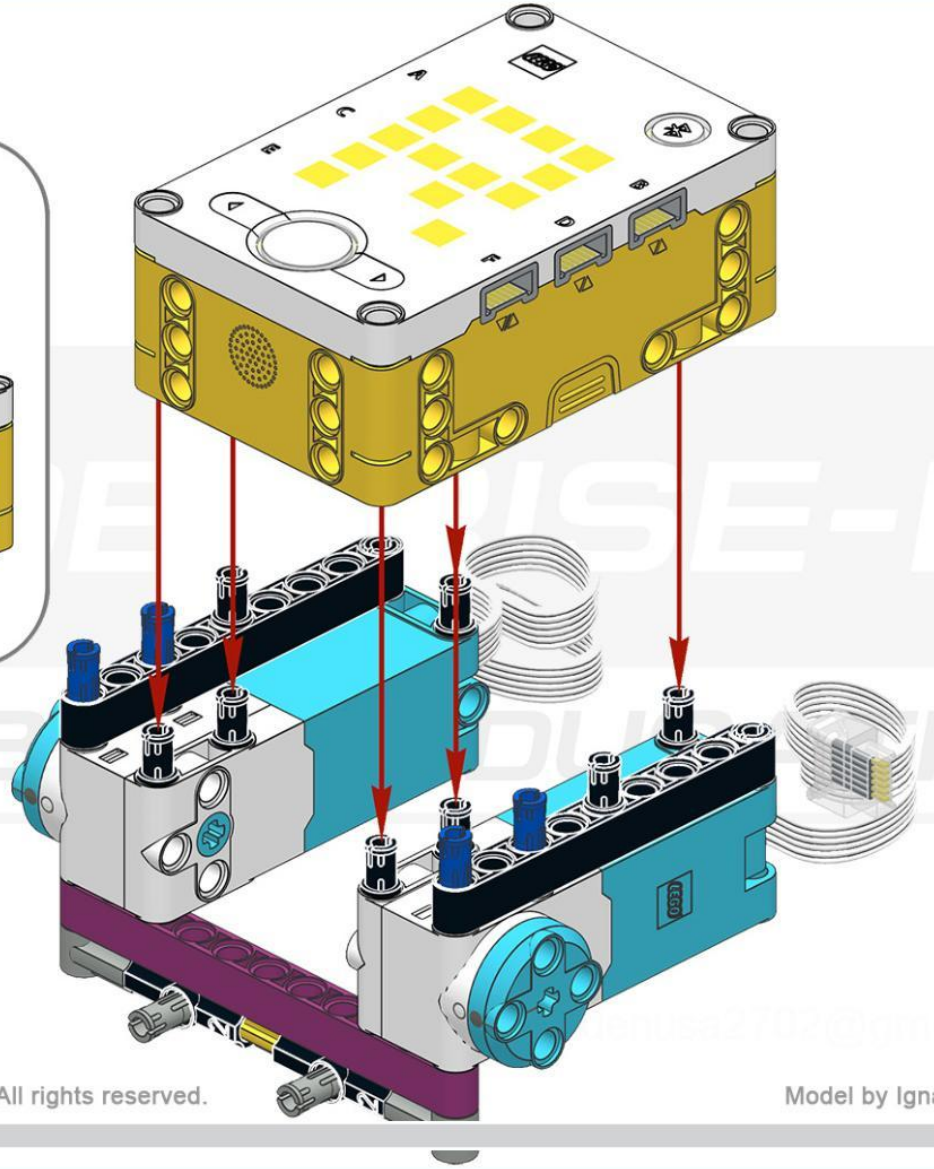

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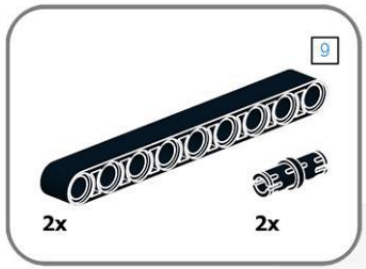

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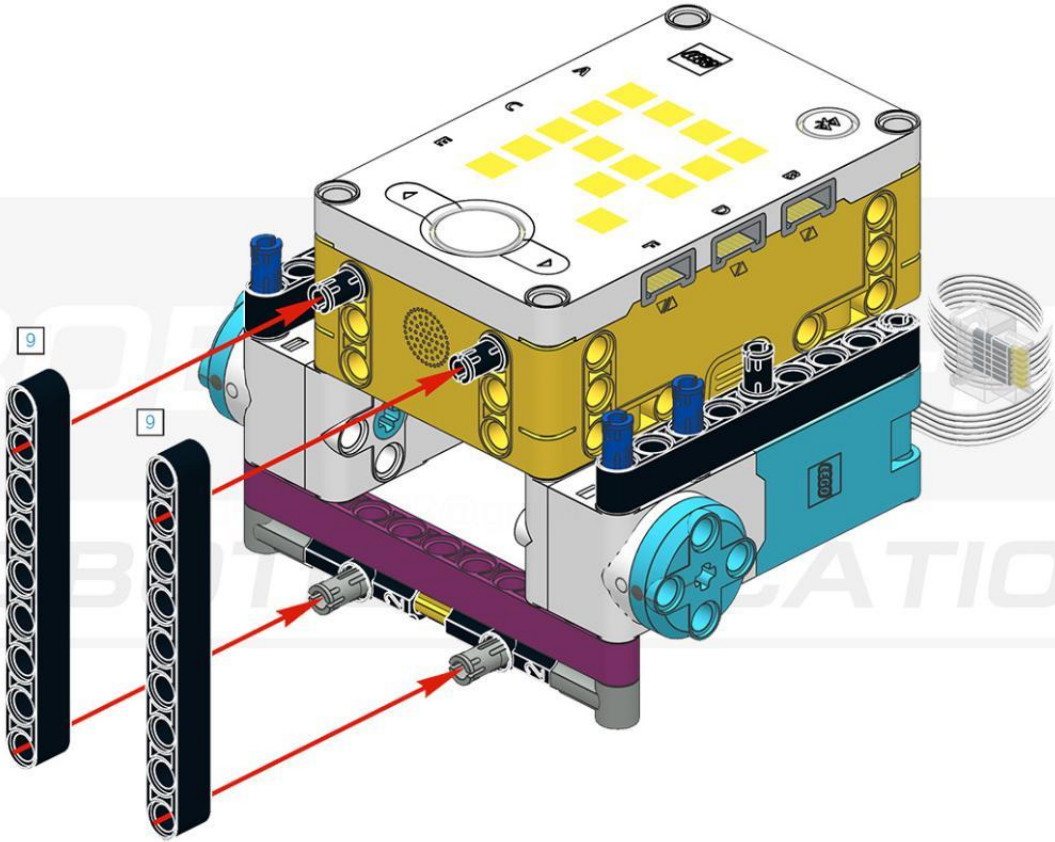

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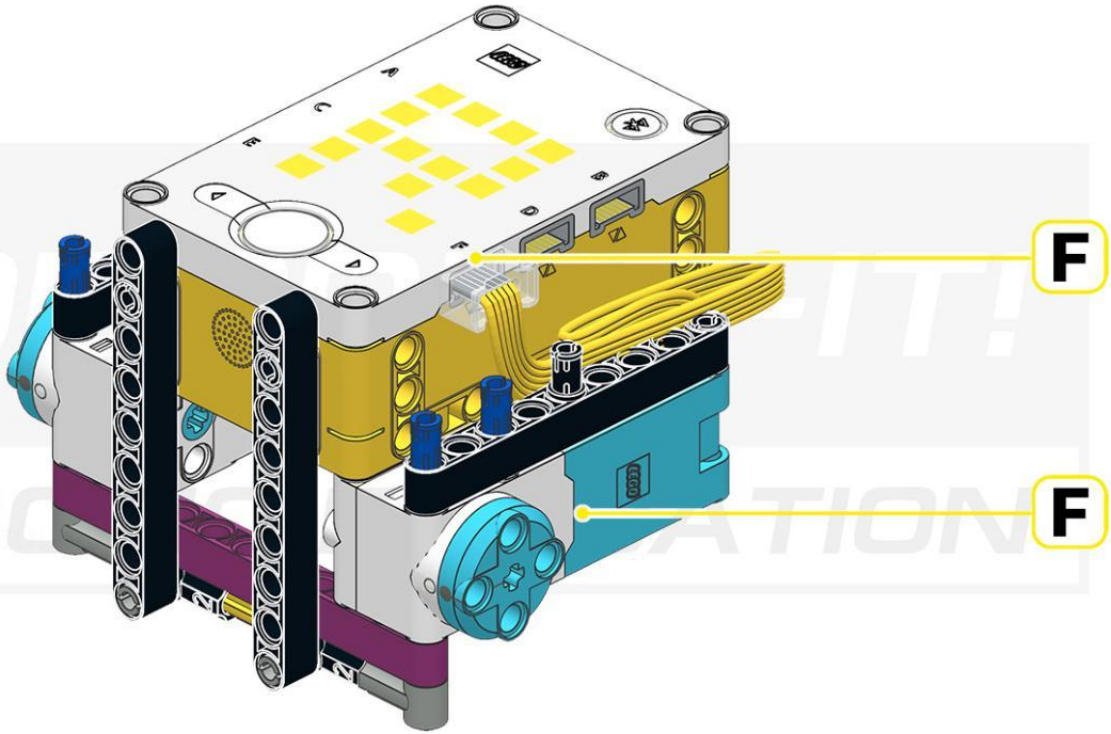

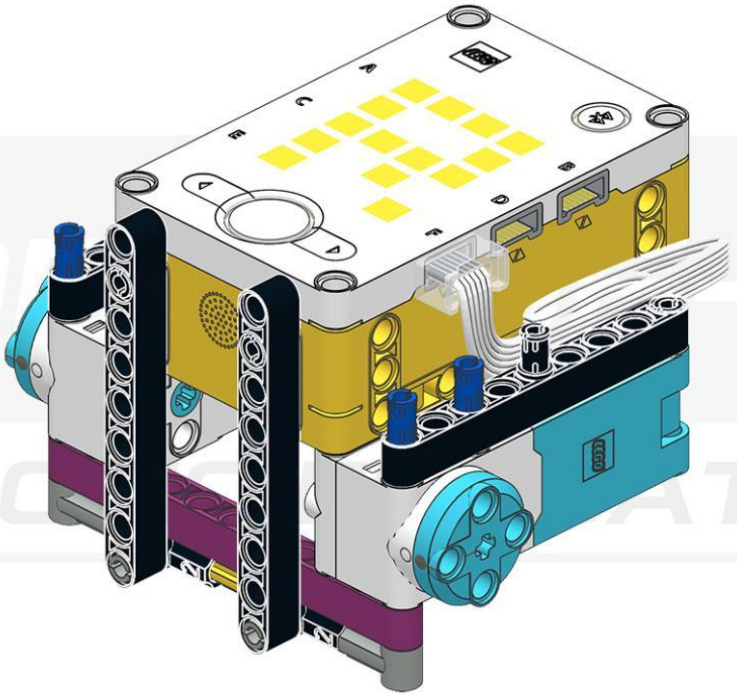

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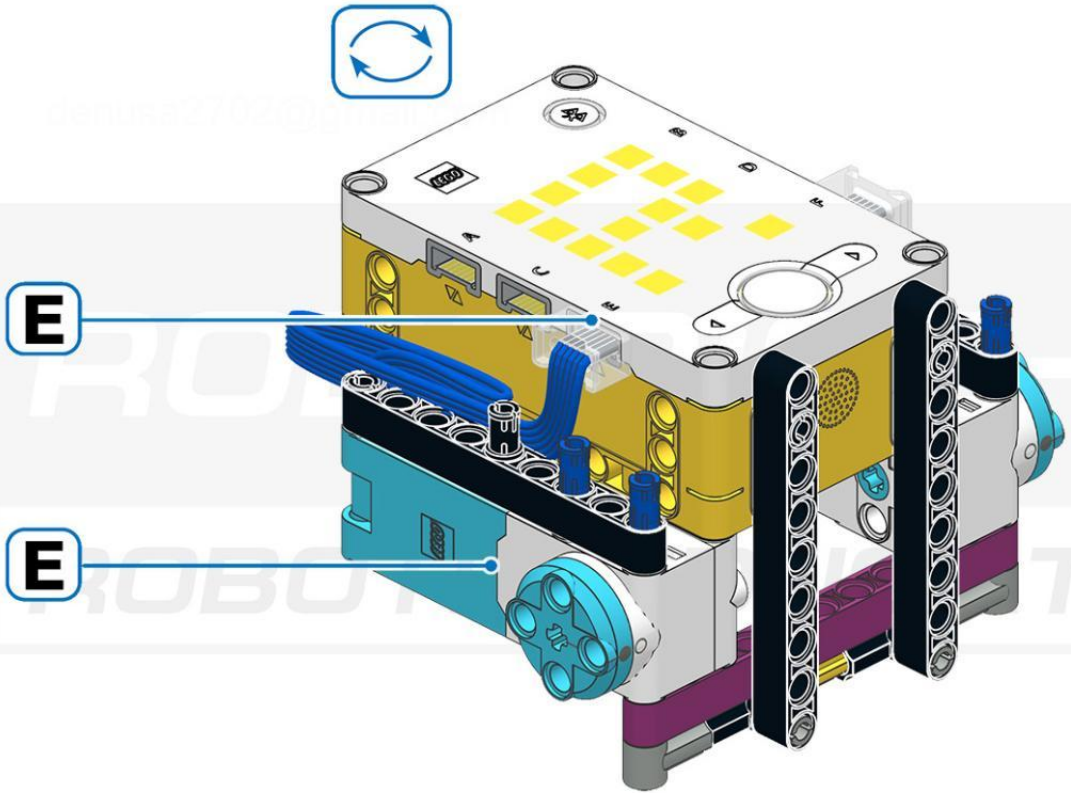

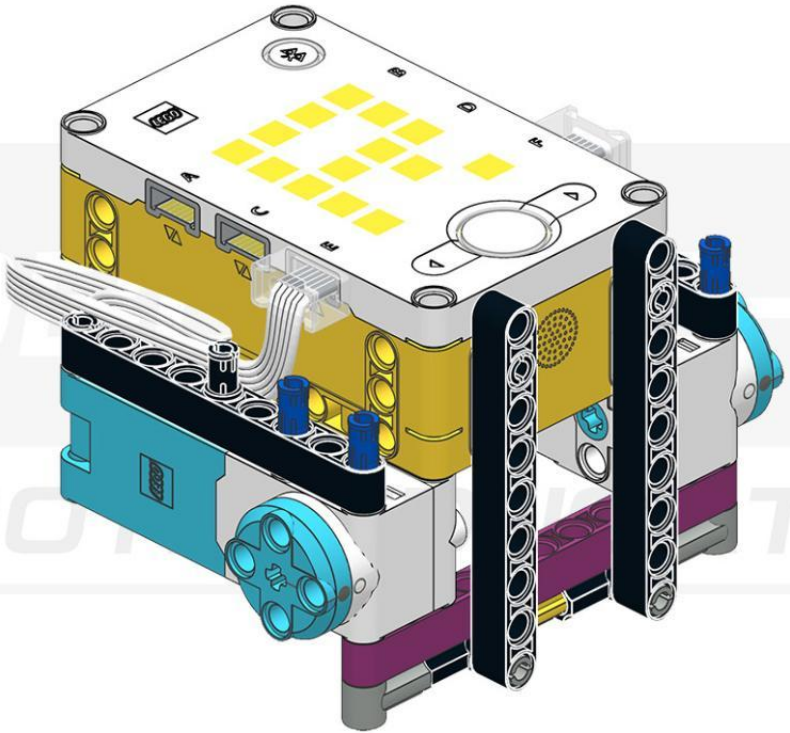

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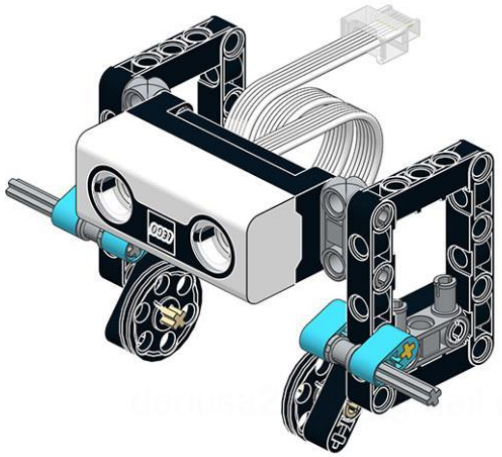

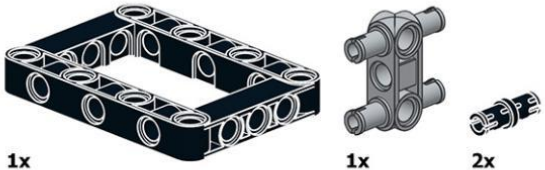

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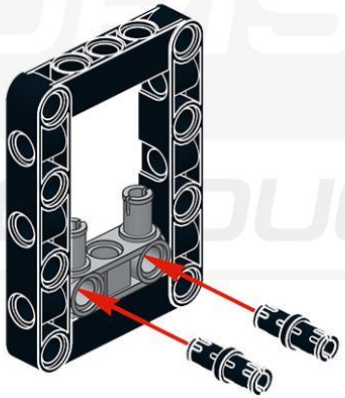

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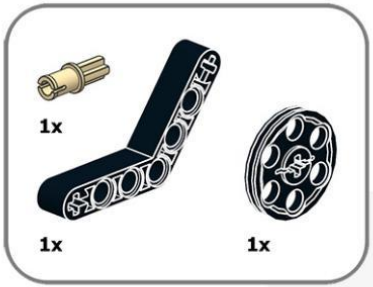

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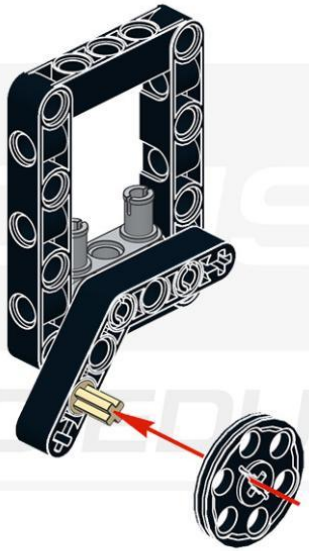

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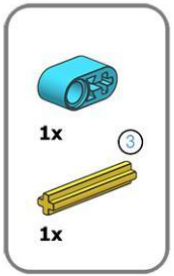

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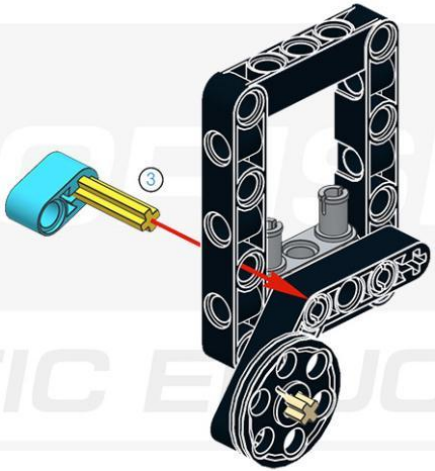

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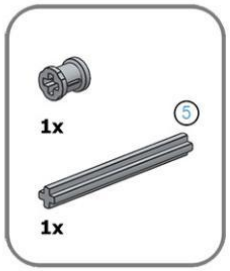

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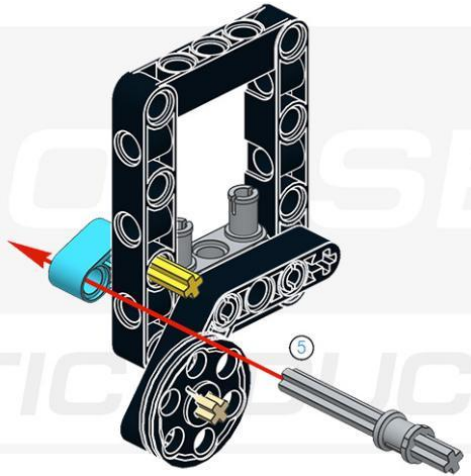

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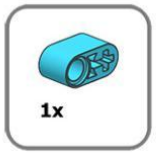

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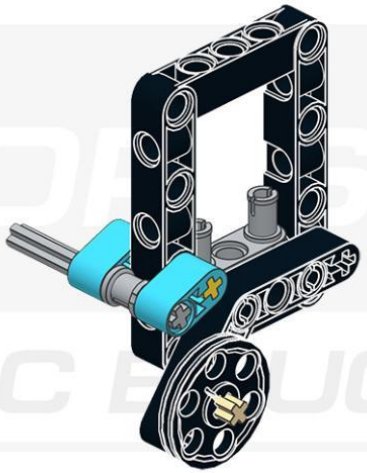

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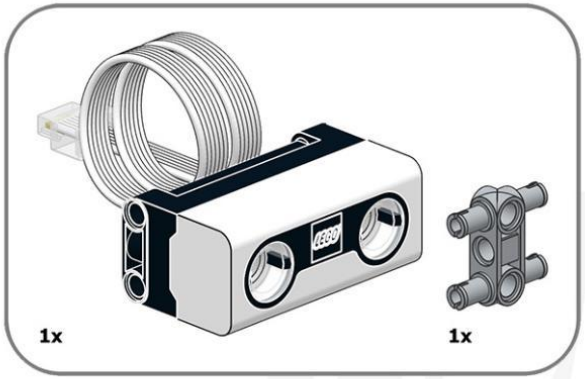

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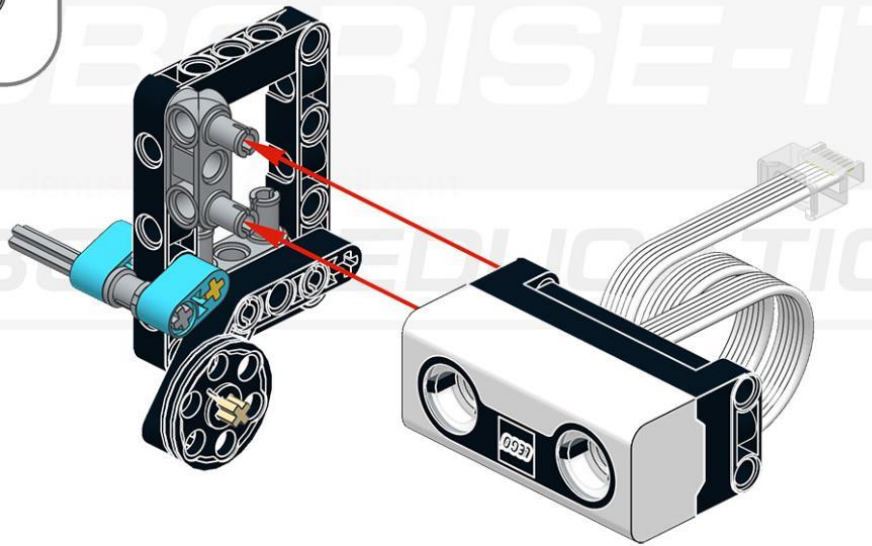

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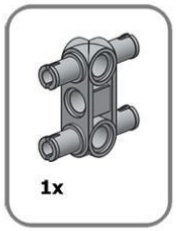

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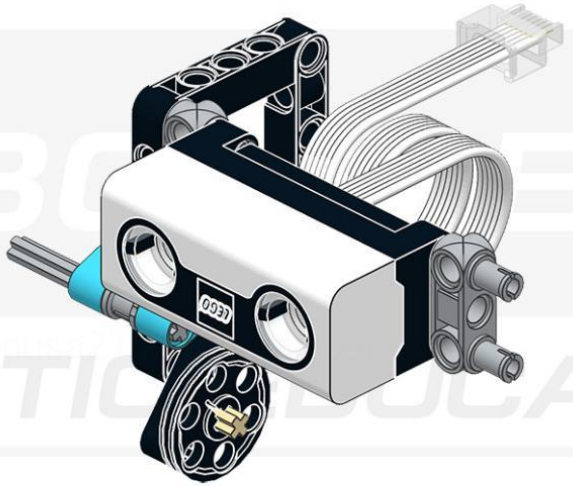

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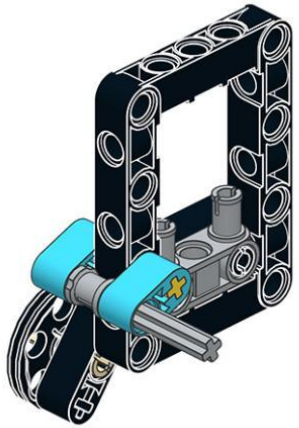

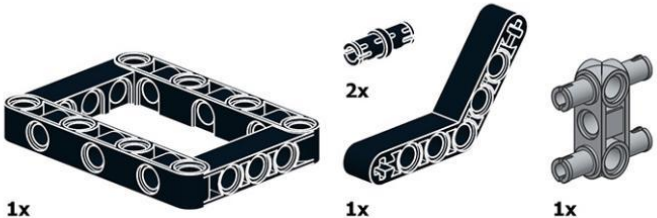

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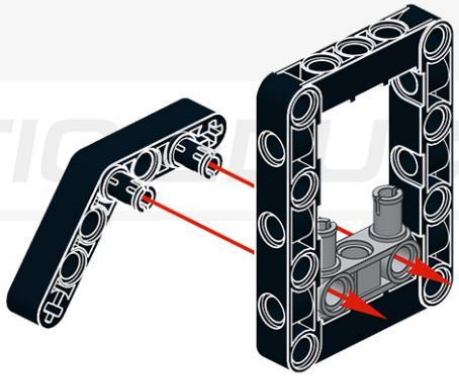

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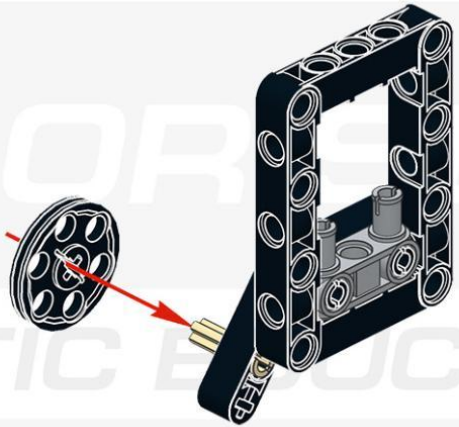

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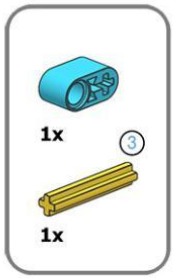

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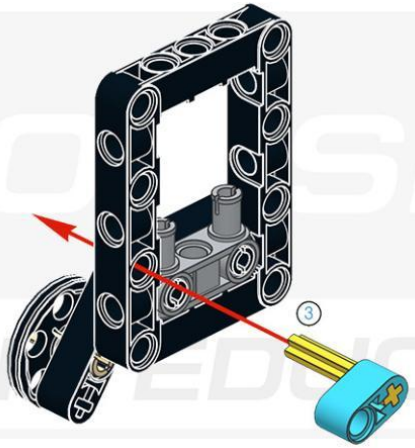

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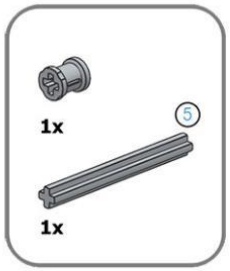

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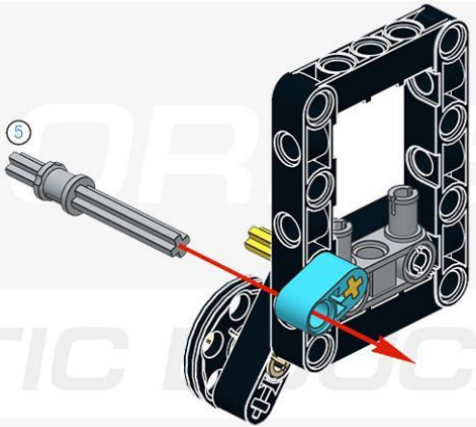

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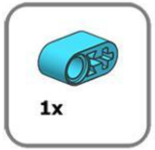

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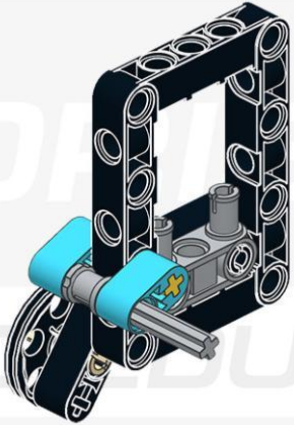

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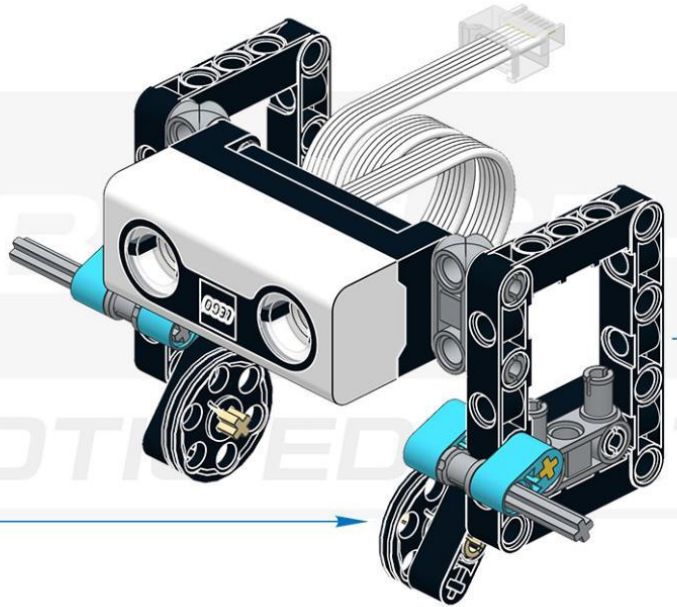

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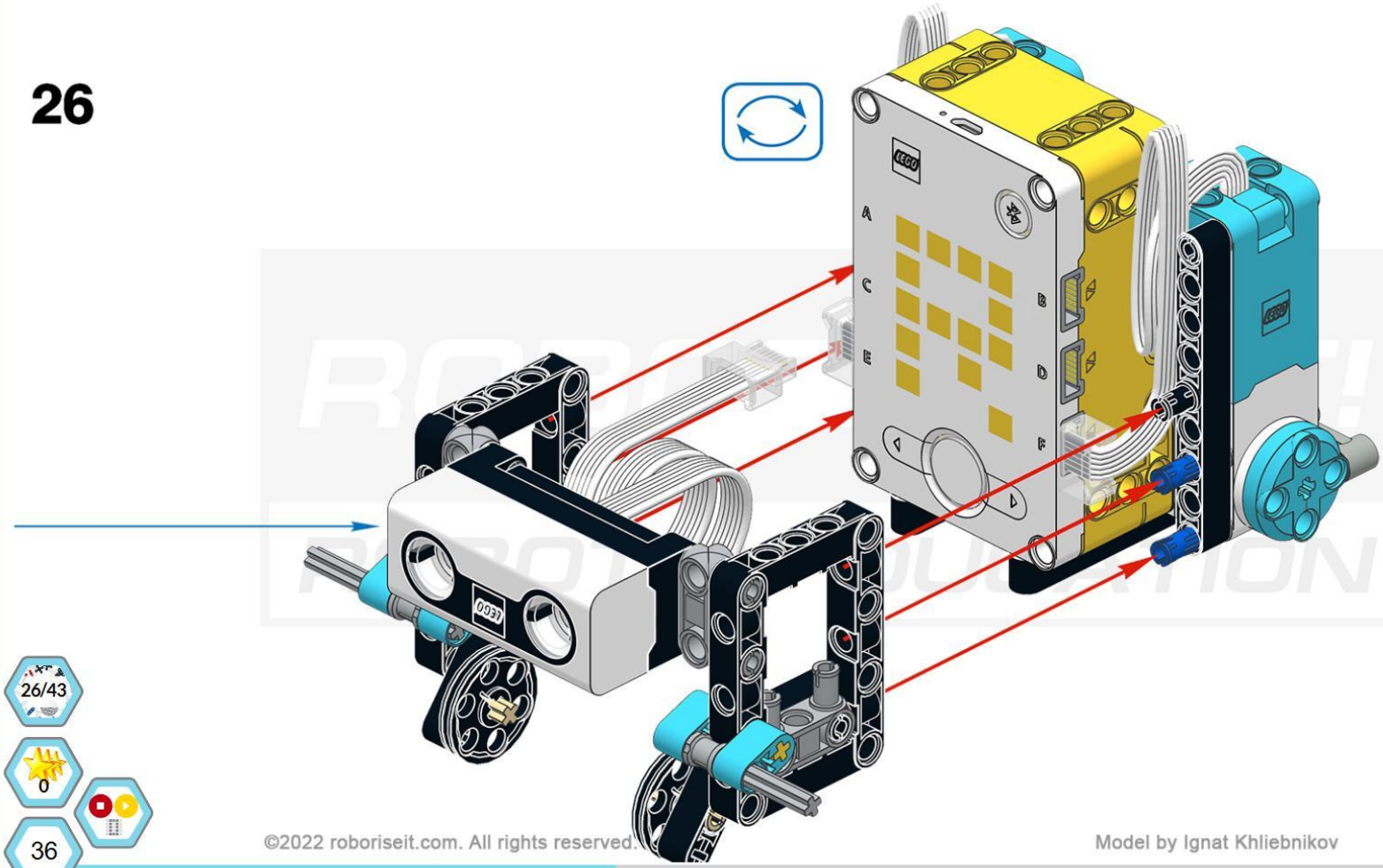

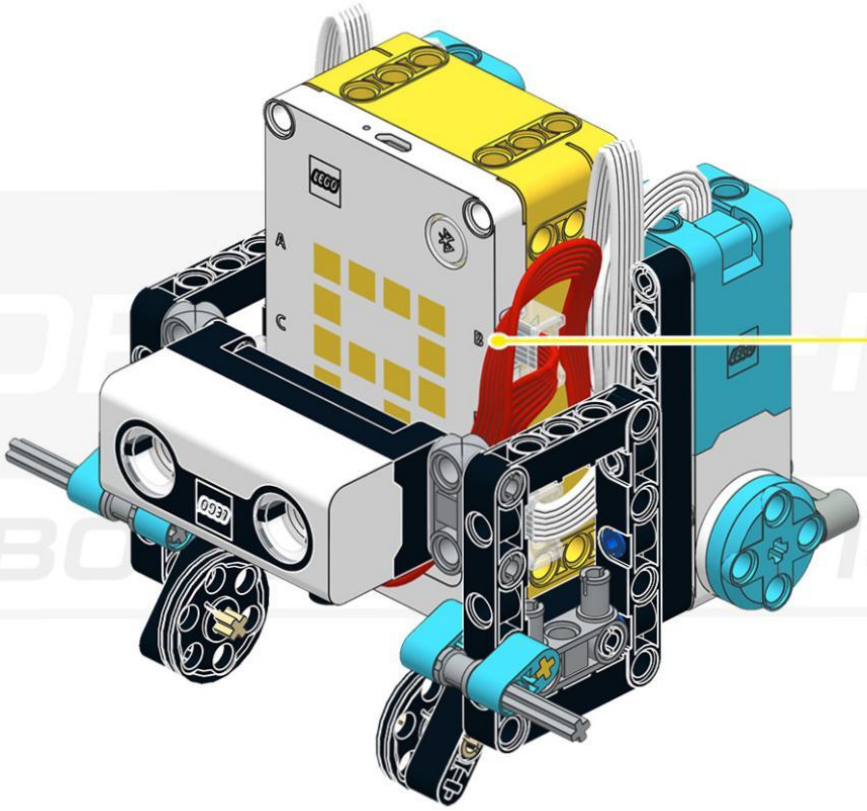

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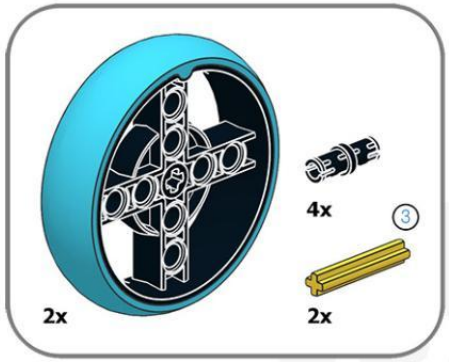

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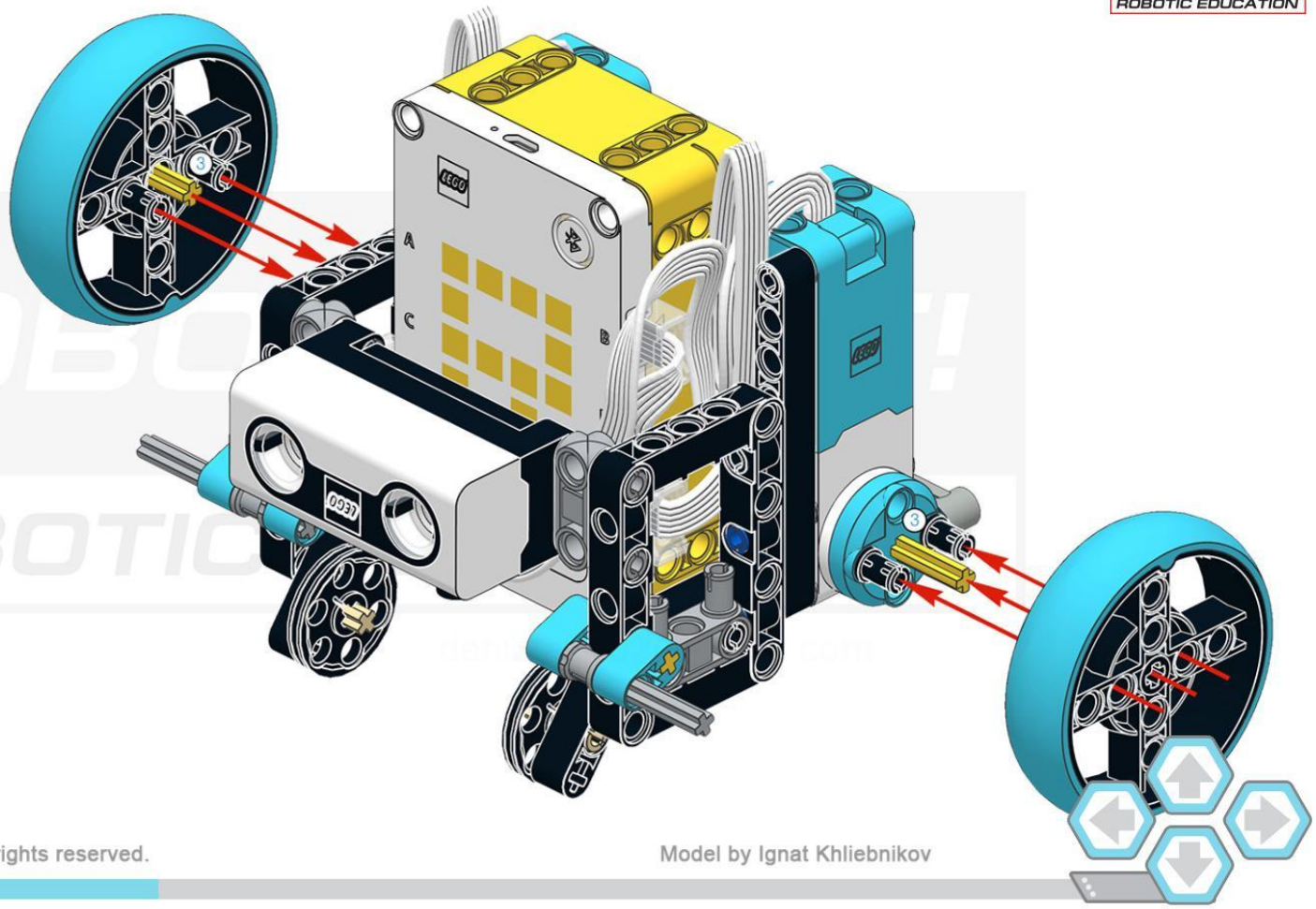

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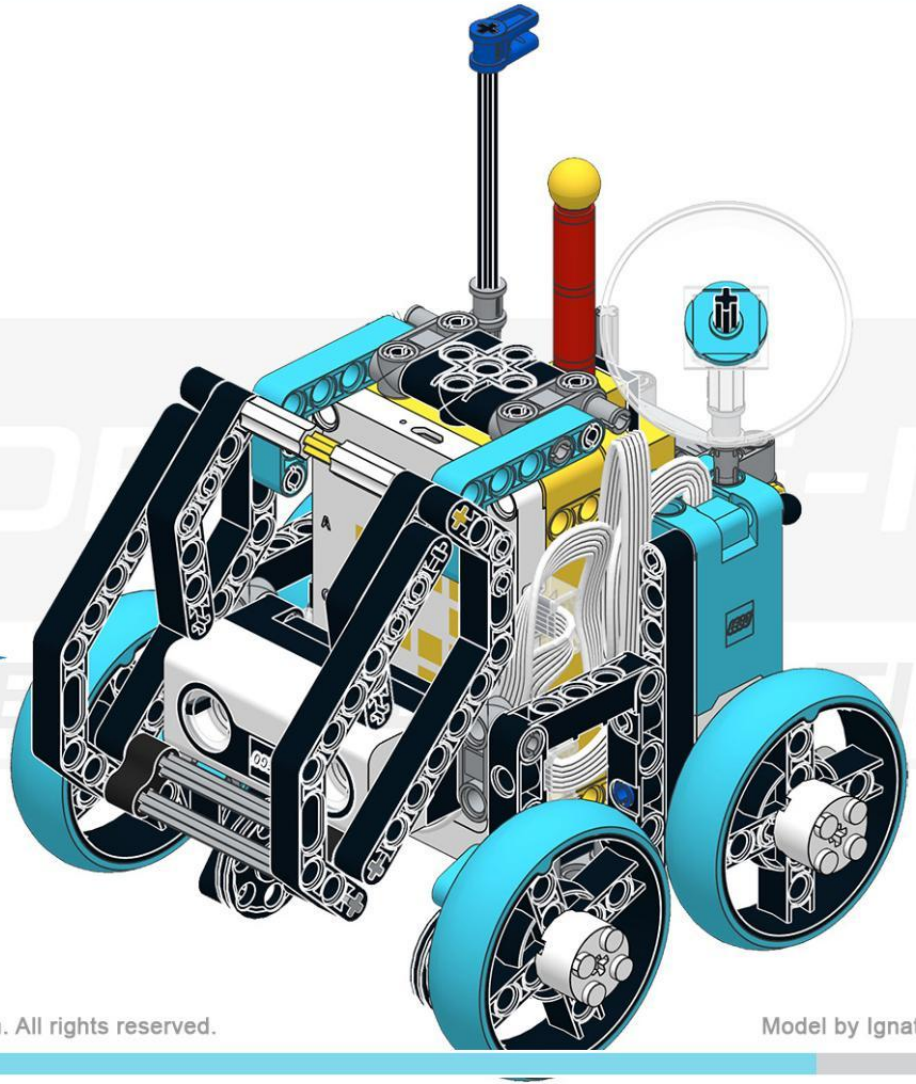
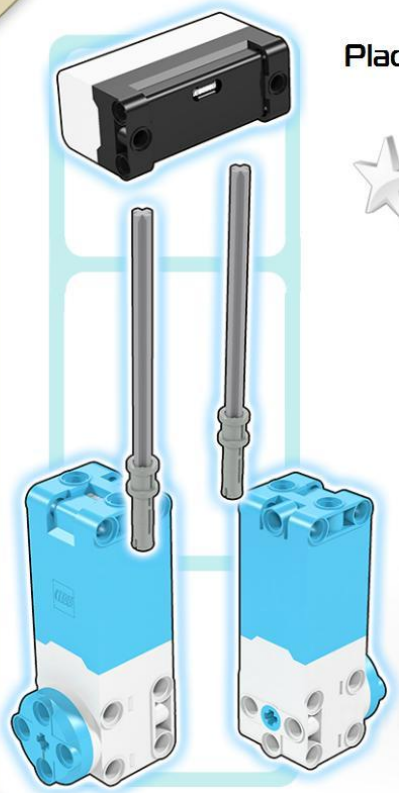


Model by Ignat Khliebnikov

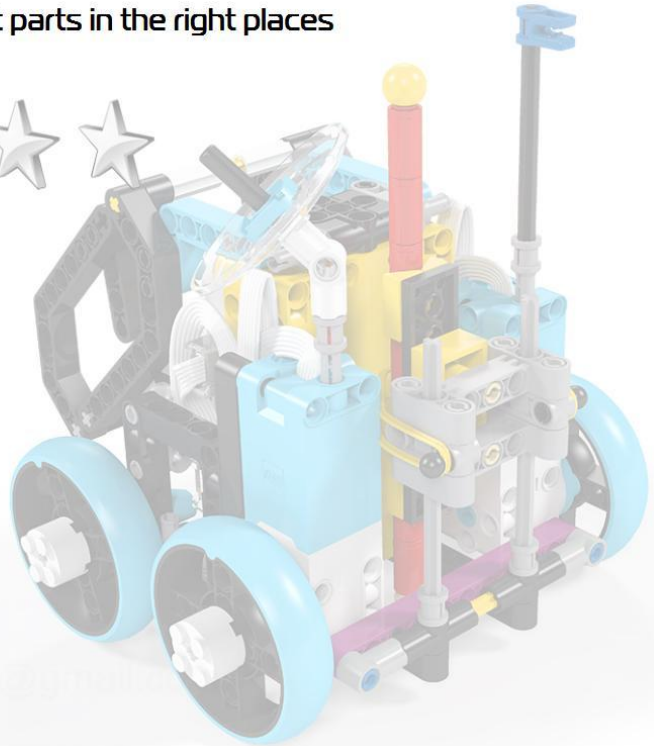
Check it out!

During the movement of the robot, the wires should not be rubbed!

Task



Place the robot parts in the right places



Task 1

Program the activation of the robot after detecting motion in front of it.
Use an ultrasonic distance sensor for this.

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Task 1. Program

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Algorithm | Program

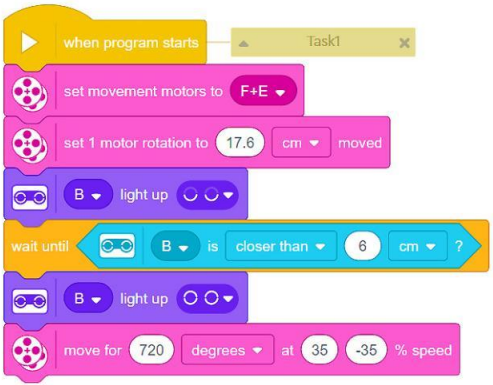
Write a test program. Set the activation distance at which the robot will work stably.

1. Set the motors for movement and the travel distance of one turn
2. Turn on the backlight of the ultrasonic distance sensor
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Perform motion to confirm detection

Task 1. Program

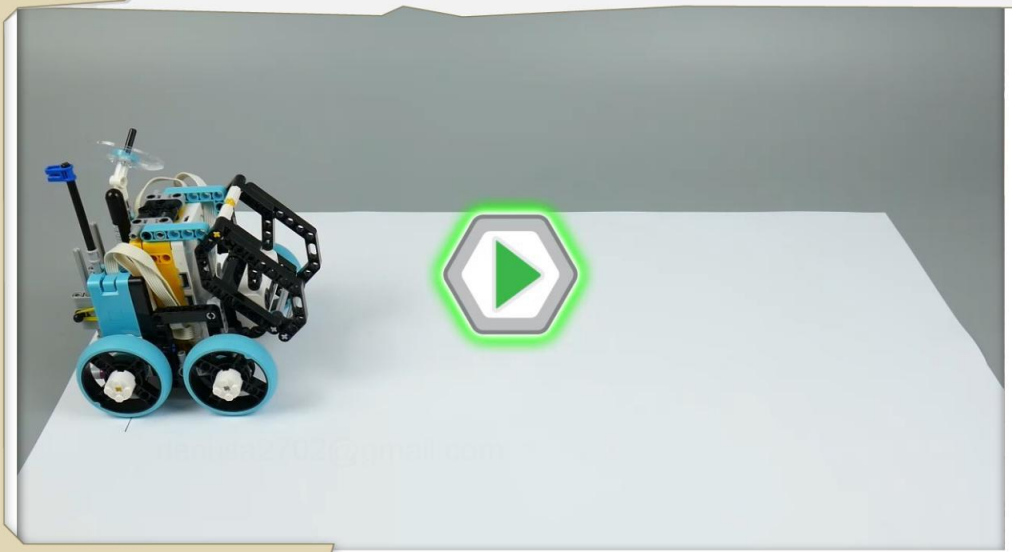
Algorithm | Program

Write a test program. Set the activation distance at which the robot will work stably.



Task 2

Write a program to drive a robot 12 centimeters. Set the marker, start the robot and measure the length of the line drawn by the robot.



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Task 2. Program

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Algorithm | Program

Write the following program.

1. Set the motors for movement and the travel distance of one turn
2. Turn on the backlight of the ultrasonic distance sensor
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Run a 12 cm drive

Task 2. Program

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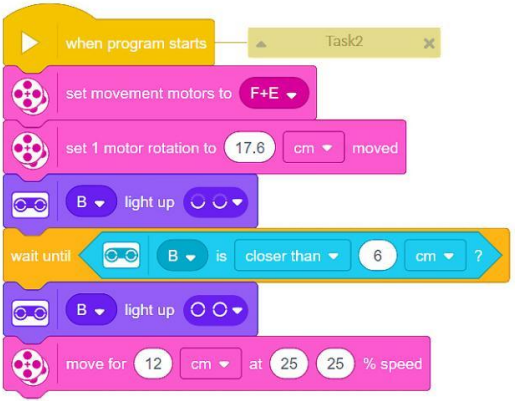
Algorithm | Program

Write the following program.



Task 3

Write a program to perform a precise 90 degree right turn. The robot's wheels can slip, so use the Smarthub's gyroscope to control the rotation angle.

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Task 3. Program

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Algorithm | Program

Write the following application. To rotate, create a separate block with a duration setting. This will make it much easier to set up and use.

1. Set the motors for movement and the travel distance of one revolution
2. Turn on the backlight of the ultrasonic distance sensor
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Run a 12 cm drive

Task 3. Program

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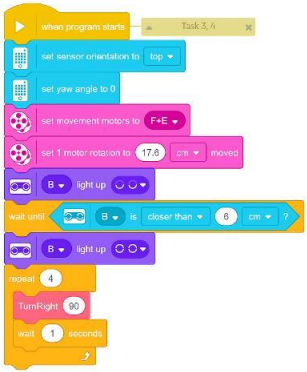
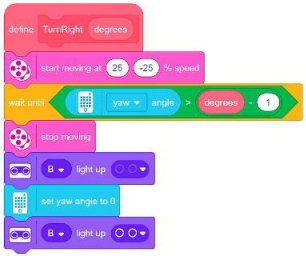
Algorithm | Program

Write the following application. To rotate, create a separate block with a duration setting. This will make it much easier to set up and use.





Task 4

You may have noticed that the robot turns to a larger angle than programmed. This is due to the inertia of the robot and the low speed of the program. Turning accuracy can be improved by slowing down the movement speed while turning.

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Task 4. Program

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Algorithm | Program

Change the turn speed:

1. Set the motors for movement and the travel distance of one turn
2. Turn on the backlight of the ultrasonic distance sensor
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Run a 12 cm drive

Task 4. Program

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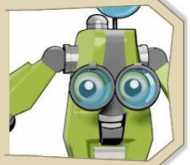
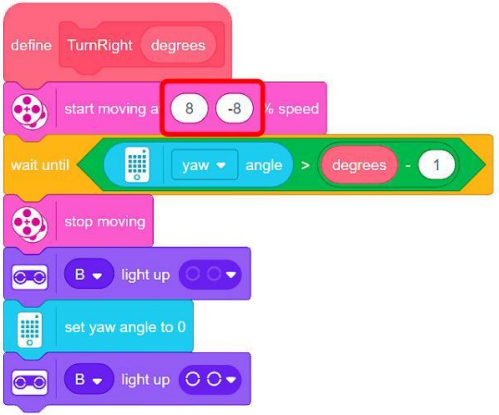
Algorithm | Program

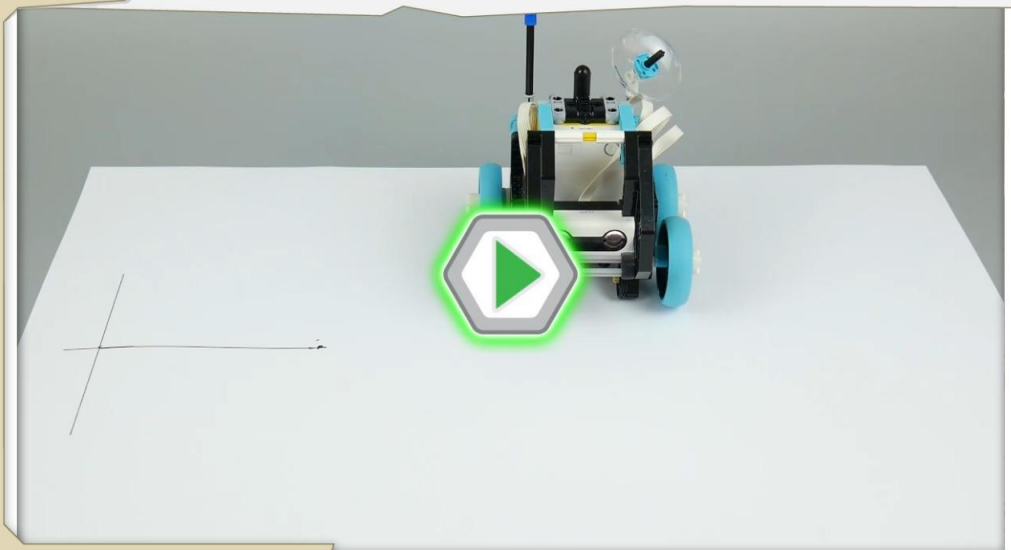


Change the turn speed:



Task 5

For a final test of the robot's accuracy, program the robot to move in a square. It must return to its starting point. If it doesn't, change the turn speed.



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Task 5. Program

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Algorithm | Program

Write and test the following program:

1. Set gyroscope orientation and set current direction to '0'
2. Set the motors for movement and turn on the sensor backlight
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Run a 12 cm drive
6. Run a turn

Repeat 4 times

Task 5. Program

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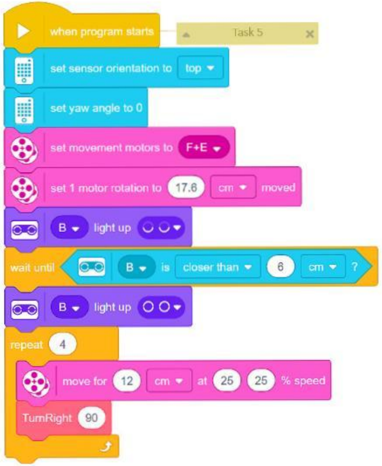
Algorithm | Program

Write and test the following program:



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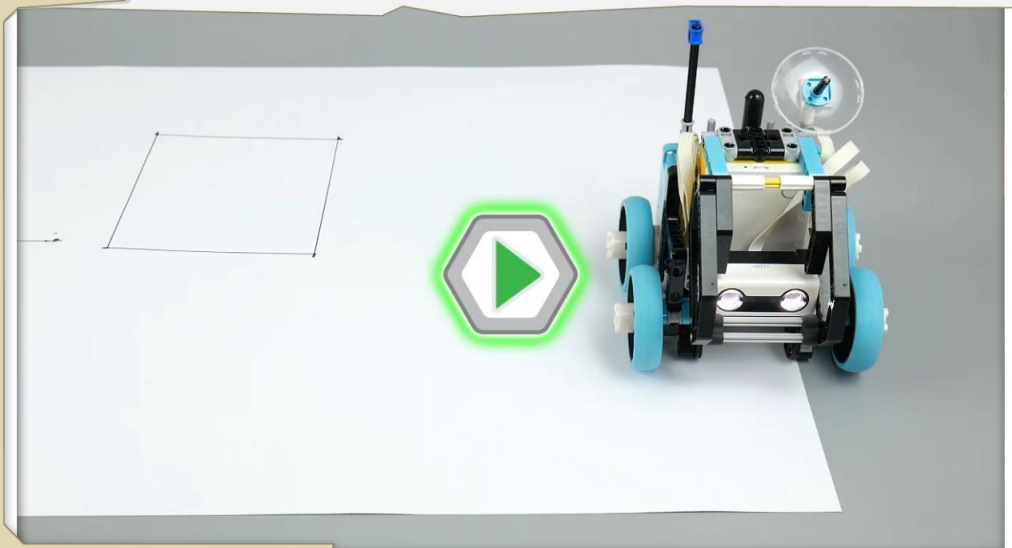
Task 6

Program the laying of magnetic markings around the first quarter of the Mars base. The robot starts moving in the middle of the long side of a rectangle with sides 20 cm and 24 cm.



Task 6. Program

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Algorithm | Program

Write and test the following program:

1. Set gyroscope orientation and set current direction to '0'
2. Set the motors for movement and turn on the sensor backlight
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Run a rectangle

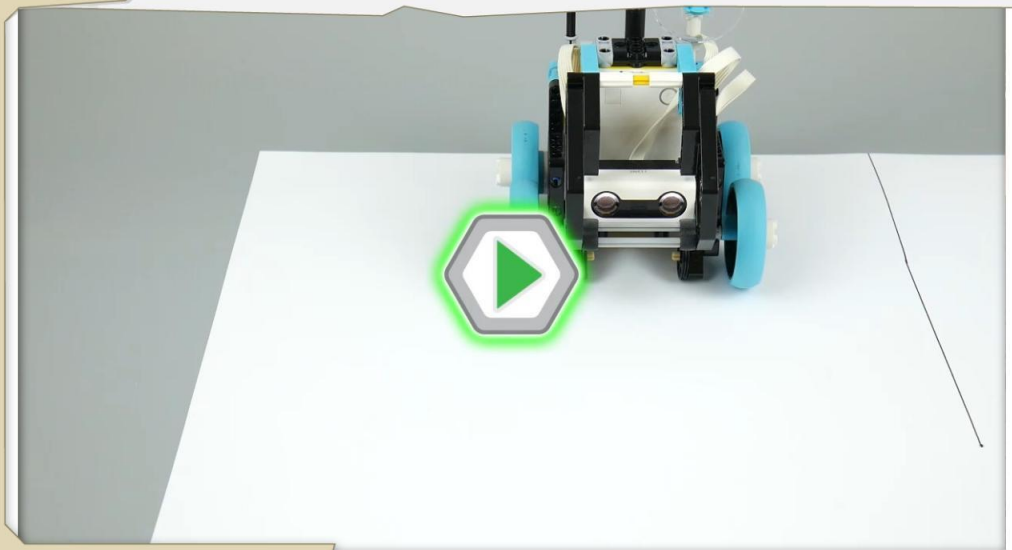
Task 6. Program

Algorithm | Program

Write and test the following program:

Task 7

Program the laying of magnetic markings on additional landing sites for ships. Use a 120 degree turn for this.



Task 7. Program

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Algorithm | Program

Write and test the following program:

1. Set gyroscope orientation and set current direction to '0'
2. Set the motors for movement and turn on the sensor backlight
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Run 15 cm
6. Perform a 120 degree turn
7. Run 15 cm

Task 7. Program

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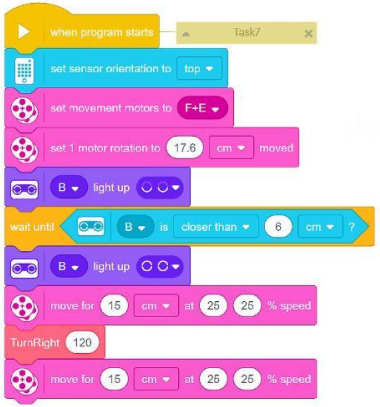
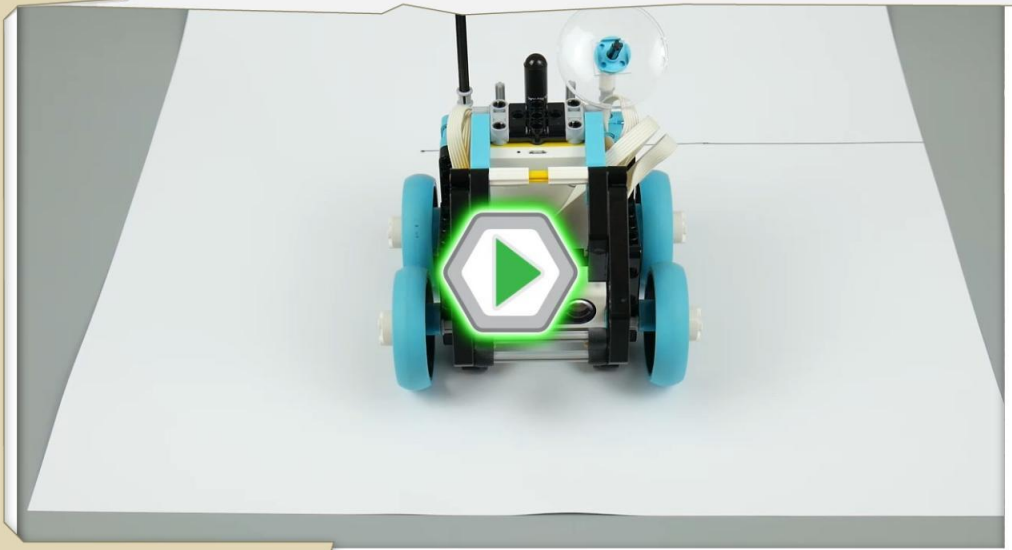
Algorithm | Program

Write and test the following program:



Task 8*

Program a delineation around the landing pads. To do this, use a turn with different capacities of the left and right wheels.



Task 8*. Program

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Algorithm | Program

Write and test the following program:

1. Set gyroscope orientation and set current direction to '0'
2. Set the motors for movement and turn on the sensor backlight
3. Wait for detection of distance less than limit
4. Change the backlight of the ultrasonic distance sensor
5. Start a roundabout
6. Wait for the gyroscope values to cross the 180 degree limit and return to its original position
7. Stop moving

Task 8*. Program

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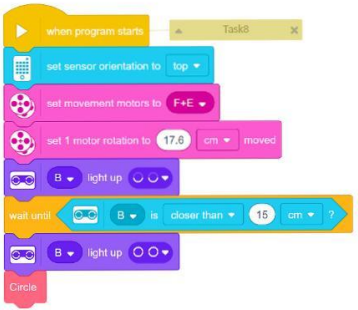
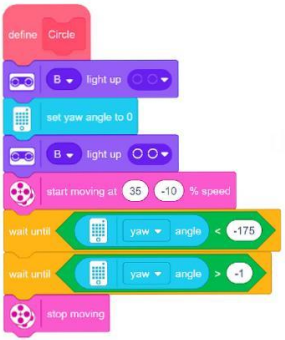
Algorithm | Program

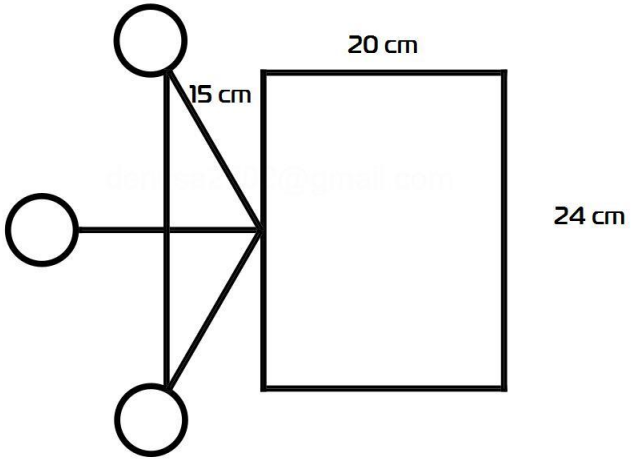
Write and test the following program:





Task 9*

Draw the markings of the first colony on Mars!



Discuss!

- Why is building a colony on Mars a good idea?
- What difficulties will the inhabitants of the colony face?

- What task did today's robot perform?
- What sensors were used to complete the task and why?
- Why can't motor encoders be used to make precise turns on Mars?

- How did you manage to achieve high accuracy of turns?

Your achievements

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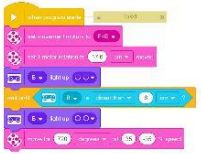
Total: 0

1

2

3



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