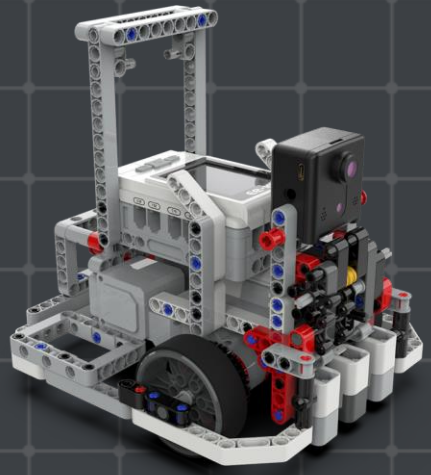


Lesson 20 | Smart Trash Bin |

Key points from this lesson:

1. Understand the servo control function of the motor

2. Learn to use the servo control function to write simple programs

Possible difficulties from this lesson:

1. Learn to adjust the waiting time according to the speed and angle of servo control

2. Understand the difference between servo control and ordinary control

Smart Trash Bin

As people's living standards improve, trash cans have become smarter. Generally, smart trash cans have the function of opening the cover by reaching out, instead of opening it manually or stepping on it, which makes it more convenient for us to throw away garbage.

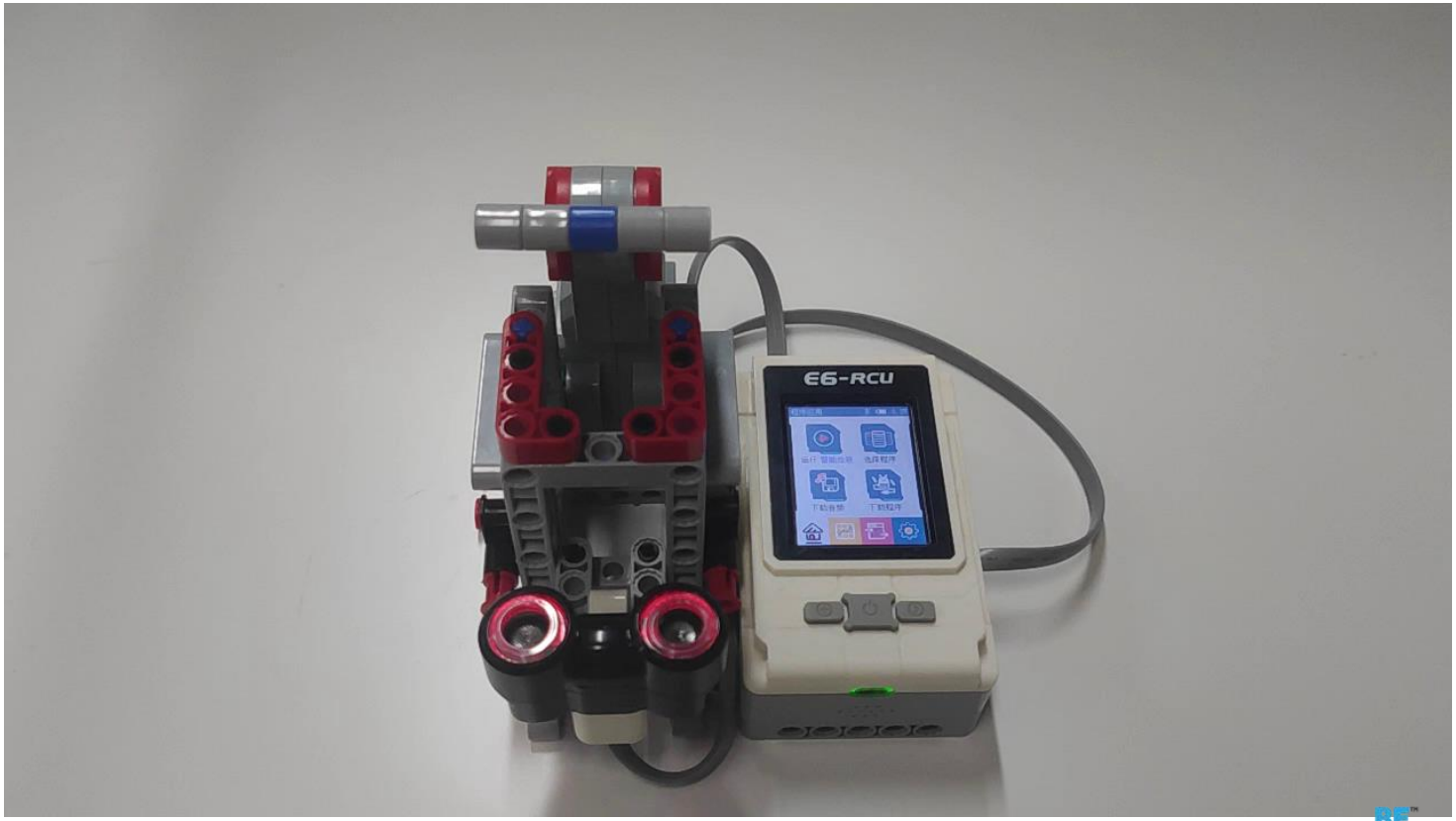


The principle of opening covers via induction



There is an infrared sensor inside the smart trash bin. When an object approaches the trash bin, the infrared sensor will detect the object, thereby driving the motor to rotate the cover and realize the automatic flip function. In addition, some induction trash bins use sound or gravity sensing to perform automatic sensing.

Effect Demonstration



Project Tasks

Design a smart trash can model and control it using an ultrasonic sensor and the left button of the controller.

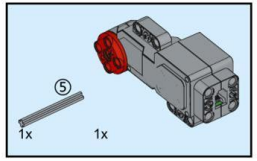
Requirements for robot functions:

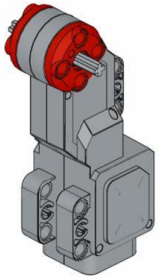
1. When your palm approaches the trash can, the cover will automatically open and close after a while.

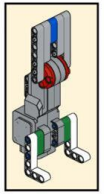
2. After pressing the left button, the cover will open quickly and close after a while (a longer time).

Build a robot

1







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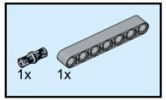
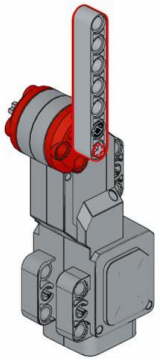
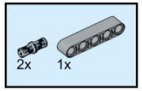
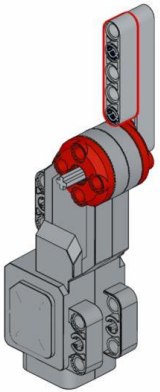




Build a robot

3





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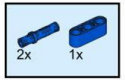
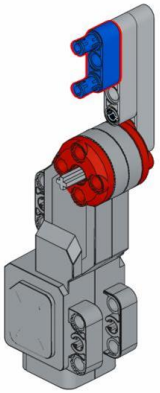
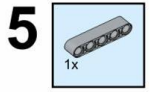
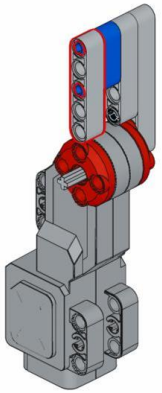




Build a robot

5





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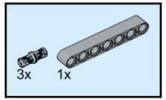
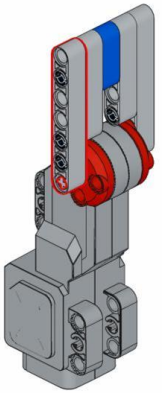
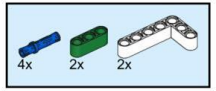
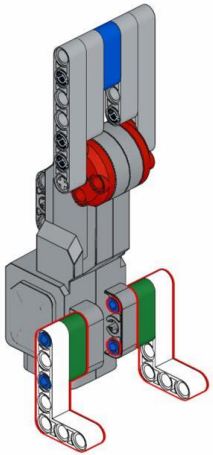




Build a robot

7





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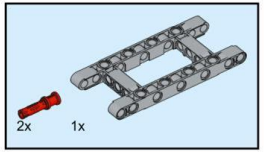
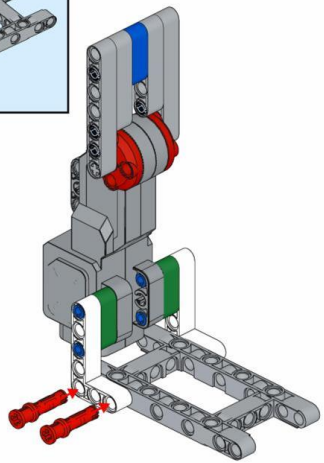
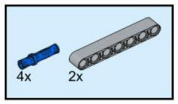
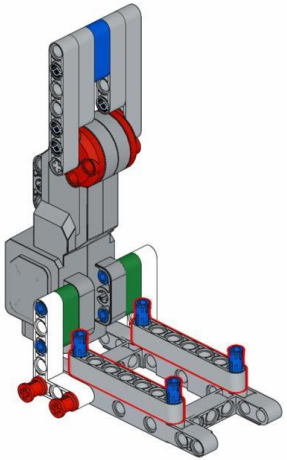




Build a robot

9





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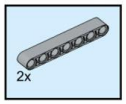
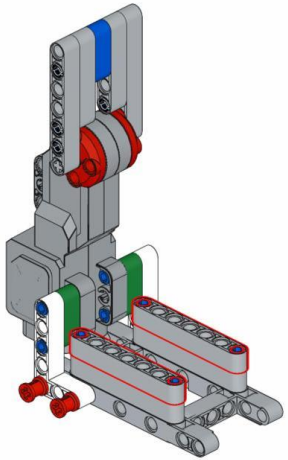
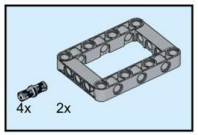
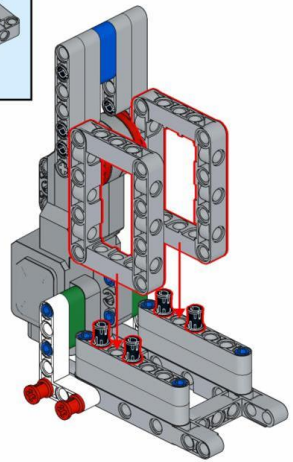




Build a robot

11





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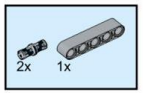
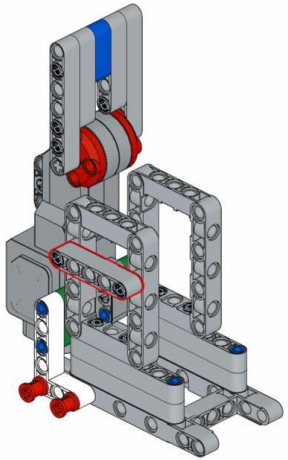


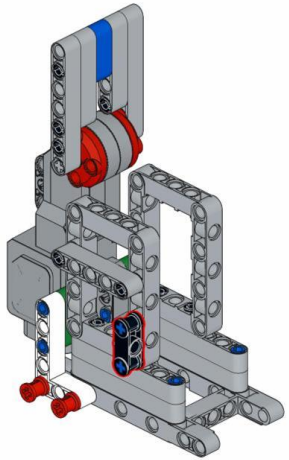


Install the box

Build a robot

13





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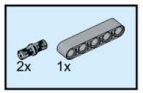
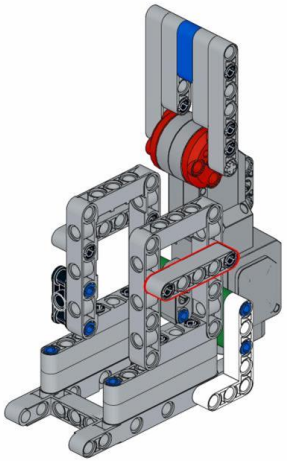


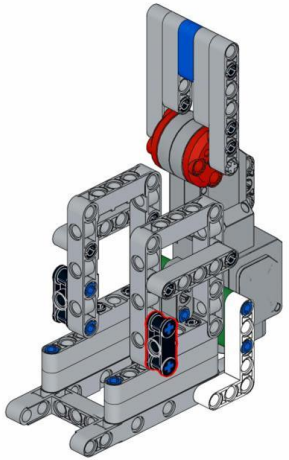


Install the box

Build a robot

15





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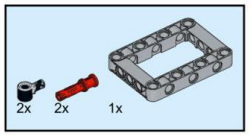
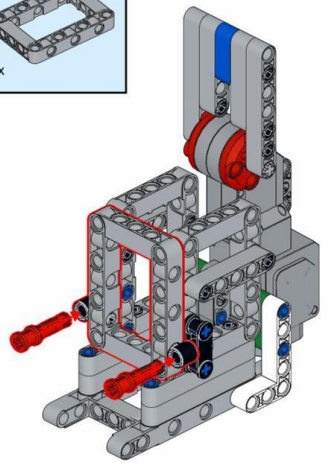
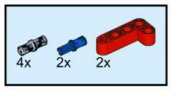
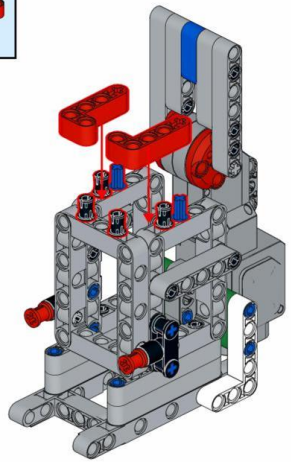




Build a robot

17





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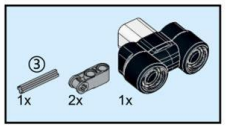
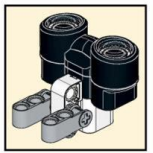
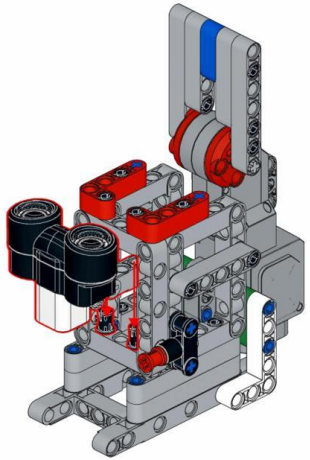






Build a robot

19 2x



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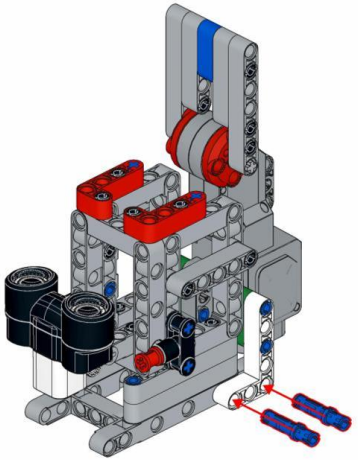
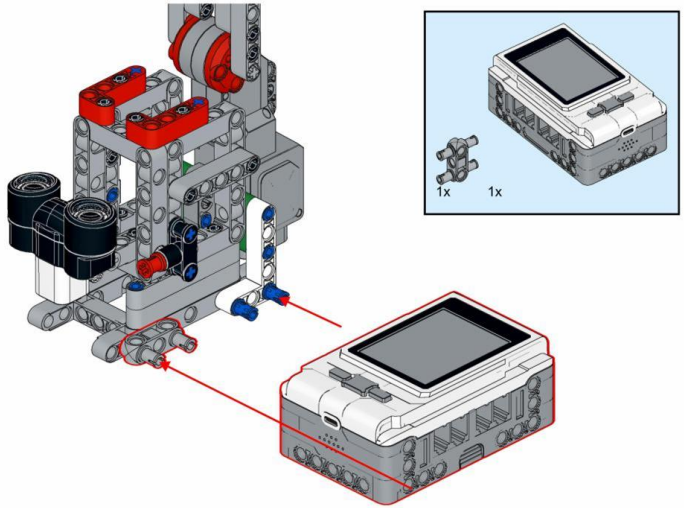


Install the ultrasonic sensor

Build a robot

21



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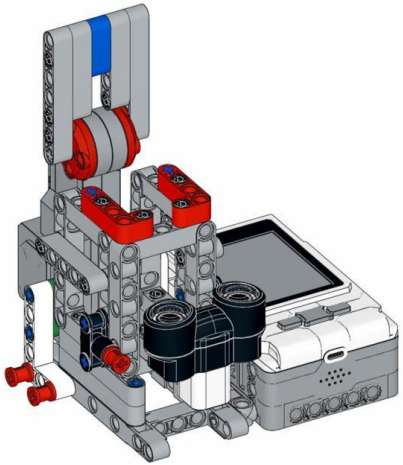
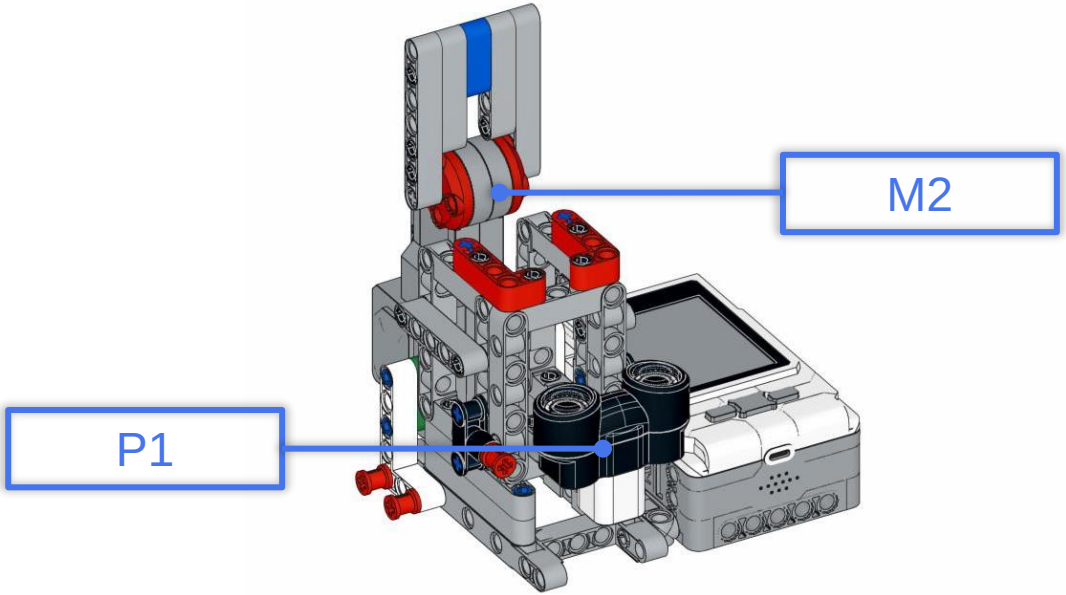


Install the controller

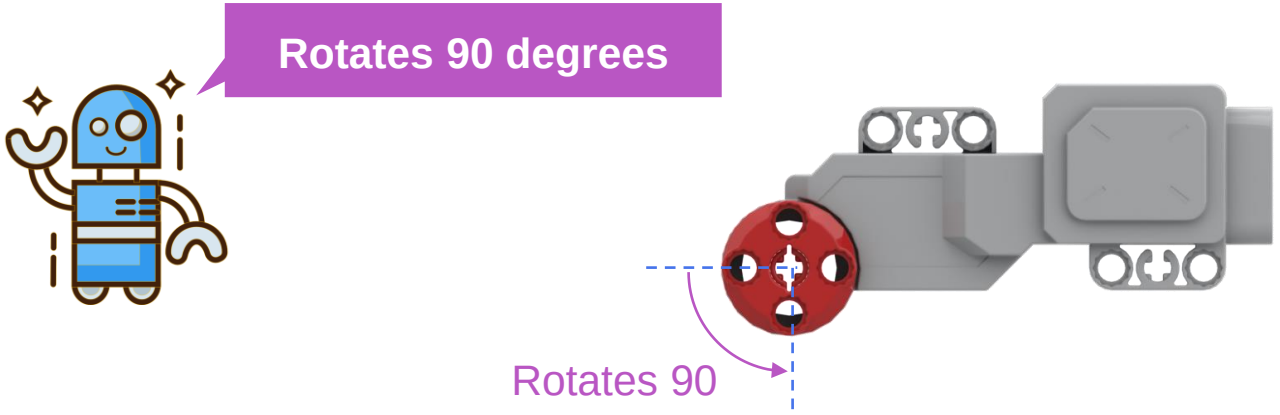
Hardware Connection



How do we achieve the required functions?

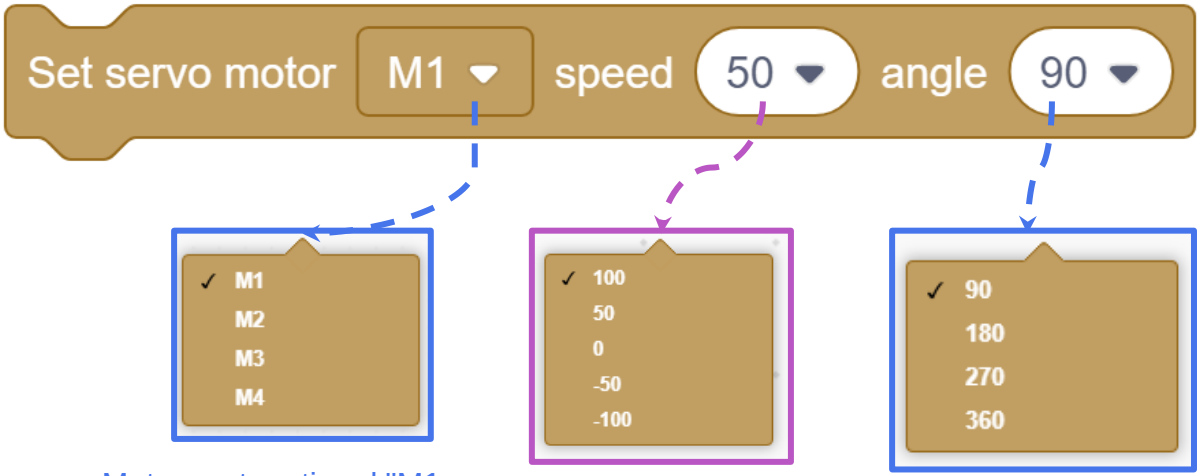
Servo Control Function of Motor

The word "servo" comes from the Greek word "servus", which means a control system that acts completely according to instructions. The servo function of a motor can be used to control the rotation speed and angle of the motor.



Coding block - set servo motor

This module can make the motor rotate at a specified speed and a specified angle.

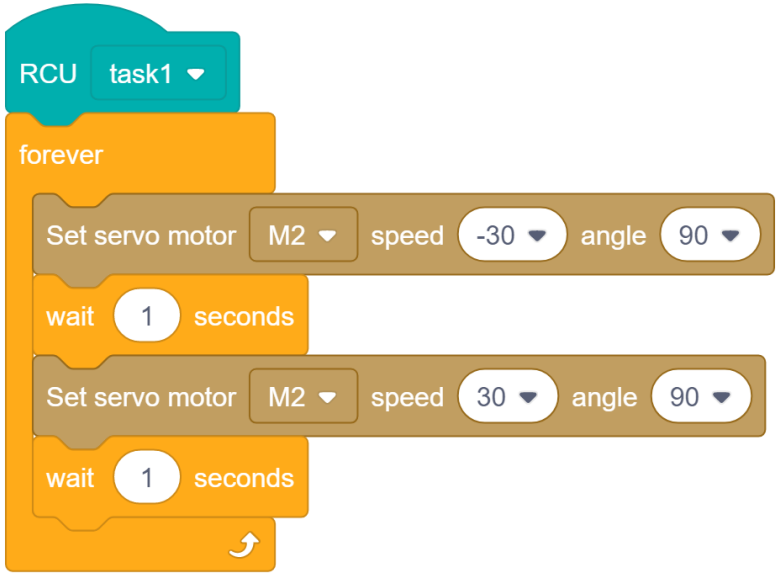


Motor port, optional "M1-M4"

Motor speed, range: “-100~100”, “±” represents direction

The angle of motor rotation, value range: 0~3600

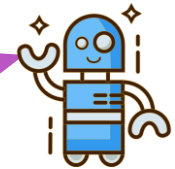
The motor rotates 90 degrees back and forth



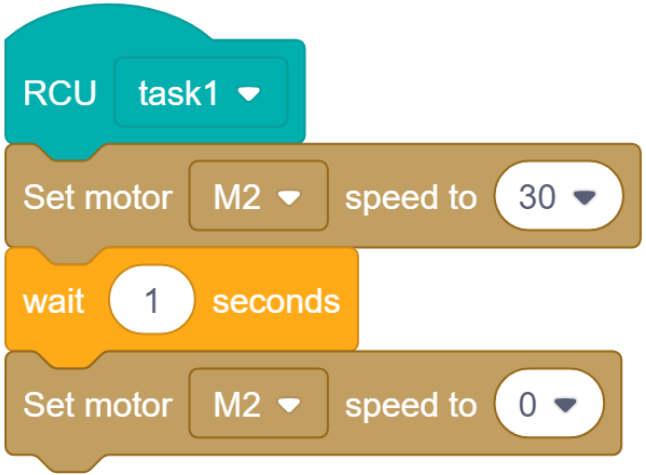
We first let the motor rotate 90 degrees counterclockwise, and then 90 degrees clockwise.

Note that you need to add a waiting time (greater than or equal to the duration of the rotation) to continue controlling the motor after the motor rotates the specified angle.

Download the program and run the test.

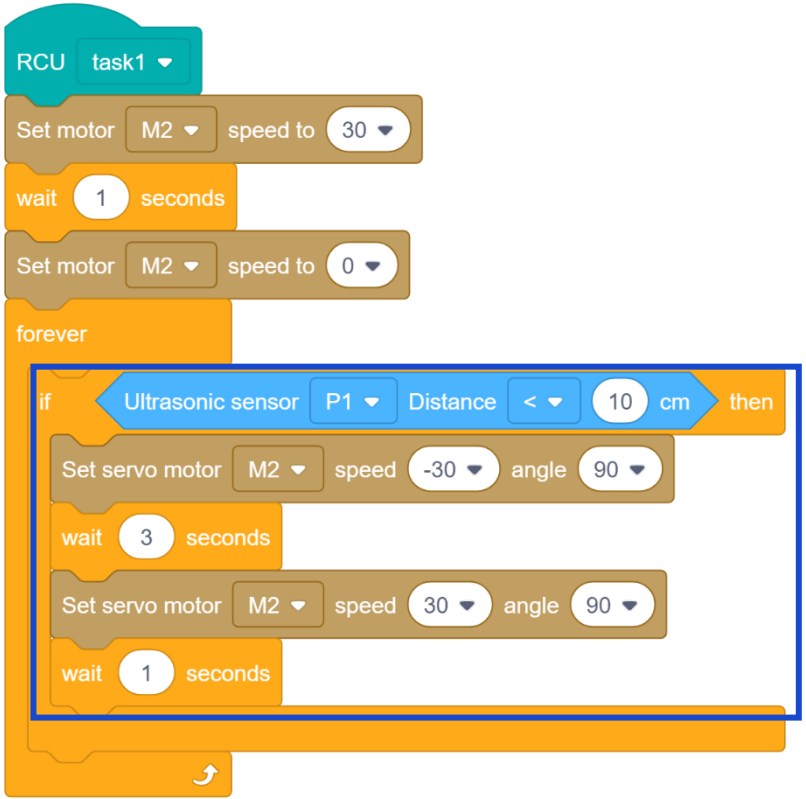


1. Close the cover first



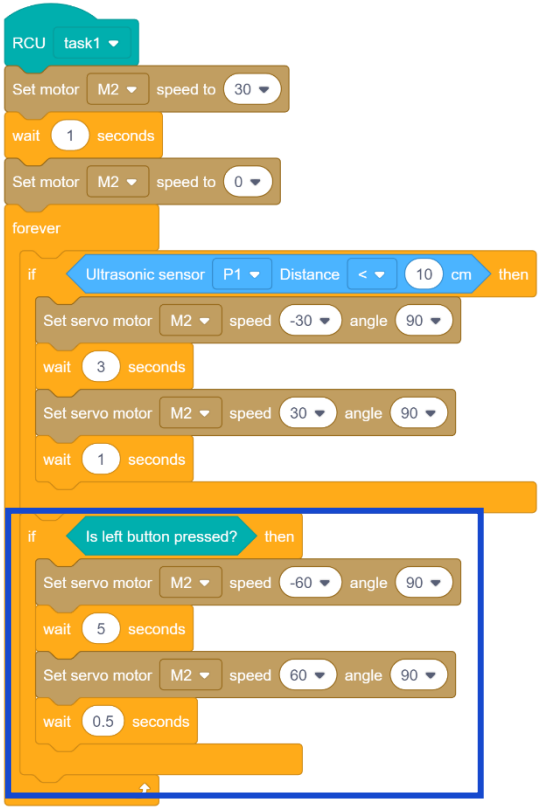
The program starts with the cover closed.

2. Opening the cover with the ultrasonic sensor's sensing function



If the ultrasonic sensor senses an object approaching, it opens the cover and closes it after 3 seconds.

3. Press the left button to open the cover



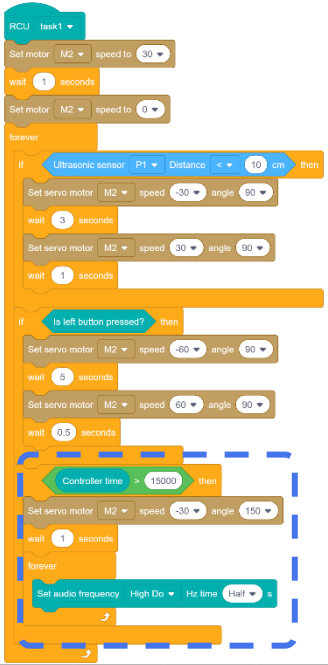
When you press the left button, the cover opens quickly and closes after 5 seconds.

Expansion Tasks

Add a regular reminder function to clean up garbage



Expansion Program



If the controller time is greater than 15 seconds, open the cover at a larger angle, and then the buzzer will continue to sound until the controller is restarted.

Quiz

Single-choice question

Regarding servo control, the following description is incorrect ( )

A. It can control the rotation speed and angle of the motor

B. It is a function of the motor

C. The rotation angle can be negative

D. It is often used to accurately control the rotation position of the component

Answer: C

Further Reading



Servo control is of great significance in improving production efficiency, enhancing product quality, realizing intelligent manufacturing, improving energy utilization efficiency and improving working conditions.

Improve precision and efficiency: Servo control can accurately control the position, speed and acceleration of mechanical parts, which helps to achieve high-precision and high-efficiency production processes, thereby enhancing product quality.

Further Reading



Realize automation and intelligent manufacturing: Servo control can be combined with other technologies, such as computer technology, sensors and the Internet of Things, to realize the automation and intelligence of mechanical systems and improve production efficiency and quality.

Energy saving and emission reduction: Servo control can reduce energy waste, help save energy and reduce emissions, and reduce corporate operating costs.

Improve working conditions: Servo control can reduce manual operations, avoid harm to workers in harsh environments, and improve production safety.

Thanks!