



Stop At the Black Line



Target

- Learn how to use the grayscale sensor for black line detection.
- Master the task of using the grayscale sensor to complete line-following tasks.
- Become proficient in the requirements for detecting black lines with the sensor.

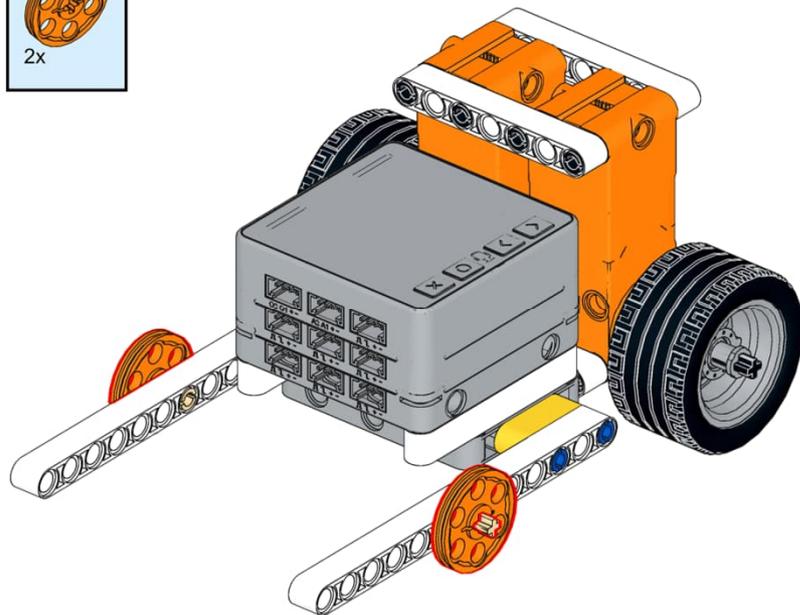
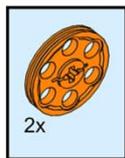


01 Task



Assembly

23

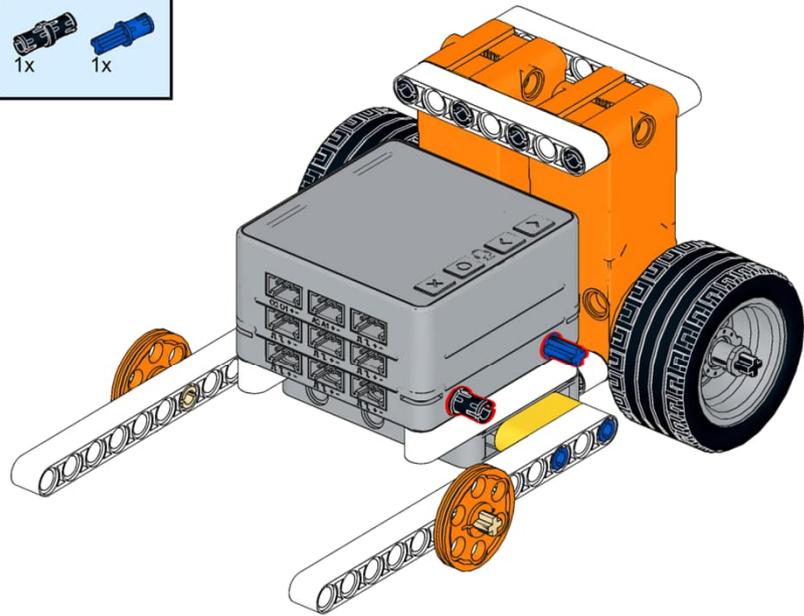
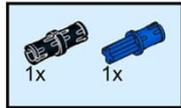


See Lesson 1
for complete
instructions



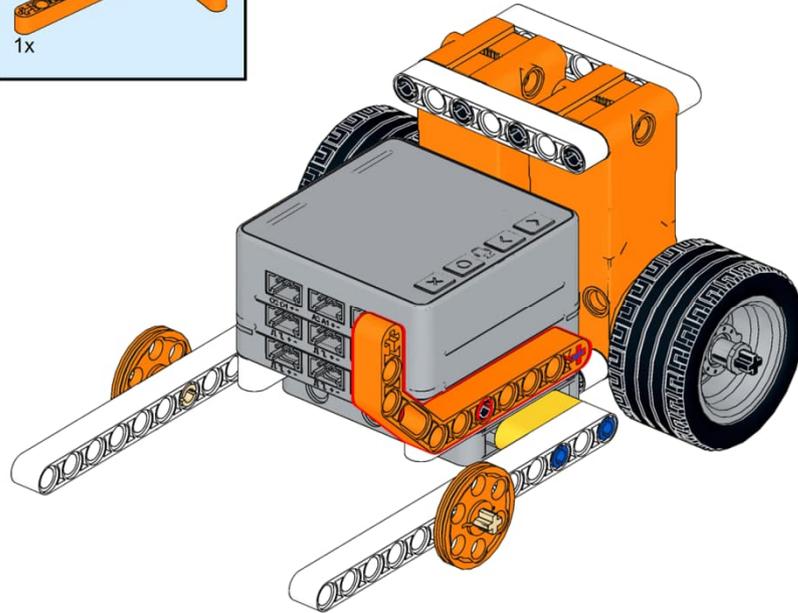
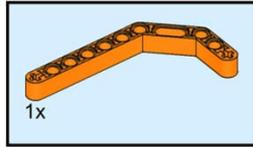
Assembly

24



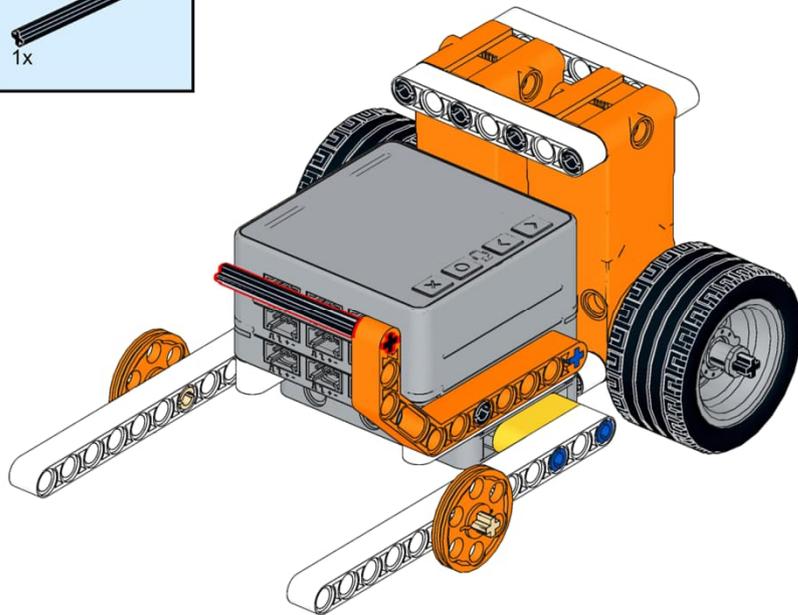
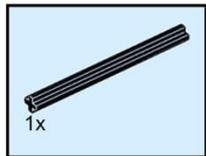
Assembly

25



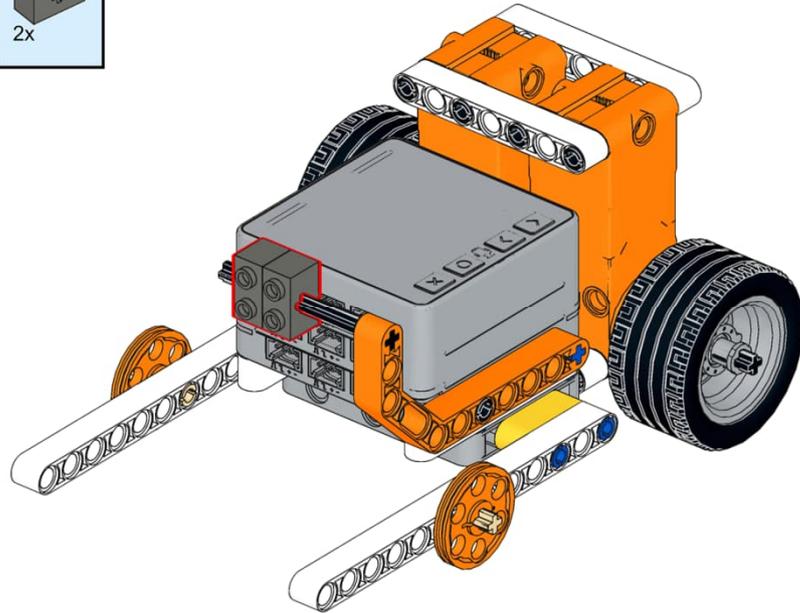
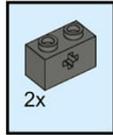
Assembly

26



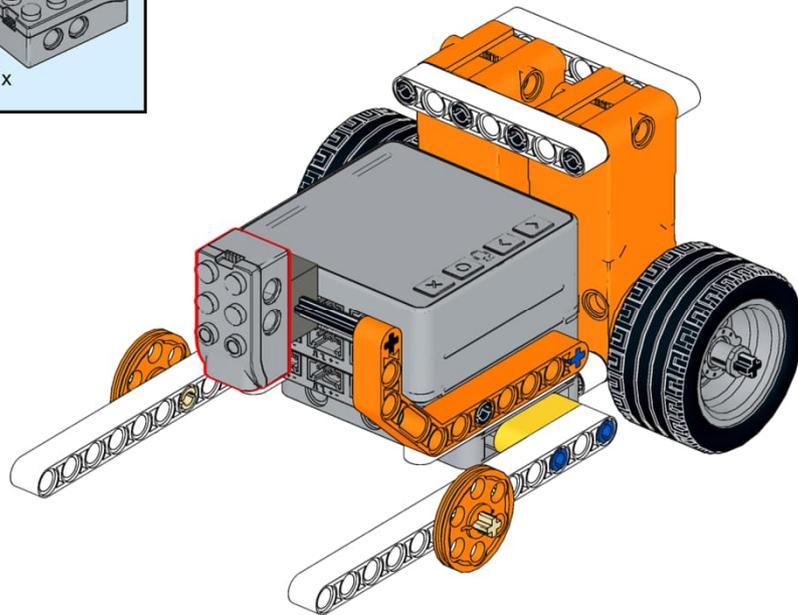
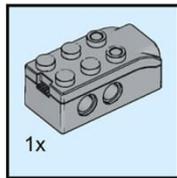
Assembly

27



Assembly

28





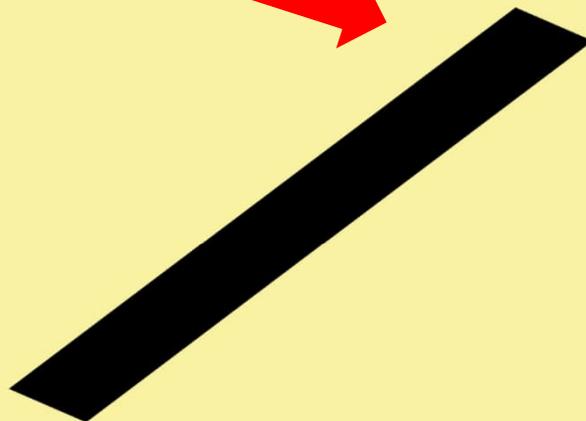
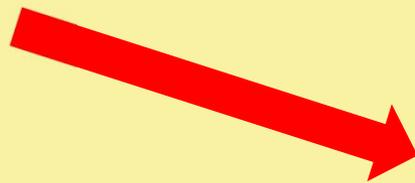
02 Task





Task

- **Task 1: Stop when the Grayscale Sensor Detects a Black Line**

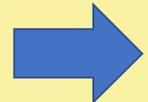
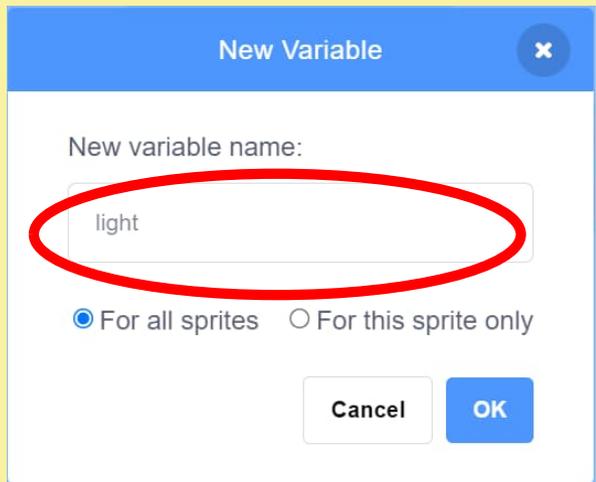
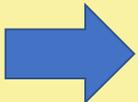
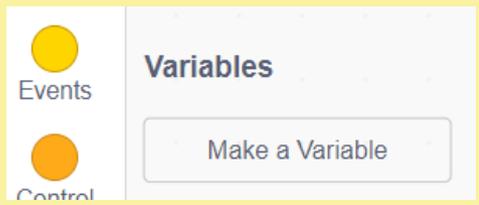




Coding Technique 1

Using Variables and Viewing Sensor Values

Note: Variable names should use only English letters.

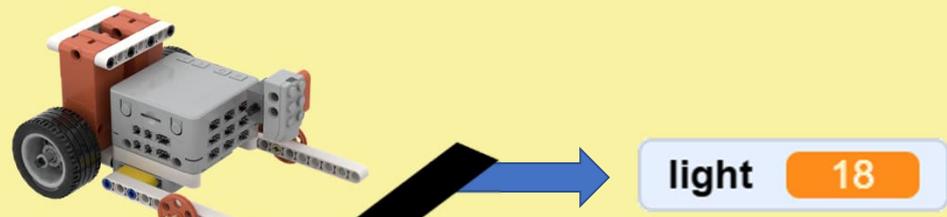




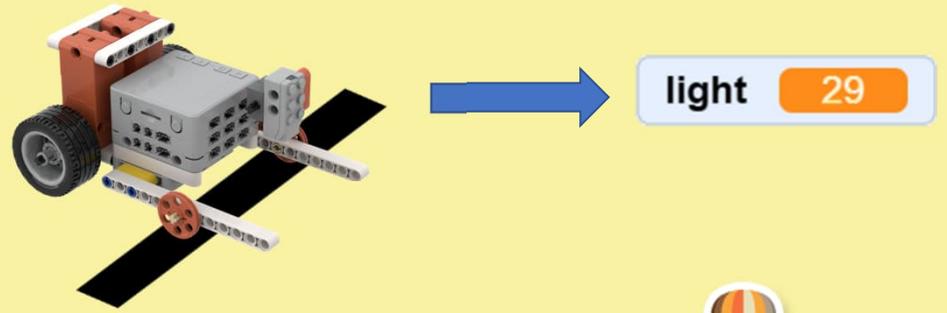
Coding Technique 1

Using Variables and Viewing Sensor Values

```
when green flag clicked
  forever loop
    set light sensor to single channel line tracker 1# 's value
```



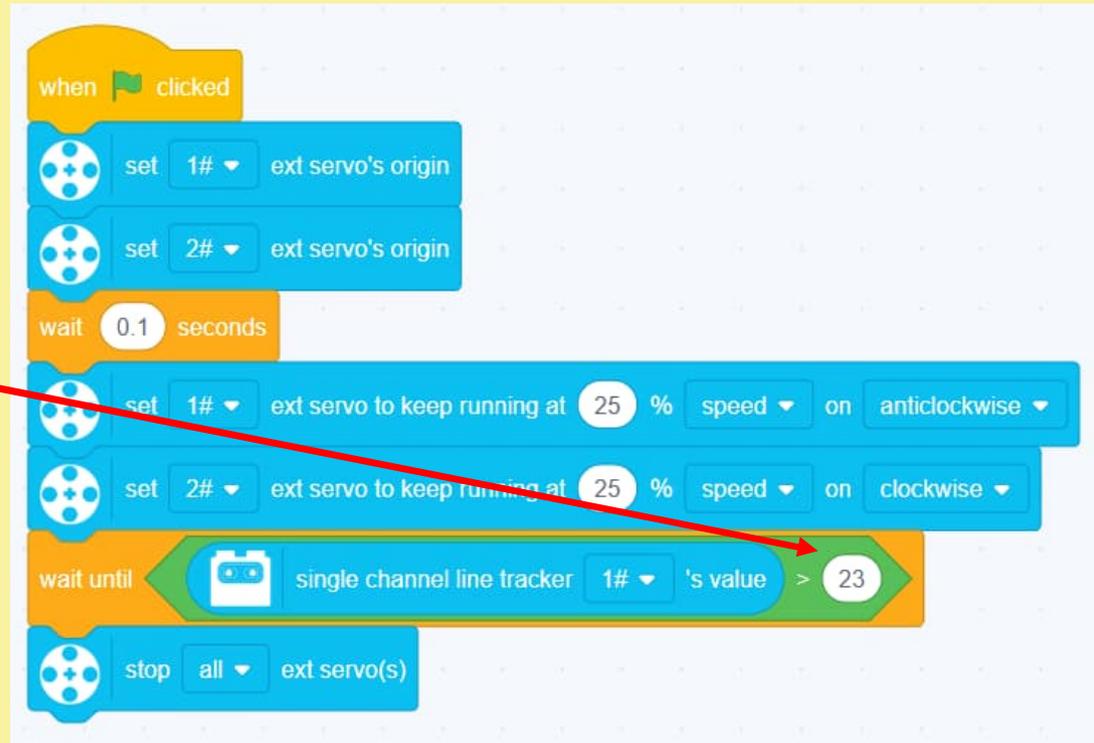
Pay close attention to the difference between **detecting the black line** and not detecting it.



Task

Referrable Program

$$\text{Threshold} = \frac{(\text{black line value} + \text{white value})}{2}$$



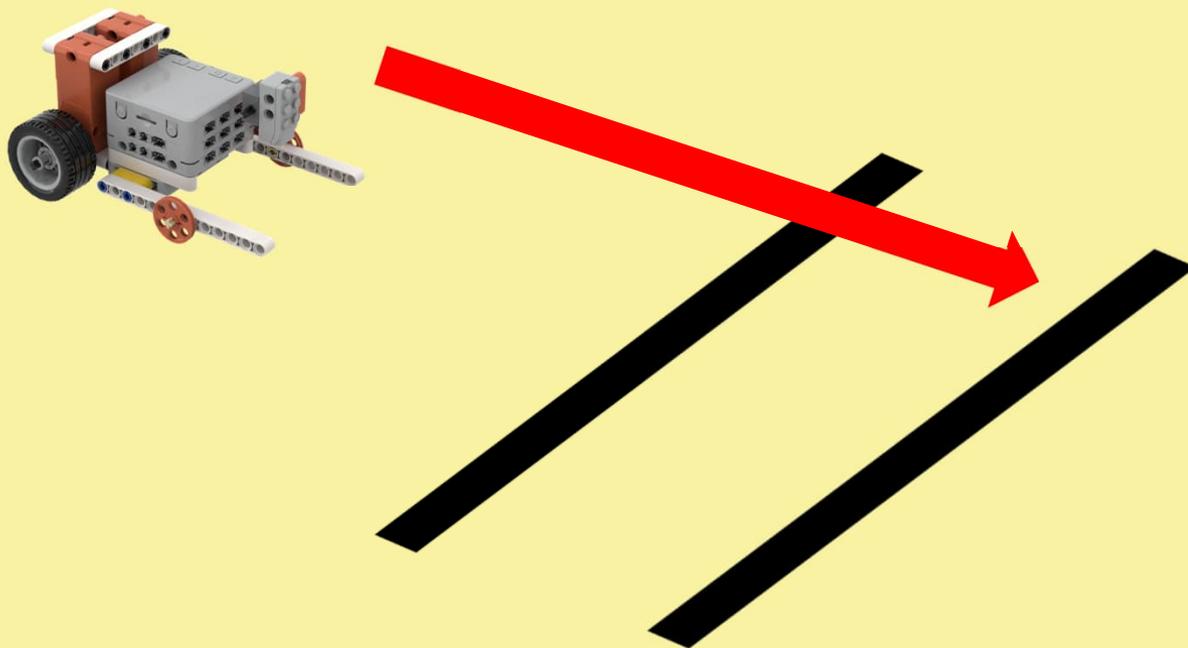
```
when green flag clicked
  set 1# ext servo's origin
  set 2# ext servo's origin
  wait 0.1 seconds
  set 1# ext servo to keep running at 25 % speed on anticlockwise
  set 2# ext servo to keep running at 25 % speed on clockwise
  wait until single channel line tracker 1# 's value > 23
  stop all ext servo(s)
```

The code block for 'wait until' is highlighted in orange, and a red arrow points from the equation above to the value '23' in the block.



Task

Task 2: Complete the Task of Stopping at the Second Black Line

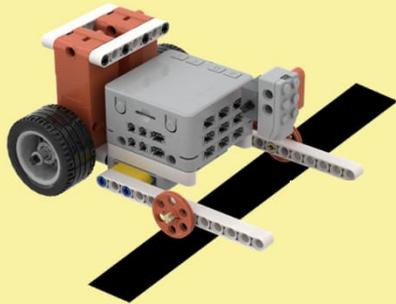


Coding Technique 2

The line-following task should involve two steps to be completed in one go.

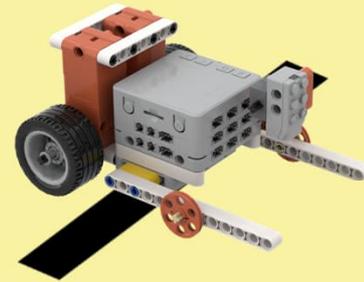
light 29

Detect the black line



light 18

Leave the black line



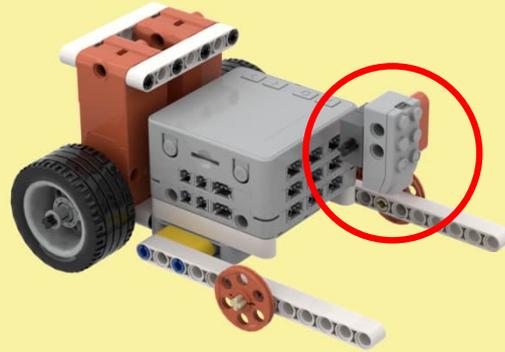
Task

Referrable Program

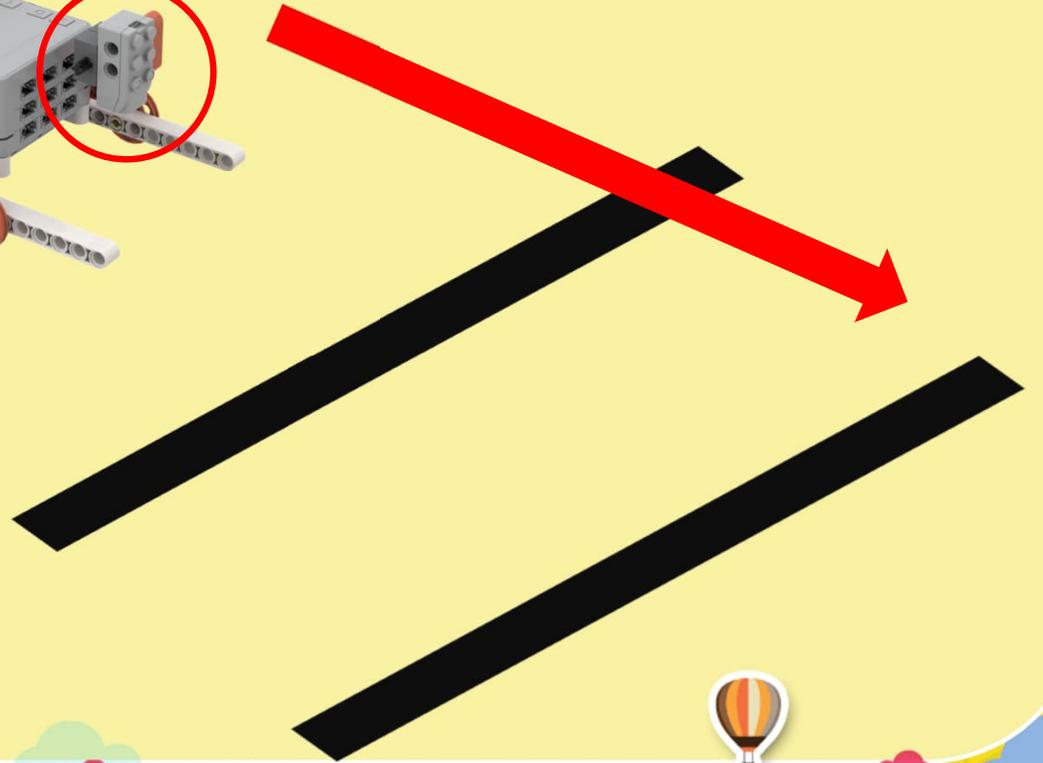
The box outlines the criteria for completing a single line-following task.

```
when clicked clicked
set 1# ext servo's origin
set 2# ext servo's origin
wait 0.1 seconds
set 1# ext servo to keep running at 30 % speed on anticlockwise
set 2# ext servo to keep running at 30 % speed on clockwise
wait until single channel line tracker 1# 's value > 25
wait 0.3 seconds
wait until single channel line tracker 1# 's value < 22
wait 0.3 seconds
wait until single channel line tracker 1# 's value > 25
wait 0.3 seconds
stop all ext servo(s)
```

Additional Task



Use the color sensor **in** reflection mode to complete the task of stopping at the second black line.



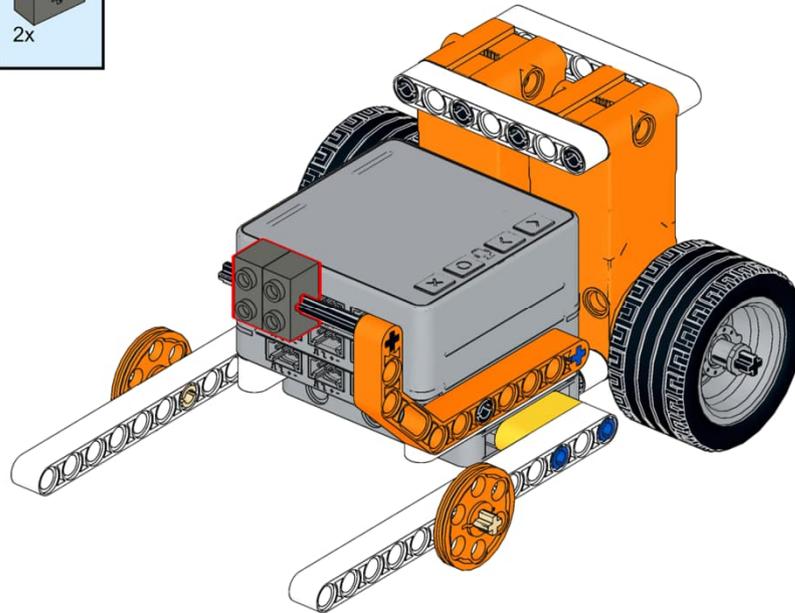
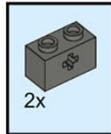


03 Assembly



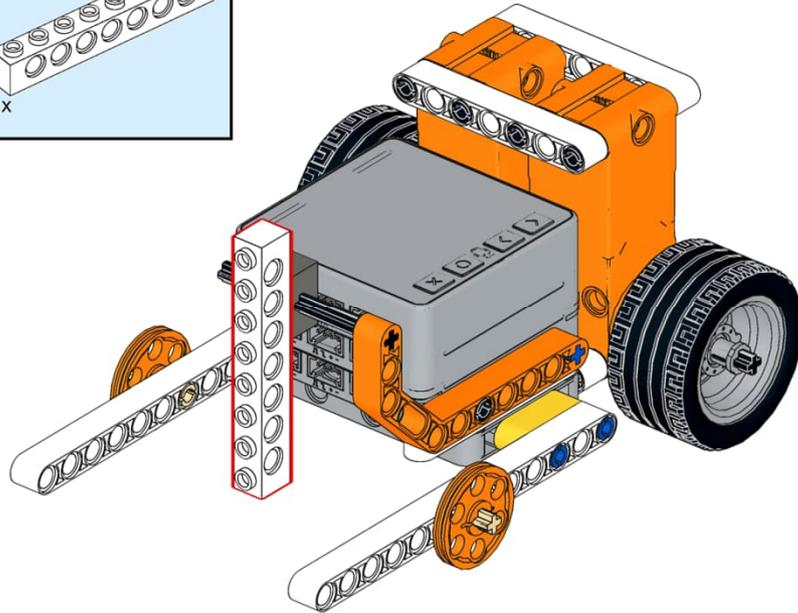
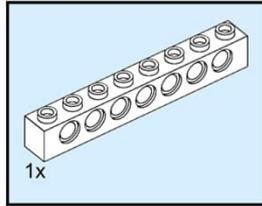
Additional Structure Assembly

27



Additional Structure Assembly

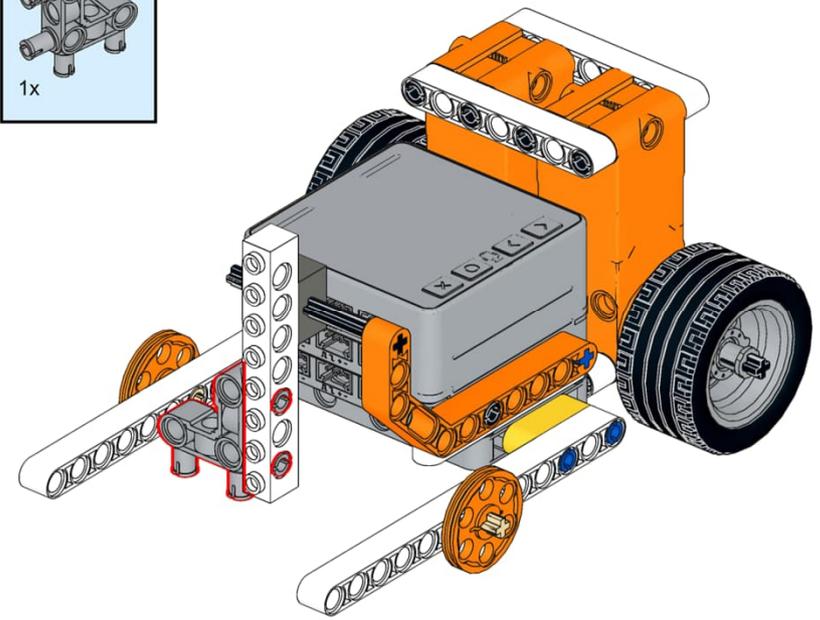
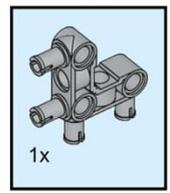
28



Additional Structure Assembly



29



Additional Structure Assembly



30

