



Microbit Robotics Beginner Level 2

Lesson 5

UFO catcher

Presented by Advanced Superlogic Team

Today's Topic

- 1. Build UFO catcher with World of Modules**
- 2. Rocker and variables programming**
- 3. Servo programming**

Learning Outcome

- 1. Able to build UFO Catcher with instruction manual**
- 2. Understand Rocker and variables programming**
- 3. Understand Servo programming work**
- 4. Able to program UFO catcher**

Lets build UFO catcher

Step 1

The diagram illustrates the assembly of two white Technic beams. A blue callout box in the top-left corner shows a black pin with the quantity 'x4' and a white Technic connector with the quantity 'x2'. The main assembly area shows two white Technic beams, one on the left and one on the right. Four black pins are positioned to connect the beams: two are already inserted into the top holes of both beams, and two are shown below, ready to be inserted into the bottom holes. Two white Technic connectors are positioned between the beams, ready to be attached to the top and bottom holes of both beams.

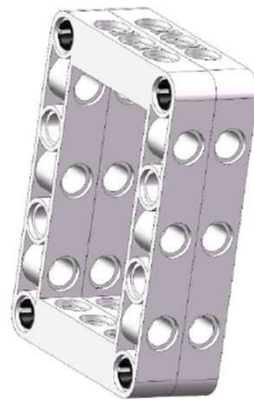
754

Step 2



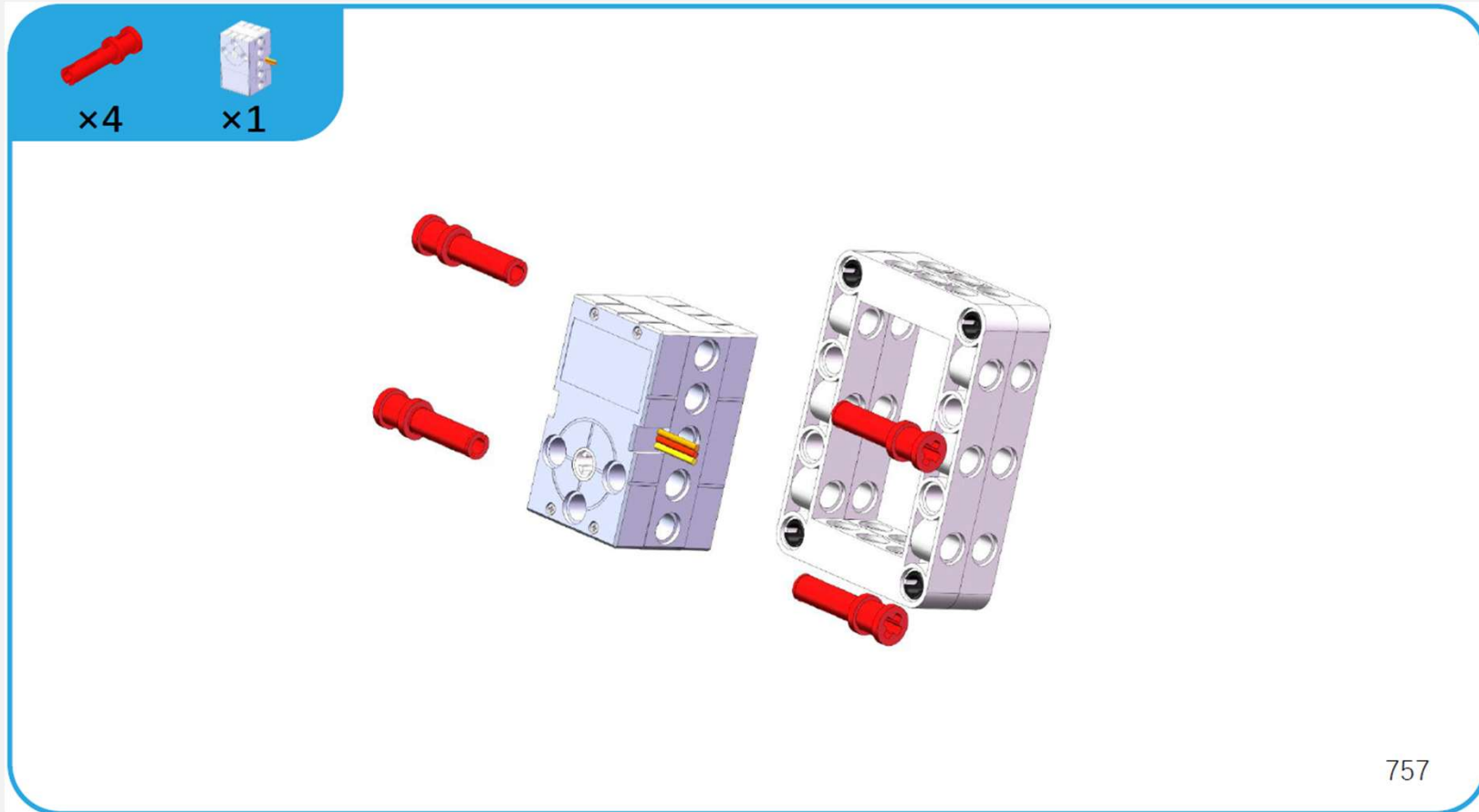
755

Step 3



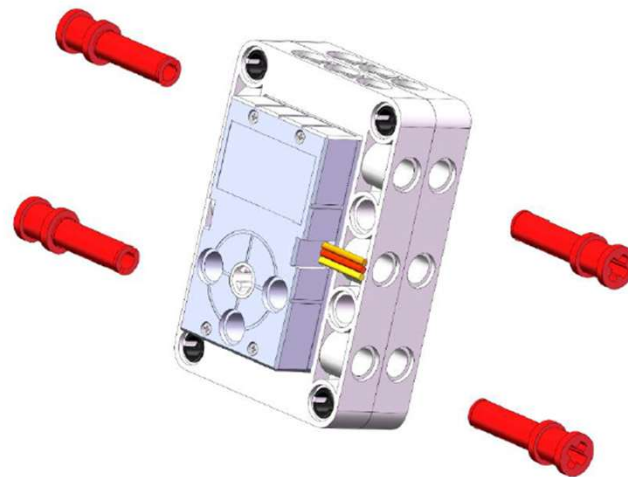
756

Step 4



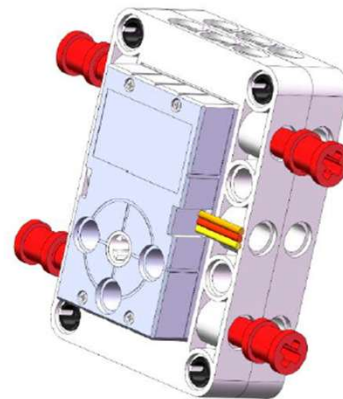
757

Step 5



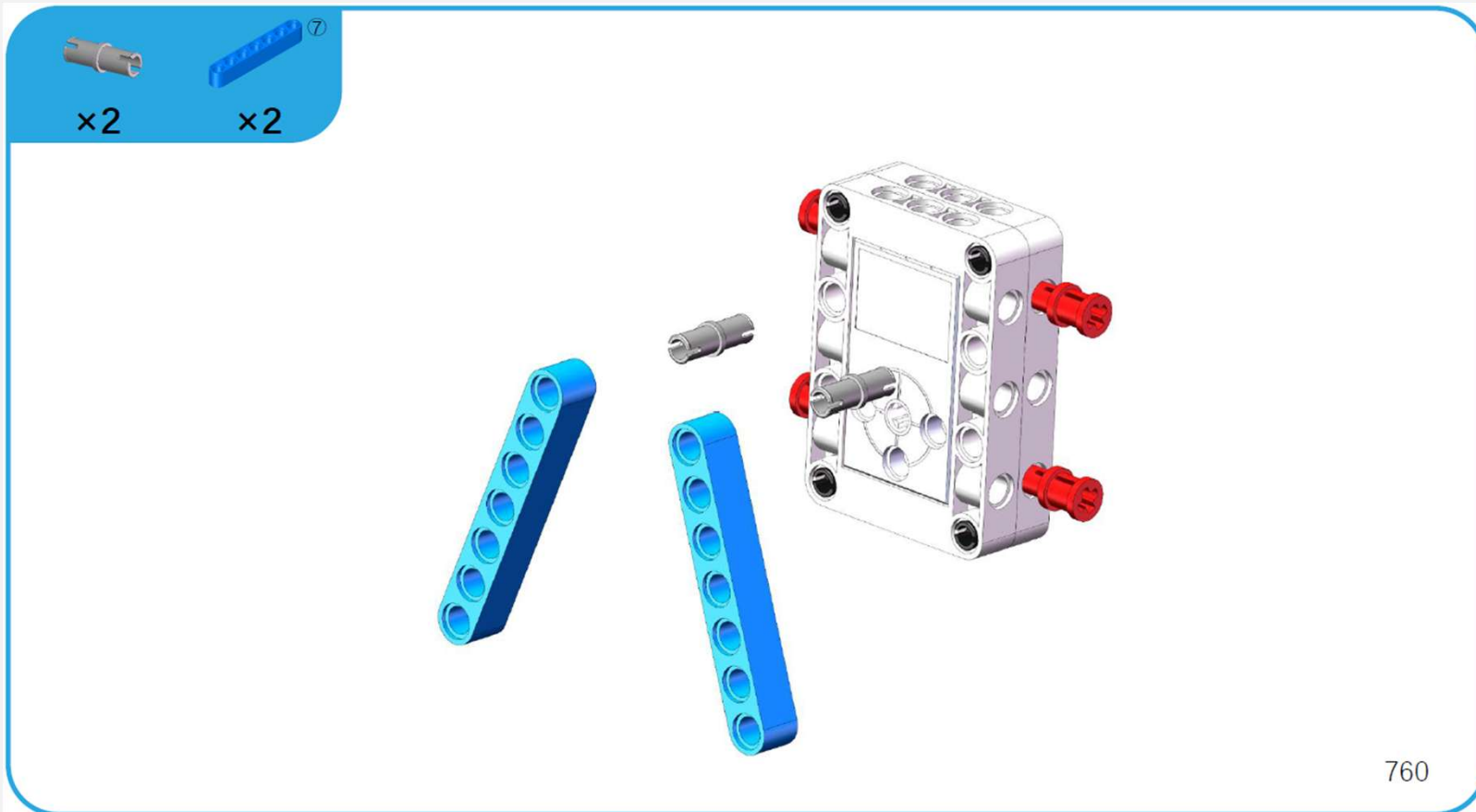
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Step 6

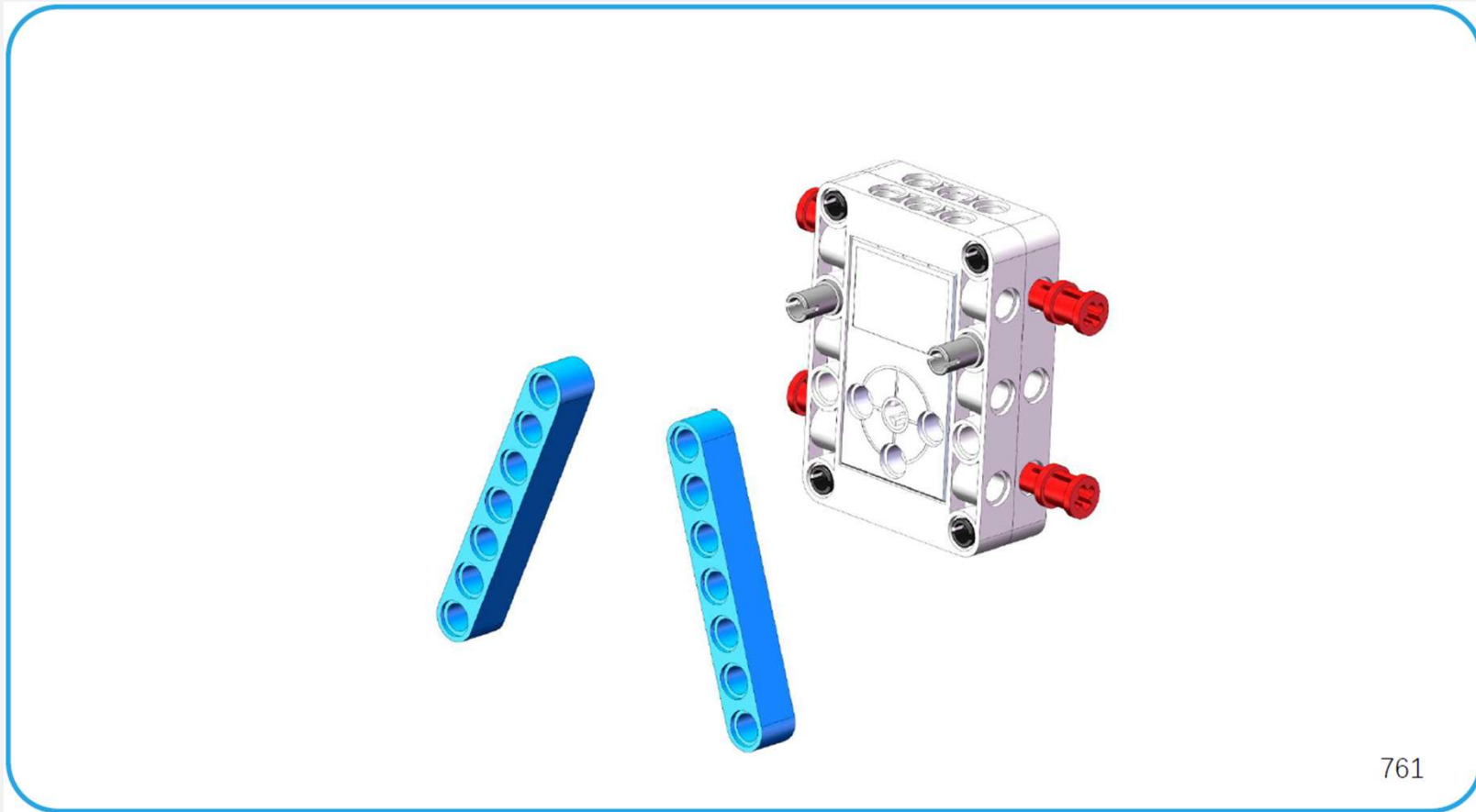


759

Step 7

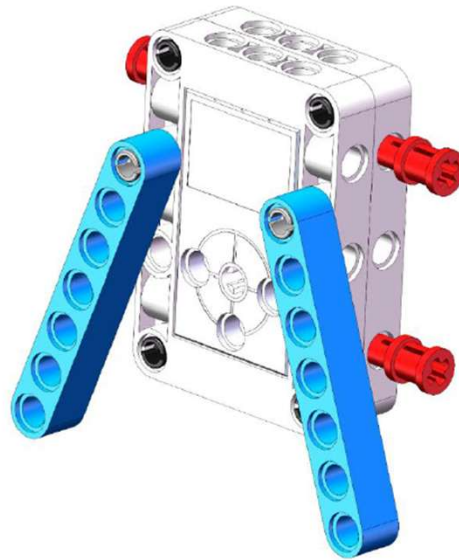


Step 8



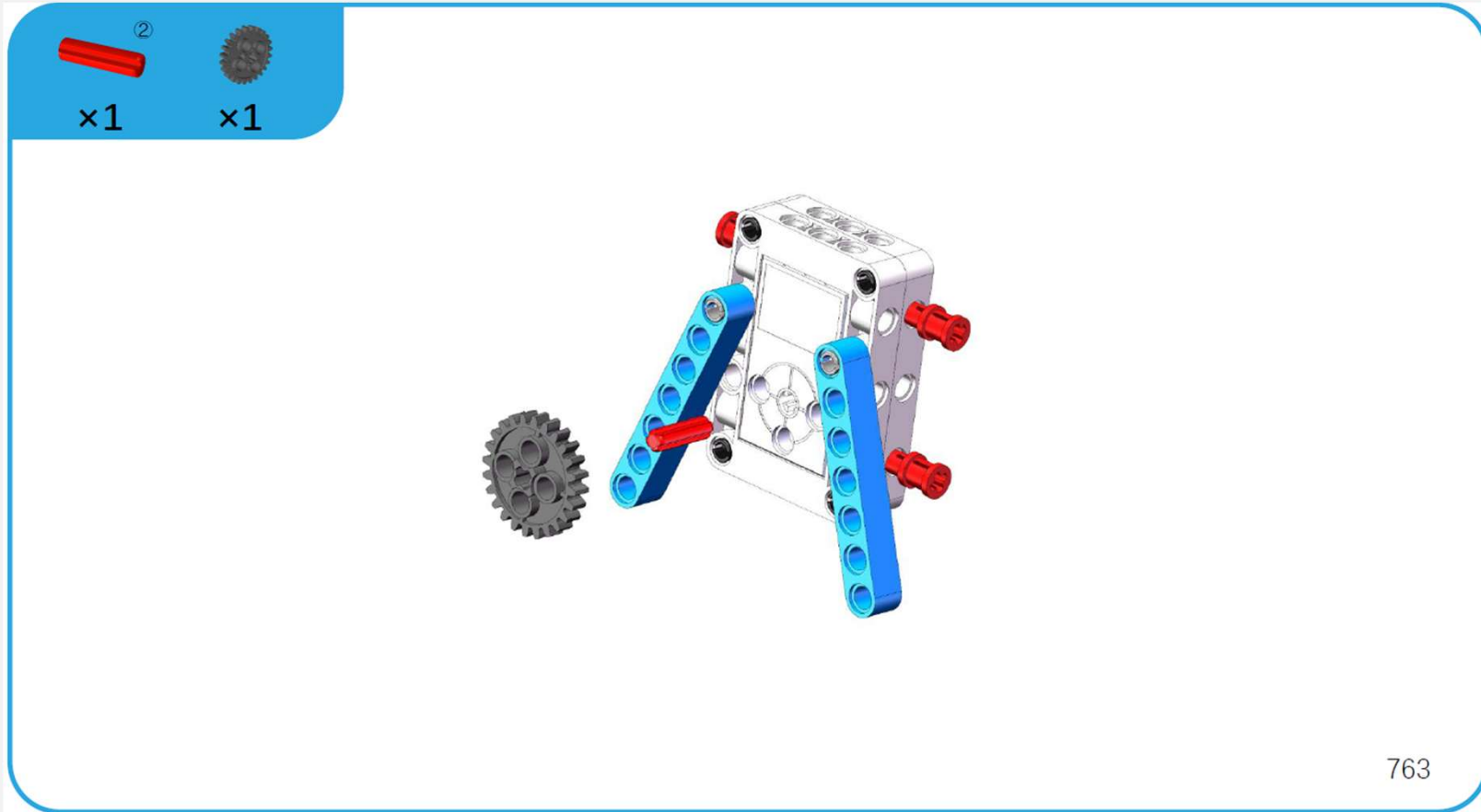
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Step 9



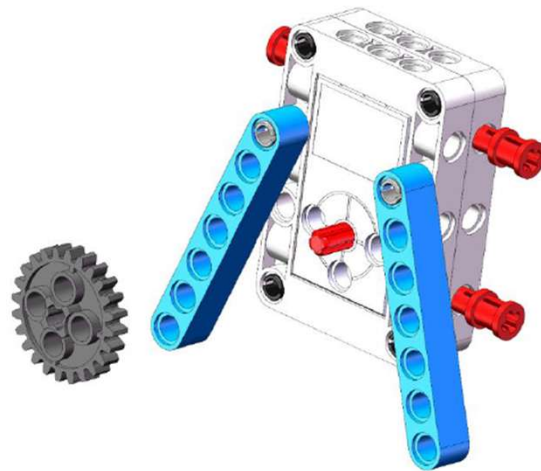
762

Step 10



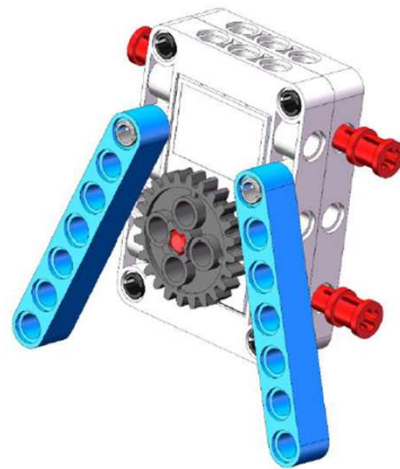
763

Step 11



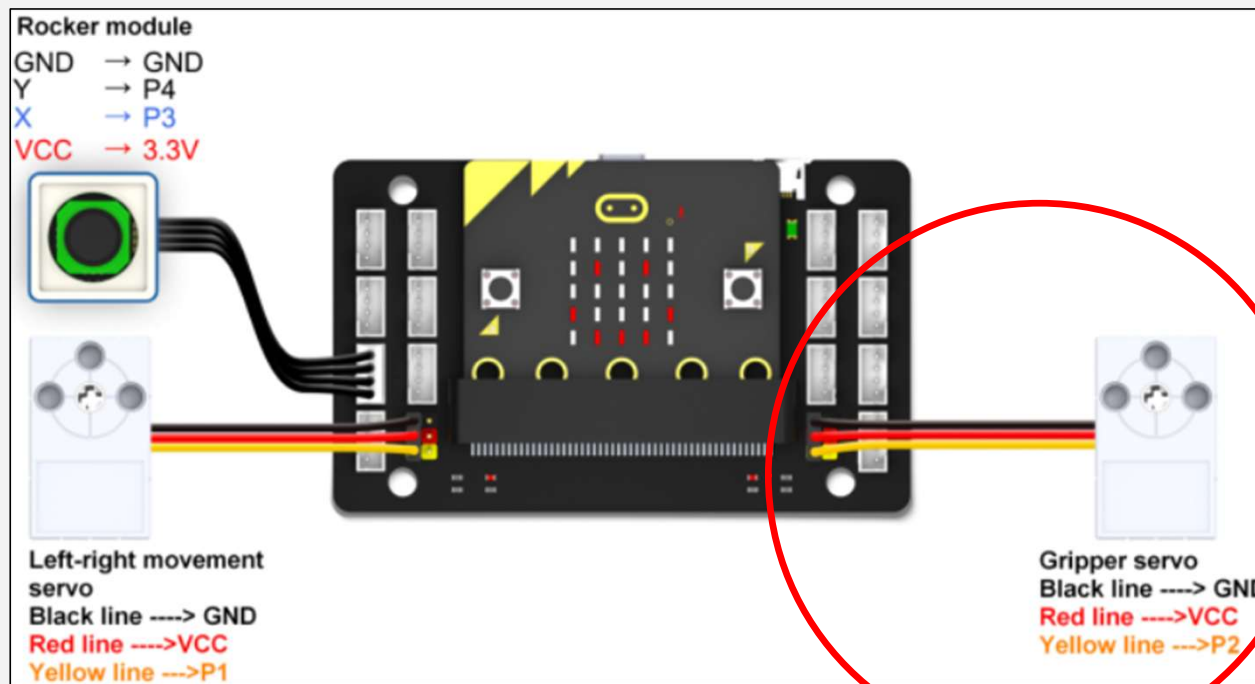
764

Step 12



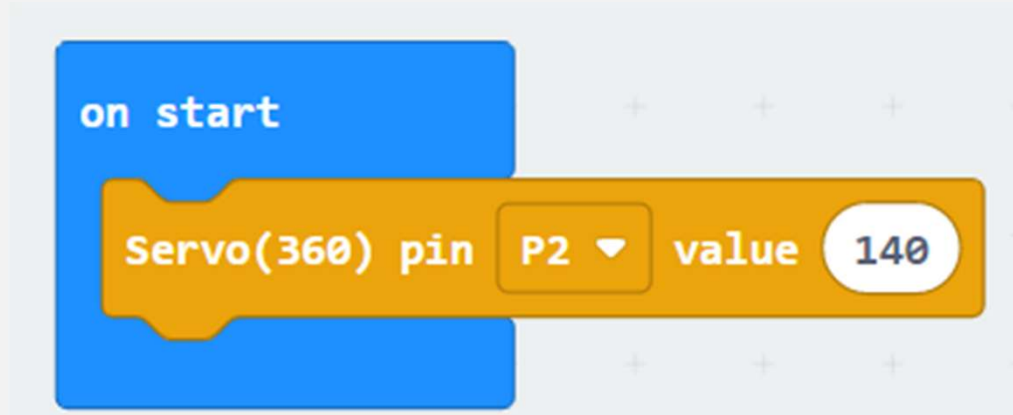
765

Step 12 – Set servo P2 Position



Let's plug in the servo to P2, then we need to set the servo program to make it go to starting position at 140.

Step 12 – Set servo P2 Position



Before proceeding to next step, we need set the servo to starting position = 140 first.

After done the coding shown at left, click download to download this script to your microbit.

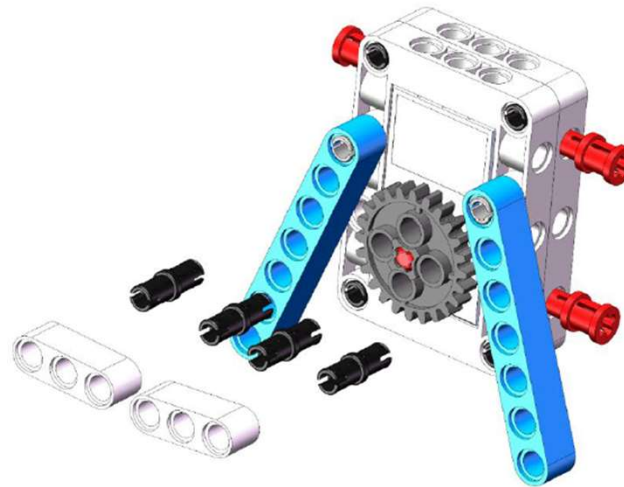
Step 13



x4

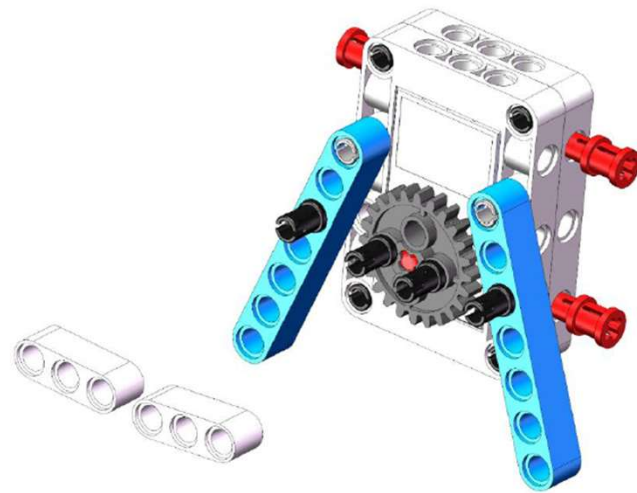


x2



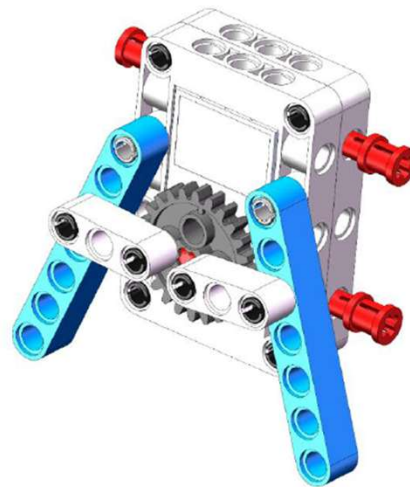
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Step 14



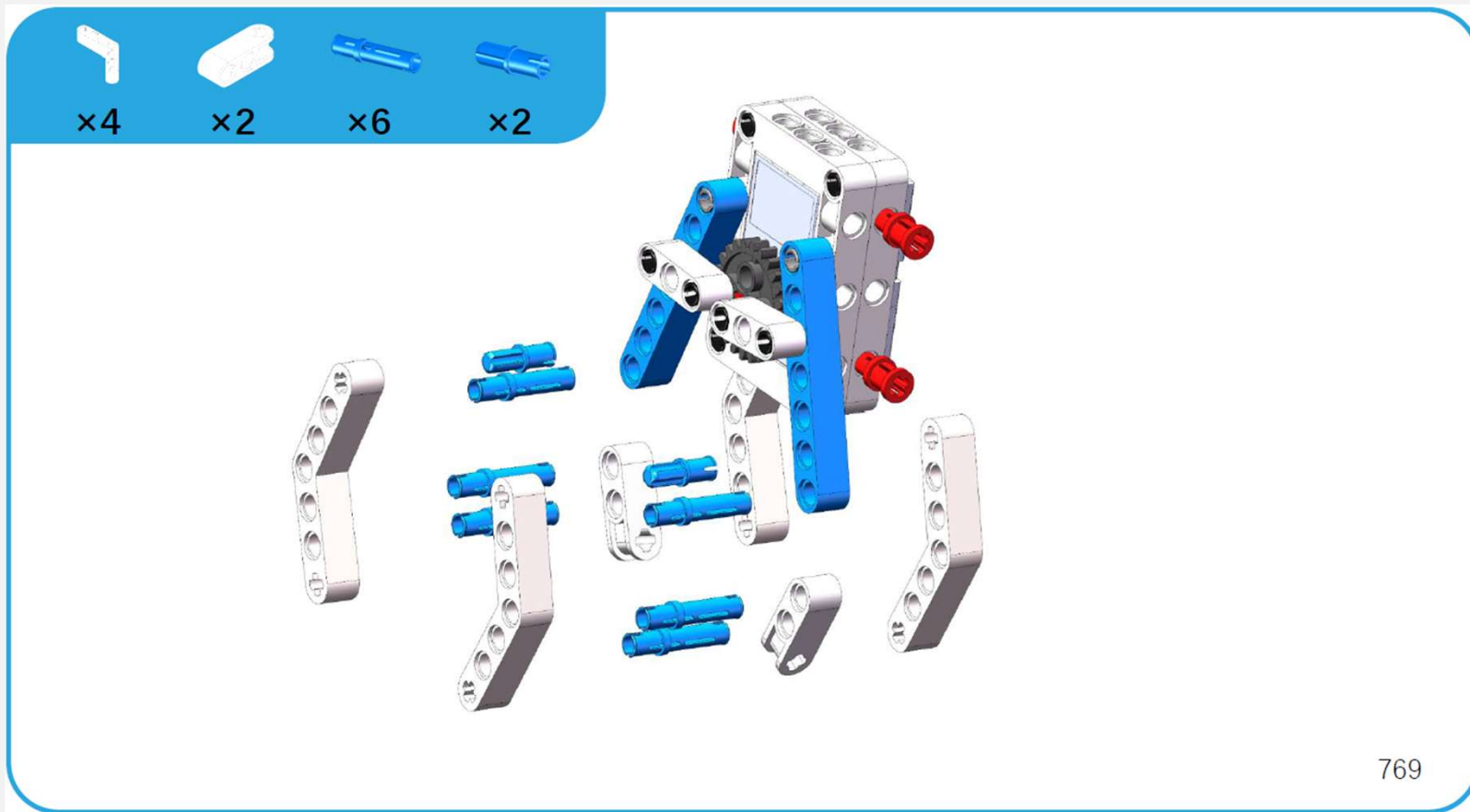
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Step 15

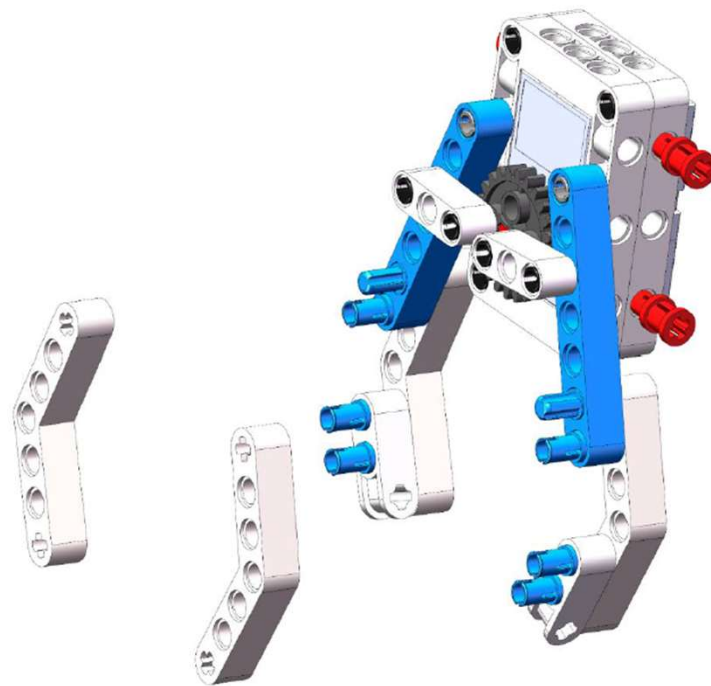


768

Step 16

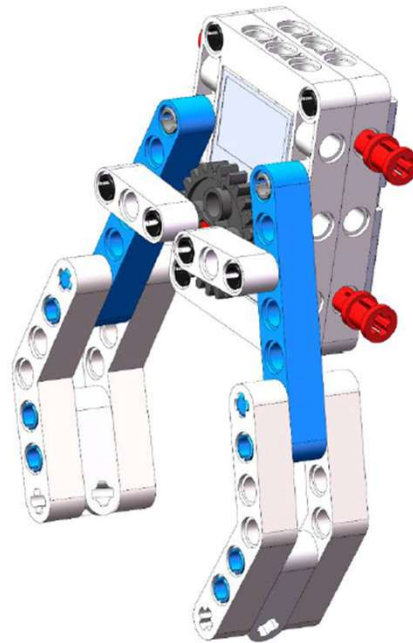


Step 17



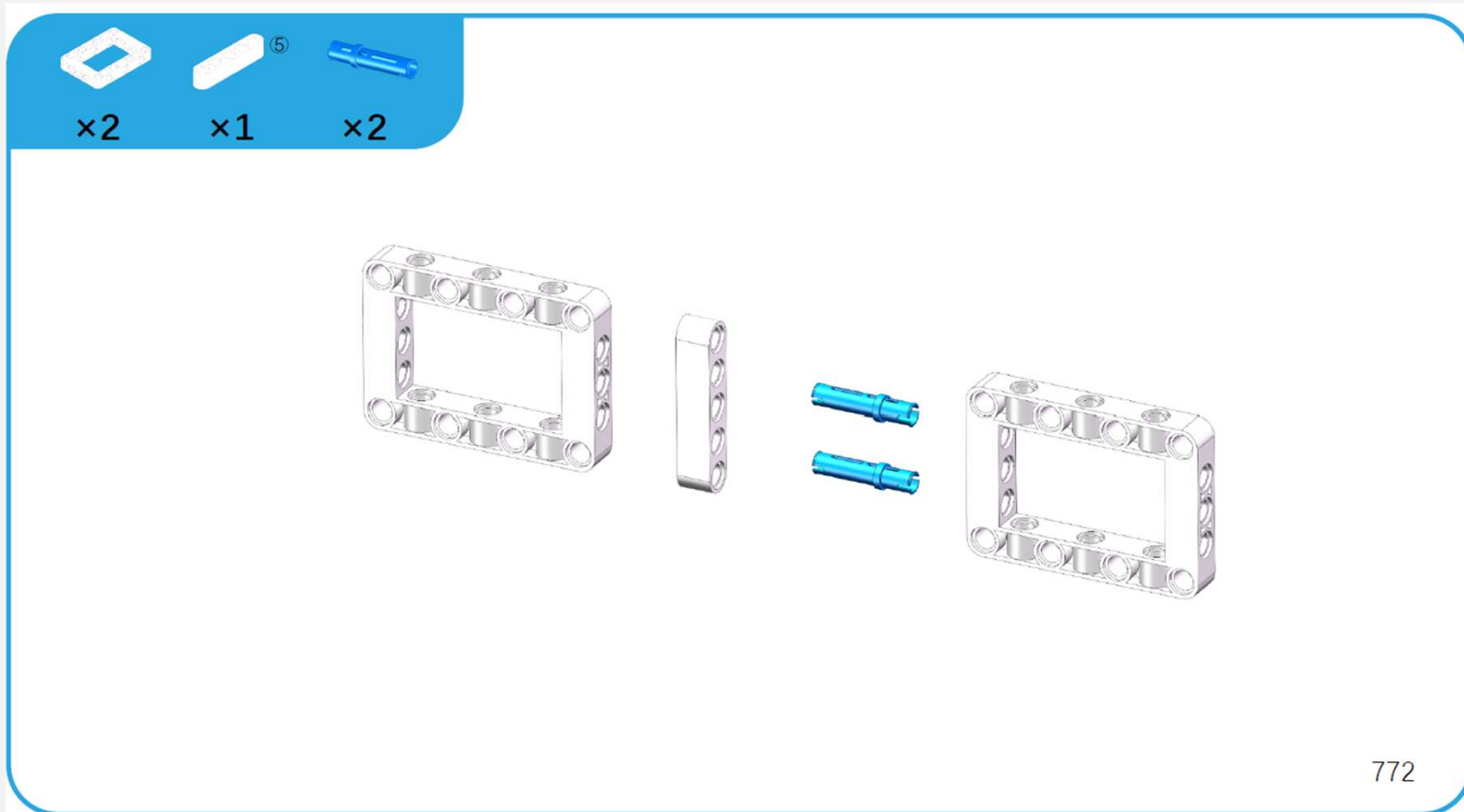
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Step 18

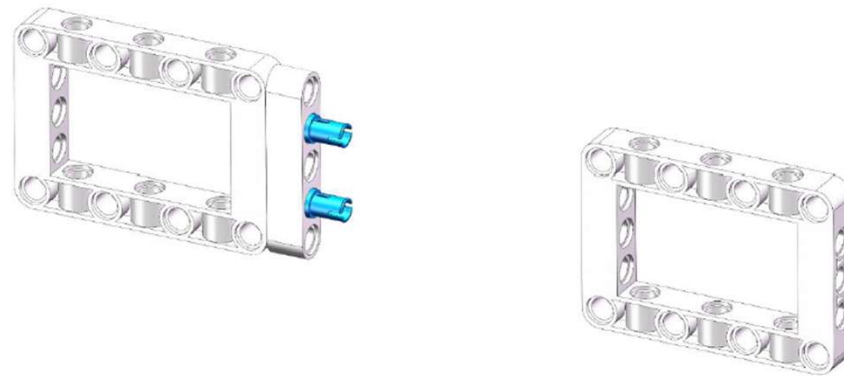


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Step 19

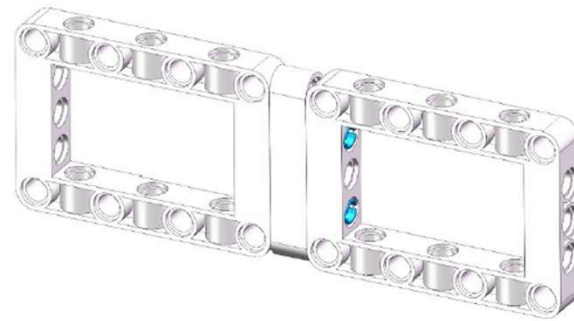


Step 20



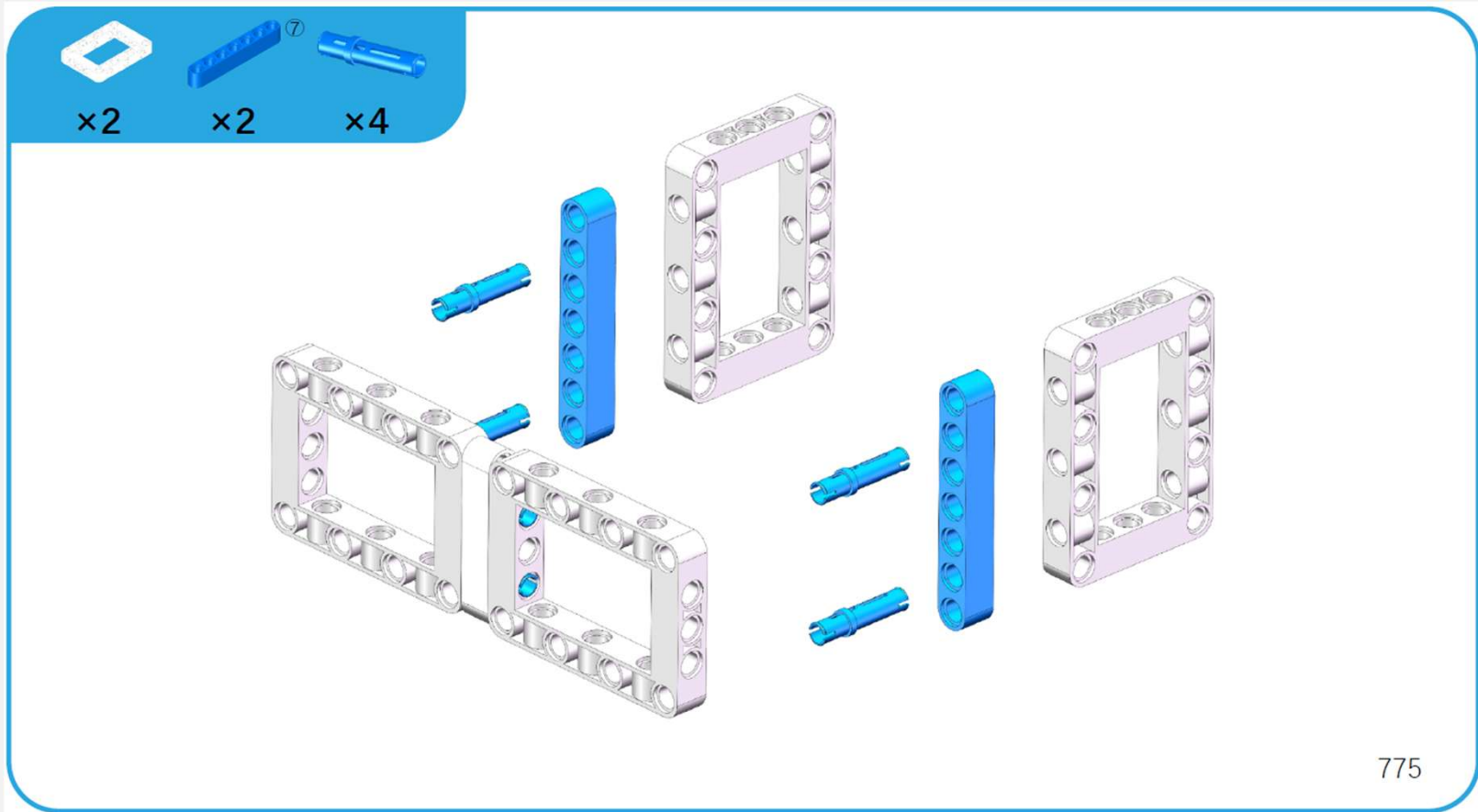
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Step 21

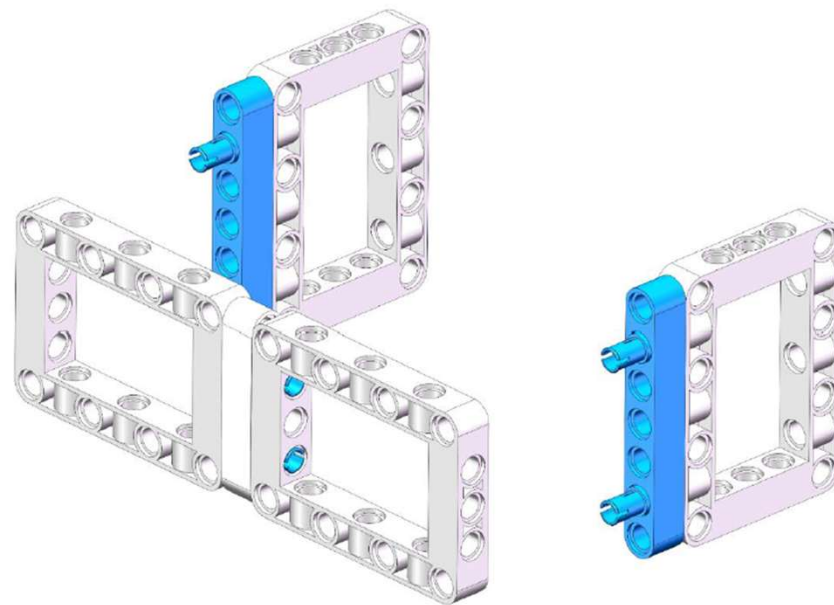


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Step 22

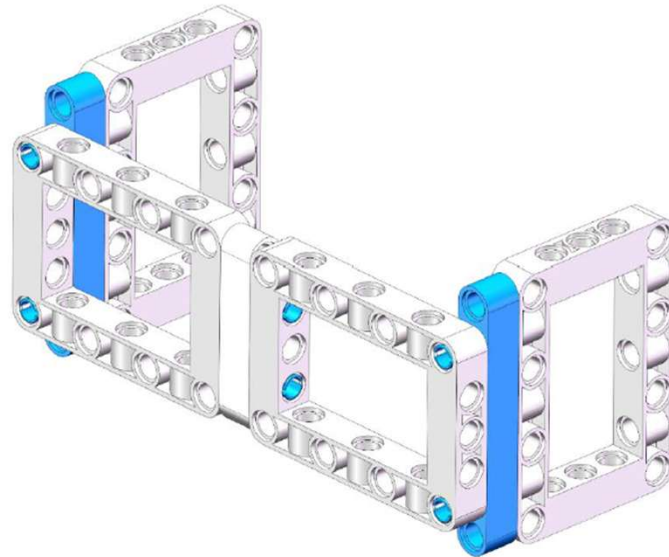


Step 23



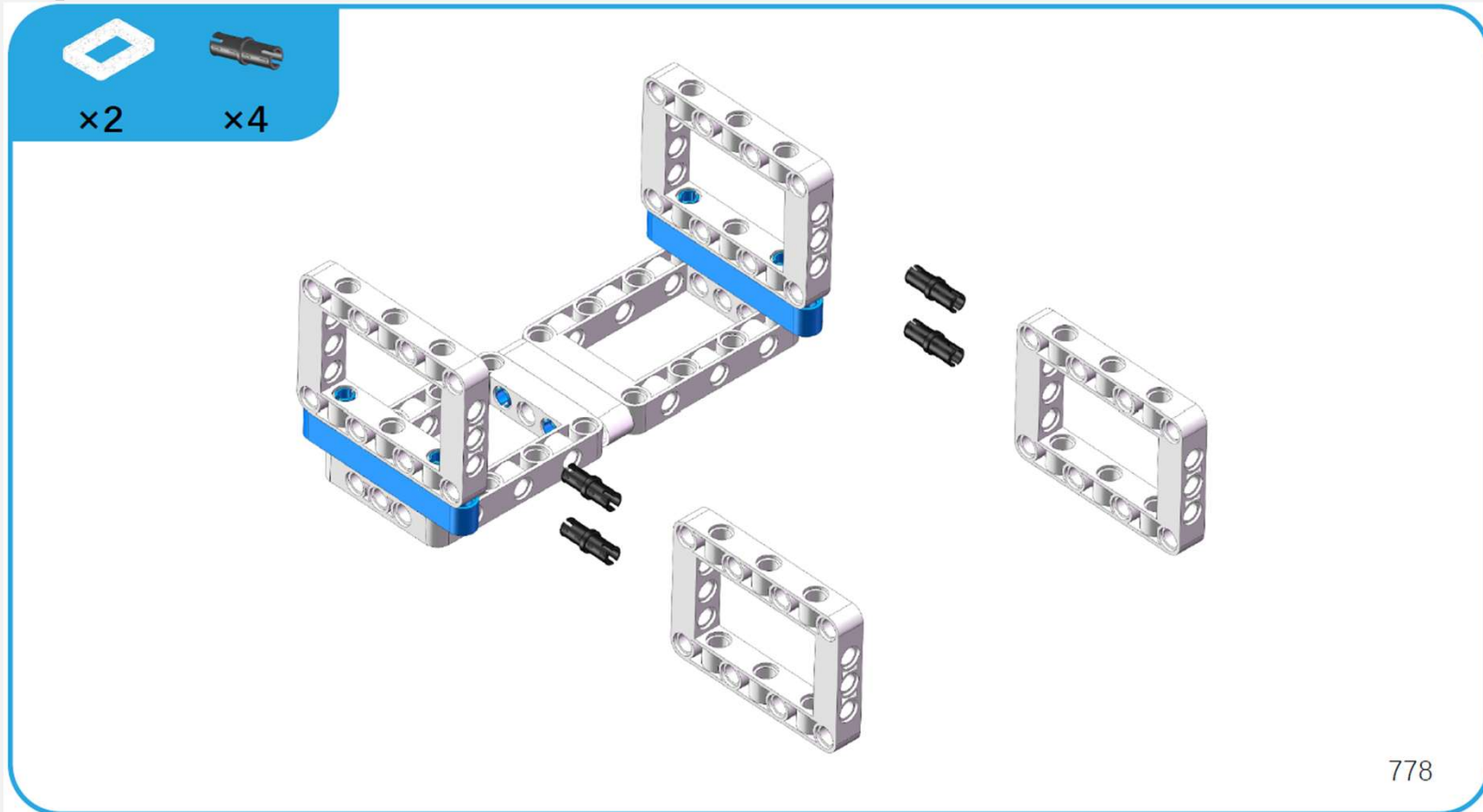
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Step 24

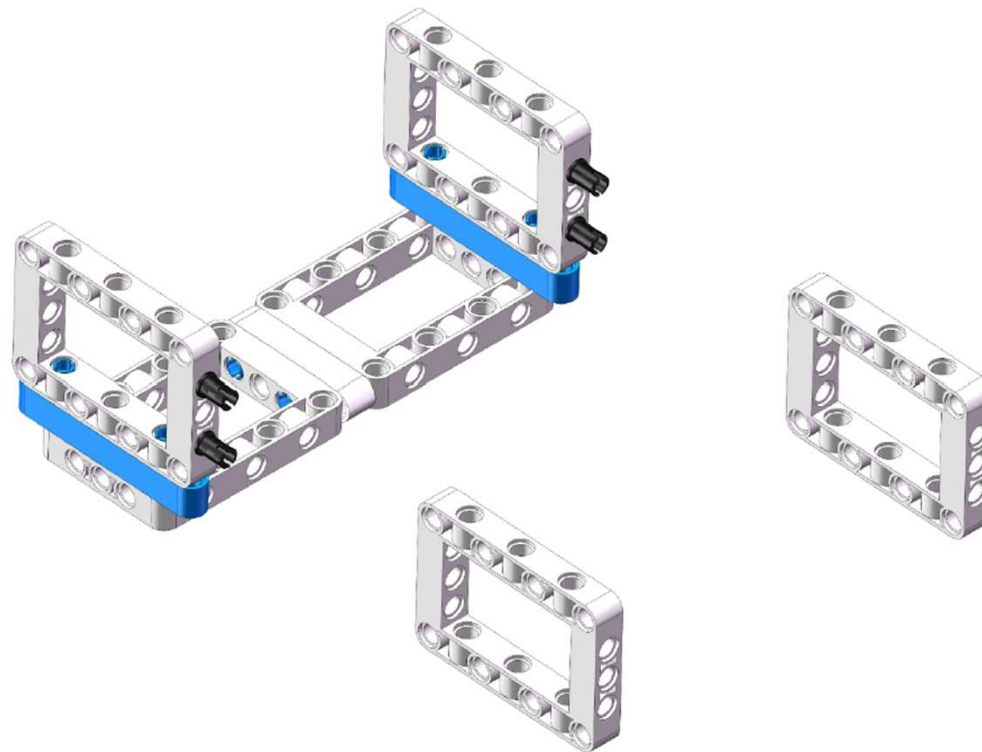


777

Step 25

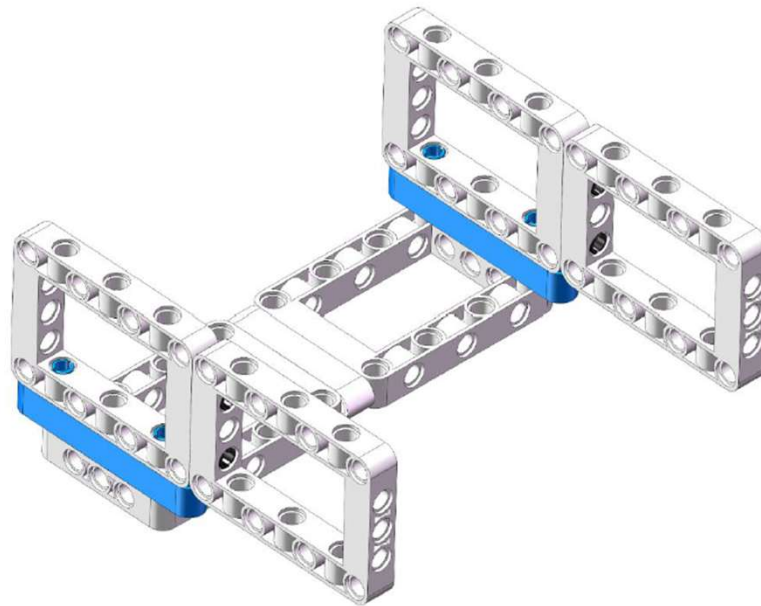


Step 26



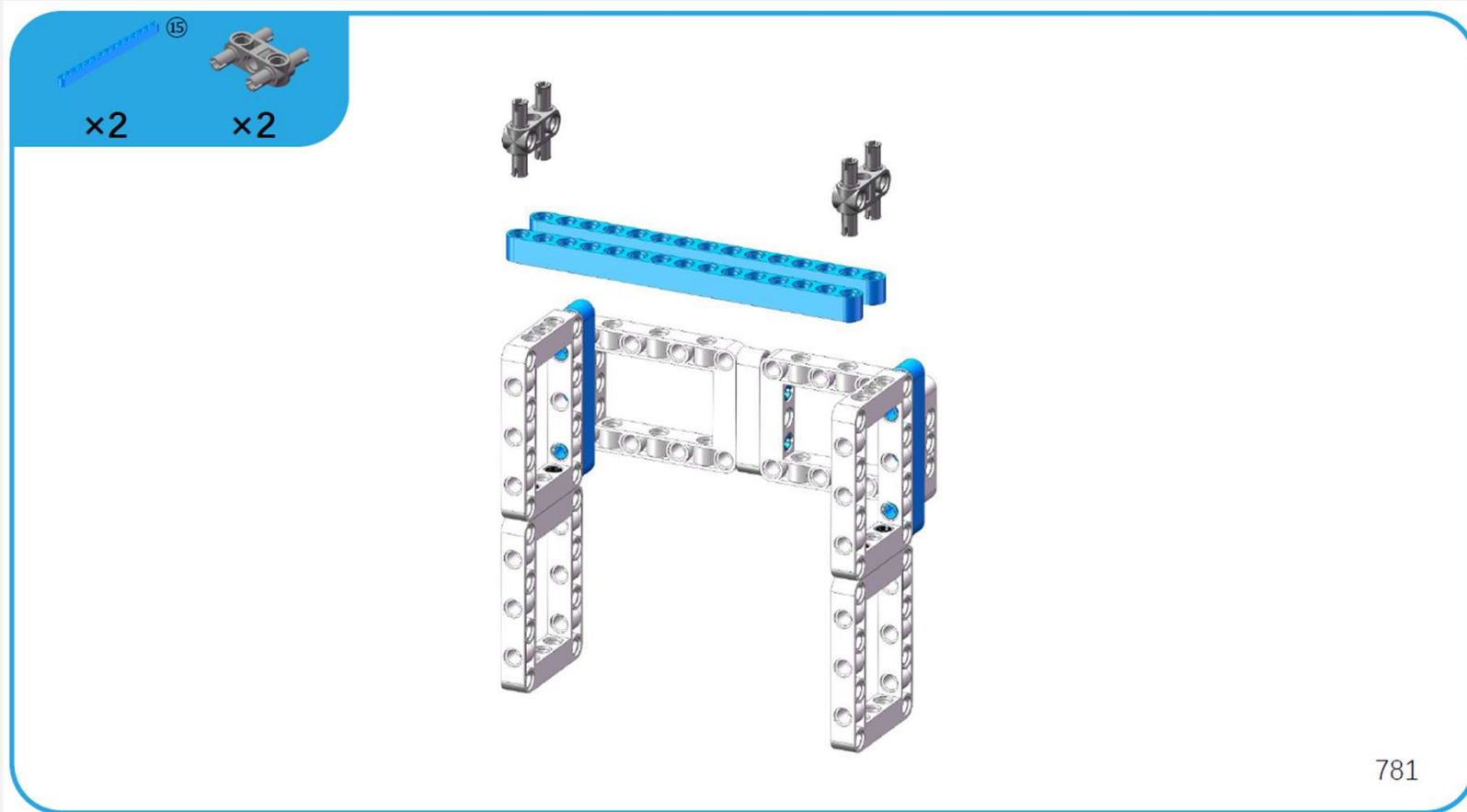
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Step 27

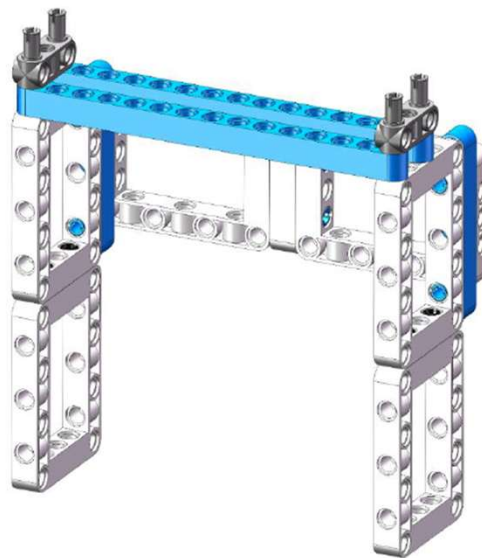


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Step 28

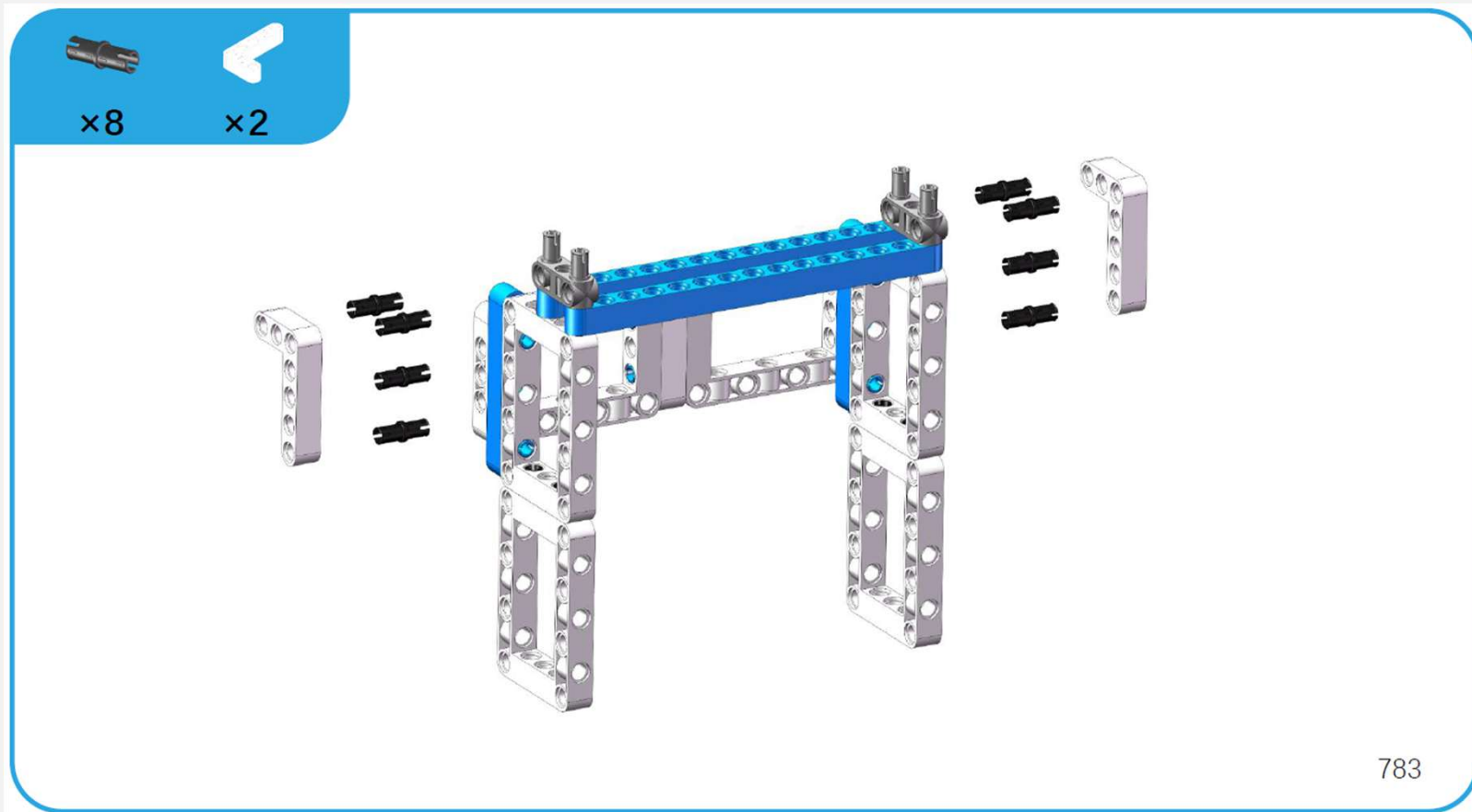


Step 29

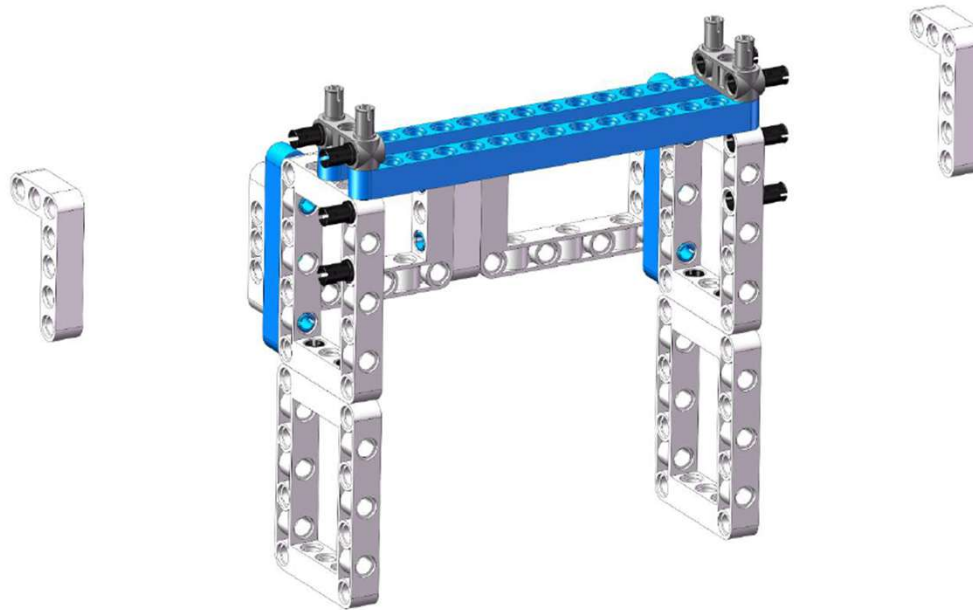


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Step 30

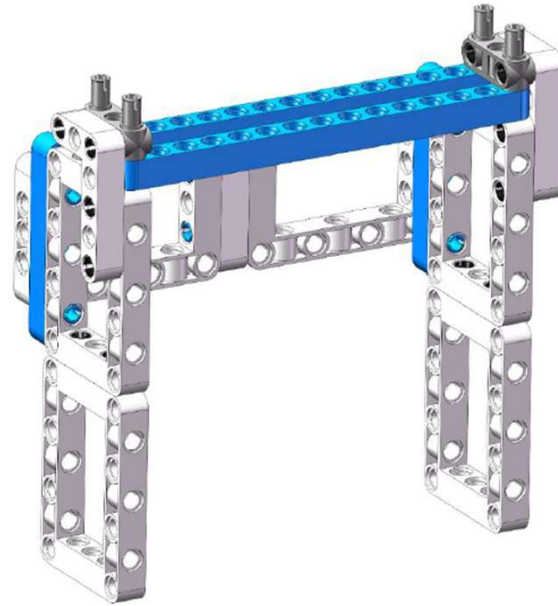


Step 31



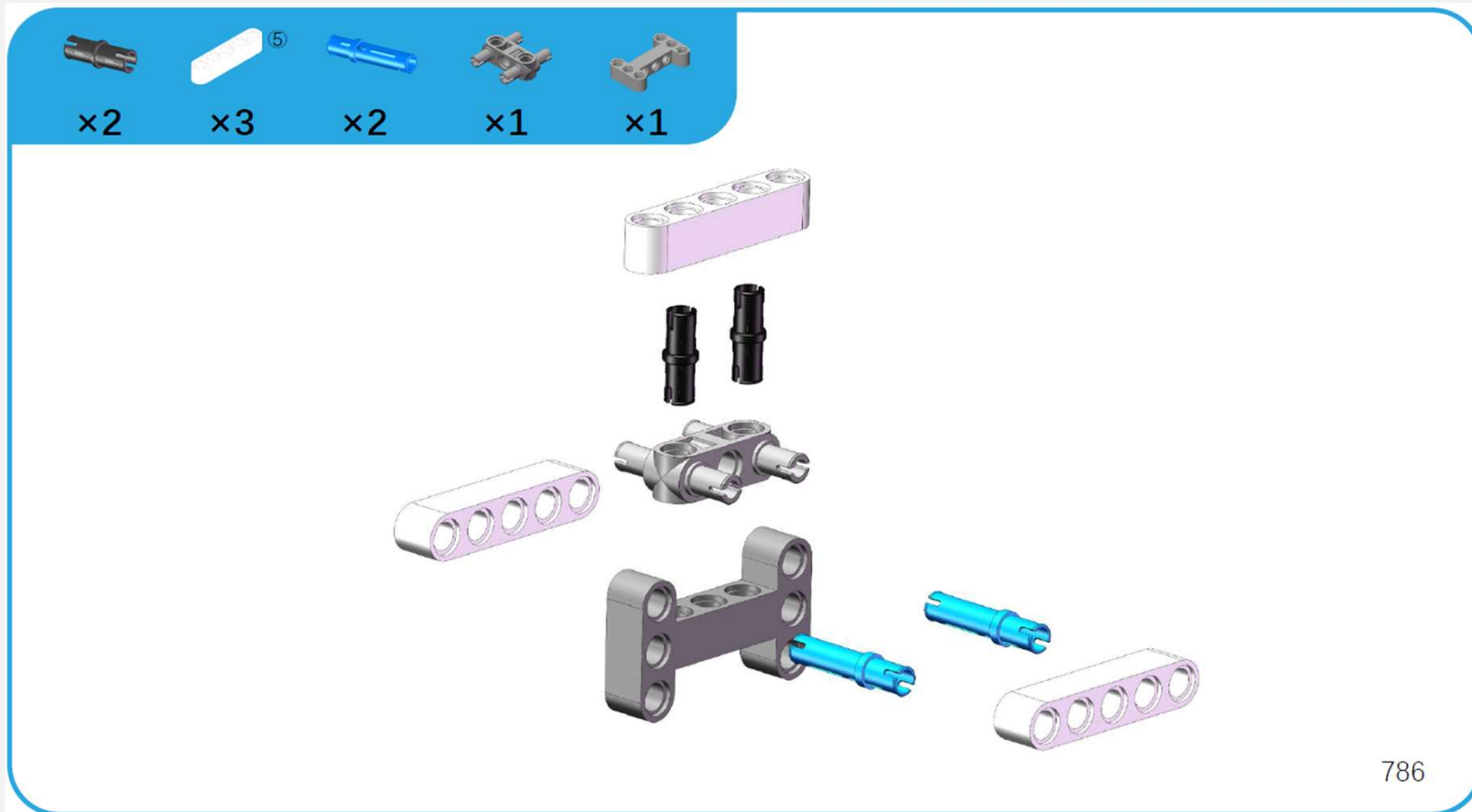
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Step 32

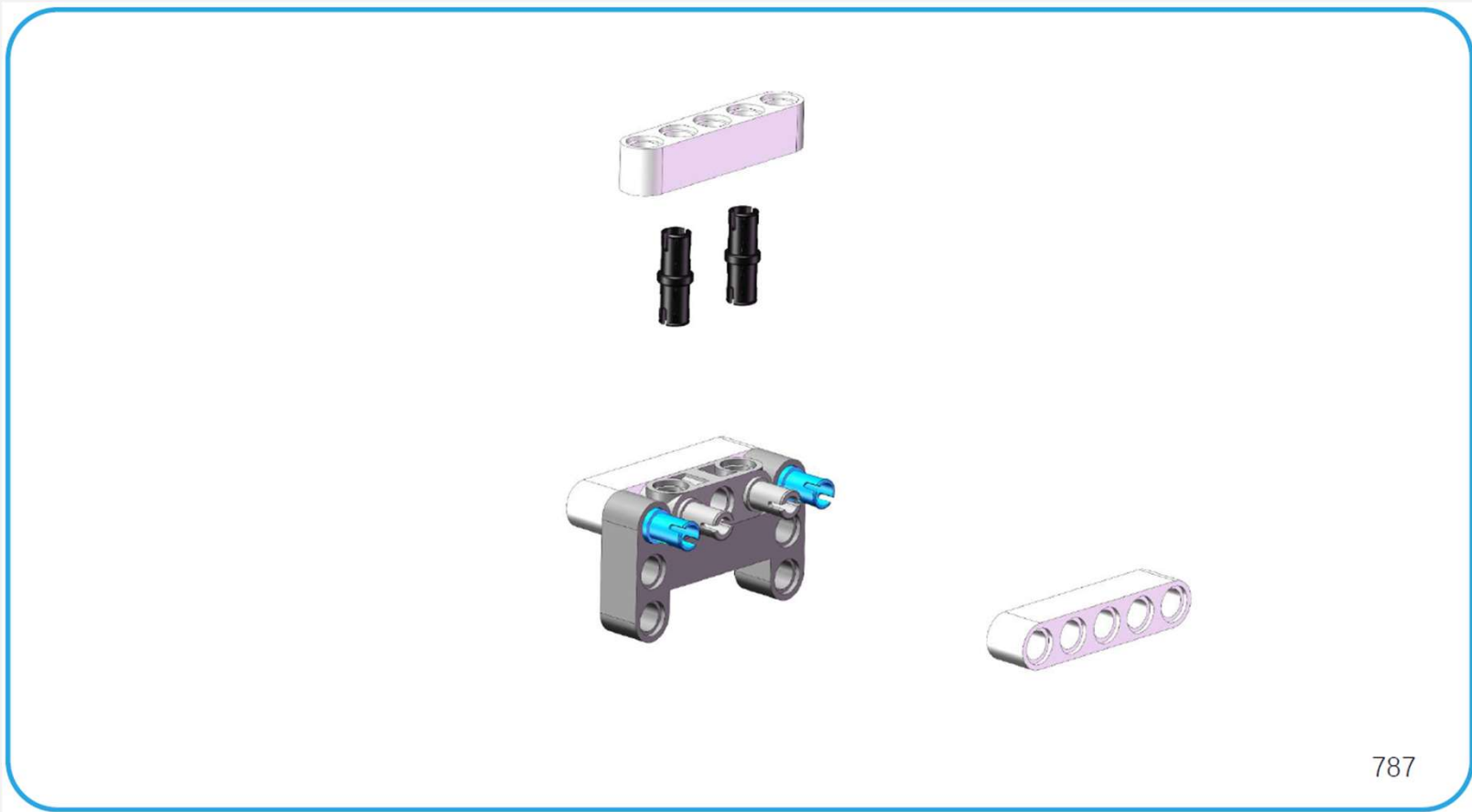


785

Step 33



Step 34



Step 35



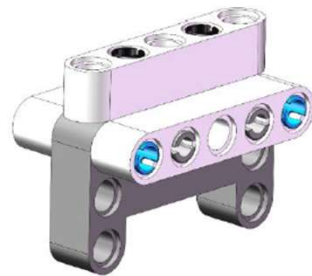
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Step 36



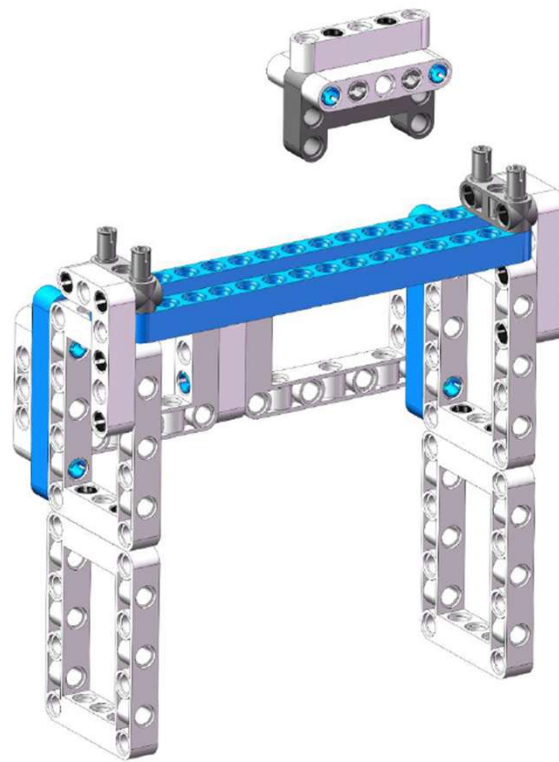
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Step 37



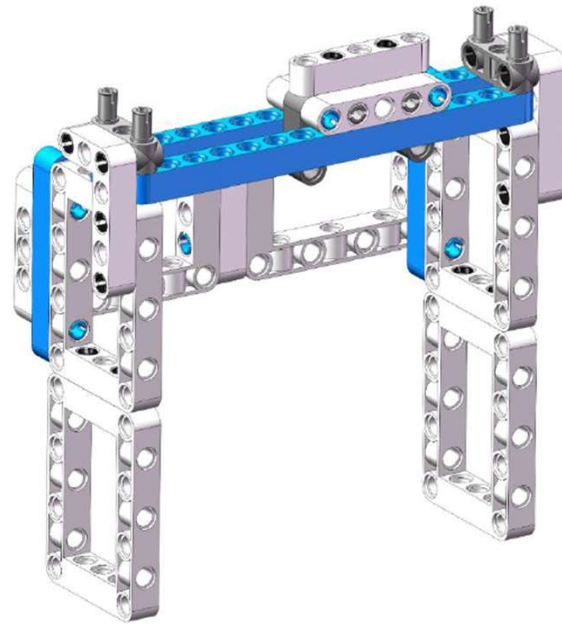
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Step 38



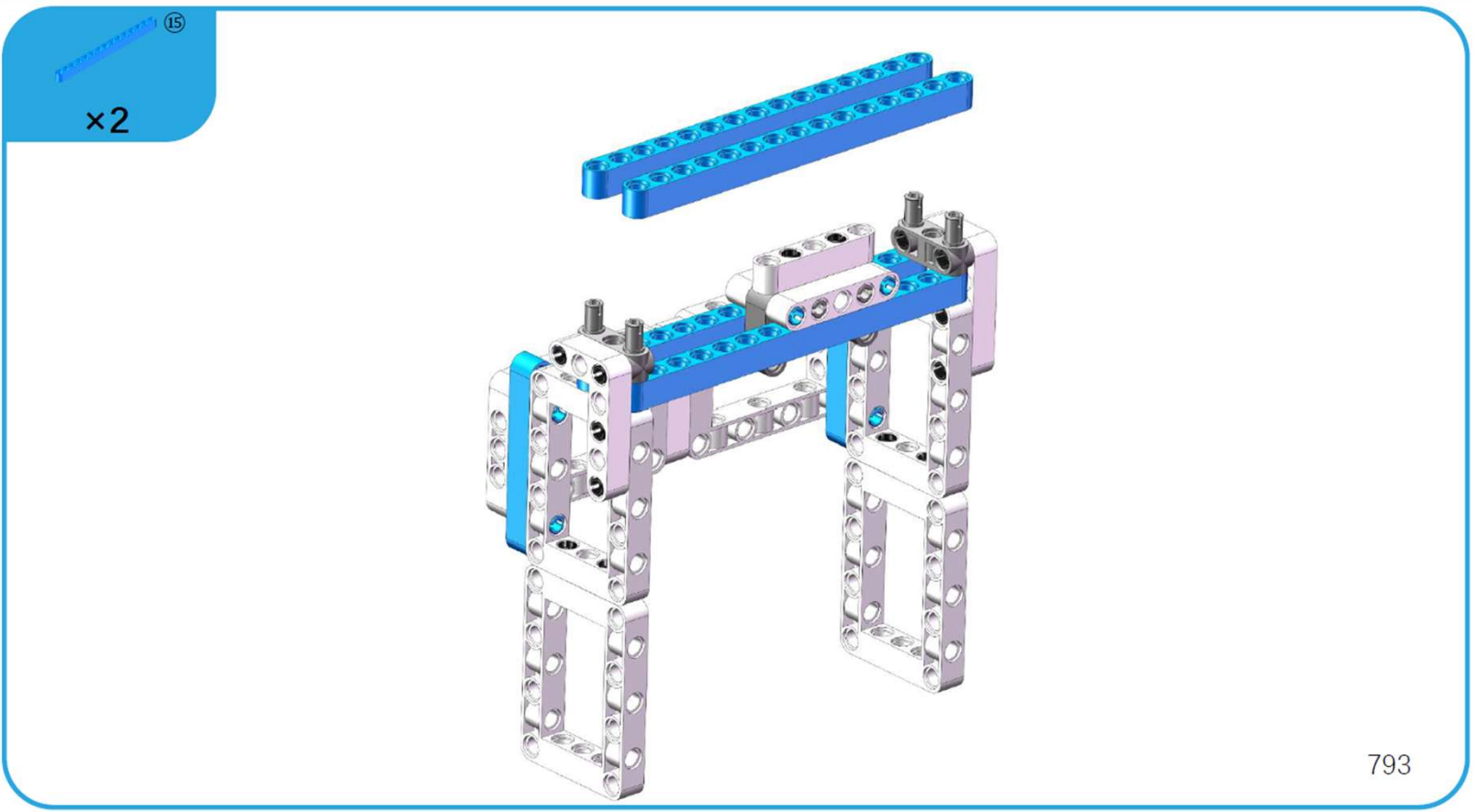
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Step 39

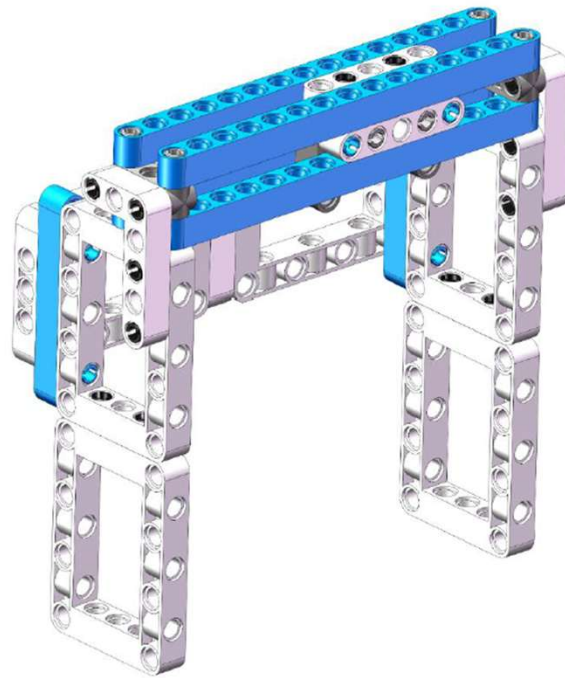


792

Step 40



Step 41



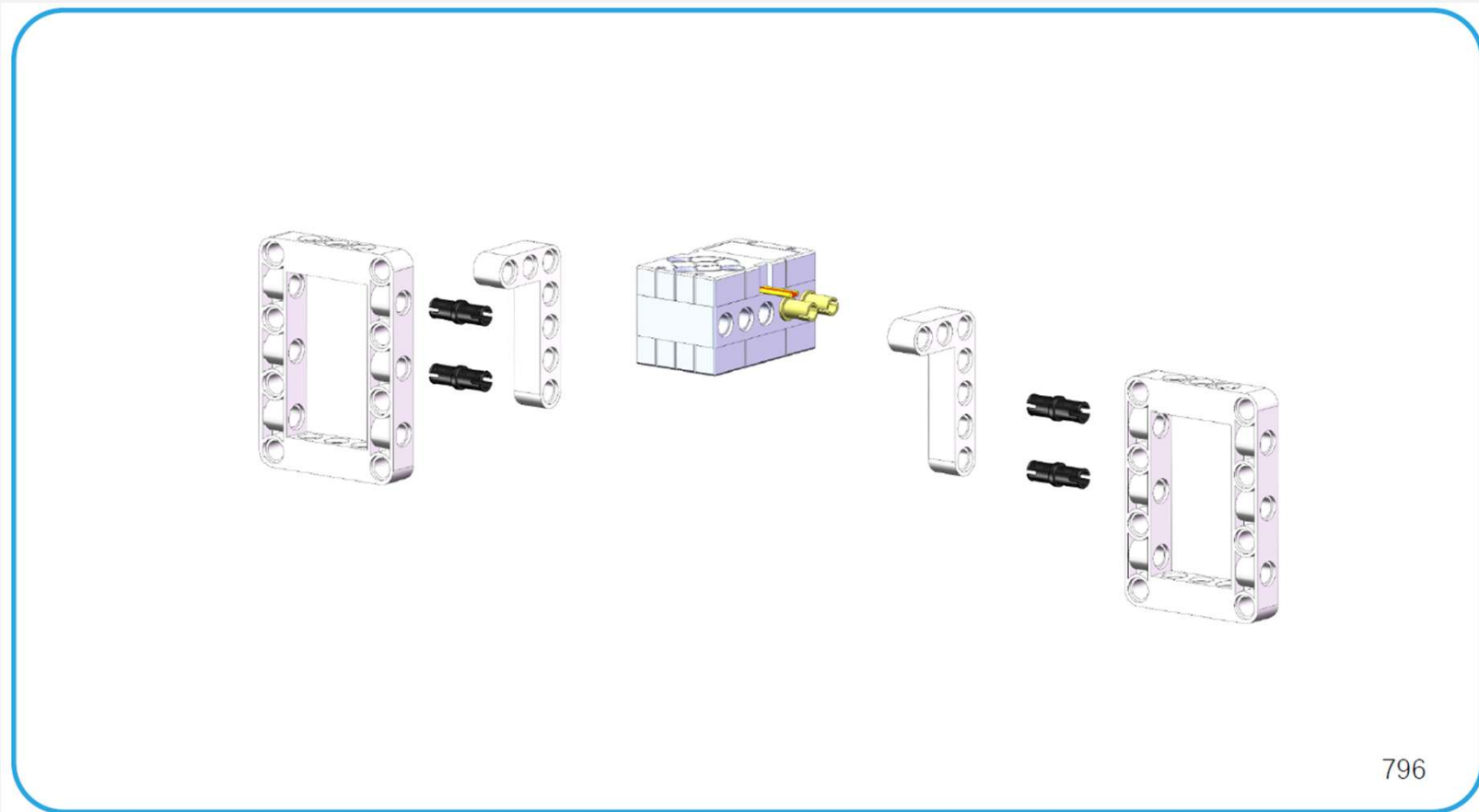
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Step 42

x4 x4 x2 x2 x1

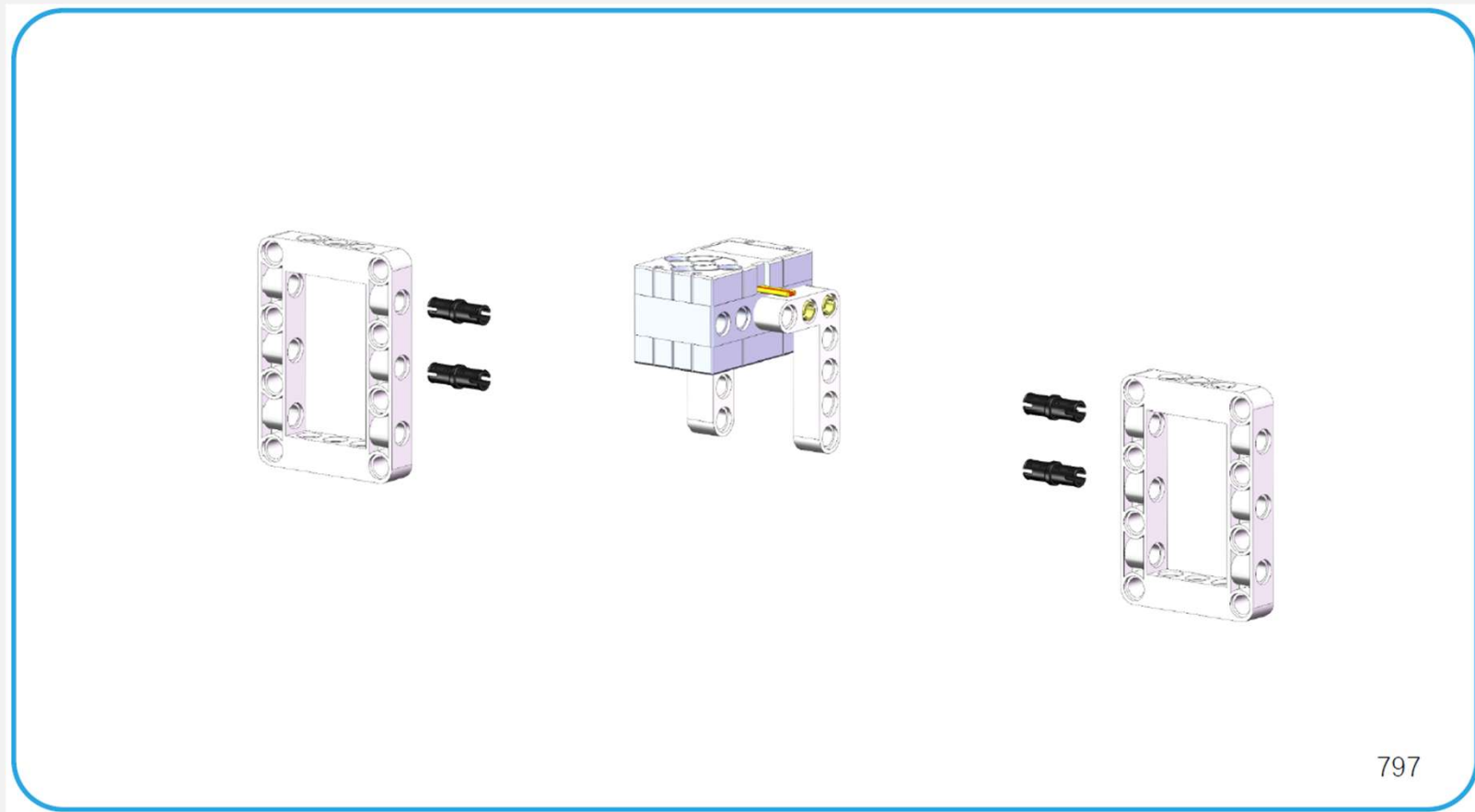
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Step 43



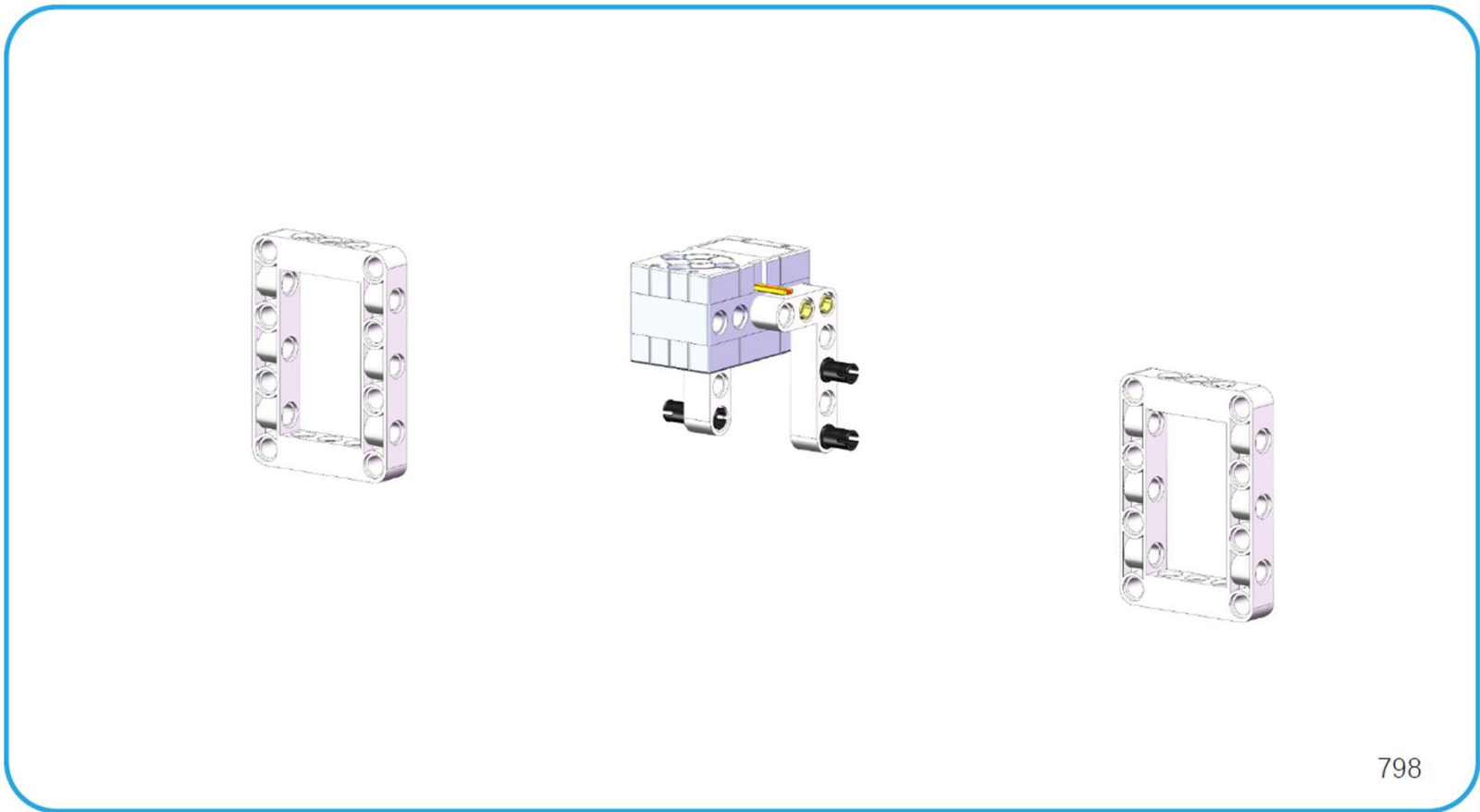
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Step 44



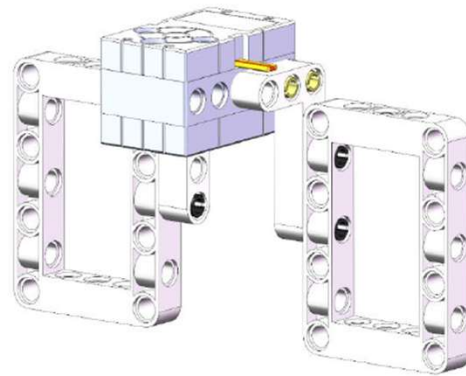
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Step 45



798

Step 46

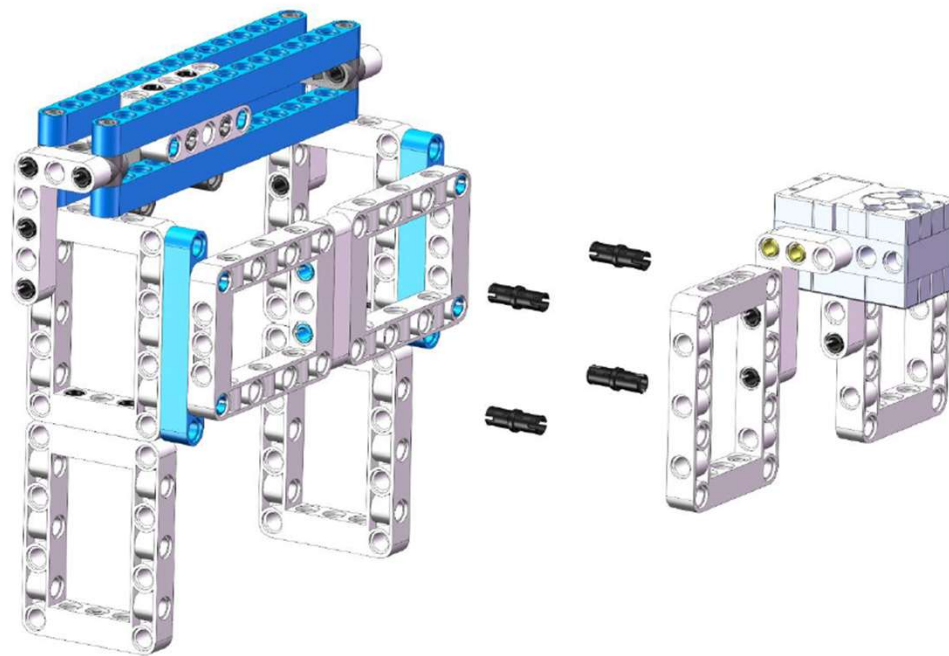


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Step 47

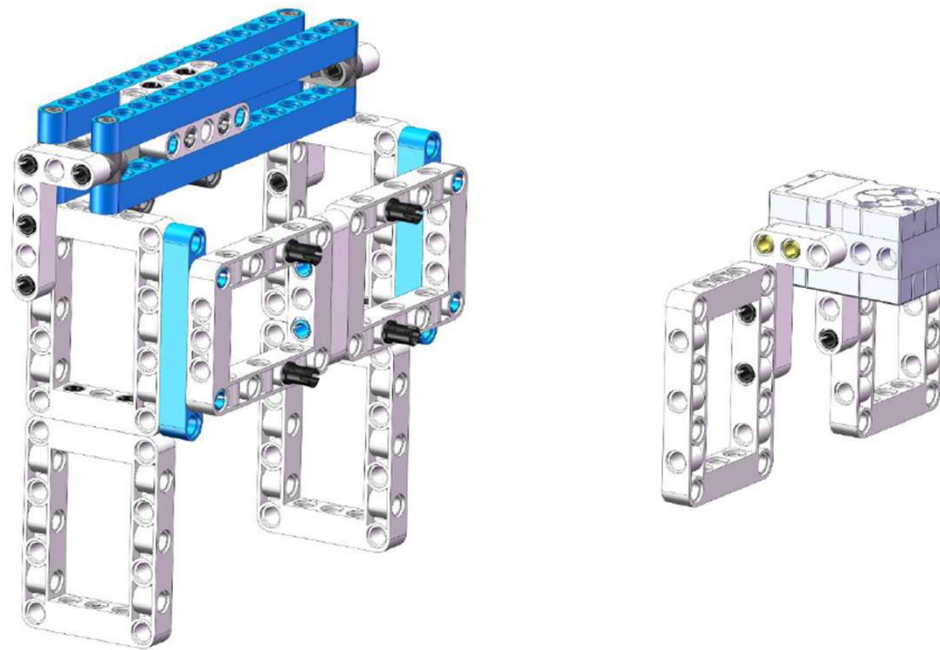


x4



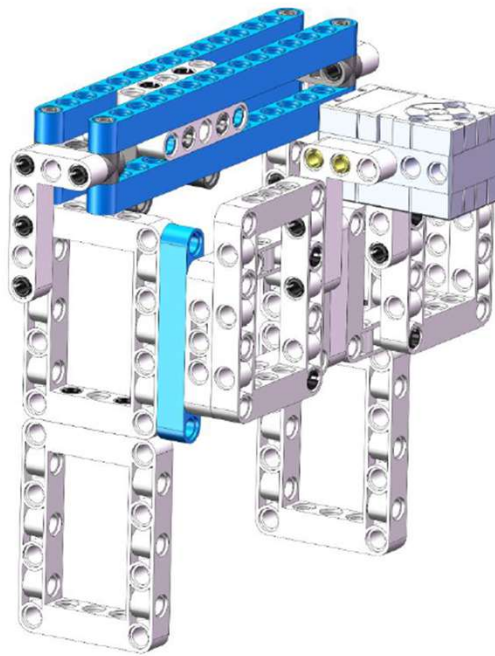
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Step 48



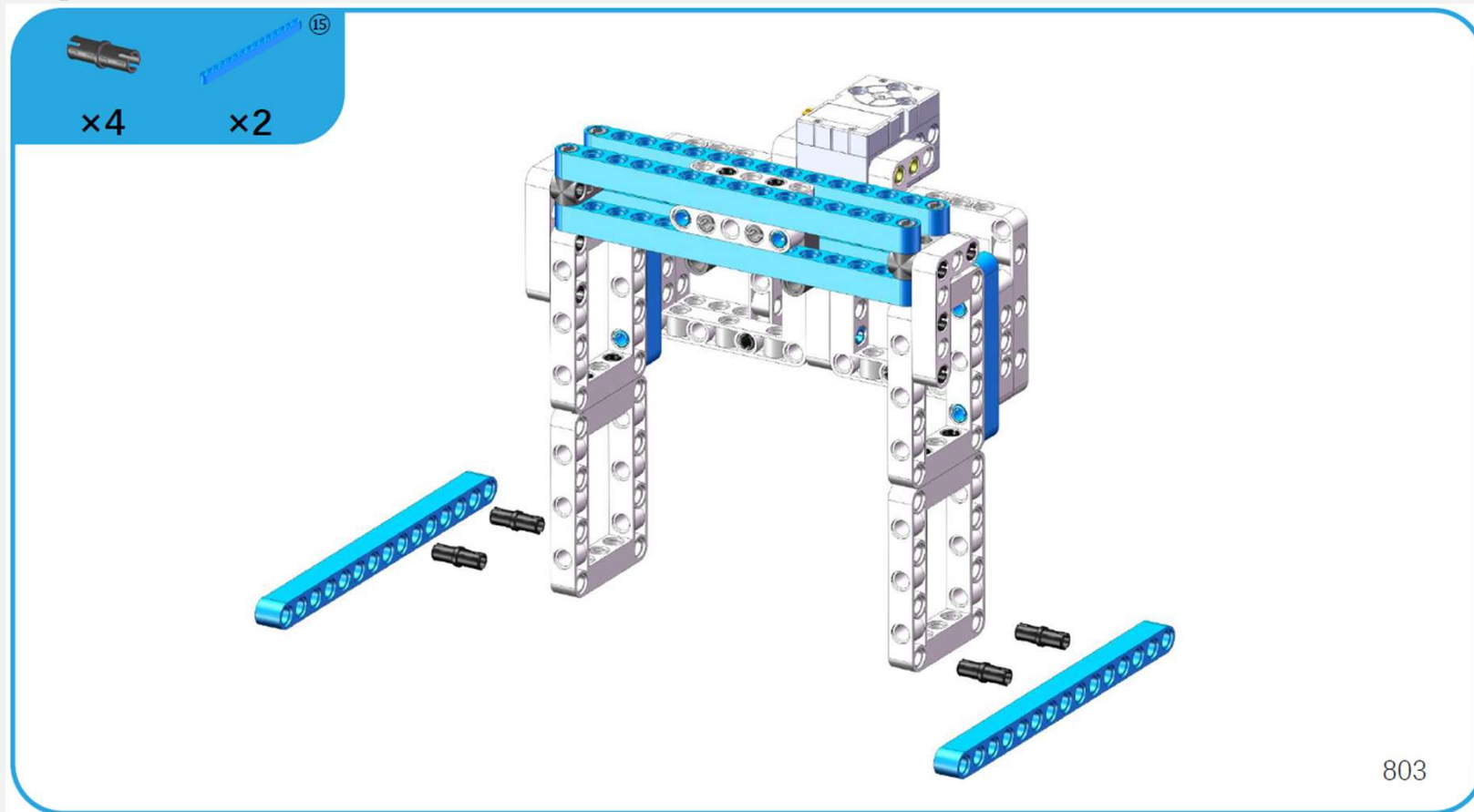
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Step 49

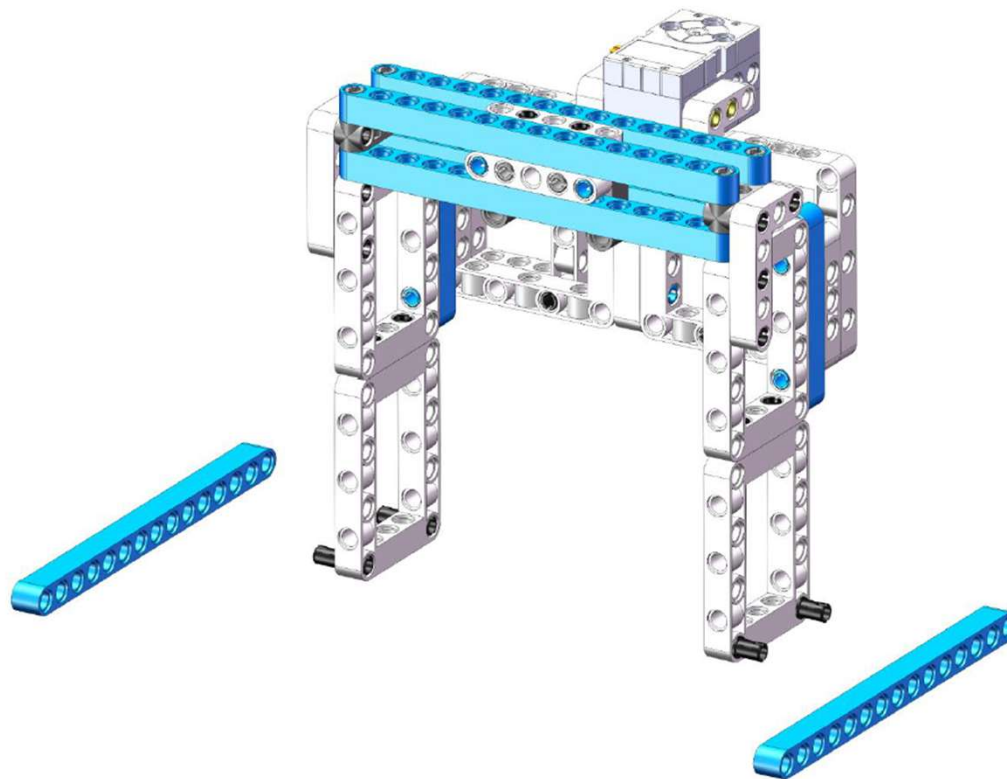


802

Step 50

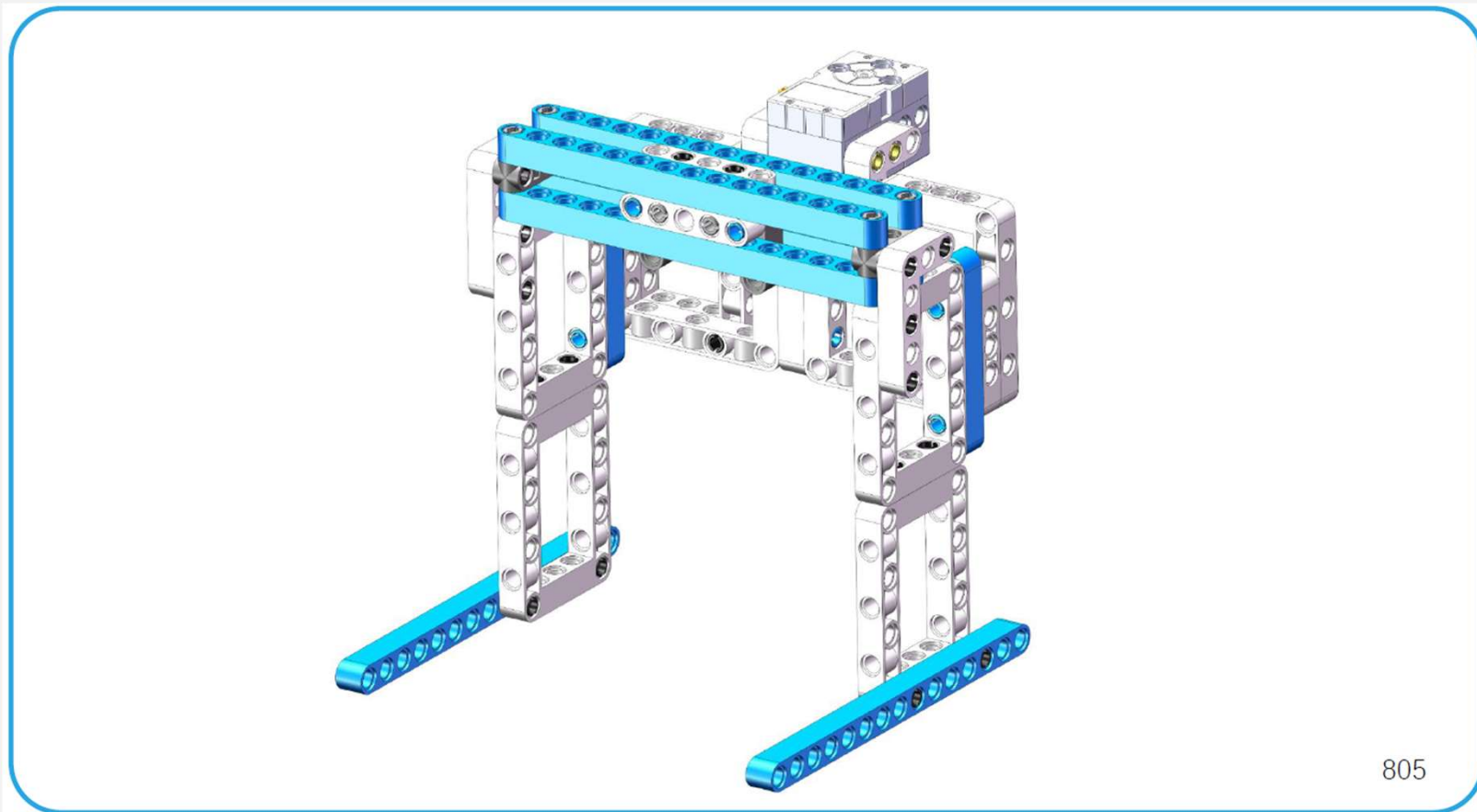


Step 51

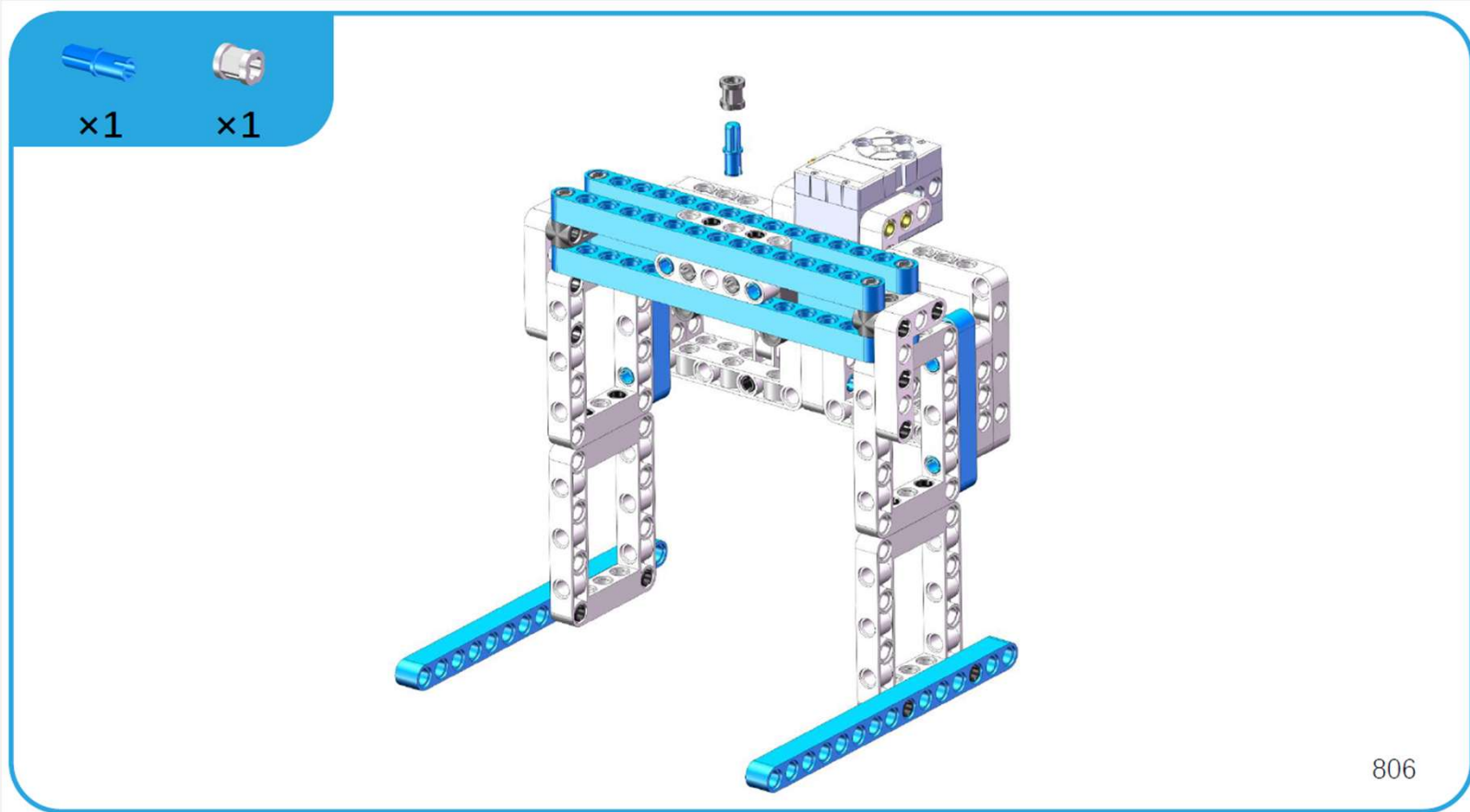


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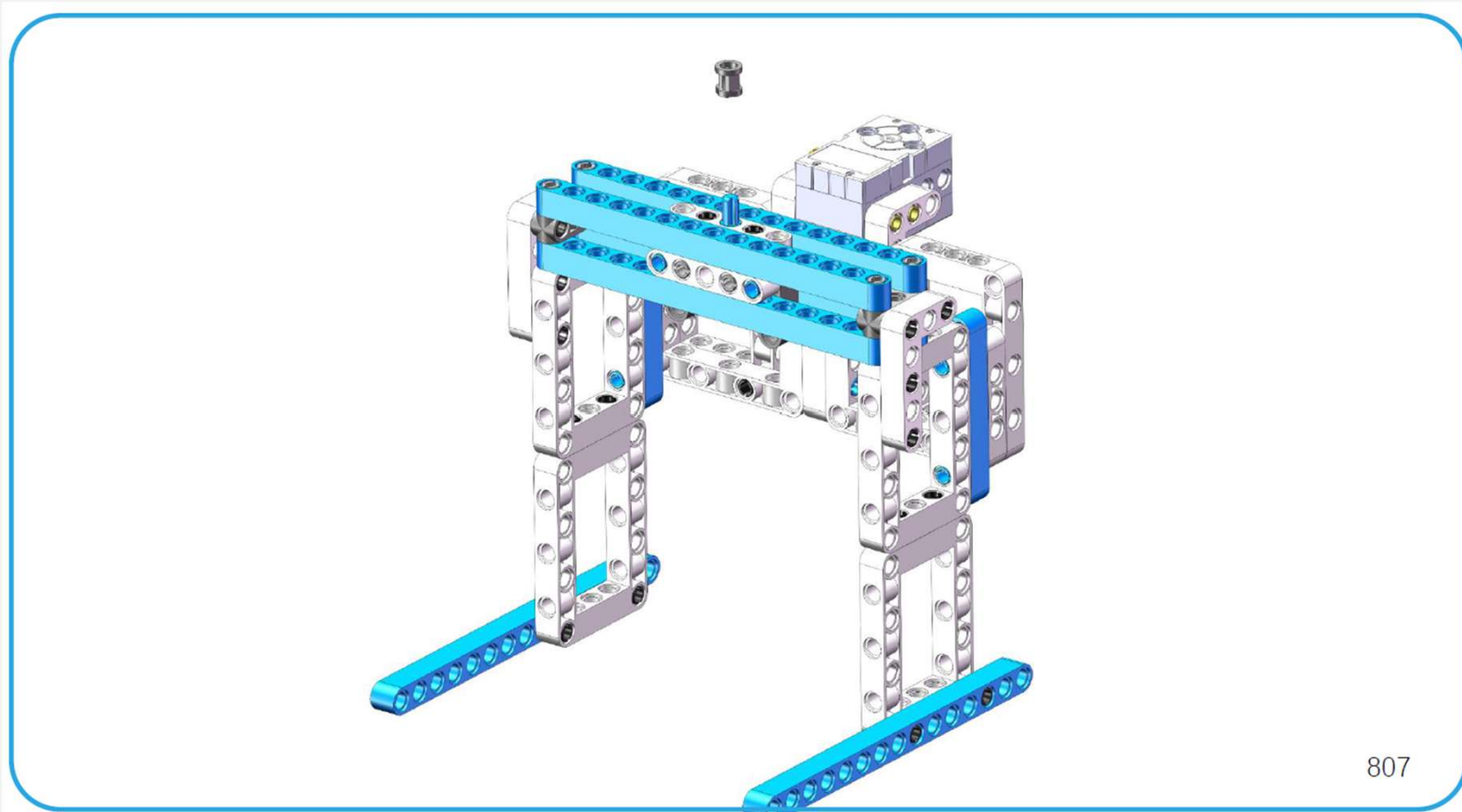
Step 52



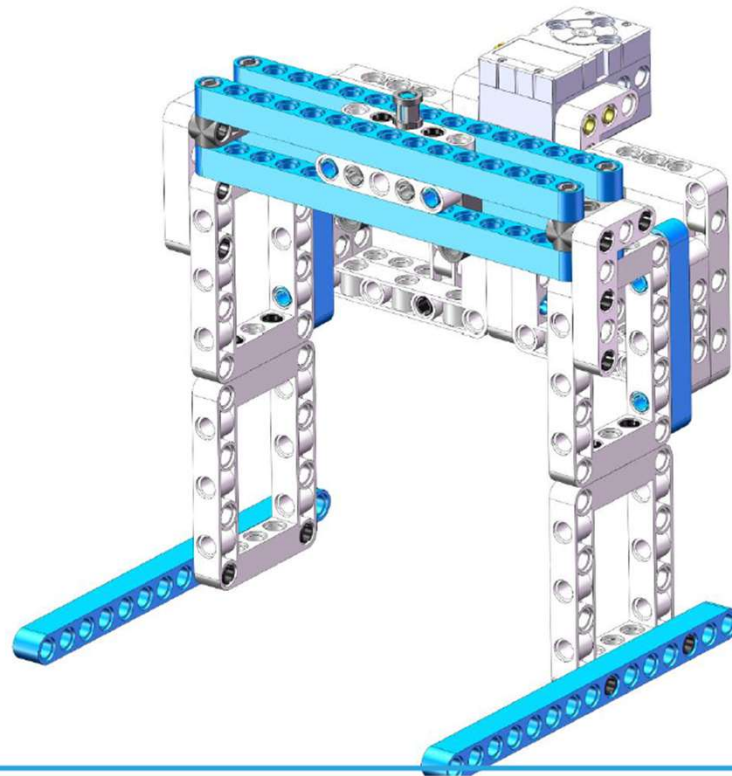
Step 53



Step 54

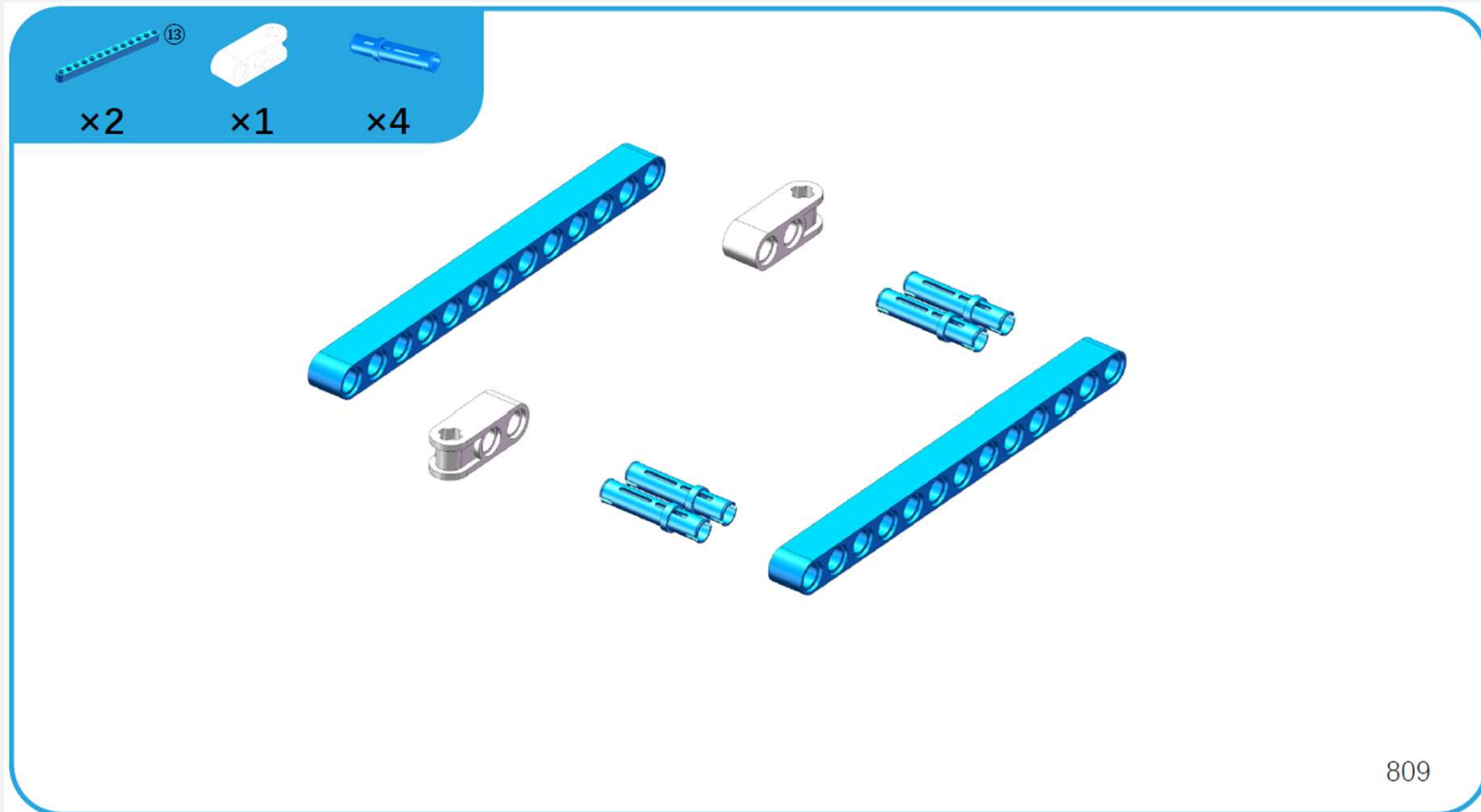


Step 55

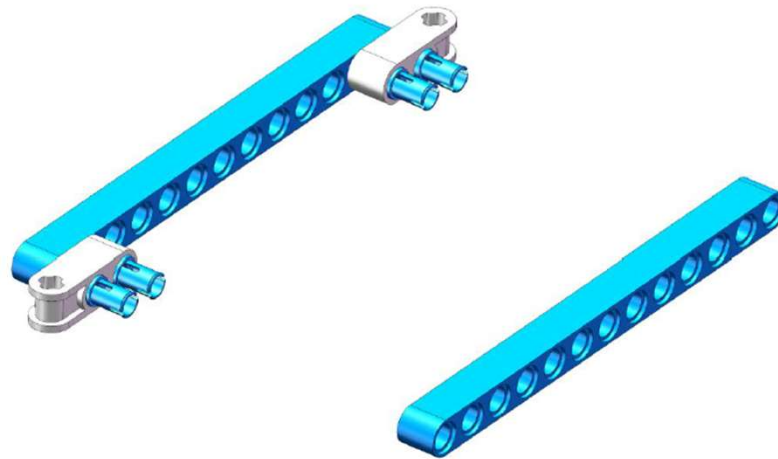


808

Step 56

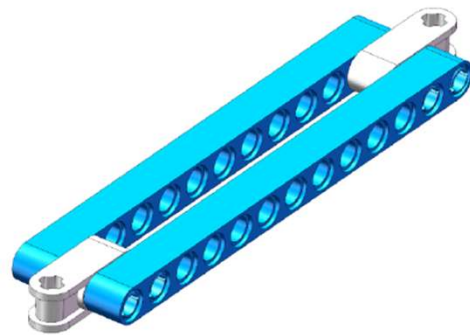


Step 57



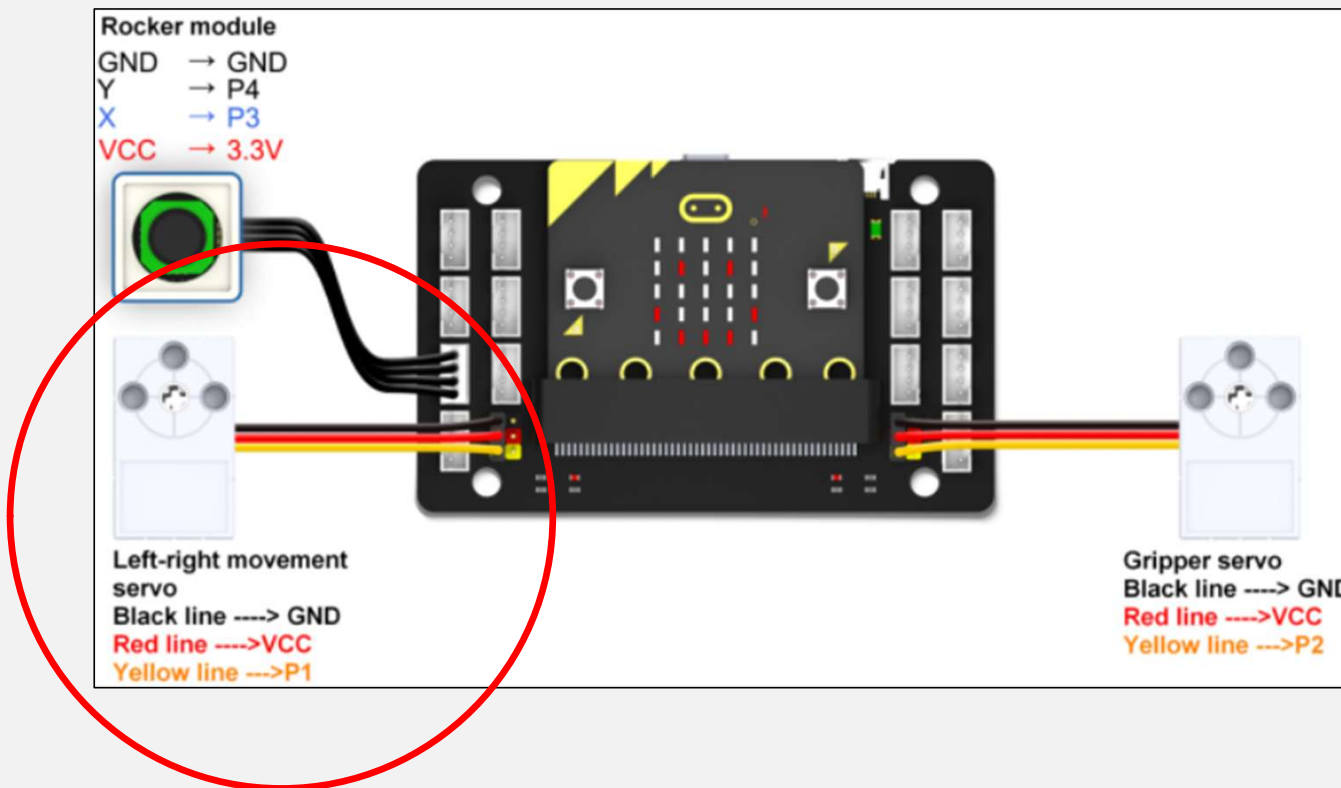
810

Step 58



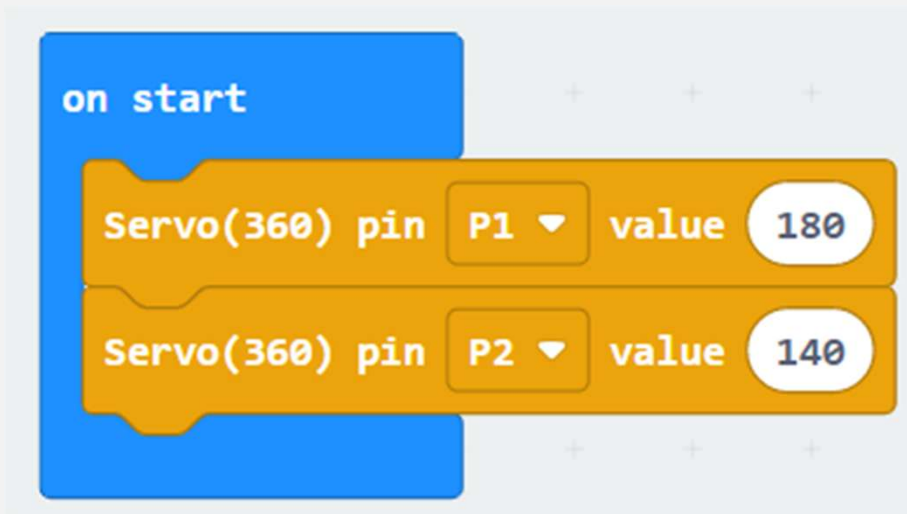
811

Step 58 – Set Servo P1



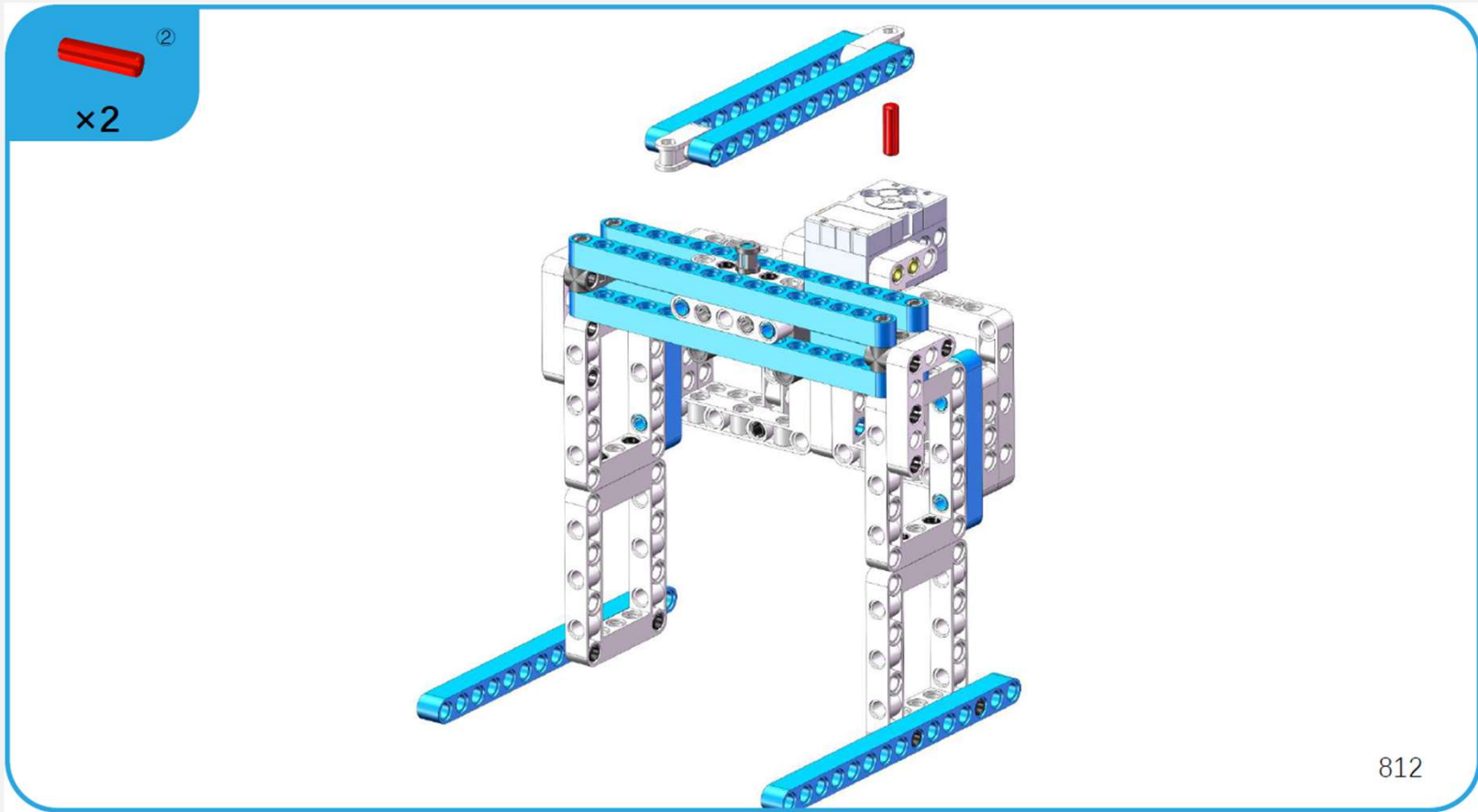
Let's plug in the servo to P1, then we need to set the servo program to make it go to starting position at 180.

Step 58 - Set Servo P1 to middle position

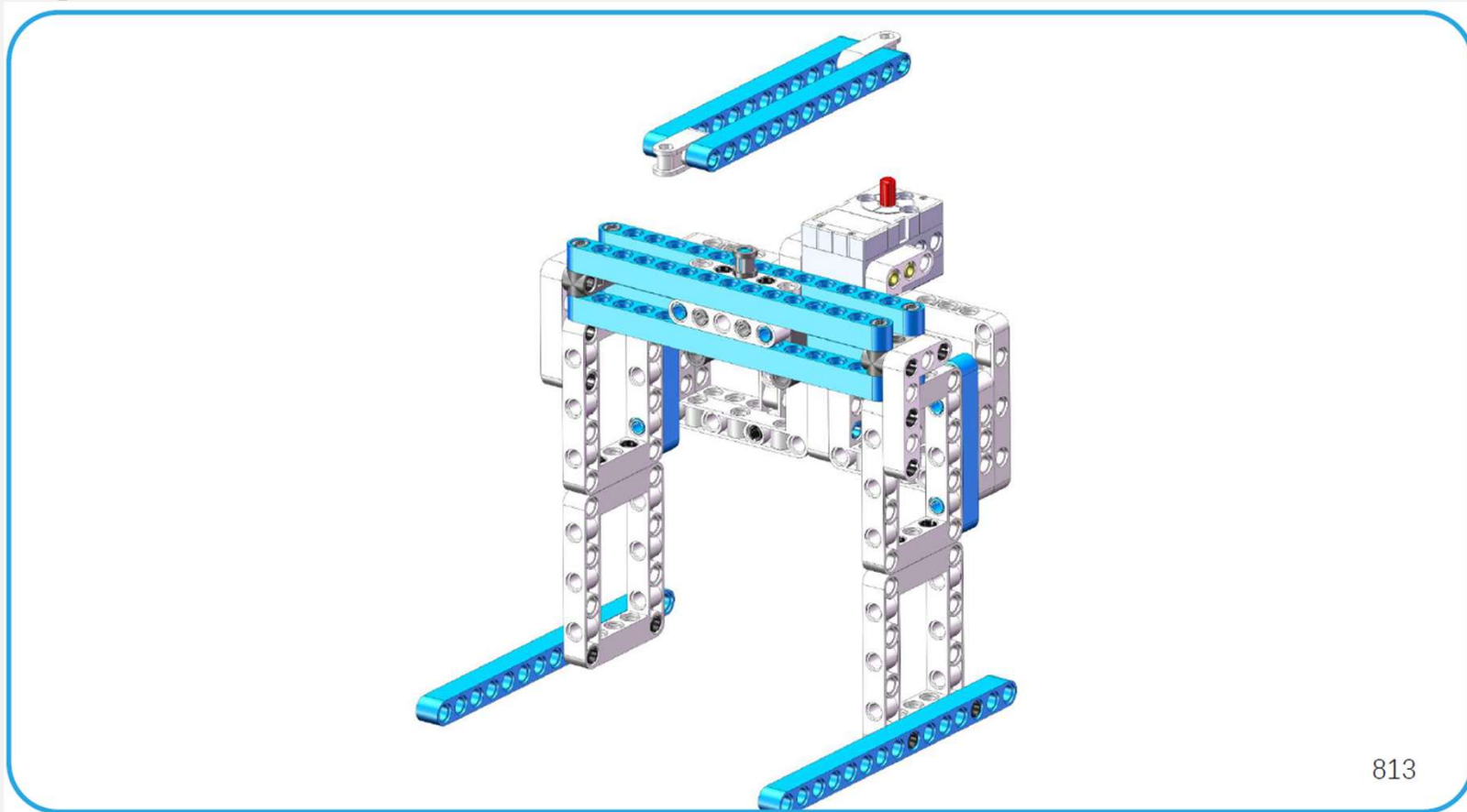


Add in Servo P1 and set the value to 180, then download this script to your microbit.

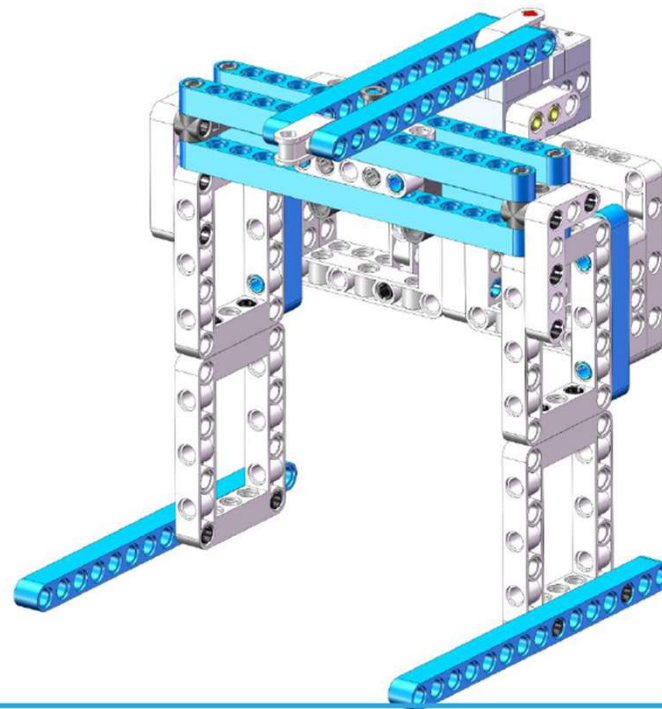
Step 59



Step 60

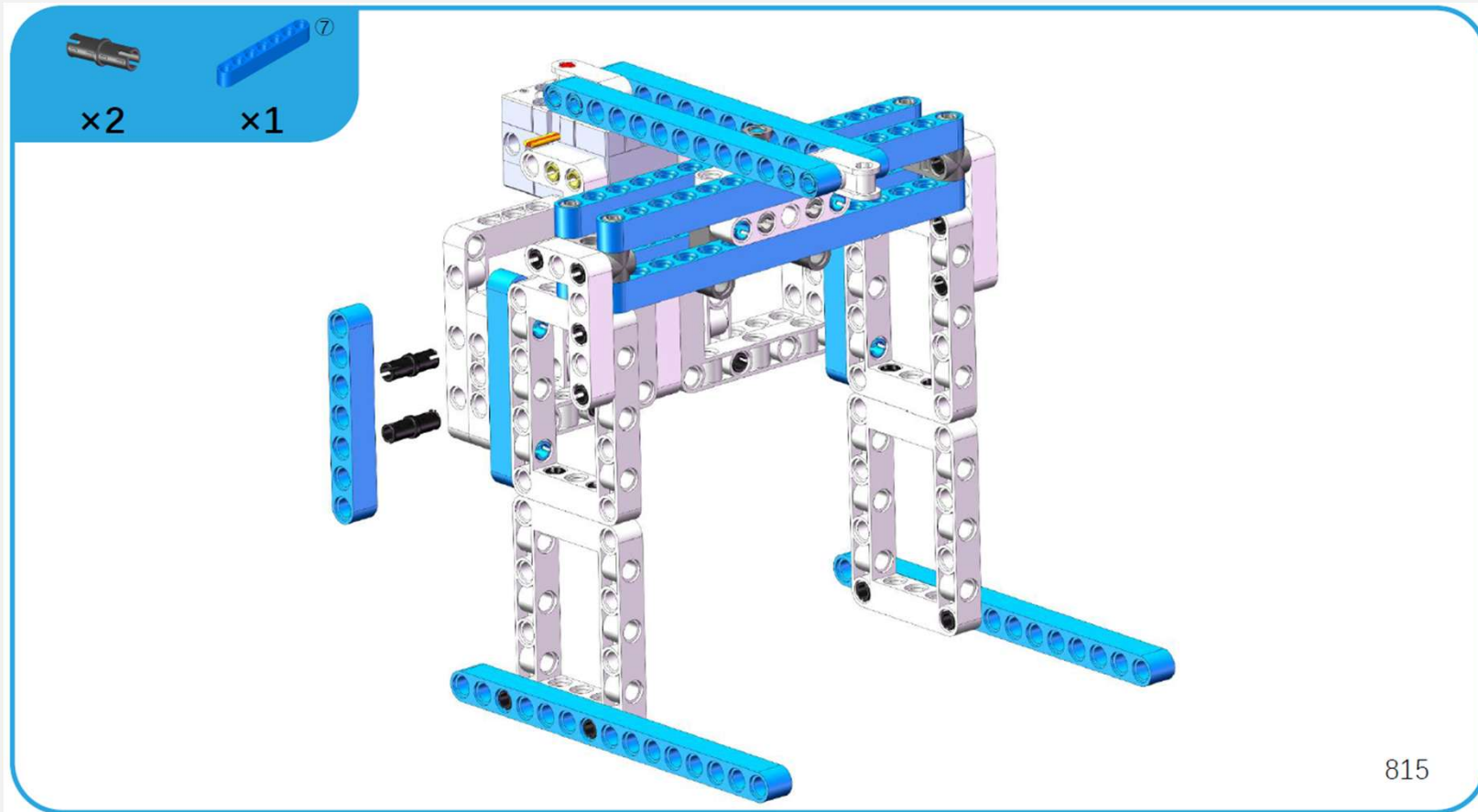


Step 61

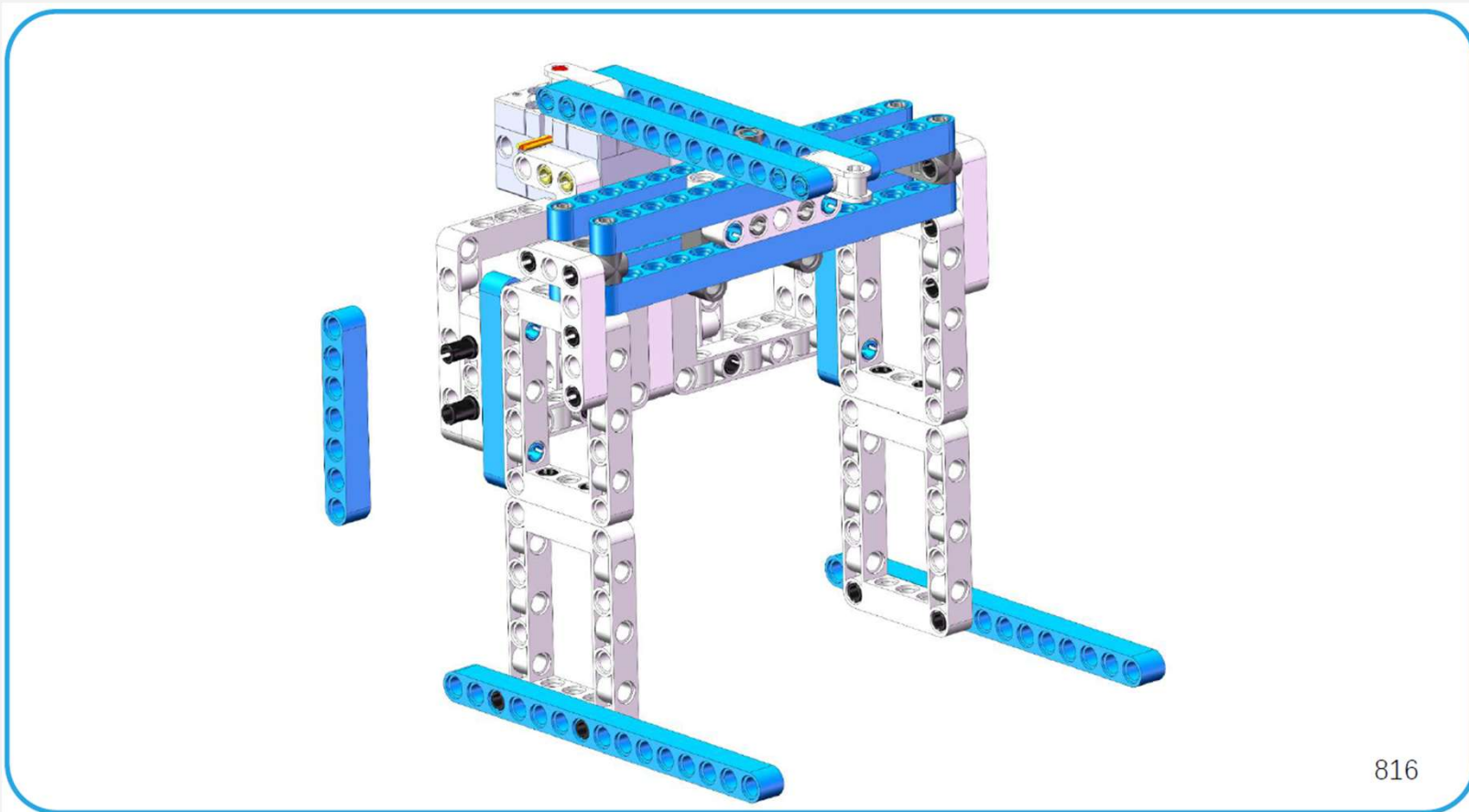


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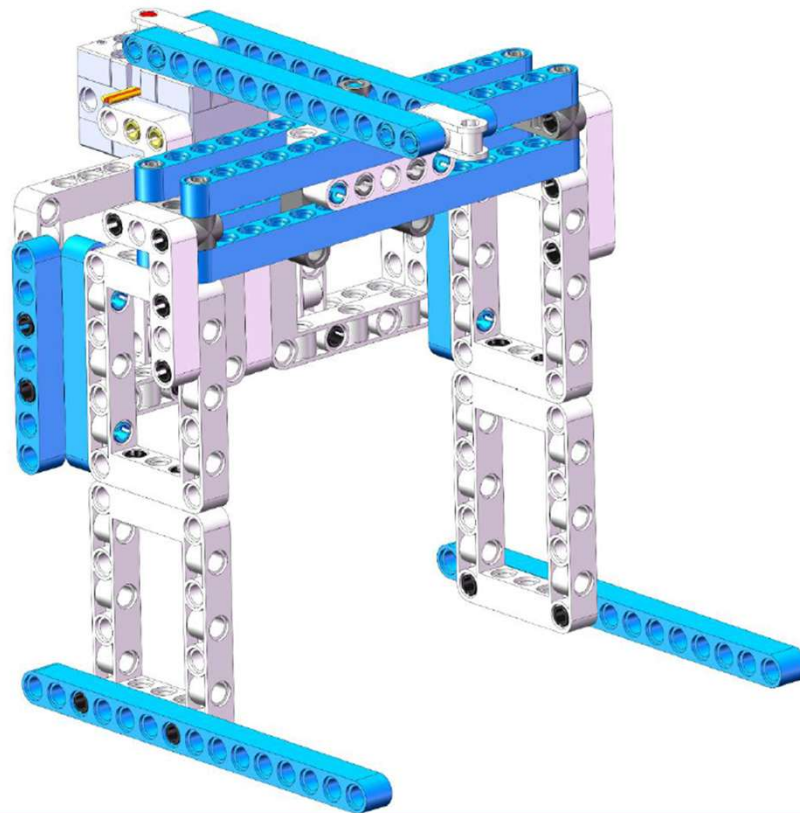
Step 62



Step 63

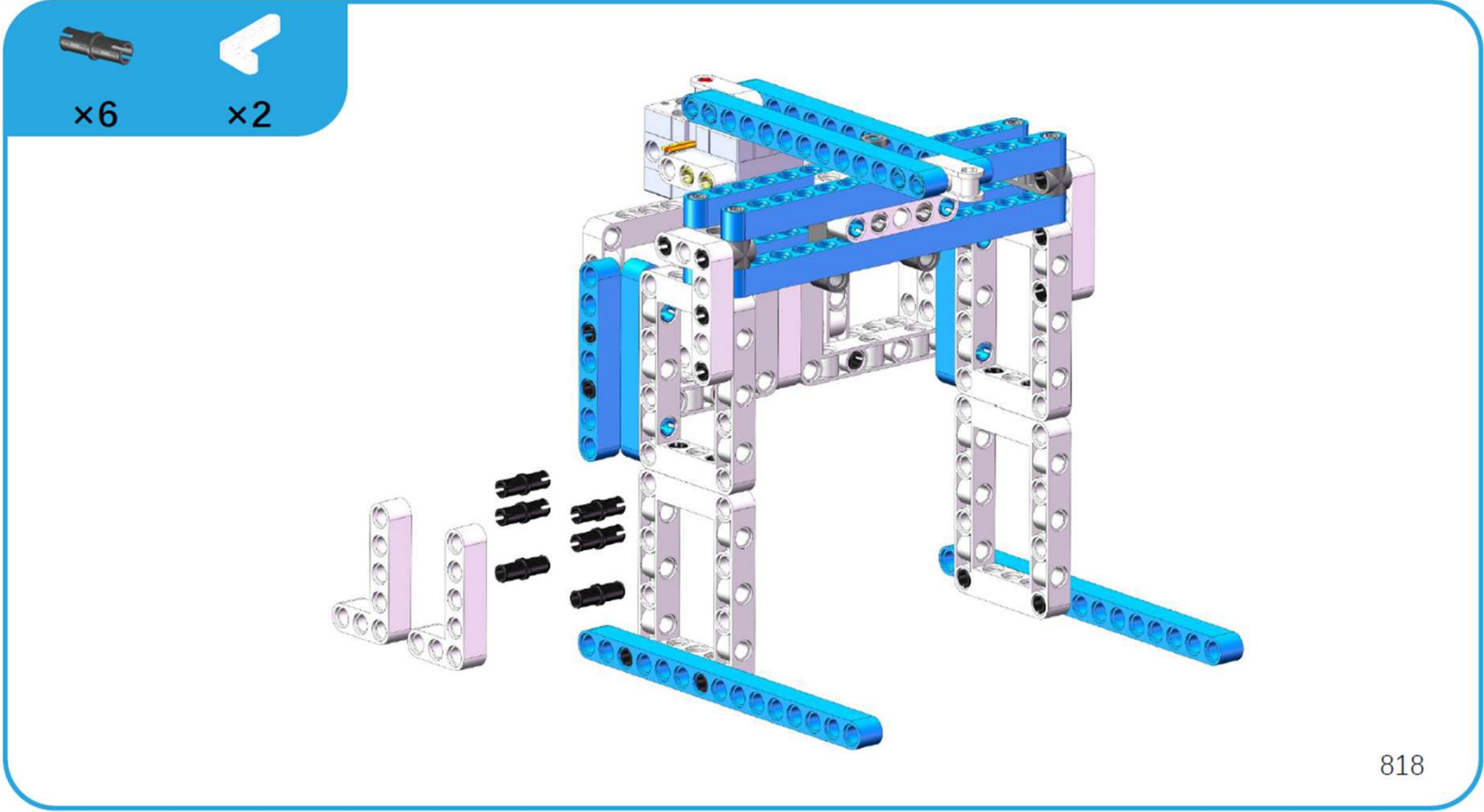


Step 64

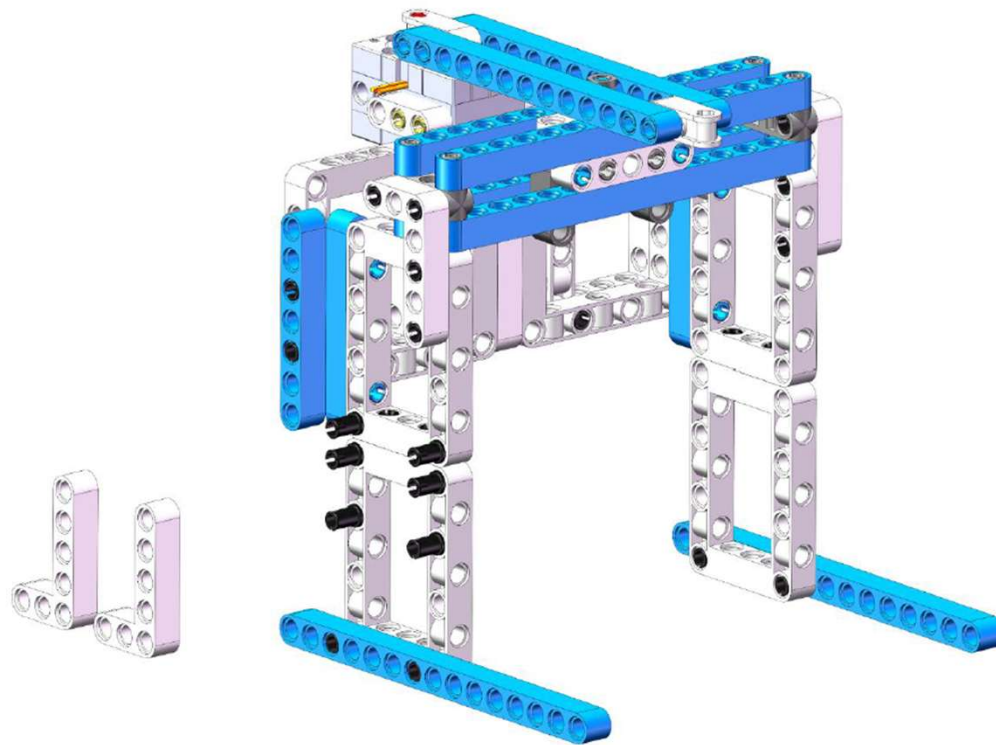


817

Step 65

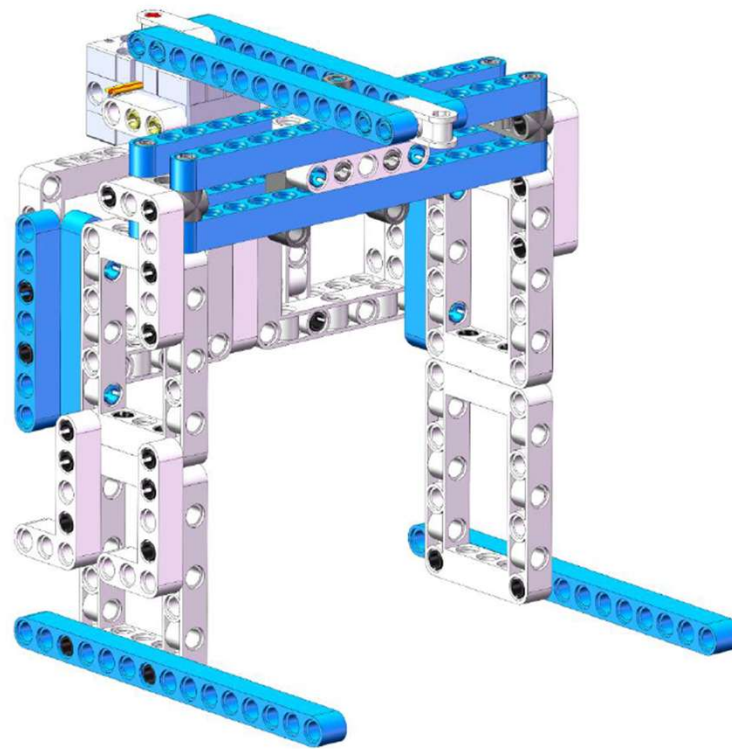


Step 66



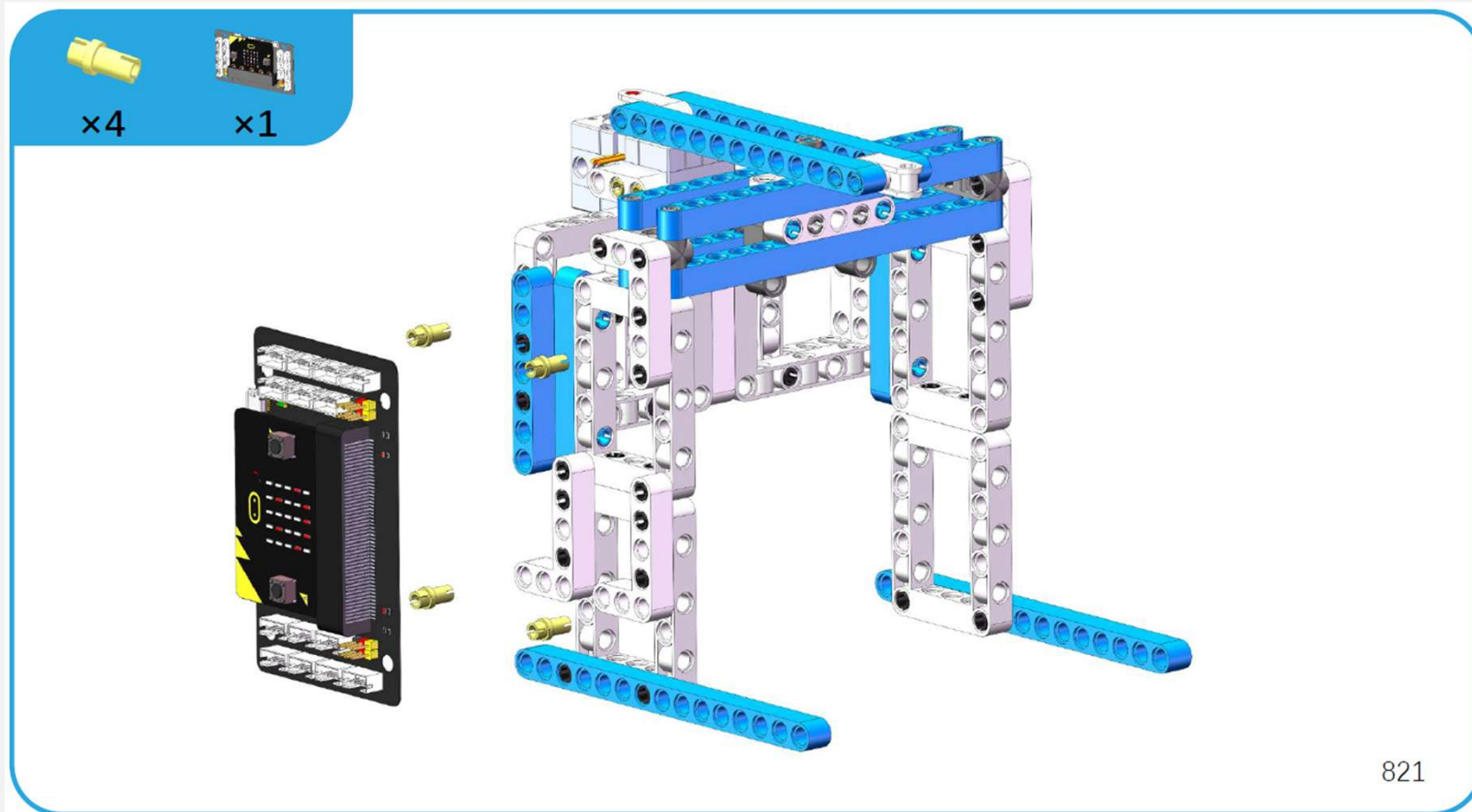
819

Step 67

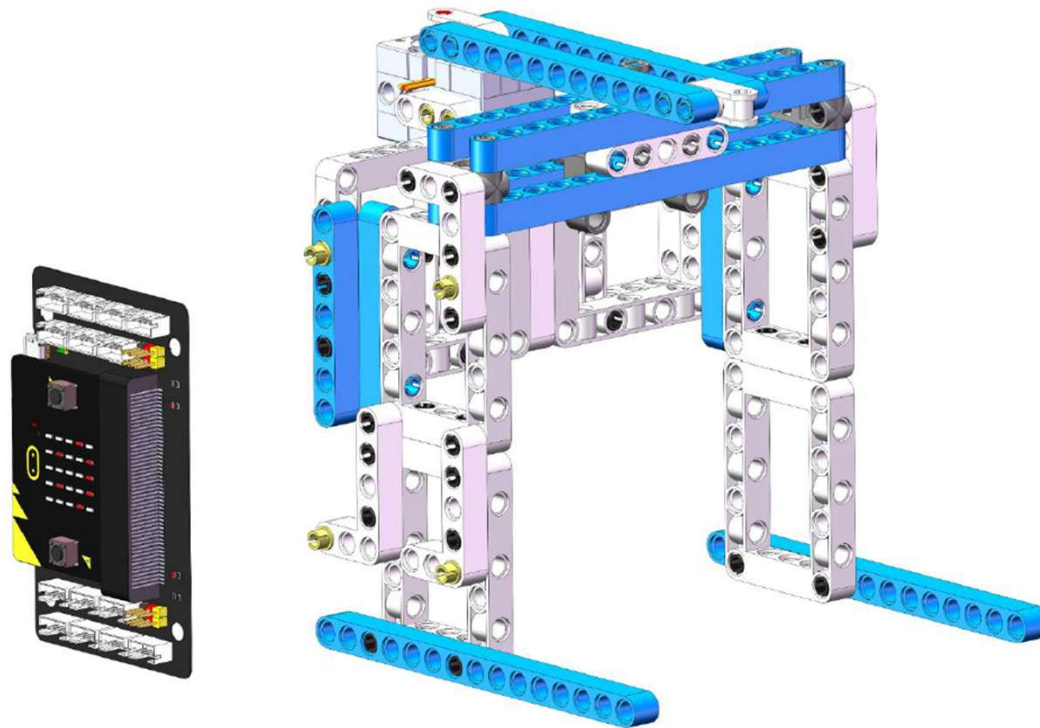


820

Step 68

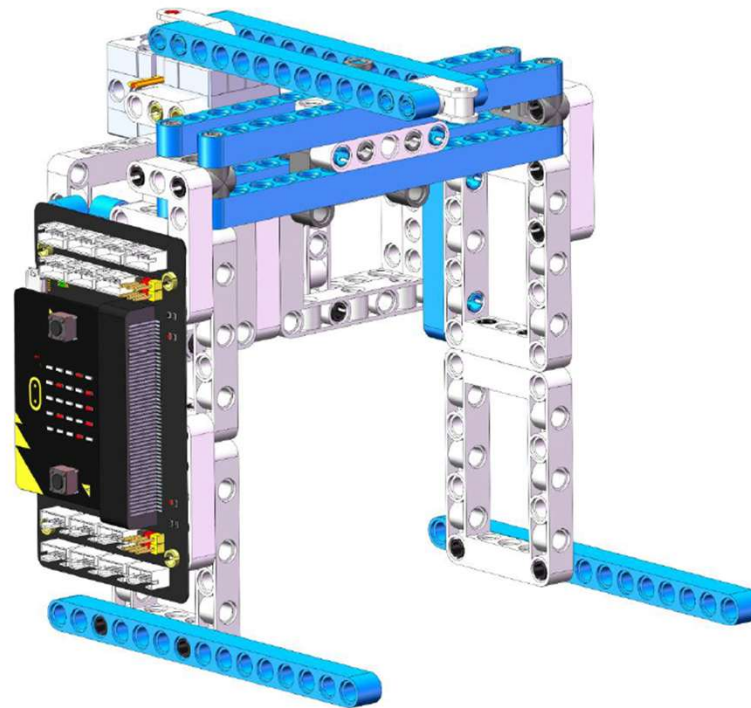


Step 69



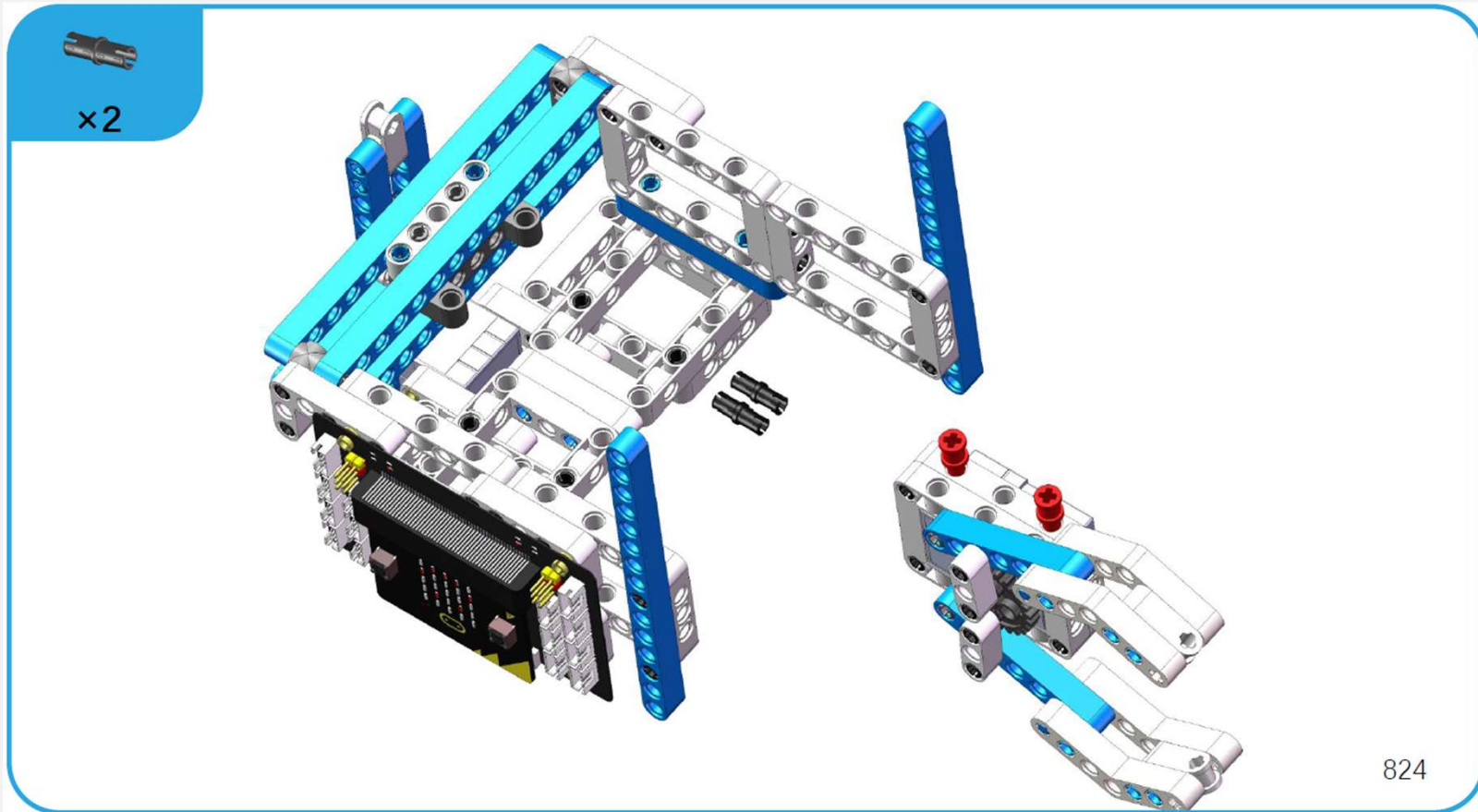
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Step 70



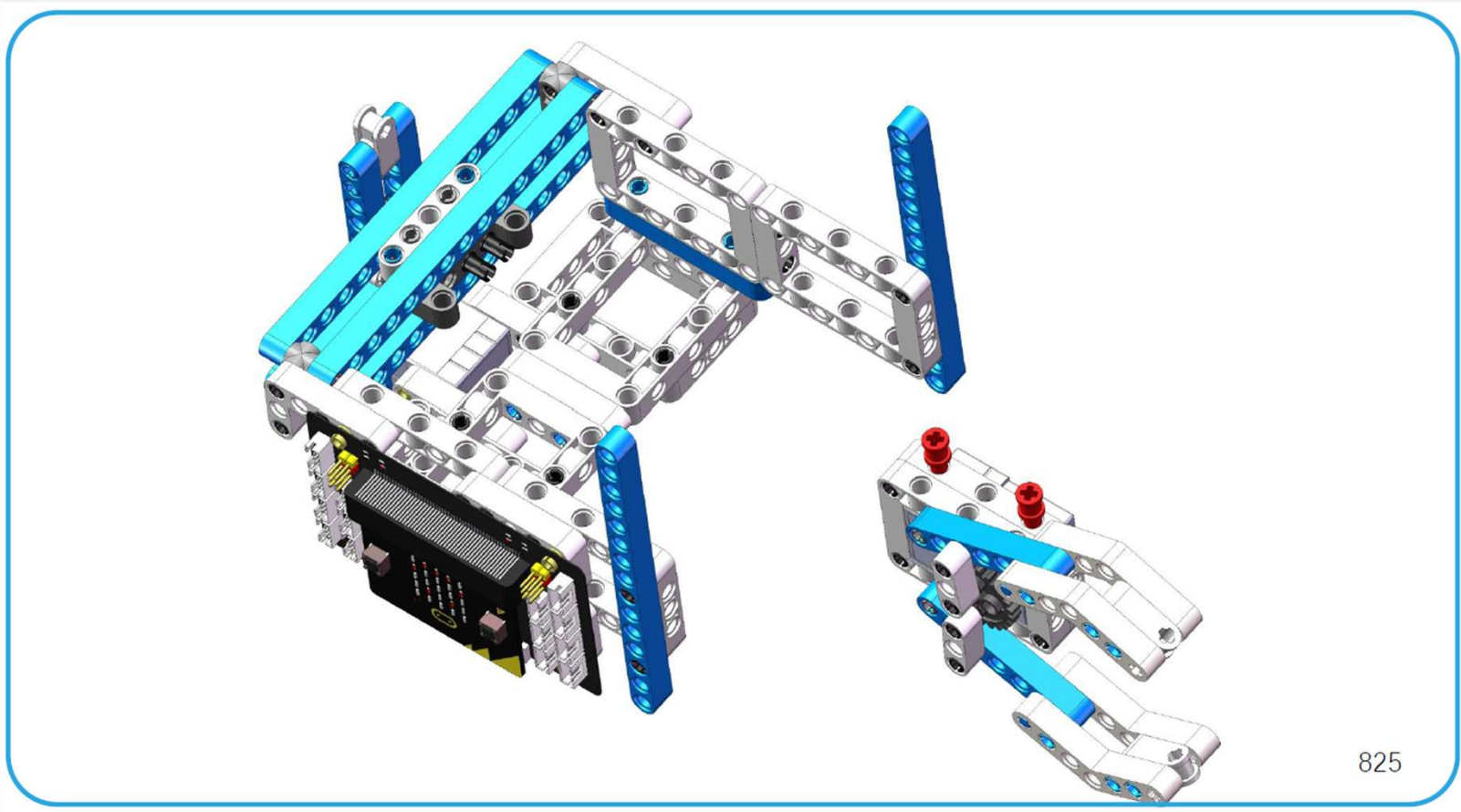
823

Step 71



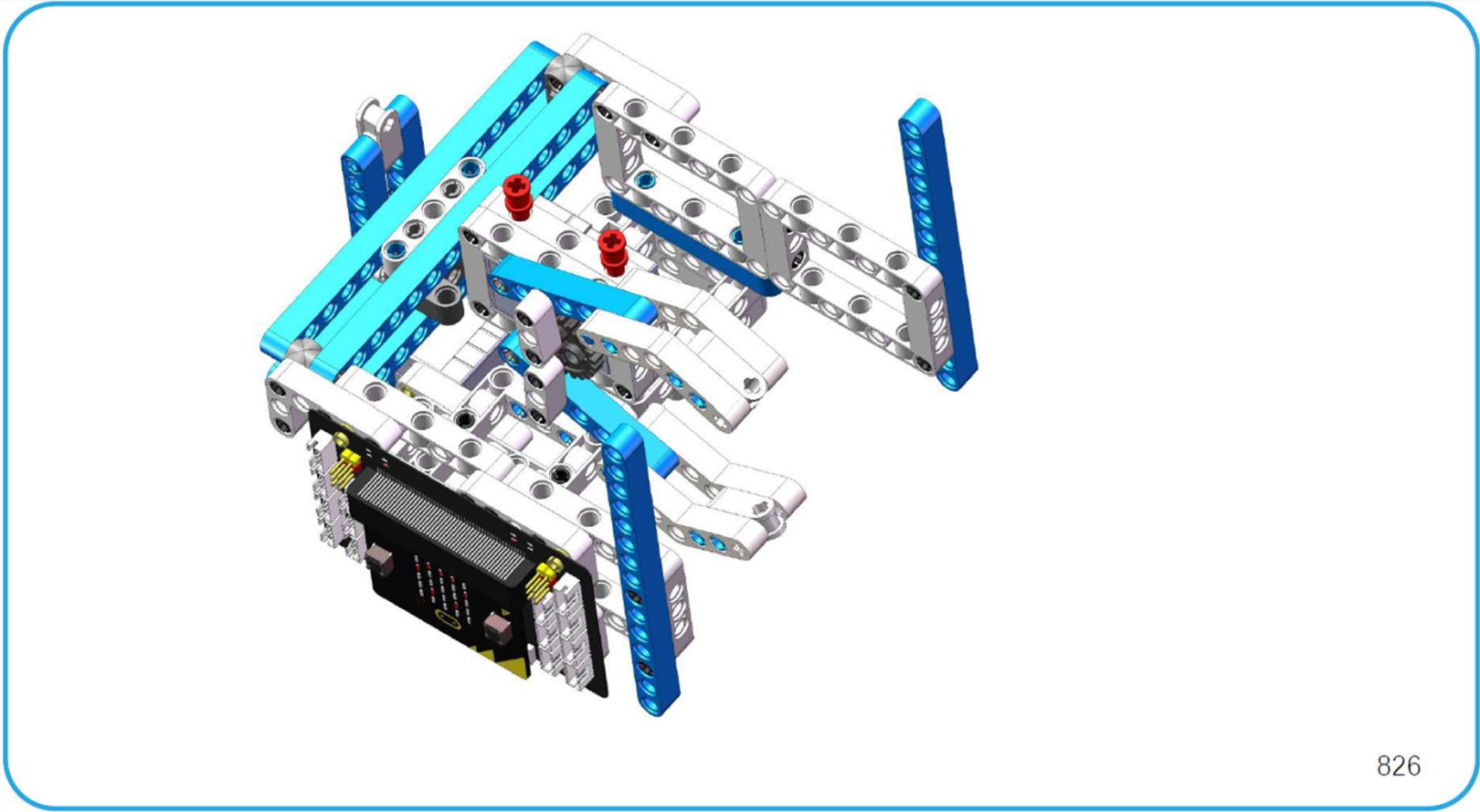
824

Step 72



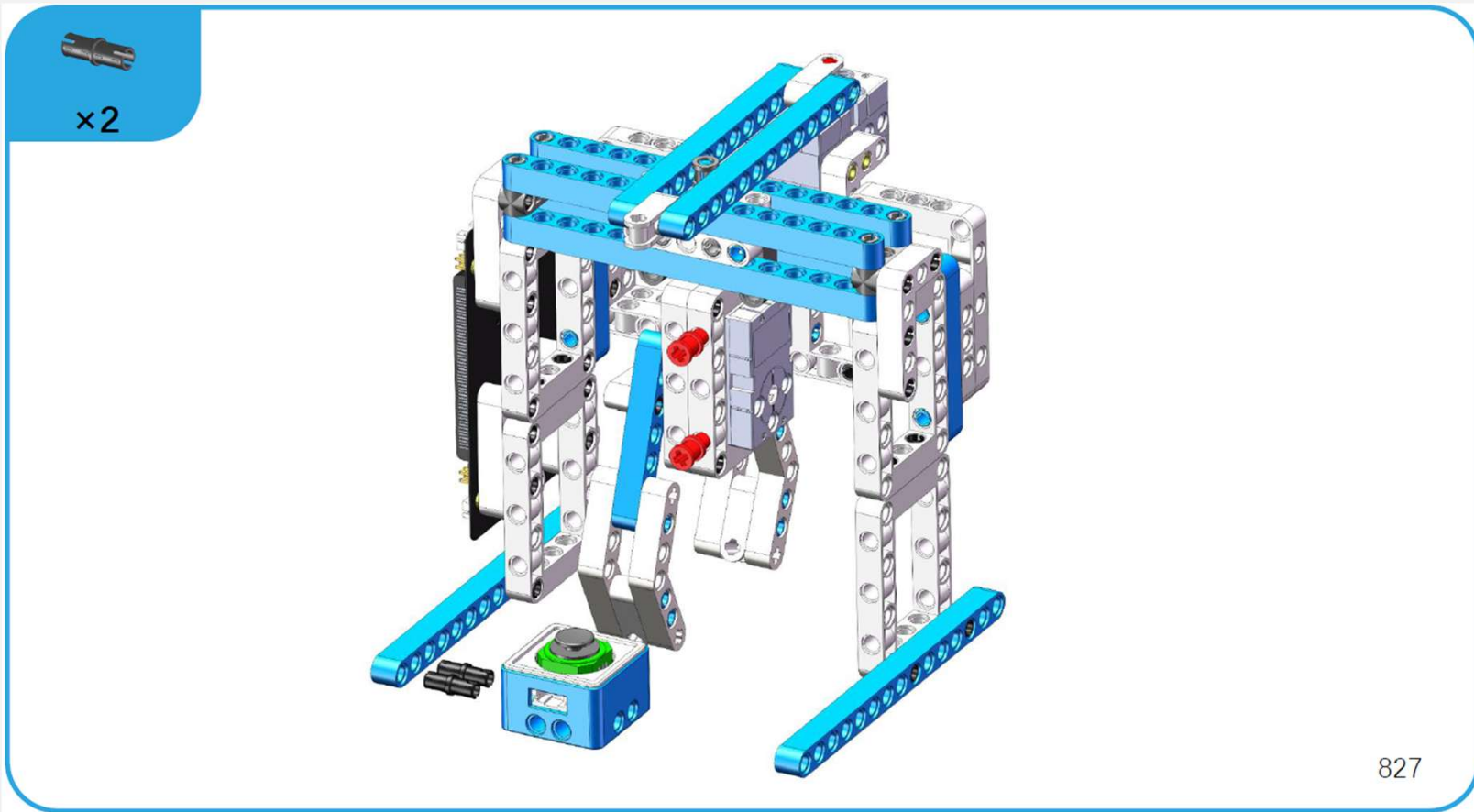
825

Step 73



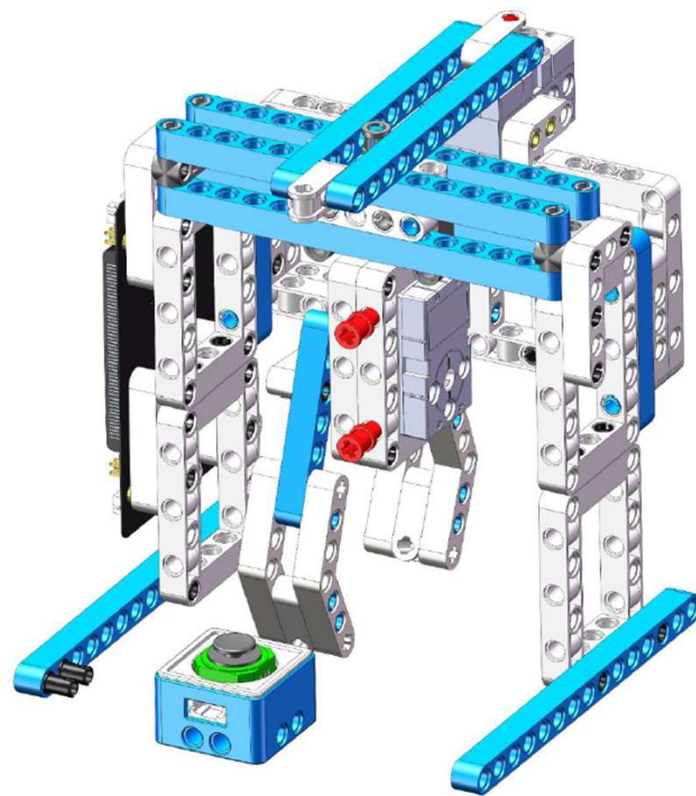
826

Step 74



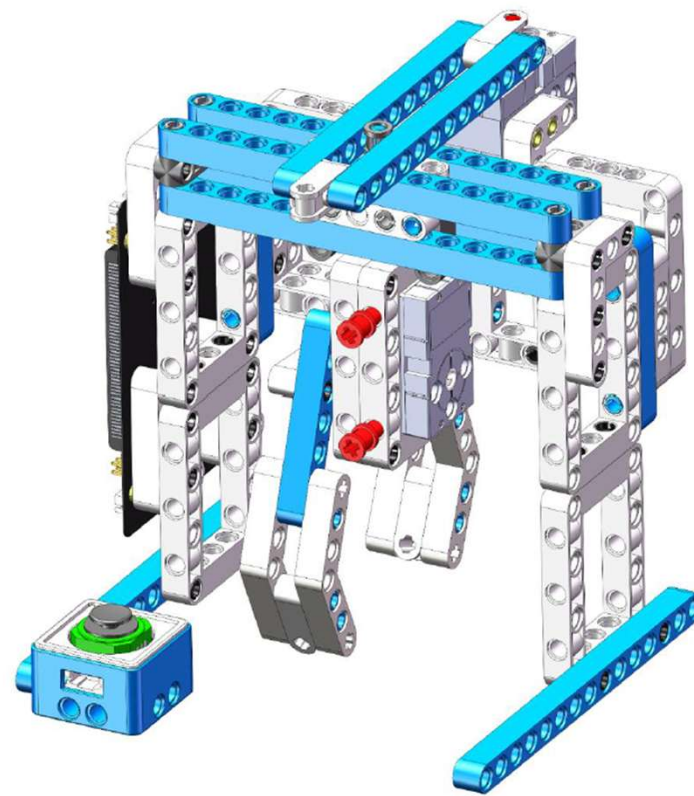
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Step 75



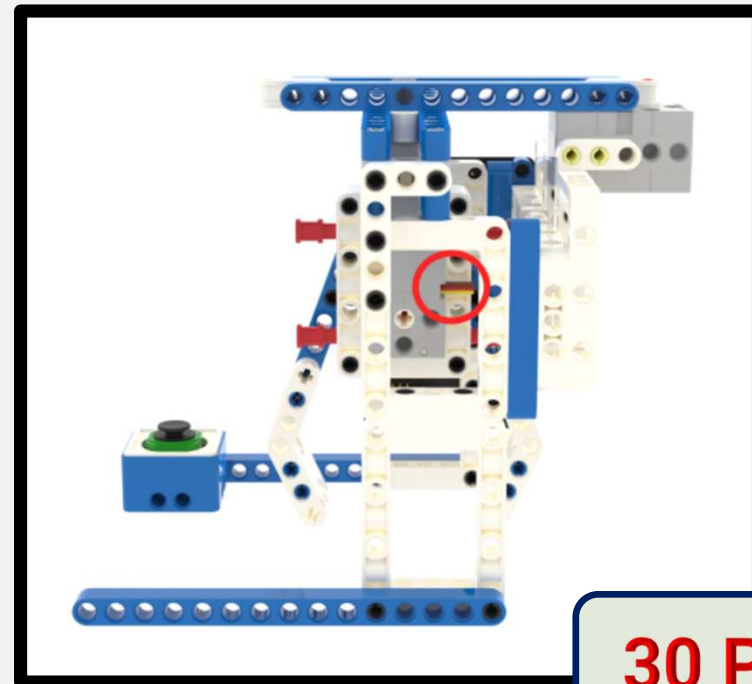
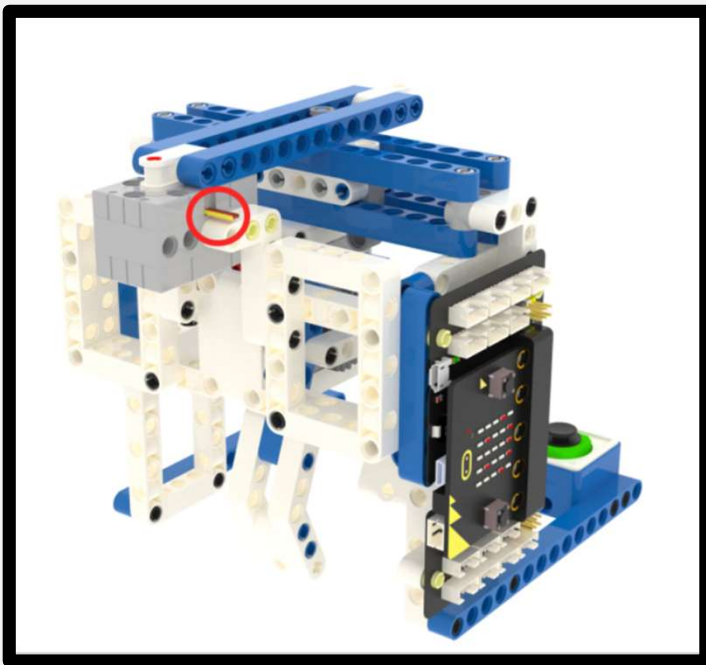
828

Step 76



829

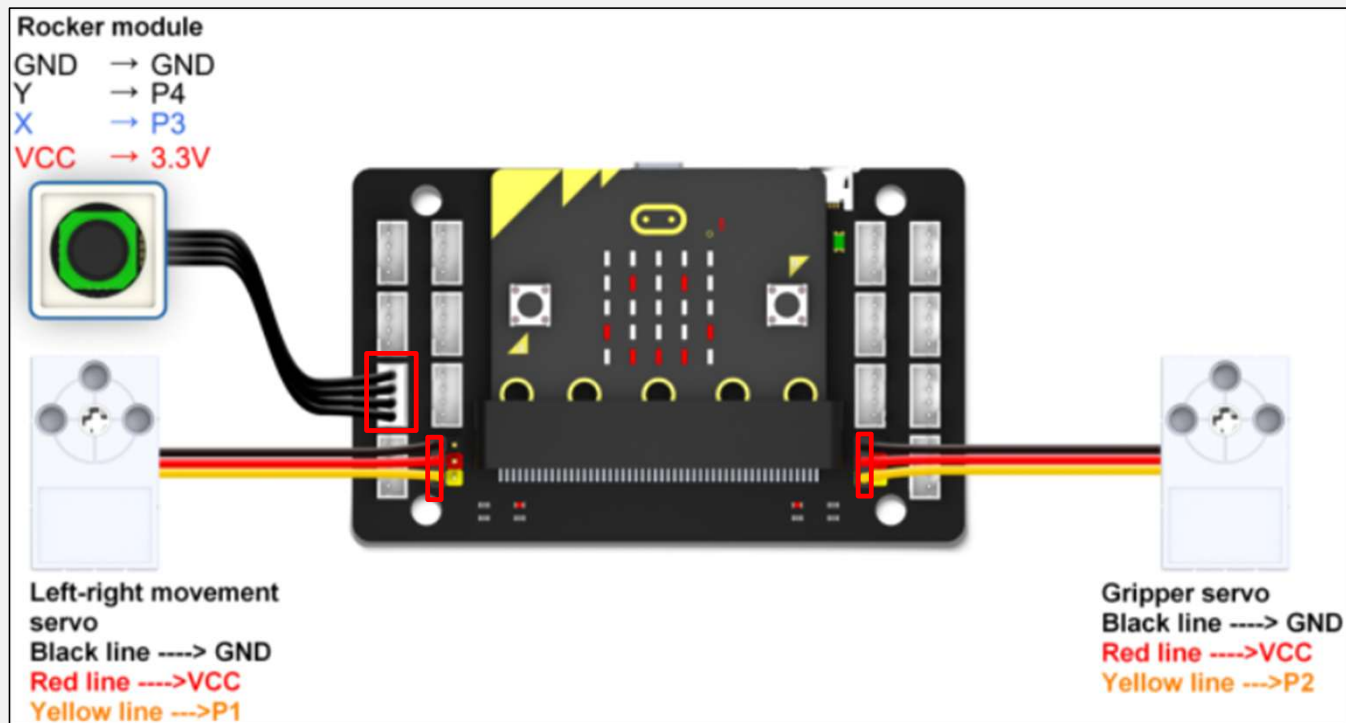
Please make sure that the wiper shaft is installed **correctly**, as shown below.



30 Points

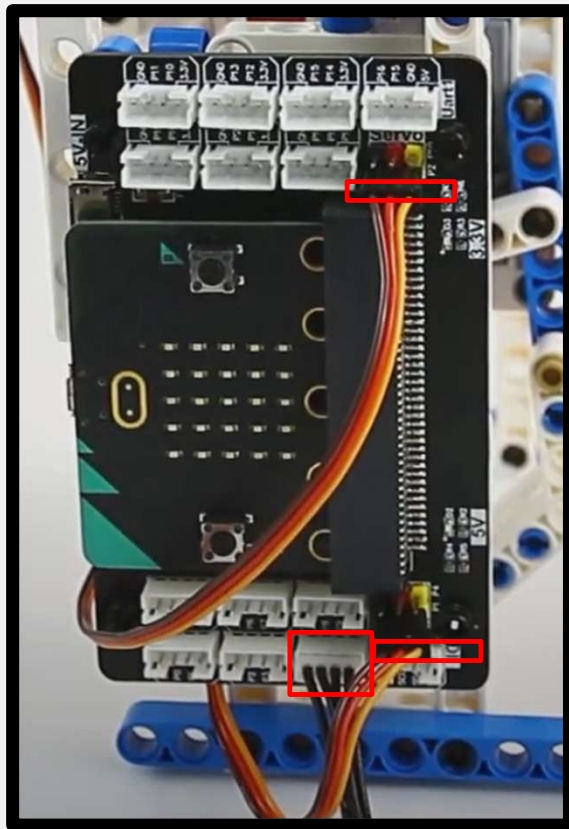
Wire Connection

Connect the modules



Let's **connect** the module like this.

Connect the modules



10 Points

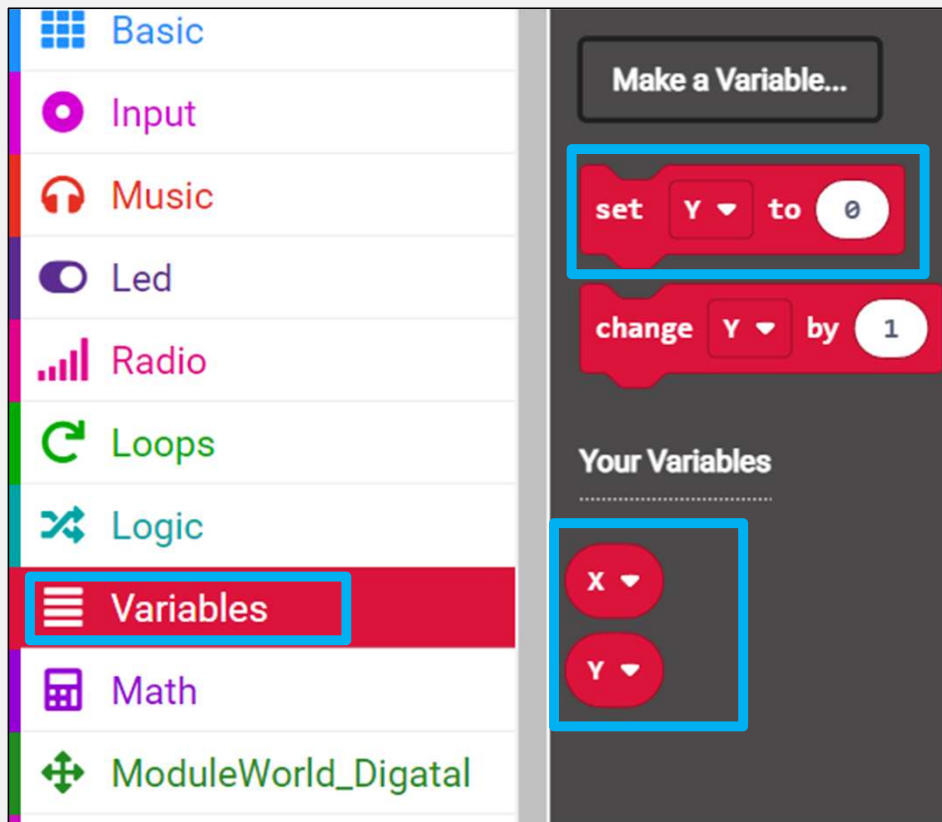
Let's **connect** the module like this.

MakeCode Programming

<https://github.com/YahboomTechnology/Module-World>.

Or search [YahboomTechnology/Module-World](https://github.com/YahboomTechnology/Module-World) in the extension block

Coding – Variables



X Variable is to record the position of Left and Right.

Where Y Variable is to record the position of Up and Down (Gripper grip or release).

Coding – On start

```

on start
  led enable false
  set X to 180
  set Y to 140
  Servo(360) pin P1 value X
  Servo(360) pin P2 value Y
  
```

Link variables to the servo P1 and P2 for starting position.

And we will disable led on start so our voltage of other pins won't be affected.

Coding – forever

```
forever
  Servo(360) pin P1 value X
  Servo(360) pin P2 value Y
  if Rocker pin P3P4 value Up then
    change Y by 1
  else if Rocker pin P3P4 value Down then
    change Y by -1
  else if Rocker pin P3P4 value Left then
    change X by 1
  else if Rocker pin P3P4 value Right then
    change X by -1
```

Add in rocker control

Coding – forever



```
forever
  if X < 150 then
    set X to 150
  else if X > 207 then
    set X to 207
  else if Y < 70 then
    set Y to 70
  else if Y > 140 then
    set Y to 140
```

To ensure the safety of the servo and overturn is not allowed, we will set minimum and maximum for both X and Y to protect the servos.

Coding - Overview



```
on start
  led enable false
  set X to 180
  set Y to 140
  Servo(360) pin P1 value X
  Servo(360) pin P2 value Y
```

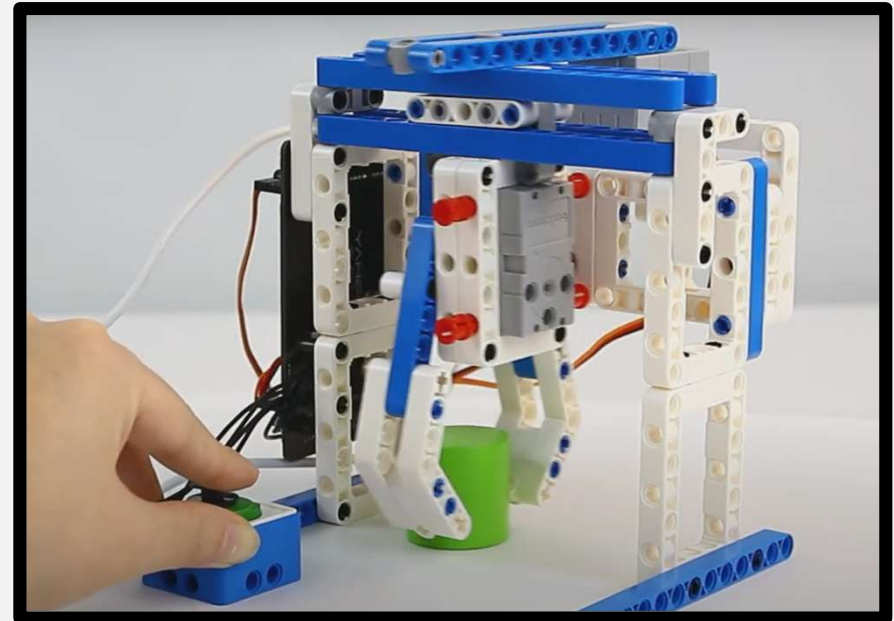
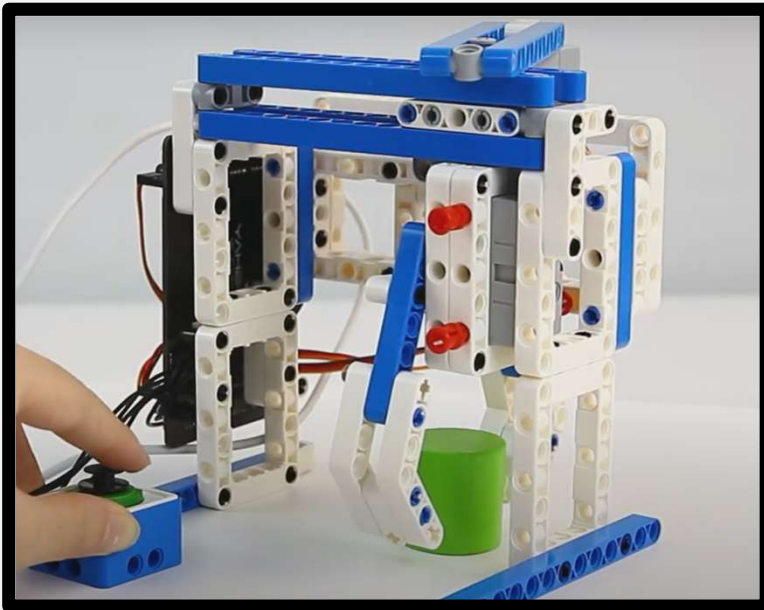
```
forever
  Servo(360) pin P1 value X
  Servo(360) pin P2 value Y
  if Rocker pin P3P4 value Up then
    change Y by 1
  else if Rocker pin P3P4 value Down then
    change Y by -1
  else if Rocker pin P3P4 value Left then
    change X by 1
  else if Rocker pin P3P4 value Right then
    change X by -1
```

```
forever
  if X < 150 then
    set X to 150
  else if X > 207 then
    set X to 207
  else if Y < 70 then
    set Y to 70
  else if Y > 140 then
    set Y to 140
```

Phenomenon

After the program is downloaded successfully. We **control** UFO catcher **movement** and **Gripping-release** by rocker module.

30 Points



CHALLENGE

for : Lesson 5



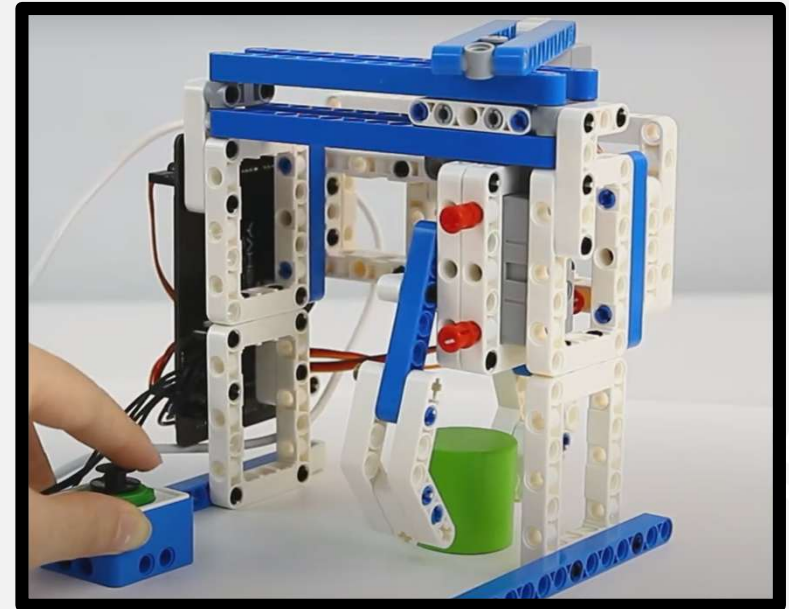
L5 – Challenge 1

Explain about how your UFO Catcher work.

Can you give an example of how this can be applied in real-life?

Briefly explain about how the coding works.

30 Points



L5 – Challenge 2

After the program is downloaded successfully.

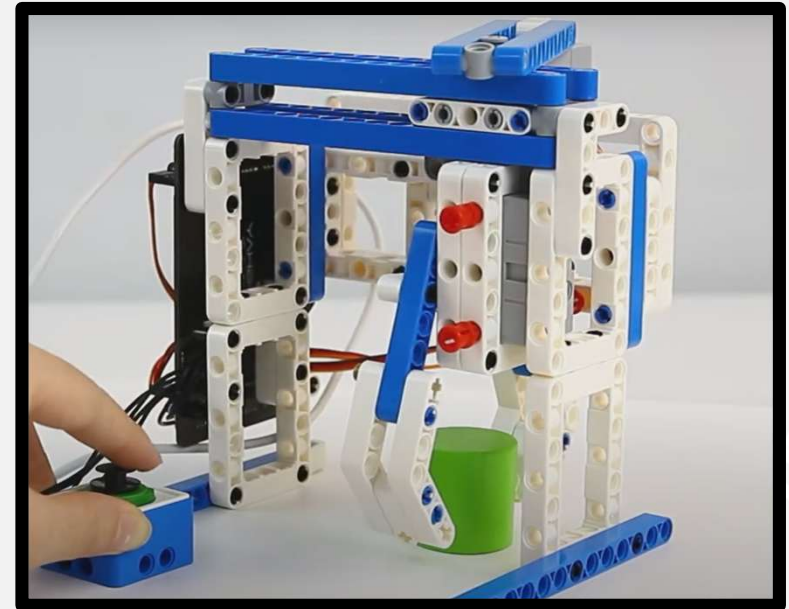
Add **button** module.

Use the button to control the **Gripping-release**

Example:

When the button is pressed, the UFO catcher will **grip**

When the button is pressed again, it will **release** the grip



30 Points

L5 – Challenge 3

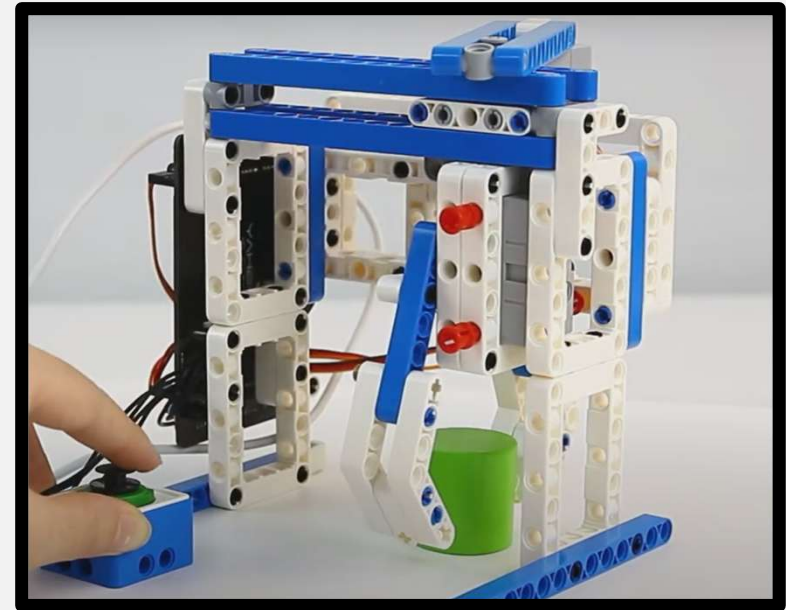
After the program is downloaded successfully.

Use the button module to **control** UFO catcher **movement** and **Gripping-release**.

Example:

When the button is pressed, the UFO catcher will **move** to the **right**, and then **grip**.

When the button is pressed again, the UFO catcher will **move** to the **left**, and it will **release** the grip



30 Points