



Microbit Robotics Beginner Level 2

Lesson 6

Color sorter

Presented by Advanced Superlogic Team

Today's Topic

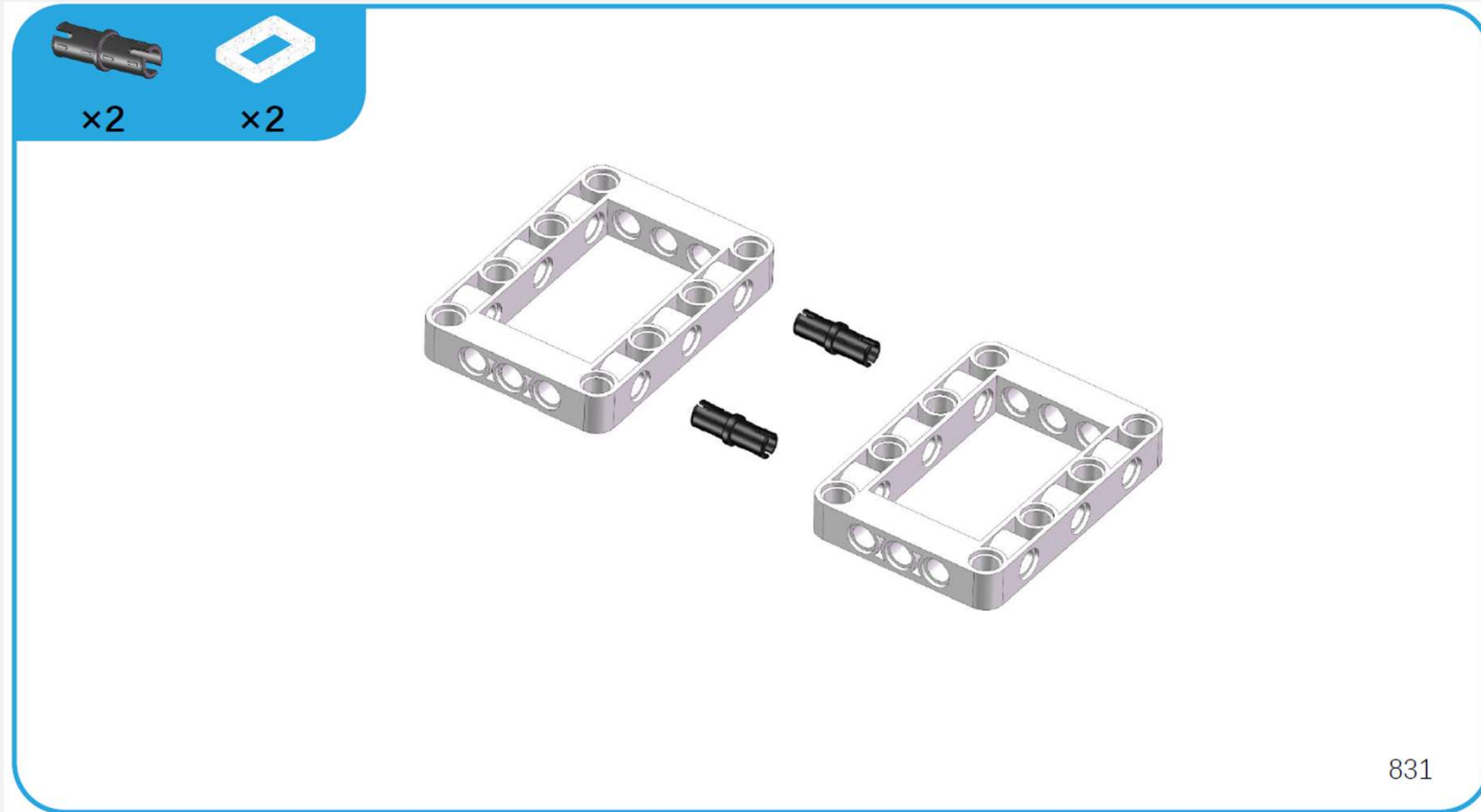
1. **Build Color sorter with World of Modules**
2. **Color recognition and RGB programming**
3. **Servo programming**

Learning Outcome

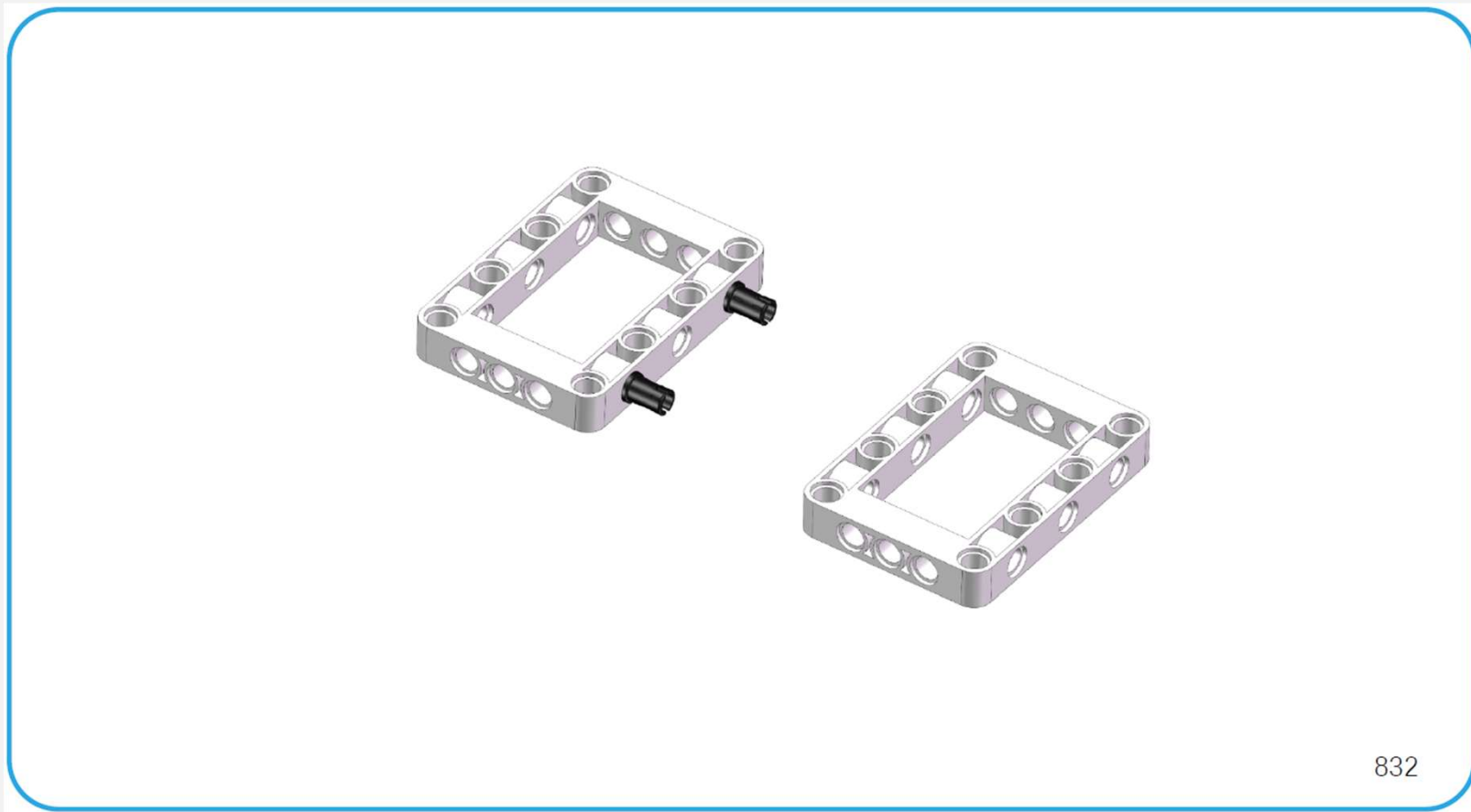
- 1. Able to build Color sorter with instruction manual**
- 2. Understand Color recognition and RGB programming**
- 3. Understand Servo programming work**
- 4. Able to program Color sorter**

Lets build Color sorter

Step 1

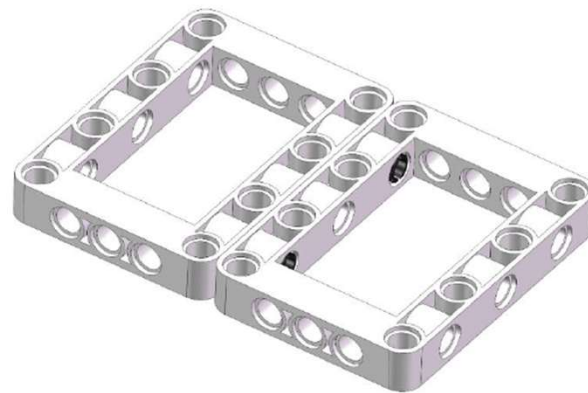


Step 2



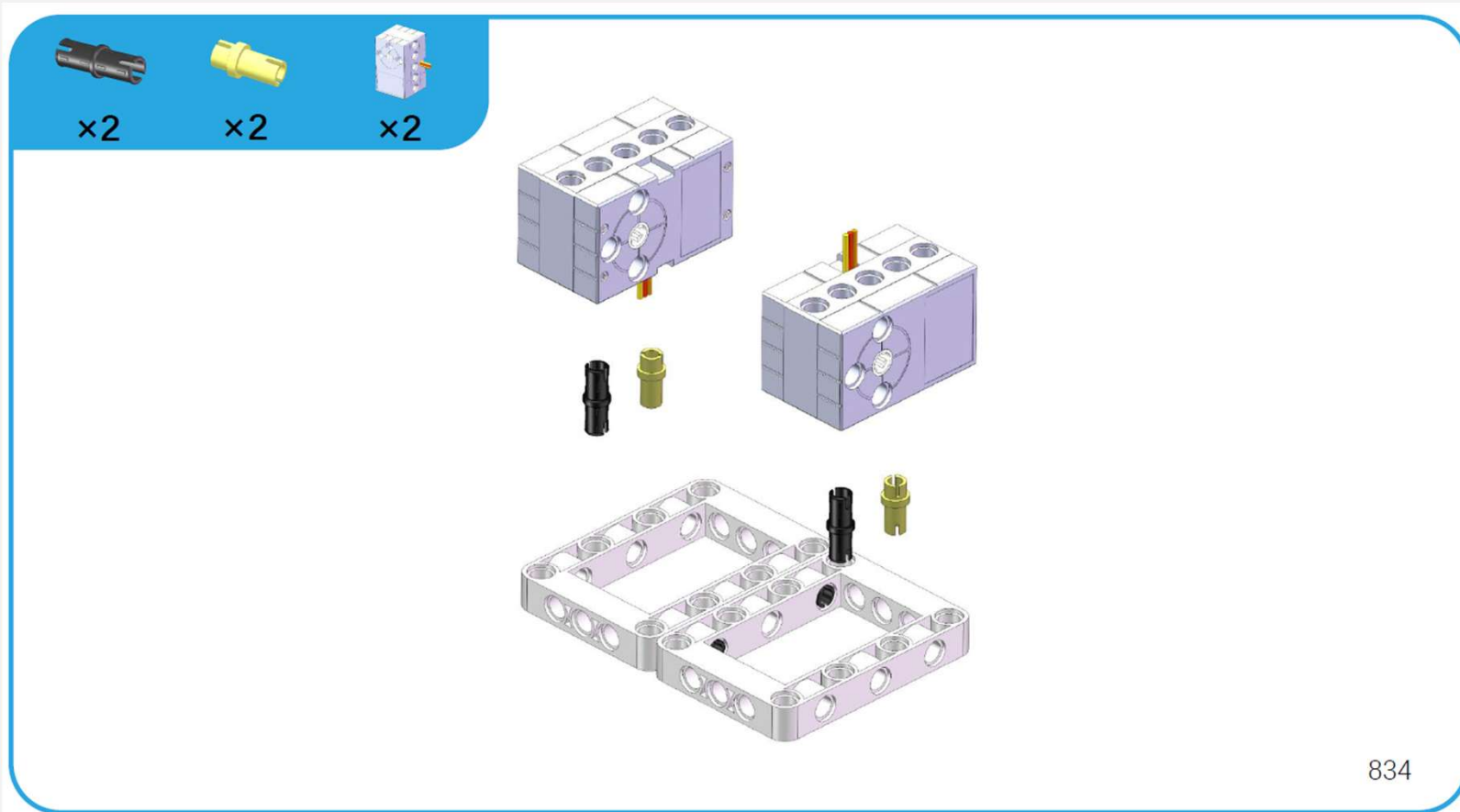
832

Step 3

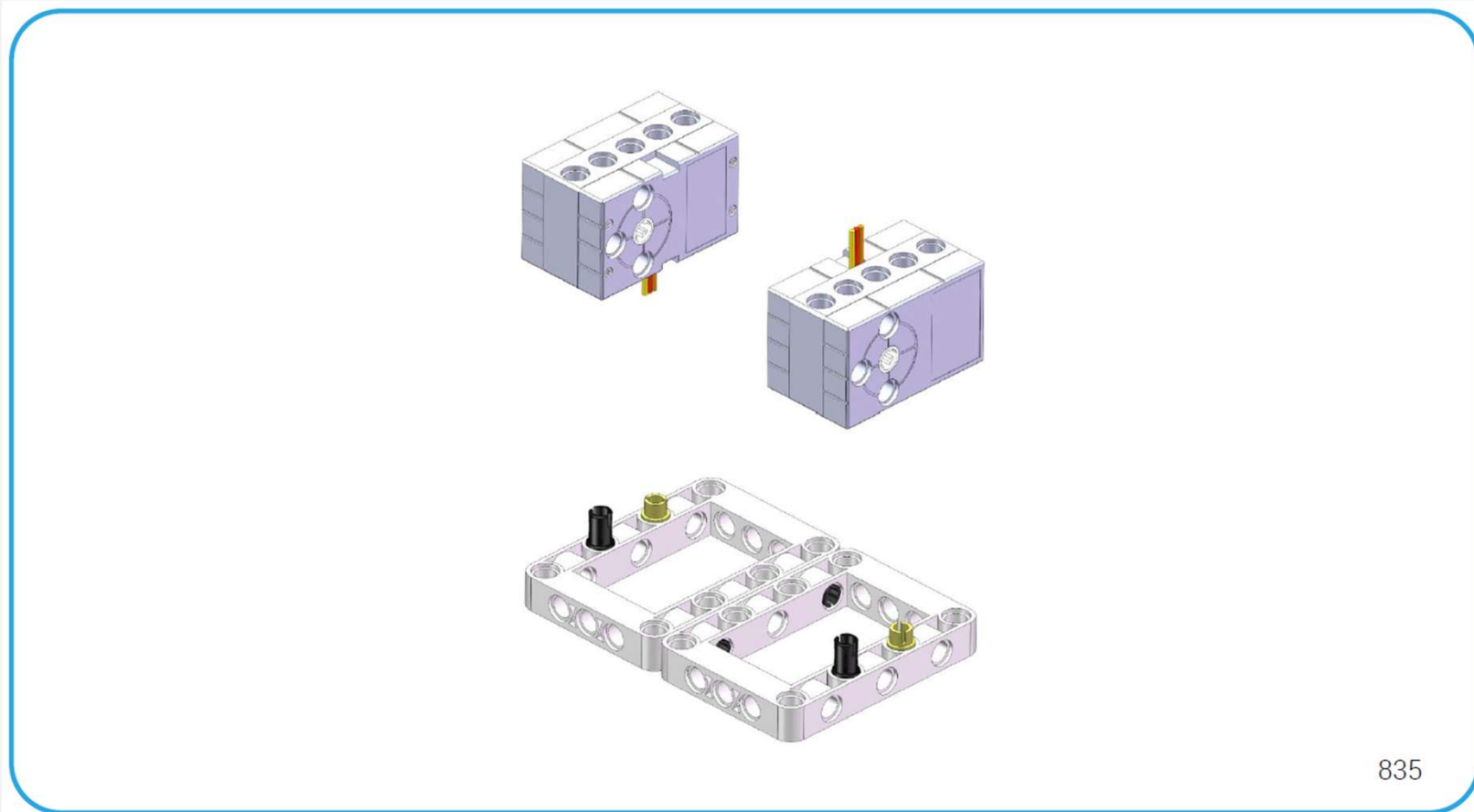


833

Step 4



Step 5



835

Step 7

x1 x1 x1

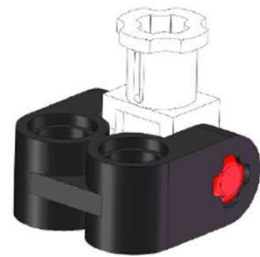
837

Step 8



838

Step 9

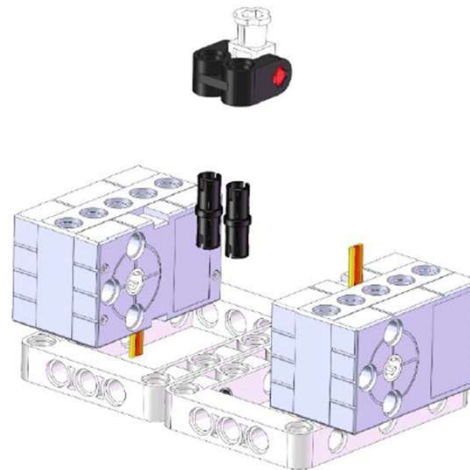


839

Step 10

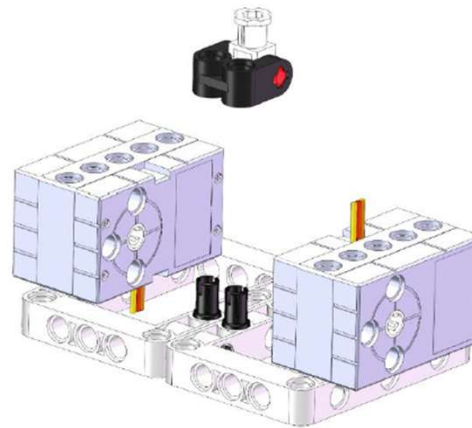


x2



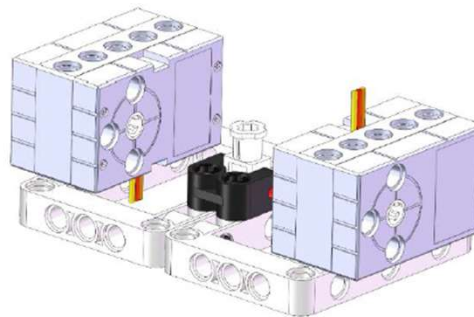
840

Step 11



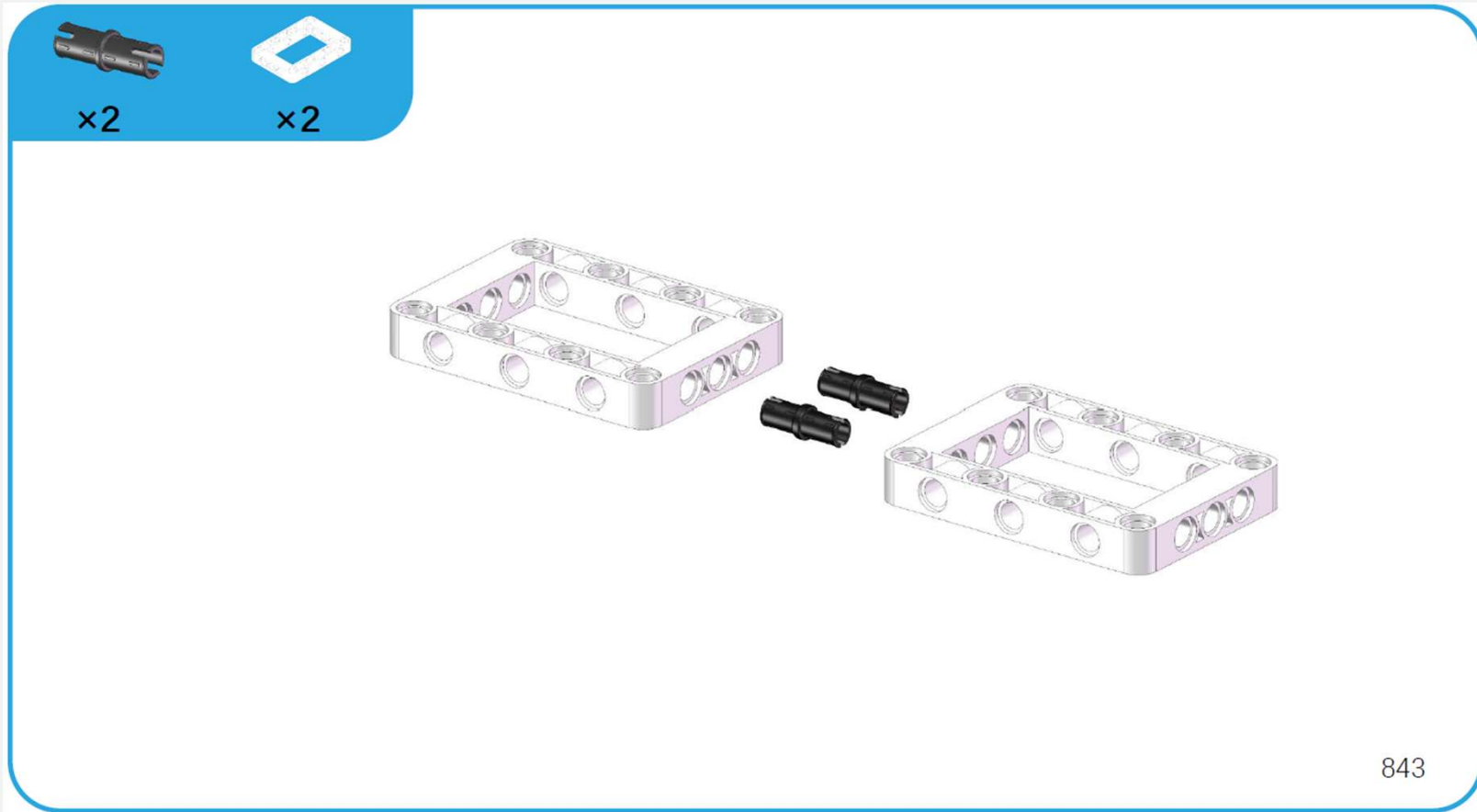
841

Step 12

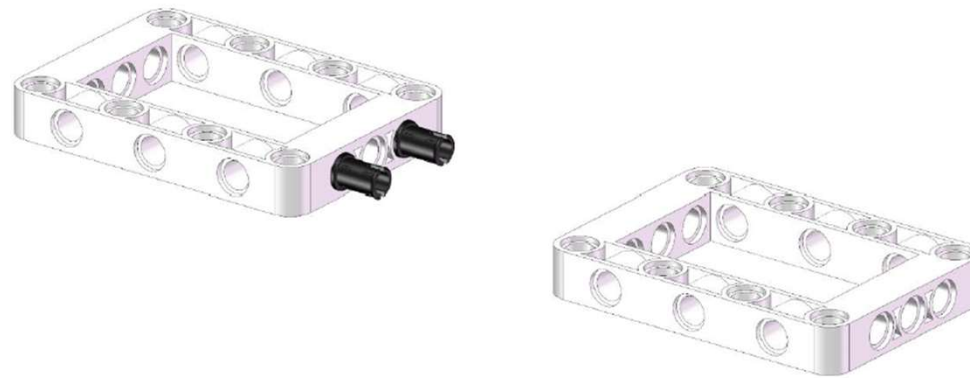


842

Step 13

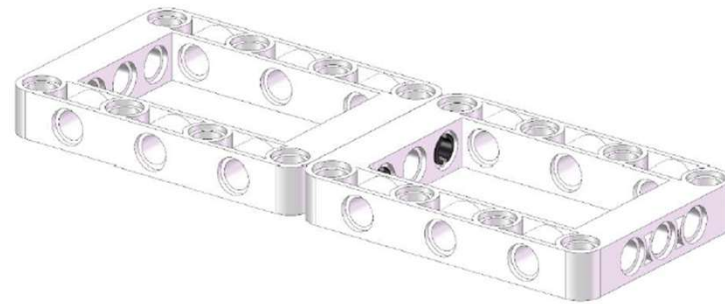


Step 14



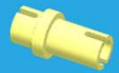
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Step 15

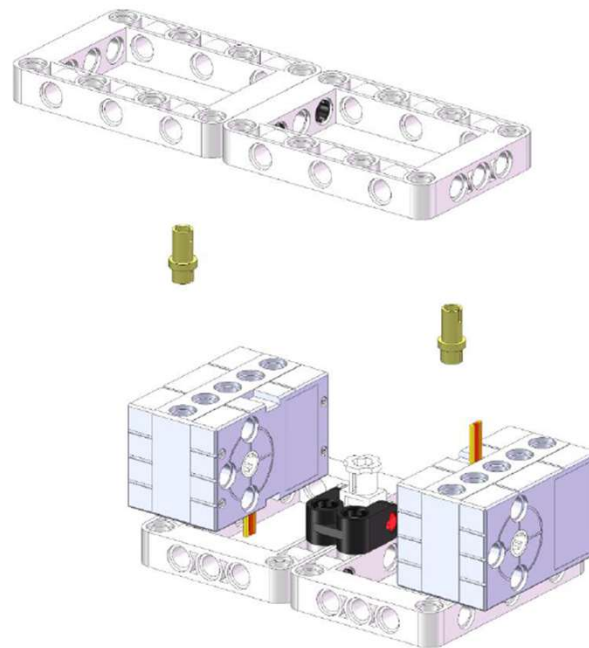


845

Step 16

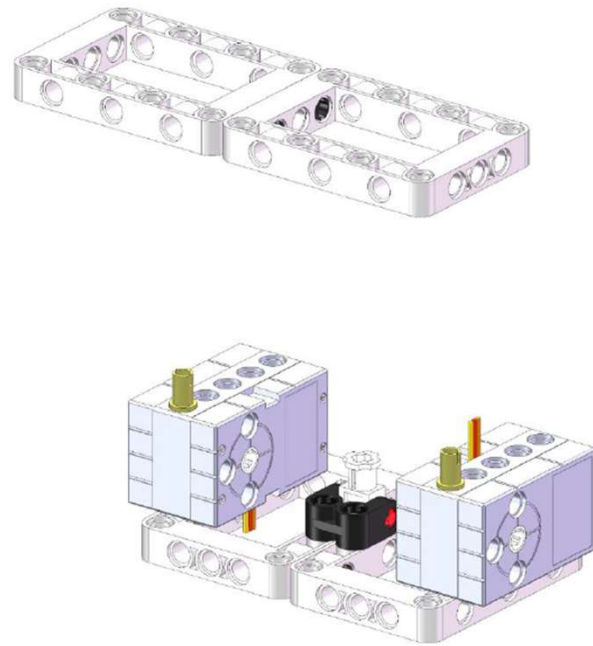


x2



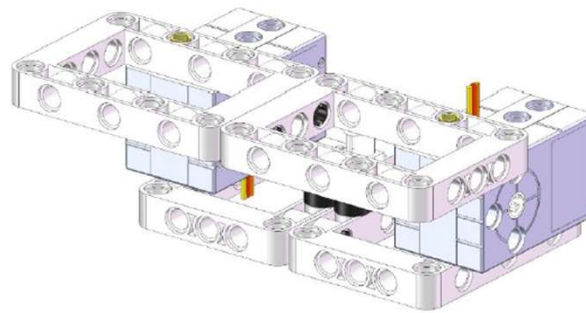
846

Step 17



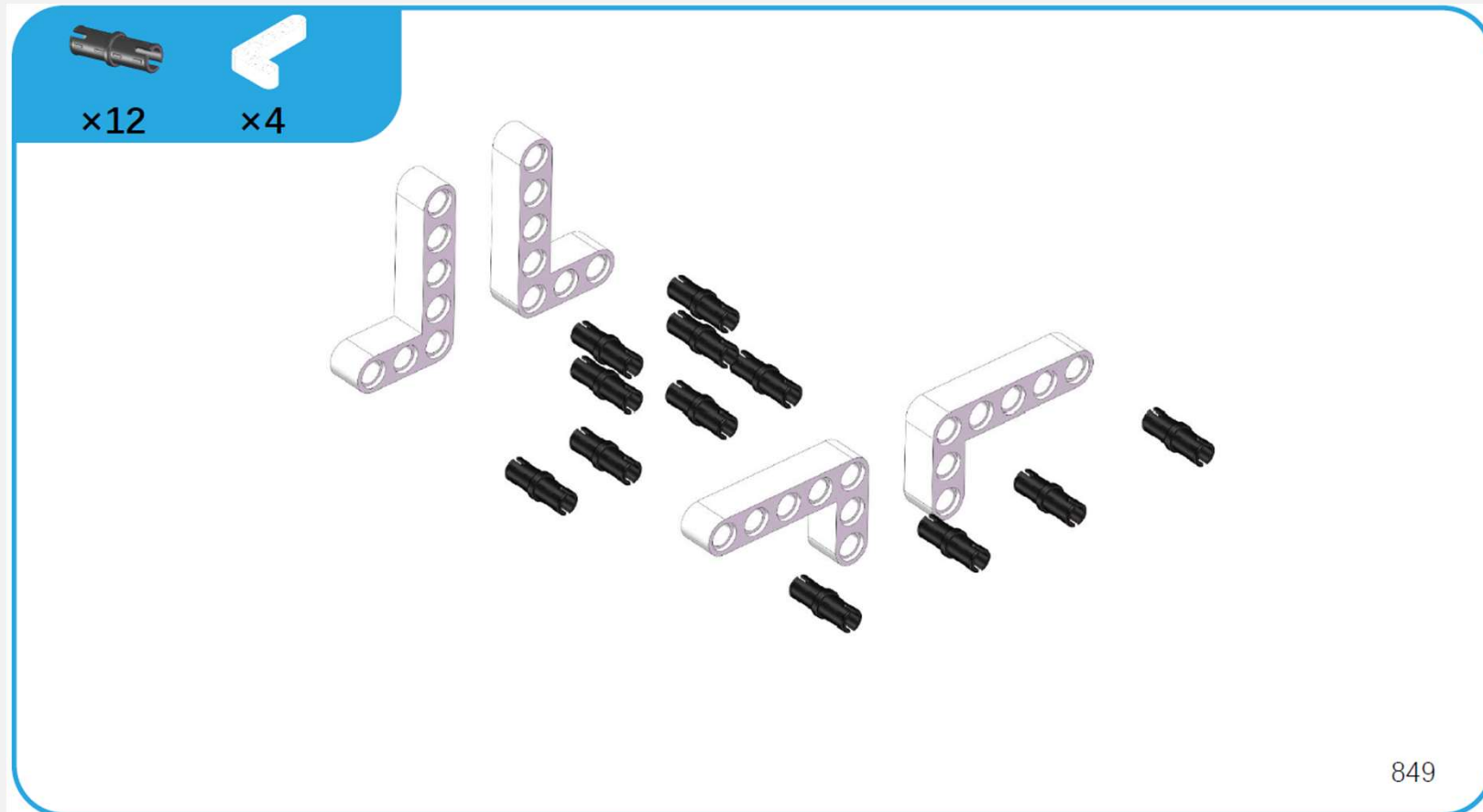
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Step 18

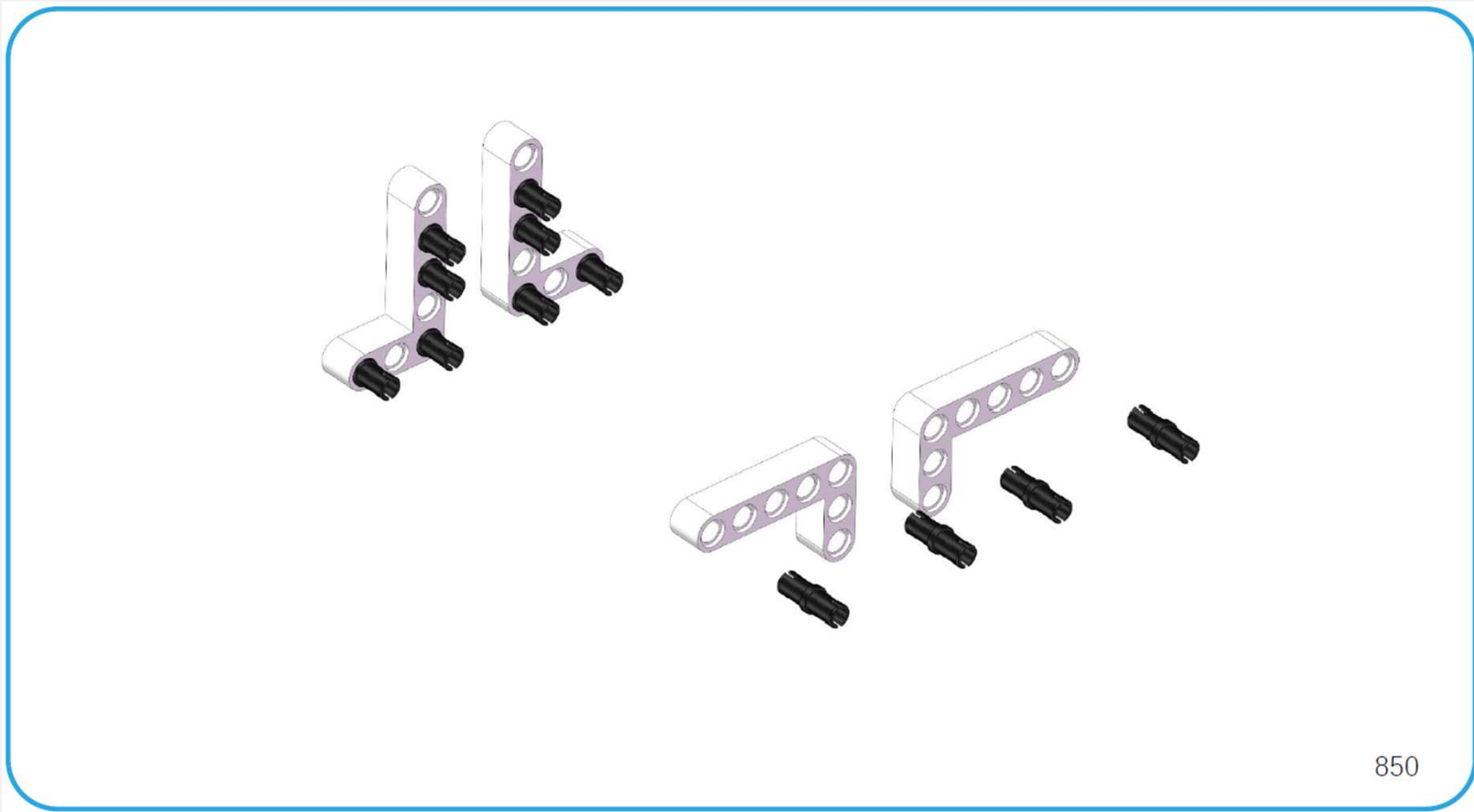


848

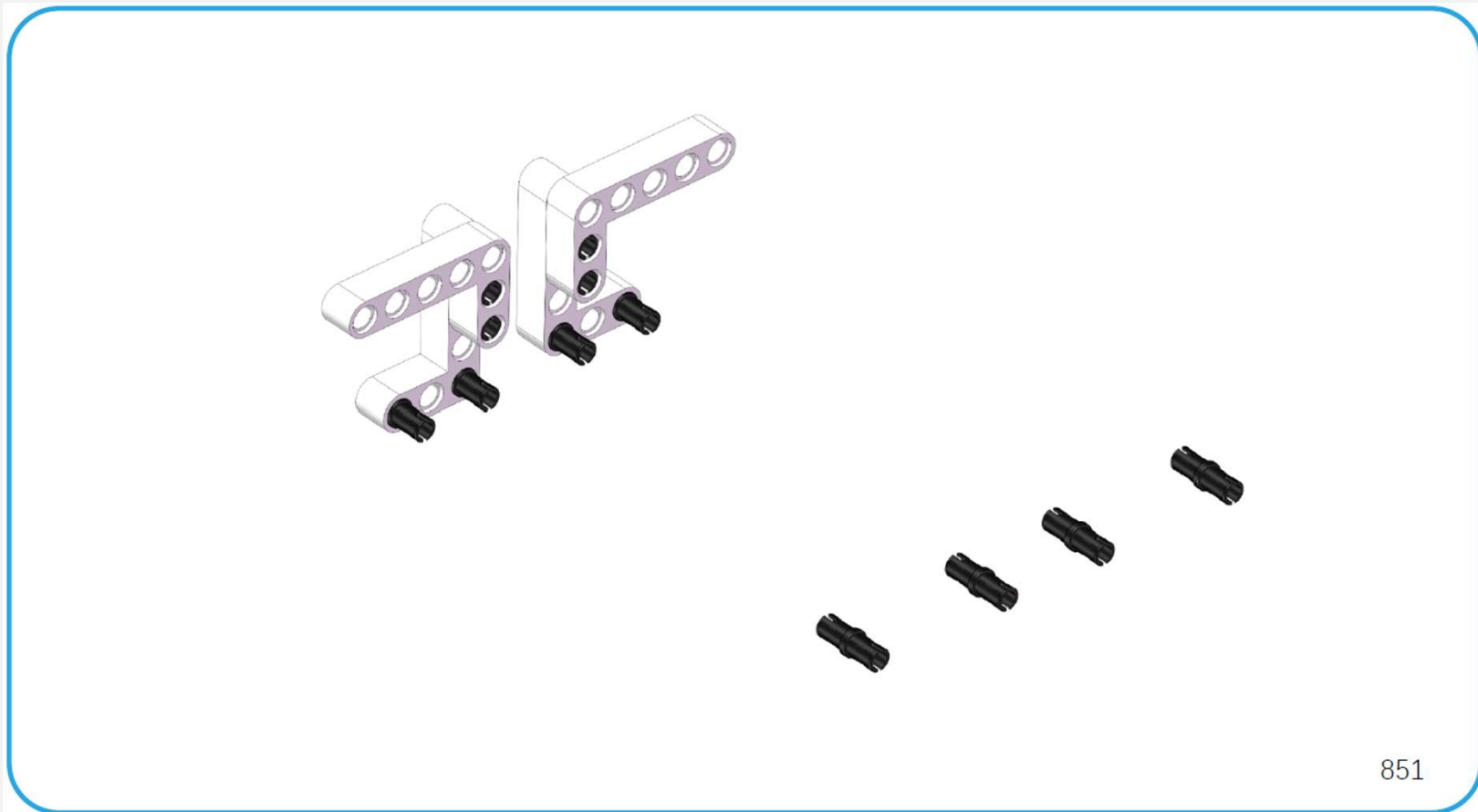
Step 19



Step 20

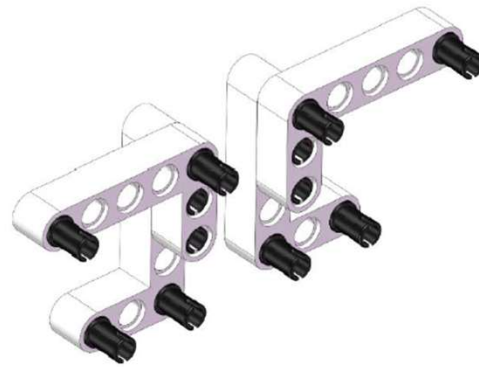


Step 21



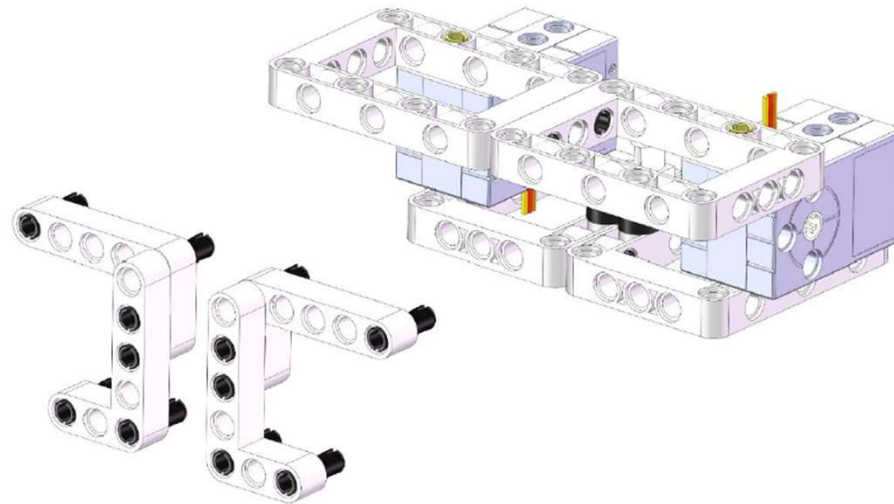
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Step 22



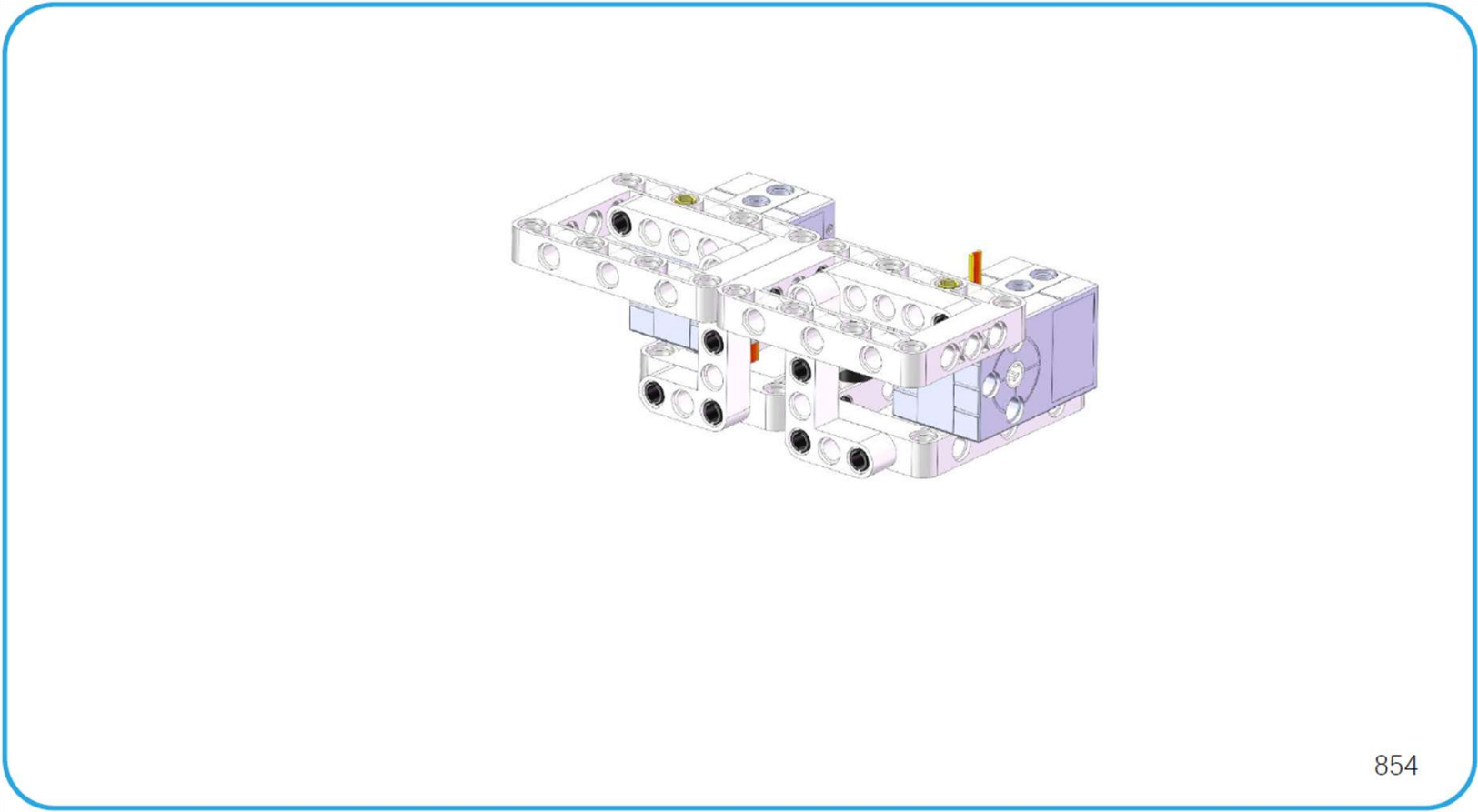
852

Step 23



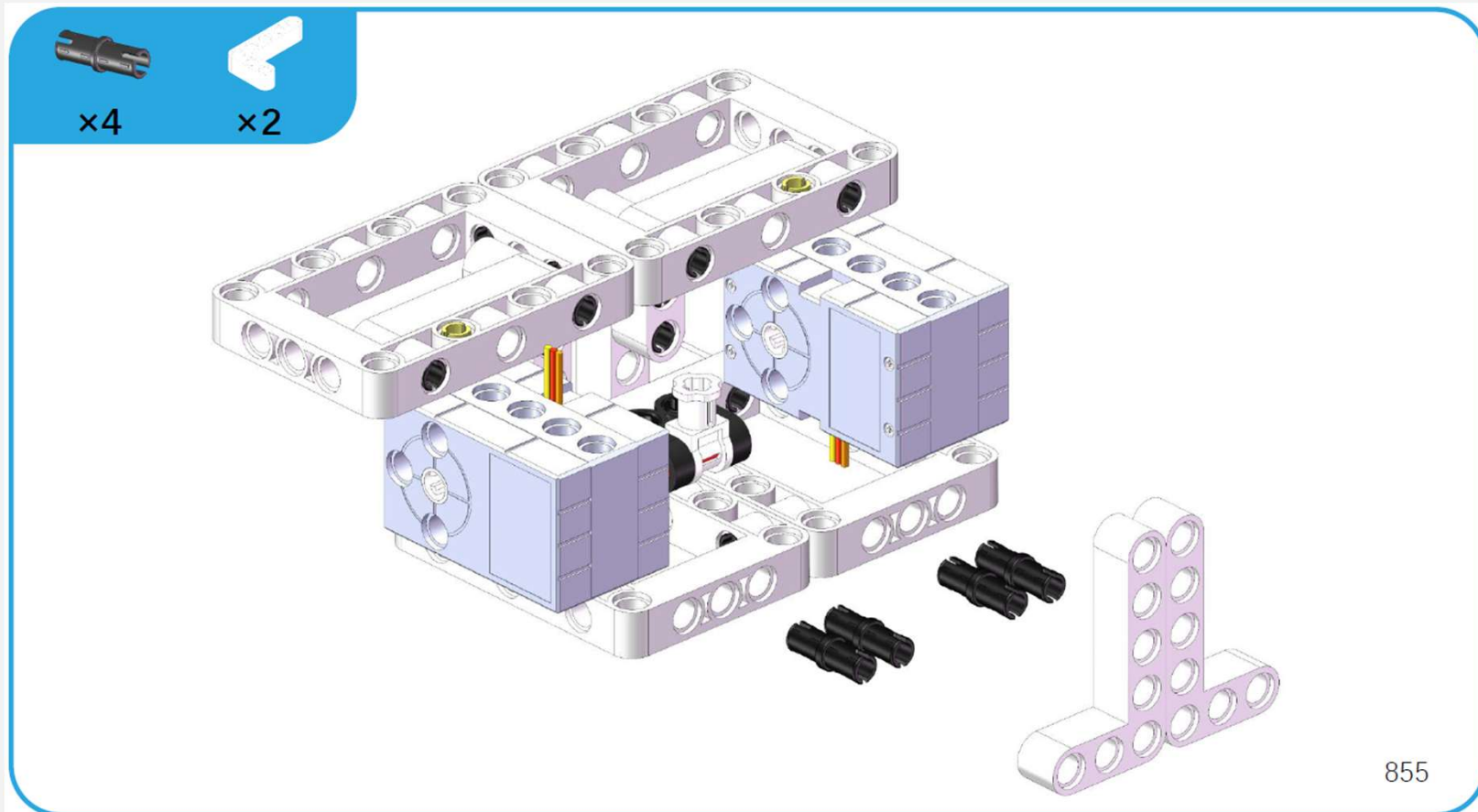
853

Step 24

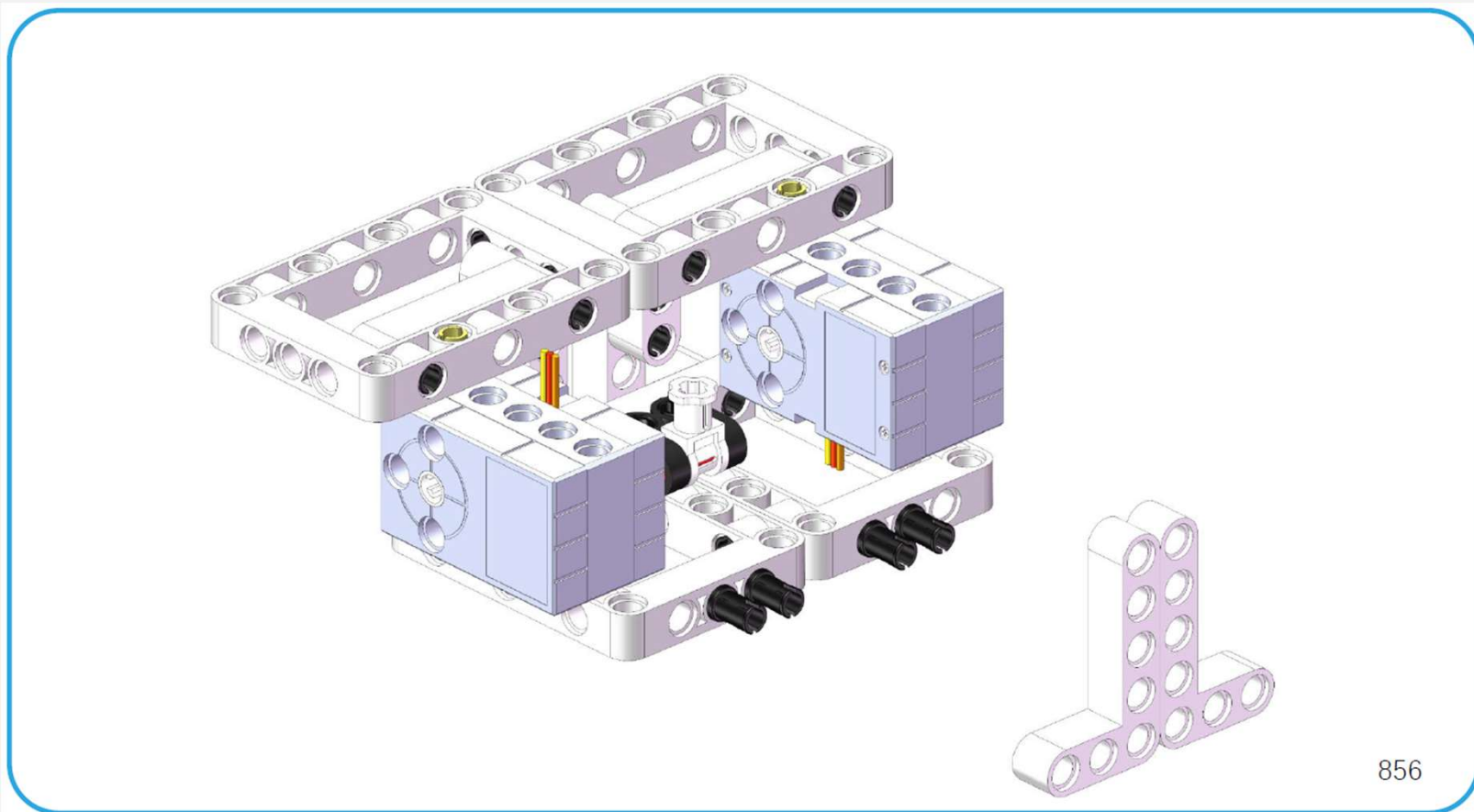


854

Step 25

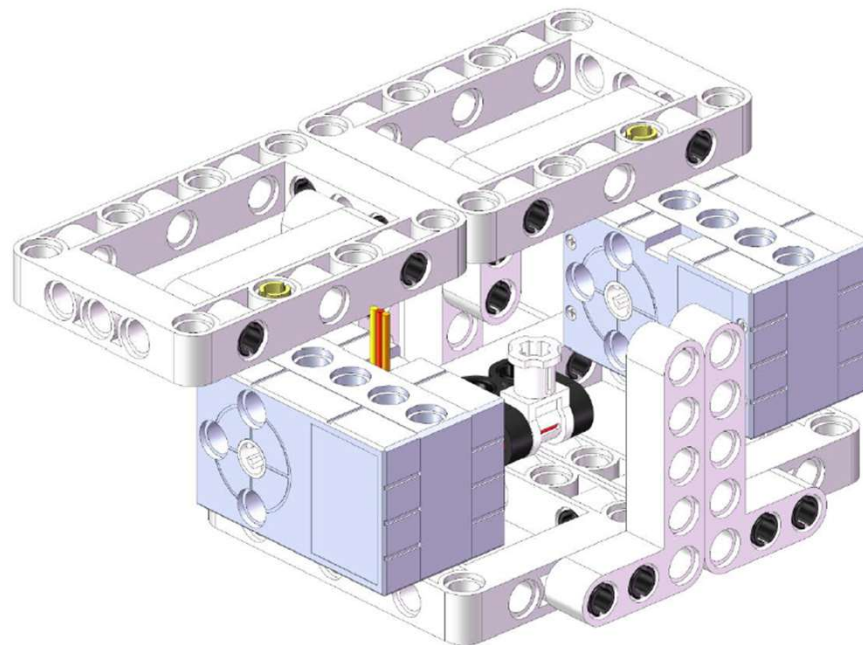


Step 26



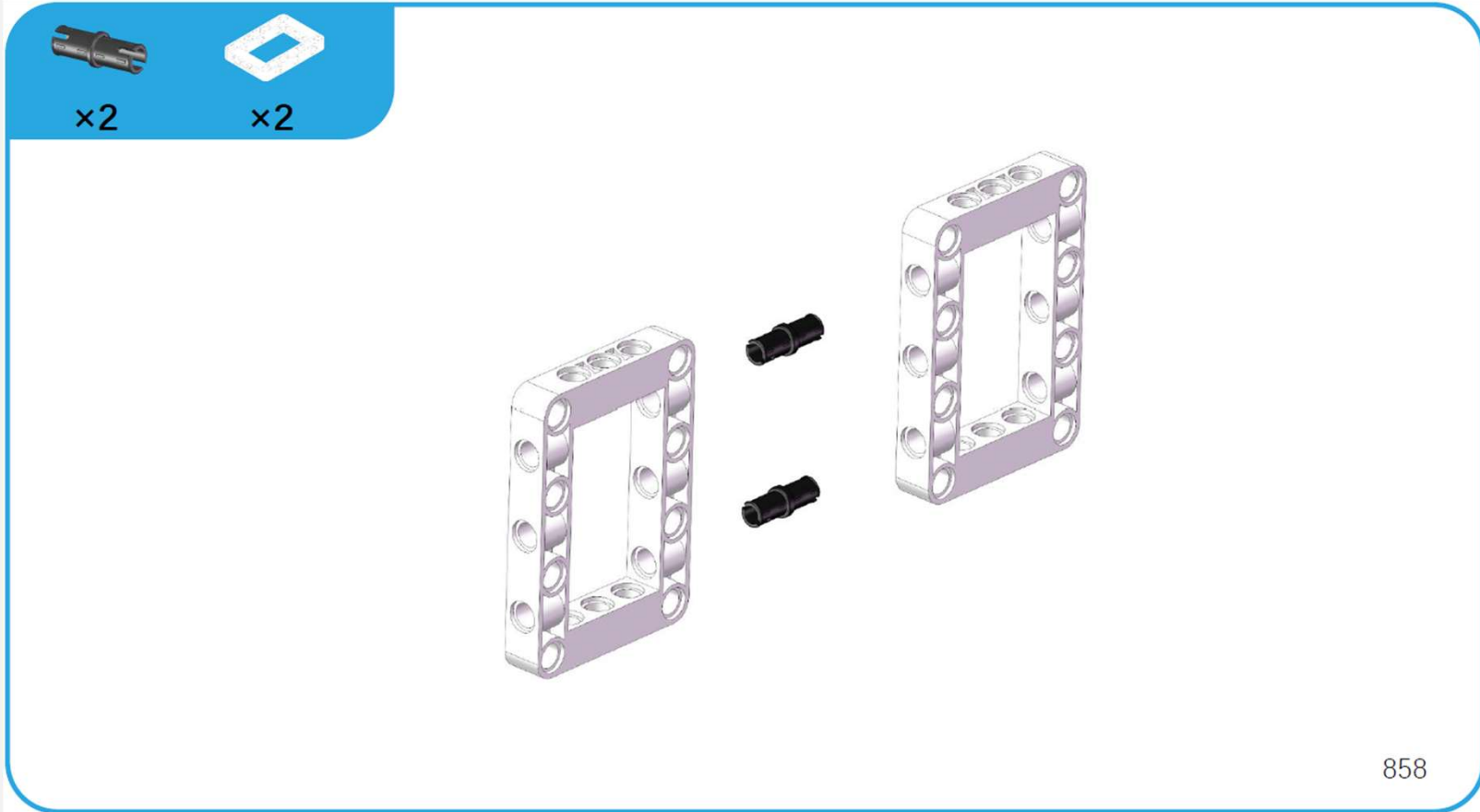
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Step 27



857

Step 28

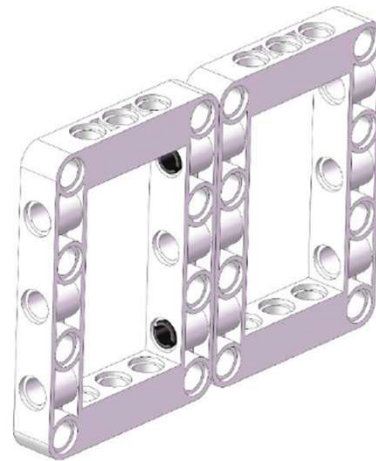


Step 29



859

Step 30

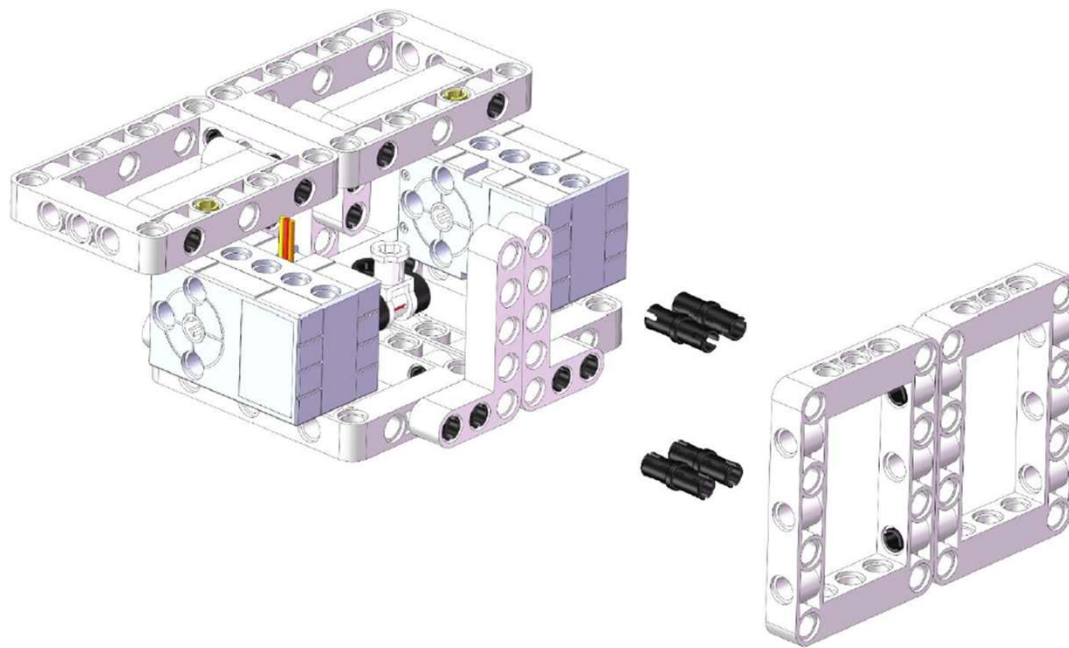


860

Step 31

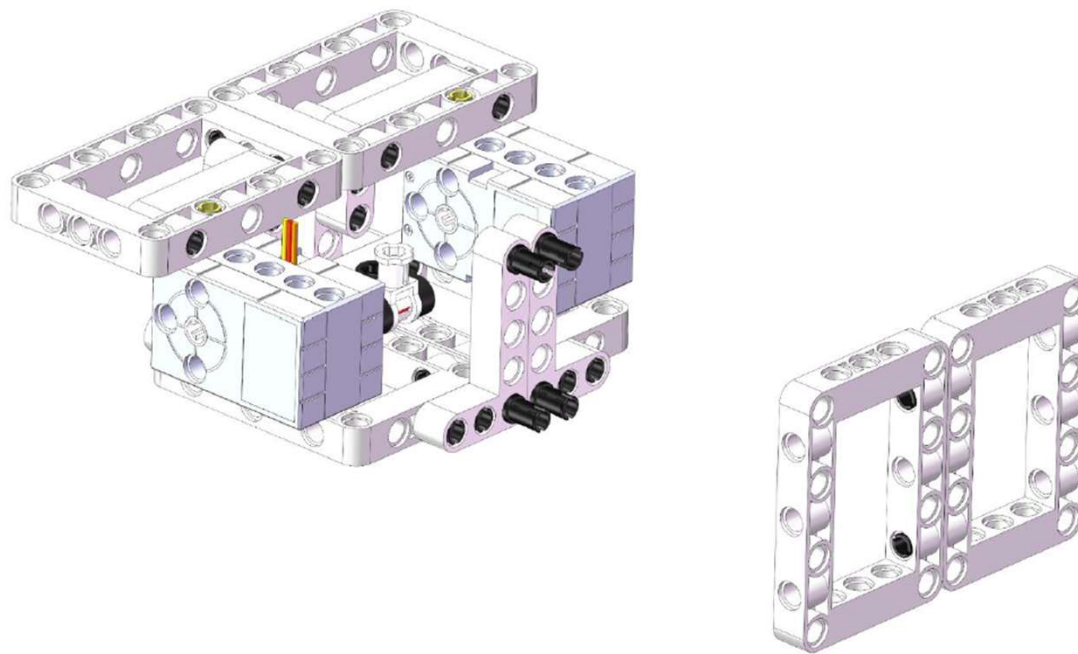


x4



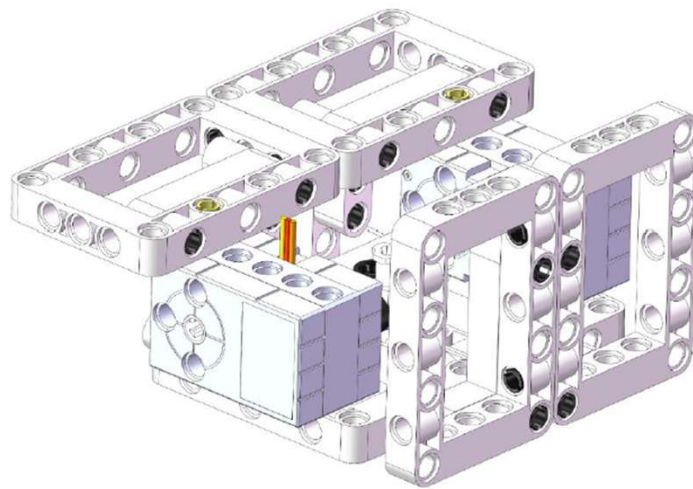
861

Step 32



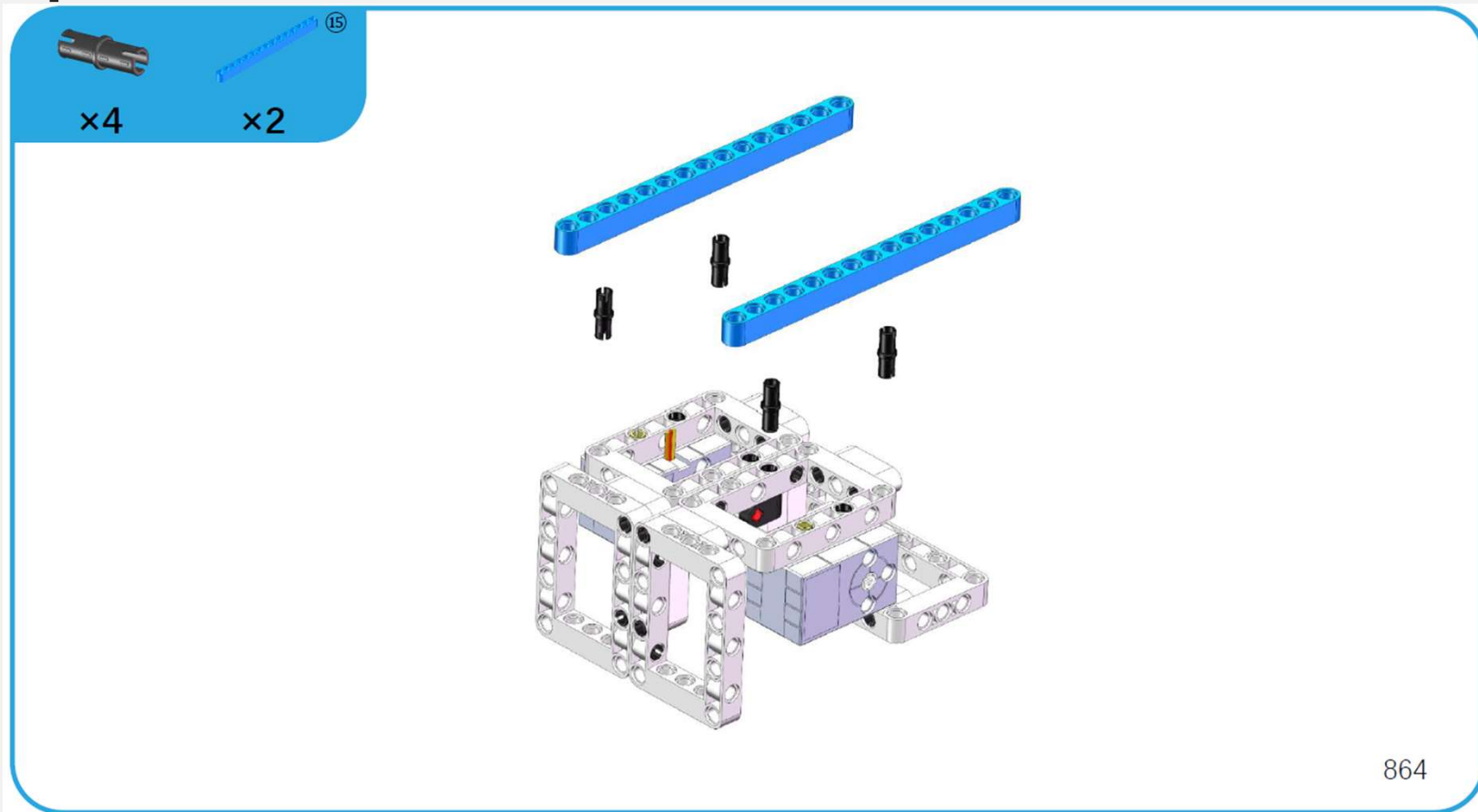
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Step 33

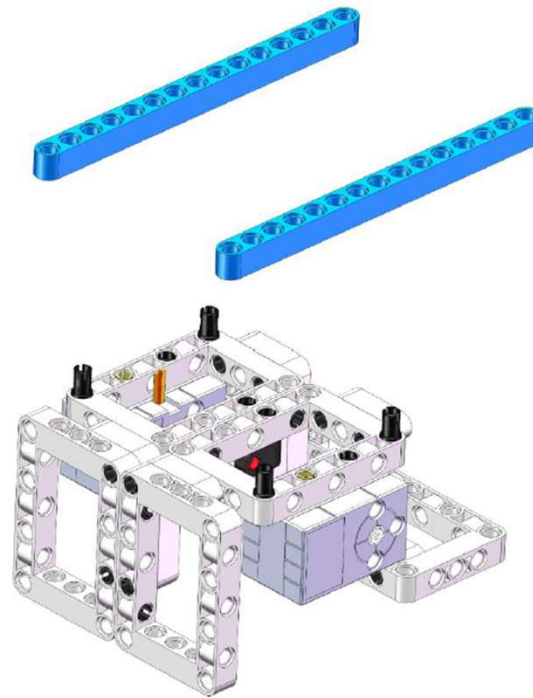


863

Step 34

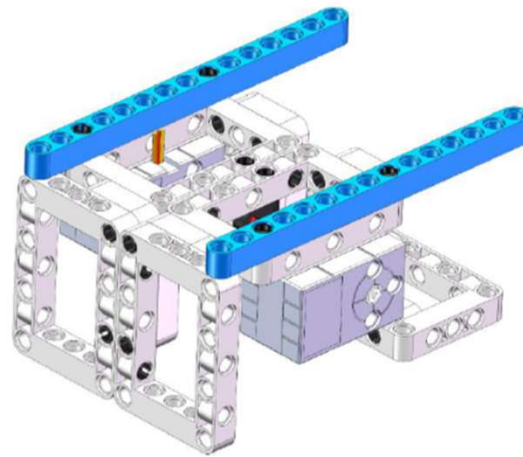


Step 35



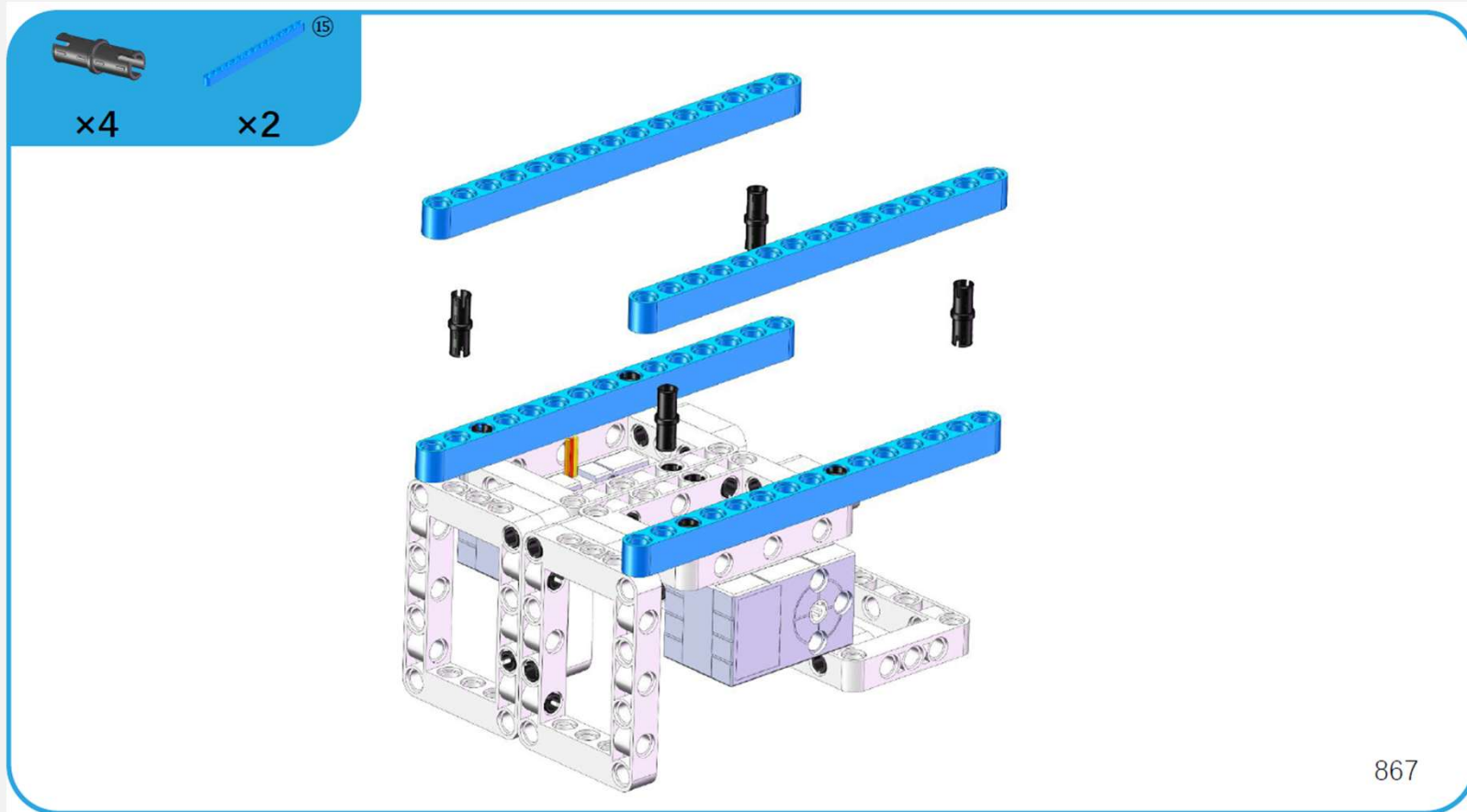
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Step 36

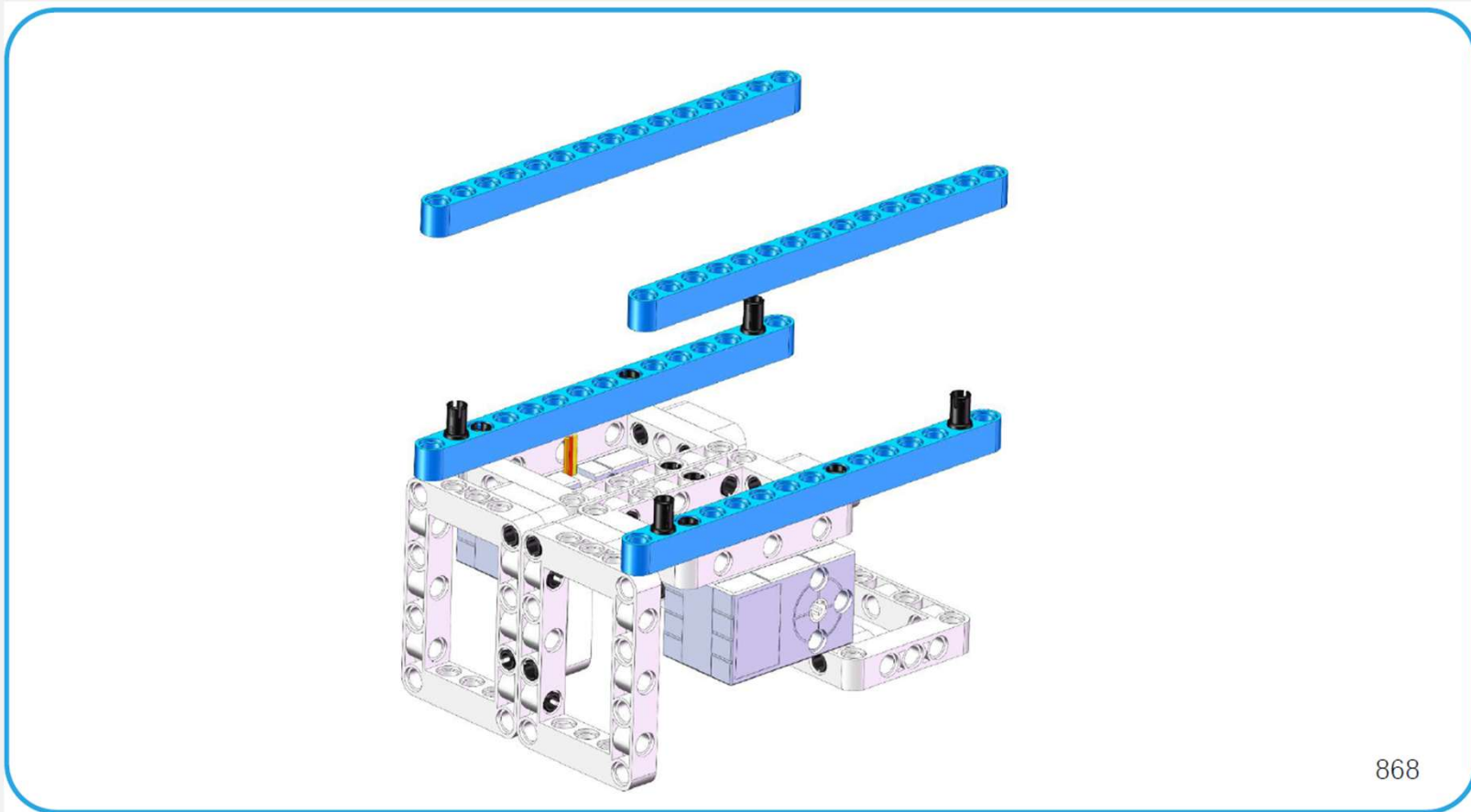


866

Step 37

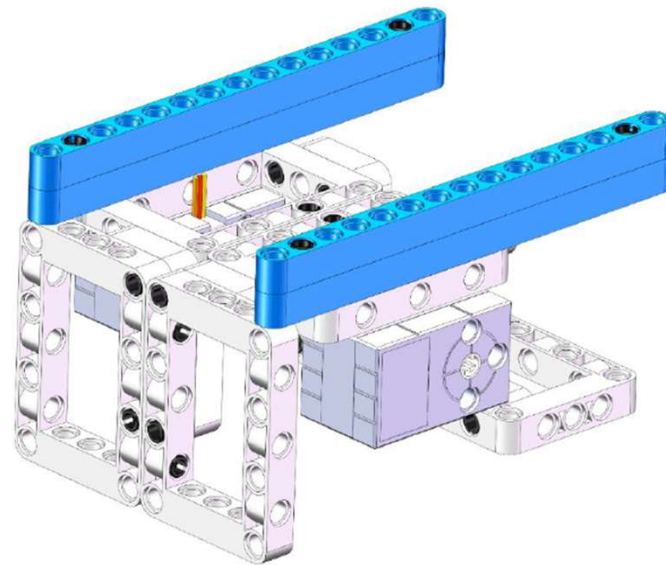


Step 38



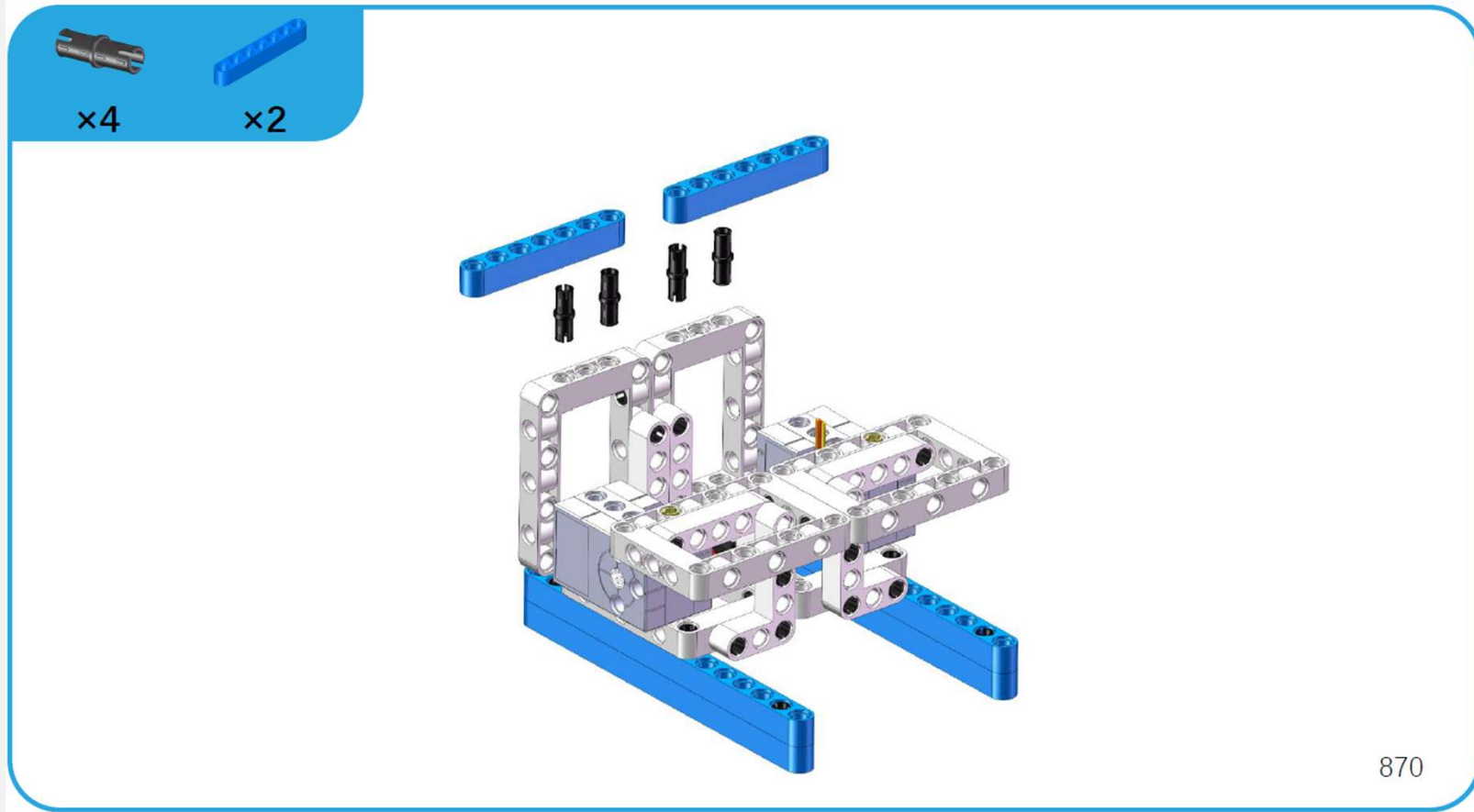
868

Step 39

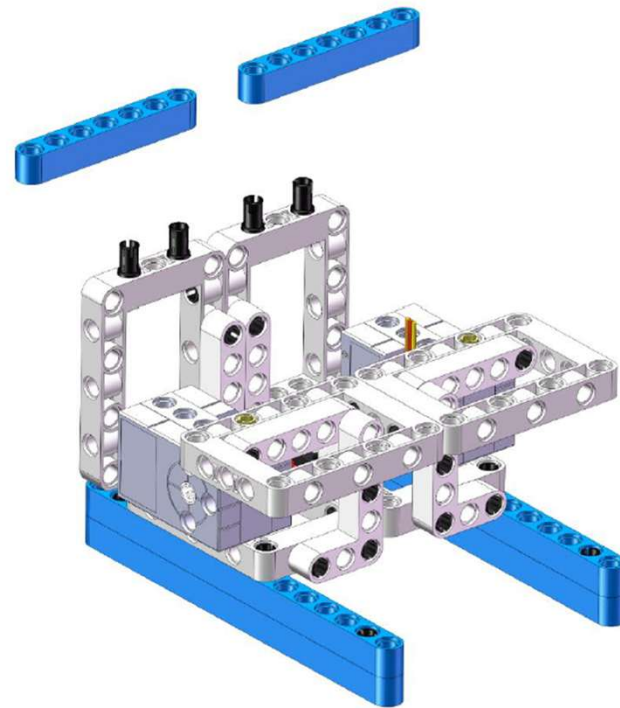


869

Step 40

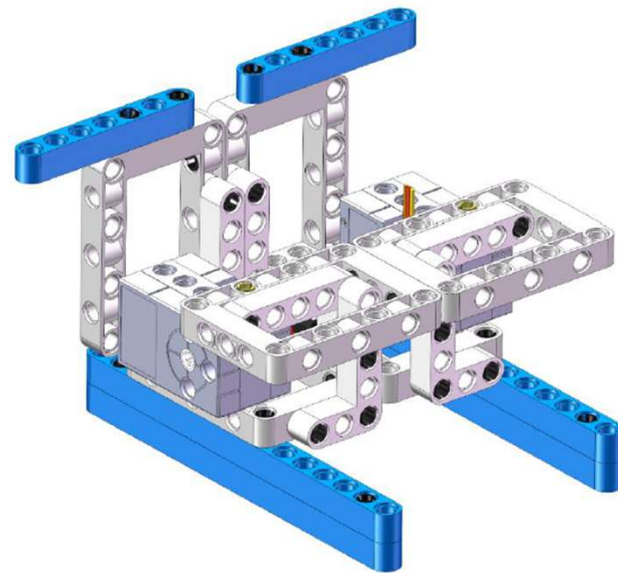


Step 41



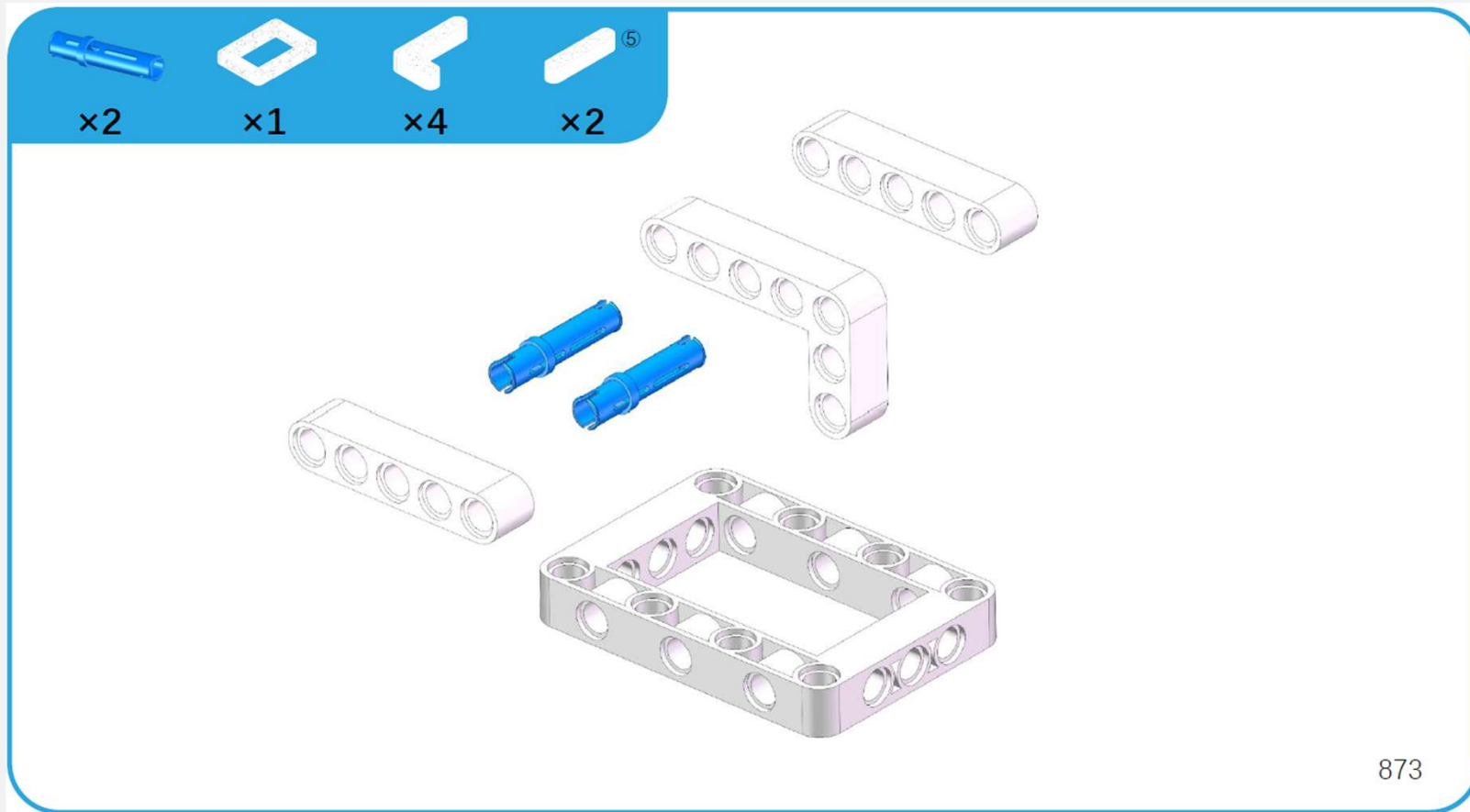
871

Step 42

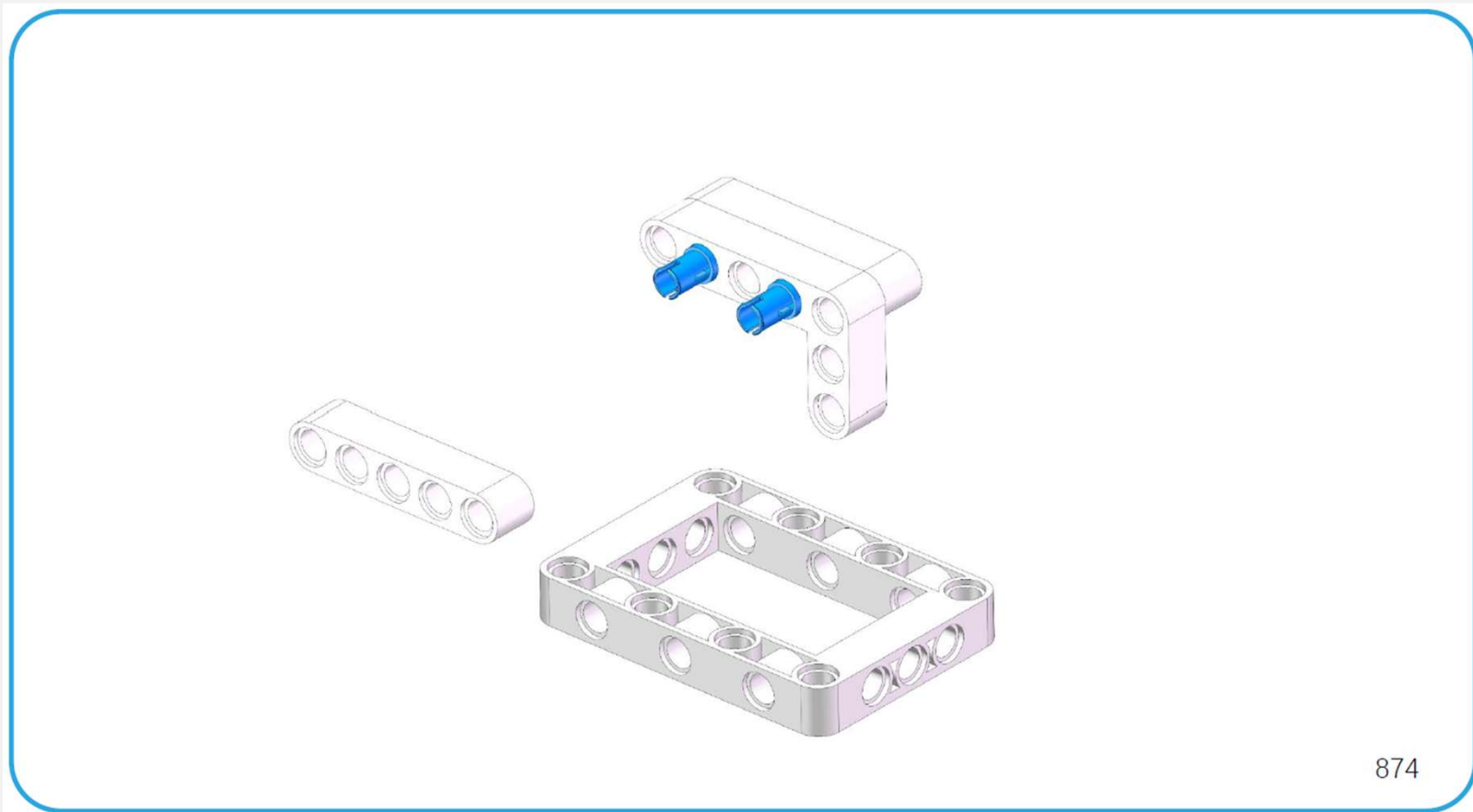


872

Step 42

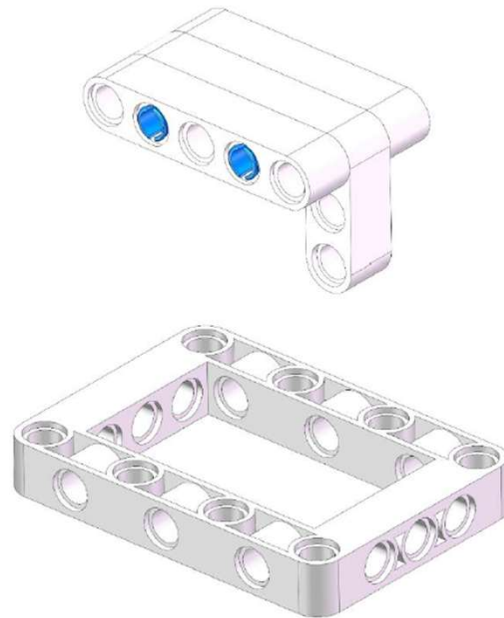


Step 43



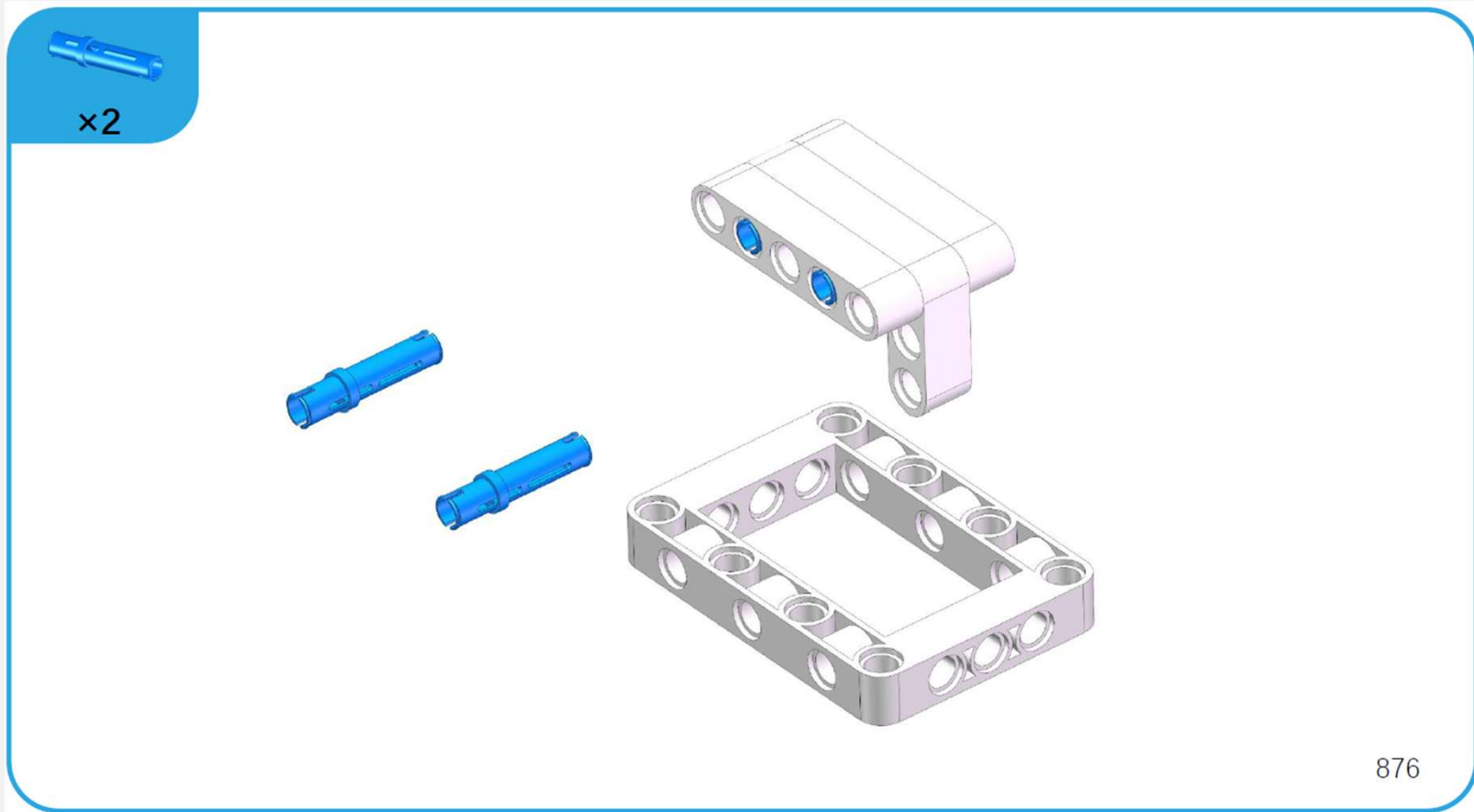
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Step 44



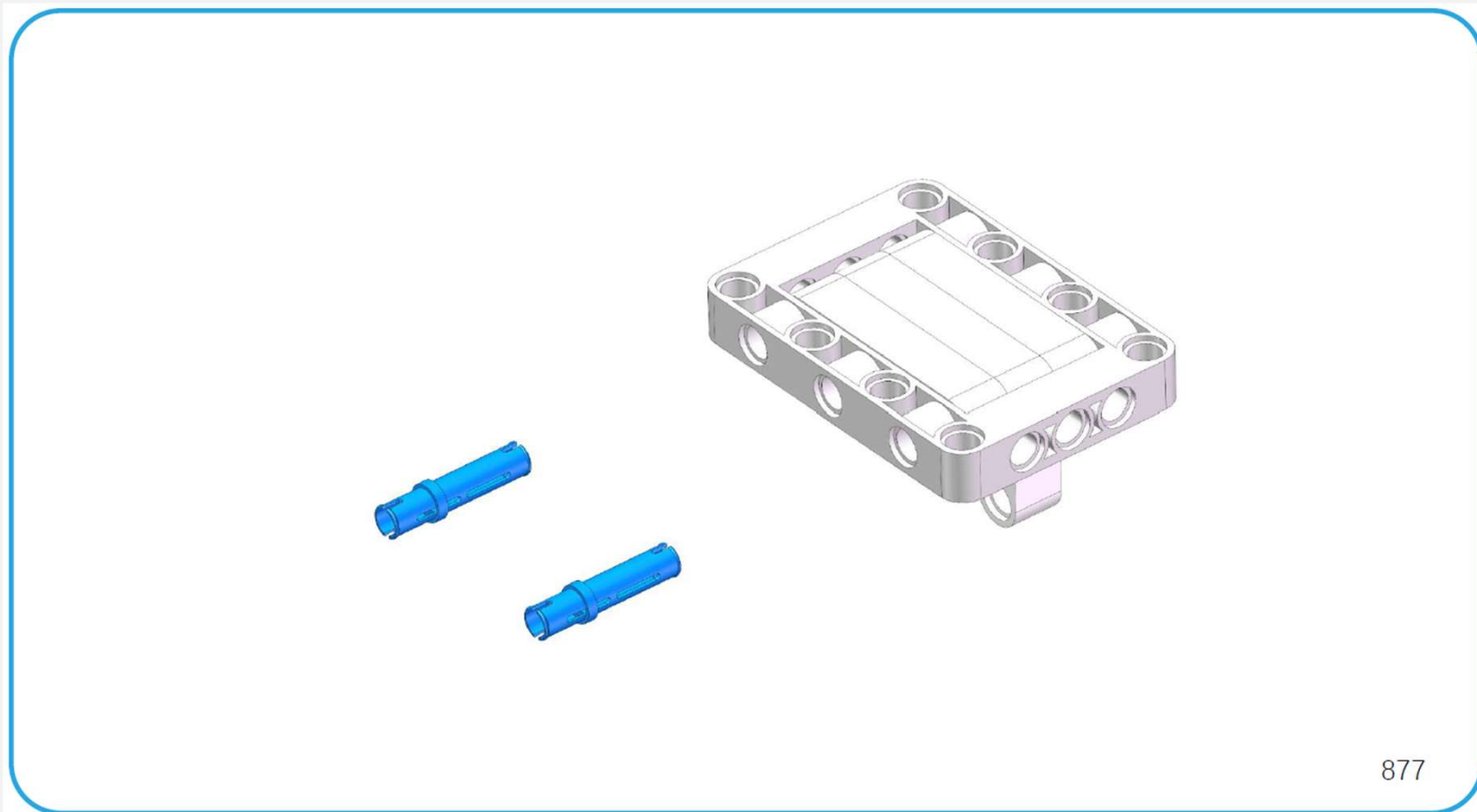
875

Step 41



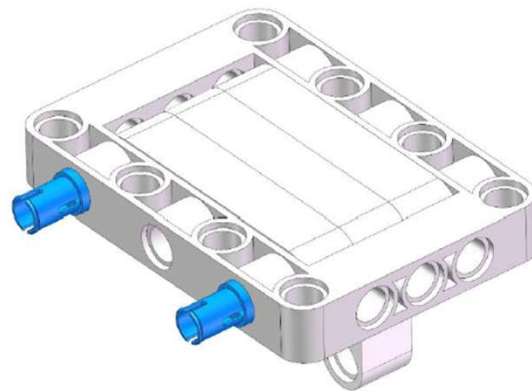
876

Step 42



877

Step 43

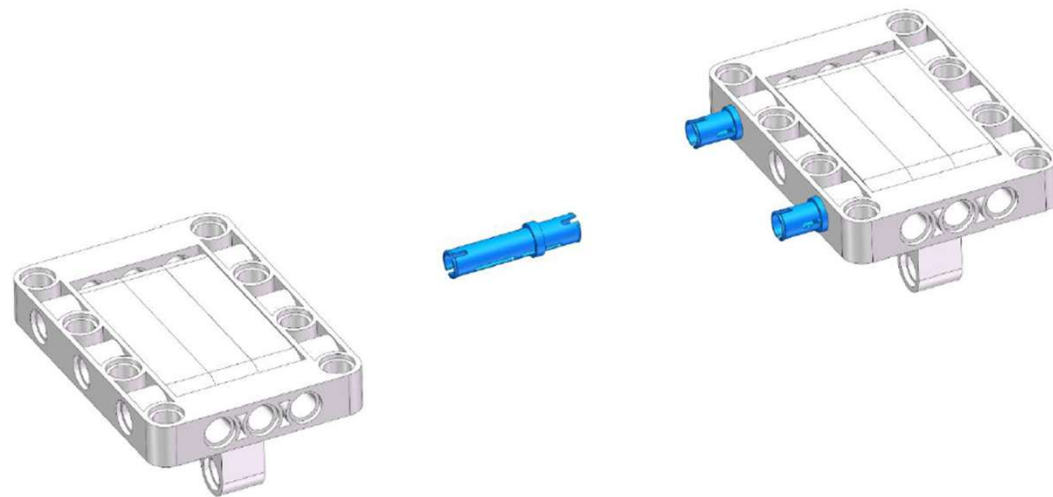


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Step 44

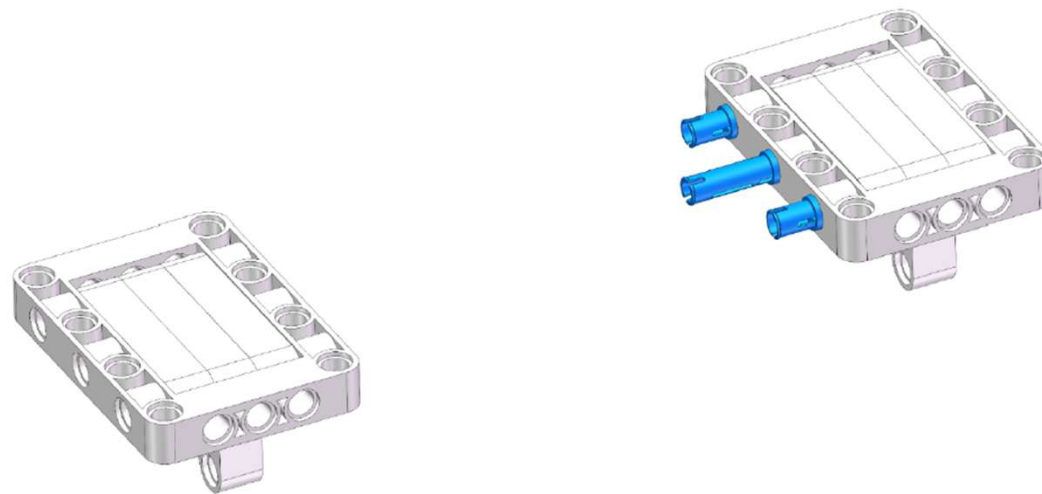


x1



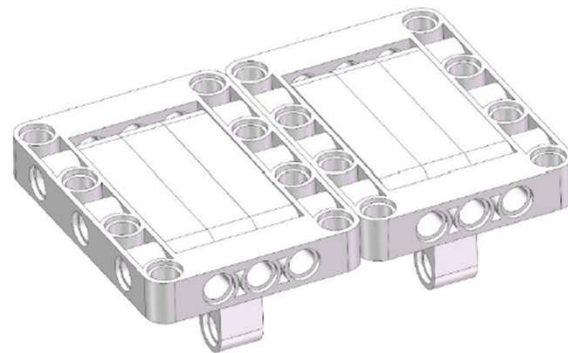
879

Step 45



880

Step 46

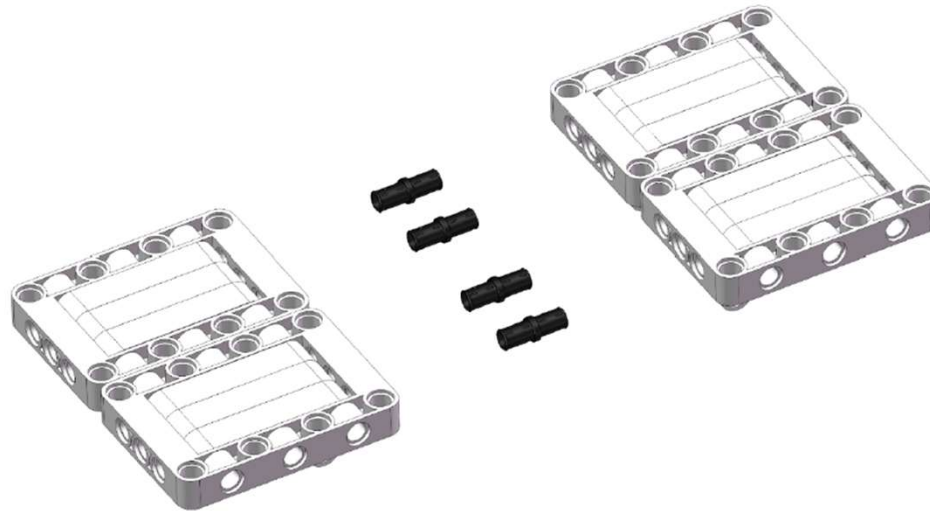


881

Step 47

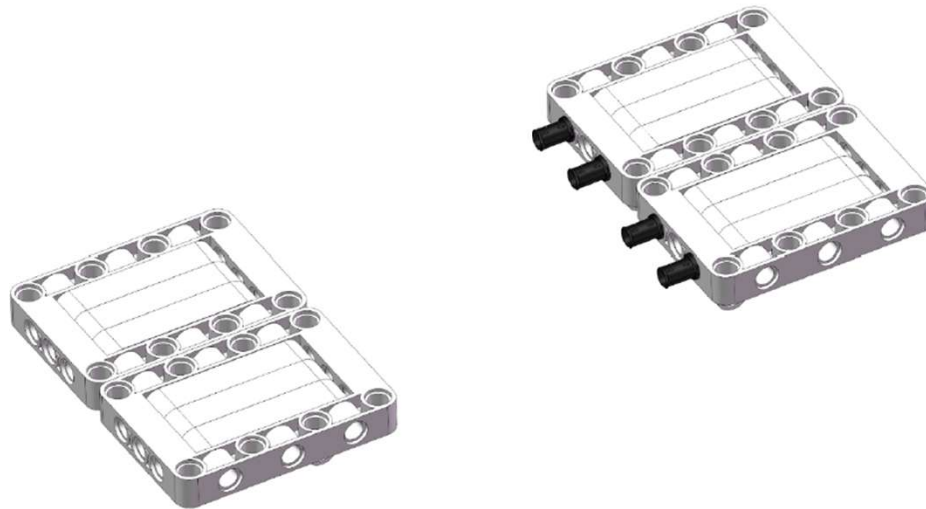


x4



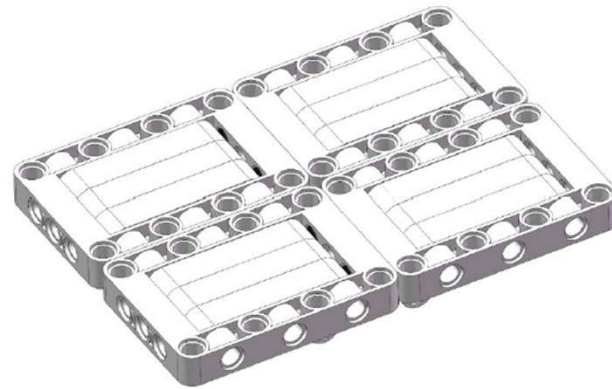
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Step 48



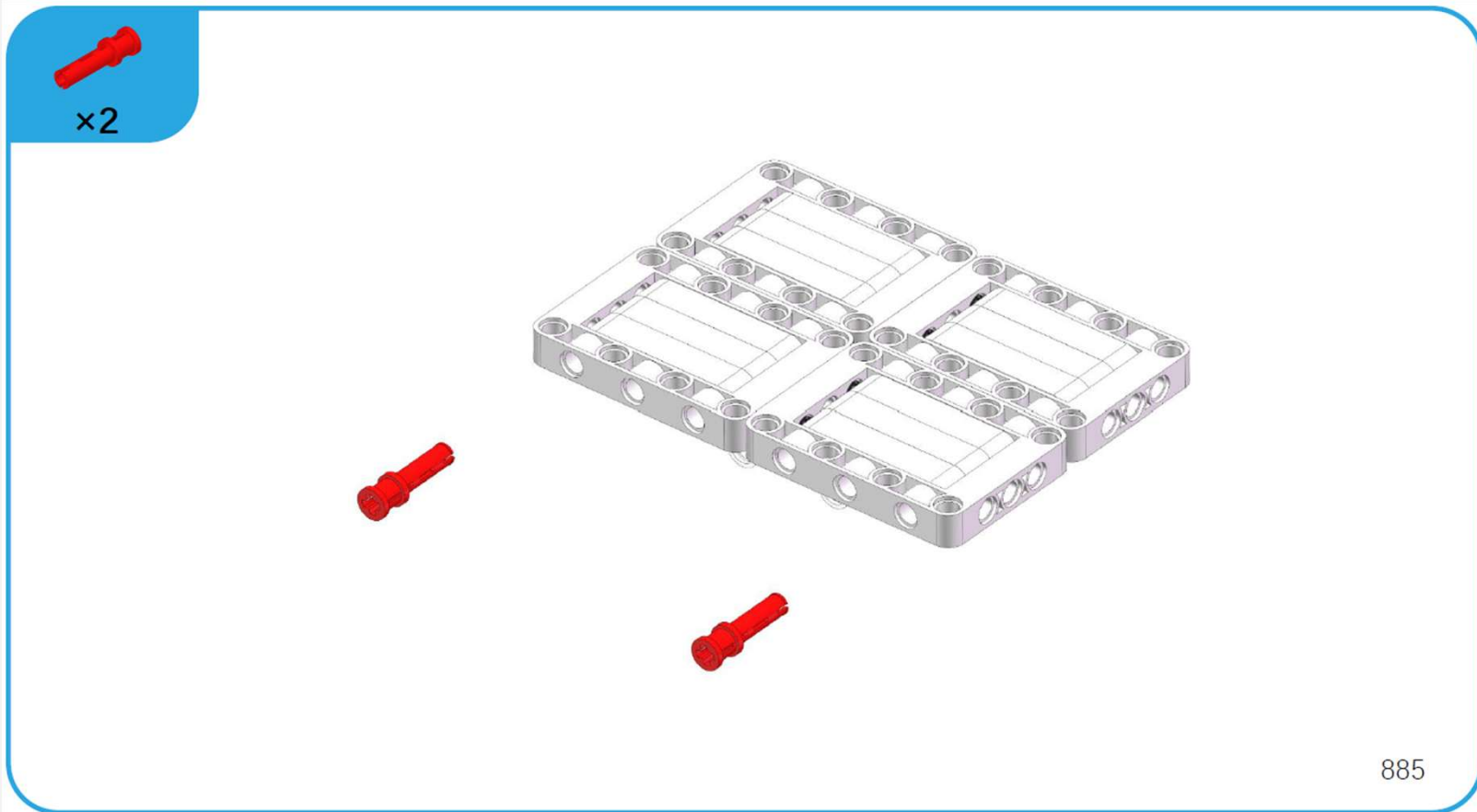
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Step 49

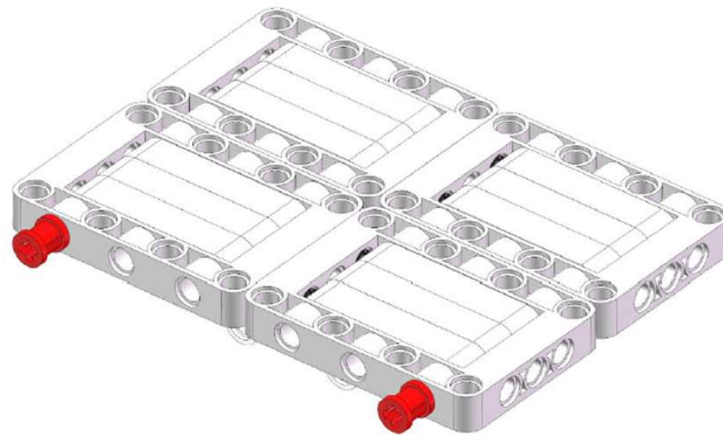


884

Step 50

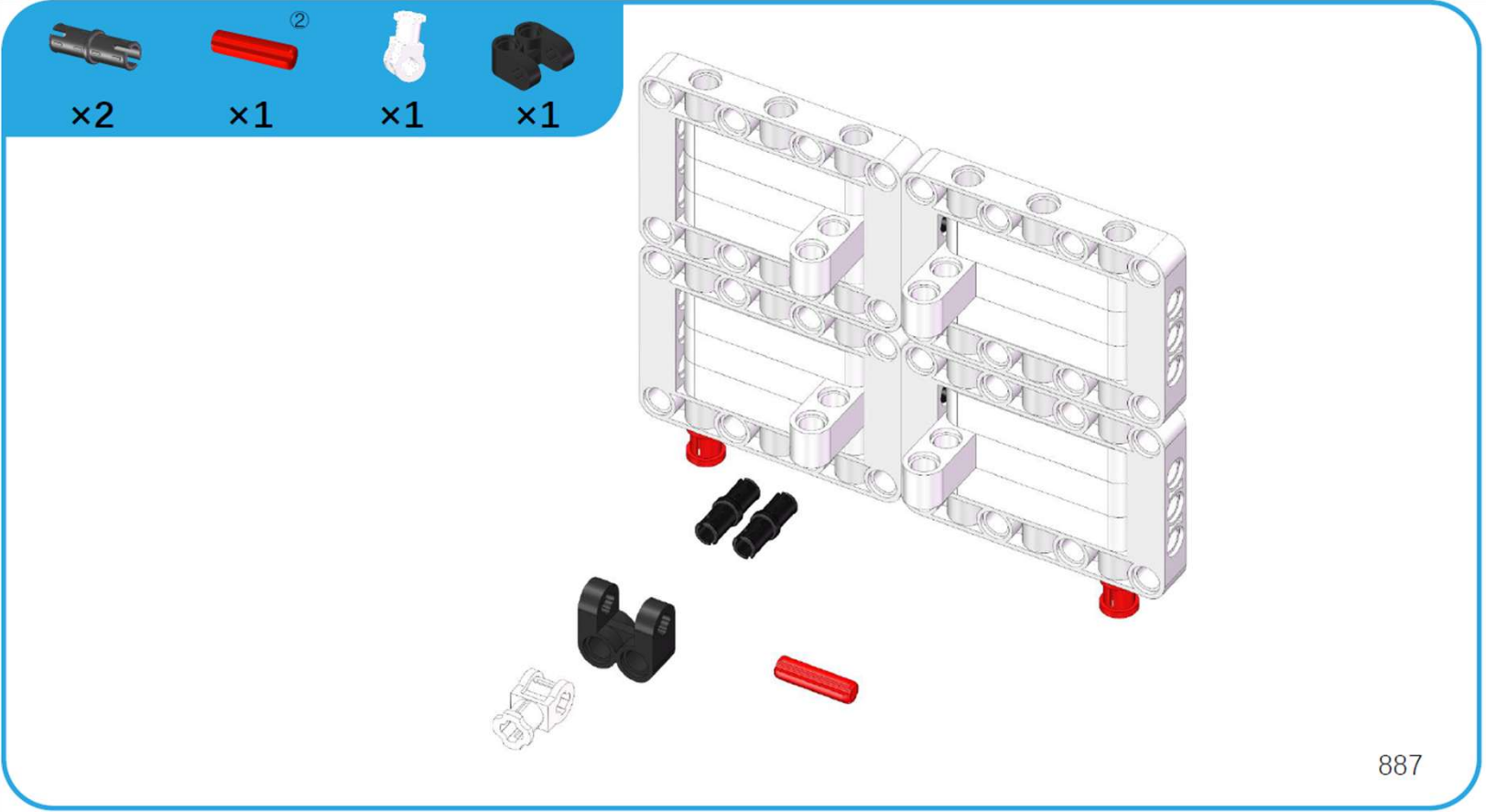


Step 51

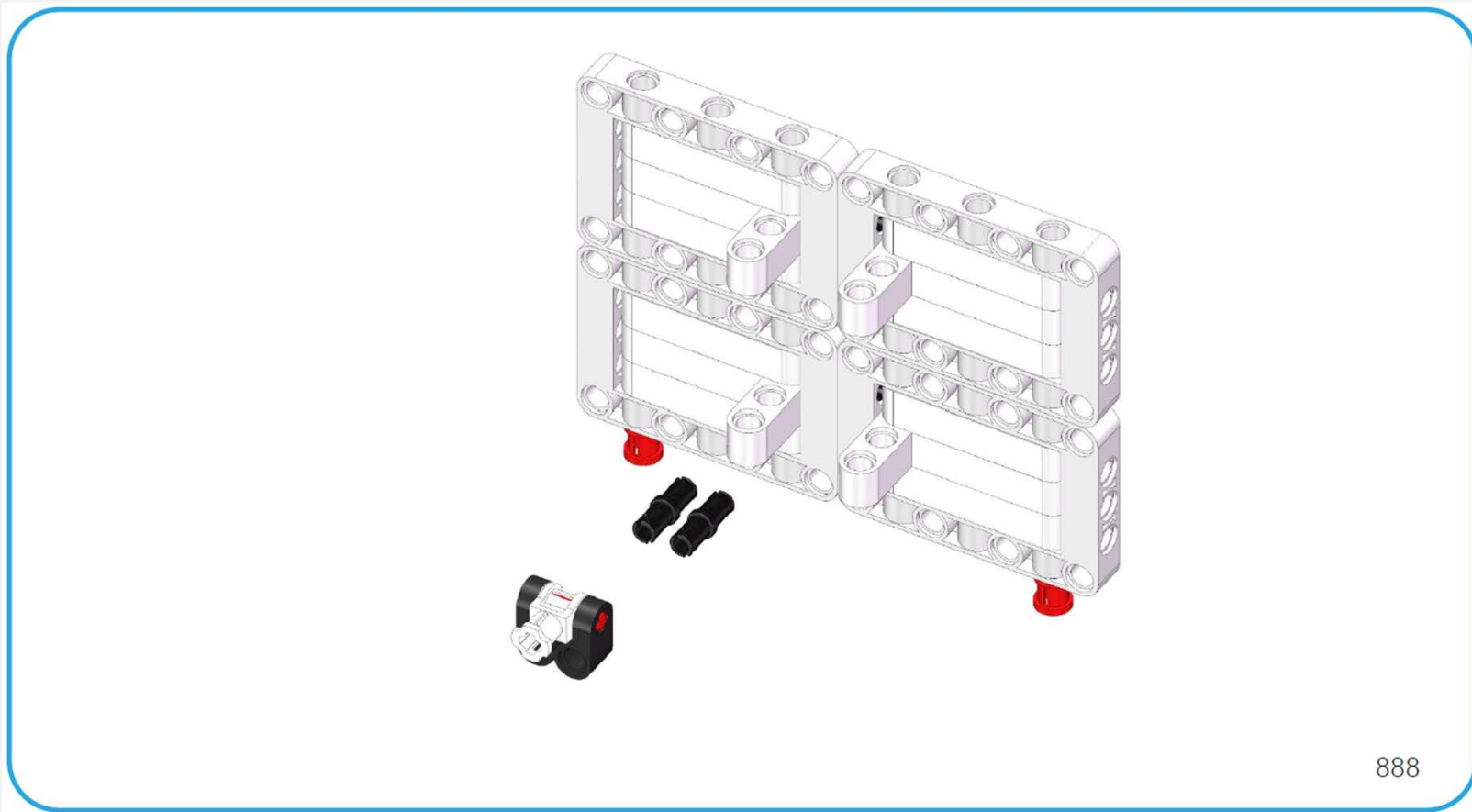


886

Step 51

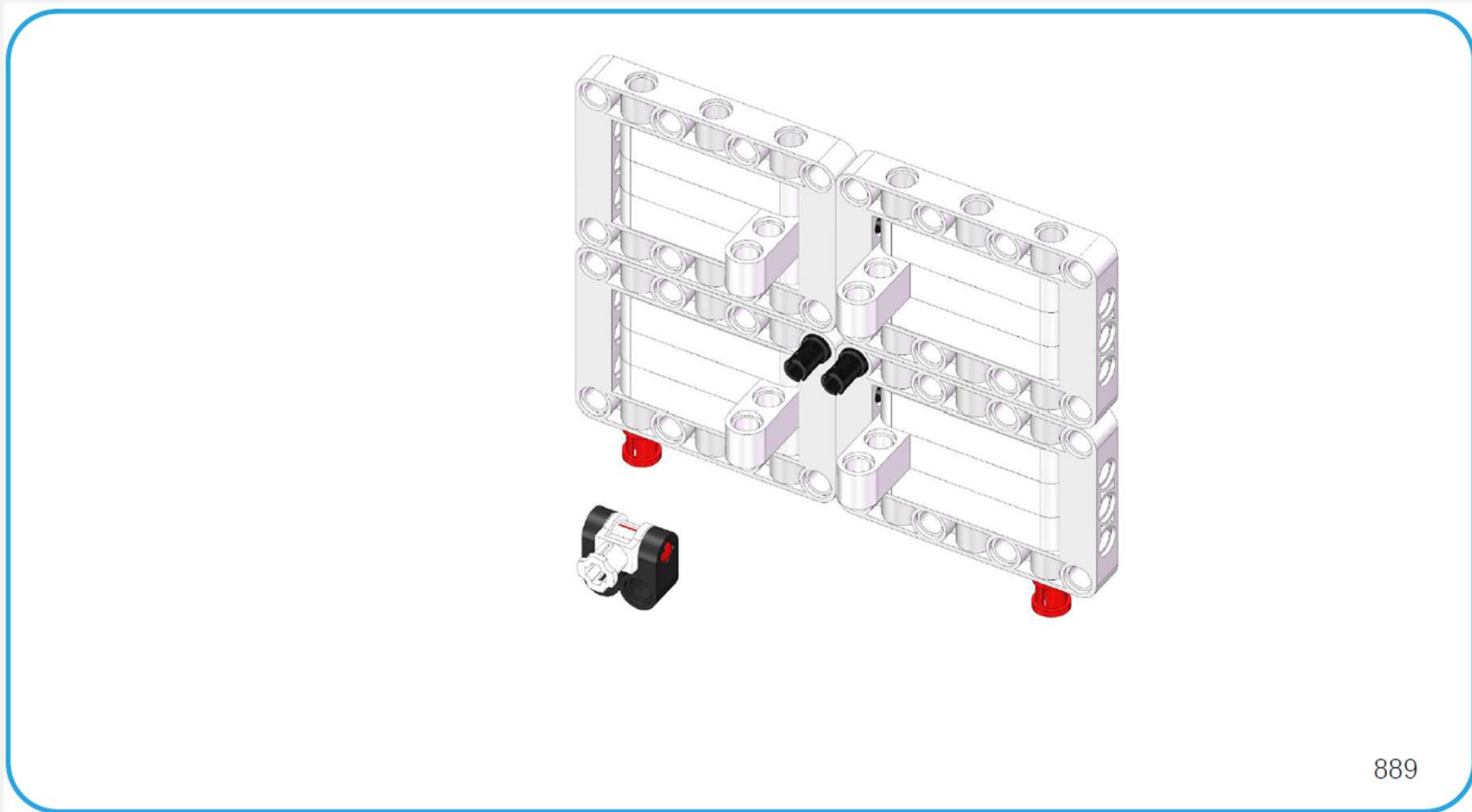


Step 52



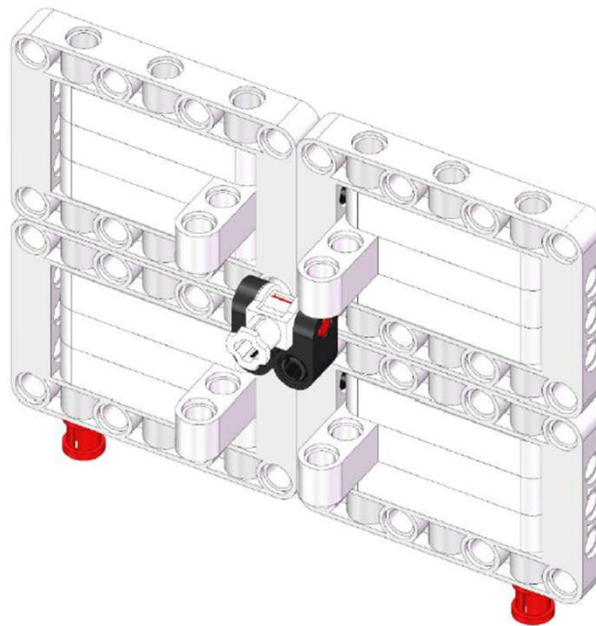
888

Step 53



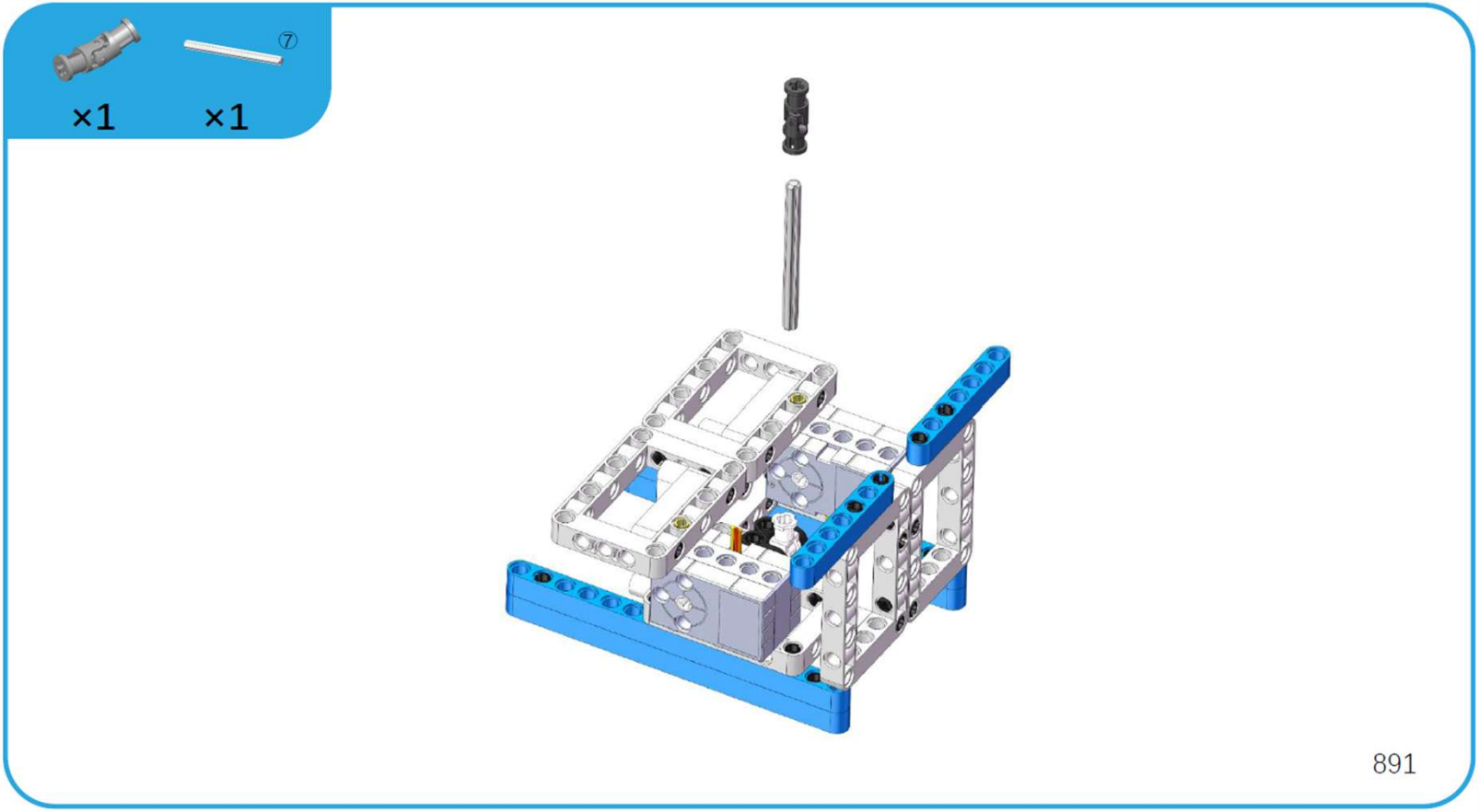
889

Step 54



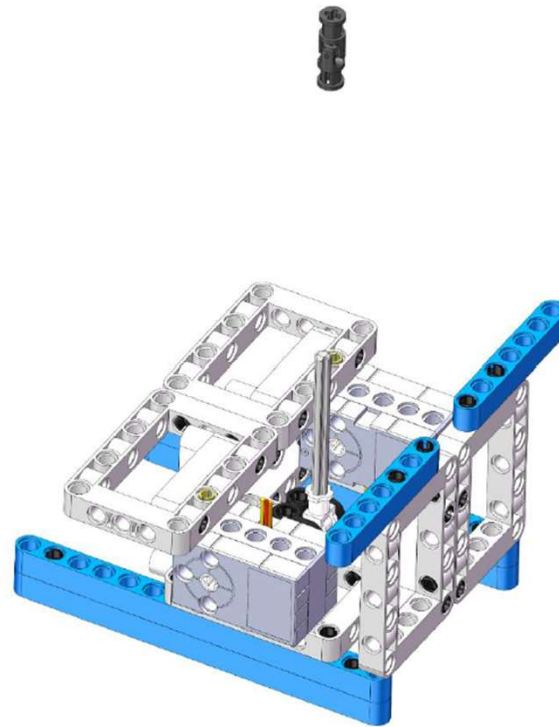
890

Step 55



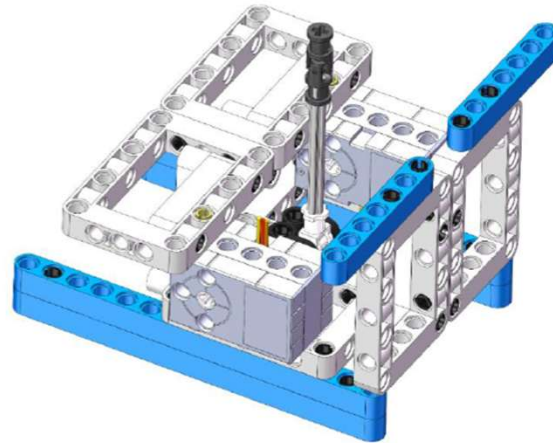
891

Step 56



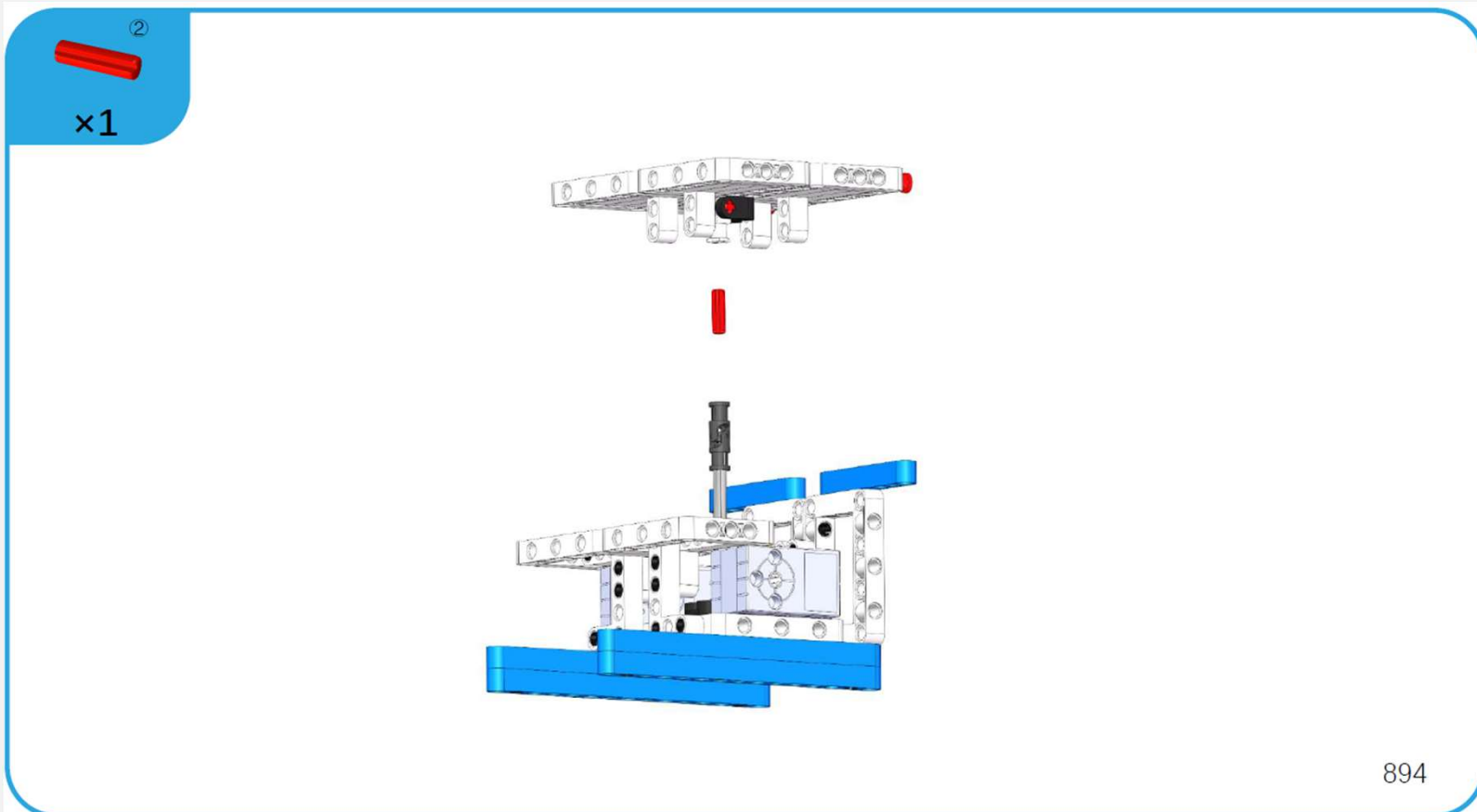
892

Step 57



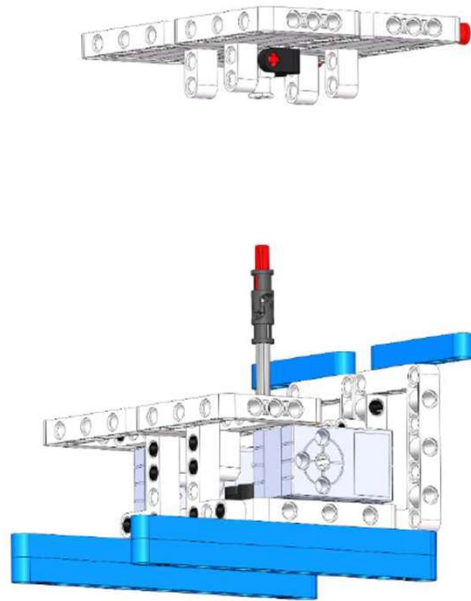
893

Step 58



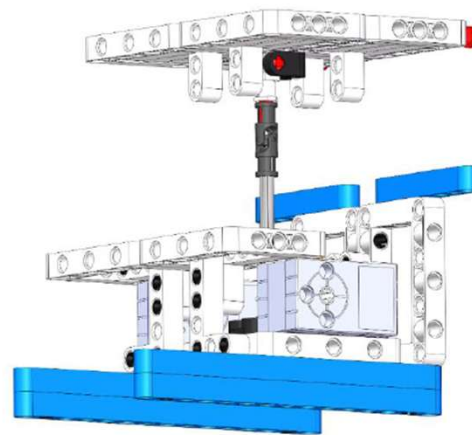
894

Step 59



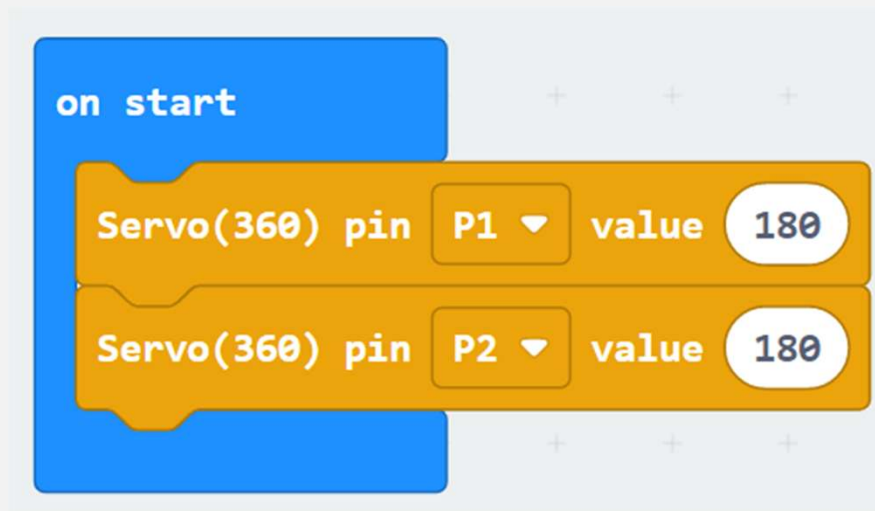
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Step 60



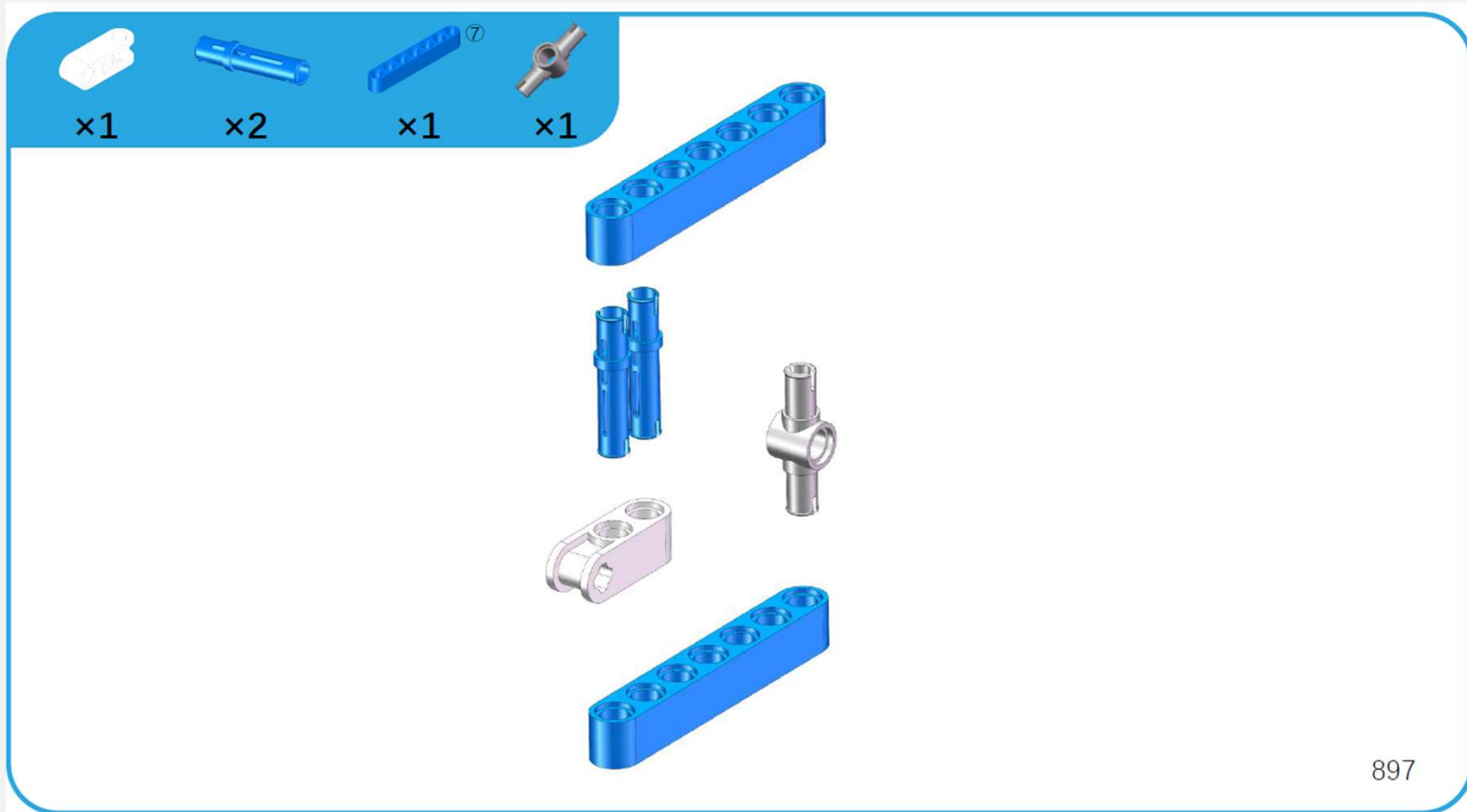
896

Step 60 – Set up Servo Motor Position

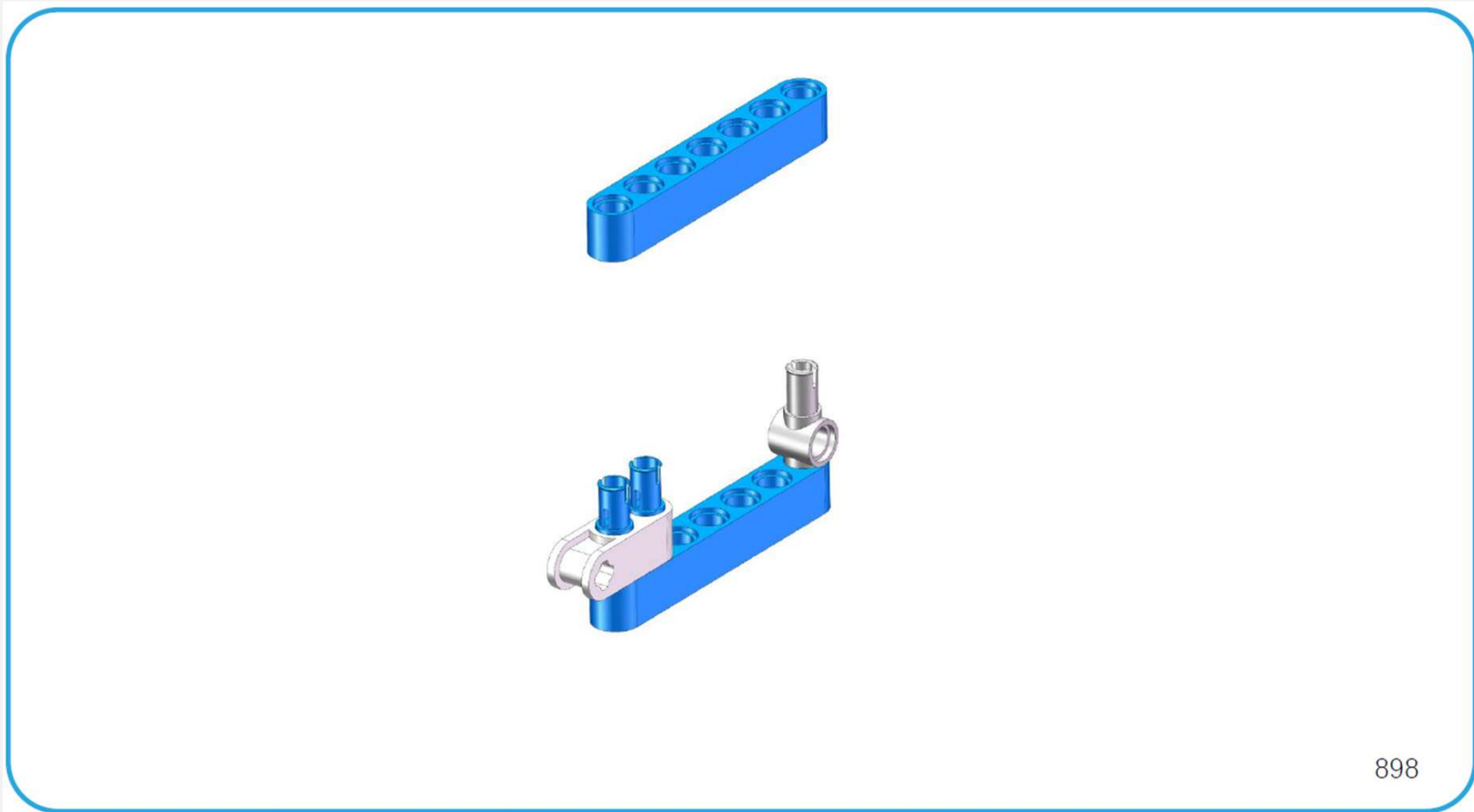


Before proceeding to next step, please download this to your microbit and make both servos run to **180 degrees.**

Step 61

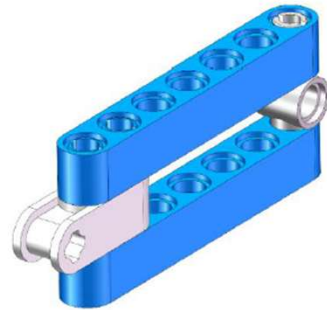


Step 62



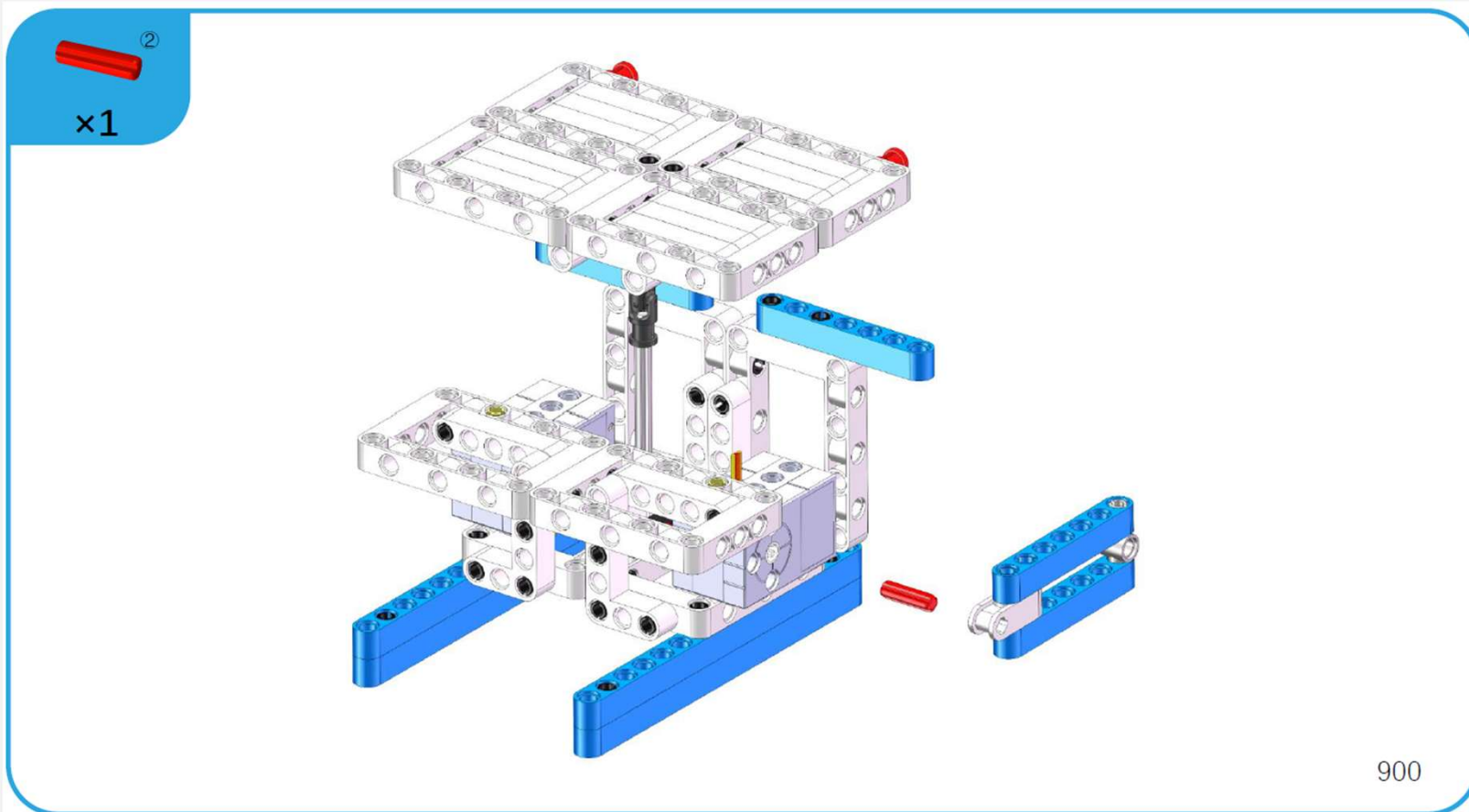
898

Step 63

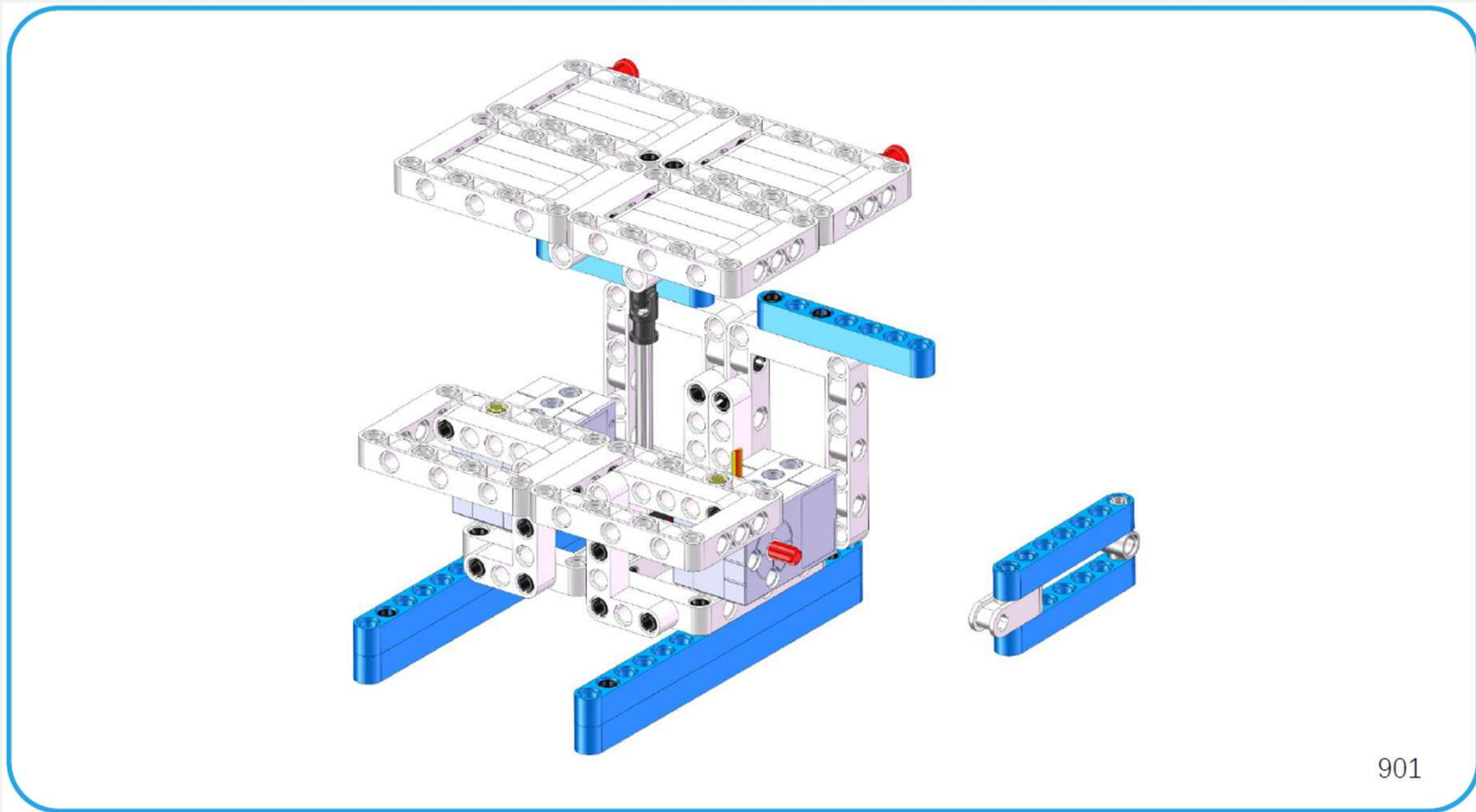


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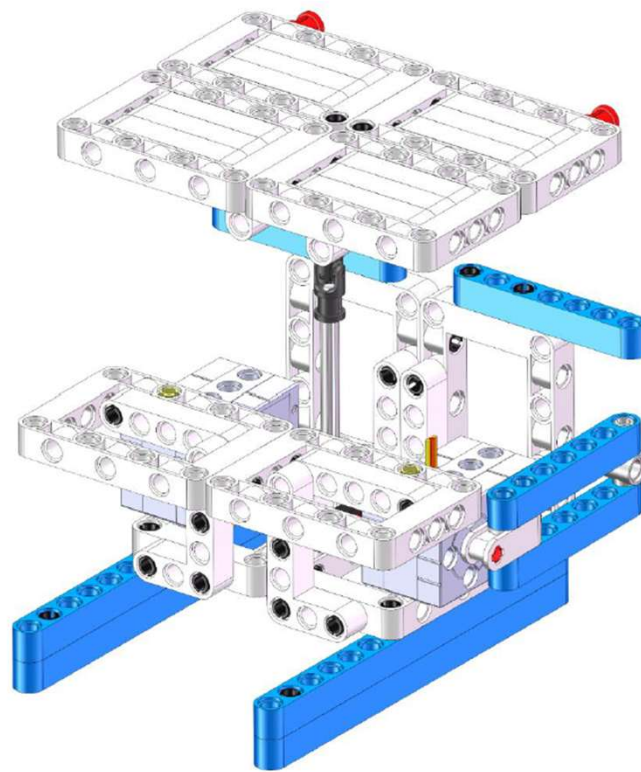
Step 64



Step 65

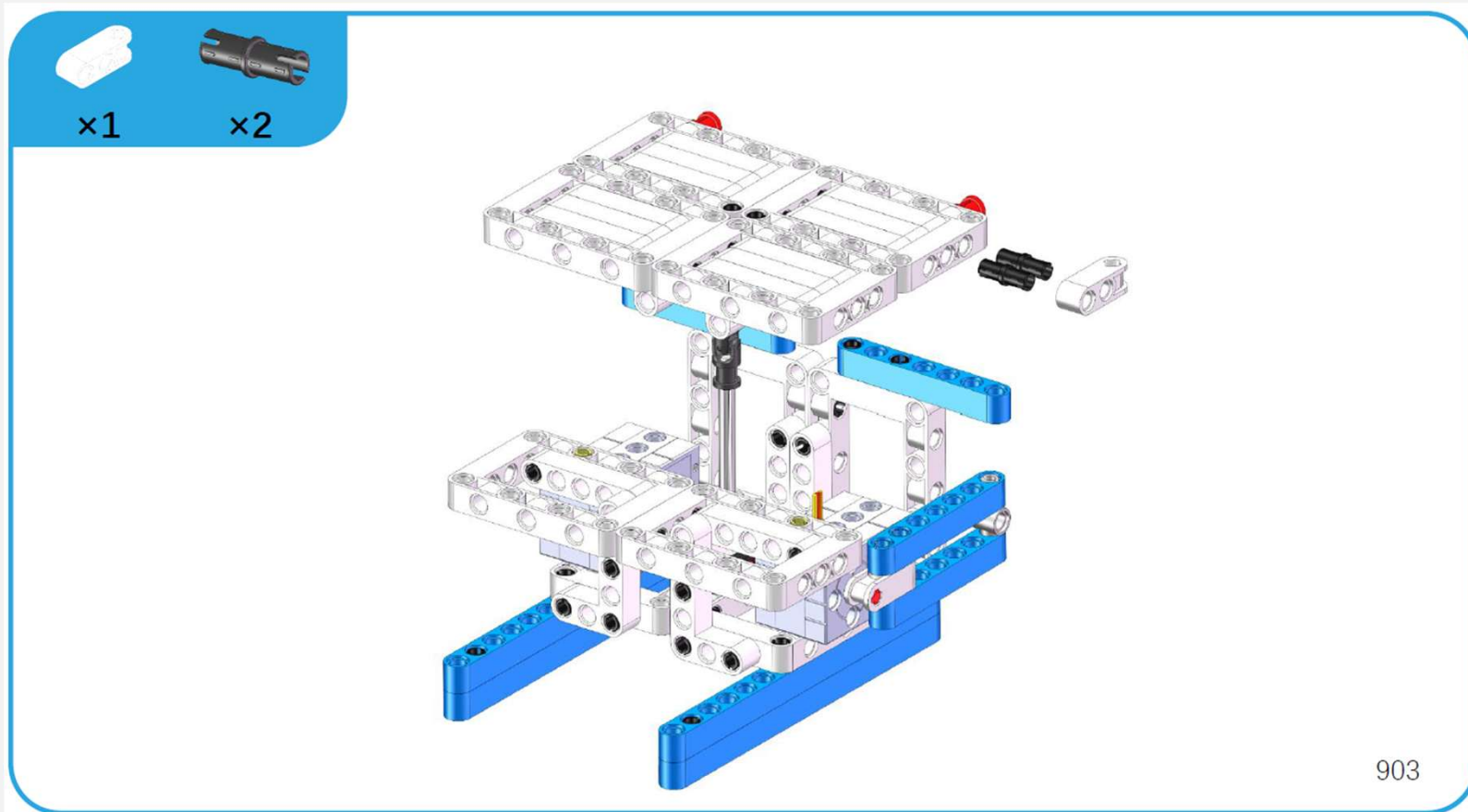


Step 66

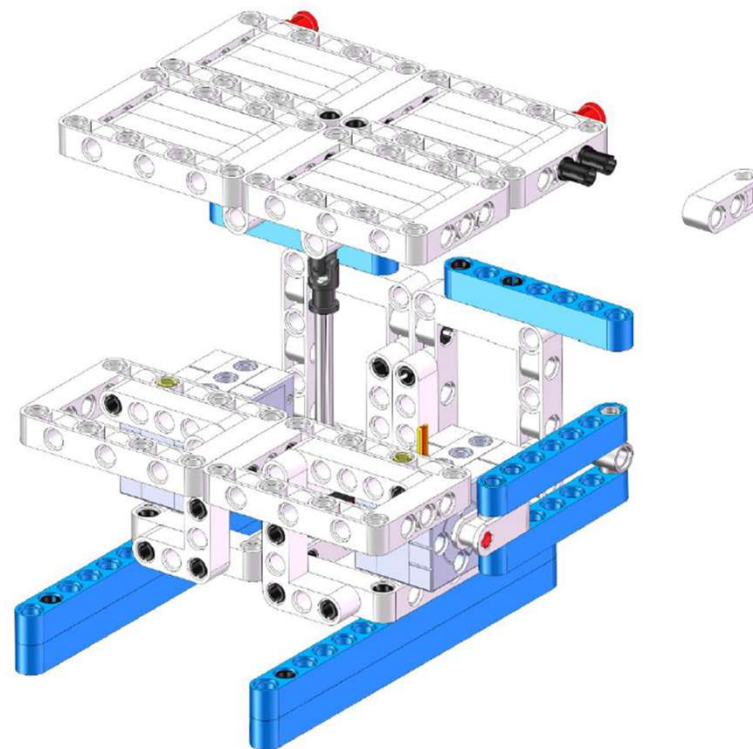


902

Step 67

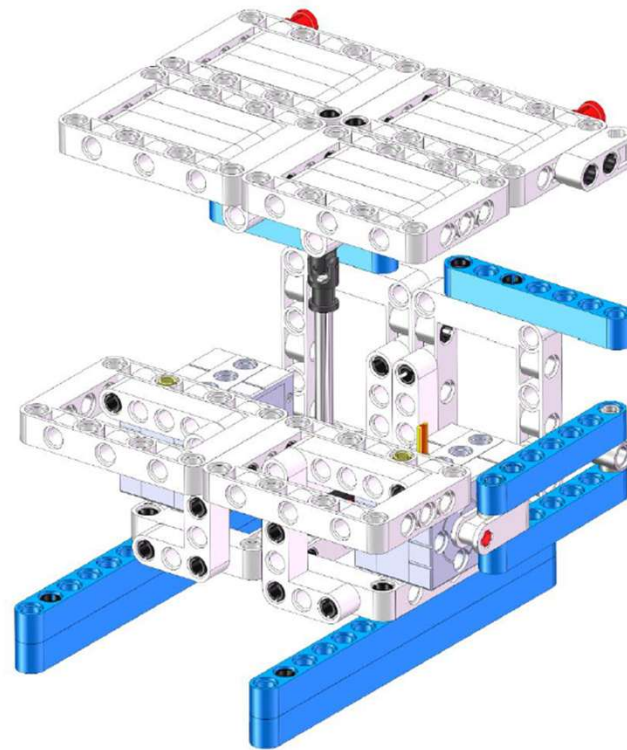


Step 68



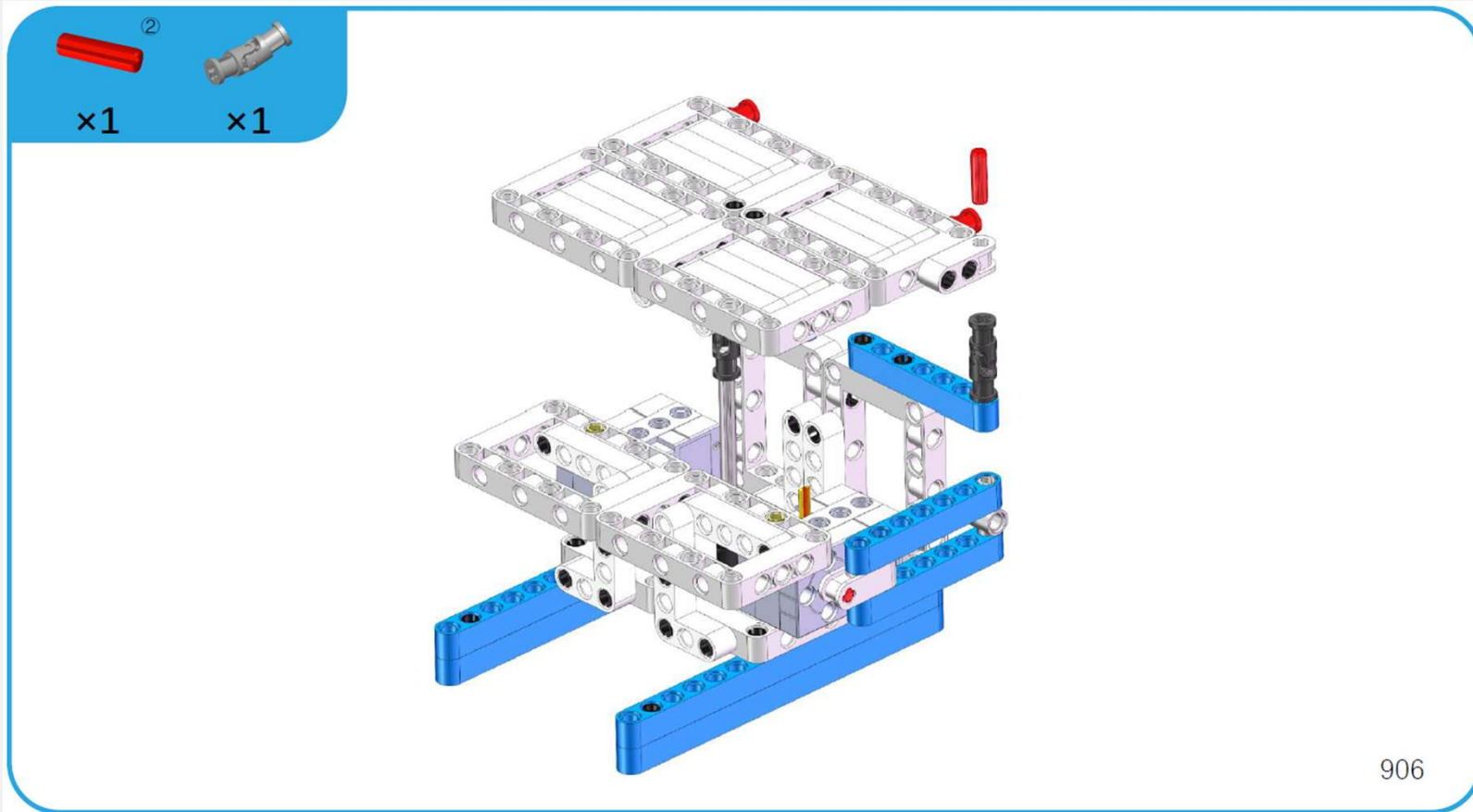
904

Step 69



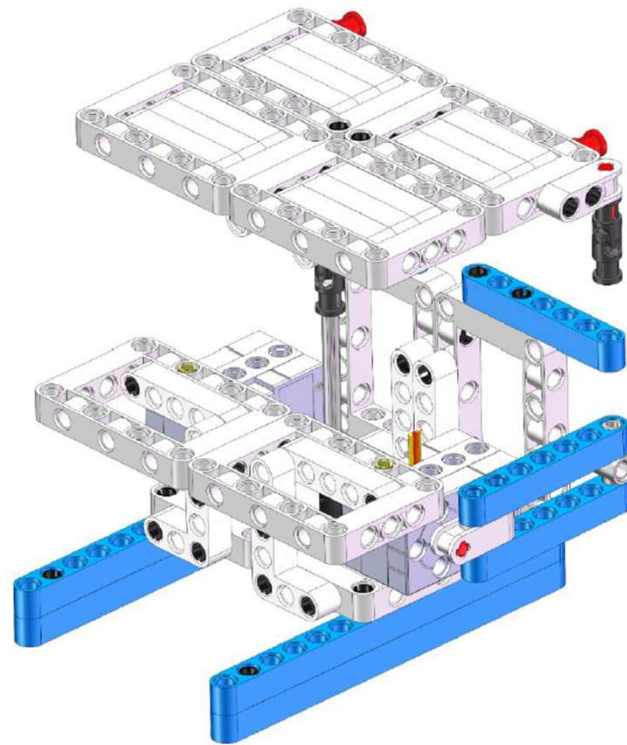
905

Step 70



906

Step 71



907

Step 72



908

Step 73



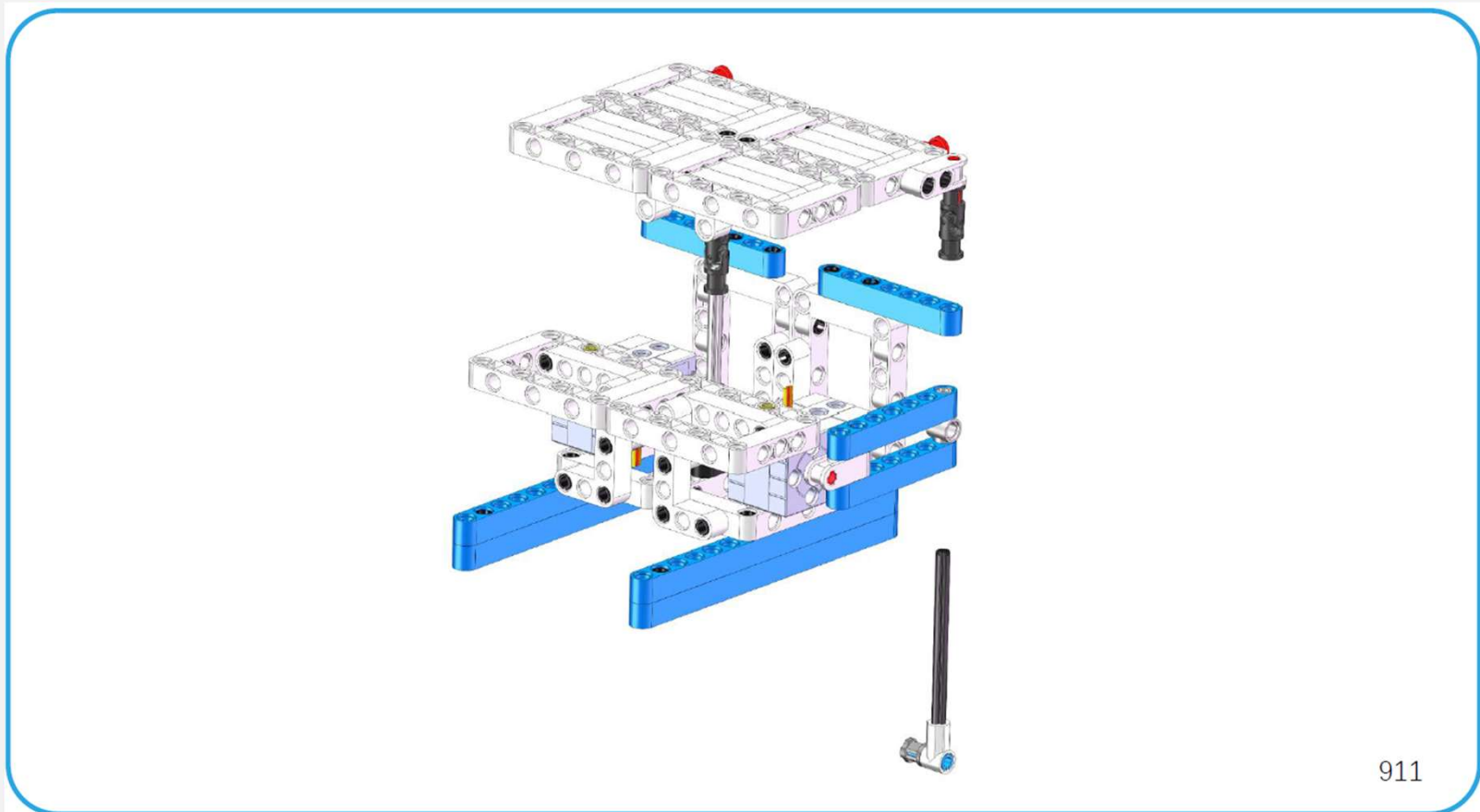
909

Step 74



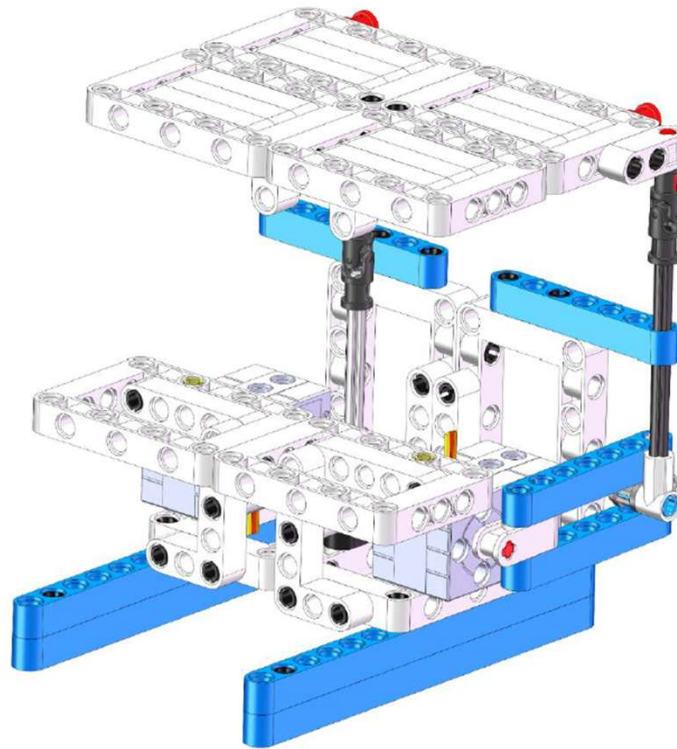
910

Step 75



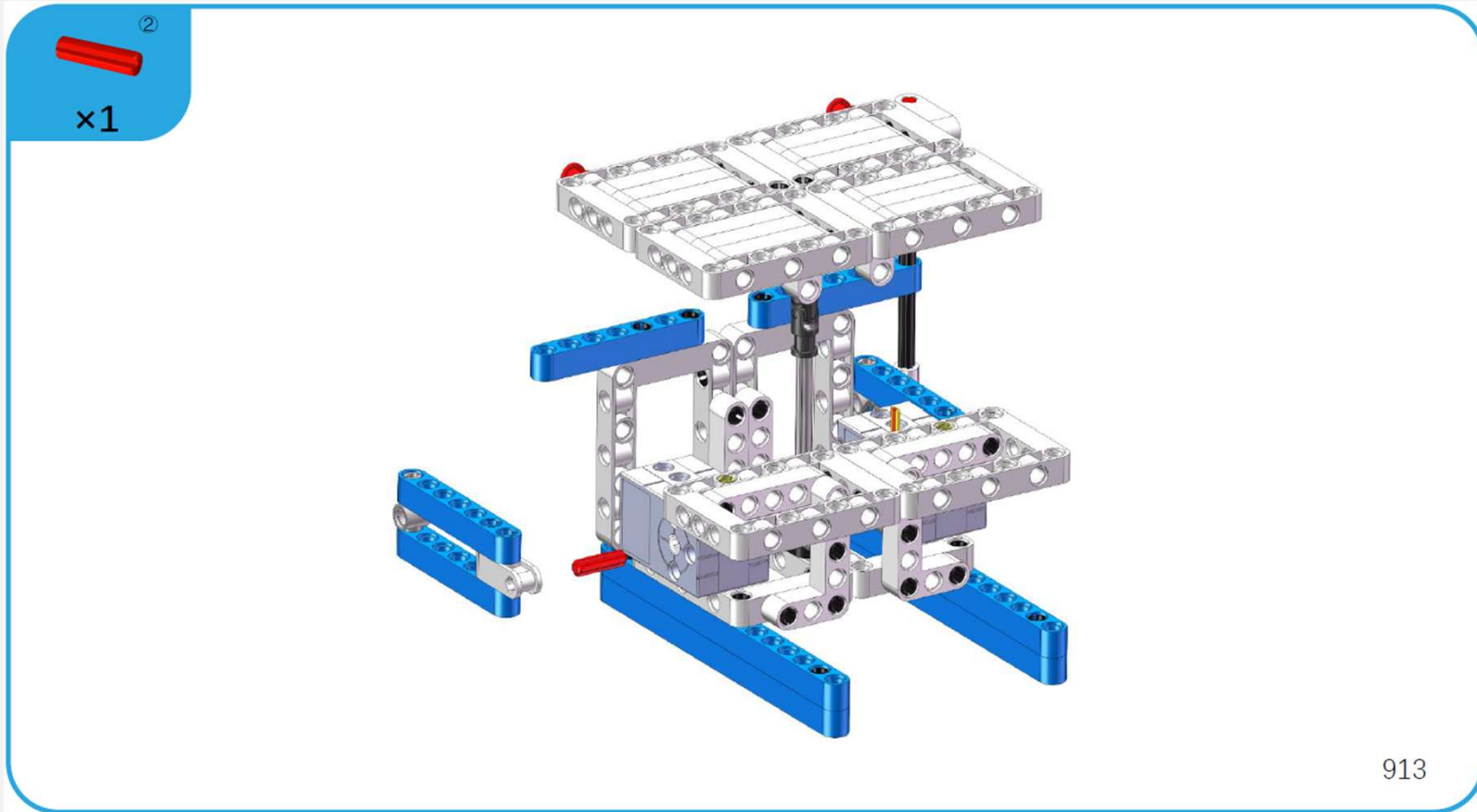
911

Step 76



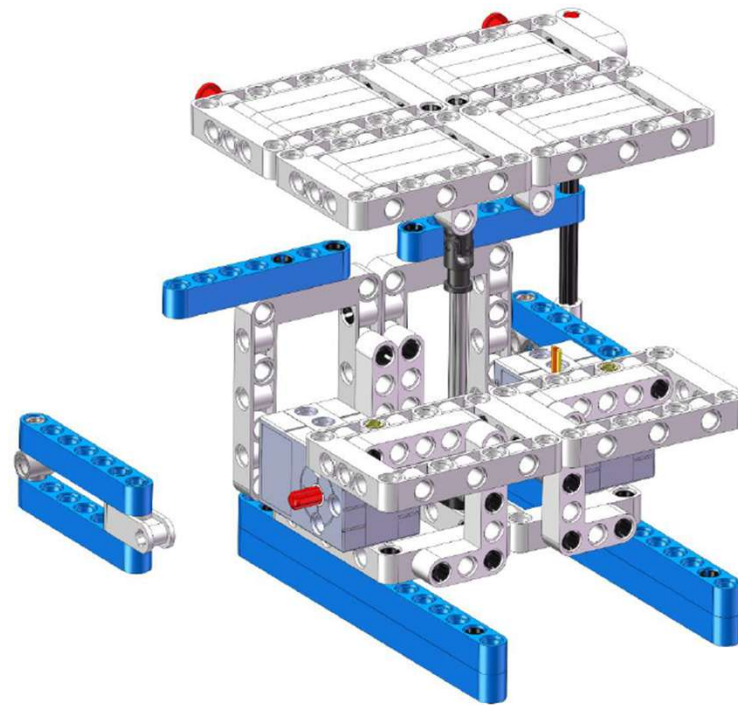
912

Step 77



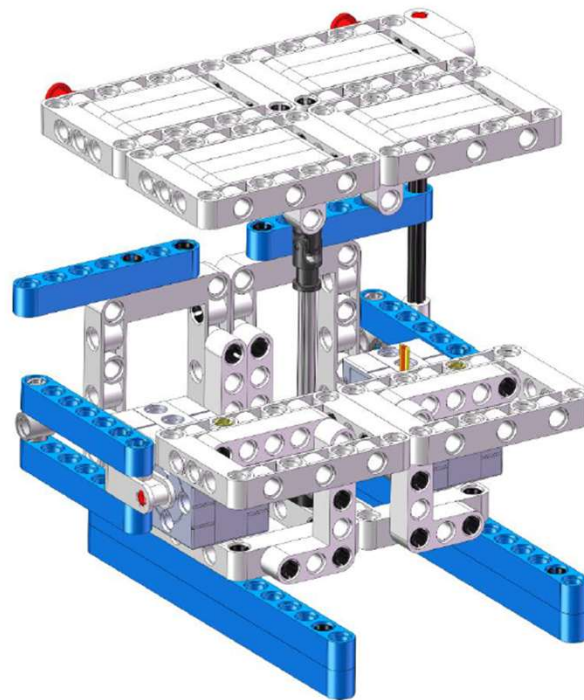
913

Step 78



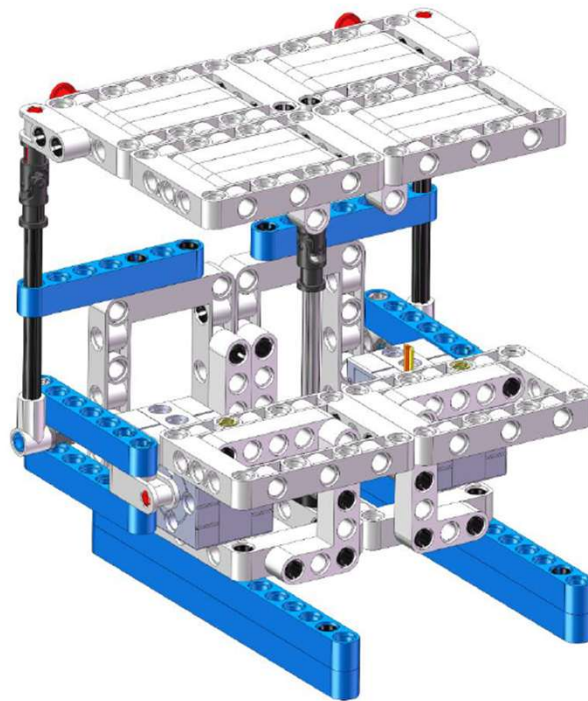
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Step 79



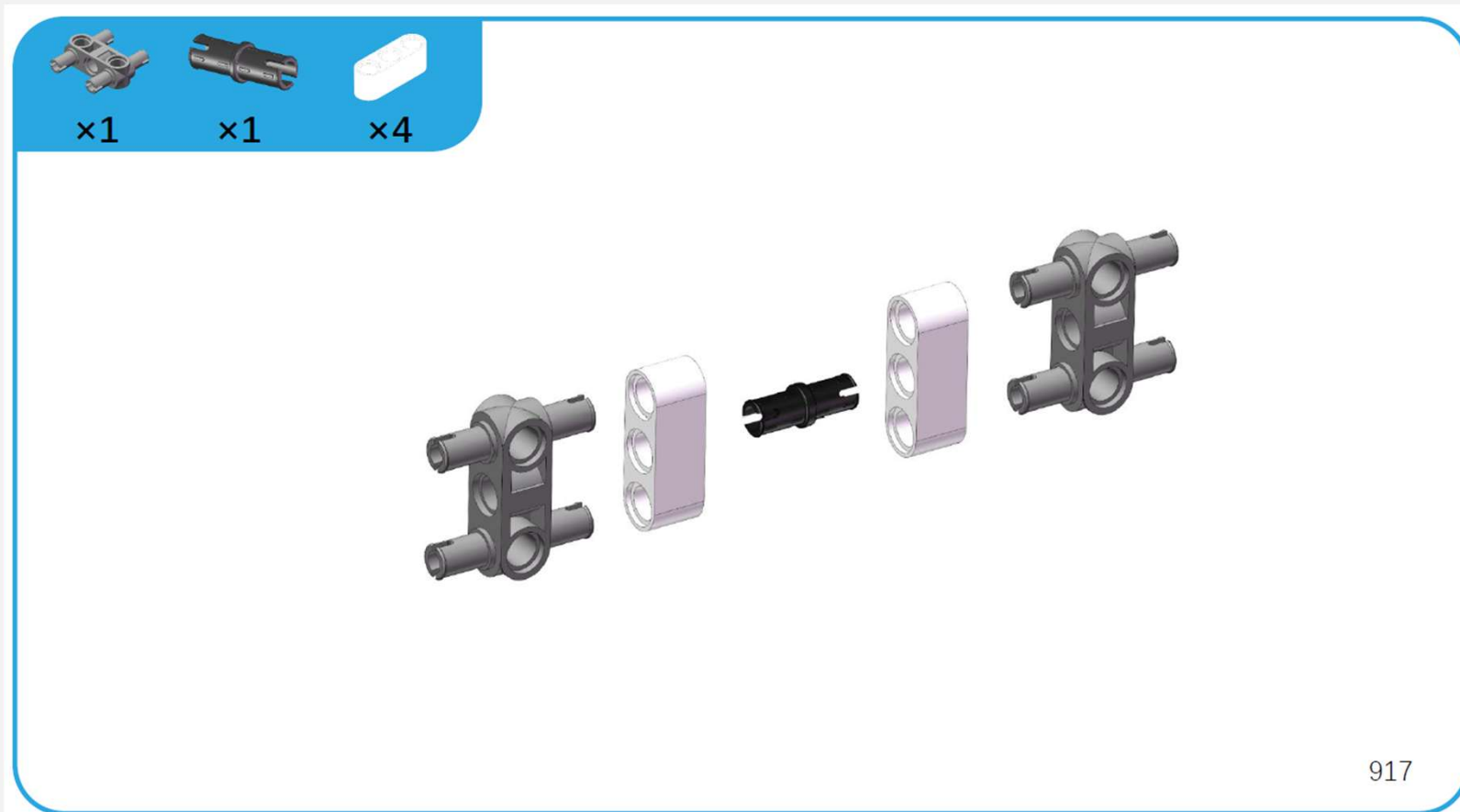
915

Step 80



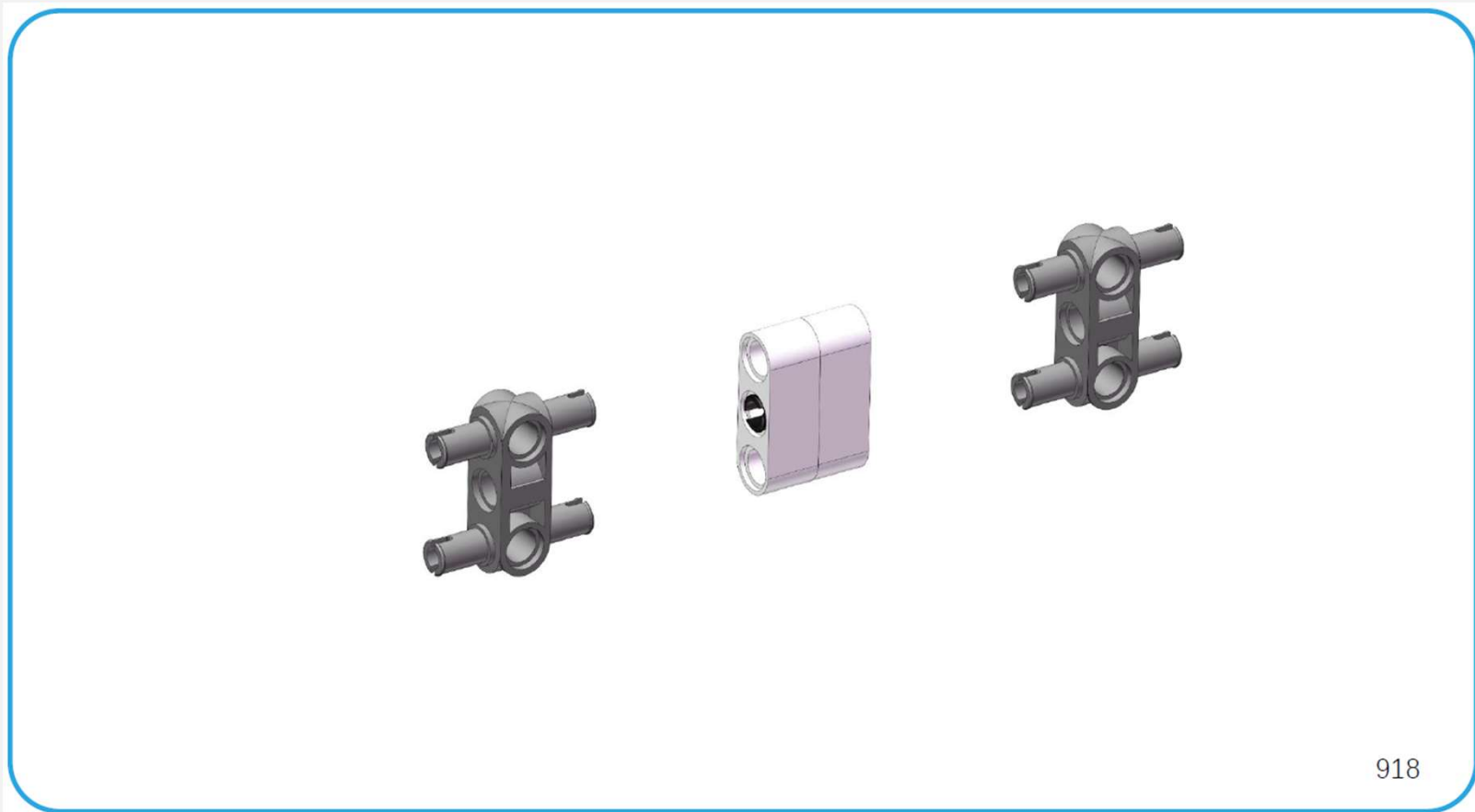
916

Step 81



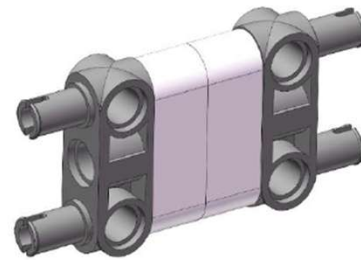
917

Step 82



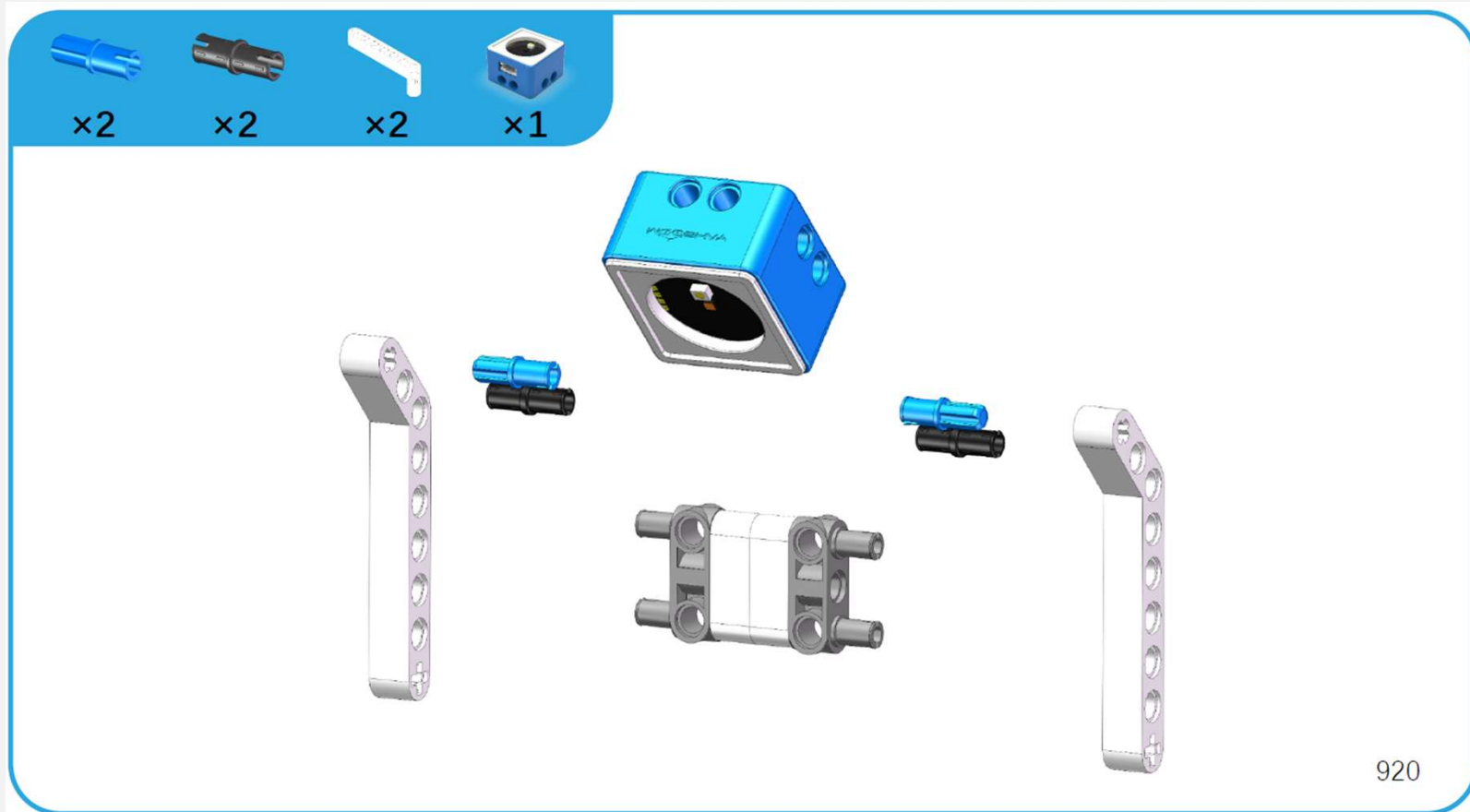
918

Step 83



919

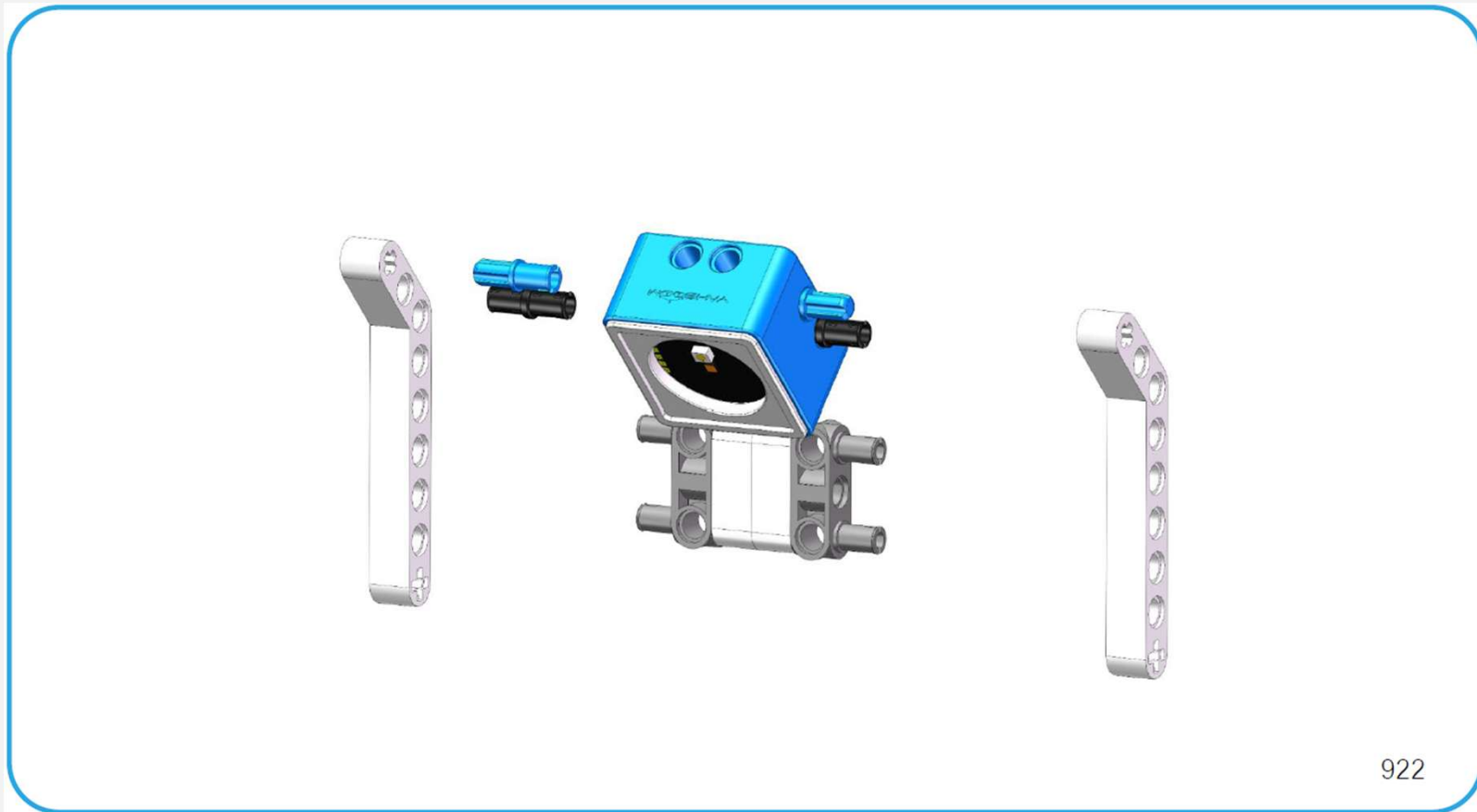
Step 84



Step 85



Step 85



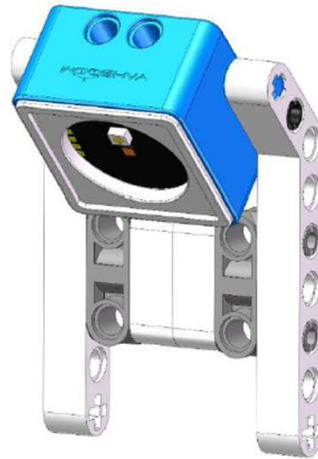
922

Step 85



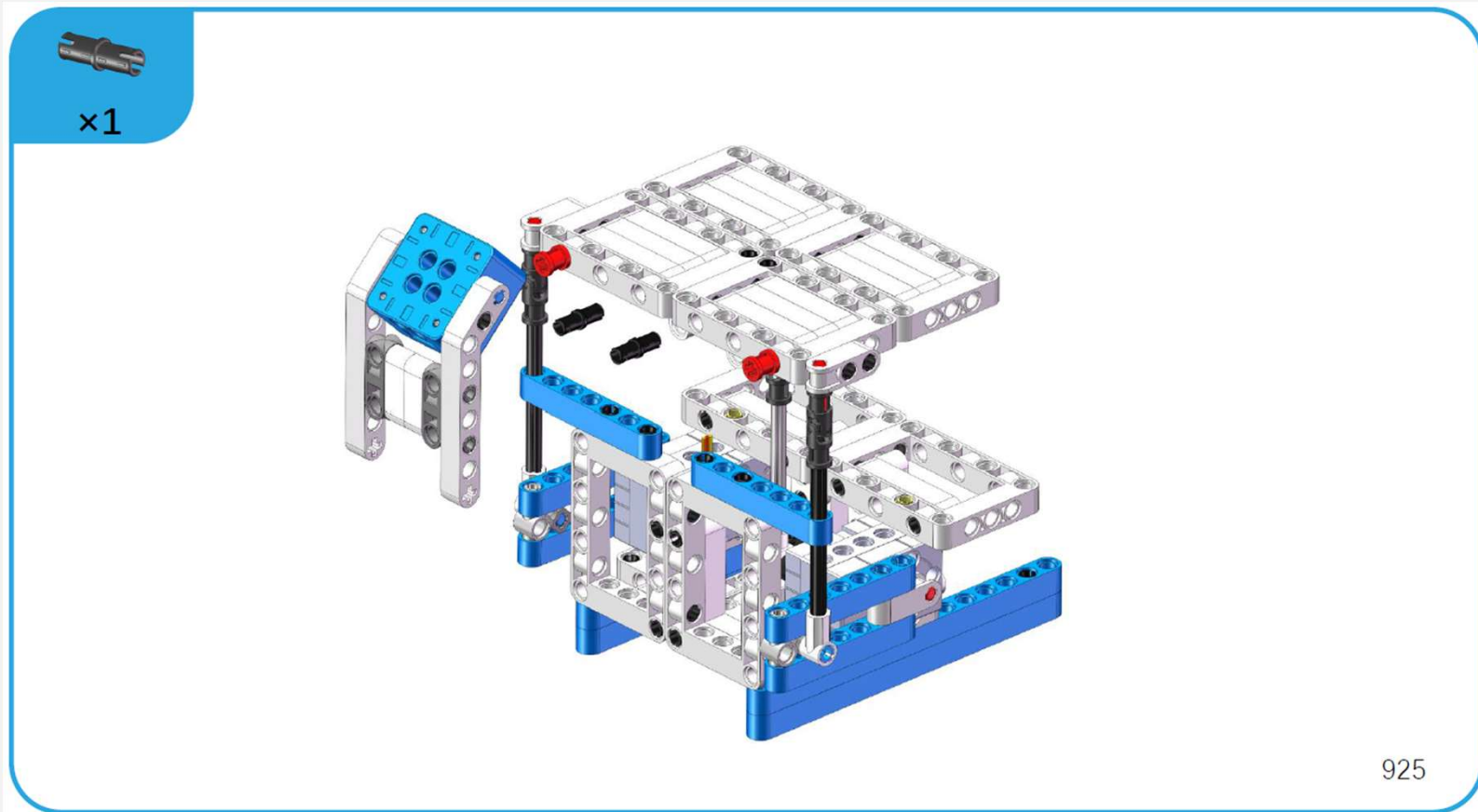
923

Step 86



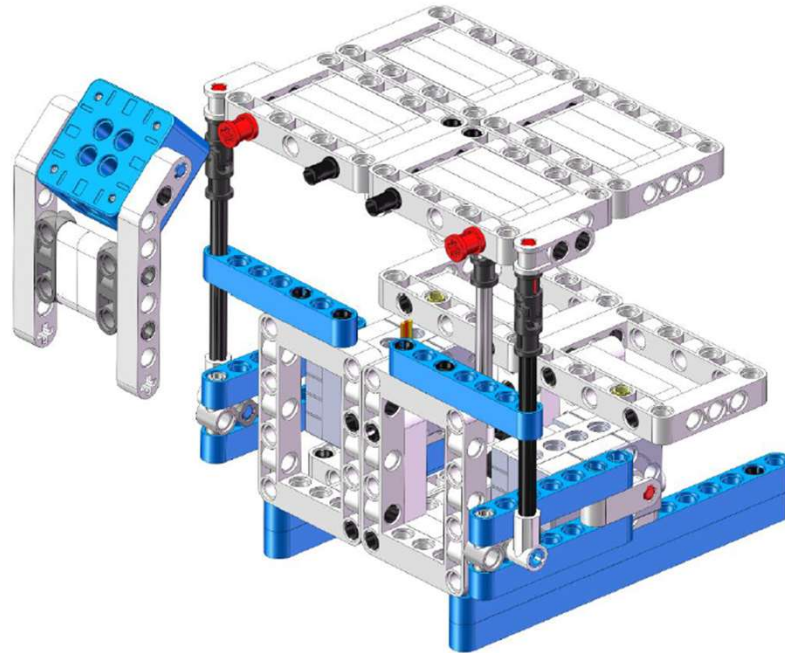
924

Step 87



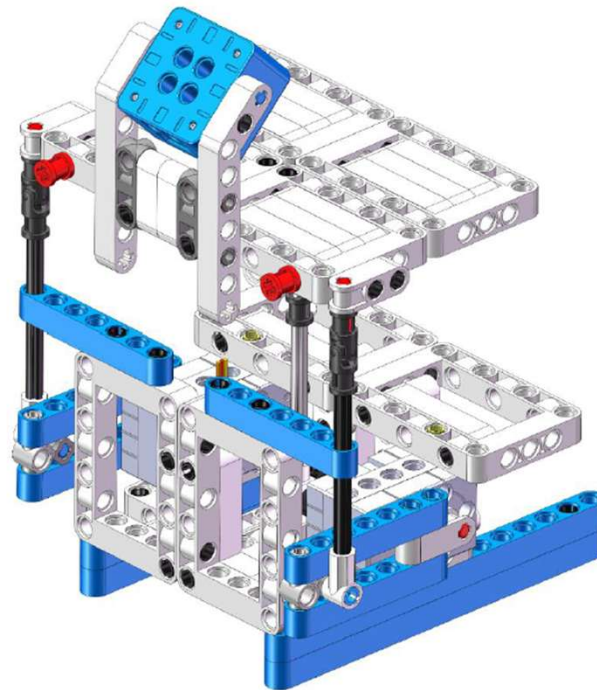
925

Step 88



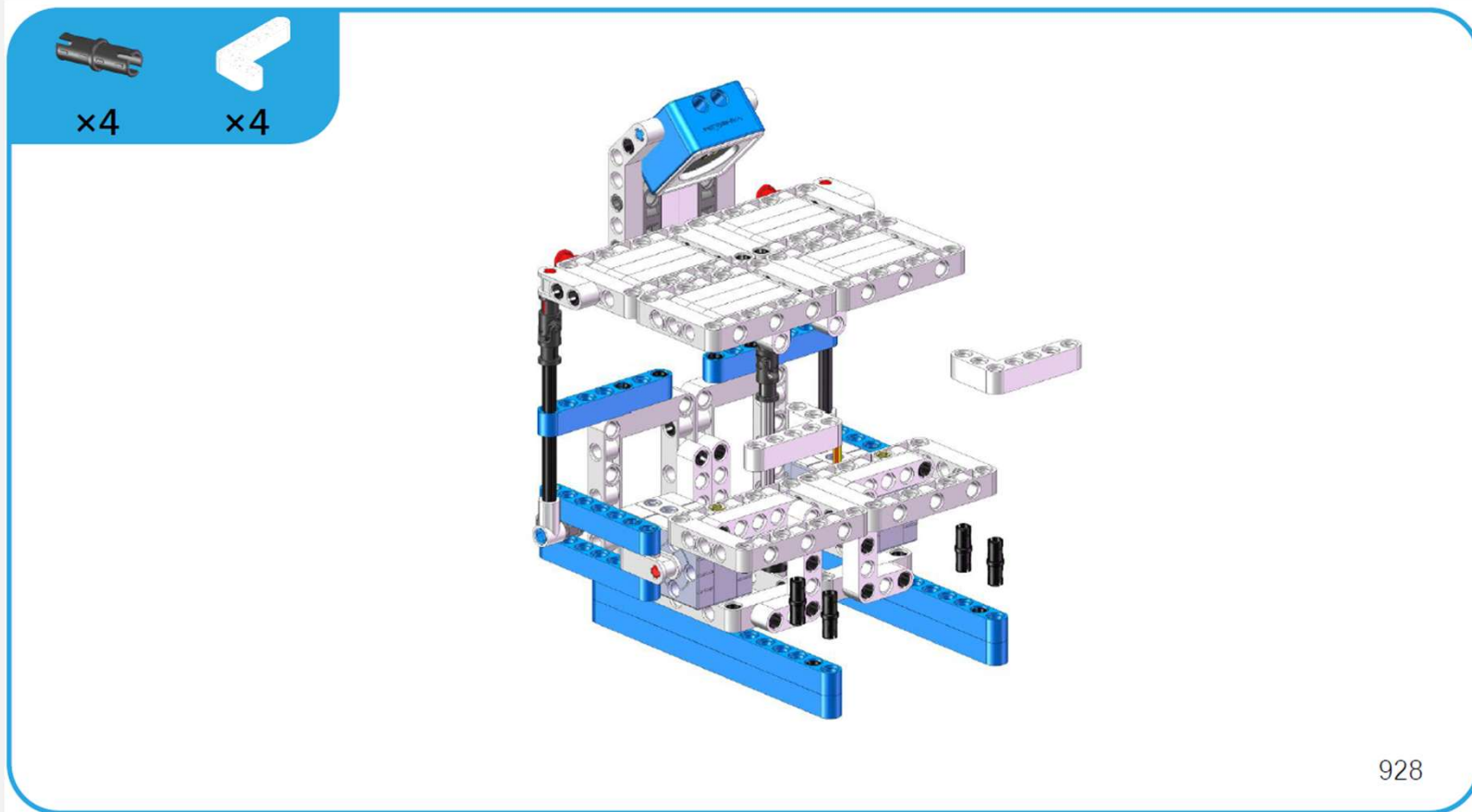
926

Step 89

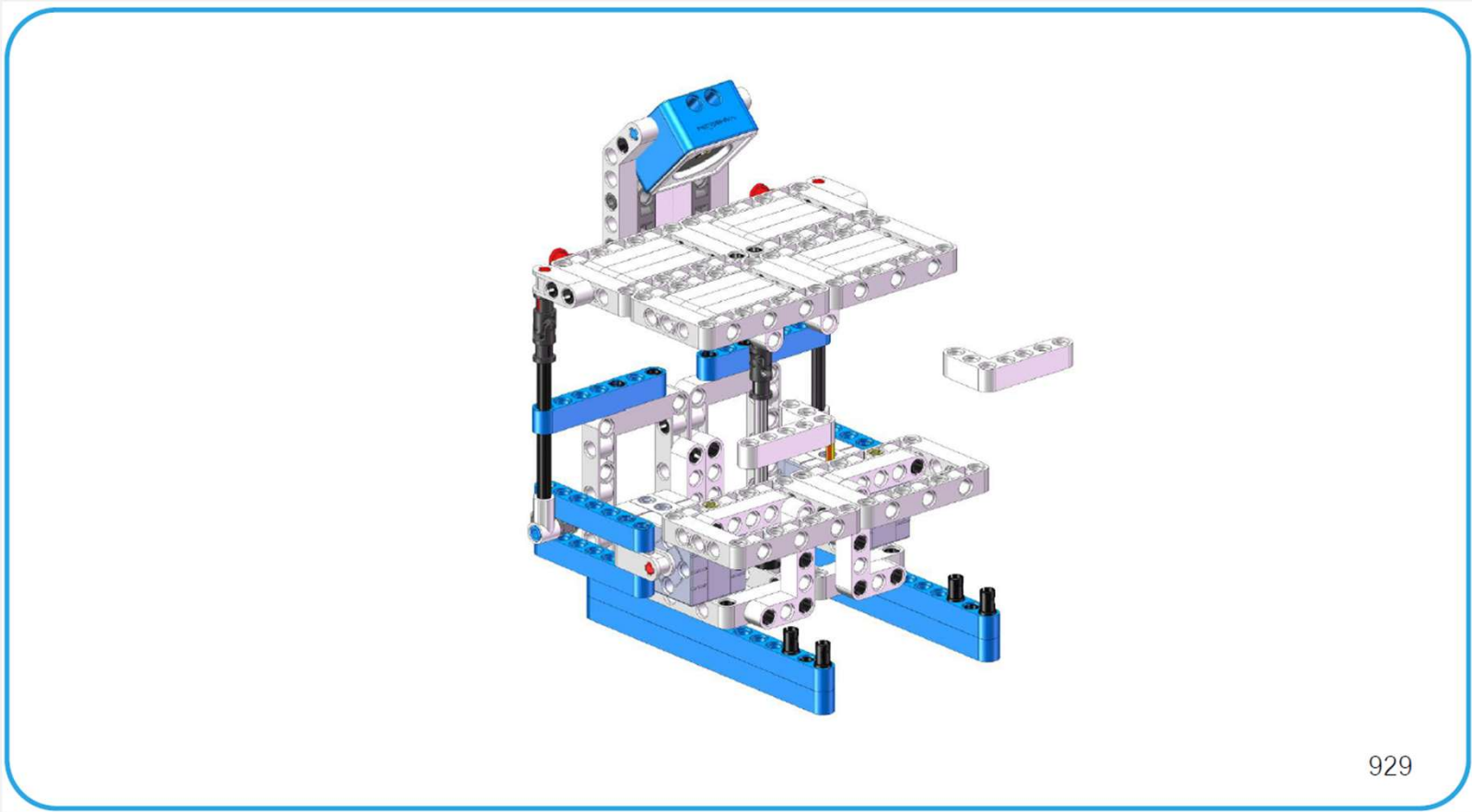


927

Step 90

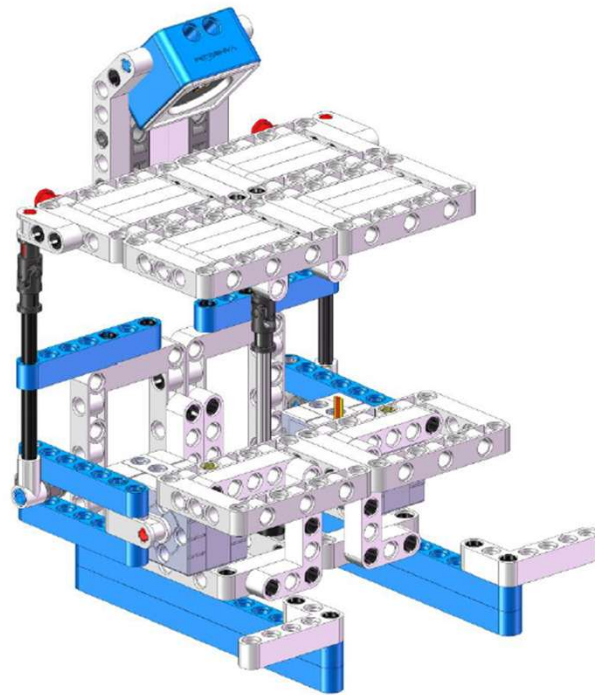


Step 91



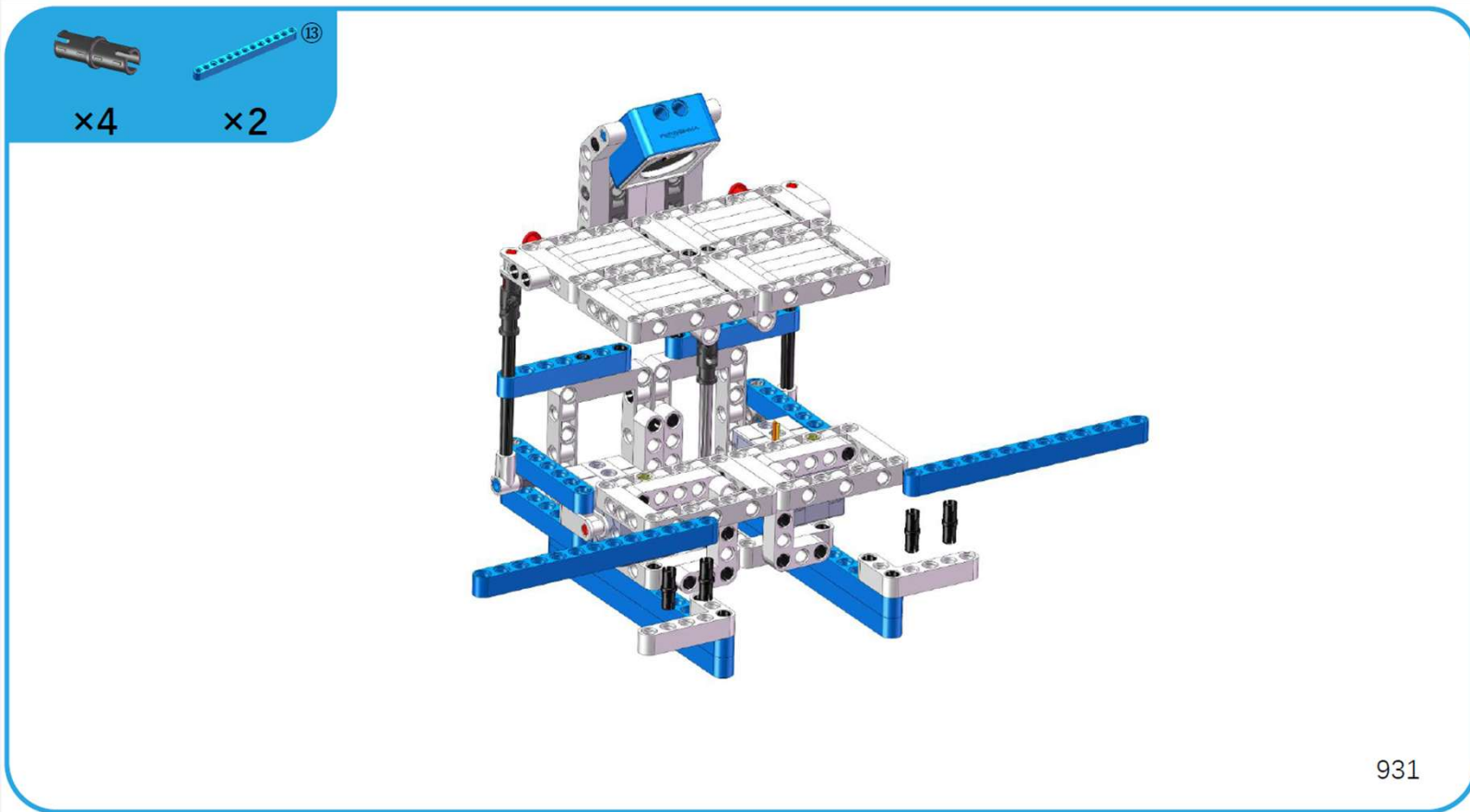
929

Step 92

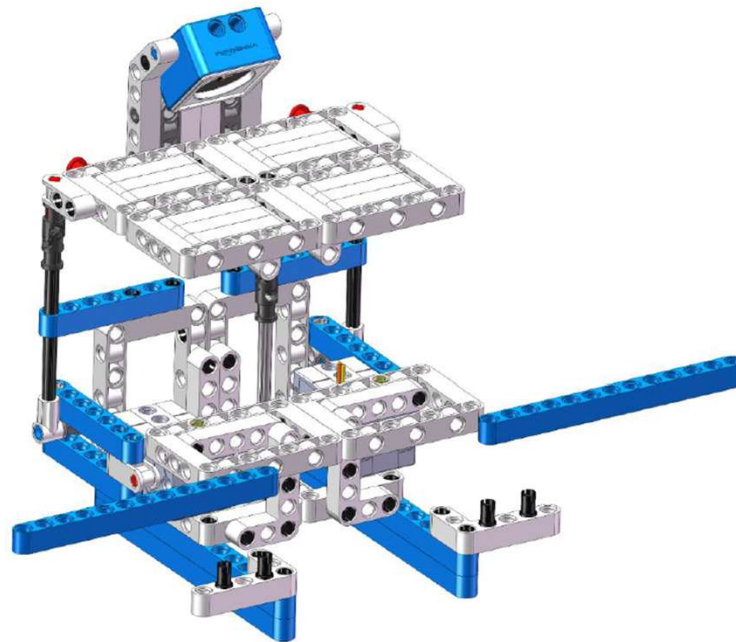


930

Step 93

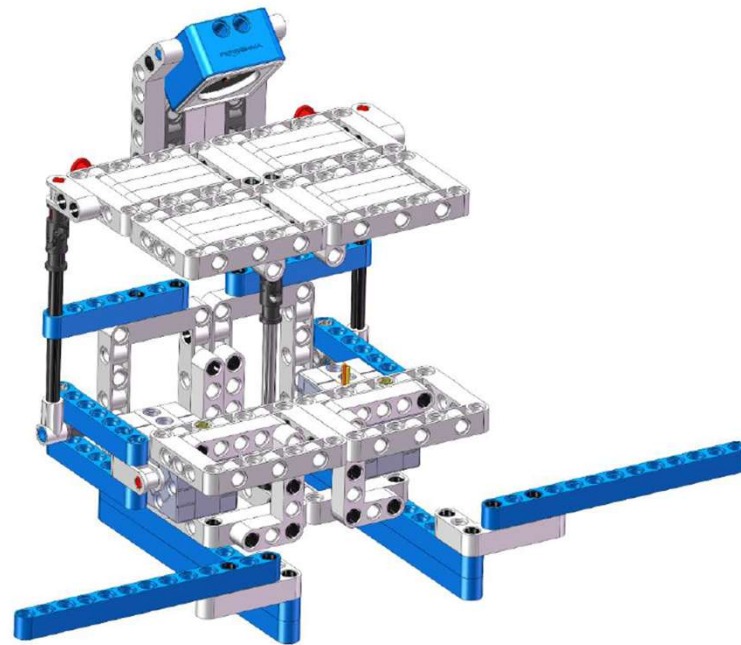


Step 94



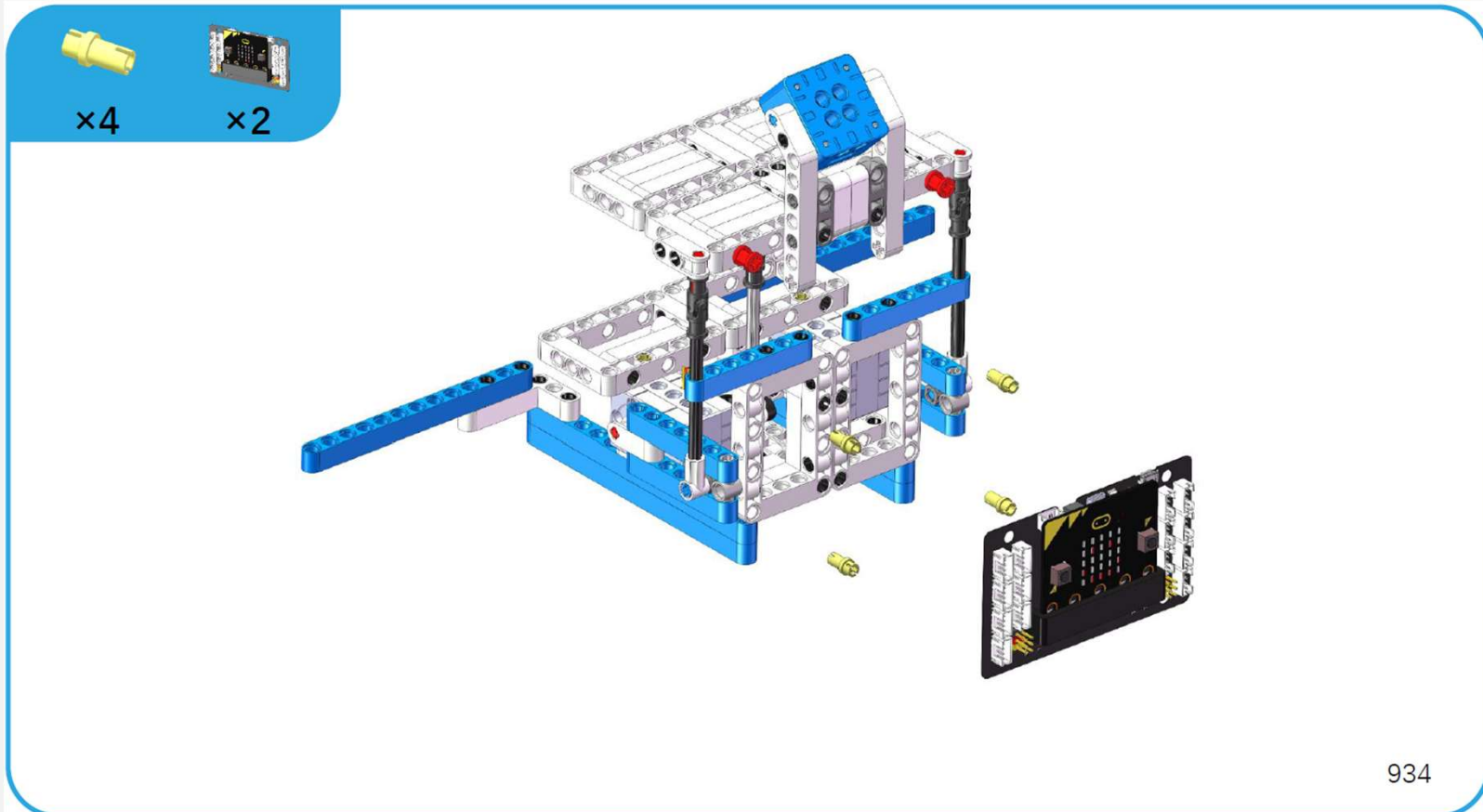
932

Step 96

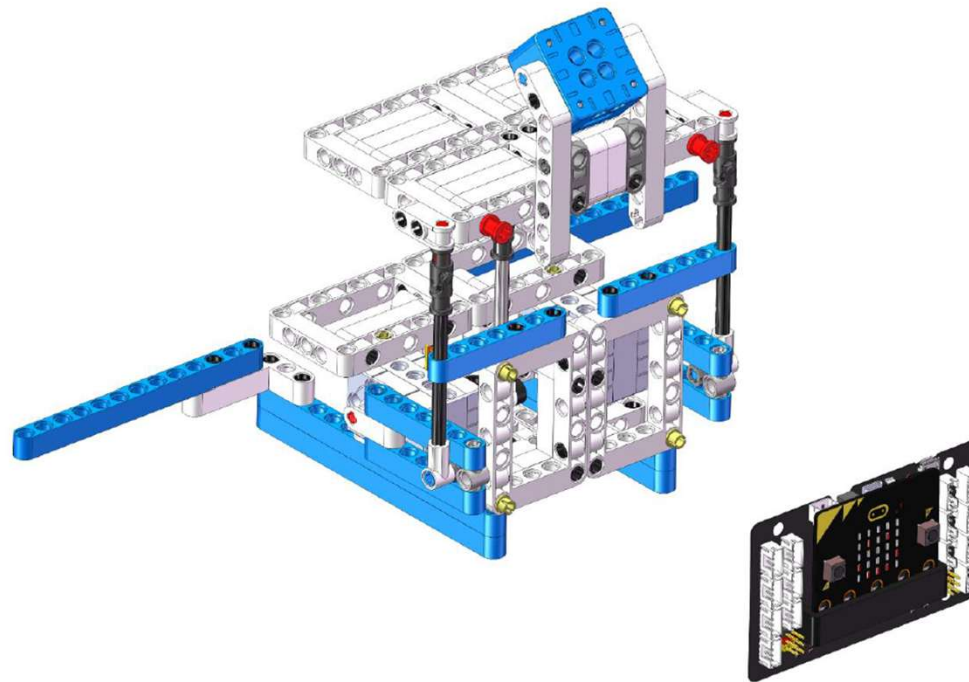


933

Step 97

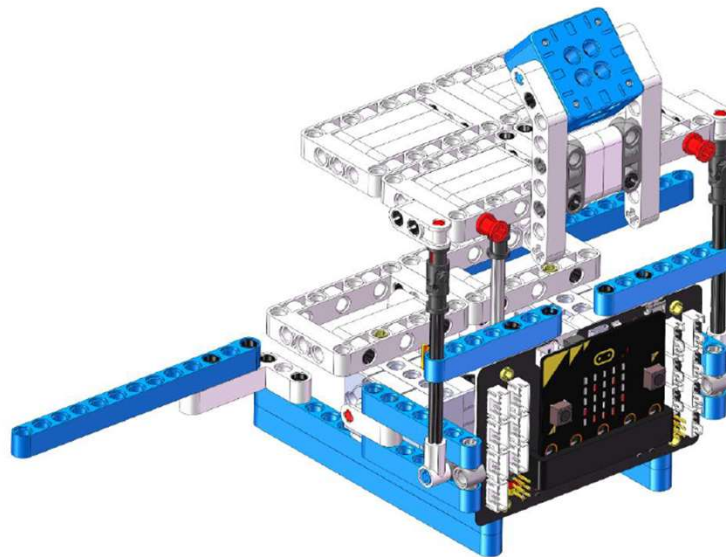


Step 98



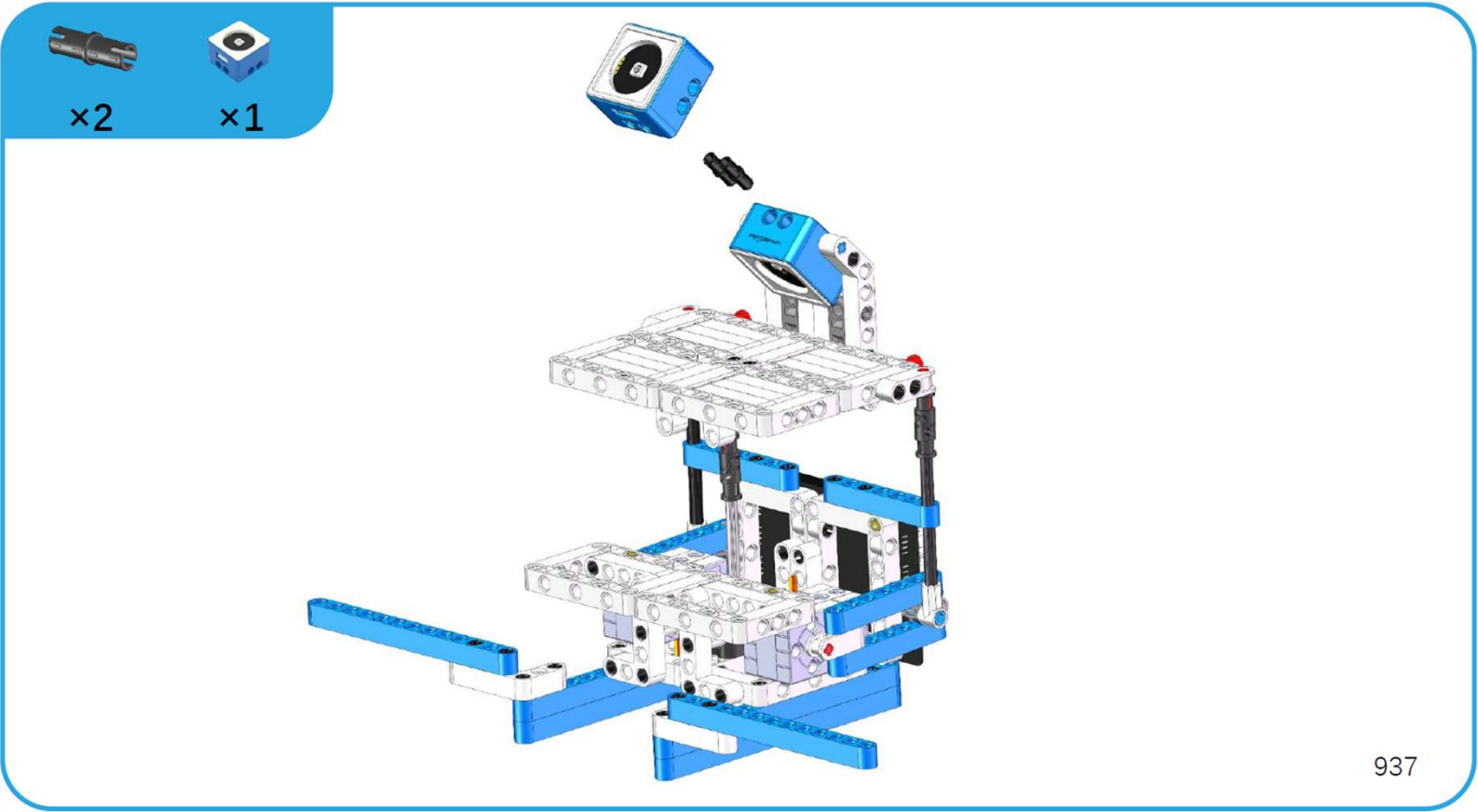
935

Step 99

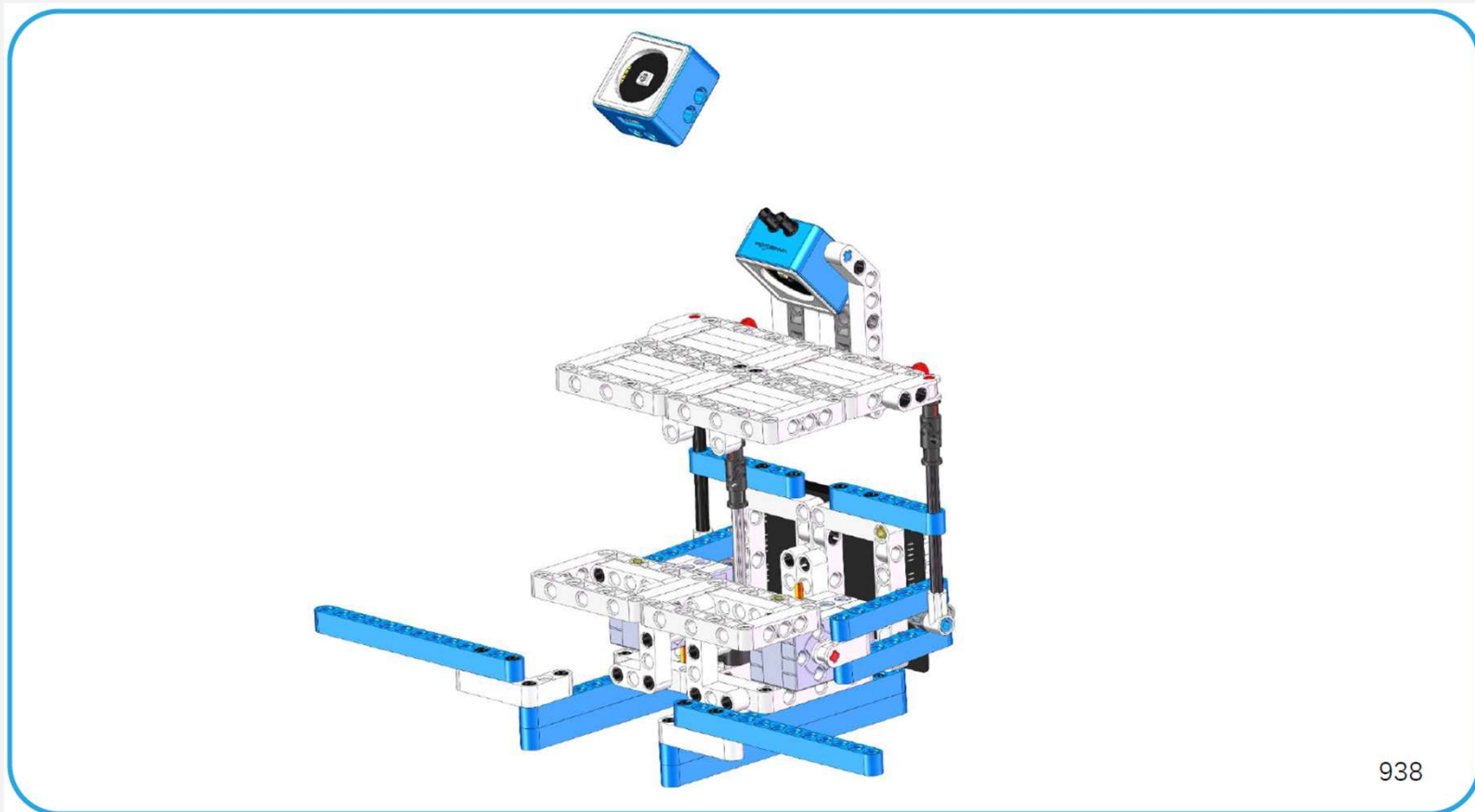


936

Step 100

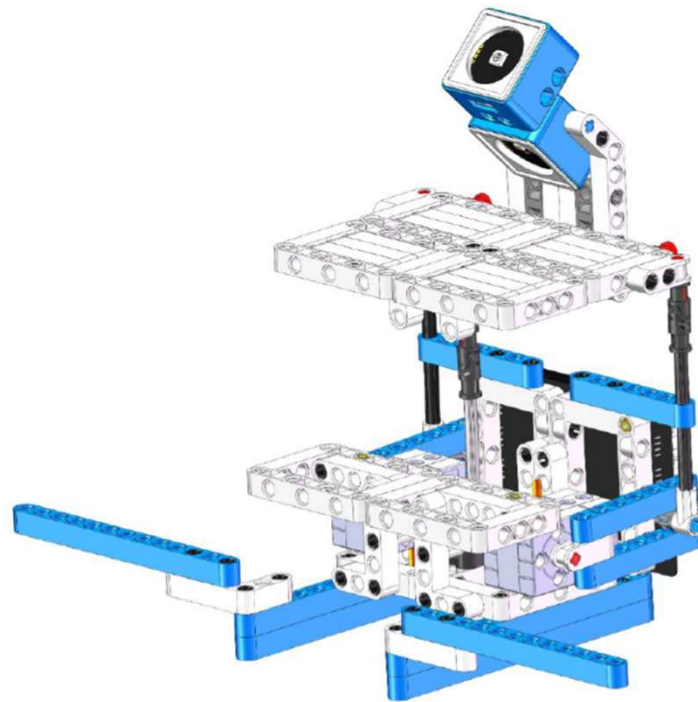


Step 101



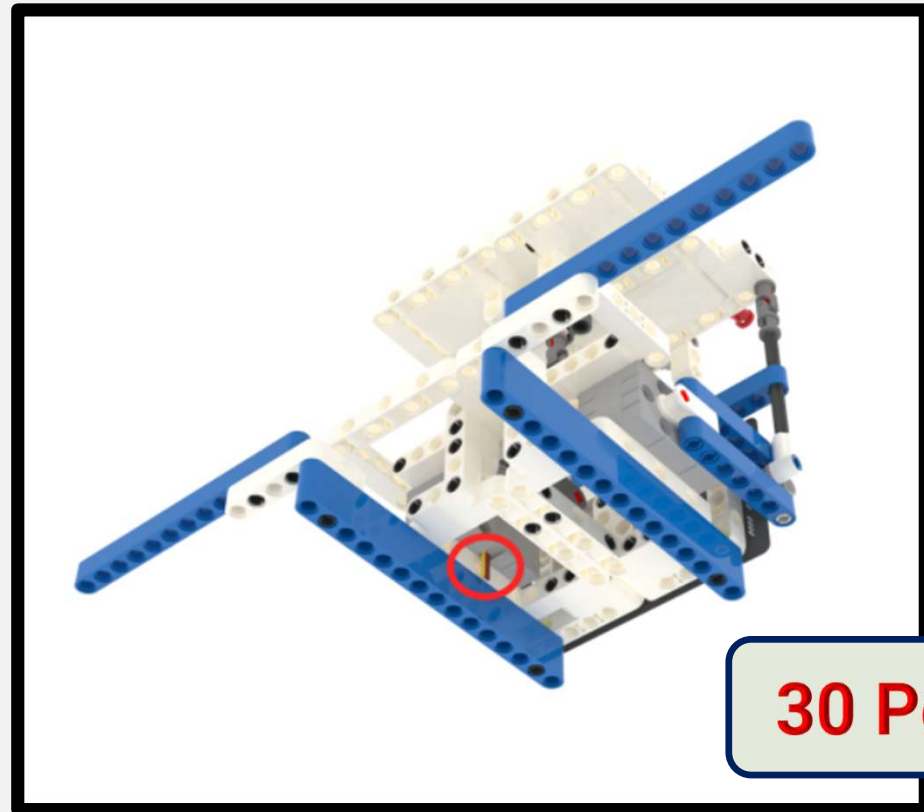
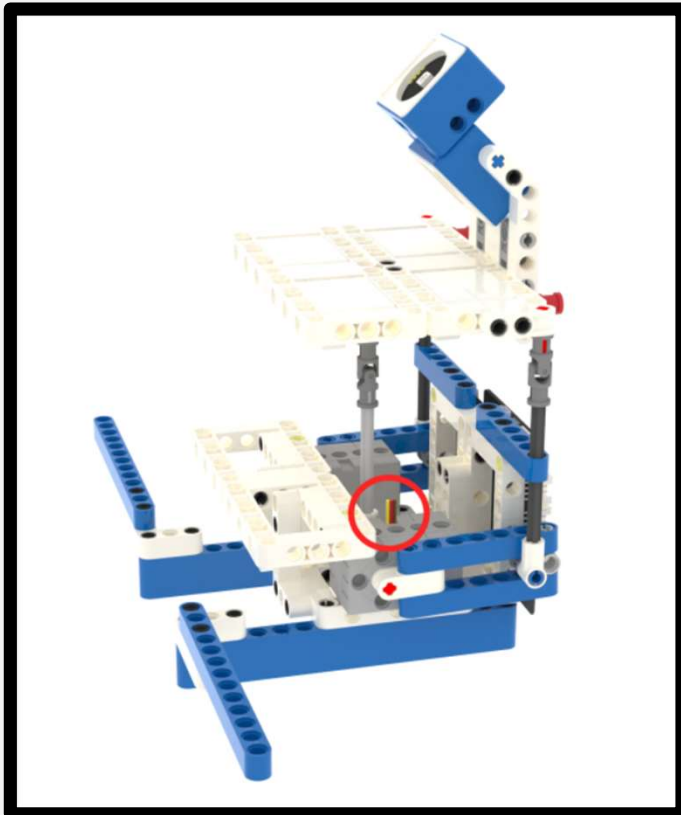
938

Step 102



939

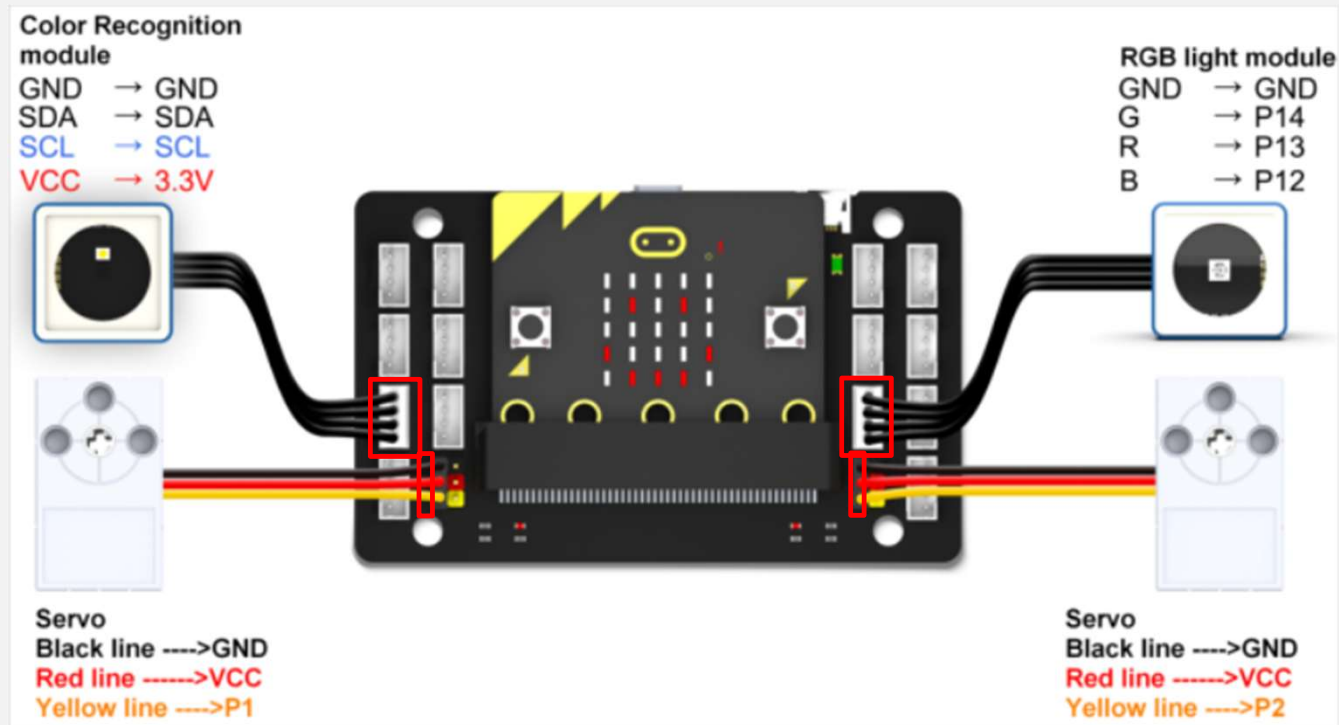
Please make sure that the wiper shaft is installed **correctly**, as shown below.



30 Points

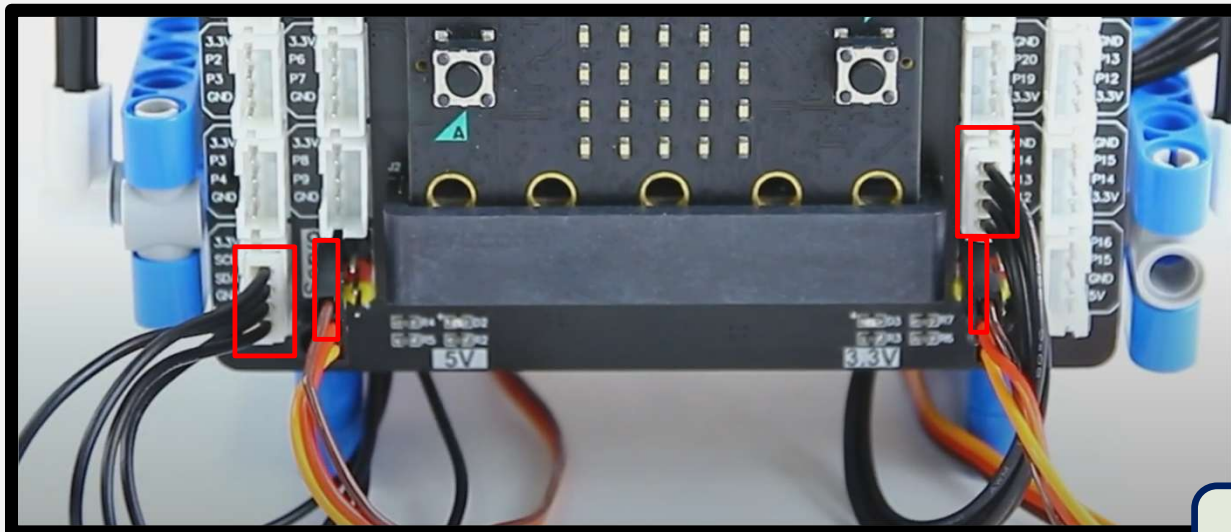
Wire Connection

Connect the modules



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

Connect the modules



10 Points

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

MakeCode Programming

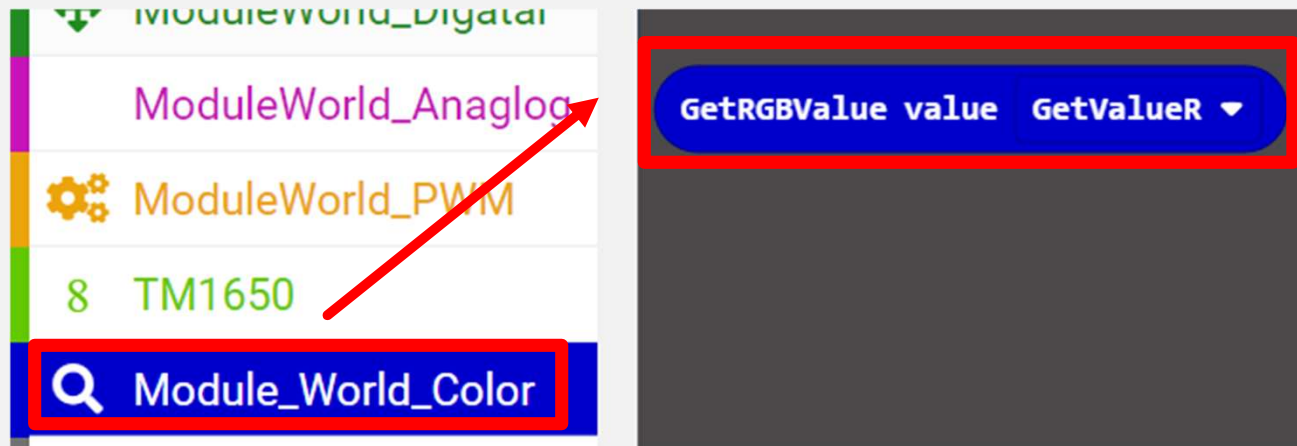
<https://github.com/YahboomTechnology/Module-World>.

https://github.com/YahboomTechnology/Module_world_color

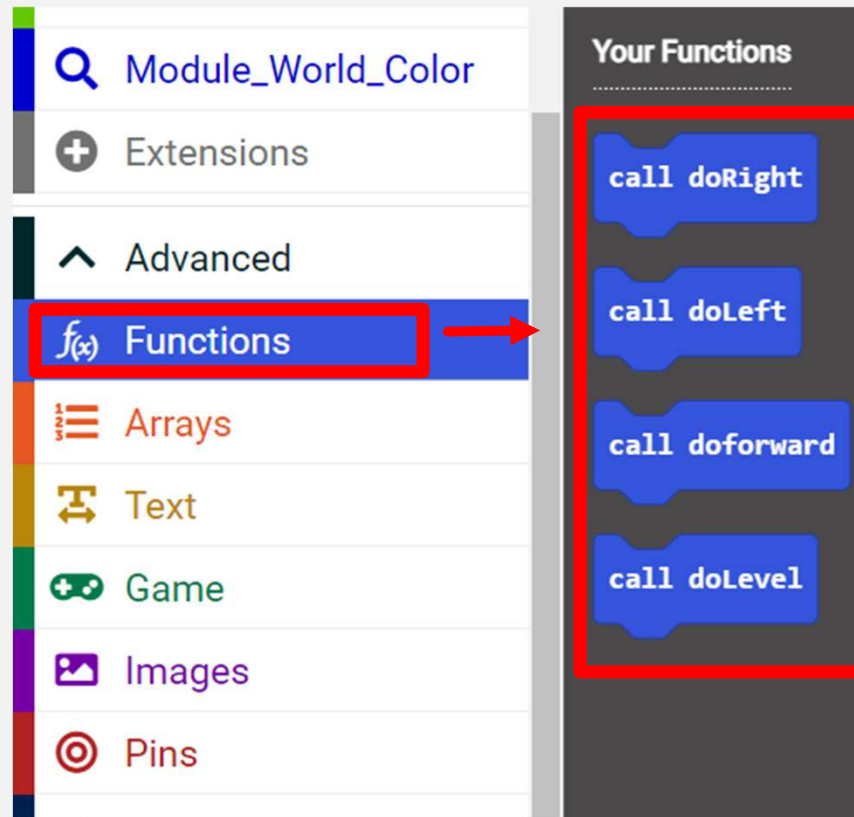
Or search [YahboomTechnology/Module-World](#) in the extension block

And add [yahboomtechnology/module_world_color](#) in the extension as well.

Coding – Module_World_Color



Coding – Function



Coding – function doRight & doLeft

```

function doRight
  Servo(360) pin P1 value 150
  Servo(360) pin P2 value 150
  pause (ms) 1000
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  pause (ms) 1000
  
```

```

function doLeft
  Servo(360) pin P1 value 210
  Servo(360) pin P2 value 210
  pause (ms) 1000
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  pause (ms) 1000
  
```

“doRight” function is to make the level tilt to the right so that the color bricks will fall to right side.

“doLeft” function is to make the level tilt to the left so that the color bricks will fall to left side.

Coding – function doforward & doLevel

```

function doforward
  Servo(360) pin P1 value 210
  Servo(360) pin P2 value 150
  pause (ms) 1000
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  pause (ms) 1000

```

We also need a function to make the level tilt forward to drop the color brick to the front.

Let's set another function called "doForward" using the function block.

Coding – On start

```

function doLevel
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  
```

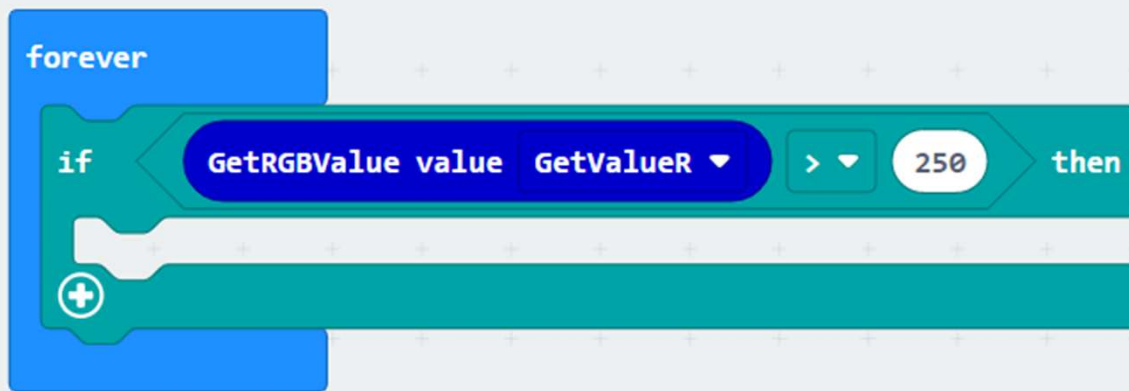
```

on start
  led enable false
  call doLevel
  
```

For the starting positions, we can make it into a function called “doLevel”, then put the function into the On Start.

I will set LED enable to false to make sure it won't affect the pin voltage for Servos and sensors.

Coding – forever (Checking Red)

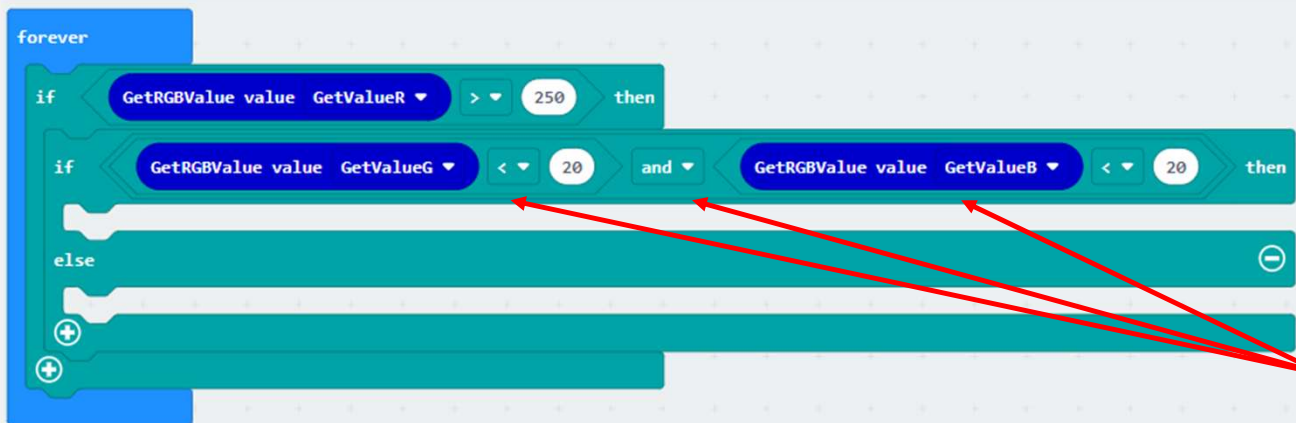


To check if the brick is red color, we need to make sure the Value R is very high, so let's set if the R Value is higher than 250, it's very likely it is red color.

Coding – forever (Checking Red)

```

forever
  if GetRGBValue value GetValueR > 250 then
  if GetRGBValue value GetValueG < 20 and GetRGBValue value GetValueB < 20 then
  else
  
```



But not just to check the R Value, because if R Value is high, the color can be either White, Yellow, Magenta or Red.

So to make sure it's red color, we must compare G Value and B Value.

If R Value is high while G & B value is low, then the possibility of red is very high.

Coding – forever (Checking Red)

```
forever
  if GetRGBValue value GetValueR > 250 then
    if GetRGBValue value GetValueG < 20 and GetRGBValue value GetValueB < 20 then
      RGB (P12P13P14) value Red
      call doLeft
    else
      RGB (P12P13P14) value OFF
```

If the red brick is detected, the RGB module will display Red color, and the level will tilt to left and drop the brick.

Else, the RGB will turn off.

Coding – forever (Checking Blue and Green)

```

forever
  if GetRGBValue value GetValueR > 250 then
    if GetRGBValue value GetValueG < 20 and GetRGBValue value GetValueB < 20 then
      RGB (P12P13P14) value Red
      call doLeft
    else
      RGB (P12P13P14) value OFF
    else if then
    else if then
  
```

Now we just need to add in another 2 conditions for checking blue and green bricks.

Coding – forever (Checking Green)

```
else if < GetRGBValue value GetValueG > > 250 then
  if < GetRGBValue value GetValueR > < 20 and < GetRGBValue value GetValueB > < 20 then
    RGB (P12P13P14) value Green
    call doRight
  else
    RGB (P12P13P14) value OFF
  end if
else if < GetRGBValue value GetValueB > > 250 then
  if < GetRGBValue value GetValueR > < 20 and < GetRGBValue value GetValueG > < 20 then
    RGB (P12P13P14) value Blue
    call doForward
  else
    RGB (P12P13P14) value OFF
  end if
end if
```

The setting for Green and Blue is similar to Red.

Coding - Overview



```
function doRight
  Servo(360) pin P1 value 150
  Servo(360) pin P2 value 150
  pause (ms) 1000
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  pause (ms) 1000

function doLeft
  Servo(360) pin P1 value 210
  Servo(360) pin P2 value 210
  pause (ms) 1000
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  pause (ms) 1000

function doLevel
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180

on start
  led enable false
  call doLevel

function doforward
  Servo(360) pin P1 value 210
  Servo(360) pin P2 value 150
  pause (ms) 1000
  Servo(360) pin P1 value 180
  Servo(360) pin P2 value 180
  pause (ms) 1000
```

```
forever
  if GetRGBValue value GetValueR > 250 then
    if GetRGBValue value GetValueG < 20 and GetRGBValue value GetValueB < 20 then
      RGB (P12P13P14) value Red
      call doLeft
    else
      RGB (P12P13P14) value OFF
    else if GetRGBValue value GetValueG > 250 then
      if GetRGBValue value GetValueR < 20 and GetRGBValue value GetValueB < 20 then
        RGB (P12P13P14) value Green
        call doRight
      else
        RGB (P12P13P14) value OFF
    else if GetRGBValue value GetValueB > 250 then
      if GetRGBValue value GetValueR < 20 and GetRGBValue value GetValueG < 20 then
        RGB (P12P13P14) value Blue
        call doforward
      else
        RGB (P12P13P14) value OFF
```

Phenomenon

After the program is downloaded successfully.

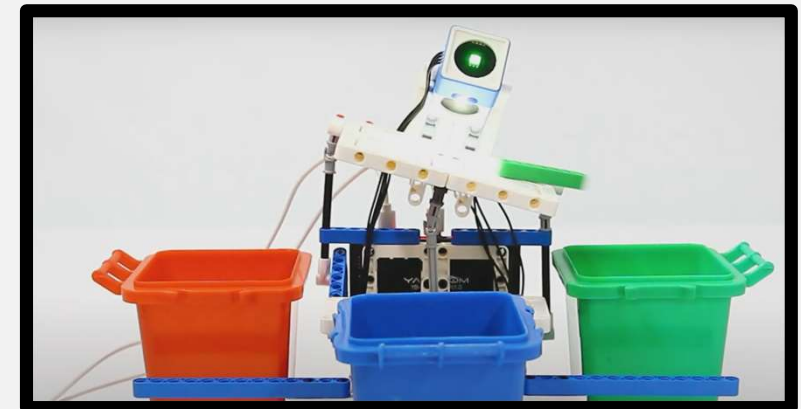
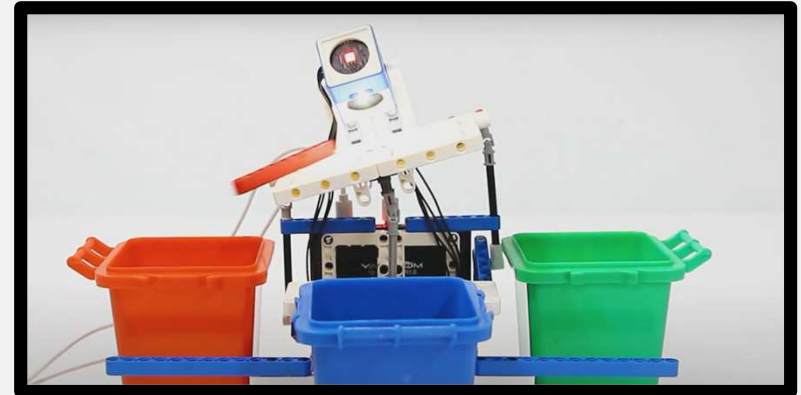
We can place **red, green, and blue blocks** on the color sorter to allow the machine to **sort**.

Place a **red** block under the color recognition module on the platform. The color sorter will **tilt** to the **left** and the blocks will **fall**.

Place a **green** block under the color recognition module on the platform. The color sorter will **tilt** to the **right** and the blocks will **fall**.

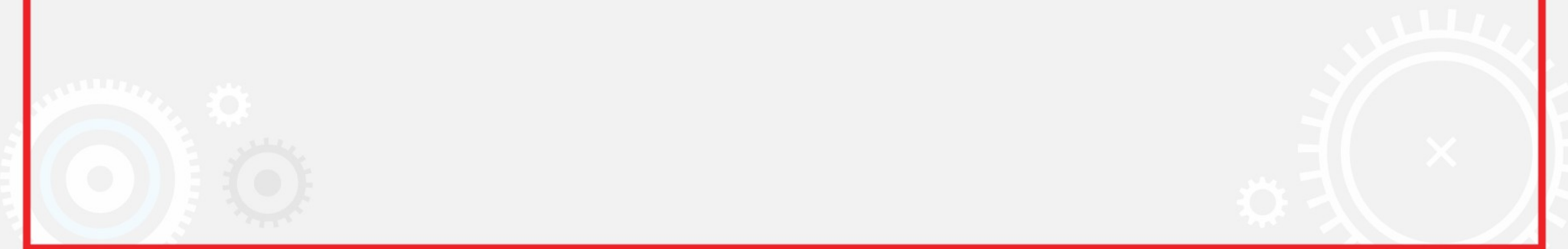
Place a **blue** block under the color recognition module on the platform. The color sorter will **tilt** to the **front** and the blocks will **fall**.

30 Points



CHALLENGE

for : Lesson 6



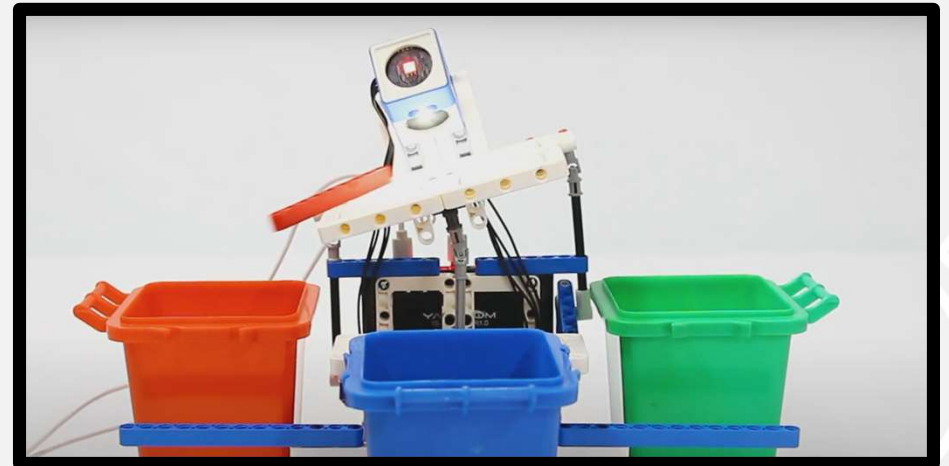
L6 – Challenge 1

Explain about how the color sorter work.

What can this application be used in real life?

Briefly explain how color recognition sensor work.

30 Points

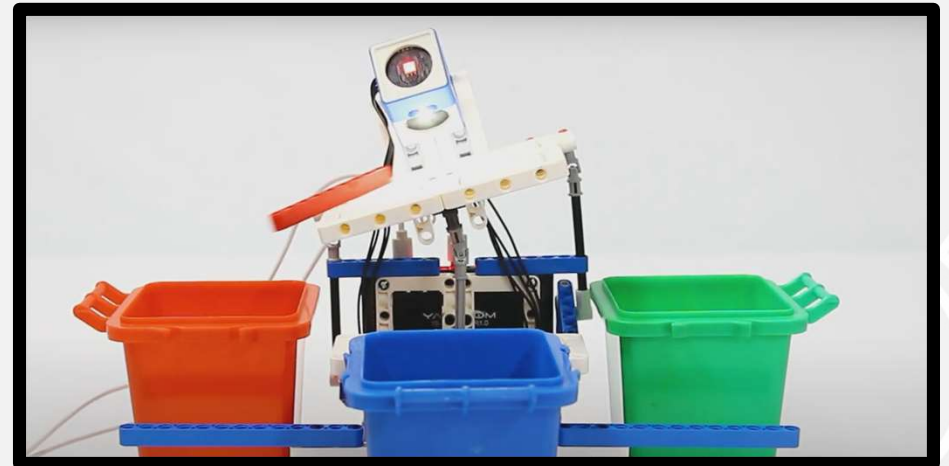


L6 – Challenge 2

Add **rocker** module.
After the program is downloaded successfully.

Using rocker module, **control** the **movement** of the platform to **sort** the blocks

30 Points



L6 – Challenge 3

Color sorter game:

Add **button** module

After the program is downloaded successfully.

Use button **module** as on/off switch

30 Points

